APPENDIX A:

Treaty of 1842 and 1854

TREATY WITH THE CHIPPEWA {1842, Oct. 4}

7 Stat., 591.

Proclamation, Mar. 23, 1843.

Articles of a treaty made and concluded at La Pointe of Lake Superior, in the Territory of Wisconsin, between Robert Stuart commissioner on the part of the United States, and the Chippewa Indians of the Mississippi, and Lake Superior, by their chiefs and headmen.

ARTICLE 1. THE Chippewa Indians of the Mississippi and Lake Superior, cede to the United States all the country within the following bounderies; viz: beginning at the mouth of Chocolate river of Lake Superior; thence northwardly across said lake to intersect the boundery line between the United States and the Province of Canada; thence up said Lake Superior, to the mouth of the St. Louis, or Fond du Lac river (including all the islands in said lake); thence up said river to the American Fur Company's trading post, at the southwardly bend thereof, about 22 miles from its mouth; thence south to intersect the line of the treaty of 29th July 1837, with the Chippewas of the Mississippi; thence along said line to its southeastwardly extremity, near the Plover portage on the Wisconsin river; thence northeastwardly, along the boundery line, between the Chippewas and Menomonees, to its eastern termination, (established by the treaty held with the Chippewas, Menomonees, and Winnebagoes, at Butte des Morts, August 11th 1827) on the Skonawby river of Green Bay; thence northwardly to the source of Chocolate river; thence down said river to its mouth, the place of beginning; it being the intention of the parties to this treaty, to include in this cession, all the Chippewa lands eastwardly of the aforesaid line running from the American Fur Company's trading post on the Fond du Lac river to the intersection of the line of the treaty made with the Chippewas of the Mississippi July 29th 1837.

ARTICLE 2. The Indians stipulate for the right of hunting on the ceded territory, with the other usual privileges of occupancy, until required to remove by the President of the United States, and that the laws of the United [543] States shall be continued in force, in respect to their trade and inter course with the whites, until otherwise ordered by Congress.

ARTICLE 3. It is agreed by the parties to this treaty, that whenever the Indians shall be required to remove from the ceded district, all the unceded lands belonging to the Indians of Fond du Lac, Sandy Lake, and Mississippi bands, shall be the common property and home of all the Indians, party to this treaty.

ARTICLE 4. In consideration of the foregoing cession, the United States, engage to pay to the Chippewa Indians of the Mississippi, and Lake Superior, annually, for twenty-five years, twelve thousand five hundred dollars, in specie, ten thousand five hundred (10,500) dollars in goods, two thousand (2,000) dollars in provisions and tobacco, two thousand (2,000) dollars for the support of two blacksmiths shops, (including pay of smiths and assistants, and iron steel &c.) one thousand (1,000) dollars for pay of two farmers, twelve hundred (1,200) for pay of two carpenters, and two thousand (2,000) dollars for the support of schools for the Indians party to this treaty; and further the United States engage to pay the sum of five thousand (5,000) dollars as an agricultural fund, to be expended under the direction of the Secretary of War. And also the sum of seventy-five thousand (75,000) dollars, shall be allowed for the full satisfaction of their debts within the ceded district, which shall be examined by the commissioner to this treaty, and the amount to be allowed decided upon by him, which shall appear in schedule hereunto annexed. The United States shall pay the amount so allowed within three years.

Whereas the Indians have expressed a strong desire to have some provision made for their half breed relatives, therefore it is agreed, that fifteen thousand (15,000) dollars shall be paid to said Indians, next year, as a present, to be disposed of, as they, together with their agent, shall determine in council.

ARTICLE 5. Whereas the whole country between Lake Superior and the Mississippi, has always been understood as belonging in common to the Chippewas, party to this treaty; and whereas the bands bordering on Lake Superior, have not been allowed to participate in the annuity payments of the treaty made with the Chippewas of the Mississippi, at St. Peters July 29th 1837, and whereas all the unceded lands belonging to the aforesaid Indians, are hereafter to be held in common, therefore, to remove all occasion for jealousy and discontent, it is agreed that all the annuity due by the said treaty, as also the annuity due by the present treaty, shall henceforth be equally divided

among the Chippewas of the Mississippi and Lake Superior, party to this treaty, so that every person shall receive an equal share.

ARTICLE 6. The Indians residing on the Mineral district, shall be subject to removal therefrom at the pleasure of the President of the United States.

ARTICLE 7. This treaty shall be obligatory upon the contracting parties when ratified by the President and Senate of the United States. [544]

In testimony whereof the said Robert Stuart commissioner, on the part of the United States, and the chiefs and headmen of the Chippewa Indians of the Mississippi and Lake Superior, have hereunto set their hands, at La Pointe of Lake Superior, Wisconsin Territory this fourth day of October in the year of our Lord one thousand eight hundred and forty-two.

Robert Stuart, Commissioner.
Jno. Hulbert, Secretary.

Crow wing River,	Po go ne gi shik,	1st	chief-
Do.	Son go com ick,.	2d	do.
Sandy Lake,	Ka non do ur uin zo,	1st	do.
Do.	Na turn e gaw bon,	2d	do.
Gull Lake,	Ua bo jig,	1st	do.
Do.	Pay pe si gon de bay,	2d	do.
Red Ceder Lake,	Kui ui sen shis,	1st	do.
Do.	Ott taw wance,	2d	do.
Poke gom maw,	Bai ie jig,	1st	do.
Do.	Show ne aw,	2d	do.
Wisconsin River,	Ki uen zi,	1st	do.
Do.	Wi aw biske kut te way,	2d	do.
Lac de Flarebeau,	A pish ka go gi,	1st	do.
Do.	May tock cus e quay,	2d	do.
Do.	She maw gon e,	2d	do.
Lake Bands,	Ki ji ua be she shi,	1st	do.
Do.	Ke kon o tum,	2d	do.
Fon du Lac,	Shin goob,	1st	do.
Do.	Na gan nab,	2d	do.
Do.	Mong o zet,	2d	do.
La Pointe,	Gitchi waisky,	1st	do.
Do.	Mi zi,	2d	do.
Do.	Ta qua gone e,	2d	do.
Onlonagan,	O kon di kan,	1st	do.
Do.	Kis ke taw wac,	2d	do.
Ance,	Pena shi,	1st	do.

Do.	Guck we san sish,	2d	do.
Vieux Desert,	Ka she osh e,	1st	do.
Do.	Medge waw gwaw wot,	2d	do.
Mille Lac,	Ne qua ne be,	1st	do.
Do.	Ua abash ko kum,	2d	do.
Do.	No din,	2d	do.
St. Croix,	Be zhi ki,	1st	do.
Do.	Ka bi na be,	2d	do.
Do.	Ai aw bens,	2d	do.
Snake River,	Sha go bi,	1st	do.
Chippewa River,	Ua be she shi,	1st	do.
	Que way zhan sis,	2d	do.
Lac Courtulle,	Ne na nang eb,	1st	do.
Do.	Be bo kon uen,	2d	do.
Do.	Ki uen zi.	2d	do.

In presence of

Henry Blanchford, interpreter.
Samuel Ashmun, interpreter.
Justin Rice.
Charles H. Oakes.
William A. Aitkin.
William Brewster.
Charles M. Borup.
Z. Platt.
C.H. Beaulieau.
L.T. Jamison.
James P. Scott.
Cyrus Mendenhall.
L.M. Warren.

(To the Indian names are subjoined marks.) [545]

Schedule of claims examined and allowed by Robert Stuart, commissioner, under the treaty with the Chippewa Indians of the Mississippi and Lake Superior, concluded at La Pointe, October 4th 1842, setting forth the names of claimants, and their proportion of allowance of the seventy-five thousand dollars provided in the fourth article of the aforesaid treaty, for the full satisfaction of their debts, as follows:

No. of claim	Name of claimant.	Proportion of $75,000, set apart in 4th

article of treaty.

1	Edward.F. Ely	$50.80
2	Z. Platt, esq., attorney for George Berkett	484.67
3	Cleveland North Lake Co	1,485.67
4	Abraham W. Williams	75.03
5	William Brewster This claim to be paid as follows, viz: William Brewster, or order ($1,929.77); Charles W. Borup, or order ($122.90)	2,052.67
6	George Copway	61.67
7	John Kahbege	57.55
8	Alixes Carpantier	28.58
9	John W. Bell	186.16
10	Antoine Picard	6.46
11	Michael Brisette	182.42
12	Francois Dejaddon	301.48
13	Pierre C. Duvernay	1,101.00
14	Jean Bts. Bazinet	325.46
15	John Hotley	69.00
16	Francois Charette	234.92
17	Clement H. Beaulieu agent for the estate of Bazil Beaulieu, dec'd	596.84
18	Francois St. Jean an~t George Bonga	366.84
19	Louis Ladebauche	322.52
20	Peter Crebassa	499.27
21	B. T. Kavanaugh	516.82
22	Augustin Goslin	169.05
23	American Fur Company: This claim to be paid as follows, viz: American Fur Company ($12,565.10); Charles W. Borup ($800.20)	13,365.30
24	William A. Aitken	935.67
25	James P. Scott	73.41
26	Augustin Bellanger	192.35
27	Louis Corbin	12.57
28	Alexes Corbin	596.03
29	George Johnston	35.24
30	Z. Platt, esq., attorney for Sam'l Ashman	1,771.63
81	Z. Platt, esq., attorney for Wm. Johnson	390.27
32	Z. Platt, esq., attorney for estate of Dan'l Dingley	1,991.62
33	Lyman M. Warren	1,566.65
34	Estate of Michael Cadotte, *disallowed*	
35	Z. Platt, esq., attorney for estate of E. Roussain	959.13
36	Joseph Dufault	144.32
37	Z. Platt, esq., attorney for Antoine Mace	170.35
38	Michael Cadotte	205.60

39	Z. Platt, esq., att'y for Francois Gauthier	167.05
40	Z. Platt, esq., att'y for Joseph Gauthier	614.30
41	Z. Platt, esq., attorney for I. B. Uoulle	64.78
42	Jean Bts. Corbin	531.50
43	John Hulbert	209.18
44	Jean Bts. Couvellion	18.80
45	Nicholas Da Couteau, *withdrawn.*	
46	Pierre Cotté	732.50
47	W.H. Brockway and Henry Holt, executors to the estate of John Holliday, dec'd.	3,157.10
48	John Jacob Astor, This claim to be paid as follows, viz: Charles W. Borup ($1,676.90); Z. Platt, esq ($2, 621.80); John Jacob Astor ($23,696 28) $27,994.98	37,994.98
	Z. Platt. esq., attorney for Thos. Connor	1,118.60
	Charles H. Oakes	4,309.21
	Z. Platt, esq., attorney for Wm. Morrison	1,074.70
	Z. Platt, esq., att'y for Isaac Butterfield	1,275.56
	J. B. Van Rensselaer	62.00
	William Brewster and James W. Abbot The parties to this claim request no payment be made to either without their joint consent, or until a decision of the case be had, in a court of justice.	2,067.10
	William Bell	17.62
		$75,000.00

Robert Stuart, Commissioner.
Jno. Hulbert, Secretary.

TREATY WITH THE CHIPPEWA {1854, Sept. 30}

10 Stat., 1109.

Ratified Jan. 10, 1855.

Proclaimed Jan. 29, 1855.

[648]

Articles of a treaty made and concluded at La Pointe, in the State of Wisconsin, between Henry C. Gilbert and David B. Herriman, commissioners on the part of the United States, and the Chippewa Indians of Lake Superior and the Mississippi, by their chiefs and head-men.

ARTICLE 1. The Chippewas of Lake Superior hereby cede to the United States all the lands heretofore owned by them in common with the Chippewas of the Mississippi, lying east of the following boundary-line, to wit: Beginning at a point where the east branch of Snake River crosses the southern boundary-line of the Chippewa country, running thence up the said branch to its source, thence nearly north, in a straight line, to the mouth of East Savannah River, thence up the St. Louis River to the mouth of East Swan River, thence up the East Swan River to its source, thence in a straight line to the most westerly bend of Vermillion River, and thence down the Vermillion River to its mouth.

The Chippewas of the Mississippi hereby assent and agree to the foregoing cession, and consent that the whole amount of the consideration money for the country ceded above, shall be paid to the Chippewas of Lake Superior, and in consideration thereof the Chippewas of Lake Superior hereby relinquish to the Chippewas of the Mississippi, all their interest in and claim to the lands heretofore owned by them in common, lying west of the above boundry-line.

ARTICLE 2. The United States agree to set apart and withhold from sale, for the use of the Chippewas of Lake Superior, the following-described tracts of land, viz:

First. For the L'Anse and Vieux De Sort bands, all the unsold lands in the following townships in the State of Michigan: Township fifty-one north range thirty-three west; township fifty-one north range thirty-two west; the east half of township fifty north range thirty-three west; the

west half of township fifty north range thirty-two west, and all of township fifty-one north range thirty-one west, lying west of Huron Bay.

Second. For the La Pointe band, and such other Indians as may see fit to settle with them, a tract of land bounded as follows: Beginning on the south shore of Lake Superior, a few miles west of Montreal River, at the mouth of a creek called by the Indians Ke-che-se-be-we-she, running thence south to a line drawn east and west through the centre of township forty-seven north, thence west to the west line of said township, thence south to the southeast corner of township forty-six north, range thirty-two west, thence west the width of two townships, thence north the width of two townships, thence west one mile, thence north to the lake shore, and thence along the lake shore, crossing Shag-waw-me-quon Point, to the place of beginning. Also two hundred acres on the northern extremity of Madeline Island, for a fishing ground.

Third. For the other Wisconsin bands, a tract of land lying about Lac De Flambeau, and another tract on Lac Court Orielles, each equal in extent to three townships, the boundaries of which shall be hereafter agreed upon or fixed under the direction of the President.

Fourth. For the Fond Du Lac bands, a tract of land bounded as follows: Beginning at an island in the St. Louis River, above Knife Portage, called by the Indians Paw-paw-sco-me-me-tig, running thence west to the boundary-line heretofore described, thence north along said boundary-line to the mouth of Savannah River, thence down the St. Louis River to the place of beginning. And if said tract shall contain [649] less than one hundred thousand acres, a strip of land shall be added on the south side thereof, large enough to equal such deficiency.

Fifth. For the Grand Portage band, a tract of land bounded as follows: Beginning at a rock a little east of the eastern extremity of Grand Portage Bay, running thence along the lake shore to the mouth of a small stream called by the Indians Maw-ske-gwaw-caw-maw-se-be, or Cranberry Marsh River, thence up said stream, across the point to Pigeon River, thence down Pigeon River to a point opposite the starting-point, and thence across to the place of beginning.

Sixth. The Ontonagon band and that subdivision of the La Pointe band of which Buffalo is chief, may each select, on or near the lake shore, four sections of land, under the direction of the President, the

boundaries of which shall be defined hereafter. And being desirous to provide for some of his connections who have rendered his people important services, it is agreed that the chief Buffalo may select one section of land, at such place in the ceded territory as he may see fit, which shall be reserved for that purpose, and conveyed by the United States to such person or persons as he may direct.

Seventh. Each head of a family, or single person over twenty-one years of age at the present time of the mixed bloods, belonging to the Chippewas of Lake Superior, shall be entitled to eighty acres of land, to be selected by them under the direction of the President, and which shall be secured to them by patent in the usual form.

ARTICLE 3. The United States will define the boundaries of the reserved tracts, whenever it may be necessary, by actual survey, and the President may, from time to time, at his discretion, cause the whole to be surveyed, and may assign to each head of a family or single person over twenty-one years of age, eighty acres of land for his or their separate use; and he may, at his discretion, as fast as the occupants become capable of transacting their own affairs, issue patents therefor to such occupants, with such restrictions of the power of alienation as he may see fit to impose. And he may also, at his discretion, make rules and regulations, respecting the disposition of the lands in case of the death of the head of a family, or single person occupying the same, or in case of its abandonment by them. And he may also assign other lands in exchange for mineral lands, if any such are found in the tracts herein set apart. And he may also make such changes in the boundaries of such reserved tracts or otherwise, as shall be necessary to prevent interference with any vested rights. All necessary roads, highways, and railroads, the lines of which may run through any of the reserved tracts, shall have the right of way through the same, compensation being made therefor as in other cases.

ARTICLE 4. In consideration of and payment for the country hereby ceded, the United States agree to pay to the Chippewas of Lake Superior, annually, for the term of twenty years, the following sums, to wit: five thousand dollars in coin; eight thousand dollars in goods, household furniture and cooking utensils; three thousand dollars in agricultural implements and cattle, carpenter's and other tools and building materials, and three thousand dollars for moral and educational purposes, of which last sum, three hundred dollars per

annum shall be paid to the Grand Portage band, to enable them to maintain a school at their village. The United States will also pay the further sum of ninety thousand dollars, as the chiefs in open council may direct, to enable them to meet their present just engagements. Also the further sum of six thousand dollars, in agricultural implements, household furniture, and cooking utensils, to be distributed at the next annuity payment, among the mixed bloods of said nation. The United States will also furnish two hundred guns, one hundred rifles, five hundred beaver-traps, three hundred dollars' worth of ammunition, [650] and one thousand dollars' worth of ready-made clothing, to be distributed among the young men of the nation, at the next annuity payment.

ARTICLE 5. The United States will also furnish a blacksmith and assistant, with the usual amount of stock, during the continuance of the annuity payments, and as much longer as the President may think proper, at each of the points herein set apart for the residence of the Indians, the same to be in lieu of all the employees to which the Chippewas of Lake Superior may be entitled under previous existing treaties.

ARTICLE 6. The annuities of the Indians shall not be taken to pay the debts of individuals, but satisfaction for depredations committed by them shall be made by them in such manner as the President may direct.

ARTICLE 7. No spirituous liquors shall be made, sold, or used on any of the lands herein set apart for the residence of the Indians, and the sale of the same shall be prohibited in the Territory hereby ceded, until otherwise ordered by the President.

ARTICLE 8. It is agreed, between the Chippewas of Lake Superior and the Chippewas of the Mississippi, that the former shall be entitled to two-thirds, and the latter to one-third, of all benefits to be derived from former treaties existing prior to the year 1847.

ARTICLE 9. The United States agree that an examination shall be made, and all sums that may be found equitably due to the Indians, for arrearages of annuity or other thing, under the provisions of former treaties, shall be paid as the chiefs may direct.

ARTICLE 10. All missionaries, and teachers, and other persons of full age, residing in the territory hereby ceded, or upon any of the reservations hereby made by authority of law, shall be allowed to enter the land occupied by them at the minimum price whenever the surveys

shall be completed to the amount of one quarter-section each.

ARTICLE 11. All annuity payments to the Chippewas of Lake Superior, shall hereafter be made at L'Anse, La Pointe, Grand Portage, and on the St. Louis River; and the Indians shall not be required to remove from the homes hereby set apart for them. And such of them as reside in the territory hereby ceded, shall have the right to hunt and fish therein, until otherwise ordered by the President.

ARTICLE 12. In consideration of the poverty of the Bois Forte Indians who are parties to this treaty, they having never received any annuity payments, and of the great extent of that part of the ceded country owned exclusively by them, the following additional stipulations are made for their benefit. The United States will pay the sum of ten thousand dollars, as their chiefs in open council may direct, to enable them to meet their present just engagements. Also the further sum of ten thousand dollars, in five equal annual payments, in blankets, cloth, nets, guns, ammunition, and such other articles of necessity as they may require.

They shall have the right to select their reservation at any time hereafter, under the direction of the President; and the same may be equal in extent, in proportion to their numbers, to those allowed the other bands, and be subject to the same provisions.

They shall be allowed a blacksmith, and the usual smithshop supplies, and also two persons to instruct them in farming, whenever m the opinion of the President it shall be proper, and for such length of time as he shall direct.

It is understood that all Indians who are parties to this treaty, except the Chippewas of the Mississippi, shall hereafter be known as the Chippewas of Lake Superior. *Provided*, That the stipulation by which the Chippewas of Lake Superior relinquishing their right to land west [651] of the boundary-line shall not apply to the Bois Forte band who are parties to this treaty.

ARTICLE 13. This treaty shall be obligatory on the contracting parties, as soon as the same shall be ratified by the President and Senate of the United States.

In testimony whereof, the said Henry C. Gilbert, and the said David B. Herriman, commissioners as aforesaid, and the undersigned chiefs and headmen of the Chippewas of Lake Superior and the Mississippi, have hereunto set their hands and seals, at the place aforesaid, this

thirtieth day of September, one thousand eight hundred and fifty-four.

Henry C. Gilbert, David B. Herriman, Commissioners.

Richard M. Smith, Secretary.

La Pointe Band:

Ke-che-waish-ke, or the Buffalo, 1st chief, his x mark.
Chay-che-que-oh, 2d chief, his x mark.
A-daw-we-ge-zhick, or Each Side of the sky, 2d chief, his x mark.
O-ske-naw-way, or the Youth, 2d chief, his x mark.
Maw-caw-day-pe-nay-se, or the Black Bird, 2d chief, his x mark.
Naw-waw-naw-quot, headman, his x mark.
Ke-wain-zeence, headman, his x mark.
Waw-baw-ne-me-ke, or the White Thunder, 2d chief, his x mark.
Pay-haw-me-say, or the Soarer, 2d chief, his x mark.
Naw-waw-ge-waw-nose, or the Little Current, 2d chief, his x mark.
Maw-caw-day-waw-quot, or the Black Cloud, 2d chief, his x mark.
Me-she-haw-way, or the Disciple, 2d chief, his x mark.
Key-me-waw-naw-um, headman, his x mark.
She-gog headman, his x mark.

Ontonagon Band:

O-cun-de-cun, or the Buoy 1st chief, his x mark.
Waw-say-ge-zhick, or the Clear Sky, 2d chief, his x mark.
Keesh-ke-taw-wug, headman, his x mark.

L'Anse Band:

David King, 1st chief, his x mark.
John Southwind, headman, his x mark.
Peter Marksman, headman, his x mark.
Naw-taw-me-ge-zhick, or the First Sky, 2d chief, his x mark.
Aw-se-neece, headman, his x mark.

Vieux De Sert Band:

May-dway-aw-she, 1st chief, his x mark.
Posh-quay-gin, or the Leather, 2d chief, his x mark.

Grand Portage Band:

Shaw-gaw-naw-sheence, or the Little Englishman, 1st chief, his x mark.
May-mosh-caw-wosh, headman, his x mark.
Aw-de-konse, or the Little Reindeer, 2d chief, his x mark.
Way-we-ge-wam, headman, his x mark.

Fond Du Lac Band:

Shing-goope, or the Balsom, 1st chief, his x mark.
Mawn-go-sit, or the Loon's Foot, 2d chief, his x mark.
May-quaw-me-we-ge-zhick, headman, his x mark.
Keesh-kawk, headman, his x mark.
Caw-taw-waw-be-day, headman, his x mark.
O-saw-gee, headman, his x mark.
Ke-che-aw-ke-wain-ze, headman, his x mark.
Naw-gaw-nub, or the Foremost Sitter, 2d chief, his x mark.

Ain-ne-maw-sung, 2d chief, his x mark.
Naw-aw-bun-way, headman, his x mark.
Wain-ge-maw-tub, headman, his x mark.
Aw-ke-wain-zeenee, headman, his x mark.
Shay-way-be-nay-se, headman, his x mark.
Paw-pc-oh, headman, his x mark.

Lac Court Oreille Band:

Aw-ke-wain-ze, or the Old Man, 1st chief, his x mark.
Key-no-zhance, or the Little Jack Fish, 1st chief, his x mark.
Key-che-pe-nay-se, or the Big Bird, 2d chief, his x mark.
Ke-che-waw-be-shay-she, or the Big Martin, 2d chief, his x mark.
Waw-be-shay-sheence, headman, his x mark.
Quay-quay-cub, headman, his x mark.
Shaw-waw-no-me-tay, headman, his x mark.
Nay-naw-ong-gay-be, or the Dressing Bird, 1st chief, his x mark.
O-zhaw-waw-sco-ge-zhick, or the Blue Sky, 2d chief, his x mark.
I-yaw-banse, or the Little Buck, 2d chief, his x mark. [652]
Ke-che-e-nin-ne, headman, his x mark.
Haw-daw-gaw-me, headman, his x mark.
Way-me-re-go-she, headman, his x mark.
Pay-me-ge-wung, headman, his x mark.

Lac Du Flambeau Band:

Aw-mo-se, or the Wasp, 1st chief, his x mark.
Ke-nish-te-no, 2d chief, his x mark.
Me-gee-see, or the Eagle, 2d chief, his x mark.
Kay-kay-co-gwaw-nay-aw-she, headman, his x mark.
O-che-chog, headman, his x mark.
Nay-she-kay-gwaw-nay-be, headman, his x mark.
O-seaw-bay-wis, or the Waiter, 1st chief, his x mark.
Que-we-zance, or the White Fish, 2d chief, his x mark.
Ne-gig, or the Otter, 2d chief, his x mark.
Nay-waw-che-ge-ghick-may-be, headman, his x mark.
Quay-quay-ke-cah, headman, his x mark.

Bois Forte Band:

Kay-baish-caw-daw-way, or Clear
Round the Prairie, 1st chief, his x mark.
Way-zaw-we-ge-zhick-way-sking, headman, his x mark.
O-saw-we-pc-nay-she, headman, his x mark.

The Mississippi Bands:

Que-we-san-se, or Hole in the Day, head chief, his x mark.
Caw-nawn-daw-waw-win-zo, or the Berry Hunter, 1st chief, his x mark.
Waw-bow-jieg, or the White Fisher, 2d chief, his x mark.
Ot-taw-waw, 2d chief, his x mark.
Que-we-zhan-cis, or the Bad Boy, 2d chief, his x mark.
Bye-a-jick, or the Lone Man, 2d chief, his x mark.

I-yaw-shaw-way-ge-zhick, or the Crossing Sky, 2d chief, his x mark.
Maw-caw-day, or the Bear's Heart, 2d chief, his x mark.
Ke-way-de-no-go-nay-be, or the Northern Feather, 2d chief, his x mark.
Me-squaw-dace, headman, his x mark.
Naw-gaw-ne-gaw-bo, headman, his x mark.
Wawm-be-de-yea, headman, his x mark.
Waish-key, headman, his x mark.
Caw-way-caw-me-ge-skung, headman, his x mark.
My-yaw-ge-way-we-dunk, or the One who carries the Voice, 2d chief, his x mark.

John F. Godfroy,
Geo. Johnston,
S. A. Marvin,
Louis Codot,
Interpreters.
Paul H. Beaulieu,
Henry Blatchford,
Peter Floy, Interpreters.

Executed in the presence of

Henry M. Rice,
J. W. Lynde,
G. D. Williams,
B. H. Connor,
E. W. Muldough,
Richard Godfroy,
D. S. Cash,
H. H. McCullough,
E. Smith Lee,
Wm. E. Vantassel,
L. H. Wheeler.

APPENDIX B:

L'Anse Reservation Legal Description and Maps

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

May 15, 2000

Ms. Carolyn Garcia
Water Quality Specialist
Keweenaw Bay Indian Community
107 Beartown Rd.
Baraga, MI 49908

RE: Legal Description of L'Anse Indian Reservation

Dear Carolyn:

As per your request, the following is the legal description of the L'Anse Indian Reservation as per Article 2 of the Treaty with the Chippewa, 1854:

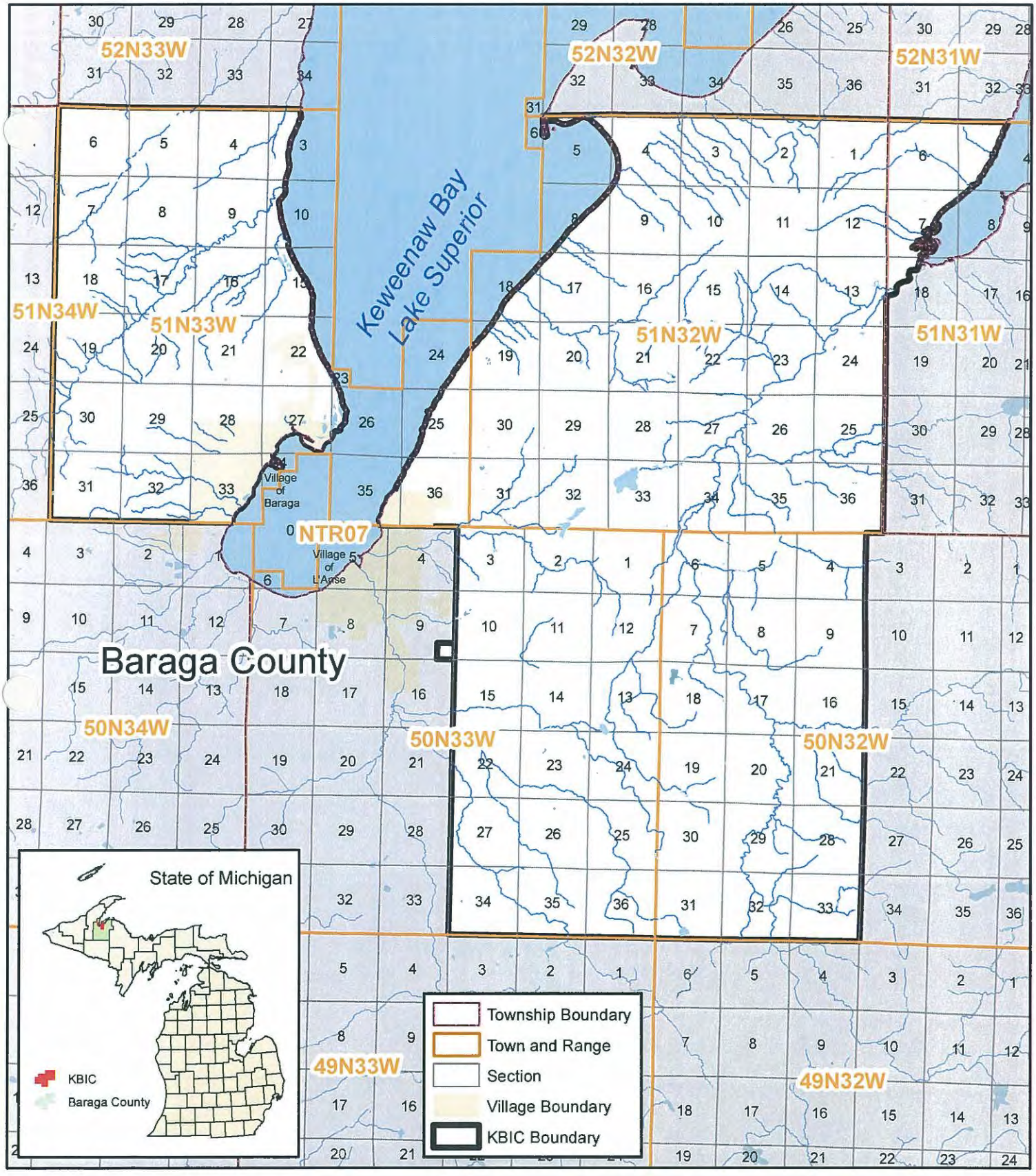
"...in the State of Michigan: Township fifty-one north range thirty-three west; township fifty-one north range thirty-two west; the east half of township fifty north range thirty-three west; the west half of township fifty north range thirty-two west, and all of township fifty-one north range thirty-one west, lying west of Huron Bay."

If you need further information please do not hesitate to let me know.

Sincerely,

Jason A. Ayres
Real Estate Director, KBIC

cc: c:\MyFiles\Treaties\Lanse Reservation Legal Desc.wpd



Keweenaw Bay Indian Community

Baraga County, Michigan

0 0.5 1 2
Miles

Keweenaw Bay Indian Community
L'Anse Reservation Boundary

Cartographer: Micah Petoskey

APPENDIX C:

Federal Register, Department of Interior, Bureau of Indian Affairs, Indian Entities Recognized and Eligible to Receive Services from the United States Bureau of Indian Affairs
(FR 2010-24640)

Dated: August 5, 2010.

Mark J. Musaus,

Acting Regional Director.

[FR Doc. 2010–24668 Filed 9–30–10; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Indian Entities Recognized and Eligible To Receive Services From the United States Bureau of Indian Affairs

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice.

SUMMARY: This notice publishes the current list of 564 tribal entities recognized and eligible for funding and services from the Bureau of Indian Affairs by virtue of their status as Indian tribes. The list is updated from the notice published on August 11, 2009 (74 FR 40218).

FOR FURTHER INFORMATION CONTACT: Elizabeth Colliflower, Bureau of Indian Affairs, Division of Tribal Government Services, Mail Stop 4513–MIB, 1849 C Street, NW., Washington, DC 20240. Telephone number: (202) 513–7641.

SUPPLEMENTARY INFORMATION: This notice is published pursuant to Section 104 of the Act of November 2, 1994 (Pub. L. 103–454; 108 Stat. 4791, 4792), and in exercise of autbority delegated to the Assistant Secretary—Indian Affairs under 25 U.S.C. 2 and 9 and 209 DM 8.

Published below is a list of federally acknowledged tribes in the contiguons 48 states and in Alaska.

Amendments to the list include name changes and name corrections. To aid in identifying tribal name changes, the tribe's former name is included with the new tribal name. To aid in identifying corrections, the tribe's previously listed name is included with the tribal name. We will continue to list the tribe's former or previously listed name for several years before dropping the former or previously listed name from the list.

The listed entities are acknowledged to have the immunities and privileges available to other federally acknowledged Indian tribes hy virtue of their government-to-government relationship with the United States as well as the responsibilities, powers, limitations and obligations of such tribes. We have continued the practice of listing the Alaska Native entities separately solely for the purpose of facilitating identification of them and reference to them given the large number of complex Native names.

Dated: September 22, 2010.

Larry Echo Hawk,

Assistant Secretary—Indian Affairs.

Indian Tribal Entities Within the Contiguous 48 States Recognized and Eligible To Receive Services From the United States Bureau of Indian Affairs

Absentee-Shawnee Tribe of Indians of Oklahoma
Agua Caliente Band of Cahuilla Indians of the Agua Caliente Indian Reservation, California
Ak Chin Indian Community of the Maricopa (Ak Chin) Indian Reservation, Arizona
Alabama-Coushatta Tribes of Texas
Alabama-Quassarte Tribal Town, Oklahoma
Alturas Indian Rancheria, California
Apache Tribe of Oklahoma
Arapahoe Tribe of the Wind River Reservation, Wyoming
Aroostook Band of Micmac Indians of Maine
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana
Augustine Band of Cahuilla Indians, California (formerly the Augustine Band of Cahuilla Mission Indians of the Augustine Reservation)
Bad River Band of the Lake Superior Tribe of Chippewa Indians of the Bad River Reservation, Wisconsin
Bay Mills Indian Community, Michigan
Bear River Band of the Rohnerville Rancheria, California
Berry Creek Rancheria of Maidu Indians of California
Big Lagoon Rancheria, California
Big Pine Band of Owens Valley Paiute Shoshone Indians of the Big Pine Reservation, California
Big Sandy Rancheria of Mono Indians of California
Big Valley Band of Pomo Indians of the Big Valley Rancheria, California
Blackfeet Tribe of the Blackfeet Indian Reservation of Montana
Blue Lake Rancheria, California
Bridgeport Paiute Indian Colony of California
Buena Vista Rancheria of Me-Wuk Indians of California
Burns Paiute Tribe of the Burns Paiute Indian Colony of Oregon
Cabazon Band of Mission Indians, California
Cachil DeHe Band of Wintun Indians of the Colusa Indian Community of the Colusa Rancheria, California
Caddo Nation of Oklahoma
Cahuilla Band of Mission Indians of the Cahuilla Reservation, California
Cahto Indian Tribe of the Laytonville Rancheria, California
California Valley Miwok Tribe, California
Campo Band of Diegueno Mission Indians of the Campo Indian Reservation, California
Capitan Grande Band of Diegueno Mission Indians of California:
Barona Group of Capitan Grande Band of Mission Indians of the Barona Reservation, California
Viejas (Baron Long) Group of Capitan Grande Band of Mission Indians of the Viejas Reservation, California
Catawba Indian Nation (aka Catawba Tribe of South Carolina)
Cayuga Nation of New York
Cedarville Rancheria, California
Chemehuevi Indian Tribe of the Chemehuevi Reservation, California
Cher-Ae Heights Indian Community of the Trinidad Rancheria, California
Cherokee Nation, Oklahoma
Cheyenne and Arapaho Tribes, Oklahoma (formerly the Cheyenne-Arapaho Tribes of Oklahoma)
Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
Chickasaw Nation, Oklahoma
Chicken Ranch Rancheria of Me-Wuk Indians of California
Chippewa-Cree Indians of the Rocky Boy's Reservation, Montana
Chitimacha Tribe of Louisiana
Choctaw Nation of Oklahoma
Citizen Potawatomi Nation, Oklahoma
Cloverdale Rancheria of Pomo Indians of California
Cocopah Tribe of Arizona
Coeur D'Alene Tribe of the Coeur D'Alene Reservation, Idaho
Cold Springs Rancheria of Mono Indians of California
Colorado River Indian Tribes of the Colorado River Indian Reservation, Arizona and California
Comanche Nation, Oklahoma
Confederated Salish & Kootenai Tribes of the Flathead Reservation, Montana
Confederated Tribes of the Chehalis Reservation, Washington
Confederated Tribes of the Colville Reservation, Washington
Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians of Oregon
Confederated Tribes of the Goshute Reservation, Nevada and Utah
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of Siletz Indians of Oregon (previously listed as the Confederated Tribes of the Siletz Reservation)
Confederated Tribes of the Umatilla Reservation, Oregon
Confederated Tribes of the Warm Springs Reservation of Oregon
Confederated Tribes and Bands of the Yakama Nation, Washington
Coquille Tribe of Oregon
Cortina Indian Rancheria of Wintun Indians of California
Coushatta Tribe of Louisiana

Cow Creek Band of Umpqua Indians of Oregon
Cowlitz Indian Tribe, Washington
Coyote Valley Band of Pomo Indians of California
Crow Tribe of Montana
Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota
Death Valley Timbi-Sha Shoshone Band of California
Delaware Nation, Oklahoma
Delaware Tribe of Indians, Oklahoma
Dry Creek Rancheria of Pomo Indians of California
Duckwater Shoshone Tribe of the Duckwater Reservation, Nevada
Eastern Band of Cherokee Indians of North Carolina
Eastern Shawnee Tribe of Oklahoma
Elem Indian Colony of Pomo Indians of the Sulphur Bank Rancheria, California
Elk Valley Rancheria, California
Ely Shoshone Tribe of Nevada
Enterprise Rancheria of Maidu Indians of California
Ewiiaapaayp Band of Kumeyaay Indians, California
Federated Indians of Graton Rancheria, California
Flandreau Santee Sioux Tribe of South Dakota
Forest County Potawatomi Community, Wisconsin
Fort Belknap Indian Community of the Fort Belknap Reservation of Montana
Fort Bidwell Indian Community of the Fort Bidwell Reservation of California
Fort Independence Indian Community of Paiute Indians of the Fort Independence Reservation, California
Fort McDermitt Paiute and Shoshone Tribes of the Fort McDermitt Indian Reservation, Nevada and Oregon
Fort McDowell Yavapai Nation, Arizona
Fort Mojave Indian Tribe of Arizona, California & Nevada
Fort Sill Apache Tribe of Oklahoma
Gila River Indian Community of the Gila River Indian Reservation, Arizona
Grand Traverse Band of Ottawa and Chippewa Indians, Michigan
Greenville Rancheria of Maidu Indians of California
Grindstone Indian Rancheria of Wintun-Wailaki Indians of California
Guidiville Rancheria of California
Habematolel Pomo of Upper Lake, California
Hannahville Indian Community, Michigan
Havasupai Tribe of the Havasupai Reservation, Arizona
Ho-Chunk Nation of Wisconsin
Hoh Indian Tribe of the Hoh Indian Reservation, Washington
Hoopa Valley Tribe, California
Hopi Tribe of Arizona
Hopland Band of Pomo Indians of the Hopland Rancheria, California
Houlton Band of Maliseet Indians of Maine
Hualapai Indian Tribe of the Hualapai Indian Reservation, Arizona
Iipay Nation of Santa Ysabel, California (formerly the Santa Ysabel Band of Diegueno Mission Indians of the Santa Ysabel Reservation)
Inaja Band of Diegueno Mission Indians of the Inaja and Cosmit Reservation, California
Ione Band of Miwok Indians of California
Iowa Tribe of Kansas and Nebraska
Iowa Tribe of Oklahoma
Jackson Rancheria of Me-Wuk Indians of California
Jamestown S'Klallam Tribe of Washington
Jamul Indian Village of California
Jena Band of Choctaw Indians, Louisiana
Jicarilla Apache Nation, New Mexico
Kaibah Band of Paiute Indians of the Kaibab Indian Reservation, Arizona
Kalispel Indian Community of the Kalispel Reservation, Washington
Karuk Tribe (formerly the Karuk Tribe of California)
Kasbia Band of Pomo Indians of the Stewarts Point Rancheria, California
Kaw Nation, Oklahoma
Kewa Pueblo, New Mexico (formerly the Pueblo of Santo Domingo)
Keweenaw Bay Indian Community, Michigan
Kialegee Tribal Town, Oklahoma
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas
Kickapoo Tribe of Oklahoma
Kickapoo Traditional Tribe of Texas
Kiowa Indian Tribe of Oklahoma
Klamath Tribes, Oregon
Kootenai Tribe of Idaho
La Jolla Band of Luiseno Indians, California (formerly the La Jolla Band of Luiseno Mission Indians of the La Jolla Reservation)
La Posta Band of Diegueno Mission Indians of the La Posta Indian Reservation, California
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
Lac du Flambeau Band of Lake Superior Chippewa Indians of the Lac du Flambeau Reservation of Wisconsin
Lac Vieux Desert Band of Lake Superior Chippewa Indians, Michigan
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Nevada
Little River Band of Ottawa Indians, Michigan
Little Traverse Bay Bands of Odawa Indians, Michigan
Lower Lake Rancheria, California
Los Coyotes Band of Cahuilla and Cupeno Indians, California (formerly the Los Coyotes Band of Cahuilla & Cupeno Indians of the Los Coyotes Reservation)
Lovelock Paiute Tribe of the Lovelock Indian Colony, Nevada
Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
Lower Elwha Tribal Community of the Lower Elwha Reservation, Washington
Lower Sioux Indian Community in the State of Minnesota
Lummi Tribe of the Lummi Reservation, Washington
Lytton Rancheria of California
Makah Indian Tribe of the Makah Indian Reservation, Washington
Manchester Band of Pomo Indians of the Manchester-Point Arena Rancheria, California
Manzanita Band of Diegueno Mission Indians of the Manzanita Reservation, California
Mashantucket Pequot Tribe of Connecticut
Mashpee Wampanoag Tribe, Massachusetts
Match-e-be-nash-she-wish Band of Pottawatomi Indians of Michigan
Mechoopda Indian Tribe of Chico Rancheria, California
Menominee Indian Tribe of Wisconsin
Mesa Grande Band of Diegueno Mission Indians of the Mesa Grande Reservation, California
Mescalero Apache Tribe of the Mescalero Reservation, New Mexico
Miami Tribe of Oklahoma
Miccosukee Tribe of Indians of Florida
Middletown Rancheria of Pomo Indians of California
Minnesota Chippewa Tribe, Minnesota (Six component reservations:
Bois Forte Band (Nett Lake); Fond du Lac Band; Grand Portage Band; Leech Lake Band; Mille Lacs Band; White Earth Band)
Mississippi Band of Choctaw Indians, Mississippi
Moapa Band of Paiute Indians of the Moapa River Indian Reservation, Nevada
Modoc Tribe of Oklahoma
Mohegan Indian Tribe of Connecticnt
Mooretown Rancheria of Maidu Indians of California
Morongo Band of Mission Indians, California (formerly the Morongo Band of Cahuilla Mission Indians of the Morongo Reservation)
Muckleshoot Indian Tribe of the Muckleshoot Reservation, Washington
Muscogee (Creek) Nation, Oklaboma
Narragansett Indian Tribe of Rhode Island

Navajo Nation, Arizona, New Mexico & Utah
Nez Perce Tribe, Idaho (previously listed as Nez Perce Tribe of Idaho)
Nisqually Indian Tribe of the Nisqually Reservation, Washington
Nooksack Indian Tribe of Washington
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana
Northfork Rancheria of Mono Indians of California
Northwestern Band of Shoshoni Nation of Utah (Washakie)
Nottawaseppi Huron Band of the Potawatomi, Michigan (formerly the Huron Potawatomi, Inc.)
Oglala Sioux Tribe of the Pine Ridge Reservation, South Dakota
Ohkay Owingeh, New Mexico (formerly the Pueblo of San Juan)
Omaha Tribe of Nebraska
Oneida Nation of New York
Oneida Tribe of Indians of Wisconsin
Onondaga Nation of New York
Osage Nation, Oklahoma (formerly the Osage Tribe)
Ottawa Tribe of Oklahoma
Otoe-Missouria Tribe of Indians, Oklahoma
Paiute Indian Tribe of Utah (Cedar Band of Paiutes, Kanosh Band of Paiutes, Koosharem Band of Paiutes, Indian Peaks Band of Paiutes, and Shivwits Band of Paiutes) (formerly Paiute Indian Tribe of Utah (Cedar City Band of Paiutes, Kanosh Band of Paiutes, Koosharem Band of Paiutes, Indian Peaks Band of Paiutes, and Shivwits Band of Paiutes))
Paiute-Shoshone Indians of the Bishop Community of the Bishop Colony, California
Paiute-Shoshone Tribe of the Fallon Reservation and Colony, Nevada
Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California
Pala Band of Luiseno Mission Indians of the Pala Reservation, California
Pascua Yaqui Tribe of Arizona
Paskenta Band of Nomlaki Indians of California
Passamaquoddy Tribe of Maine
Pauma Band of Luiseno Mission Indians of the Pauma & Yuima Reservation, California
Pawnee Nation of Oklahoma
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, California
Penobscot Tribe of Maine
Peoria Tribe of Indians of Oklahoma
Picayune Rancheria of Chukchansi Indians of California
Pinoleville Pomo Nation, California (formerly the Pinoleville Rancheria of Pomo Indians of California)
Pit River Tribe, California (includes XL Ranch, Big Bend, Likely, Lookout, Montgomery Creek and Roaring Creek Rancherias)
Poarch Band of Creek Indians of Alabama
Pokagon Band of Potawatomi Indians, Michigan and Indiana
Ponca Tribe of Indians of Oklahoma
Ponca Tribe of Nebraska
Port Gamble Indian Community of the Port Gamble Reservation, Washington
Potter Valley Tribe, California
Prairie Band of Potawatomi Nation, Kansas
Prairie Island Indian Community in the State of Minnesota
Puehlo of Acoma, New Mexico
Pueblo of Cochiti, New Mexico
Pueblo of Jemez, New Mexico
Pueblo of Isleta, New Mexico
Pneblo of Laguna, New Mexico
Pueblo of Nambe, New Mexico
Pueblo of Picuris, New Mexico
Pueblo of Pojoaque, New Mexico
Pueblo of San Felipe, New Mexico
Pueblo of San Ildefonso, New Mexico
Pueblo of Sandia, New Mexico
Pueblo of Santa Ana, New Mexico
Pueblo of Santa Clara, New Mexico
Pueblo of Taos, New Mexico
Pueblo of Tesuque, New Mexico
Pueblo of Zia, New Mexico
Puyallup Tribe of the Puyallup Reservation, Washington
Pyramid Lake Paiute Tribe of the Pyramid Lake Reservation, Nevada
Quapaw Tribe of Indians, Oklahoma
Quartz Valley Indian Community of the Quartz Valley Reservation of California
Quechan Tribe of the Fort Yuma Indian Reservation, California & Arizona
Quileute Tribe of the Quileute Reservation, Washington
Quinault Tribe of the Quinault Reservation, Washington
Ramona Band of Cahuilla, California (formerly the Ramona Band or Village of Cahuilla Mission Indians of California)
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
Red Lake Band of Chippewa Indians, Minnesota
Redding Rancheria, California
Redwood Valley Rancheria of Pomo Indians of California
Reno-Sparks Indian Colony, Nevada
Resighini Rancheria, California
Rincon Band of Luiseno Mission Indians of the Rincon Reservation, California
Robinson Rancheria of Pomo Indians of California
Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota
Round Valley Indian Tribes of the Round Valley Reservation, California
Sac & Fox Tribe of the Mississippi in Iowa
Sac & Fox Nation of Missouri in Kansas and Nebraska
Sac & Fox Nation, Oklahoma
Saginaw Chippewa Indian Tribe of Michigan
St. Croix Chippewa Indians of Wisconsin
Saint Regis Mohawk Tribe, New York (formerly the St. Regis Band of Mohawk Indians of New York)
Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona
Samish Indian Tribe, Washington
San Carlos Apache Tribe of the San Carlos Reservation, Arizona
San Juan Southern Paiute Tribe of Arizona
San Manuel Band of Mission Indians, California (previously listed as the San Manual Band of Serrano Mission Indians of the San Manual Reservation)
San Pasqual Band of Diegueno Mission Indians of California
Santa Rosa Indian Community of the Santa Rosa Rancheria, California
Santa Rosa Band of Cahuilla Indians, California (formerly the Santa Rosa Band of Cahuilla Mission Indians of the Santa Rosa Reservation)
Santa Ynez Band of Chumash Mission Indians of the Santa Ynez Reservation, California
Santee Sioux Nation, Nebraska
Sauk-Suiattle Indian Tribe of Washington
Sault Ste. Marie Tribe of Chippewa Indians of Michigan
Scotts Valley Band of Pomo Indians of California
Seminole Nation of Oklahoma
Seminole Tribe of Florida (Dania, Big Cypress, Brighton, Hollywood & Tampa Reservations)
Seneca Nation of New York
Seneca-Cayuga Tribe of Oklahoma
Shakopee Mdewakanton Sioux Community of Minnesota
Shawnee Tribe, Oklahoma
Sherwood Valley Rancheria of Pomo Indians of California
Shingle Springs Band of Miwok Indians, Shingle Springs Rancheria (Verona Tract), California
Shoalwater Bay Tribe of the Shoalwater Bay Indian Reservation, Washingtou
Shoshone Tribe of the Wind River Reservation, Wyoming
Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho
Shoshone-Paiute Tribes of the Duck Valley Reservation, Nevada
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, South Dakota
Skokomish Indian Tribe of the Skokomish Reservation, Washington

Skull Valley Band of Goshute Indians of Utah
Smith River Rancheria, California
Snoqualmie Tribe, Washington
Soboba Band of Luiseno Indians, California
Sokaogon Chippewa Community, Wisconsin
Southern Ute Indian Tribe of the Southern Ute Reservation, Colorado
Spirit Lake Tribe, North Dakota
Spokane Tribe of the Spokane Reservation, Washington
Squaxin Island Tribe of the Squaxin Island Reservation, Washington
Standing Rock Sioux Tribe of North & South Dakota
Stockbridge Munsee Community, Wisconsin
Stillaguamish Tribe of Washington
Summit Lake Paiute Tribe of Nevada
Suquamish Indian Tribe of the Port Madison Reservation, Washington
Susanville Indian Rancheria, California
Swinomish Indians of the Swinomish Reservation, Washington
Sycnan Band of the Kumeyaay Nation
Table Mountain Rancheria of California
Te-Moak Tribe of Western Shoshone Indians of Nevada (Four constituent bands: Battle Mountain Band; Elko Band; South Fork Band and Wells Band)
Thlopthlocco Tribal Town, Oklahoma
Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota
Tohono O'odham Nation of Arizona
Tonawanda Band of Seneca Indians of New York
Tonkawa Tribe of Indians of Oklahoma
Tonto Apache Tribe of Arizona
Torres Martinez Desert Cahuilla Indians, California (formerly the Torres-Martinez Band of Cahuilla Mission Indians of California)
Tule River Indian Tribe of the Tule River Reservation, California
Tulalip Tribes of the Tulalip Reservation, Washington
Tunica-Biloxi Indian Tribe of Louisiana
Tuolumne Band of Me-Wuk Indians of the Tuolumne Rancheria of California
Turtle Mountain Band of Chippewa Indiaus of North Dakota
Tuscarora Nation of New York
Twenty-Nine Palms Band of Mission Indians of California
United Auburn Indian Community of the Auburn Rancheria of California
United Keetoowah Band of Cherokee Indians in Oklahoma
Upper Sioux Community, Minnesota
Upper Skagit Indian Tribe of Washington
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah
Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah
Utu Utu Gwaitu Paiute Tribe of the Benton Paiute Reservation, California
Walker River Paiute Tribe of the Walker River Reservation, Nevada
Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts
Washoe Tribe of Nevada & California (Carson Colony, Dresslerville Colony, Woodfords Community, Stewart Community, & Washoe Ranches)
White Mountain Apache Tribe of the Fort Apache Reservation, Arizona
Wichita and Affiliated Tribes (Wichita, Keechi, Waco & Tawakonie), Oklahoma
Wilton Rancheria, California
Winnebago Tribe of Nebraska
Winnemucca Indian Colony of Nevada
Wiyot Tribe, California (formerly the Table Bluff Reservation—Wiyot Tribe)
Wyandotte Nation, Oklahoma
Yankton Sioux Tribe of South Dakota
Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona
Yavapai-Prescott Tribe of the Yavapai Reservation, Arizona
Yerington Paiute Tribe of the Yerington Colony & Campbell Ranch, Nevada
Yocha Dehe Wintun Nation, California (formerly the Rumsey Indian Rancheria of Wintun Indians of California)
Yomba Shoshone Tribe of the Yomba Reservation, Nevada
Ysleta Del Sur Pueblo of Texas
Yurok Tribe of the Yurok Reservation, California
Zuni Tribe of the Zuni Reservation, New Mexico

Native Entities Within the State of Alaska Recognized and Eligible To Receive Services From the United States Bureau of Indian Affairs

Native Village of Afognak
Agdaagux Tribe of King Cove
Native Village of Akhiok
Akiachak Native Community
Akiak Native Community
Native Village of Akutan
Village of Alakanuk
Alatna Village
Native Village of Aleknagik
Algaaciq Native Village (St. Mary's)
Allakaket Village
Native Village of Ambler
Village of Anaktuvuk Pass
Yupiit of Andreafski
Angoon Community Association
Village of Aniak
Anvik Village
Arctic Village (See Native Village of Venetie Tribal Government)
Asa'carsarmiut Tribe
Native Village of Atka
Village of Atmautluak
Atqasuk Village (Atkasook)
Native Village of Barrow Inupiat Traditional Government
Beaver Village
Native Village of Belkofski
Village of Bill Moore's Slough
Birch Creek Tribe
Native Village of Brevig Mission
Native Village of Buckland
Native Village of Cantwell
Native Village of Chenega (aka Chanega)
Chalkyitsik Village
Cheesh-Na Tribe (formerly the Native Village of Chistochina)
Village of Chefornak
Chevak Native Village
Chickaloon Native Village
Chignik Bay Tribal Council (formerly the Native Village of Chignik)
Native Village of Chignik Lagoon
Chignik Lake Village
Chilkat Indian Village (Klukwan)
Chilkoot Indian Association (Haines)
Chinik Eskimo Community (Golovin)
Native Village of Chitina
Native Village of Chuathbaluk (Russian Mission, Kuskokwim)
Chuloonawick Native Village
Circle Native Community
Village of Clarks Point
Native Village of Council
Craig Community Association
Village of Crooked Creek
Curyung Tribal Council
Native Village of Deering
Native Village of Diomede (aka Inalik)
Village of Dot Lake
Douglas Indian Association
Native Village of Eagle
Native Village of Eek
Egegik Village
Eklutna Native Village
Native Village of Ekuk
Ekwok Village
Native Village of Elim
Emmonak Village
Evansville Village (aka Bettles Field)
Native Village of Eyak (Cordova)
Native Village of False Pass
Native Village of Fort Yukon
Native Village of Gakona
Galena Village (aka Louden Village)
Native Village of Gambell
Native Village of Georgetown
Native Village of Goodnews Bay
Organized Village of Grayling (aka Holikachuk)
Gulkana Village
Native Village of Hamilton
Healy Lake Village
Holy Cross Village
Hoonah Indian Association
Native Village of Hooper Bay
Hughes Village
Huslia Village
Hydaburg Cooperative Association
Igiugig Village
Village of Iliamna
Inupiat Community of the Arctic Slope

Iqurmuit Traditional Council
Ivanoff Bay Village
Kaguyak Village
Organized Village of Kake
Kaktovik Village (aka Barter Island)
Village of Kalskag
Village of Kaltag
Native Village of Kanatak
Native Village of Karluk
Organized Village of Kasaan
Kasigluk Traditional Elders Council
Kenaitze Indian Tribe
Ketchikan Indian Corporation
Native Village of Kiana
King Island Native Community
King Salmon Tribe
Native Village of Kipnuk
Native Village of Kivalina
Klawock Cooperative Association
Native Village of Kluti Kaah (aka Copper Center)
Knik Tribe
Native Village of Kobuk
Kokhanok Village
Native Village of Kongiganak
Village of Kotlik
Native Village of Kotzebue
Native Village of Koyuk
Koyukuk Native Village
Organized Village of Kwethluk
Native Village of Kwigillingok
Native Village of Kwinhagak (aka Quinhagak)
Native Village of Larsen Bay
Levelock Village
Lime Village
Village of Lower Kalskag
Manley Hot Springs Village
Manokotak Village
Native Village of Marshall (aka Fortuna Ledge)
Native Village of Mary's Igloo
McGrath Native Village
Native Village of Mekoryuk
Mentasta Traditional Council
Metlakatla Indian Community, Annette Island Reserve
Native Village of Minto
Naknek Native Village
Native Village of Nanwalek (aka English Bay)
Native Village of Napaimute
Native Village of Napakiak
Native Village of Napaskiak
Native Village of Nelson Lagoon
Nenana Native Association
New Koliganek Village Council
New Stuyahok Village
Newhalen Village
Newtok Village
Native Village of Nightmute
Nikolai Village
Native Village of Nikolski
Ninilchik Village
Native Village of Noatak
Nome Eskimo Community
Nondalton Village
Noorvik Native Community
Northway Village
Native Village of Nuiqsut (aka Nooiksut)
Nulato Village
Nunakauyarmiut Tribe
Native Village of Nunam Iqua (formerly the Native Village of Sheldon's Point)
Native Village of Nunapitchuk
Village of Ohogamiut
Village of Old Harbor
Orutsararmuit Native Village (aka Bethel)
Oscarville Traditional Village
Native Village of Ouzinkie
Native Village of Paimiut
Pauloff Harbor Village
Pedro Bay Village
Native Village of Perryville
Petersburg Indian Association
Native Village of Pilot Point
Pilot Station Traditional Village
Native Village of Pitka's Point
Platinum Traditional Village
Native Village of Point Hope
Native Village of Point Lay
Native Village of Port Graham
Native Village of Port Heiden
Native Village of Port Lions
Portage Creek Village (aka Ohgsenakale)
Pribilof Islands Aleut Communities of St. Paul & St. George Islands
Qagan Tayagungin Tribe of Sand Point Village
Qawalangin Tribe of Unalaska
Rampart Village
Village of Red Devil
Native Village of Ruby
Saint George Island (See Pribilof Islands Aleut Communities of St. Paul & St. George Islands)
Native Village of Saint Michael
Saint Paul Island (See Pribilof Islands Aleut Communities of St. Paul & St. George Islands)
Village of Salamatoff
Native Village of Savoonga
Organized Village of Saxman
Native Village of Scammon Bay
Native Village of Selawik
Seldovia Village Tribe
Shageluk Native Village
Native Village of Shaktoolik
Native Village of Shishmaref
Native Village of Shungnak
Sitka Tribe of Alaska
Skagway Village
Village of Sleetmute
Village of Solomon
South Naknek Village
Stebbins Community Association
Native Village of Stevens
Village of Stony River
Sun'aq Tribe of Kodiak (formerly the Shoonaq' Tribe of Kodiak)
Takotna Village
Native Village of Tanacross
Native Village of Tanana
Tangirnaq Native Village (formerly Lesnoi Village (aka Woody Island))
Native Village of Tatitlek
Native Village of Tazlina
Telida Village
Native Village of Teller
Native Village of Tetlin
Central Council of the Tlingit & Haida Indian Tribes
Traditional Village of Togiak
Tuluksak Native Community
Native Village of Tuntutuliak
Native Village of Tununak
Twin Hills Village
Native Village of Tyonek
Ugashik Village
Umkumiut Native Village (previously listed as Umkumiute Native Village)
Native Village of Unalakleet
Native Village of Unga
Village of Venetie (See Native Village of Venetie Tribal Government)
Native Village of Venetie Tribal Government (Arctic Village and Village of Venetie)
Village of Wainwright
Native Village of Wales
Native Village of White Mountain
Wrangell Cooperative Association
Yakutat Tlingit Tribe

[FR Doc. 2010–24640 Filed 9–30–10; 8:45 am]
BILLING CODE 4310–4J–P

INTERNATIONAL TRADE COMMISSION

[Investigations Nos. 731–TA–308–310, 520, and 521 (Third Review)]

Carbon Steel Butt-Weld Pipe Fittings From Brazil, China, Japan, Taiwan, and Thailand

AGENCY: United States International Trade Commission.

ACTION: Institution of five-year reviews concerning the antidumping duty orders on carbon steel butt-weld pipe fittings from Brazil, China, Japan, Taiwan, and Thailand.

SUMMARY: The Commission hereby gives notice that it has instituted reviews pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. 1675(c)) (the Act) to determine whether revocation of the antidumping duty orders on carbon steel butt-weld pipe fittings from Brazil, China, Japan, Taiwan, and Thailand would be likely to lead to continuation or recurrence of material injury. Pursuant to section 751(c)(2) of the Act, interested parties are requested to respond to this notice by submitting the information specified below to the Commission; [1] to be assured of

[1] No response to this request for information is required if a currently valid Office of Management and Budget (OMB) number is not displayed; the OMB number is 3117–0016/USITC No. 11–5–224, expiration date June 30, 2011. Public reporting

APPENDIX D:

Constitution and Bylaws of the Keweenaw Bay Indian Community

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF INDIAN AFFAIRS

*

CONSTITUTION AND BY-LAWS OF THE KEWEENAW BAY INDIAN COMMUNITY MICHIGAN

APPROVED DECEMBER 17, 1936

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1937

PREAMBLE

We, the L'Anse, Lac Vieux Desert and Ontonagon Bands of Chippewa Indians, residing within the original confines of the L'Anse servation, in order to organize as a tribe for the common welfare of ourselves and our posterity, to insure domestic tranquility, to conserve and develop our natural resources, to form business and other organizations, to establish a credit system, to enjoy certain rights of home rule, do ordain and establish this Constitution and By-laws, for our community which shall be known as the Keweenaw Bay Indian Community.

ARTICLE I - TERRITORY

The territorial jurisdiction of this Constitution shall embrace the land within the original boundary lines of the L'Anse Reservation as defined pursuant to treaty dated September 30, 1854, (10 Stat. 1109), and any and all future additions of land acquired within or without said boundary line by the Secretary of the Interior or by the Tribe, except as otherwise provided by law.

ARTICLE II - MEMBERSHIP

Section 1. The membership of the Keweenaw Bay Indian Community shall consist of the following:

(a) The bona fide enrolled members of the L'Anse, Lac Vieux Desert and Ontonagon Bands of Chippewa Indians as shown on any of the allotment rolls of the L'Anse, Lac Vieux Desert and Ontonagon Reservations, and their descendents who were residing within the limits of the L'Anse Reservation of June 1, 1934.

(b) Every child of one-quarter or more Indian blood, born hereafter to any member of the Keweenaw Bay Indian Community, provided such member is a resident of the Reservation at the time of birth of said child, and every child both of whose parents are members of the Community.

Sec. 2. The Tribal Council shall have power to enact ordinances subject to review by the Secretary of the Interior governing the adoption of members for the Keweenaw Bay Indian Community. Other Indians not now members of this Reservation who desire to affiliate with the Community may upon written application be admitted by a majority vote of the membership, and shall thereupon have a right to vote on matters pertaining to the Community, but shall be excluded from participating in any rights or claim arising out of treaties, and from the right to hold office in the Community. The same limitations are to be extended to the children of adopted members, except where one parent is a member by birth of the Community.

ARTICLE III - GOVERNING BODY

Section 1. The governing body of the Keweenaw Bay Indian Community shall be the Tribal Council.

Sec. 2. The Tribal Council shall consist of twelve councilmen to be elected by popular ballot as follows. Six councilmen from the L'Anse district and six councilmen from the Baraga district.

Sec. 3. The Tribal Council shall have power to change the districts and the representation from each district based on community population, such change to be made by ordinance, but the total number of delegates as provided for in Section 2, Article III, of this Constitution, shall not be changed.

Sec. 4. After each popular election the Tribal Council shall elect from within its own number a President, a Vice-President, a Secretary, an Assistant Secretary, a Treasurer and such other officers and committees as may be deemed necessary. The five officers named and so elected from the Tribal Council shall be known as the Executive Council.

Sec. 5. The Tribal Council of the Keweenaw Bay Indian Community shall be the sole judge of the qualifications of its members

ARTICLE IV - NOMINATIONS AND ELECTIONS

Section 1. The first election of a Tribal Council under this Constitution shall be called and supervised by the present business and advisory committee within thirty days after the ratification and approval of this Constitution and thereafter elections shall be held each year, on the third Saturday prior to the expiration of office of the members of the Tribal Council.

Sec. 2. At the first election four councilmen shall be elected for a period of one year, and four councilmen for a period of two years, and four councilmen for a period of three years; and after the first election each councilmen shall be elected for a period of three years.

Sec. 3. The Tribal Council or an election board appointed by the Tribal Council shall determine rules and regulations governing elections.

Sec. 4. The L'Anse and Baraga districts shall formulate their own rules and regulations regarding nominations and candidates for the Tribal Council, such nominees being elected by majority vote of the entire tribe. Each district will be required to file the names of proposed candidates with the Tribal Secretary at least fifteen days prior to election. It shall be the duty of the Secretary of the Tribal Council to post at least ten days before election the names of all candidates for the Council.

Sec. 5. The Tribal Council or a board appointed by the Council shall certify to the election of the members of the Council mediately after the election returns.

Sec. 6. Any member of the Keweenaw Bay Indian Community who is twenty-one years of age or over and who maintains residence on the reservation, and presents himself at the polls on election day, shall be entitled to vote in the district in which he resides.

Sec. 7. Any enrolled member of the Keweenaw Bay Indian Community, twenty-five years of age or over and who is at least one-fourth degree Indian blood and shall have resided within the district from which elected for at least one year immediately preceding this nomination, shall be eligible for election to the Tribal Council.

ARTICLE V - VACANCIES AND REMOVAL FROM OFFICE

Section 1. If a councilman or official shall die, resign, permanently leave the reservation, or be removed from office, the Council shall declare the position vacant and appoint a successor from the district which has lost a representative to fill the office until the next general election, when a successor shall be elected for the unexpired term, provided that the person chosen to fill such vacancy shall be qualified.

Sec. 2. Any councilman who is proven guilty of improper conduct or gross neglect of duty, may be expelled from the Council under the following procedure:

Should a complaint in writing from fifty members of the Tribe against a member of the Tribal Council be presented to the Council, it shall be the duty of the Tribal Council, if the grounds for such complaint is considered of sufficient merit, to appoint a committee of five members of the Tribe, independent of its own membership and those making such complaints, to hold a public hearing and make written report to the Tribal Council of its findings, a copy of such report to be furnished the accused. Upon receipt of such report by the Tribal Council, it shall meet in executive session to consider such report, grant a hearing and hear testimony of the accused. The Tribal Council may expel a member found guilty of gross neglect of duty or improper conduct by a two-thirds vote.

ARTICLE VI - POWERS AND DUTIES OF THE TRIBAL COUNCIL

Section 1. The Tribal Council shall have the power, subject to any limitations imposed by the Statutes or the Constitution of the United States, and subject to all express restrictions upon such powers contained in this Constitution and attached By-laws:

(a) To regulate the uses and disposition of tribal property, to protect and preserve the tribal property, wild life and natural resources of the Community, to cultivate Indian arts, crafts and culture, to administer charity, to protect the health, security, and the general welfare of the Keweenaw Bay Indian Community.

(b) To employ legal counsel for the protection and advancement of the rights of the Keweenaw Bay Indian Community and its members, the choice of counsel and fixing of fees to be subject to the approval of the Secretary of the Interior.

(c) To negotiate with the Federal, State, and local governments on behalf of the Community and to advise and consult with the representatives of the Departments of the Government of the United States on all matters affecting the affairs of the Keweenaw Bay Indian Community.

(d) To approve or veto any sale, disposition, lease or encumbrance of tribal lands, and tribal assets, which may be authorized or executed by the Secretary of the Interior, the Commissioner of Indian Affairs, or any other agency of the Government, provided that no tribal lands shall be sold or encumbered, or leased for a period in excess of five years, except for governmental purposes, and except that mineral leases and leases to associations, or members, may be made for such longer periods as may be authorized by law.

(e) To advise with the Secretary of the Interior with regard to all appropriation estimates, or Federal projects, for the benefit of the Keweenaw Bay Indian Community, prior to the submission of such estimates to the Bureau of the Budget and to Congress.

(f) To manage all economic affairs and enterprises of the Keweenaw Bay Indian Community in accordance with the terms of a charter to be issued by the Secretary of the Interior.

(g) To make assignments of tribal lands to members of the Keweenaw Bay Indian Community in conformity with Article VII of this Constitution.

(h) To appropriate for tribal use any available tribal funds, provided, that any appropriation in excess of $10,000 in any one fiscal year shall be of no effect until approved at a popular referendum.

(i) To promulgate and enforce ordinances, subject to review by the Secretary of the Interior, which would provide for taxes, assessments, or license fees upon non-members doing business within the reservation, or obtaining special rights or privileges, and such ordinances may also be applied to members of the Keweenaw Bay Indian Community, without such review, provided such ordinances have been approved by a referendum of the Keweenaw Bay Indian Community.

(j) To exclude from the restricted lands of the Reservation persons not legally entitled to reside thereon, under ordinances which shall be subject to review by the Secretary of the Interior.

(k) To enact resolutions or ordinances not inconsistent with Article II of this Constitution governing adoptions and abandonment of membership, subject to review by the Secretary of the Interior.

(l) To promulgate and enforce ordinances, which shall be subject to review by the Secretary of the Interior, governing the conduct of members of the Keweenaw Bay Indian Community, and providing for the maintenance of law and order and the administration of justice by the establishment of an Indian Court, and a definition of its powers and duties.

(m) To purchase land from members of the Keweenaw Bay Indian Community for public purposes under condemnation proceedings in courts of competent jurisdiction.

(n) To promulgate and enforce ordinances which are intended to safeguard and promote the peace, safety, morals, and general welfare of the Keweenaw Bay Indian Community by regulating the conduct of trade and the use and disposition of property upon the reservation, providing that any ordinance directly affecting non-members shall be subject to review by the Secretary of the Interior.

(o) To charter subordinate organizations for economic purposes, and to regulate the activities of such organizations by ordinances which shall be subject to review by the Secretary of the Interior.

(p) To regulate the inheritance of real and personal property, other than allotted lands, within the Keweenaw Bay Indian Community, subject to review by the Secretary of the Interior.

(q) To regulate the domestic relations of members of the Keweenaw Bay Indian Community.

(r) To recommend and provide for the appointment of guardians for orphans, minor members of the Keweenaw Bay Indian Community, and mental incompetents, subject to review by the Secretary of the Interior, and to administer tribal and other funds or property which may be transferred or entrusted to the Tribe or Tribal Council for this purpose.

(s) To create and maintain a Community fund by accepting grants or donations from any person, State, or the United States, or by tribal enterprises.

(t) To delegate to subordinate boards or to cooperative associations which are open to all members of the Keweenaw Bay Indian Community, any of the foregoing powers, reserving the right to review any action taken by virtue of such delegated power.

(u) To adopt resolutions or ordinances to effectuate any of the foregoing powers.

Sec. 2. Any resolution or ordinance, which, by the terms of this Constitution, is subject to review by the Secretary of the Interior, shall be presented to the Superintendent of the Reservation, who shall, within ten days thereafter, approve or disapprove the same, and if such ordinance or resolution is approved, it shall thereupon become effective, but the Superintendent shall transmit a copy of the same, bearing his endorsement, to the Secretary of the Interior, who may, within ninety days from the date of enactment, rescind said ordinance or resolution for any cause, by notifying the Council of such action. If the Superintendent shall refuse to approve any resolution or ordinance submitted to him, within ten days after its enactment, he shall advise the Council of his reasons therefor, and the Council, if such reasons appear to be insufficient, may refer it to the Secretary of the Interior, who may within ninety days from its enactment, approve the same in writing, whereupon the said ordinance or resolution shall become effective.

Sec. 3. The Council of the Keweenaw Bay Indian Community may exercise such further powers as may in the future be delegated to it by the Federal Government, either through order of the Secretary of the Interior, or by Congress, or by the State Government, or by any member of the Keweenaw Bay Indian Community.

Sec. 4. Any rights and powers heretofore vested in the L'Anse, Lac Vieux Desert, and Ontonagon Bands of Chippewa Indians, residing within the original confines of the L'Anse Reservation, but not expressly referred to in this Constitution shall not be abridged by this article but may be exercised by the members of the Keweenaw Bay Indian Community through the adoption of appropriate By-laws and constitutional amendments.

ARTICLE VII - LAND

Section 1. **Allotted lands.** - Allotted lands, including heirship lands, within the L'Anse Reservation shall continue to be held as heretofore by their present owners. It is recognized that under existing law such lands may be condemned for public purposes, such as roads, public buildings, or other public improvements, upon payment of adequate compensation, by any agency of the Federal or State Government, or by the Community itself. It is further recognized that under existing law such lands may be inherited by the heirs of the present owner, whether or not they are members of the Community. Likewise, it is recognized that under existing law the Secretary of the Interior may, in his discretion, remove restrictions upon such land, upon application by the Indian owner, whereupon the land will become subject to State taxes and may then be mortgaged or sold. The right of the individual Indian to hold or to part with his land, as under existing law, shall not be abrogated by anything contained in this Constitution, but the owner of restricted land, may with the approval of the Secretary of the Interior, voluntarily convey his land to the Keweenaw Bay Indian Community either in exchange for a money payment or in exchange for an assignment covering the same land or other land, as hereinafter provided.

Sec. 2. **Tribal lands.** - The unallotted lands of the Community, and all lands which may hereafter be acquired by the Community or by the United States in trust for the Community shall be held as tribal lands, and no part of such land shall be mortgaged or sold. Tribal lands shall not be allotted to individual Indians but may be assigned to members of the Community, or leases, or otherwise used by the Community, as hereinafter provided.

Sec. 3. **Leasing of tribal lands.** - Tribal lands may be leased by the Tribal Council, with the approval of the Secretary of the Interior, for such periods of time as are permitted by law.

In the leasing of tribal lands preference shall be given, first, to Indian cooperative associations, and, secondly, to individual Indians who are members of the Community. No lease of tribal lands to non-members shall be made by the Tribal Council unless it shall appear that no Indian cooperative association or individual member of the Community is able and willing to use the land and to pay a reasonable fee for such use.

All action of the Tribal Council in the regulation and leasing of tribal land shall be consistent with the rules and regulations prescribed by the Secretary of the Interior in accordance with section 6 of the Act of June 18, 1934.

Sec. 4. **Grant of "standard assignments."** - In any assignment of tribal lands which are now owned by the Community or which hereafter may be acquired for the Community by the United States or purchased by the Community out of tribal funds, preference shall be given, first, to heads of families which are entirely landless, and, secondly, to heads of families which have no allotted lands or interests in allotted lands but shall have already received assignments consisting of less than an economic unit of agricultural land, or other land or interests in land of equal value, such economic unit to be determined from time to time by the Tribal Council.

No allotted member of the Community who may hereafter have the restrictions upon his land removed and whose land may thereafter be alienated shall be entitled to receive an assignment of land as a landless Indian. The Tribal Council, may, if it sees fit, charge a fee of not to exceed five dollars ($5.00) on approval of an assignment made under this section.

Assignments made under this section shall be for the primary purpose of establishing homes for landless Indians, and shall be known as standard assignments.

If any member of the Community holding a standard assignment of land shall for a period of one year fail to use the land so assigned or shall use such land for any unlawful purpose such assignment may be cancelled by the Tribal Council after due notice and an opportunity to be heard, and the said land may be reassigned in accordance with the provisions of section 4, of this article.

Upon the death of any Indian holding a standard assignment his heirs or other individuals designated by him, by will or written request, shall have a preference in the reassignment of the land, provided such persons are members of the Community who would be eligible to receive a standard assignment.

Sec. 6. **Grant of "exchange assignments."** - Any member of the Community who owns an allotment or any share of heirship land or deeded land may voluntarily convey his interest in such land to the Community exchange for an assignment to the same land or other land of equal value. If the assignee prefers he may receive, in lieu of a specific tract of land, a proportionate share in a larger unit of land or other interest.

Assignments under this section shall be known as exchange assignments.

Sec. 7. **Leasing of exchange assignments.** - Exchange assignments may be used by the assignee or leased by him to Indian cooperative associations, to individual members of the Keweenaw Bay Indian Community, or, if no individual Indian or Indian cooperative association is able and willing to rent the land at a reasonable fee, such assignments may be leased to non Indians in the same manner as allotted lands.

Sec. 8. **Inheritance of "exchange assignments."** - Upon the death of the holder of any exchange assignment, such land shall be reassigned by the Tribal Council to his heirs or devisees, subject to the following conditions:

(a) Such lands may not be reassigned to any heirs or devisees who are not members of the Keweenaw Bay Indian Community, except that a life assignment may be made to the surviving widower or widow of the holder of an assignment.

(b) Such lands may not be reassigned to any heir or devisee who already holds more than an economic unit of land or interests in land, such unit to be determined from time to time by the Tribal Council.

(c) Such lands may not be subdivided into units too small for economic use as may be determined by the Tribal Council, except that land used for buildings or other improvements may be divided to suit the convenience of the parties. Where it is impossible to divide the land properly among the eligible heirs or devisees, the Tribal Council shall issue to the eligible heirs or devisees, interests in tribal lands of the same value as their interests in the assignment of the decedent.

(d) If there are no eligible heirs or devisees of the decedent, the land shall be eligible for reassignment in accordance with the provisions of section 4 of this article.

Sec. 9. **Use of unassigned community land.** - Community land which is not assigned, including community timber reserves, shall be managed by the Tribal Council for the benefit of the members of the entire Community, and any cash income derived from such land shall accrue to the benefit of the Community as a whole.

Sec. 10. **Inheritance of improvements.** - Improvements of any character made upon assigned land may be bequeathed to and inherited by members of the Community or otherwise disposed of under such regulations as the Tribal Council shall provide. No permanent improvements shall be removed from the land without the consent of the Tribal Council.

Sec. 11. **Exchange of assignment.** - Assignments may be exchanged between members of the Community by common consent in such manner as the Tribal Council shall designate.

Sec. 12. **Use of community funds.** - Community funds may be used with the consent of the Secretary of the Interior, to acquire land, under the following conditions:

(a) Land within the L'Anse Reservation or adjacent to the boundaries thereof which is not now in Indian ownership may be purchased by or for the Community.

(b) Restricted land, which is in heirship status at the time of the adoption and approval of this Constitution, may be purchased by or for the Community, with the consent of all the adult heirs, and the legal guardians of minor hiers, payment thereof to be made as may be agreed upon.

(c) Land owned by any member of the Keweenaw Bay Indian Community who is over the age of 60 years, or who is physically incapacitated, may be transferred by its owner to the Keweenaw Bay Indian Community in exchange for a pension of not more than twice the annual rental value of the land for the life of the pensioner, to be paid out of available tribal funds.

(d) Land in excess of an economic unit as determined by the Tribal Council owned by any member of the Keweenaw Bay Indian Community may be purchased by or for the Community with the consent of the owner, payments to be made under such terms as may be agreed upon.

(e) Land owned by any member of the Keweenaw Bay Indian Community who desires to leave the reservation permanently may be purchased by the Keweenaw Bay Indian Community, under such terms as may be agreed upon.

Sec. 13. **Method of making assignments.** - Applications for assignments shall be filed with the Secretary of the Council, and shall be in writing, setting forth the name of the person or persons applying for the land and as accurate a description of the land desired as the circumstances will permit.

Notices of all applications received by the Secretary shall be posted by him in the agency office and in at least three conspicuous places in the district in which the land is located for not less than twenty (20) days before action is taken by the Council. Any member of the Community wishing to oppose the granting of an assignment shall do so in writing, setting forth his objections, to be filed with the Secretary of the Council, and may if he so desires appear at or before the Council to present evidence. The Secretary of the Council shall furnish the Superintendent or other offices in charge of the agency a complete record of all action taken by the Council on applications for assignment of land, and a complete record of assignments shall be kept in the agency office and shall be open for inspection by members of the Community.

The Tribal Council shall draw up one or more forms for standard and exchange assignments, which shall be subject to the approval of the Secretary of the Interior.

ARTICLE VIII - AMENDMENTS

Section 1. This Constitution and By laws may be amended by a majority vote of the qualified voters of the Community voting at an election called for that purpose by the Secretary of the Interior provided that at least thirty (30) per cent of those entitled to vote shall vote in such election, but no amendment shall become effective until it shall have been approved by the Secretary of the Interior. It shall be the duty of the Secretary of the Interior to call an election on any proposed amendment upon presentation of a petition signed by two thirds of the eligible voters of the Community.

BY-LAWS OF THE KEWEENAW BAY INDIAN COMMUNITY

ARTICLE I - DUTIES OF OFFICERS

Section 1. The President of the Tribal Council shall preside at all meetings of the Council. He shall at all times have general supervision of the affairs of the Tribal Council and such matters as naturally pertain to the general welfare of the Community. It shall also be the duty of the President to countersign all checks drawn against any funds of the organization by the Treasurer. He shall be ex-officio member of all subordinate boards and committees.

Sec. 2. In the absence of the President, the Vice-President shall preside at all meetings of the Tribal Council and shall act in his stead in all matters pertaining to the office of President.

Sec. 3. The Secretary shall keep an accurate record of all proceedings of the Tribal Council and furnish copies thereof to the Superintendent of the jurisdiction. He shall attend to the keeping of the official records of the Tribal Council and shall be responsible for the prompt and efficient handling of all correspondence pertaining to the business of the Tribal Council. All official records of the Tribal Secretary shall be open to inspection by the members of the Community at all times. The Secretary shall be ex-officio member of all subordinate boards and committees.

Sec. 4. The Assistant Secretary shall perform all duties that pertain to the office of the Secretary whenever the Secretary needs assistance.

Sec. 5. The Treasurer of the Tribal Council shall accept, receive, receipt for, preserve, and safeguard all funds in the custody of the Council, whether they be tribal funds or such funds for which the Council is acting as trustee or custodian. He shall deposit all funds in such depository as the Council shall direct, and shall make and preserve a faithful record of such funds and shall report on all funds in his possession and custody at each regular meeting of the Tribal Council, and at such other times as required by the Tribal Council, or the Executive Council. He shall not pay out or otherwise disburse any funds in his possession or custody except in accordance with a resolution passed by the Council.

The Treasurer shall be required to give a bond satisfactory to the Council and to the Commissioner of Indian Affairs. The books of the Treasurer shall be audited at least once a year by direction of the Tribal Council.

Sec. 6. The subordinate officers, boards and committees of the Tribal Council shall perform such duties as the Tribal Council shall, by resolution, from time to time provide.

ARTICLE II - OATH

Section 1. All officers when elected shall be duly installed and subscribe to an oath of office to support the Constitution of the United States and this Constitution. Such officers may be sworn in by any officer qualified to administer an oath.

ARTICLE III - MEETINGS

Section 1. Stated meetings of the Tribal Council shall be held the first Saturday of January, April, July, and October, and at such other times as the Council may by ordinance provide. Called meetings shall be held at the discretion of the President, or upon request of three members of the Tribal Council. Three days' written notice shall be given to all Council members.

Sec. 2. Seven members shall constitute a quorum.

Sec. 3. The Tribal Council shall prescribe such rules of order for its meetings as it desires.

Sec. 4. The meetings of the Tribal Council except executive sessions shall be public to the Community.

ARTICLE IV - ADOPTION OF CONSTITUTION AND BY-LAWS

This Constitution and By-laws, when ratified by a majority vote of the qualified voters of the L'Anse, Lac Vieux Desert, and Ontonagon Bands of Chippewa Indians, residing within the original confines of the L'Anse Reservation, voting at a special election called for the purpose by the Secretary of the Interior, provided that at least thirty per cent of those entitled to vote shall vote in such election, shall be submitted to the Secretary of the Interior, and if approved, shall be effective from the date of the approval.

CERTIFICATION OF ADOPTION

Pursuant to an order, approved October 15, 1936, by the Secretary of the Interior, the attached Constitution and By-laws was submitted for ratification to the L'Anse, Lac Vieux Desert, and Ontonagon Bands of Chippewa Indians, residing within the original confines of the L'Anse Reservation, and was on November 7, 1936, duly adopted by a vote of 239 for, and 18 against, in an election in which over 30 per cent of those entitled to vote cast their ballots, in accordance with section 16 of the Indian Reorganization Act of June 18, 1934, (48 Stat. 984), as amended by the Act of June 15, 1935 (49 Stat. 378).

John E. Thomas,
Chairman of Election Board.
William Curtis,
Secretary of Election Board.

J.C. Cavill,
Superintendent.

I, Harold L. Ickes, the Secretary of the Interior of the United States of America, by virtue of the authority granted me by the act of June 18, 1934 (48 Stat. 984), as amended, do hereby approve the attached Constitution and By-laws of the Keweenaw Bay Indian Community.

All rules and regulations heretofore promulgated by the Interior Department or by the Office of Indian Affairs, so far as they may be incompatible with any of the provisions of the said Constitution or By-laws are hereby declared inapplicable to these Indians.

All officers and employees of the Interior Department are ordered to abide by the provisions of the said Constitution and By-laws.

Approval recommended December 9, 1936.

William Zimmerman, Jr.,
Assistant Commissioner of Indian Affairs.

Harold L. Ickes,
Secretary of the Interior.
[SEAL]

Washington, D.C., December 17, 1936.

PROPOSED AMENDMENT "A"

CONSTITUTION AND BYLAWS
OF THE
KEWEENAW BAY INDIAN COMMUNITY

Article II - Membership shall be amended in its entirety to read as follows:

Article II - Membership

Section 1. The membership of the Keweenaw Bay Indian Community shall consist of the following:

(a) Those persons listed on any of the allotment rolls of the L'Anse, Lac Vieux Desert or Ontonagon Bands of the Chippewa Indians as an enrolled member, their siblings of Indian blood, and their descendants who were residing within the limits of the L'Anse Reservation as of June 1, 1934; and

(b) Any other Chippewa Indian or their descendants of one quarter degree or more of Indian blood who demonstrates, by reliable documentation, ancestral ties to the Keweenaw Bay Indian Community, and who were residing within the limits of the territory as described and ceded in the Treaty between the United States and the Chippewa Indians of October 4, 1842, as of June 1, 1934; and

(c) Any person of at least one-quarter degree Indian blood who is descended from a member; and

(d) Any person descended from a member of the Keweenaw Bay Indian Community who has resided within the L'Anse Reservation and who desires to affiliate with the Community may be adopted by a majority vote of the voting membership. Members who have been adopted before the enactment of this Amendment shall retain their right to vote, but shall not have the right to hold office, to receive monetary distributions or exercise on-reservation treaty rights. Members who are adopted subsequent to the enactment of this Amendment shall have the right to exercise on-reservation treaty rights, but shall not have the right to vote, hold office, to receive monetary distributions or exercise off-reservation treaty rights.

Section 2. There is established for the Community an Enrollment Board with such powers and duties as are necessary to implement this Article. Determinations, rulings and decisions of the Enrollment Board shall be made in accordance with an Enrollment Ordinance.

Section 3. Any member enrolled subsequent to the enactment of this Amendment shall be disenrolled upon a finding that such member was enrolled based upon fraudulently presented or erroneous information, or upon a finding that such member is enrolled in another federally recognized Indian nation, tribe, band or group. Disenrollment proceedings shall be conducted in accordance with the Enrollment Ordinance. Any person who is a member of the Community on the date of the enactment of this Amendment shall not be subject to disenrollment proceedings.

Section 4. Any member of the Community age eighteen (18) and over may relinquish their membership or the membership of their minor children. Persons relinquishing their membership shall be eligible to reapply for enrollment five (5) years after the date of their relinquishment. Any minor whose membership has been relinquished shall be eligible to reapply for enrollment at any time. Relinquishment proceedings shall be conducted in accordance with the Enrollment Ordinance.

CERTIFICATE OF APPROVAL

, LARRY MORRIN, Regional Director, Midwest Regional Office, Bureau of Indian Affairs, by virtue of the authority granted to the Secretary of the Interior by the Act of June 18, 1934 (48 Stat. 984), as amended, and further delegated to me by 3 IAM 4.4, do hereby approve Amendment "A," now designated as "Amendment Number 1," to the Constitution and By-laws of the Keweenaw Bay Indian Community. This amendment is effective as of this date; PROVIDED, that nothing in this approval shall be construed as authorizing any action under this document that would be contrary to Federal law.

Regional Director

Date: OCT 2 3 2002

AMENDMENT NUMBER 1

ARTICLE II – MEMBERSHIP

Section 1. The membership of the Keweenaw Bay Indian Community shall consist of the following:

(a) Those persons listed on any allotment rolls of the L'Anse, Lac Vieux Desert or Ontonagon Bands of the Chippewa Indians as an enrolled member, their siblings of Indian blood, and their descendants who were residing within the limits of the L'Anse Reservation as of June 1, 1934; and

(b) Any other Chippewa Indian or their descendents of one quarter degree or more of Indian blood who demonstrates, by reliable documentation, ancestral ties to the Keweenaw Bay Indian Community, and who were residing within the limits of the territory as described and ceded in the Treaty between the United States and the Chippewa Indians of October 4, 1842, as of June 1, 1934; and

(c) Any person of at least one-quarter degree Indian blood who is descended from a member; and

(d) Any person descended from a member of the Keweenaw Bay Indian Community who has resided within the L'Anse Reservation and who desires to affiliate with the Community may be adopted by a majority vote of the voting membership. Members who have been adopted before the enactment of this Amendment shall retain their right to vote, but shall not have the right to hold office, to receive monetary distributions or exercise on-reservation treaty rights. Members who are adopted subsequent to the enactment of this Amendment shall have the right to exercise on-reservation treaty rights, but shall not have the right to vote, hold office, to receive monetary distributions or exercise off-reservation treaty rights.

Section 2. There is established for the Community an Enrollment Board with such powers and duties as are necessary to implement this Article. Determinations, rulings and decisions of the Enrollment Board shall be made in accordance with an Enrollment Ordinance.

Section 3. Any member enrolled subsequent to the enactment of this Amendment shall be disenrolled upon a finding that such member was enrolled based upon fraudulently presented or erroneous information, or upon a finding that such member is enrolled in another federally recognized Indian nation, tribe, band or group. Disenrollment proceeding shall be conducted in accordance with the Enrollment Ordinance. Any person who is a member of the Community on the date of the enactment of this Amendment shall not be subject to disenrollment proceedings.

Section 4. Any member of the Community age eighteen (18) and over may relinquish their membership or the membership of their minor children. Persons relinquishing their membership shall be eligible to reapply for enrollment five (5) years after the date of their relinquishment. Any minor whose membership has been relinquished shall be eligible to reapply for enrollment at any time. Relinquishment proceedings shall be conducted in accordance with the Enrollment Ordinance.

CERTIFICATE OF RESULTS OF ELECTION

Pursuant to an order issued by Larry Morrin, Midwest Regional Director, on June 7, 2002. This Proposed Amendment "A" was submitted to the qualified voters of the Keweenaw Bay Indian Community on October 8, 2002, and was duly adopted by a vote of 201 for, and 58 against, and 0 cast ballots found spoiled or mutilated, in an election in which at least thirty percent (30%) of the 379 entitled to vote cast their ballots in accordance with Section 16 of the Indian Reorganization Act of June 18, 1934 (48 Stat. 984), as amended, and the Lac Vieux Desert Band of Lake Superior Chippewa Indians Act, 25 U.S.C. §1300h-7 (Pub. L. 100-420 as amended by Pub. L. 101-301).

Anne E. Bolton
Chairman, Election Board
Doreen Blaker
Member, Election Board
Jennifer Misegan
Member, Election Board
Violet R. Friisvall
Member, Election Board
Gretchen Emery
Member, Election Board

Date: 08 Oct 2992

I, Larry Morrin, Regional Director, Midwest Regional Office, Bureau of Indian Affairs, by virtue of the authority granted to the Secretary of the Interior by the Act of June 18, 1934 (48 Stat. 984), as amended, and further delegated to me by 3 IAM 4.4, do hereby approve Amendment "A" now designated as "Amendment Number 1," to the Constitution and By-laws of the Keweenaw Bay Indian Community. This amendment is effective as of this date; PROVIDED, that nothing in this approval shall be construed as authorizing any action under this document that would be contrary to Federal law.

Larry Morrin
Regional Director

Date: OCT 23 2002

APPENDIX E:

KBIC Tribal Code; Table of Contents

Keweenaw Bay Indian Community

TRIBAL CODE

Compiled and produced by Keweenaw Bay Indian Community
TRIBAL COURT
Baraga, Michigan 49908
(906) 353–8124

May 1996 Edition

Keweenaw Bay Indian Community

TRIBAL CODE

TABLE OF CONTENTS

APPENDIX F:

KBIC Government Structure and Committees/Boards/Task Force Groups

KBIC Organization

(Approved 4-25-98)

Tribal Council

- Tribal Court
- Housing Authority
- Community College

Tribal President

- Election Board
- Tribal Attorney
- Enrollment Board
- Mining Prevention
- Council Committees
- Gaming Commission

Chief Executive Officer

Protective Services

- Social Services/ICWA
- Beartown Firefighters
- Tribal Police/Conservation

Public Works

- Realty/Roads
- Maintenance

Enterprises

- Radio Stations
- Ojibwa Casino I
- Ojibwa Casino II
- Tribal Construction
- Pines Convenience Center

Administrative Services

- Accounting
- Personnel
- Grants Office
- Economic Development
- Information Technology

Community Services

- TERO
- THPO
- Education
- Commodity Foods
- Health Department
- Language Program
- Natural Resources
- Community Library
- Enrollment/Licensing
- Pre-Primary Program
- New Day/Outpatient
- Community Assistance
- Youth Center/Programs
- Senior Center/Elderly Nutrition

KBIC Committees/Boards/Task Force Groups

Substance Abuse Advisory Board – By-laws approved on April 7, 2006 – 4-year terms

Barbara Bryan (new term effective 5-09-08, ends 2012)
Beverly Lussier (new term effective 5-09-08, ends 2012)
Gary Magnant (new term effective 5-09-08, ends 2012)
Gerry Mantila (new term effective 5-09-08, ends 2012)
Janice Shalifoe (new term effective 5-09-08, ends 2012)
Al Hendricks, Pharmacy (new term effective 5-09-08, ends 2012)
Jerry Lee Curtis - Director
Elizabeth "Chiz" Matthews – Council Rep

Committee for Alternative & Renewable Energy (CARE) - By-laws approved on Oct. 9, 2008 – By Position

Gregg Nominelli, Economic Developer – Lead Comm. Advisor
William Emery, Tribal Council Rep. – Comm. Advisor
Todd Warner, Natural Resource Director – Comm. Advisor
Larry Denomie III, CEO – Lead Comm. Advisor
Gerry Mantila, Cultural Committee Chair
Jason Ayres, Real Estate Officer
Arlan Friisvall, KBIC Maintenance Director
Jim Stingle, Grant Writer
Eddy Edwards, Ojibwa Housing Director
Gary Loonsfoot, Jr., Natural Resources Committee Chair
Paul DesRochers, Jr., Economic Development Comm. Chair

Board of Jury Selectors

Jerry Lee Curtis
Elizabeth Mayo

Casino Projects Task Force

Larry Denomie III
Hosh LaPointe
Gene Emery
Eddy Edwards
John Baker

Cultural Committee - By-laws approved June 30, 2005 – 3-year terms

Gerry Mantila – Chair (2012)
Cody Blue (term ends 2013)
~~Diane Charron (2011)~~
Leo Durant (term ends 2013)
Beverly Lussier (2014)
Toni Minton (term ends 2013)
~~Evelyn Ravindran (2011)~~
Myrtle Tolonen (2014)
Doreen Blaker (2014)
Annette Emery (2012)
Rebecca Genschow (2012)
Chiz Matthews – Council Rep

Drug Task Force – 2006, 2007, 2008, 2009, 2010, 2011

Vicki Dompier
Becky Tussing, Chair
Valerie Voakes, Secretary
Marty Curtis
Brad Dakota
Bill Kirchoffer
Dale Dakota
Tyler Larson, Weed & Seed Community Coordinator
Susan LaFernier – Council Rep.
Heather Chapman – Attorney Advisor

Economic Development Committee – By-laws approved on September 25, 2008 - 2-year terms (all terms end September 2012)

Paul DesRochers, Jr. – Chair
Bruce LaPointe
Brad Dakota
Janice Halverson
Lynn Ketola
Dale Shalifoe
Debbie Parrish
Gregg Nominelli – Director
Gary Loonsfoot, Sr. – Council Rep
Larry Denomie III, CEO - Advisor

Fire Fighting Committee – Policy Book – See Resolution KB-1185-2003

Doreen Blaker
Tom Chosa
George Decota
Michael Decota
Joe Dowd
Charles Gauthier
Rebecca Genschow (April 11, 2007)
Will Wiggins – Director

Gaming Commission – Ordinance 2006-02

Jennifer Misegan, – 3-year term (effective June 1, 2010, term ends June 2013)
Mike Duschene – 1-year term (effective June 1, 2011, term ends June 2012)
David Rantanen – 3-year term (effective June 1, 2011, term ends June 2014)
Dale Shalifoe, Executive Director

Health Board – By-laws approved on October 4, 2005 – 3-year terms

Wayne Swartz, Chair (effective May 8, 2009, term ends 2012)
Kerry Picciano (effective May 8, 2009, term ends 2012)
Carl Rasanen (effective May 8, 2009, term ends 2012)
Allen Gauthier (effective May 8, 2009, term ends 2012)
Denise LaPointe (effective May 8, 2009, term ends 2012)
Darlene Genschow (effective May 8, 2009, term ends 2012)
Philomena Ekdahl (May 20, 2010, term ends 2013)
Susan LaFernier – Council Rep

Hiring/Personnel Committee – By-laws approved on September 22, 2005 and amended on April 17, 2009 – 3-year terms

~~Michelle St. George – Chair (term ends April, 2013)~~ Resigned on 11-4-10
~~Jerry Lee Curtis (term ends April, 2011)~~
~~Patricia Gerard (term ends April, 2013)~~ Resigned on 11-4-10
Charles Loonsfoot, Sr. (term ends April, 2013)
Wanda Seppanen (term ends April, 2013)
Mathew Shalifoe (term ends April, 2013)
Amy St.Arnold (term ends April, 2013)
Jacquelyn Swartz – Chair (start as of Feb. 2010 - term ends April, 2013)
~~Janice Halverson (start as of Feb. 2010 - term ends April, 2013) resigned as of April 2011~~
Lawrence Swartz (term ends April, 2013 – finishing Janice's term)
Roger Duschene (term ends April 2014)

Indian Child Welfare/Justice Committee (ICWA)– By-laws approved on November 8, 2007 – 3-year terms, staggered

Ruth Keller - 3-year term (effective March 2009, term ends March 2012)

Robert Mayo, Jr., Secretary (Resigned 3/26/09 not to be replaced by new ordin.?)
Brenda Brunk
Sharon Brunk (8-01-05) ???
William Emery
Eddy Edwards – Director

Ojibwa Seniors Executive Board – Terms effective 2008 - 2010

Sandi Pittsley, President
Ron Spruce, Vice President
Loretta Hugo, Secretary
Molly Loonsfoot, Assistant Secretary
Roger Duschene, Treasurer (Resigned – replaced by??)
Agatha Cardinal, Assistant Treasurer

Parks and Recreation Committee – By-laws approved on April 17, 2009 (3 Two-yr terms and 4 Three-year terms)

Evelyn Ravindran, Chair (term ends April 2014)
Allen Gauthier (term ends April 2014)
Dominic Picciano (term ends April 2014)
~~Amelia "Dolly" Sapcut - (as of 7-15-10) (term ends April 2011) did not reapply~~
Vicki Dompier (term ends April 2012)
Suzanne Jondreau (term ends April 2012)
Jody Joki, Secretary (as of 7-14-08) (term ends April 2012)
Dale Goodreau (as of 7-15-10) (term ends April 2012)
~~Joe Spruce, Vice Chair - verbally resigned 7/10~~ need something in writing!!
~~Sandy Swartz - verbally resigned 7/10~~

William Emery – Council Rep
Mike LaFernier, Sr. – Council Rep
Elizabeth Mayo – Council Rep

Mark Misegan, Park Caretaker
Arlan Friisvall, Maintenance Director
Bruce LaPointe, Director

Pow-wow Committee – By-laws approved on April 10, 2008 – 3-year terms (16 members)

Tracy Emery, Chair (term ends April 2014)
Elvera Lantz, Vice Chair (term ends April 2014)
Monica Kohn, Secretary (term ends April 2014)
Angela Kelly, Treasurer (term ends April 2013)

Youth Committee – By-laws approved on September 22, 2005 – 2-year terms

Jeanne Kauppila, Secretary (begin 10-08, 10-10) (term ends Oct. 2012)
Gary Loonsfoot, Jr., Assistant Secretary (term ends April 2014)
Cecelia Chosa Dowd (term ends April 2014)
William Jondreau (term ends April 2014)
Vicky Mleko (begin 04-17-09) (term ends April 2014)
~~Dawn Alexander (begin 04-17-09) (term ends April 2011) did not reapply~~
Carole LaPointe (begin 10-10), (term ends Oct. 2012)
Michelle Maki (begin 10-10), (term ends Oct. 2012)
Nanette Beck (begin 10-10), (term ends Oct. 2012)
Eddy Edwards – Council Rep
Cheryne Clements – Director

APPENDIX G:

Title 10; Hunting, Fishing, Trapping and Gathering Ordinance

KEWEENAW BAY INDIAN COMMUNITY
TRIBAL CODE OF LAW

TITLE TEN
HUNTING, FISHING, TRAPPING AND GATHERING

Revised by the Keweenaw Bay Tribal Council
at Special Council sessions conducted on March 31st, April 1st, April 3rd, April 28th, and September 8th of the year 2003.

Keweenaw Bay Indian Community
Hunting, Fishing, Trapping and Gathering Code
Ordinance 2004-001

Introduced by Council Member Warren C. Swartz, Jr.

The Keweenaw Bay Indian Community has enacted this ordinance for the purpose of preserving and protecting hunting, fishing, trapping and gathering rights, which were reserved by the Community in the Treaty of La Pointe, Wisconsin with the Chippewa on September 30, 1854, (10 Stat. 1109), for future generations of tribal members.

TABLE OF CONTENTS

Hunting, Fishing, Trapping and Gathering Notices

Chapter One Definitions and General Provisions

Chapter Two Commercial and Subsistence Fishing

[Reserved 10.234 to 10.240]

- 10.241. Impoundment Gear Identification.
- 10.242. Impoundment Gear Restrictions.

[Reserved 10.243 to 10.250]

- 10.251. Small Boat; Effort.
- 10.252. Big Boat; Effort.
- 10.253. Commercial Fishing; Catch Reporting and Sampling.
- 10.254. Failure to Submit Monthly Catch Report.
- 10.255. Misrepresentation of Species Poundage; Small Boat.
- 10.256. Misrepresentation of Species Poundage; Big Boat.
- 10.257. Excessive Misrepresentation of Species Poundage; License Suspension.
- 10.258. Commercial Fishing Season Restrictions.
- 10.259. Legal Sizes of Commercial Fish Species.
- 10.260. Tagging of Lean Lake Trout.
- 10.261. Lost Lean Lake Trout Tags.
- 10.262. Lean Lake Trout Catch Exceeding Tags Allocated.
- 10.263. Sale of Prohibited Fish Species; Incidental Catch.

[Reserved 10.264 to 10.275]

- 10.276. Commercial Bait Fishing License.
- 10.277. Subsistence Fishing License.
- 10.278. Subsistence Fishing; Gear.
- 10.279. Subsistence Fishing; Commercial Fishing Regulations Apply.
- 10.280. Subsistence and Commercial Bait Fishing Effort.

Chapter Three Commercial Fishing Vessels

Four Fishing

).414. Fishing On Experimental Lakes Prohibited.

eserved 10.415 to 10.420]

).421. Legal Sizes of Fish Species.
).422. Creel Limits.
).423. Walleye; Spring Spearing Season; Creel; Possession Limit.
•10.424. Isle Royale; Possession Limit.
).425. Wanton Waste of Fish Species.

eserved 10.426 to 10.429]

).430. Gear and Method Restrictions.
).431. Gear; Bait Fishing a Non-Commercial Purpose.
).432. Prohibited Methods of Fishing.
).433. Inspection of Fish and Gear.

F.. e Hunting and Trapping

).501. Definitions.
).502. Hunting and Trapping License.
).503. Hunting and Trapping License; Minors.
).504. Identification.
).505. Hunting Permits for Community and Ceremonial Activities.
).506. Stationary Vehicle Permit.
).507. Stationary Vehicle and Special Assistant Permit Application and Issuance.
).508. Stationary Vehicle Permit; Restrictions.
).509. Special Assistant Permit; Requirements and Restrictions.
).510. License Misrepresentation.
).511. Allowing or Making Use of Another Tribal Hunting or Trapping License.

).512. Possession or Transportation of Game.

eserved 10.513 to 10.525]

).526. L'Anse Reservation and Ontonagon Reservation Bear Hunting; Limitation.
).527. Inspection of Game.
).528. Sale of Game.
).529. Wanton Waste of Game.
).530. Animals Fleeing From Fire.
).531. Endangered Species and Protected Animals.

eserved 10.532 to 10.545]

- 10.546. Prohibited Methods of Taking Game.
- 10.547. Prohibited Hunting Gear.
- 10.548. Hunting and Trapping; Prohibited Areas.
- 10.549. Hunting or Trapping While Under the Influence of Alcohol.
- 10.550. Possession or Transportation of a Firearm, Bow or Cross-bow.

[Reserved 10.551 to 10.560]

- 10.561. Hunting Season.
- 10.562. Hunting; Game Limits.
- 10.563. Hunting; Issuance of Tags.
- 10.564. Hunting; Tagging and Registration.
- 10.565. Blaze Orange During Daylight Hours.
- 10.566. Hunting; Weapon Restrictions.
- 10.567. Hunting; Gear.
- 10.568. Hunting; Methods.
- 10.569. Hunting With Dogs.

[Reserved 10.570 to 10.5100]

- 10.5101. Trapping Seasons.

- 10.5102. Trapping Game Limits.
- 10.5103. Traps and Hides; Tagging and Registration.
- 10.5104. Possession, Sale and Transportation of Hides, Pelts, and Furs.
- 10.5105. Shipping Hides, Pelts or Fur.

Chapter Six Plant Gathering

- 10.601. Definitions.
- 10.602. Wild Plant Gathering.
- 10.603. License and Identification.
- 10.604. L'Anse Reservation and Ontonagon Reservation; BIA Gathering Permit.
- 10.605. Ottawa Nation Forest; U.S. Forest Service Gathering Permit.
- 10.606. Gathering License or Permit Misrepresentation.
- 10.607. Allowing or Making Use of Another's Gathering License or Permit.

[Reserved 10.608 to 10.614]

- 10.615. Gathering in Campgrounds Prohibited.
- 10.616. Firewood.
- 10.617. Conifer Bough; Prohibitions.
- 10.618. Ginseng; Season Restrictions.
- 10.619. Maple Sap and Sugar-bushes.
- 10.620. Wild Rice; Harvest.
- 10.621. Christmas Trees.

[Reserved 10.622 to 10.630]

- 10.631. Inspection of Plants.
- 10.632. Commercial Harvesting.
- 10.633. Endangered Plant Species.
- 10.634. Wanton Waste of Wild Plant Species.

KEWEENAW BAY INDIAN COMMUNITY TRIBAL CODE
HUNTING, FISHING, TRAPPING, AND GATHERING

NOTICES

1. Fishing on Private Lakes.
Tribal members who desire to fish in lakes where riparian ownership is totally private must procure the written permission from a landowner to access the lake.
History: Formerly 10.511 (c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

2. Exercising Treaty Rights Outside of Home Territory.
Tribal members who wish to exercise hunting, fishing, trapping or gathering treaty-rights outside of the home territory of the Keweenaw Bay Indian Community,
but within the territory ceded by the Lake Superior Bands of Chippewa in the Treaty of 1842, must obtain any required approval to exercise their treaty right from the tribe who has jurisdiction over the territory the tribal member desires to use and shall be subject to the laws of that tribe. Besides the Keweenaw Bay Indian Community, the ancestors to the signatory tribes of the Treaty of 1842 are the: Red Cliff Band of Lake Superior Chippewa, Lac Courte Oreilles Band, Bad River Band, Lac du Flambeau Band of Lake Superior Chippewa Indians, Sokaogon Chippewa Community Mole Lake Band, St. Croix Tribe, and the Lac View Desert Band. Please contact the appropriate tribe for permits and information regarding hunting, fishing, trapping or gathering within their home territory.
History: Formerly 10.503, 10.503 (a) and 10.806 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

3. Hunting on Posted Land Within Home Territory.
The State of Michigan has taken the legal position that tribal members' right to fish, hunt, trap and gather under the Treaty of 1842 does not extend to privately owned land outside of the boundaries of the L'Anse Reservation and Ontonagon Reservation. The Community supports the right of tribal members to fish, hunt, trap and gather on all land within the ceded territory, according to each tribes laws, that are open to the public for fishing, hunting,

trapping and gathering, but not including farmland, fenced land, or private land that is posted.
History: Formerly 10.503 (c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

4. Permits for Plant Gathering in Home Territory.
Contact the Ottawa National Forest offices for maps and information for plant gathering within the exterior boundaries of the Ottawa National Forest. An on-reservation permit is required from the Bureau of Indian Affairs (BIA) Agency Forester for firewood cutting, clearing of residential or recreational leases, fence posts, maple sap collection, or miscellaneous cuttings for education, religious, or ceremonial use within the exterior boundaries of the L'Anse Reservation and Ontonagon Reservation. The permits will be issued by the BIA Agency Forester in accordance with the requirements set forth in the Community's Forest Management Plan. Contact the BIA Agency Forester, for information, maps and free use permits for on-reservation lands.
History: Formerly 10.806 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

5. Migratory Birds in Home Territory.
The taking of migratory birds shall be governed by federal regulations approved annually.
History: Formerly 10.514 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

6. Forestry Management Plan, Bureau of Indian Affairs.
Copies of the Forest Management Plan are available at the BIA Agency Foresters Office.
History: Formerly 10.804 (h) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

7. Fisheries Management Plan; Keweenaw Bay Natural Resources Department.
Copies of the Fisheries Management Plan are available at the Keweenaw Bay Natural Resources Department.
History: Formerly Title 10, Chapter 7 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

KEWEENAW BAY INDIAN COMMUNITY TRIBAL CODE
HUNTING, FISHING, TRAPPING, AND GATHERING

Chapter 1

Definitions and General Provisions

•10.101 Definitions.
As used in this Title the following words and phrases shall have the following meanings:

1. "Ceded territory" means land and waters ceded to the United States by the Treaty of 1842 and the Treaty of 1854.
2. "Commercial taking" or •commercial purposes• means the taking of fish species or game for barter or sale.
3. •Community• means the Keweenaw Bay Indian Community.
4. •Council• means the Keweenaw Bay Indian Community Tribal Council.
5. •Court• means the Keweenaw Bay Indian Community Tribal Court.
6. "Endangered or threatened species" means any fish, animal or wild plant species designated as rare, endangered or threatened, or of cultural significance by Tribal or federal law, or within Endangered and Threatened Wildlife and Plants, published by the United States Fish and Wildlife Service in August, 1993, (50 CFR 17.11 &17.12) as amended.
7. •Enforcement Officer• means (1) any enforcement agent of the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service and any other person authorized by the Secretary to enforce the provisions of 25 CFR Part 256, Subpart A; (2) Law Enforcement Officers of the Keweenaw Bay Indian Community; (3) Great Lakes Indian Fish and Wildlife Commission (GLIFWC) Conservation Officers; and (4) any other person deputized by the Keweenaw Bay Tribal Council to enforce these regulations.
8. "Farmland" means any land that appears to be a field used for farming or has been cultivated for farming.
9. "Firearm" means a weapon from which a dangerous projectile may be propelled by using explosives, gas, or air as a means of propulsion. Firearm does not include a smooth bore rifle or handgun designed

and manufactured exclusively for propelling BBs not exceeding .177 caliber by means of a spring, air or gas.

10. "Free use permits" means permits issued by the BIA for specific gathering.

11. "Game" means big game, small game, game birds and fur bearing animals.

12. "Home territory" means all lands and waters within the Upper Peninsula of the State of Michigan which lie West of a line described as commencing at the mouth of the Chocolay River in Marquette County, thence following the course of the Chocolay River to its source; thence Southerly to the big island of the Escanaba River, AND lying North of a line commencing at the big island of the Escanaba River; thence Westerly to the junction of the Brule and Menominee Rivers, Michigan; excluding Gogebic County, Iron County and that part of Ontonagon County which lies west of the mouth of the Ontonagon River; and all waters and islands of Lake Superior described in the Treaty of 1842 that lie within the State of Michigan.

13. "Indian" means a person who is an enrolled member of a federally recognized Indian tribe, or a person eligible for enrollment in a federally recognized Indian tribe.

14. "KBNRD" means the Keweenaw Bay Natural Resources Department.

15. "L'Anse Reservation" means the area of land described in the Treaty of 1854 as the permanent homeland of L'Anse and Lac Vieux Desert Bands of Lake Superior Chippewa.

16. "License" means a hunting, fishing, trapping, commercial fishing, subsistence fishing, bait fishing license or all tags and permits issued and regulated by the Community pertaining to all hunting, fishing, trapping and gathering activities.

17. "Licensing Clerk" means the person designated by the Community to issue hunting, fishing, and trapping licenses and gathering permits.

18. "Non-commercial use" means the taking of fish species or game for non-commercial purposes.

19. "Ontonagon Reservation" means the area of land as referred to in the Treaty of 1854.

20. "Permit" means a license.

21. "Person" shall include all Indian individuals, co-partnerships, associations or corporations; the singular shall include the plural; and

the masculine gender shall include the feminine.

22. "Posted land" means land that is designated with visible signs indicating that entry upon such land is restricted, not limited to signs marked ▪no trespassing▪ or ▪private▪.

23. ▪Protected animals▪ means the bald eagle, golden eagle, timber wolf, moose, spruce hen, sharp tail grouse, trumpeter swan, grayling, caribou, swan, wolf and elk.

24. ▪Season▪ means time period where hunting or trapping is permitted for a specific species of animal as prescribed herein.

25. ▪Signatory tribe▪ means a tribe that is ancestor to a signatory of the Treaty of 1842, including the Keweenaw Bay Indian Community, Red Cliff Band of Lake Superior Chippewa, Lac Courte Oreilles Band, Bad River Band, Lac du Flambeau Band of Lake Superior Chippewa Indians, Sokaogon Chippewa Community Mole Lake Band, St. Croix Tribe, and the Lac View Desert Band.

26. ▪Tag▪ means a tag issued by the Licensing Clerk pursuant to this ordinance.

27. ▪Take▪ or ▪taken▪ means to kill an animal while hunting or trapping.

28. "Treaty of 1827" means the 1827 Treaty between the Chippewa, Menominee, and Winnebago and the Unted States.

29. "Treaty of 1842" means the 1842 Treaty between the Lake Superior Bands of Chippewa and the United States.

30. ▪Treaty of 1854" means the 1854 Treaty between the Lake Superior Bands of Chippewa and the United States.

31. "Tribal lands" means land held in trust by the federal government for the Community or fee land owned by the Community.

32. "Tribal member" means an enrolled member of the Keweenaw Bay Indian Community.

33. "Tribe" means the Keweenaw Bay Indian Community.

34. ▪United States▪ means the United States of America.

35. "Wild animals" means all creatures, not human or domestic, wild by nature, and includes quadrupeds, mammals, birds, fish species, amphibians, reptiles, crustaceans and mollusks.

History: Formerly 10.101, 10.301, 10.402, 10.501, 10.505, 10.512, 10.803 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.102. Purpose of the Regulations.
The purpose of these regulations is to preserve, protect and conserve the natural resources on and in the lands and waters ceded by the Community in the Treaty of 1842 for the continuing use, benefit, and enjoyment of tribal members and such other persons that are entitled by the Treaty of 1842 to utilize such resources.
History: Formerly 10.501 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.103. Effect of Law; Other Tribal Laws.
A. These regulations shall have the same effect as a law of the Community and a violation of any such regulation shall be a punishable as a criminal misdemeanor or a civil offense as hereinafter stated. All laws of the Community, as set forth in the Tribal Code, have the same force and effect while hunting, fishing, trapping or gathering in the home territory. The Council may adopt, modify and amend any regulation regarding hunting, fishing, trapping and gathering from time to time.
B. In addition to any punishment provided for herein, upon the conviction of any offense described herein, any person so convicted may have any hunting, fishing, trapping or gathering equipment or paraphernalia in his possession at the time of the offense confiscated by an Enforcement Officer. Equipment or paraphernalia may be returned to convicted individual after serving the sentence for the conviction at the discretion of the Court. At the discretion of the Court, fishing, hunting, trapping or gathering privileges of any person so convicted may be temporarily suspended for a period not to exceed one (1) year or permanently revoked.
History: Formerly 10.104 & 10.205 (k) & 10.205 (l) & 10.308 (j) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.104. Jurisdiction.
For purposes of enforcing these hunting, fishing, trapping and gathering regulations, the territorial jurisdiction of the Court shall encompass all such traditional lands and waters that are collectively referred to herein as the "home territory".
History: Formerly 10.503 of May 2002 Fishing, Hunting, Trapping and

Gathering Regulations; as amended on (date).

•10.105. Scope and Application of Laws.
These regulations apply to all Indian persons who fish, hunt, trap and gather within the L'Anse Reservation and Ontonagon Reservation and lands held in trust by the United States for the Community, including all Indian persons who are members of the signatory tribes to the Treaty of 1842 and are exercising reserved usufructuary rights within the home territory.
History: Formerly 10.502 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.106. Enforcement.
Any Enforcement Officer may enforce these regulations.
History: Formerly 10.503 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.107. Knowledge of Regulation Presumed.
Any person engaged in hunting, fishing,
trapping, or gathering within home territory is presumed to know that these regulation apply to that person and it shall not be a defense, in any judicial proceedings resulting from an alleged violation of these regulations, to claim a lack of awareness or understanding of these regulations.
History: Formerly 10.105 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.108. License and Permit Fees.
The Council shall set and collect such fees as it may deem to be appropriate as a pre-condition to the issuance of any license or permit for hunting, fishing, trapping and gathering.
History: Formerly 10.103 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.109. License Availability.
No hunting, fishing, trapping or gathering license or permit shall be issued to any person who is not a member of a federally recognized Indian tribe.

•10.110. On- Reservation Visitor Permits.

A. The Community may issue a visitors permit to hunt, fish, trap or gather within the boundaries of the L'Anse Reservation and Ontonagon Reservation to a member of another federally recognized Indian tribe whose tribal hunting, fishing, trapping and gathering laws provide the same privilege requested to the members of the Community within their Reservation.
B. A visitors permit may be obtained by applying to the Licensing Clerk and shall be subject to the approval of the President of the Council.
History: Formerly 10.513 (k) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

10.111. Home Territory Visitor Permits.
A. The Community may issue a license to hunt, fish, trap or gather within the home territory to a visitor who is a member of a signatory tribe whose Tribe's hunting, fishing, trapping and gathering laws provide the same privileges to the members of the Community in the "home territory" of the visitors Tribe.
B. A license for a member of another signatory tribe may be obtained by applying to the Licensing Clerk and shall be subject to the approval of the President of the Council.

10.112. Exemptions from Rules and Regulations.
Upon a finding by the Council that special circumstances exist which warrant an exemption from any of these regulations, whether or not herein contained, the Council may exempt a specific person from compliance with such regulations. No exemption shall be valid unless duly adopted by the Council and maintained in the possession of the person to whom the exemption applies, before said action occurs. Permits issued under this provision shall be effective for a period not to exceed one (1) year. A person granted an exemption under this provision may re-apply to the Council for another permit upon expiration of any permit the person may hold.
History: History: Formerly 10.201 (e) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

10.113. Severability.
In the event that any provision of this title or the application thereof is held invalid by a court of competent jurisdiction the remaining provisions of this

title, and other applications of such provision, shall not be affected thereby.

References.

1. The Treaty of Butte Des Morts, on the Fox River, Michigan Territory with the Chippewa, Menominee, and Winnebego on August 11, 1827. (7 Stat. 303).
2. The Treaty of La Pointe, Wisconsin Territory with the Chippewa of the Mississippi and Lake Superior, October 4, 1842. (7 Stat. 591).
3. The Treaty of La Pointe, Wisconsin with the Chippewa on September 30, 1854. (10 Stat. 1109).
4. Endangered and Threatened Wildlife and Plants, published by the United States Fish and Wildlife Service in August, 1993, (50 CFR 17.11 &17.12) as revised.
5. "Numbering of Certain Vessels", 33 Code of Federal Regulations 173.
6. Criminal Offenses and Penalties, Title 3 of the Keweenaw Bay Tribal Code.
7. Michigan Department of Natural Resource Regulations pertaining to Craig Lake State Park.
8. 2003 Keweenaw Bay Indian Community Forest Management Plan, Bureau of Indian Affairs Agency Foresters Office, Baraga, Michigan.
9. 2000 Keweenaw Bay Indian Community Fisheries Management Plan, Keweenaw Bay Department of Natural Resources, L'Anse, Michigan.

Chapter Two

Commercial and Subsistence Fishing

•10.201. Definitions.

As used in this chapter, the following words and phrases shall have the following meanings unless the context clearly requires a different meaning:

1. ▪Assessment fishing activities• means scientific studies performed by Keweenaw Bay Natural Resources Department to evaluate the status of fisheries.
2. ▪Application• means a commercial fishing license application and all necessary forms.
3. ▪Bait fish species• means rainbow smelt, lake herring, burbot, minnow, sucker and chub species.
4. ▪Big boat• means a vessel that is greater than twenty-seven (27) feet in length from bow to stern.
5. ▪Big boat license• means a commercial fishing license issued by the Council to operate a big boat in off-reservation commercial waters.
6. "Breakwall" means a manmade barrier which breaks the force of waves, as before a harbor.
7. ▪Bridle• means the line on an impoundment net that keeps the float or top line attached to the bottom line.
8. "Catch reports" means the monthly paper reports filed to the KBNRD that document commercial fishermen activities.
9. ▪Commercial bait fishing" means to fish for the purpose of taking or catching bait fish species for sale, barter or exchange.
10. "Commercial fishing• means to fish for the purpose of taking any fish species for a commercial purpose. Including all related activities which occur in or on the water, or immediately adjacent to the water's edge and in the process of loading or unloading fish species, nets, or related gear, in or from a boat or vehicle.
11. ▪Commercial fish species• means herring, lake trout, ciscos, chubs, alewives, lake whitefish, menominee whitefish, rainbow smelt, salmon, minnows and suckers.
12. ▪Commercial fishing license• means a license issued by the Council to fish for commercial fish species and allows the holder to fish and sell, barter, transport, or cause to transport, or deliver or receive for transportation, or package any commercial fish species or commercial fish species parts, or have in his possession or under his control for commercial purposes any commercial fish species.
13. ▪Commercial bait license• means a commercial fishing license issued by the Council to fish on/off reservation waters for bait fish species for commercial purposes.
14. "Commercial purposes" means sale, barter, or exchange for profit.
15. ▪Depth• means the depth of water.
16. ▪Director• means the Director of the KBNRD.
17. ▪Effort• means the length of net or number of traps including number of nights fished.
18. ▪Emergency situation• means hospitalization, a death in the family, or other sudden

need to leave the L•Anse Reservation.

19. "Fish• or ■Fishing• means to catch, take or kill, or attempt to catch, take or kill any fish species for barter or sale, including all related activities which occur in or on the water, or immediately adjacent to the water's edge and in the process of loading or unloading fish species, nets, or related gear, in or from a boat or vehicle.

20. "Gill net" means gear designed to capture fish species by means of entanglement. A "gang of nets" is more than one gill net tied in a series. This gear shall be composed of a buoy and float, anchors, and gill net(s).

21. ■Health hazard• means an act of a person while commercial fishing that may endanger the health of another.

22. ■Hearts• means that aspect of an impoundment net that serves as a temporary staging area of the net before the fish is trapped in the pot.

23. "Helpers card" means an identification card with photograph issued by the Licensing Clerk to Indian persons assisting or employed by a commercial fisherman or assisting a subsistence fisherman.

24. "Impaired" means damaged, weakened or diminished mental or physical capabilities.

25. "Impoundment gear" means gear designed to capture fish species by means of deflection and to retain them in a live condition (e.g. trap, pound, fyke, hoop nets). This gear shall be composed of a lead, wings, and hearts attached to a lifting pot.

26. ■Incidental catch• means those non-targeted fish caught.

27. ■King anchor• means the main anchor used for impoundment gear.

28. ■Lead• means either the bottom line of a gill net or the part of impoundment net which directs fish towards the entrance of the trap.

29. ■Lean lake trout• means the subspecies of lake trout managed in Lake Superior that tends to have a leaner body formation as compared to a fat lake trout that has a lesser market value.

30. ■Lean lake trout tags• means the plastic tags allotted to commercial fishermen for permanent tagging of each lean lake trout before commercial sale.

31. ■Management Zone 5" means that area of Lake Superior used by management agencies that is roughly, in an abstract form, defined by the west boundary as being just east of the Huron Islands to the east boundary of the Chocolay River in Marquette county, Michigan.

32. ■Marking tag• means a tag used to mark a net or associated lines.

33. ■Metal bands• means a circular, numbered band that is attached to a net for identification purposes.

34. ■Nets• means gill nets or impoundment gear.

35. ■Net marker• means a device used to mark a net in the water.

36. ■Off-reservation commercial waters• means that part of Lake Superior lying outside of those waters defined in ■on-reservation commercial waters• within home territory.

37. ■On-reservation commercial waters• means that part of Keweenaw Bay, Lake Superior, lying between the following described North and South boundary lines: (1) The

North boundary is an imaginary line approximately drawn between a point on the West shoreline of Keweenaw Bay which is due East of the intersection of the Beartown Road and US 41 in Baraga Township and Pequaming Point in L'Anse Township, more particularly described as beginning at the meander corner between Township 52 North, Range 33 West, Section 34 and Township 51 North, Range 33 West, Section 3; thence East across Keweenaw Bay to the meander corner, also being the point of termination of described line, between Township 52 North, Range 32 West, Section 32 and Township 51 North, Range 32 West, Section 5. (2) The South boundary is an imaginary line approximately drawn between a point on the West shoreline of Keweenaw Bay which is East of the Southerly intersection of Superior Avenue and US 41 in the Village of Baraga, Baraga Township and a point on the East shoreline of Keweenaw Bay which is due West of the intersection of Eastern Avenue and Main Street in the Village of L'Anse, L'Anse Township, more particularly described as beginning at the meander corner between Township 51 North, Range 33 West, Section 33 and Township 50 North, Range 34 West, Section 1; thence East to the meander corner, also being the point of termination of described line, between Township 51 North, Range 33 West, Section 35 and Township 50 North, Range 33 West, Section 5.

38. "Overall length" means the minimum distance between the extreme outside end of the bow and the stern considering the nearest whole number of feet.

39. "Pollution" means to make physically impure or unclean.

40. "Pot" means an enclosed framework of net mesh for catching fish and that part of the impoundment gear lifted to removed caught fish.

41. "Ring" means a device used on an impoundment net to connect the back of the pot to the headline.

42. "Small boat" means a vessel that is less than twenty-seven (27) feet in length from bow to stern.

43. "Small boat license" means a commercial fishing license issued by the Council to operate a small boat in on or off-reservation commercial waters.

44. "Staff buoy" means a device used to mark a net consisting of a metal or wood vertical staff surrounded by a foam-like substance that keeps it visible above the water's edge.

45. "Statistical grid" means a grid, approximately 10 miles x 10 miles, as indicated on standard U.S. Lake Survey Charts, (USEOP: 1973-761-578) and commonly used by governmental agencies in reporting fishing statistics.

46. "Stretched mesh size" means the width of a net twine when stretched to its maximum length so that opposing sides of the opening touch each other.

47. "Subsistence fishing license" means a temporary license issued by the Council to fish for fish species with a gill net or impoundment gear for a non-commercial purpose, not for profit.

48. "Subsistence fisherman" means person who fishes for non-commercial purpose by means of a gill net or impoundment gear.

49. "Subsistence fishing" means fishing with a gill net or impoundment gear for non-commercial purpose not for barter or sale.

50. "Target fishing" means fishing which has the effect of catching or taking a specific

species or several specific fish species.

51. ▪Trot-line▪ means a type of fishing gear that consists of a main fishing line that is stretched out and has a series of fishing lines that are hooked and baited off of the main fishing line.

52. ▪Vessel▪ means a boat or other vessel intended to be used on navigable waters.

History: Formerly 10.402, 10.409 (e), 10.414, & 10.415 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

▪10.202. Assessment Fishing Activities.

These regulations do not restrict assessment fishing activities by GLIFWC, employees of the Community under the supervision of the KBNRD or other entities authorized by the Council. Further, these regulations do not restrict stock assessment activities by a commercial fishermen with authorization from the Council.

History: Formerly 10.412 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

▪10.203. Commercial Fishing License.

Any person who shall engage in commercial fishing with a gill net or impoundment gear within the home territory without first obtaining a current and valid commercial fishing license issued by the Community shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days and a maximum fine of $1,500.00 or both.

History: Formerly 10.205 (a) & 10.404 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations, as amended on (date).

▪10.204. Commercial Fishing License; Application.

A. Any tribal member or member of a signatory tribe who wishes to engage in commercial fishing within the home territory may apply to the Council for a commercial fishing license.

B. An application may be obtained and submitted to the Licensing Clerk on oath when required and on a form provided by the first Monday in the month of February of each year.

C. The fee for a commercial fishing license shall be based upon the type of fishing proposed and on the size of the boat being used. The fee for a commercial fishing license for a person who is not a tribal member shall be 5 times the equivalent fee charged to a tribal member.

D. The application shall state the name and residence of the applicant, the manner in which he or she proposes to fish, the name or number of the vessel, and the overall length of the vessel. The application shall also include proof that the vessel the applicant will be using for commercial fishing purposes has passed a safety inspection by a certified tribal official or Coast Guard officer, certification of completion of the Hazard Analysis and Critical Control Point (HACCP) management training offered by the United States Food and Drug Association and a completed security background check form to check for outstanding conservation fines only.

E. The Licensing Clerk shall review the application and determine whether or not the application and supporting documentation are sufficient within seven (7) days of the application deadline.

F. The Licensing Clerk shall submit the complete application to the Director of the KBNRD who shall present the application to the Council along with the recommendation of the KBNRD for licensing within thirty (30) days after receiving the application.
G. The Council shall review the application and recommendation of the KBNRD for licensing and shall make a determination of approval or disapproval within seven (7) days after receipt of the application from the KBNRD.

•10.205. Commercial Fishing License Restrictions.
A. Any person who shall apply for a commercial fishing license shall not be eligible for the license if the person has any outstanding fines from the Court for fishing violations.
B. Any person who holds a commercial fishing license shall not be issued a subsistence fishing license.
C. Only one vessel shall be used for each commercial fishing license.
History: Formerly 10.404 **of May 2002 Fishing, Hunting, Trapping and Gathering Regulations;** as amended on (date).

•10.206. Approval of a Commercial Fishing License.
When a determination is made by the Council to approve the application, the Council shall send notice of approval along with the application and all other supporting documentation to the Licensing Clerk. The Licensing Clerk shall notify a commercial fisherman that their application has been approved within five (5) days. An applicant has forty-five (45) days to pick up the commercial license.
History: Formerly 10.404 (a) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations, as amended on (date).

•10.207. Denial of Application For Commercial Fishing License.
A. When a determination is made by the Council to deny the application, the Council shall send notice of such denial by certified mail to the applicant within five

(5) days of the denial.
B. A letter of denial shall include;
1. A statement informing the person that their application has been denied and the reasons why;
2. The remedial action required to comply with the applicable standards, if any;
3. A statement that the applicant may seek a formal hearing concerning the denial of the application before the Council within thirty (30) days of the date of the letter of denial.

•10.208. Identification.
Any person who shall engage in commercial or subsistence fishing within the home territory who shall fail to have in their possession a valid and current license therefore or who shall fail to make the license available for inspection by any Enforcement Officer upon the request of the Enforcement Officer shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $ 1,000.00 or both.
History: Formerly 10.205 (h) and 10.404 (g) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.209. Employees, Agents, Assistants and Helpers.
Any person who shall help a commercial or subsistence fisherman who shall not have in their possession at all times a valid enrollment card with photograph from a federally recognized Indian tribe or a helpers card issued by the Licensing Clerk and who shall not make such identification available for inspection by any Enforcement Officer upon the request of the Enforcement Officer shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.205 (h)(m) & 10.404 (c)(g) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.210. License Misrepresentation.
Any person who shall use fraud or misrepresentation in procuring a commercial or subsistence fishing license shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.

History: Formerly 10.205 (i) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.211. Sale of Fish Species at Retail Locations.
Any person who shall sell fish species for profit retail without first obtaining a business license from the Community or fails to comply with the applicable provisions of the FDA Food Code and HAACP management training regulations to that person•s operation for the sale of fish species at retail shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.404 (a) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.212. Allowing or Making Use of Another•s License.
Any person who shall allow another person or make use of another persons commercial or subsistence fishing license shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days and a maximum fine of $ 1,500.00 or both.
History: Formerly 10.205 (b)(c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.213 to 10.216]

•10.217. Wanton Waste of Fish Species.
Any person who shall wantonly destroy or waste any fish species caught with a net shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,500.00 or both.
History: Formerly 10.205(d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.218. Fish Species Remains Disposal.
Any person who shall dispose of fish species remains in a manner which causes a health hazard or constitutes pollution to either land or water shall be guilty of a civil offense.
History: Formerly 10.405 (c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.219. Protected Fish Species.
Any person who shall fish, possess, transport, catch, kill or aid or assist another in the same, any fish species defined as a protected animal by tribal law or an endangered species by federal law shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.205(e) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.220. Prohibited Methods of Catching Fish Species.
Any person who shall fish any fish species by the use of explosives, drugs, poisons, lime, medicated bait, or other deleterious substances, or by springs or cables or by any other prohibited means shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.201 (b) & 10.205 (f) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.221. Inspection of Fish and Gear.
Any person who shall use a net to fish and shall not allow the inspection of fish species or gear in one's possession upon the demand of a Enforcement Officer shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days or a maximum fine of $1,500.00 or both.
History: Formerly 10.205 (j)(m) & 10.405 (d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.222. Net Lifting; Presence Required.
Any person who shall hold a commercial or subsistence fishing license issued by the Community and who shall not be present when their nets are placed in and removed from the water shall be guilty of a civil offense.
History: Formerly 10.404(d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.223. Lost Nets.
All lost nets which are lost during commercial or subsistence fishing shall be reported by the owner thereof to a Enforcement Officer or the KBNRD within

eight (8) hours after discovery that the net has been lost. It is the responsibility of the owner to make every reasonable effort to locate and remove their lost net, and in no case shall the owner set additional net within forty-eight (48) hours after discovery that the net has been lost unless the lost net is first located and removed from the water. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.405 (b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.224. Emergency ■Net Lifting."
If a person is unable to lift their nets due to an emergency situation, the person may seek permission from the KBNRD or the President of the Council to have another commercial or subsistence fisherman to lift the nets. This permission shall be granted on a day-to-day basis to assure the fishery resources of the Community is not wasted. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.415 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.225. Fishing With Nets While Impaired.
Any person who shall fish with a net while impaired due to the consumption of alcohol or controlled substances shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.205(g) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.226. Nets in Lake Superior Only.
Any person who shall commercial fish or subsistence fish with a gill net or impoundment gear outside of the waters of Lake Superior within home territory shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.410 (d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.227 to 10.229]

•10.230. Area Restrictions on Gill Nets.

Any person who shall use a Gill Net:

1. Within one-fourth (1/4) mile from other nets for off-reservation commercial waters;
2. Closer than three hundred thirty (330) feet from shore line of Lake Superior;
3. Within one-fourth (1/4) mile from the mouth of any river, stream or tributary of an inland lake; or
4. Within two hundred (200) feet of another net for on-reservation commercial waters,

shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.

History: Formerly 10.407(a) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.231. Area Restriction; Keweenaw Bay.

Any person who shall fish with a net without the permission of the Council at the head of Keweenaw Bay, south of an imaginary line created by the land points of Wadaga Road and Eastern Avenue, shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.

History: Formerly 10.407 (b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.232. Gill Net Identification.

A. All gill nets utilized by any person shall have a clearly marked and visible net marker on one end and a clearly marked and visible staff buoy and flag on the other end. The net marker and staff buoy shall be permanently and legibly identified with the license number of the fisherman who set the gill net, and clearly marked with the initials "KB".

B. Any person using a gill net shall place metal bands attached to the float line in at least two locations on each gill get, within ten (10) feet of the beginning and end of each gill net. Metal bands will be supplied by the Licensing Clerk to all persons using gill nets on an as needed basis. The fisherman shall mark each metal band provided with "KB" and the enrollment number of the fisherman. Other marking methods maybe used in conjunction with the metal bands.

C. All gill nets set in off-reservation commercial waters during the time period from January 31st to March 31st shall be anchored with hook anchors and buoyed with at least one cedar pole or equivalent gear, to reduce the amount of gill nets that are set and lost due to shifting ice floes.
D. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.205 (m) & 10.408 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.233. Gill Net Restrictions.
A. Any person shall use gill nets with a stretched mesh size of:
1. Four and a half (4 1/2) inches or greater for lake trout, siscowet trout, salmon and whitefish;
2. Two and three-eighths (2 3/8) to three (3) inch for herring, menominees, and chubs; and
3. One (1) to one and a half (1 1/2) inches for rainbow smelt, except as otherwise restricted.
B. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.205 (m) & 10.409 (a)(b)(d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.234 to 10.240]

•10.241. Impoundment Gear Identification.
A. All impoundment gear utilized by any person shall be marked with a staff buoy on the pot at least four (4) feet exposed above the surface of the water that has a visible flag affixed at the top of the staff bearing the enrollment number of the fisherman who set the net and clearly marked with the initials ■KB•. In addition, the king anchor and inside end of the lead shall both be marked with a visible float not less than one gallon in size and shall also be permanently and legibly identified with the enrollment number and initials ■KB•.
B. Any person who shall use impoundment gear shall place one (1) marking tag on the bridle near the ring. The marking tags shall be supplied by the Licensing Clerk to all persons using impoundment gear. The fisherman

shall mark each marking tag with "KB" and the enrollment number of the fisherman.
C. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.205 (m) & 10.408 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

10.242. Impoundment Gear Restrictions.
A. A person shall use impoundment gear with a pot that has a stretched mesh size of:

1. Four and a half (4 1/2) inches or greater for lake whitefish and lake trout; or
2. Two and three-eighths (2 3/8) to three (3) inches for herring, chubs and menominees;

B. The minimum mesh size in the top of the hearts of the impoundment net shall be twelve (12) inches or greater to reduce the mortality to loons.
C. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.205(m) & 10.409(c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations, as amended on (date).

[Reserved 10.243 to 10.250]

10.251. Small Boat; Effort.
Any commercial fisherman with a small boat license who shall set more than:

1. One thousand two hundred fifty-five (1,255) feet of Gill Net at one time in on-reservation commercial waters;
2. Two (2) impoundment nets at one time in on-reservation commercial waters;
3. Four thousand (4,000) feet of Gill Net at one time in off-reservation commercial waters;
4. Four (4) impoundment nets at one time in off-reservation commercial waters,

shall be guilty of a civil offense, unless otherwise specified on the license or by special provision authorized in writing by the Council.

History: Formerly 10.205(m) & 10.409(f)(1)(2) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.252. Big Boat; Effort.

Any commercial fisherman with a big boat license who shall set more than twelve thousand (12,000) feet of gill net at one time or twelve (12) impoundment nets at one time shall be guilty of a civil offense, unless otherwise specified on the license or by special provision authorized in writing by the Council.

History: Formerly 10.205(m)& 10.409(f)(3)(4) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.253. Commercial Fishing; Catch Reporting and Sampling.

A. All commercial fishermen shall be required to submit monthly catch reports by the 15th of the following month to the KBNRD. Commercial fishermen are required to report in the catch report for each day of fishing:

1. The location of net on a statistical grid;
2. Length of gill nets lifted;
3. Mesh size of gill nets lifted;
4. Depth at which nets were set;
5. Poundage of each fish species caught and sold; and
6. Names and identification number of individuals fishing with the licensee.

B. All commercial fishing catch shall be subject to monthly biological sampling by KBNRD to obtain information required for conservation and management purposes. If such sampling impairs or destroys the market value of fish species sampled, the reasonable value of the loss shall be reimbursed by the agency conducting the sampling.

History: Formerly 10.405(a)(e) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.254. Failure to Submit Monthly Catch Report.

A commercial fisherman who shall fail to submit a monthly catch report shall be guilty of a civil offense and in addition shall have their license suspended for:

1. Fifteen (15) days following the first offense;

2. Thirty (30) days following the second such offense in a twelve (12) month period;
3. Sixty (60) days following the third such offense in a twelve (12) month period; and
4. Up to one year for subsequent offenses.

History: Formerly 10.205 (m)(n) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.255. Misrepresentation of Species Poundage; Small Boat.

Any commercial fisherman who holds a small boat license and who shall misrepresent species poundage on a catch report shall be guilty of a civil offense. The penalties for this civil offense shall be as follows:

1. On-reservation commercial waters:
   a. One dollar ($1.00) for each pound under-reported up to one hundred (100) pounds.
   b. Not less than one-hundred dollars ($100) and not more than one-thousand dollars ($1000) for under reporting in excess of one hundred (100) pounds.
   c. The fines in subsection 1.(a) and 1.(b) above shall be doubled if an individual is found to be in violation for under-reporting three (3) times in any twelve (12) month period.
2. Off-reservation commercial waters:
   a. One dollar ($1.00) for each pound under-reported up to two-hundred fifty (250) pounds.
   b. Not less than two-hundred fifty dollars ($250) and not more than two-thousand five-hundred dollars ($2500) for under-reporting in excess of two-hundred fifty (250) pounds.
   c. The fines in subsection 2.(a) and 2.(b) above shall be doubled if an individual is found to be in violation for under-reporting three (3) times in any twelve (12) month period.

History: Formerly 10.205 (m)(o)(1)(2) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.256. Misrepresentation of Species Poundage; Big Boat.

Any commercial fisherman who holds a big boat license who shall misrepresent species poundage on a catch report shall be guilty of a civil

offense. The penalties for this civil offense shall be as follows:

1. One dollar ($1.00) for each pound under-reported up to five hundred (500) pounds.
2. Not less than five-hundred dollars ($500) and not more than five-thousand ($5000) for under-reporting in excess of five-hundred (500) pounds.
3. The fines in subsection 1. and 2. shall be doubled if an individual is found to be in violation for under-reporting three (3) times in any twelve (12) month period.

History: Formerly 10.205 (m)(o)(3) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.257. Excessive Misrepresentation of Species Poundage; License Suspension.

Commercial fisherman found to have misrepresented species poundage on their monthly catch reports more than three (3) times in any twelve (12) month period shall have their license suspended for a period of not less than thirty (30) days and not more than one (1) year.

History: Formerly 10.205 (m)(p) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.258. Commercial Fishing Season Restrictions.

A. Management Zone 5 near Big Bay and Marquette shall be closed to commercial fishing for whitefish and lean lake trout from 11:59 p.m. October 31st to 11:59 p.m. November 27th of each year.

B. Except as indicated in Management Zone 5, all off-reservation commercial fishing for whitefish and lean lake trout shall be closed between 11:59 p.m., October 31st to 11:59 p.m., November 27th of each year.

C. Commercial fishing shall be prohibited within a one-half (.) mile radius of a river or stream mouth from 12:00 a.m., April 15th to 11:59 p.m., May 14th; and 12:00 a.m., October 15th to 11:59 p.m., November 14th of each year.

D. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.

History: Formerly 10.406 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.259. Legal Sizes of Commercial Fish Species.

A. A commercial fisherman shall not take, possess or sell any lake trout or lake whitefish of a length less than seventeen (17) inches, commercial fishing size restrictions for other fish species shall be established as necessary by the Council from time to time.

B. Commercial fishing for lake sturgeon shall be prohibited, however, incidental catch of two (2) lake sturgeon per license year is allowed provided the lake sturgeon is fifty (50) inches or greater in total length. All lake sturgeon taken by a commercial fisherman shall be registered and tagged with the Licensing Clerk.

C. Commercial fisherman may take undersize lake trout and restricted fish species, except lake sturgeon, for non-commercial use.

D. Any person who shall violate the provisions of this section shall be guilty of a civil offense.

History: Formerly 10.205 (m)& 10.410 (b)(e) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.260. Tagging of Lean Lake Trout.

All lean lake trout caught for a commercial purpose by a commercial fisherman shall be tagged with lean lake trout tags prior to removal from boat or frozen surface of Lake Superior and in any event prior to transportation from the water's edge. Any person who shall violate the provisions of this section shall be guilty of a civil offense.

History: Formerly 10.205 (m) & 10.410 (c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.261. Lost Lean Lake Trout Tags.

All lost lake trout tags shall be reported to a Enforcement Officer or the KBNRD within eight (8) hours of the discovery of the loss. Any person who shall violate the provisions of this section shall be guilty of a civil offense.

History: Formerly 10.405 (b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.262. Lean Lake Trout Catch; Exceeding Tags Allocated.

Any person who shall take or possess lean lake trout in excess of lean lake trout tags allocated by the KBNRD shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.

History: Formerly 10.205 (m) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.263. Sale of Prohibited Fish Species; Incidental Catch.

All fish species that are caught during commercial fishing and are not permitted to be taken by a commercial fisherman, if alive, shall be returned to the waters of Lake Superior, and if dead, shall not be sold commercially, but shall be used solely for the personal consumption of the fisherman•s family or his helpers. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.205 (m) & 10.410 (a)(d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.264 to 10.275]

•10.276. Commercial Bait Fishing License.

A. Any person who wishes to commercial fish for bait fish species only shall obtain a commercial bait fishing license. A commercial bait fishing may be obtained from the Licensing Clerk, upon approval of the President of the Council, such license shall be valid for a period of one (1) year.
B. Commercial bait fishing activities shall be restricted to on-reservation commercial waters with the use of a small boat.
C. A commercial fisherman with a small boat license shall not be issued a commercial bait fishing license.
C. A violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.413 (1)(6) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.277. Subsistence Fishing License.

A. A subsistence fishing license may be obtained from the Licensing Clerk, with the approval of the President, by persons who wish to fish for non-commercial purposes with a gill net or impoundment gear. A subsistence fishing license shall only be valid for a period of seven (7) days from the date of issuance and shall not be available to licensed commercial fisherman.
B. Any person who shall engage in subsistence fishing with a gill net or

impoundment gear within the home territory without first obtaining a current and valid subsistence fishing license issued by the Community shall be guilty of a civil offense.
History: Formerly 10.201(c), 10.404(b)f) & 10.411(c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.278. Subsistence Fishing; Gear.
A person shall use gill nets, impoundment gear, trot-lines, and any other gear approved for subsistence fishing by the Council. A violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.201(c)(d) & 10.411(a) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.279. Subsistence Fishing; Commercial Fishing Regulations Apply.
Unless specifically authorized by the Council in writing, commercial fishing regulations and standards apply to fishing with a gill net or impoundment gear for a non-commercial purpose.
History: Formerly 10.201 (c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.280. Subsistence and Commercial Bait Fishing Effort.
Any subsistence or commercial bait fisherman who shall:

1. Set more than six hundred (600) feet of gill nets at any one time, or
2. Set more than one (1) impoundment net at one time,

Shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days and a maximum fine of $1,000.00 or both.
History: Formerly 10.201 (d), 10.413 (5) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; amended on (date).

Chapter Three

Commercial Fishing Vessels

•10.301. Definitions.

As used in this chapter, the following words and phrases shall have the following meanings unless the context clearly requires a different meaning:

1. ▪Coast guard• means the United States Coast Guard.
2. "Commercial fishing• means to catch, take or kill, or attempt to catch, take or kill any commercial fish species for commercial purposes such as sale, exchange or barter, including all related activities which occur in or on the water, or immediately adjacent to the water's edge and in the process of loading or unloading fish species, nets, or related gear, in or from a boat or vehicle.
3. ▪Good working condition• means good working order and ready for immediate use and must have been inspected, cleaned, repaired and/or tested in accordance with manufacturer guidelines and U.S. Coast Guard rules.
4. "Operate" means to navigate or otherwise use a vessel on the water.
5. ▪Owner" means any person, other than a lien holder, who shall hold title to a vessel. The term "owner" includes a person entitled to the use or possession of a vessel subject to an interest in another person, reserved or created by agreement and securing payment or a performance of an obligation but the term excludes a lessee under a lease not intended as a security.
6. ▪Placard• means a metal card or plaque with instructions or which identifies something.
7. ▪Vessel• means a boat or other vessel intended to be used on navigable waters.

History: Formerly 10.601 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.302. Commercial Fishing Vessel; Equipment Requirements.

All vessels used for commercial fishing in the waters of home territory shall at all times carry the following equipment in good working condition:

1. Navigational Lights.

Navigational lights that are affixed to the vessel of the type and location on the vessel as specified in the Coast Guard navigation rules. All navigational lights must be illuminated between sunset and sunrise and during other periods of reduced visibility such as rain, fog or haze.

2. Visual Distress Signals.

   a. A distress signal kit, Coast Guard approval series 160-066-8-0, which contains three (3) hand flares, a dye marker, and one (1) distress flag, which is orange-colored canvas with a black square and circle; and

   b. A water-proof flashlight, which produces a beam of light which can be seen by the naked eye from a distance of one (1) mile.

3. Personal Flotation Devices (PFD).

   a. An orange-colored ring life buoy at least twenty-four (24) inches in size, or a buoyant boat cushion, Coast Guard approved Type IV PFD, with at least 60 (sixty) feet of line attached. Each buoy shall be marked with "KB" and the enrollment number of the license holder; and

   b. One (1) life jacket or vest, Coast Guard approved Type I or Type II PFD, for each person on the vessel, which has attached thereto a Coast Guard approved light. Each PFD shall be marked with "KB" and the enrollment number of the license holder; and

4. Emergency Positioning Indicating Radio Beacon (EPIRB).

   An emergency positioning indicating radio beacon (EPIRB) 406 MHz Category I, that is licensed by the Federal Communication Commission, if the vessel will be operating beyond three (3) miles from the coastline. The EPIRB shall be tested at least once every month and registered with the National Oceanic and Atmospheric Administration.

5. Survival Suit.

   One survival or immersion suit, Coast Guard approved, for each person on the vessel.

6. Ventilation System.

   If the vessel is carrying or using an inflammable or toxic fluid in any enclosure within the vessel, and if the vessel is not entirely

open to the natural air, an efficient ventilation system in good working condition, which shall be capable of removing gasses on a continuous basis from the vessel.

History: Formerly 10.601 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.303. Additional Equipment Requirements for Vessels 20 Feet in Length or Longer.

In addition to other requirements, any commercial fishing vessel which is twenty (20) feet or more in length shall also carry the following equipment, in good working condition:

1. Fire extinguisher.
   One (1) B-II or two (2) B-I hand portable fire extinguishers.
2. Radio.
   A VHF marine radio, with a current FCC SSL license, capable of transmitting an audible distress signal five (5) miles from the boat.
3. Horn or Whistle.
   A horn or whistle which shall produce a sound of sufficient volume to ensure audibility to the naked ear within one (1) mile of the boat.
4. Placards.
   Injury, Pollution and Garbage Placards as prescribed by the Coast Guard shall be visibly displayed upon entrance of deputized officers into each vessel.

History: Formerly 10.602 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.304. Additional Equipment Requirements for Vessels 40 Feet in Length or Longer.

In addition to other requirements, any commercial fishing vessel which is forty (40) feet or more in length shall carry the following equipment, in good working condition:

1. Machinery Space Fire Extinguisher.
   Three (3) B-1 OR one (1) B-1 and one B-2 hand portable fire extinguisher mounted in a bracket in the machinery space area

of the vessel

2. Coast Guard Documentation.
   Coast guard approved documentation must be carried at all times.
3. Numbering.
   Except for certain vessels exempted by the Coast Guard, self-propelled vessels of less than 5 tons must be numbered (33 CFR 173).
4. Buoyant Apparatus.
   Coast Guard approved floatation device that is designed to support a specific number of persons in the water, as specified by Coast Guard regulations.

History: Formerly 10.603 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.305 to 10.309]

•10.310. Enforcement by Coast Guard.
Coast Guard personnel are authorized to enforce the provisions of this Chapter on any person licensed by the Community and to cite violations to the Court.
History: Formerly 10.604 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date)

•10.311. Safety Boardings.
A. All commercial fishing vessels shall be inspected annually by a certified Enforcement Officer or Coast Guard officer prior to undertaking any fishing activity. Each vessel shall be checked for compliance with the required safety equipment required by this Chapter and shall display a proof of annual inspection decal affixed to the vessel's outer hull. During an inspection a person may request an exemption from the Enforcement Officer or Coast Guard for any required buoyant apparatus, immersion/survival suit or other Coast Guard requirement. If the exemption is issued by the Coast Guard, then the written exemption certificate must be carried on the vessel at all times. Any vessel not having required safety equipment shall be given seven (7) days to meet the requirements prior to the issuance of citations for violation of the provisions of this section.

B. The civil remedial penalty for each violation shall not be more than twenty-five dollars ($25) for the first offense, fifty dollars ($50) for the second offense, and one hundred dollars ($100) for the third offense.
C. No vessel which has been found to violate this section may be utilized for commercial fishing until its owner provides documentation to the Court that the violation has been remedied through the acquisition of and installation on the vessel, if required, of equipment for which the violation was adjudicated.
History: Formerly 10.605 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.312. Operation of Unnumbered Commercial Fishing Vessels Prohibited.

A. Every commercial fishing vessel operated on the waters of the home territory, shall have been issued a commercial fishing vessel registration certificate by the Community and shall have permanently set forth on each side of the bow of the vessel •KB• and the enrollment number of its owner, in letters and numerals not less than three inches in height. No person shall operate or give permission for the operation of any commercial fishing vessel on such waters unless the vessel shall conform with the provisions of this Chapter, applicable federal law, or a federally approved numbering system of another jurisdiction and unless:

1. The registration certificate assigning such number shall be in full force and effect; and
2. The identifying number set forth in such certificate shall be displayed on each side of the bow of the commercial fishing vessel in a manner comparable to the manner provided above.

Any person who shall violate the provisions of this section shall be guilty of a civil offense.

•10.313. Reckless or Negligent Operation of a Commercial Fishing Vessel.

Any person who shall operate any commercial fishing vessel in a reckless or negligent manner so as to endanger the life, limb or property of any person or who shall operate a commercial fishing vessel while intoxicated or under the influence of any controlled substance shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days

or a maximum fine of $1,500.00 or both.

•10.314. Collisions, Accidents and Casualties.

A. It shall be the duty of the operator of any commercial fishing vessel involved in a collision, accident, or other casualty, to the extent possible without placing his own vessel and crew in danger, to render to other persons affected by such collision, accident, or casualty such assistance as may be possible and necessary in order to minimize any danger to them resulting from the collision, accident or other casualty.

B. The operator of any commercial fishing vessel involved in a collision, accident, or other casualty shall provide his name, address, and identification of his vessel in writing to any person injured, or to any person whose property has been damaged, as a result thereof.

C. In the case of a collision, accident, or other casualty involving a commercial fishing vessel which results in death, personal injury, or damage to property in excess of $100.00, the operator shall make a report of the incident to the Coast Guard or the Keweenaw Bay Tribal Police forthwith.

D. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

•10.315. Full Liability.

The owner of a commercial fishing vessel shall be liable for any injury or damage occasioned by the negligent operation of such vessel, whether such negligence consists of a violation of the provisions of the Tribal Code, or consists of neglect in observing such ordinary care and such standards of operation as the rules of the common law shall require provided, however, that such liability shall not attach if the vessel is being operated at the time of the negligent act without the consent of the owner, unless the vessel is under the control of his spouse, or a member of his immediate family. Nothing contained herein shall be construed to relieve any other person from any liability which the person would otherwise have as a matter of law.

Chapter Four

Fishing

•10.401. Definitions.

As used in this chapter, the following words and phrases shall have the following meanings unless the context clearly requires a different meaning:

1. ▪Bait fish• or "bait fishing" means to engage in fishing solely for the purpose of catching bait fish species for a non-commercial purpose by use of a minnow trap, dip net or seine.
2. ▪Bait fish species• means rainbow smelt, lake herring, burbot, minnow, sucker and chub species.
3. ▪Commercial fishing license• means a license issued by the Council to fish for commercial species that allows the holder to capture, take, catch, kill, sell, barter, or transport or cause to transport or deliver or receive for transportation any package or parcel containing a fish species or fish species parts, or have in his possession or under his control for the purposes of sale or barter any commercial fish species.
4. "Dam" means a barrier to obstruct the flow of water, especially one of earth or masonry, built across a stream or river.
5. ▪Dip net• means a hand net without walls that is lifted vertically.
6. ▪Fish species• means vertebrate organisms that live in an aquatic environment.
7. ▪Fish• or ▪fishing• means to catch, take or kill, or attempt to catch, take or kill any fish species for a non-commercial purpose, including all related activities which occur in or on the water, or immediately adjacent to the water's edge and in the process of loading or unloading fish species, nets, or related gear, in or from a boat or vehicle.
8. "Game fish species" means lake trout, brook trout, brown trout, rainbow trout, steelhead, splake, coho, chinook, pink or atlantic salmon, largemouth bass, smallmouth bass, walleye, sauger, northern pike, muskellunge, tiger muskellunge, lake sturgeon, bluegill, sunfish, crappie, rock bass, yellow perch, white bass, lake whitefish, menominee whitefish, catfish species, rainbow smelt, herring and chubs.

9. "Gill net" means gear designed to capture fish species by means of entanglement. A "gang of nets" is more than one gill net tied in a series. This gear shall be composed of a buoy and float, anchors, and gill net(s).
10. •Hook• means a single, double or treble pointed hook. A hook, single, double or treble pointed, attached to a manufactured artificial bait shall be counted as one hook.
11. •License year• means a period of one year beginning May 1st and ending April 30th of the subsequent year.
12. "Minnow trap" means impoundment gear used for taking minnows for bait that does not exceed eighteen (18) inches in length, with an opening for the entrance of fish that does not exceed one (1) inch in diameter.
13. "Pier" means a structure built to extend from land out over water, used as a landing place for ships or boats.
14. •Protected fish species• means fish species that are protected by the Community, generally, these species have low population numbers.
15. "Seine" means a net with sinkers on one edge and floats on the other that hangs vertically in the water and is used to enclose fish when its ends are pulled or drawn together.
16. •Streams• means tributaries of a lake, creeks, or rivers.
17. •Subsistence fishing license• means a license issued by the Council to fish for fish species for a non-commercial purpose and not sale.

History: Formerly 10.505 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.402. Fishing License.

Any person who shall engage in fishing within the home territory without a current and valid fishing license issued by the Community shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

History: Formerly 10.102 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.403. Identification.

Any person who shall be engaged in fishing within home territory who shall fail to have in their possession a valid and current fishing license and who shall fail to make the license available for inspection by any Enforcement Officer upon the request of the Enforcement Officer shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.205(g) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.404. License Misrepresentation.
Any person who shall use fraud or misrepresentation in procuring a fishing license shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.205 (h) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.405. Allowing or Making Use of Another Tribal Fishing License.
Any person who shall allow another person to use his or her fishing license or who shall make use of another persons fishing license shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.205 (a)(b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.406. Sale of Game Fish Species.
A. Any person who shall catch a game fish species for a non-commercial purpose and shall sell the game fish species caught within the home territory without having been issued a current and valid commercial fishing license shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
B. This prohibition contained in this section shall not preclude the incidental non-commercial sale of fish spawn.
History: Formerly 10.205(f) & 10.404(a) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.407 to 10.409]

•10.410. Fishing Seasons.

A. During the dates designated in this section, a person may fish for the following fish species in the waters of the home territory:

1. Largemouth and smallmouth bass, sauger, muskellunge, tiger muskellunge, northern pike: all waters are open 12:00 a.m., May 15th to 11:59 p.m. March 31st, and closed thereafter, or
2. Lake sturgeon:
   a. Inland Lakes - No closed season;
   b. Streams -
      Open 12:00 a.m., August 1st to 11:59 p.m., April 30th; and
      Closed 12:00 a.m., May 1st to 11:59 p.m., May 31st;
   c. Lake Superior -
      Open 12:00 a.m., July 1st to 11:59 p.m., April 30th; and
      Closed 12:00 a.m., May 1st to 11:59 p.m., June 30th.

B. A person may fish all other game fish species in the waters of home territory at any time.

C. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

History: Formerly 10.506 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.411. Protected Fish Species.

Any person who shall fish, possess, transport, or aid, assist, or abet in the same, any fish species defined as a protected animal by tribal law or an endangered species by federal law shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

History: Formerly 10.205(d) & 10.506 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.412. Special Fishing Provisions; Pricket Dam; Craig Lake.

A. Any person who shall fish any fish species in the Sturgeon River from the Prickett Dam spillway to one-half (.) mile downstream between 12:00 a.m., April 1st to 11:59 p.m., June 30th shall be guilty of a Class D misdemeanor,

punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both. This provision represent the Community's approval of the State of Michigan's regulation to protect the unique trophy fishery which exists at these areas, and does not imply any authority over an Indian person by the State of Michigan when such person is exercising a treaty right.
B. Any person who shall violate a provision contained in State of Michigan law or the Michigan Department of Natural Resources regulations pertaining to seasons, size limits, take and possession limits, methods of taking, and authorized gear and bait pertaining to the Craig Lake State Park shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.204 & 10.511(a)(b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.413. Restricted Lakes and Streams; Parent Lake.
Any person who shall spear fish in Parent Lake, located in Baraga County, from 12:00 a.m., April 1st to 11:59 p.m., May 31st shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.511(c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended (date).

•10.414. Fishing On Experimental Lakes Prohibited.
Any person who shall fish in any inland lake which shall be designated as an experimental lake by the Community or the United States for any purpose whatsoever shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.204 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.415 to 10.420]

•10.421. Legal Sizes of Fish Species.
A. A person shall not fish or possess any of the following:

1. Any trout or salmon of a length less than 10 inches when taken from Lake Superior or inland lakes or 7 inches when taken from streams, or
2. Lake sturgeon of a length less than 50 inches on all waters.

B. A person may fish or possess all sizes of all other game fish species.
C. Any person who shall fish or possess any fish species of a length less than described above shall be guilty of a civil offense.
History: Formerly 10.205 (m) and 10.507 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.422. Creel Limits.
A. A person shall not in a single day fish or have in their possession at any time more than the number of fish species stated below:
1. Lake trout and splake: ten (10) species in combination.
2. Brook trout: ten (10) species.
3. Rainbow trout, steelhead and brown trout: six (6) per species.
4. Largemouth bass, smallmouth bass, walleye, sauger, northern pike: five (5) per species.
5. Walleye during the special spring walleye season (12:00a.m., April 15th to 11:59 p.m., May 14th): ten (10) species.
6. Muskellunge and tiger muskellunge: one (1) per species.

B. A person shall not in a single license year fish or possess at any time more than two (2) lake sturgeon over 50 inches. All lake sturgeon must be registered and tagged by the Licensing Clerk.
C. A person may fish or have in their possession at any time any number of all other game fish species.
D. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.205 (e)& 10.508 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.423. Walleye; Spring Spearing Season; Creel; Possession Limit.
A. There shall be a special spring walleye spearing season which opens 12:00 a.m., April 15th and closes 11:59 p.m., May 14th.

B. The creel limit for walleye during the special spring walleye spearing season shall be ten (10) per species.
C. A person who shall spear walleye between sunset and sunrise during the special spring walleye season may possess twenty (20) walleye after midnight (12:00 a.m.), provided that the person does not exceed the walleye creel limit of ten (10) per species before midnight (12:00 a.m.). Any walleye taken after midnight (12:00 a.m.) shall count toward that day's creel limit of ten (10) per species.
D. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.509 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.424. Isle Royale; Possession Limit.
On Isle Royale National Park, possession limit is equal to the creel limit multiplied by the number of days spent on Isle Royale for any consecutive number of days. A National Park Service visitor permit is needed for confirmation. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.509 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.425. Wanton Waste of Fish Species.
Any person who shall wantonly destroy or waste fish species shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.205(c) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.426 to 10.429]
•10.430. Gear and Method Restrictions.
A. At any given point in time, a person may only use the following gear or any combination thereof, provided that all gear must be under the immediate control of the person and the person does not exceed the permitted maximum for each type of gear specified:

1. Three (3) fishing poles;
2. Two (2) spears;

3. Six (6) tip-ups;
4. Two (2) hand-lines;
5. One (1) Bow with arrows;
6. One (1) Cast net;
7. One (1) Trotline on Lake Superior only not to exceed 360 feet with baited hooks.

B. A dip net may be used, in combination with any of the above gear, to fish for rainbow smelt.

C. Protective shelters left on the ice overnight shall be permanently identified with "KB" and the enrollment number of the person in black letters three inches high on one exterior wall. Fish traps must be identified with ■KB• and the tribal members enrollment number. Trotlines must be identified with ■KB• and the tribal members enrollment number at both ends of the line.

D. A person may snag game fish species with a hook.

E. A person may spear game fish species at night while using an artificial light.

F. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

History: Formerly 10.510(a)(b)(c)(e)(f)(g) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.431. Gear; Bait Fishing a Non-Commercial Purpose.

A. Any person who shall bait fish for a non-commercial purpose may use seines, dip nets and minnow traps provided that the seines and minnow traps are permanently identified with ■KB• and the enrollment number of the person.

B. Gill nets may be used while bait fishing for non-commercial purpose provided that a subsistence fishing license has been obtained as provided in this title.

C. Any person who shall violate the provisions of this section shall be guilty of a civil offense.

History: Formerly 10.413 & 10.510(c)(d) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.432. Prohibited Methods of Fishing.
Any person who shall fish any fish species by the use of an explosive substance, drugs, poisons, lime, medicated bait or combination of substances that have a tendency to kill or stupefy fish species, or by springs or cables or by any other prohibited means shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.201 (b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.433. Inspection of Fish and Gear.
Any person who shall not allow the inspection of fish species or gear in one's possession by a Enforcement Officer upon the demand of a Enforcement Officer shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.205(i) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

Chapter Five

Hunting and Trapping

•10.501. Definitions.
As used in this chapter, the following words and phrases shall have the following meanings unless the context clearly requires a different meaning:

1. "Big game" means bear and deer.
2. ■Bow• means a device such as a longbow, recurve bow, or compound bow that is hand drawn and hand held at full draw without the aid of any mechanical device or triggering device.
3. ■Cross-bow• means a device consisting of a bow fixed transversely on a stock having a trigger mechanism to release the bowstring, and often incorporating or accompanied by a mechanism for bending the bow.
4. ■Elder• means a person who is sixty-five (65) years of age or older.
5. "Firearm" means a device from which a projectile may be propelled by using explosives, gas, or air as a means of propulsion.
6. ■Flesh• means the soft tissue of a game animal excluding pelts and furs.
7. ■Fur bearing animal" includes otter, fisher, marten, mink, weasel, muskrat, beaver, opossum, badger, raccoon, fox, coyote, bobcat, and skunk.
8. "Game" means big game, small game, game birds, and fur bearing animals.
10. ■Game birds• means migratory game birds and upland game birds.
11. ■Handicapped• or ■disabled• means a medical infirmity that precludes a person from engaging in normal hunting activities.
12. ■Hunt• and ■hunting• means to take, trap, hunt, shoot, kill, purse, or have in possession, or attempt to take, trap, hunt, shoot, kill, or pursue an animal by the use of a weapon.

13. ▪Hunting and trapping license▪ means a license issued by the Community to authorize a person to hunt and trap within home territory.
14. ▪Licensed adult▪ means a person eighteen years of age or older who possesses a current and valid hunting or trapping license from a competent jurisdiction.
15. ▪Migratory game bird▪ means all bird species that migrate and are classified as migratory game birds by the United States Fish and Wildlife, including but not limited to duck species, geese species, mergansers, coots, sora, rail, woodcock, snipe and doves.

16. "Small game" means rabbit species, squirrel species, and raccoon.
17. ▪Trap▪ and ▪trapping▪ means to capture, trap, snare, and net fur bearing animals by use of a trap or other device used to take fur bearing animals, including every attempt to take and every act of assistance to any person in taking or attempting to take a fur bearing animal by means of entrapment.
18. ▪Upland game bird▪ means all bird species that do not migrate such as ruffed grouse (partridge) pheasant and quail.
19. "Wild animal" means all creatures , not human or domestic, wild by nature, and includes quadrupeds, mammals, birds, fish, amphibians, reptiles, crustaceans and mollusks.

History: Formerly 10.101, 10.512 and 10.301 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

▪10.502. Hunting and Trapping License.

Any person who shall engage in hunting and trapping within the home territory without a current and valid hunting and trapping license issued by the Community
shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.504 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

▪10.503. Hunting and Trapping License; Minors.

A. Any person under the age of eighteen (18) years must submit proof to the Licensing Clerk that the person has passed a recognized Hunter's Safety Course before a hunting and trapping license will be issued.
B. Any person under the age of fifteen (15) years shall be issued a free hunting and trapping license.
C. Any person under the age of fourteen (14) years shall be supervised by a licensed adult while hunting big game but shall be allowed to hunt small game without supervision.
D. Any person under the age of twelve (12) years shall not hunt or trap within the home territory.
E. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.102(a)(b) & 10.517 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.504. Identification.
Any person who shall be engaged in hunting or trapping within home territory who shall fail to have in their possession a valid and current hunting or trapping license and appropriate tag or who shall fail to make the license or tag available for inspection by any Enforcement Officer upon the request of the Enforcement Officer shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.102 (a), 10.504, 10.513(n) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.505. Hunting Permits for Community and Ceremonial Activities.
Hunting permits may be issued by the President to tribal members for ceremonial or Community events upon request. Hunting permits for Community and ceremonial activities shall only be effective for a period not to exceed three (3) days.
History: Formerly 10.518 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.506. Stationary Vehicle Permit.

Any person who shall hunt from a stationary vehicle without a Stationary Vehicle Permit shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000 or both.
History: Formerly 10.520 & 10.521 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.507. Stationary Vehicle and Special Assistant Permit Application and Issuance.

A. An elder, handicapped or disabled person may obtain a Stationary Vehicle Permit or Special Assistant Permit by applying to the Licensing Clerk. Each applicant shall:

1. Identify which type of permit they are requesting;
2. Submit proof they have obtained a valid tribal hunting license;
3. As applicable, submit proof of age or submit medical documentation establishing the person has a medical infirmity that precludes the person from engaging in normal hunting activities; and
4. As applicable, identify and submit proof of a valid tribal hunting license possessed by the tribal member who the applicant has designated to be authorized to fill the deer tags of the elder, handicapped or disabled persons.

B. Every stationary vehicle permit and special assistant permit issued by the Licensing Clerk, shall be subject to the approval of the President.
History: Formerly 10.520 & 10.521 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.508. Stationary Vehicle Permit; Restrictions.

A. Any person who is authorized to hunt from a stationary vehicle shall not:

1. Hunt from a vehicle that is located on a public road or highway; or
2. Discharge a firearm or other hunting device across or parallel to the roadway.

B. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.520 & 10.521 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.509. Special Assistant Permit; Requirements and Restrictions.

A. Any tribal member authorized to fill the deer tags of a tribal member who has been issued a Special Assistant Permit shall:

1. Only fill the tags of one (1) person with a valid Special Assistant Permit per season, and
2. Within forty-eight (48) hours of a kill,
   a. Register the animal with the Licensing Clerk or an Enforcement Officer, and
   b. Permit the physical inspection of the animal by the Licensing Clerk or an Enforcement Office, prior to processing the animal.

B. Any elder, handicapped or disabled person who obtains a Special Assistant Permit shall sign and file with the Licensing Clerk a form verifying receipt of the deer from the tribal member within thirty (30) days after the date the deer was taken.

C. A violation of the provisions of this section shall constitute a civil offense.

History: Formerly 10.520 & 10.521 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.510. License Misrepresentation.

Any person who shall use fraud or misrepresentation in procuring a hunting and trapping license, Stationary Vehicle Permit or Special Assistant Permit shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days or a maximum fine of $2,000.00 or both.

History: Formerly 10.308 (h) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.511. Allowing or Making Use of Another Tribal Hunting or Trapping License.

Any person who shall allow another person to use his or her hunting or trapping license or who shall make use of another persons hunting or trapping license shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

History: Formerly 10.308 (a)(b)of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.512. Possession or Transportation of Game.
Any person who shall possess or transport game, furs, or hides, or axillary parts thereof who does not have a valid and current hunting and trapping license in his or her possession shall be guilty of a civil infraction.
History: Formerly 10.102 (a) and 10.303 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.513 to 10.525]

•10.526. L•Anse Reservation and Ontonagon Reservation Bear Hunting; Limitation.
Any person who is not a member of the Community shall not hunt a bear within the boundaries of the L•Anse Reservation. A violation of the provision of this section shall constitute a Class A misdemeanor, punishable by a maximum period of incarceration of 365 days or a maximum fine of $5,000.00 or both.

•10.527. Inspection of Game.
Any person who shall not allow the inspection of any game, hides, pelts, or fur in the person•s possession upon the demand of a Enforcement Officer shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days an a maximum fine of $1,500.00 or both.
History: Formerly 10.308 (i) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.528. Sale of Game.
A. Any person who shall engage in the barter or sale of the flesh of any game shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
B. This section shall not be construed to include those animals defined as a •fur bearing animal• which are trapped under the provisions of this title.
History: Formerly 10.302 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.529. Wanton Waste of Game.

Any person who shall wantonly maim, destroy or waste game shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.308 (c) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.530. Animals Fleeing From Fire.
Any person who shall set afire or assist in setting afire a marshland or other lands for the purpose of driving out wild animals or who shall take or attempt to take a wild animal driven out of a marshland or land which is on fire shall be guilty of a Class A misdemeanor, punishable by a maximum period of incarceration of 365 days or a maximum fine of $5,000.00 or both.
History: Formerly 10.513 (d) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.531. Endangered Species and Protected Animals.
Any person who shall hunt or trap an endangered or threatened species or a protected animal shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days an a maximum fine of $1,500.00 or both.
History: Formerly 10.308 (d), 10.513 (j) and 10.519 (d) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.532 to 10.545]

•10.546. Prohibited Methods of Taking Game.
A. Any person who shall:
    1. Take game by the use of explosives, drugs, poisons, lime, medicated bait, or other deleterious substances; or
    2. Make use of a pit, pitfall, dead-fall, cage, net, baited hook, or similar device, or a drug, poison, chemical, smoke, gas, explosive, electrical device or mechanical device, except for traps, for the purpose of injuring, capturing, or taking game.

shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days or a maximum fine of $1,500.00 or both.

B. For the purpose of this provision, a mechanical device shall not be construed to mean a firearm, slingshot, bow and arrow, or crossbow.
History: Formerly 10.304 (a) and 10.513 (b) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.547. Prohibited Hunting Gear.
Any person who shall:

1. Utilize recorded animal calls for hunting wild turkey or waterfowl; or
2. Live decoys,

shall be guilty of a civil offense.
History: Formerly 10.513 (o) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.548. Hunting and Trapping; Prohibited Areas.
Any person who shall hunt or trap any wild animal within a recreation area, public campground, public beach, picnic area, or safety zone, without the specific written permission of the owner, shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.513(g) and (h) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.549. Hunting or Trapping While Under the Influence of Alcohol.
A. Any person who shall hunt or trap while that persons physical condition is impaired due to the influence of alcohol or a controlled substance shall be guilty of a Class C misdemeanor, punishable by a maximum period of incarceration of 90 days or a maximum fine of $1,500.00 or both.
B. For the purposes of this section impaired physical condition by alcohol shall be deemed to have occurred if the person•s blood contains in excess of 0.07% or more by weight of alcohol.
History: Formerly 10.308 (f) & 10.513 (s) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.550. Possession or Transportation of a Firearm, Bow or Cross-bow.

Any person who shall possess or transport afield a firearm, bow and cross-bow during the big game season who does not have a valid and current hunting and trapping license and a valid tag in his or her possession shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.102 (a) and 10.513(n) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.551 to 10.560]

•10.561. Hunting Season.
A. During the following designated dates a person with a hunting and trapping license may hunt the following animal species in the home territory:

1. Wild Turkey:
   Spring season - 12:00 a.m., April 1st to 11:59 p.m., May 31st.
   Fall season - 12:00 a.m., September 1st to 11:59 p.m., December 31st.
2. Deer: 12:00 a.m., September 1st to 11:59 p.m., December 31st.
3. Bear: 12:00 a.m., September 1st to 11:59 p.m., December 31st.
4. Small game: 12:00 a.m., September 1st to 11:59 p.m., March 31st.
5. Upland game birds: 12:00 a.m., September 1st to 11:59 p.m., March 31st.
6. Migratory game birds: Refer to the Code of Federal Regulations.

B. Any person who take any of the animal species described above before or after the applicable hunting seasons specified above shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.514(a) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.562. Hunting; Game Limits.
The taking of any of the following species shall be limited as follows:

1. Deer: During the deer hunting season four (4) deer of either sex may be taken with a firearm, bow and arrow or crossbow, unless otherwise authorized by the Council. Visitors who are hunting on the L•Anse Reservation and Ontonagon Reservation with a visitors permit

may take only one (1) deer of either sex with a firearm, bow and arrow or crossbow.

2. Bear: During the bear hunting season only one (1) bear may be taken by a licensed person. The taking of bear on the L'Anse Reservation and Ontonagon Reservation shall be limited to tribal members only.

3. Wild Turkey: During the wild turkey hunting season, only two (2) wild turkeys may be taken.

4. Small Game: During the small game hunting season, the taking of small game shall be limited to five (5) of each species per day and no licensee shall possess or transport more than ten (10) of each species at any one time.

5. Upland Game Birds: During the upland game bird hunting season, the taking of small game shall be limited to five (5) of each species per day and no licensee shall possess or transport more than ten (10) of each species at any one time.

6. Migratory Game Birds: Refer to the Code of Federal Regulations.

7. Other Game: There are no hunting game limits for any other wild animals.

E. Any person who shall violate the provisions of this section shall be guilty of a Class C misdemeanor, punishable by a maximum penalty of 90 days in jail or a maximum fine of $1,500.00 or both.

History: Formerly 10.308 (e) and 10.515 (a)(b)(c)(g) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.563. Hunting; Issuance of Tags.

A. Two (2) deer tags will be issued by the Licensing Clerk at the time a hunting and trapping license is purchased. A person may purchase two additional deer tags at a fee set by the Council, if the first two (2) deer tags have been utilized and registered as required. B. Upon request by a person holding a hunting and trapping license, a bear tag will be issued by the Licensing Clerk.

C. Upon request by a person holding a hunting and trapping license, a wild turkey tag will be issued by the Licensing Clerk.

•10.564. Hunting; Tagging and Registration.

A. All deer, bear and wild turkeys taken shall be affixed with a tag provided by the Licensing Clerk when the animal is taken. Tags must be securely attached to the gambrel or ankle of the animal immediately upon the taking of the animal and prior to transportation from the area of the taking. Transportation of the deer, bear or wild turkey shall be restricted to only the tribal member who takes the deer, bear, or wild turkey and who was issued the tag affixed to the animal. All deer, bear and wild turkey taken shall be registered with the Licensing Clerk or an Enforcement Officer within seven (7) days of the taking.
B. A violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.516 (a)(c)(d) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.565. Blaze Orange During Daylight Hours.
A. All persons hunting deer, bear and upland game birds shall wear in an easily visible manner, a vest, jacket or cap of the highly visible color commonly referred to as hunters orange or flourescent blaze orange between September 1st and January 1st during daylight hours.
B. All persons engaged in hunting or trapping between November 15th and December 1st shall wear in an easily visible manner, a vest, jacket or cap of the highly visible color commonly referred to as hunters orange or flourescent blaze orange.
C. A violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.517(a) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.566. Hunting; Weapon Restrictions.
A. Any person who shall while hunting:
1. Have in the person•s possession or use an apparatus known as a silencer; or
2. Have in the person•s possession or in an area frequented by wild animals a semi-automatic, auto-loading shotgun or rifle, other than .22 caliber rimfire, capable of holding more than ten (10) shells at one (1) time in the magazine and barrel combined; or
3. Use a cartridge containing a tracer bullet or cartridge containing an explosive bullet; or

4. Hunt big game with a firearm capable of firing a rim-fire cartridge; or
5. Utilize a fully automatic firearm,

Shall be guilty of a Class C misdemeanor, punishable by a maximum penalty of 90 days in jail or a maximum fine of $1,500.00 or both.

B. Any person who shall hunt with a bow having a draw weight less than forty-five (45) pounds or a crossbow with a draw weight less than one hundred (100) pounds shall be guilty of a civil offense.

History: Formerly 10.513 (a)(c)(p) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.567. Hunting; Gear.

A. A person may:

1. Use an artificial light during the deer hunting season (12:00 a.m., September 1st to 11:59 p.m., December 31st.), outside of a safety zone; or
2. Use a manufactured hunting blind provided that the hunting blind shall be permanently identified with "KB" and enrollment number of the tribal member and clearly visible on all sides.

B. A violation of the provisions of this section shall constitute a civil offense.

History: Formerly 10.513 (l)(m) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.568. Hunting; Methods.

A person may:

1. Use bait when hunting for deer; or
2. Hunt from a raised platform scaffold, portable raised platform, or tree.

History: Formerly 10.513 (b)(e) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.569. Hunting With Dogs.

A. Any person who shall while hunting:

1. Use more than six (6) hunting dogs afield; or
2. Use dogs to hunt deer or wild turkey,

shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1.000.00 or both.

B. Any person who utilizes hunting dogs, afield is required to have each dog:

1. Vaccinated against rabies; and
2. Identified with a collar and a tag that is marked with the enrollment number of the tribal member utilizing the dog,

a violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.513 (f) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.570 to 10.5100]

•10.5101. Trapping Seasons.

A. During the following designated dates a person with a hunting and trapping license may trap the following animal species in home territory:

1. Mink and Muskrat: 12:00 a.m., October 1st to 11:59 p.m., May 15th.
2. Bobcat: 12:00 a.m., October 1st to 11:59 p.m., March 31st.
3. Beaver and Otter: 12:00 a.m., October 15th to 11:59 a.m., May 15th.
4. Marten: 12:00 a.m., December 1st to 11:59 p.m., December 31st.
5. Fisher: 12:00 a.m., December 1st to 11:59 p.m., January 15th.
6. Other fur bearing animals: All other fur bearing animals not listed may be taken by trap between 12:00 a.m., September 1st to 11:59 p.m., March 31st.

B. Any person who shall take any of the animal species described above before or after the applicable trapping season specified above shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.514 (a) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.5102. Trapping Limits of Fur Bearing Animal.

A. The taking of any of the following species shall be limited as follows:

1. Otter: During the otter trapping season only five (5) otter may be taken.
2. Marten: During the marten trapping season only five (5) marten may be taken.
3. Fisher: During the fisher trapping season only ten (10) fisher may be taken.

4. Bobcat: During the bobcat trapping season only five (5) bobcat may be taken.
5. Racoon: During the fur bearing animal season only five (5) racoon may be taken.
6. Other fur bearing animals: No limit.

B. Except as provided above, no other animals may be trapped.

C. Any person who shall discover a trapped animal in his or her trap which exceeds the season limits or is an endangered species or protected animal shall immediately notify the Keweenaw Bay Natural Resource Department or an Enforcement Officer of the details concerning the trapped animal.

C. Any person who shall violate the provisions of this section shall be guilty of a civil offense.

History: Formerly 10.515 (d)(e)(f)(h) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.5103. Traps and Hides; Registration.

A. All traps set, shall be permanently and clearly marked with "KB" and the tribal enrollment number of the person setting the traps.

B. All fur-bearing animals, and hides and furs thereof shall be registered with the Licensing Clerk and tagged with a fur-bearing animal tag within five (5) days after the animal has been harvested.

C. Fur bearing animal tags shall be clearly marked with "KB" and the tribal enrollment number of the person to whom the fur bearing animal and hides and furs thereof shall belong.

D. A fur bearing animal tag must be attached to each pelt. A person shall not remove a tag until the pelt is processed or tanned, nor shall a person possess or transport a raw fisher, marten, bobcat or otter hide more than five (5) days after the animal was harvested without a fur bearing animal tag attached.

E. A violation of the provisions of this section shall constitute a civil offense.

History: Formerly 10.305 and 10.516(b) of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.5104. Possession, Sale and Transportation of Hides, Pelts, and Furs.

Any person who shall have been issued a current and valid hunting and trapping license may possess, sell or transport any hides, pelts of furs. A violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.306 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.5105. Shipping Hides, Pelts or Fur.
A. Any person who shall have been issued a current and valid hunting and trapping license, who wishes to ship hides, pelts, or fur by common carrier or by any other method where the actual possession thereof during transportation shall not be with the person possessing a hunting and trapping license, shall:

1. Securely wrap or pack the hides, pelts or fur; and
2. Clearly print on the outside of each shipping package:
    a. the name of the trapper (shipper),
    b. the address of the trapper (shipper),
    c. ■KB• and the enrollment number of the trapper (shipper), and
    d. the number and variety of hides, pelts or furs contained in the package.

B. Any bill of lading or receipt from any common carrier or other shipping company who shall transport hides, pelts, or furs, for the trapper (shipper) shall specify the same information concerning the trapper (shipper) as shall be set forth on the shipping package. C. A violation of the provisions of this section shall constitute a civil offense.
History: Formerly 10.307 of the May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

Chapter Six

Plant Gathering

•10.601. Definitions.
As used in this chapter, the following words and phrases shall have the following meanings unless the context clearly requires a different meaning:

1. ■Active timber sale area" is generally indicated by logging equipment, stacked wood, or trees cut into eight (8) -foot lengths. It is the tribal member's responsibility to be certain about an active timber sale area. Any uncertainty in determining the existence of an ■active timber sale area• should be resolved by contacting the local National Forest Service District office or BIA Agency Forester.
2. ■BIA• means Bureau of Indian Affairs.
3. ■Campground• means a parcel or tract of land under the control of a person in which sites are offered for use by the public or members of an organization, either free of charge or for a fee, for the establishment of temporary living quarters for recreational units.
4. "Commercial harvesting" means the products of timber and plant harvesting that are traded, sold, or exchanged for goods, money, or services.
5. ■Gathering permit• means a permit issued by the Community allowing non-members to gather medicinal plants.
6. ■Gathering• means the harvesting of wild plants by a person.
7. ■Medicinal plant gathering• means the harvesting of wild plants used for traditional or medicinal purposes.
8. ■Membership card• means documentation from a federally recognized Indian tribe that identifies a person as being an enrolled member of such tribe.
9. ■Permit• means any permit issued by the Council or the Bureau of Indian Affairs.

10. ▪Princess pine• means Lycopodium obscurum, L. dendroidium, L. Hickeyi.

11. "Prohibited areas" means National Forest Research Natural Areas, campgrounds and administrative sites of the Ottawa National Forest, and safety zones on the L▲Anse Reservation and Ontonagon Reservation.

12. ▪Safety zone• means any area within one hundred fifty (150) yards of any occupied dwelling house, residence, or any other building, cabin, camp, or cottage or any barn or other building used in connection therewith.

13. "Wild plants" means any undomesticated species, or part thereof, of the plant kingdom occurring in the natural ecosystem, but excludes threatened and endangered plant species protected and defined by Federal law, or described in the Endangered and Threatened Wildlife and Plants, published by the United States Fish and Wildlife Service in August, 1993, (50 CFR 17.11 &17.12) as revised.

14. ▪Wild Rice Chief• means the person designated by the Council to determine when the wild rice is to be harvested.

History: Formerly 10.803 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.602. Wild Plant Gathering.

Members of a signatory tribe may gather wild plants within the home territory subject to the restrictions and regulations contained in this Chapter. Indians who are not a member of a signatory tribe shall not gather any wild plant within the home territory.

•10.603. License and Identification.

Any tribal member engaged in gathering any wild plant within the home territory shall have in their possession at all times a valid membership card issued by the Community and shall at all times make the membership card available for inspection by any

Enforcement Officer upon the request of the Enforcement Officer. Any tribal member who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.504 & 10.802; as amended on (date).

•10.604. L'Anse Reservation and Ontonagon Reservation; BIA Gathering Permit.
In addition to a valid license or permit issued by the Community, an On-reservation Free-use Timber Cutting Permit issued by the BIA Agency Forester shall be required for firewood cutting, clearing of residential or recreational leases, fence posts, maple sap collection, or miscellaneous cutting for educational, religious, or ceremonial use by groups authorized by the Council within the exterior boundaries of the L'Anse Reservation and Ontonagon Reservation. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.804 (a)(b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.605. Ottawa Nation Forest; U.S. Forest Service Gathering Permit.
In addition to a valid license or permit issued by the Community, a permit issued by the U.S. Forest Service shall be required to engage in the gathering of any wild plant or tree within the exterior boundaries of the Ottawa National Forest. Any person who shall violate the provisions of this section shall be guilty of a civil offense.
History: Formerly 10.804 (f) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.606. Gathering License or Permit Misrepresentation.
Any person who shall use fraud or misrepresentation in procuring a license or permit shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

•10.607. Allowing or Making Use of Another•s Gathering License or Permit.

Any person who shall allow another person or make use of another persons gathering license or permit shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

[Reserved 10.608 to 10.614]

•10.615. Gathering in Campgrounds Prohibited.

Any person who shall gather any wild plant species, including but not limited to, conifer boughs, princess pine, ginseng, maple sap, wild rice, or Christmas trees in any campgrounds within home territory shall be guilty of a civil offense.

History: Formerly 10.804(b)(c)(d)(e)(f) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.616. Firewood.

Any person who, for a non-commercial use, shall:

1. Cut any live tree for firewood, unless the tree is included within a National Forest "firewood sale", or as otherwise permitted by the Community and the U.S. Forest Service; or
2. Cut any standing dead tree within fifty (50) feet from the cleared edge of any road open to automobile traffic and any standing dead tree within one hundred (100) feet of any pond, lake, stream, or river or any standing dead tree greater than sixteen inches (16") in diameter; or
3. Gather any firewood, on the L•Anse Reservation and Ontonagon Reservation, within an active timber sale area without the permission of the BIA Agency Forester; or
4. Use any commercial heavy equipment, farm tractor, rubber tired skidder, or similar vehicle for gathering firewood; or
5. Gather firewood in any campground except for personal use while camping;

Shall be guilty of a civil offense.

History: Formerly 10.804(c)of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.617. Conifer Bough; Prohibitions.
Any person who shall cut down a tree for the purpose of gathering conifer boughs or who shall cut boughs from the upper half of a tree shall be guilty of a civil offense.
History: Formerly 10.804(b) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.618. Ginseng; Season Restrictions.
Tribal members may gather ginseng from 12:00 a.m., September 1st to 11:59 p.m., October 31st of each year within the home territory. Any person who shall gather ginseng from 12:00 a.m., November 1st to 11:59 p.m., August 31st within home territory shall be guilty of a civil offense.
History: Formerly 10.804(e) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.619. Maple Sap and Sugar-bushes.
A. Any person who shall collect maple sap on tribal land without a free use permit issued by the BIA for a designated tribal sugar-bush or some other approved location in the Ottawa National Forest shall be guilty of a civil offense.
B. The gathering of maple sap and establishment of sugar-bushes is permitted by the issuance of a permit by the BIA Agency Forester or Ottawa National Forest.
History: Formerly 10.804(f) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.620. Wild Rice; Harvest.
A. The harvest of wild rice seed shall be determined by the Wild Rice Chief annually at designated sites in August of each year.
B. Any person who shall harvest wild rice at site not designated or before it is determined harvestable by the Wild Rice Chief shall be guilty of a civil offense.
History: Formerly 10.804(g) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.621. Christmas Trees.
A. Tribal members residing on the L'Anse Reservation and Ontonagon Reservation may cut without permit, one Christmas tree per household per year.
B. Any person who shall cut more than one tree without a permit shall be guilty of a civil offense.
History: Formerly 10.804(h) of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

[Reserved 10.622 to 10.630]

•10.631. Inspection of Plants.
Any person who shall fail to allow the inspection of plants in one's possession upon the demand of a Enforcement Officer shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

•10.632. Commercial Harvesting.
A person may engage in the commercial harvesting of any wild plant or tree within home territory on tribal land with authorization from the Council. Any person who shall violate the provisions of this section shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.
History: Formerly 10.802 of May 2002 Fishing, Hunting, Trapping and Gathering Regulations; as amended on (date).

•10.633. Endangered Plant Species.
Any person who shall take, harvest, harm, damage or destroy a plant defined as a threatened or endangered plant species shall be guilty of a Class D misdemeanor, punishable by a maximum period of incarceration of 45 days or a maximum fine of $1,000.00 or both.

•10.634. Wanton Waste of Wild Plant Species.
Any person who shall wantonly destroy or waste wild plant species gathered within home territory shall be guilty of a civil offense.

APPENDIX H:

Source Water Assessment and Protection Plans; Kawbawgam Road and Zeba

Kawbawgam Road Public Water Supply
Source Water Assessment and Protection Plan

Keweenaw Bay Indian Community

By M.K. Slis and T.L. Weaver

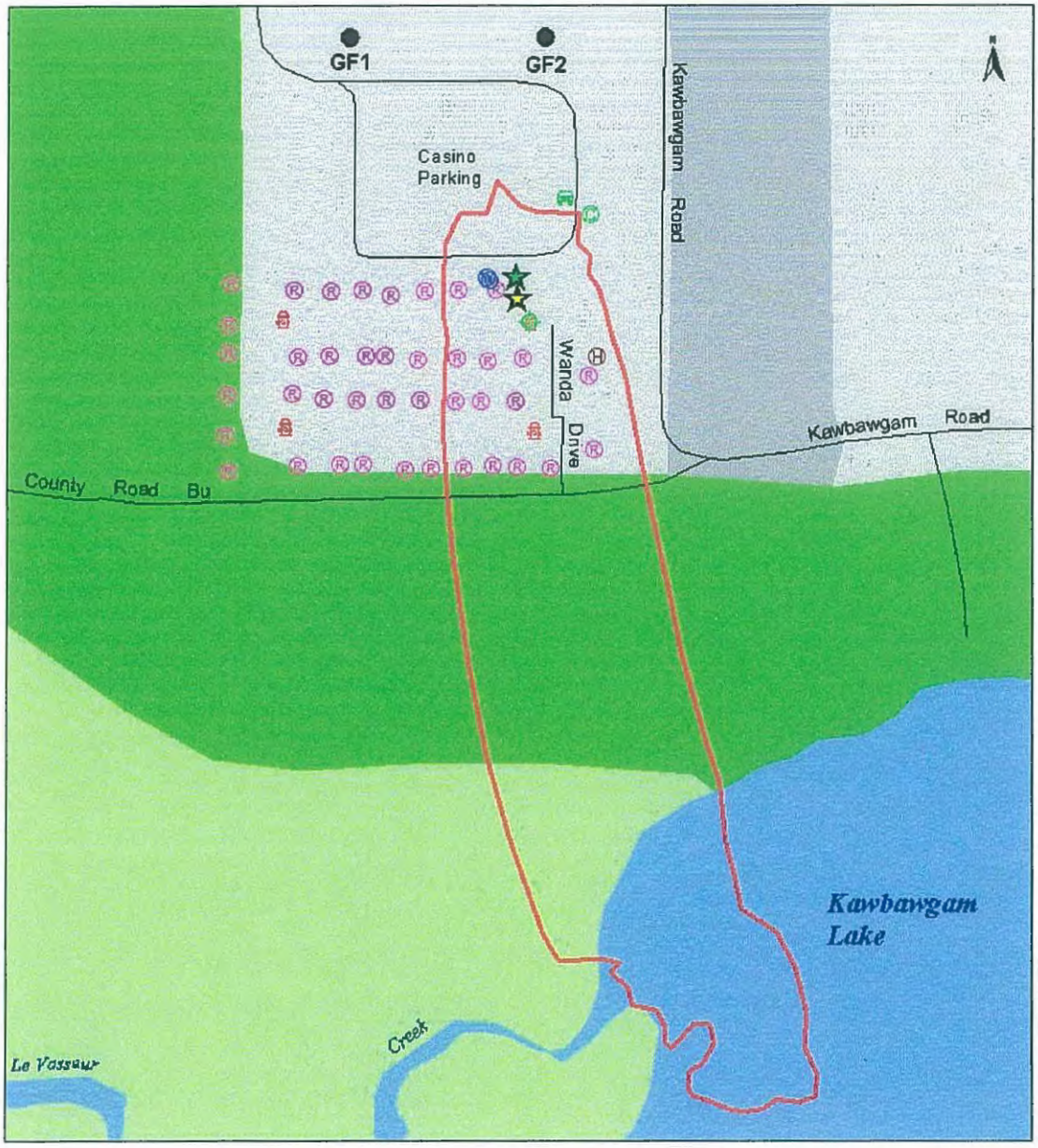


TABLE OF CONTENTS

Kawbawgam Road Public Water Supply Source Water Assessment and Protection Plan

INTRODUCTION TO SOURCE WATER PROTECTION OF GROUND-WATER SOURCES

There are several guidance documents identifying strategies for completing a source water assessment and protection plan (SWA&PP) for ground-water supplies. Protecting a ground-water source is often, if not universally, easier than a surface-water supply, such as the Zeba public water supply (PWS), L'Anse Indian Reservation, Baraga County, MI.

Keweenaw Bay Indian Community (KBIC) has been proactive when dealing with water supply issues. In 1999, the U.S. Geological Survey (USGS) developed a wellhead Protection Area (WHPA) delineation for the Kawbawgam Road PWS wells (Weaver and others, 2000), which included a MODFLOW (McDonald and Harbaugh, 1988) model of ground-water flow. The USGS also prepared a source water assessment (SWA) for the Kawbawgam Road PWS wells in November 2002 (Sweat, 2002).

Michigan Department of Environmental Quality (MDEQ) currently requires completion of a WHPA delineation, source water assessment and contingency plans to meet the requirements for a ground-water system SWA&PP (Brad Brogren, oral. commun., 2003). The Michigan Section of the American Water Works Association and the Michigan Water Environment Association issued a joint position statement in September 2001 detailing their interpretation of source water protection (SWP) that are included as appendix 1.

The previous USGS report and MODFLOW model (Weaver, Luukkonnen, and Ellis, 2000) and Kawbawgam SWA (Sweat, 2002) are an integral part of the SWA&PP, containing the bulk of scientific information comprising the SWA&PP, and included with this report as appendix 2 and 3, respectively.

Protecting Drinking Water: An Example Workbook for Tribes

KBIC and USGS chose Protecting Drinking Water: A Workbook for Tribes, written by Glenn Totten of the Water Education Foundation and funded by USEPA (version dated July 11, 2000; modified by USEPA Region 5 in November 2000) as a drinking water protection guide. Language in this workbook is similar, if not identical in many sections, to previous documentation provided to Tribes by USEPA. This workbook contains 16 worksheets, which augment information previously gathered during the preparation of the SWA, and collectively form the basis for a SWA&PP that the USEPA is likely to approve. A great deal of information that is contained within the workbook should be updated as necessary to keep the SWA&PP as current as possible. Several worksheets have been omitted for reasons of inapplicability.

B.1 ASSESSMENT AND PUBLIC PARTICIPATION

WORKSHEET 1 Public Participation

Public participation is broken into 5 subcategories: forming a planning committee; adopting a mission, or mission statement; publicizing activities of the planning and advisory committees; drafting ordinances or codes; and notifying tribal members and leaders of the results of the SWA&PP processes. The first two subcategories have been completed. The SWA has been distributed to the KBIC Housing Department for distribution to all KBIC Housing tenants and will be announced in the local papers for private citizen review in October of 2003. Ordinances, regulations, or codes may follow public notification and would be noted within Worksheet 16, as updates to the plan. Delineation, contaminant inventory, and susceptibility determination were completed as part of SWA.

WORKSHEET 2 Management Group

Worksheet 2 lists members of the team that oversees SWA&PP activities, contact information, and a brief description of how each member will be involved in the SWA&PP activities.

Active groups and/or individuals are listed in the first spreadsheet and secondary groups/individuals are listed in the second spreadsheet. Groups and individuals in the initial list are responsible for maintaining the SWA&PP, and will hereafter be referred to as the Group, while those on the second list play less important roles, such as initial compilation of the SWA&PP. Groups or individuals on the secondary list would be notified about problems with the SWA&PP, or within the source water area, if the initial Group determines that the secondary list groups or individuals need to play a role in efforts to address the problem. Members of the Group will institute provisions and make changes to the contingency plan, if necessary. A contingency plan has been produced as a separate document, complimenting the SWA&PP, and is included as appendix 4.

Management Group, charged with implementation and maintenance of Kawbawgam SWA&PP

Groups to be represented	Name, position, and contact information	How will this person be involved?
Program director	Mike Donofrio, KBIC Natural Resources Department Director, 906-524-5757 (ext. 13)	Coordinate Program, ensure that Tribal Groups use best management practices e.g. do not increase development pressure on the current delineated wellhead protection area
Water Quality Specialist	Marc Slis, KBIC Water Quality Specialist 906-524-5757 (ext. 15)	Coordinate Program. Update SWA&PP.
Environmental Specialist	Mike Sladewski, KBIC Environmental Specialist 906-5757 (ext. 14)	Maintain map of SWA/WHPA with updates to PCS list. Assist Group with developing ordinances and codes necessary to protect SWA.
KBIC, Tribal Police Department	Baraga (906) 353-6626	Uphold ordinances or codes adopted by KBIC and Group.
KBIC, Housing Authority	(906) 353-6623	Ensure that development activities pose no threat to SWA/WHPA.
Marquette County Emergency Services Coordinator/Sheriff Department	Marquette County Emergency Services Division, Sheriff's Department (906) 346-4045	Uphold ordinances or codes adopted by Group. Notify Group or KBIC if emergency threatens source water.
Water Plant Operator, Kawbawgam Road Housing Community	Carl, Rasenen, Operator (906) 353-7117	Adjust water treatment plant as necessary to counteract changes in source water quality.

Secondary group, consisting of non-essential contacts that have either participated in the development of the SWA&PP, or could be contacted for informational purposes.

Groups to be represented	Name, position, and contact information	How will this person be involved?
U.S. Geological Survey	Tom Weaver, Hydrologist (906) 786-0714	Developed the SWA&PP and contingency plan in conjunction with KBIC Environmental Director and Staff.
Michigan Department of Environmental Quality, Remediation and Redevelopment Division	Clif Clark, District Supervisor, Upper Peninsula District, (906) 346-8515 clarkcg@michigan.gov	Notify KBIC if emergency threatens source water.
Michigan Department of Environmental Quality, Water Division	Chuck Thomas, Geologist, (906) 475-2048	MDEQ Water Division administers the Source Water Protection program for the state and provides oversight for non-Tribal community water supplies.
Marquette County Health Department, Environmental Health	Unknown, Sanitarian (906) 475-4195	Assist with dissemination of group findings to non-Tribal community members.
U.S. Environmental Protection Agency	Chuck Pycha, Tribal Technical Contact (312) 886-0259 Dennis Baker, Michigan Circuit Rider (231) 271-7492	Represent U.S. EPA as necessary, assist group with addendums to SWA&PP as a necessary, as well as assistance with Great Lakes spills, land-based discharges, updating potential contaminant sources list.
Bureau of Indian Affairs	Jim Ruhl, Hydrologist 612-713-4400, Ext. 1068	Represent BIA as necessary. Update SWA&PP as necessary.
Indian Health Service	Sanitarian (Rhinelander Office) (715) 365-5120	Represent IHS as necessary, monitor finished and source water quality at Kawbawgam WTP as necessary. Update SWA&PP as necessary.
Water Plant Operator, City of Marquette	Pumping Station (906) 228-0488	Provide City of Marquette water to KBIC on an emergency basis. Need to make arrangements to fill tank trucks if this option is utilized.
Chocolay Township	Randy Yelle, Zoning Supervisor (906) 249-1448	Township contact responsible for zoning compliance within the Lake Kawbawgam watershed

WORKSHEET 3 Mission Statement

Worksheet 3 includes a mission statement, and is used to set goals, and includes ideas on how to accomplish them.

The mission (primary goal) of the Group is protection of the delineated source water area supplying water to the PWS wells at the KBIC Tribal Housing Community on Kawbawgam Road. The Group should function in a communicative, cooperative, and proactive environment. The group needs to use best management practices, have an effective emergency response plan that Group members know and understand, and maintain ***the Source Water Assessment and Protection Plan as needed to keep the document(s) current***.

We have increased the likelihood of the Group obtaining their mission/primary goal by breaking it down into a series of smaller, more easily achievable goals. This worksheet lists the Group's goals and ideas and the steps needed to accomplish them.

The presence of Lake Kawbawgam within the boundaries of the source water area complicates the SWA&PP somewhat. Access to the lake is possible even though no public access sites are located on the lake. Some water from the Lake Kawbawgam drainage basin, which includes Lake Le Vasseur and two branches of Le Vasseur Creek, is likely to be intercepted by the PWS wells as shown on the figures in the WHPA delineation and SWA (appendixes 2 and 3, respectively). The entire watershed is zoned with multiple designations depending on the common use in an area.

A table of goals has been developed with at least the following minimum categories, although the list most likely will contain others, as time progresses. Additions to the list will be noted within Worksheet 16.

Goal	How does group accomplish goal
Keep petroleum products from entering soil in source water area	Educate residents of KBIC Tribal Housing and private citizens of Lake Kawbawgam area on proper disposal techniques and the dangers of on-site disposal.
Keep untreated or poorly-treated human waste from entering Lake Kawbawgam and PWS wells	Inspect KBIC Tribal Housing and gaming facility septic systems to ensure proper operation. Educate private residents of Lake Kawbawgam area on the benefits of maintaining septic systems in proper working order.
Keep hazardous chemicals and other contaminants such as lawn chemicals and petroleum products from entering Lake Kawbawgam	Educate Tribal members and private residents of Lake Kawbawgam area on the benefits of keeping hazardous chemicals and other contaminants from entering Lake Kawbawgam.
Keep hazardous chemicals and other contaminants from entering the basin upstream of Lake Kawbawgam	Work with Chocolay Township to insure that zoning restrictions included in the Township Zoning Ordinance protect the watershed and are adequately enforced

B.2 DELINEATION

WORKSHEET 4 WHPA Delineation

The worksheet consists of information needed for delineation. A WHPA delineation and SWA were completed as part of the USGS water-resources investigation (appendixes 2 and 3, respectively).

WORKSHEET 5 Drinking Water Source Location

Drinking Water Source
Location: Kawbawgam Road Tribal Housing Community; Marquette County
Mailing Address: Keweenaw Bay Indian Community Housing Authority, 107 Beartown Road, Baraga, Michigan, 49946
Organization: Keweenaw Bay Indian Community
Name of source: Jacobsville Sandstone
Location of wells: N46° 28' 49" W87° 14'36"

Physical description of wells: The Tribal Housing, Community wells, PWS1 and PWS 2, were drilled in 1990 and 1991, respectively. PWS1 has a 6-inch diameter steel casing and is completed to a depth of 145 feet (ft) and PWS2 has an 8-inch steel casing and is completed to a depth of 138 ft. PWS1 is open to 20.5 ft aquifer material (Jacobsville sandstone) and PWS2 is open to 15 ft of aquifer material. Both wells are equipped with 100 gallon-per-minute (gpm) submersible pumps, but were set to pump at 50 to 53 gpm in 1999 (Carl Rasanen, KBIC, oral commun., 1999), and feed a common treatment area. Only one well is typically used at a time and the other well is kept on standby to satisfy firm capacity requirements and allow for maintenance. However, both wells can pump simultaneously as needed to meet demand, which is notably higher in hot, dry summer months.

B.2 WHPA DELINEATION

The WHPA delineation (appendix 2) includes a detailed description of the source water area contributing to the PWS and gaming facility wells as well as the methods chosen to delineate the source water area, with a thorough discussion of surficial as well as subsurface flow to the PWS and gaming facility wells.

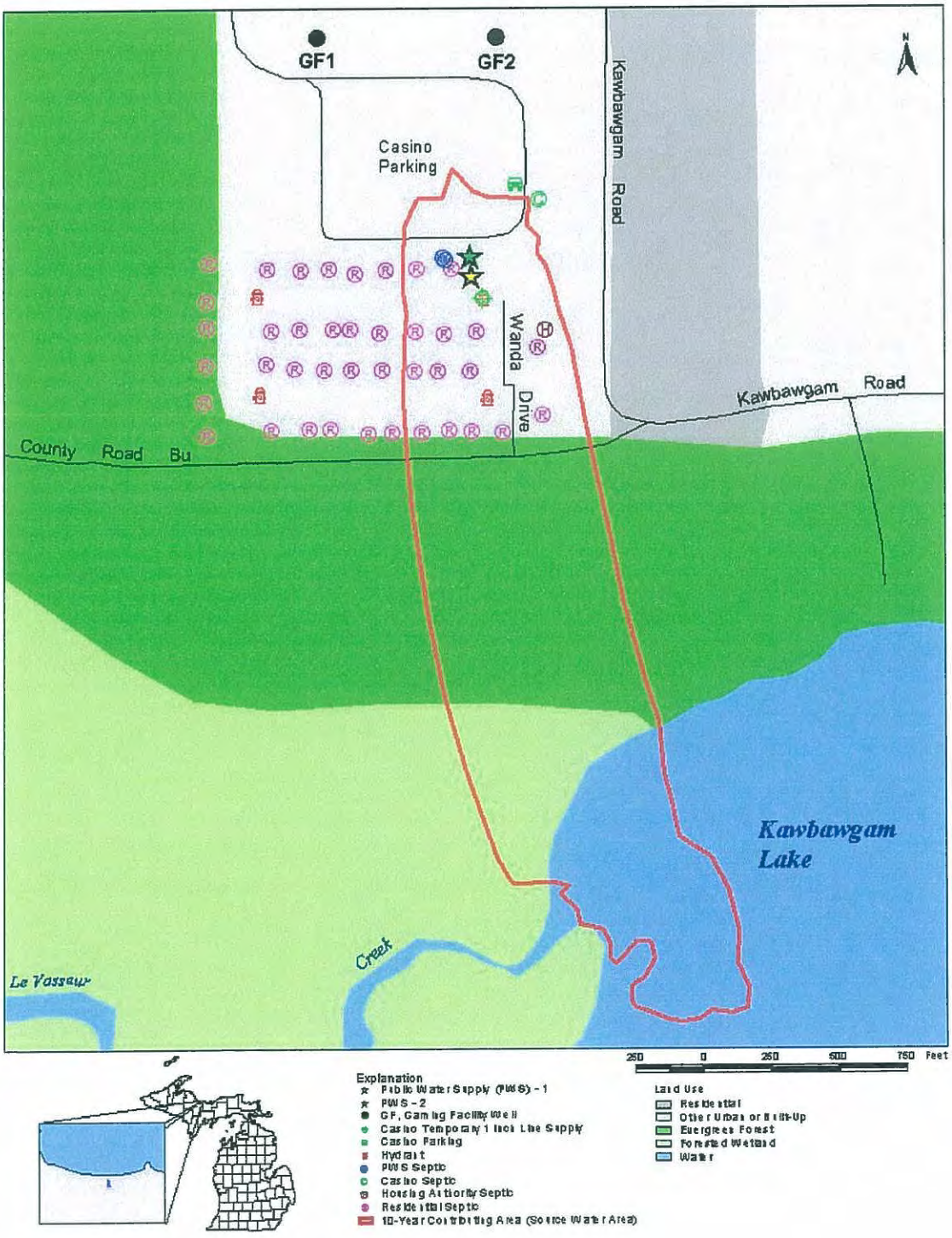
Ground-water flow model prepared for WHPA delineation

USGS investigated a number of different options prior to selecting a MODFLOW (McDonald and Harbaugh, 1988, 1996) ground-water model to complete the WHPA delineation for the Kawbawgam Road PWS wells. USGS chose MODFLOW, which is a three-dimensional finite-difference modeling program to construct the model for the Kawbawgam Road PWS wells after reviewing the information available. A properly constructed MODFLOW model typically provides a more accurate representation of aquifer conditions than less-complex models, where multiple aquifers and confining layers are present. A complete discussion of the methods chosen and modeling results is

included in the WHPA Delineation (appendix 2). The proceeding figure shows the source water area and was adapted from the WHPA Delineation (appendix 2).

The completed SWA&PP and Contingency Plan should enable the Kawbawgam PWS operators and KBIC Environmental Staff to react rapidly to problems within the delineated watershed area. Should a contaminant spill or some other problem impacting the ability of the PWS wells to produce potable water occur, the MODPATH model could be re-run with various time scenarios less than 10 years in duration to assist KBIC environmental and housing staff with contingency planning, including water supply augmentation or even replacement, if necessary.

The proceeding figure from the SWA (p. 3, appendix 3) graphically illustrates potential contaminant sources within the source water area of the Kawbawgam PWS wells. The delineated source water area is shown, with symbols and codes for a number of different layers including 10-year contributing area, PWS well locations, potential contaminant sources (PCS) including septic locations, land-use, and streams, lakes, and drains.



B.3 CONTAMINANT INVENTORY

WORKSHEET 9 RECORDS REVIEW FOR CONTAMINANT INVENTORY

Past, current, and potential future sources of contaminants were inventoried to identify several categories of potential sources of contaminants including microorganisms (bacteria, oocysts, and viruses), inorganic compounds (nitrates and metals), organic compounds (solvents, petroleum compounds, pesticides), and disinfection by-product precursors (trihalomethanes, haloacetic acids).

It is important to remember that sites and areas identified by this process are only **potential contaminant sources** (PCS) to the drinking water. Environmental contamination is not likely to occur when potential contaminants are used and managed properly. In addition, assumptions were made about particular types of land uses and risks associated with those land uses, and these are discussed further in the results portion of this report.

The purpose of the inventory is three fold: 1) provide information on the location of PCS, especially those within the susceptible area; 2) to provide an effective means of educating the public about PCS; 3) to provide a reliable basis for developing a management plan to reduce potential contaminant risks to the source water area of the Kawbawgam Road PWS wells.

The inventory process attempts to identify potential point-source contaminants within the SWA&PP. It does not include an attempt to identify specific potential contamination problems at specific sites, such as facilities that do not safely store potentially hazardous materials. However, assumptions were made about particular types of land use. For example, it is assumed that rural residences associated with farming operations have specific potential contamination sources such as fuel storage, chemical storage and mixing areas, and machinery repair shops. It should also be noted that although the inventory depicts existing land uses, these are likely to undergo continual change due to normal crop rotation practices. What is irrigated farmland now may be a non-irrigated tree farm, or vice versa.

The results of the inventory were analyzed in terms of current, past, and future land uses and their relation to the susceptible area and the wells. In general, land uses and PCS that are closest to the delineated source water area pose the greatest threat to a safe drinking water supply. Inventory results are summarized in table below.

Potential contaminant sources in the Kawbawgam Road wellhead protection area

Type of potential contaminant source	Number of potential contaminant sources in the Source Water Area	Number of potential contaminant sources in the susceptible area
Hazardous or Solid Waste Site	0	0
Industrial Facilities Discharge Site	0	0
National Priority List Sites	0	0
Permit Compliance System	0	0
Toxic Release Inventory	0	0

The ***known*** *potential* sources of contamination within the delineated source water area are septic systems for 14 single-family homes within the housing community, the housing office, and the commercial septic system for the gaming facility (p. 7, appendix 3); and the parking lot, generator, trash compacting dumpster, and materials storage area behind for the gaming facility; and infiltration gallery for filter backwash from the PWS well house, which is currently inoperative. The Tribe should take steps to ensure that proper and timely maintenance of septic system is continued.

The ground-water flow model used to produce the WHPA delineation shows that water from Lake Kawbawgam may enter the public water supply system at the southern end of the zone of contribution. Because of this, the entire upstream drainage basin, much of which is either sparsely inhabited should be considered a source area for contamination. Hazardous material could enter the surface water system throughout the basin and move into Lake Kawbawgam. It is possible that the geologic materials comprising the bottom of the lake could prevent contaminants from reaching the PWS wells, but no information is currently known to assist with that determination.

WORKSHEET 10 WINDSHIELD SURVEY

A windshield survey was completed during August 2003 of all easily accessible areas within the source water area. Results of the windshield survey are included in tables included in Worksheet 14. As noted in the preceding section, ***known*** *potential* sources of contamination within the delineated source water area noted during the windshield survey are the septic systems for 14 single-family homes within the housing community, the housing office, and the commercial septic system for the gaming facility (p. 7, appendix 3); and the parking lot, generator, trash compacting dumpster, and materials storage area behind for the gaming facility; and infiltration gallery for filter backwash from the PWS well house, which is currently inoperative. In addition, non-Tribal residences on both south and north shore are built adjacent to Lake Kawbawgam and several public stream crossings also cross tributaries to the lake basin.

WORKSHEET 12 ABANDONED WELL SURVEY

This worksheet is intended to document the location of abandoned ground-water wells within, or near, the source water area of the Kawbawgam Road PWS wells. It is possible that there are unused wells located at one or more of the houses along Kawbawgam Road. However, the source water area does not include any of the Kawbawgam road residences and only a single well completed in the Jacobsville Sandstone aquifer is known to have been drilled at a Kawbawgam Road residence, about a mile east of the PWS wells. That well was not located during the USGS study in 1999 and may have been abandoned.

Additionally, both of the households located on the south shore of the lake that granted access to their wells completed in the Jacobsville Sandstone aquifer during the WHPA delineation have (3) unused wells, total. The wells are outside the 10 yr. contributing area (figure 2, appendix 2). The three, unused wells are listed in the short table below. The current owners of the wells have properly maintained the wells and they are not considered a serious threat to the source water area. It is possible that owners of the wells could be enticed into abandoning their unused wells by providing funding to complete the task.

Obviously, the cost of abandoning all of the abandoned wells within the source water area is less than replacing the current water system.

The Group will initially consider an informational approach to this issue.

Potential contaminant source/abandoned well	Location/address	Depth of abandoned well	Documentation of well abandonment filed with MDEQ, County, etc.
Abandoned well-RWGE	1002 Mangum Rd., Marquette, MI	120 ft.	None
Abandoned well-RWCK1	Unknown /south shore of Lk. Kawbawgam	Unknown	Unknown
Abandoned well-RWCK2	Unknown /south shore of Lk. Kawbawgam	Unknown	Unknown

WORKSHEET 13 P.C.I.: Naturally Occurring Sources

The process for completing the Potential Contaminant Inventory included several steps, which are summarized in appendix 5.
The contaminant inventory checklist should be kept updated by the Group as information is collected. It is likely that only a few of the categories will apply to the Kawbawgam Road PWS wells source water area, but the information gained may be important for the protection strategy of the source water area. Zoning and other local changes could be made to protect the source water area if the Group is made aware that a threat to the water source exists that was not even considered prior to completion of this list.

CONTAMINANT INVENTORY CHECKLIST

Check if present	Naturally occurring sources	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
Yes	Rocks and soils	e.g., metals, iron, arsenic, magnesium, sulfates, fluorides, etc.	Iron in unconsolidated deposits and Jacobsville Sandstone aquifer	Entire source water area
Yes	Decaying organic matter	e.g., bacteria		Wetlands adjacent to Lakes LeVasseur and Kawbawgam
Possible	Radioactive materials	e.g., radon gas, Uranium	Present in unconsolidated deposits and Jacobsville Sandstone aquifer elsewhere in U.P.	Entire source water area
Possible	Natural geological processes	e.g., salt water infiltration of wells	Present in Jacobsville Sandstone aquifer elsewhere in U.P.	Entire source water area

WORKSHEET 13 Agricultural and Logging Sources

Check if present	Agricultural and logging sources	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
None Noted	Crop areas, irrigation sites	e.g., pesticides, petroleum products		
None Noted	Chemical storage	e.g., pesticides, herbicides, fertilizers, petroleum products, solvents, paints, etc.		
None Noted	Farm/logging machinery	e.g., fuel, lubricants, hydraulic oil, solvents		
Yes	Stream crossings	e.g., sedimentation, petroleum products, etc.	Each road crossing of Kawbawgam and Magnum Roads	At least 1 mile, varies

WORKSHEET 13 Residential Sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Residential sources	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
Yes	Abandoned wells	e.g., petroleum products, etc.	Abandoned or unused wells on residential sites within the 10 yr. SWA	Varied
Yes	Artificial ground-water recharge	e.g., storm water runoff, treated sewage effluent that may contain detergents, solvents, etc.	Every residential site within the 10 yr SWA is a potential source, i.e., each septic.	Varied
Yes	Household chemicals	e.g., cleaners, bleach, paint and paint removers, strippers, petroleum products	Every residential site within the 10 yr SWA is a potential source	Varied
Yes	Lawn and gardens	e.g., pesticides and herbicides, petroleum products	Every residential site within the 10 yr source water area is a potential source	Varied
None Noted	Swimming pools	chemicals		
Yes	Septic systems and sewage lines	e.g., sewage, bacteria, viruses, metals, petroleum products, anti-freeze, road salt, chemicals, etc.	Every residential site within the 10 yr SWA is a potential source	Varied
Possible	Underground and above ground storage tanks	home heating oil		May be present at homes outside of source water area

WORKSHEET 13 Municipal Sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Municipal sources	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
None noted	Parks	e.g., pesticides, herbicides, petroleum products		
Yes	Highways, roads	e.g., herbicides, road salt, petroleum products, etc.	All roads and parking locations within the source water area	Several locations
None noted	Municipal sewage	e.g., sewage, sludge, treatment by-products, chemicals, bacteria, viruses		
None noted	Storage, treatment, and disposal ponds and other surface impoundments	e.g., sewage, wastewater, liquid chemical wastes, bacteria, viruses		
None noted	Sewer overflows	e.g., road runoff, bacteria, viruses		
None noted	Recycling facilities	e.g., petroleum products, battery acid, anti-freeze, metals, etc.		
None noted	Landfills	e.g., chemicals, petroleum products, solvents, etc.		
None noted	Illegal dumps and open burning areas	e.g., chemicals, metals, petroleum products, metals, solvents, etc.		
None noted	Municipal incinerators, burning areas	e.g., metals, chemicals, sulfur, etc.		
None noted	Water supply wells	e.g., surface runoff, chemicals, etc		
None noted	Drainage wells	e.g., pesticides, herbicides, bacteria, etc.		
Yes	Sumps and dry wells	e.g., storm run-off water, spilled liquids, dumped liquids, minerals, etc.	Filter backwash from PWS well house, infiltration galleries not functioning correctly Aug. 2003	100 to 300 ft

WORKSHEET 13 Commercial Sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Commercial sources	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
None noted	Airports and airfields	e.g., fuels, solvents, de-icers, wastes		
None noted	Auto repair shops	e.g., petroleum wastes, solvents, anti-freeze, acids, etc.		
None noted	Barber and beauty shops	e.g., perm solutions, dyes, chemicals, etc.		
None noted	Boat yards and marinas	e.g., fuels, lubricants, solvents, paints, wood preservatives, waxes, etc.		
None noted	Bowling alleys	e.g., epoxy floor finishes, solvent, cleaning fluids		
None noted	Automobile dealerships	e.g., petroleum wastes, solvents, anti-freeze, acids, etc.		
None noted	Car washes	e.g., soaps, detergents, petroleum products, anti-freeze, acids, road salt, etc.		
None noted	Campgrounds	e.g., sewage, petroleum products, pesticides, household wastes		
None noted	Carpet stores	e.g., glues and solvents, petroleum products		
None noted	Cemeteries	e.g., chemicals, petroleum products, herbicides, etc.		
None noted	Construction areas	e.g., solvents, asbestos, paints, glues, insulation, tars, sealants, chemicals, etc.		
None noted	Dry cleaners	e.g., solvents, chemicals, etc.		
None noted	Furniture refinishers	e.g., paints, stains, solvents		

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Commercial sources-continued	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
None noted	Gasoline dealers	e.g., petroleum products		
None noted	Hardware and lumber stores	e.g., chemicals, stains, paints, petroleum products, etc.		
None noted	Heating oil suppliers	e.g., petroleum products including stored materials		
None noted	Horticultural practices	e.g., herbicides, pesticides, fungicides		
None noted	Jewelry/metal plating	e.g., sodium and hydrogen cyanide, metallic salts, acids, chromium, etc.		
None noted	Laundromats	e.g., detergents, bleaches, dyes		
None noted	Medical institutions	e.g., X-ray developers/fixers, infectious wastes, disinfectants, radioactive wastes, pharmaceuticals, etc.		
Yes	Office buildings	e.g., building wastes, lawn and garden maintenance chemicals, etc.	Gaming facility generator, septic system, parking lot, trash compactor, and maintenance area	50 to 800 ft
None noted	Paint stores	e.g., paints, stains, solvents, wood preservatives, etc.		
None noted	Pharmacies	e.g., spilled and returned products		
None noted	Photography shops and labs	e.g., silver sludges		
None noted	Print shops	e.g., inks, solvents, photo chemicals		
Yes	Railroads	e.g., herbicides, petroleum products, chemicals, etc.	Abandoned RR grade north of gaming facility parking lot	~2,000 ft
None noted	Research laboratories	e.g., X-ray fixers/ developers, infectious/radioactive wastes, disinfectants, pharmaceuticals		

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Commercial sources-continued	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
Yes	Scrap and junk yards	e.g., wastes such as metals, chemicals, petroleum products, solvents, acids, anti-freeze, etc.	Junkyard in backyard along Kawbawgam Road	~2,500 ft east of source water area
None noted, but possible	Storage tanks	e.g., any chemical in a storage tank		
Yes	Transportation services	e.g., petroleum products, solvents, etc.	Fuel tanks in Casino Shuttle buses and diesel fuel tank on ground at housing office	100 to 300 ft
None noted	Veterinary services	e.g., solvents, infectious wastes, vaccines, disinfectants		

WORKSHEET 13 Industrial Sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Industrial sources	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
None noted	Material stockpiles (coal, metallic ores)	e.g., acid drainage, metals runoff		
None noted	Waste tailing ponds/basins	e.g., acids, metals, radioactive ores		
None noted	Transport and transfer stations	e.g., fuel tanks, repair shop wastes, etc.		
None noted	Storage tanks (above and below ground)	e.g., petroleum products		
None noted	Storage, treatment, or disposal ponds & other surface impoundments	e.g., sewage wastewater, liquid chemical wastes, bacteria, viruses		
None noted	Chemical landfills	e.g., hazardous and no-hazardous liquid wastes		
None noted	Radioactive waste disposal sites	e.g., radioactive wastes from medical facilities, power plants, or defense operations		
None noted	Dry wells	e.g., saline water		
None noted	Injection wells	e.g., oil field brine, chemicals, wastes, etc.		

WORKSHEET 13 Industrial Processes

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Industrial processes	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
None noted	Asphalt plants	e.g., metals, chemicals, sulfur, etc.		
None noted	Communication equipment manufacturers	e.g., acid wastes, metal sludge's, etchants, cutting oils, plating wastes		
None noted	Electronic equipment manufacturers	e.g., cyanides, solvents, acids, paints, PCBs, etchants		
None noted	Foundries and metal fabricators	e.g., heavy metals, paint wastes, plating wastes, solvents, oils, etc.		
None noted	Furniture and fixtures manufacturers	e.g., paints, stains, solvents, degreasers		
None noted	Metal and metal-working shops	e.g., solvents, lubricants, degreasers, metals		
None noted	Mining operations	e.g., mine spoils, tailings, stamp sands, acids, highly-mineralized water, etc.		
None noted	Unsealed abandoned mines used for waste pits	e.g., metals, acids, minerals, sulfides, etc.		
None noted	Paper mills	e.g., metals, acids, chlorine, etc.		
None noted	Petroleum storage companies	e.g., petroleum products		
None noted	Industrial pipelines	e.g., corrosive fluids, petroleum products, hydrocarbons, etc.		
None noted	Photo processing labs	e.g., silver sludge's, cyanides, chemicals, etc.		
None noted	Plastics materials and synthetics producers	e.g., solvents, oils, cyanides, acids, formaldehyde		
None noted	Publishers, printers, and allied industries	e.g., inks, solvents, dyes, photographic chemicals		

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Industrial processes-continued	Potential contaminants	Potential contaminant source(s)	Distance from Kawbawgam Road PWS wells
Possible	Public utilities	e.g., PCB from transformers and capacitors, oils, solvents, metal plating solutions	Transformers on poles may still contain PCB's	Varies, numerous
None noted	Sawmills and planers	e.g., wood residue, treated wood preservatives, paints, glues		
None noted	Stone, clay, and glass manufacturers	e.g., solvents, oils and grease, glazing materials, metal sludge's		
None noted	Welding shops	e.g., oxygen and acetylene, metals		
None noted	Wood preserving facilities	e.g., wood preservative chemicals, creosote		

B.4 SUSCEPTIBILITY DETERMINATION

The following is a narrative approach to susceptibility, complemented by the EPA Region 5 Susceptibility worksheet, which is attached as appendix 6.

Near the Kawbawgam Road PWS wells, the land is used for commercial purposes (KBIC gaming facility) and residential development. South of the wells and the residential area, the land is classified as wooded and wetland. The most southern part of the area that contributes recharge to the PWS wells is under Lake Kawbawgam. There are several possible sources of contamination within the source water area; point sources include septic systems for the 14 private residences, housing office, and the gaming facility; and trash compactor, maintenance area, and standby generator at the gaming facility. Non-point sources include lawn chemicals, and the parking lot for the gaming facility, because of fuels and other fluids leaking from vehicles. Within the 10-year time of travel (figure 2, appendix 2) to the wells identified by the USGS, there are no regulated facilities, or facilities with permits to store, handle, or discharge potential contaminants. The susceptibility of the source water to contamination is considered low. KBIC owns all land within 200 ft of the wellheads of the PWS system.

Geologic Susceptibility

The following discussion is largely excerpted from the WHPA delineation (appendix 2). The source of water for the Kawbawgam Road PWS wells is the Jacobsville Sandstone, which is a bedrock aquifer present throughout much of the Upper Peninsula. Near the wells, the Jacobsville Sandstone is primarily overlain by sand, with some areas of silty,

and or, clayey sand. The upper part of the Jacobsville Sandstone is probably more productive than other parts of the formation. The formation is friable, highly fractured, and parts along bedding planes in outcrop, although it known to become more massive at depth. The Kawbawgam Road wells are completed in the upper 26 to 31 feet of the formation, and are much more productive than other wells completed in the formation throughout the Upper Peninsula of Michigan. The Kawbawgam Road wells are capable of producing as much as 100 gallons per minute. Static water levels are about 35 feet below the surface in the area. Because of the relatively high permeability of overlying sands throughout the source-water area, the geological susceptibility of the source water to contamination is considered high.

Historical Contaminant Detections

The Kawbawgam Road PWS well records show that the plant currently produces about 9,600 gallons per day (five-year average). Water quality conditions have been monitored on a routine basis since the wells were installed and became operational. Water quality is good, exceeding USEPA Drinking Water Quality Standards for most constituents except iron.

Annual monitoring for Volatile Organic Contaminants (VOCs) occurred in years 1993, 1995, 1996 and 1999. In 1998, the US EPA, Region 5 Safe Drinking Water Branch, placed Kawbawgam Road PWS well on a three-year monitoring schedule (Mary Morgan, written comm., 1998). The next sampling is to occur for the 2002-2004 Compliance Period. Historical (VOC) detections are listed below.

In 1996, detections above the Method Detection Limit (MDL), but below the Maximum Contaminant Level (MCL) occurred for the following analytes; Bromoform, Chlorodibromomethane, Chloroform, Dichlorobromomethane, Total Trihalomethanes, Xylene Meta- & Para- and Xylenes Total.

In 1997, detections above the Method Detection Limit (MDL), but below the (MCL) occurred for the following analytes; Bromoform, Chlorodibromomethane, Chloroform, Dichlorobromomethane, Total Trihalomethanes, Ortho-Xylene, Meta-&Para-Xylene, and Total Xylenes.
Trace detection above the (MDL) but too low to quantitate was recorded for the analyte Ethylbenzene.

In 1999, detections above the Method Detection Limit (MDL), but below the (MCL) occurred for the following analytes; Chlorodibromomethane, Chloroform, Dichlorobromomethane and Total Trihalomethanes.

C.1 STRATEGIES FOR PROTECTING DRINKING WATER SOURCES

A) Non-regulatory strategies

B) Regulatory strategies
C) Planning for the future
D) Contingency planning

Building a Source Water Assessment Protection Program

Once a SWA&PP is completed, the focus shifts to protection. New information should be added as it becomes available, as the SWA&PP becomes a "living" document. The SWA&PP uses information collected during the assessment phase to develop community-based strategies for long-term protection of the source water. Public notification and participation play pivotal roles in the process, giving the public input into the process. Protection strategies do not have to represent large departures from current Tribal laws, policies, and restrictions, and could simply require enforcement of current laws, codes, and ordinances. The biggest complication with the source water area for the Kawbawgam Road PWS wells is that it extends past Tribal, but KBIC has a good relationship with private citizens around the source water area. The SWA&PP Group plays a key role in the entire process, weighing the advantages and limitations of various management strategies, and assessing their ultimate value to the SWA&PP.

Non-regulatory Strategies

Non-regulatory strategies are considered the least-costly, but possibly less effective method of choice for KBIC, given the limited amount of resources available.
The following are just a few examples of the strategies KBIC has used in the past and/or plans to use in the future.
A continuing public education program for tribal residents within the (WHPA), as well as non-tribal residents near the (WHPA). This includes dissemination of the (SWA) to inform the public and also programs, flyers and signs that encourage voluntary protection and conservation.
Water conservation is already practiced at the (PWS). The pumps only operate at an estimated minimum rate, one at a time, which can be increased to both pumps simultaneously, as demand increases in the hot, dry summer months.
Marquette County already sponsors a residential hazardous waste disposal program. KBIC plans to re-inform the residents in and around the (WHPA), of the program and it's contact information.

Regulatory Strategies

KBIC has a limited range of regulatory strategies that are available due, in part to the limited amount of tribal-owned land within the (WHPA). Health based regulations were followed for the location, construction and operation of the septic systems within the (WHPA), for the existing residential septic systems as well as for the Casino and

Community Building septics. Size and location of these systems can be inferred from the IHS sanitation diagram (Appendix 7).
In the future, KBIC may consider codes or ordinances that restrict or regulate the use and/or storage of hazardous chemicals or materials. Other strategies such as land-use regulations or codes, buffer zones or setbacks, aren't applicable as the tribal-owned land has already been developed within the (WHPA).

Planning for the Future

A representative of the Group could visit each house within the source water area with an informational package. The informational package should, at a minimum, include a map of the source water area, information about properly and improperly abandoned wells, a list of local contractors that do the work, and an estimate of typical cost of the procedure. A brief interview of the property owner at this time could also provide information for the Resident Survey.
A formal, public education program designed by the Management Group may be put into effect, in the future.
The Management Group shall also perform a yearly review of this document to insure it is up to date.

Contingency plan

Even though the source water area of the Kawbawgam Road wells is relatively removed from population centers and many sources of contamination typical of larger municipal water systems, the drainage basin contributing to Lake Kawbawgam is relatively large and contains at least a public access site on Lake Le Vasseur and several road crossings. A contingency plan was prepared as a separate document to accompany the SWA&P (appendix 4). The contingency plan has identified a strategy KBIC will follow for supplying an emergency short-term supply of potable water should the Kawbawgam Road PWS wells be rendered unusable by either accidental or malicious contamination and considers longer-term alternatives to the Kawbawgam Road wells should the system be rendered unusable for longer periods of time.

WORKSHEET 15 EVALUATION OF MANAGEMENT STRATEGIES
The following worksheet should be used to help evaluate the worth of various strategies for minimizing or preventing contamination of drinking water sources.

Option	Advantages	Limitations	Resources needed
Public Education	Inexpensive, simple to implement	Relies on voluntary public response	Brochures, fliers, signs, posters,
Water conservation	Free, little effort required	Relies on voluntary public response	Public education, or a volume-based rate structure.
Kawbawgam Lake water monitoring	Ten yr. advance notice of potential water quality issues.	Funding, staff	Funding, staff, training, access and equipment

Regulation of use/storage of hazardous materials	Addresses possible contaminants, directly. Increases overall safety of the area.	Requires training of staff. Requires monitoring to insure compliance. Relies on current regulations, further regulation could be costly and time-consuming	Enforcement, monitoring, training, equipment , possibly containment facilities.
Land use regulations	Control over more of the (SWA)	Can only regulate tribal land. Majority of the tribal land within the (SWA) is already developed for residential use.	Time and funds to adopt new regulations. Area studies.
Land purchase	Greater control over the (SWA)	Costly. Availability of land for purchase.	Funding and available land.
Spill response plans for most significant (PCS's)	Greater control and better response to spills/contamination. Can also be incorporated into the (PWS) contingency plan in the future.	Enforcement requires compliance	Time, staff, funding, training and equipment

WORKSHEET 16 SOURCE WATER PROTECTION PROGRAM CHECKUP

Used to update information and include listing of new, or previously unlisted, delineations, and facilities in the protected area. Additionally, try to incorporate any changes within the source water area that might increase the potential for contamination, contingency plans, or strategies used to maintain or expand the SWA&PP. Some example questions are included below.

1) List any new facilities in, or near, the source water area since the last update.
2) List any changes in existing sites that may increase the potential to contaminate the Kawbawgam Road PWS wells.
3) Describe changes made to, maintenance performed on, wells, structures, piping, treatment plant, etc. to the Kawbawgam Road PWS wells.
4) Were contingency plans implemented at any time since last update? If so, what changes, if any, are needed in the contingency plans?
5) Were any new management strategies introduced since previous update? If so, describe the strategies and the reason for their adoption.
6) Add those strategies to worksheet 15 and complete their evaluation.
7) Describe any environmental changes that have affected the source water area and the surrounding land such as forest fires, flooding, etc.

Selected References

Grannemann, N.G., 1984, Hydrogeology and effects of tailings basins on the hydrology of Sands Plains, Marquette County, Michigan, U.S. Geological Survey, Water-Resources Investigations Report 84-4114, 98 p.

McDonald, M.G., and Harbaugh, A.W., 1988, A modular three-dimensional finite-difference ground-water flow model: U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 6, Chap. A1, 576 p.

McDonald, M.G., and Harbaugh, A.W., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.

Michigan Department of Environmental Quality, 1999, State of Michigan source water assessment program, 153 p.

Michigan Section, American Water Works Association and Michigan water Environment Association, 2001, Source water protection, a joint position statement, 2 p.

MIRIS, 2000, Michigan Resource Information System: Michigan Department of Natural Resources, Land and Water Management Division, 2 compact discs, as updated.

Pollock, D.W., 1989, Documentation of computer programs to compute and display pathlines using three-dimensional finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 89-381, 188 p.

Sweat, M.J., 2002, Source water assessment report for the Kawbawgam Road water supply, Michigan Source Water Assessment Report 72: U.S. Geological Survey – WRD, 8 p.

Totten, Glenn, 2000, Protecting drinking water: a workbook for Tribes: Water education Foundation, *and modified by U.S. EPA Region 5*, 108 p.

U.S. Environmental Protection Agency, 1998, Better assessment science integrating point and non-point sources: BASINS Version 2.0 EPA 823-B-98-006, variably numbered.

U.S. Environmental Protection Agency, 2000, Assessment protocol for Great Lakes Sources: final draft (revised 6/6/00) by Great Lakes Protocol Workshop, 6 p.

Weaver, T.L., Luukkonnen, C.L., and Ellis, J.M., 2000, Simulation of ground-water flow and delineation of contributing area to public water supply wells, Keweenaw Bay Indian Community, Marquette County, Michigan: U.S. Geological Survey Water-Resources Investigation Report, 00-4050, 25 p.

Appendix 1

MSAWWA and MWEA Joint Position Statement

The Michigan Section of the American Water Works Association (MSAWWA) and the Michigan Water Environment Association (MWEA) issued a joint position statement in September 2001 detailing their interpretation of SWP. The following introduction is largely excerpted from their position statement. Both associations are dedicated to protecting Michigan's waters with members supporting public involvement through awareness, willingness to support clean water activities, and promoting public health and public confidence in drinking water supplies. Source water protection is one of many barriers or safeguards available to a water supplier to protect public health, such as proper intake/well construction and maintenance, water treatment, operator training, and a host of other activities. The position of MSAWWA and MWEA is that wellhead protection (WHP) and SWP are synonymous for ground-water supplies.

- Defining roles and duties of government units and water supply agencies.
- Delineating a source water protection area for each water supply source, based on the state's defined source water area.
- Identifying potential contaminant sources within each source water protection area.
- Utilizing management approaches for protection of source water, including but not limited to education and regulatory approaches.
- Creating contingency plans for public water supply sources including the location of alternate drinking water supplies.
- Assuring proper siting of new water sources to minimize potential contamination.
- Encouraging public participation.

The elements listed above have been applied successfully in WHP programs, and translate directly to SWP. The associations believe that a program of this kind is necessary for protection of local drinking water sources. They do not believe that local efforts by themselves are likely to be sufficient. At the local level, SWP is instituted through WHP programs and watershed management plans plus efforts such as hazardous material training, zoning, local ordinances, abandoned well management, illegal connection programs, storm water treatment, street and catch basin cleaning plus public education.

It is important that state, local and Tribal authorities work together to accurately assess source water susceptibility. Since assessment criteria involve dynamic, changing parameters, source water assessments should be periodically updated to prioritize additional SWP activities.

Appendix 2

U.S. Geological Survey Water Resources Investigation Report 00-4050, Simulation of ground-water flow and delineation of contributing area to public water supply wells, Keweenaw Bay Indian Community, Marquette County, Michigan.

Simulation of Ground-Water Flow and Delineation of Contributing Area to Public Water Supply Wells, Keweenaw Bay Indian Community, Marquette County, Michigan

Department of the Interior
U.S. Geological Survey

Water-Resources Investigations Report 00-4050

Prepared in cooperation with the Keweenaw Bay Indian Community

USGS
science for a changing world

Simulation of Ground-Water Flow and Delineation of Contributing Area to Public Water Supply Wells, Keweenaw Bay Indian Community, Marquette County, Michigan

---

By **T.L. Weaver, C.L. Luukkonen, and J.M. Ellis**

Lansing, Michigan
2000

U.S.DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

For additional information write to:

District Chief
U.S. Geological Survey, WRD
6520 Mercantile Way, Suite 5
Lansing, Michigan 48911

Copies of the report can be purchased from

U.S. Geological Survey
Branch of Information Services
Box 25286
Denver, CO 80225-0286

CONTENTS

FIGURES

TABLES

CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATIONS

Multiply	By	To obtain
foot (ft)	0.3048	meter
foot (ft)	30.48	centimeter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.590	square kilometer
acre	0.405	hectare

VERTICAL DATUM: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929-a geodetic datum derived from general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviated water-quality units used in this report: Chemical concentration is given as milligrams per liter (mg/L). Milligrams per liter is a unit expressing the concentration of chemical constituents in solution as weight (milligrams of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million.

Other abbreviations used in this report are: square miles (mi^2), feet (ft), feet per day (ft/day), feet squared per day (ft^2/day), gallons per minutes (gpm), inches per year (in/yr).

Simulation of Ground-Water Flow and Delineation of Contributing Area to Public Water Supply Wells, Keweenaw Bay Indian Community, Marquette County, Michigan

By **T.L. Weaver, C.L. Luukkonen, and J.M. Ellis**

ABSTRACT

The Keweenaw Bay Indian Community (KBIC) in Marquette County, Michigan has two public water supply (PWS) wells completed in the Jacobsville Sandstone Formation. The production capacity of these wells exceeds that of most other wells completed in the formation throughout the Upper Peninsula of Michigan. In 1998, the KBIC was awarded a grant to develop a wellhead protection plan for the PWS wells. As part of that plan, the 10-year contributing areas for the PWS wells and a well at a community-owned gaming facility were delineated.

Geologic, hydrologic, and hydraulic characteristics of the Jacobsville Sandstone and the overlying, hydraulically connected glacial and lacustrine deposits were compiled and used to develop a ground-water flow model of the area based on the U.S. Geological Survey's MODFLOW-96 program. Results of simulations made with MODFLOW were then used in conjunction with the particle-tracking program MODPATH to delineate the contributing areas to the two PWS wells and the gaming facility well. The combined 10-year contributing areas encompass about 0.2 square miles. The zone of contribution (subsurface area through which water moves toward a well) for the PWS wells extends from within the Jacobsville Sandstone upward into glacial and lacustrine deposits, reaching land surface about 1,200 ft south of the wells and extending into Lake Kawbawgam. The zone of contribution for the gaming facility well is entirely within glacial and lacustrine deposits, intersecting land surface at the well head and extending about 3,300 ft south.

INTRODUCTION

Keweenaw Bay Indian Community (KBIC) in Marquette County, Michigan has two public water supply wells completed in the Jacobsville Sandstone Formation. The wells can pump more water than other known wells completed in the formation throughout the Upper Peninsula of Michigan, where most wells completed in the formation are poor water producers.

In 1998, KBIC was awarded a Source Water Protection grant from the U.S. Environmental Protection Agency (USEPA) to complete a wellhead protection plan (WHPP) for the PWS wells located on tribal lands in Chocolay Township. As part of the WHPP, USGS delineated the 10-year contributing areas for the public water supply wells. A contributing area or wellhead protection area, as defined by USEPA, is the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield (Environmental Protection Agency, 1993). KBIC completed a contaminant source inventory as specified by USEPA guidelines using the contributing area delineated by USGS. Potential sources of contamination are identified within the contributing area by recording existing data, describing sources of contamination within the contributing area, targeting likely sources for further investigation, collecting and interpreting new information on existing or potential sources through surveys, and verifying accuracy and reliability of the information gathered.

The purposes of this report are to describe the hydrogeology of the study area and to delineate the 10-year contributing area to KBIC public water supply wells. The geology and hydrology of the area were described on the basis of analysis of existing

and newly collected data. The new data were collected in spring, 1999.

Physical Setting

The study area is in Chocolay Township, Marquette County, in the Upper Peninsula of Michigan (fig. 1). KBIC Tribal lands comprise 98 acres of the study area described in this report. The study area (fig. 2), which extends beyond Tribal boundaries for purposes of establishing boundary conditions for the ground-water flow model, comprises about 8.5 mi^2.

The study area is part of the Chocolay River drainage basin, which flows into Lake Superior several miles west of the study area and several miles east of the City of Marquette. Le Vasseur Creek, Dorow Creek, and Lakes Kawbawgam, Le Vasseur, and Superior are the principal surface-water bodies in the study area, although several unnamed streams and drainage ditches are also present.

Land-surface altitudes range from 601 ft at the shore of Lake Superior to about 700 ft at the southern end of the study area. Most of the northern part of the study area consists of fairly flat-lying beach ridges that are remnants of declining lake levels and isostatic rebound following the Marquette Re-advance of continental glaciation about 10,000 to 9,800 years before present (Farrand and Drexler, 1985). Altitude of the beach ridges is typically less than 650 ft. Relief rapidly changes with the morainal features attaining an altitude of over 1,000 ft several miles south of the southern boundary of the study area. The moraines in this region mark the southern position of the Marquette Re-advance, which probably "stalled" after contacting bedrock highlands. Erosion of clay-rich till directly overlying the Jacobsville Sandstone was probably widespread during the recessionary period following the Marquette Re-advance as glacial meltwater flowed eastward toward glacial Lake Minong (Farrand and Drexler, 1985). Drainage along the ice front was probably extensive for a number of years, resulting in variations in thickness and areal extent of the basal clay unit noted in proceeding sections of this study.

Soil types vary, but in the northern part of the study area, where KBIC Tribal lands are located, sand is prevalent, ranging from fine- to coarse-grained, extending to the subsurface contact with bedrock in some locations. In some places, beach ridge sands overlie finer-grained materials typical of morainal deposits. The terrain and soil composition change dramatically toward the southern part of the study area. Mixed sediments typical of till, including clays, are found in the area south of Mangum Road.

The areal extent and elevation of the Jacobsville Sandstone in the study area is poorly known because few wells have been completed in the formation. Jacobsville Sandstone outcrops at Shot Point, about four miles east of the study area, and at Harvey, about five miles west of the study area (fig.1). The top of the Jacobsville Sandstone is about 110 to 115 ft below land surface at the KBIC public water supply wells, and rapidly slopes upward toward the southeast. Driller's logs of wells on the south side of Lake Kawbawgam (RWGE and RWKC2) and east of the intersection of Kawbawgam Road and Mangum Road (RWA) indicate only 1 to 4 ft of glacial and lacustrine deposits overlying the Jacobsville Sandstone (appendix A, fig. 2). Driller's logs also indicate the unconsolidated deposits thicken to at least 36 ft just south of the intersection of Brown Road and Mangum Road (RWB) and at least 64 ft near Dorow Creek (RWC)(appendix A, fig. 2). This bedrock low may be remnants of an erosional channel of the pre-glacial Chocolay River valley. Changes in land surface as a result of Pleistocene glaciation likely resulted in the river mouth shifting west to its present location in Harvey.

Vegetation types range from mature conifer and deciduous forests in the sandy or well-drained areas, to bushes and other plants in the wetland areas.

The climate of the study area is moderated due to proximity to Lake Superior. The nearest climatological data-collection site is at the Marquette County

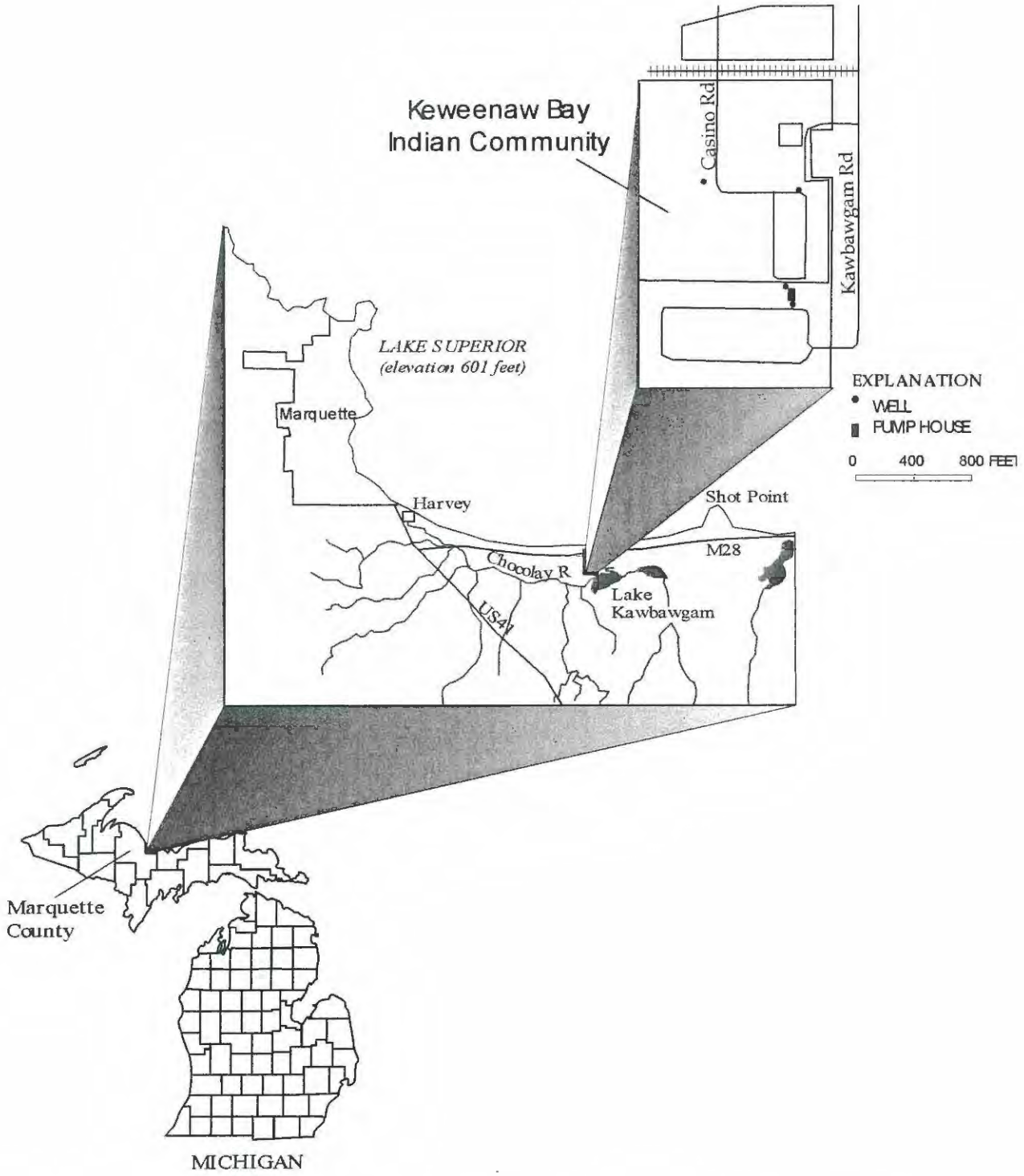


Figure 1. Location of the Keweenaw Bay Indian Community, near Marquette, Michigan.

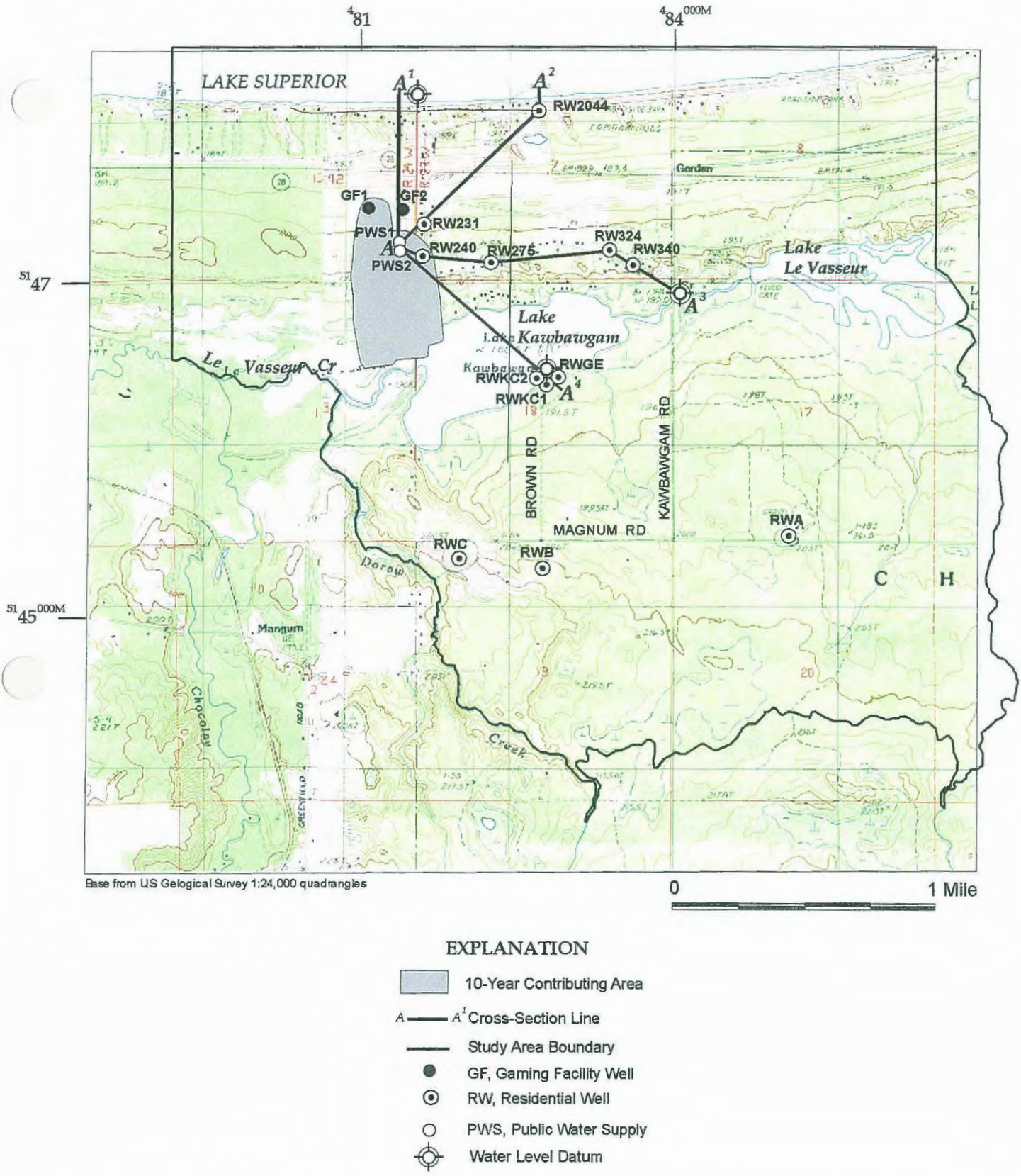


Figure 2. Modeled area plotted on USGS 1:24,000 quadrangle map showing 10-year contributing areas for public water-supply wells and gaming facility wells, Keweenaw Bay Indian Community study area.

Airport. Annual precipitation ranges from 21 to 47 inches, with a reported annual average of 32 inches (Twenter, 1981) to 34 inches (Grannemann, 1984).

Methods of Investigation

The thickness, areal extent, and general lithologic characteristics of glacial and lacustrine deposits and the Jacobsville Sandstone were determined by evaluating driller's logs from two public water supply wells, one well supplying the gaming facility, and 13 domestic supply wells in the study area. Hydraulic properties of the Jacobsville Sandstone were determined by analyzing data from an aquifer test completed by Indian Health Services for KBIC in 1991.

A three-dimensional, finite-difference, ground-water flow-model of the study area was devised using the MODFLOW 96 code (McDonald and Harbaugh, 1996). The ground-water-flow model was then used in conjunction with the particle-tracking program MODPATH (Pollock, 1989) to delineate contributing areas of the two PWS wells supplying the housing community and the well supplying the gaming facility.

HYDROGEOLOGY

In the KBIC study area, two geologic units are used as aquifers. Pleistocene glacial and lacustrine and till deposits ranging from 0 to115 ft unconformably overlie the Precambrian Jacobsville Sandstone.

Lithology

The Jacobsville Sandstone is found at, or near, land surface throughout much of the northern part of Michigan's Upper Peninsula. In the Marquette area, the formation is mainly a reddish to reddish-brown feldspathic sandstone with intercalated lenses of red or gray conglomerate and reddish shale. Bleaching to a lighter color is typical along bedding planes, cracks, and other permeable parts of the rock. The top of the formation is an erosional surface that is commonly fractured (Gair and Thaden, 1968). Glacial and lacustrine deposits comprised of clay- to sand-sized materials overlie the formation throughout the study area.

Driller's logs from Michigan Department of Environmental Quality (MDEQ) indicate that eight domestic supply wells within the study area were completed in the Jacobsville Sandstone (appendix A). At least one additional well exists, but no driller's log was located. All other known domestic wells in the study area are completed in glacial and lacustrine deposits and Appendix B contains driller's logs of wells that were used in this study. All wells referenced in this report are shown on figure 2.

A clay-rich layer up to 36 ft thick, which directly overlies the Jacobsville Sandstone, is indicated on driller's logs of several domestic supply wells (RW324, RWB, and RWC). However, little or no clay is indicated on driller's logs of several other wells, in particular those located in the area south of Lake Kawbawgam and north of Mangum Road (e.g., RWGE and RWKC2). Driller's logs of PWS well Nos. 1 and 2 show 8 and 7 ft, respectively, of clay or silty-clay directly overlying sandstone. As a result of sparse data, areal extent, thickness, and confining capabilities of any clay-rich unit within the glacial and lacustrine sediments are poorly defined.

The driller's log for PWS well No. 1 (appendix C) shows 106 ft of fine-grained silty sand, and sand with clay from 106 to 114 ft, overlying the Jacobsville Sandstone. The Jacobsville Sandstone consists of sandstone and gravel from 114 to 119 ft, firm sandstone from 119 to 128 ft, fractured sandstone from 128 to 130 ft, and firm sandstone from 130 to 145 ft. PWS well No. 1 is open to the formation from 124.5 to 145 ft. The driller's log for PWS well No. 2 (appendix C) shows 85 ft of clean sand, fine silty sand from 85 to 105 ft, and clay and silty sand from 105 to 112 ft overlying the Jacobsville Sandstone. The Jacobsville Sandstone consists of sandstone and gravel

from 112 to 117 ft, broken sandstone from 117 to 122 ft, firm sandstone from 122 to 125 ft, fractured sandstone from 125 to 127 ft, and firm sandstone from 127 to 138 ft. PWS well No. 2 is open to the formation from 123 to 138 ft. The gravelly interval present in both wells is probably conglomeratic as described by Gair and Thaden (1968).

Three hydrogeologic cross-sections, oriented approximately east-west (fig. 3), southeast-northwest (fig. 4), and southwest-northeast (fig. 5), illustrate information contained in the driller's logs, water levels of surface water bodies and wells, and an approximately-located land surface configuration.

Aquifer Test and Analysis

Keweenaw Bay Indian Community and Indian Health Services began work on the community water supply system in Marquette County in 1990, beginning with installation of PWS well No. 1. To meet firm capacity requirements, PWS well No. 2 was installed in 1991. After installation of PWS well No. 2, Indian Health Services conducted an aquifer test using PWS well No. 2 as the pumping well and PWS well No. 1, located about 80 ft away, as an observation well. PWS well No. 2 was pumped at 100 gpm for 450 minutes, with drawdown measured in both wells. After 450 minutes of pumping, drawdown was about 15.5 ft in the pumping well and about 14 ft in the observation well. Following the pumping period, recovery was measured in both wells for 60 minutes. A drawdown-recovery curve was prepared, but no aquifer test analysis was completed. Data from the aquifer test is included as Appendix D.

To complete an analysis of aquifer test data, several standard assumptions must be made prior to data analysis. The assumptions are: flow is in the range of Darcy's law; water is discharged instantaneously from storage; and the aquifer is homogeneous and isotropic, has a constant thickness and a negligible slope, and is of infinite extent (Fetter, 1988). No aquifer is infinite, but most aquifers, including those used by KBIC, are areally extensive, and respond near the well as though they are uniformly thick, homogeneous and isotropic, and of infinite extent. Additionally, during the period of an aquifer test, most water is derived from storage, but pumpage has a negligible effect on long-term water levels within the aquifer.

To delineate the contributing area of the PWS wells, aquifer test data were analyzed using solutions for confined, leaky confined, and unconfined aquifers. Figure 6 illustrates the time-drawdown (displacement) curves with data analyzed using the methods of; (a) Theis (1935) for confined aquifers, (b) Hantush and Jacob (1955) for leaky-confined aquifers, and (c) Neuman (1974) for unconfined aquifers, respectively. Table 1 summarizes results of the aquifer test analyses.

Table. 1 Results of aquifer test analysis for Keweenaw Bay Indian Community public water supply wells, Marquette County, Michigan.
[NA, not applicable to analytical method.]

Analytical method	Estimated Saturated thickness (ft)	Radius from pumping well (ft)	Transmissivity (ft^2/d)	Conductivity, (ft/d)	Storativity	Specific yield
Theis (1935)	30	80	880	30	2.7×10^{-5}	NA
Hantush-Jacob (1955)	30	80	880	30	2.4×10^{-5}	NA
Neuman (1974)	110	80	360	3	4.3×10^{-5}	0.001

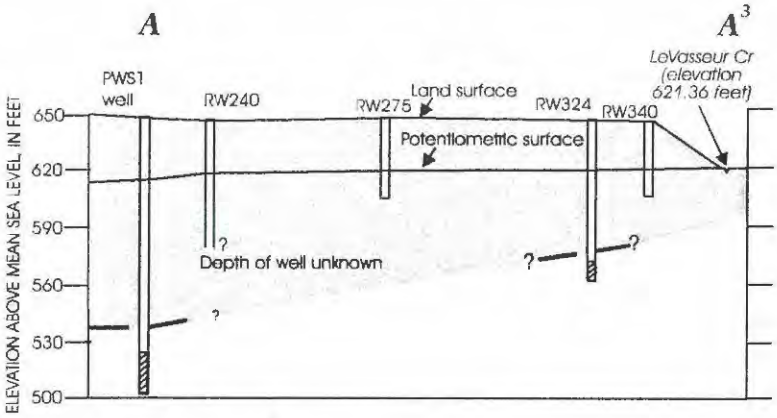


Figure 3. A-A^3

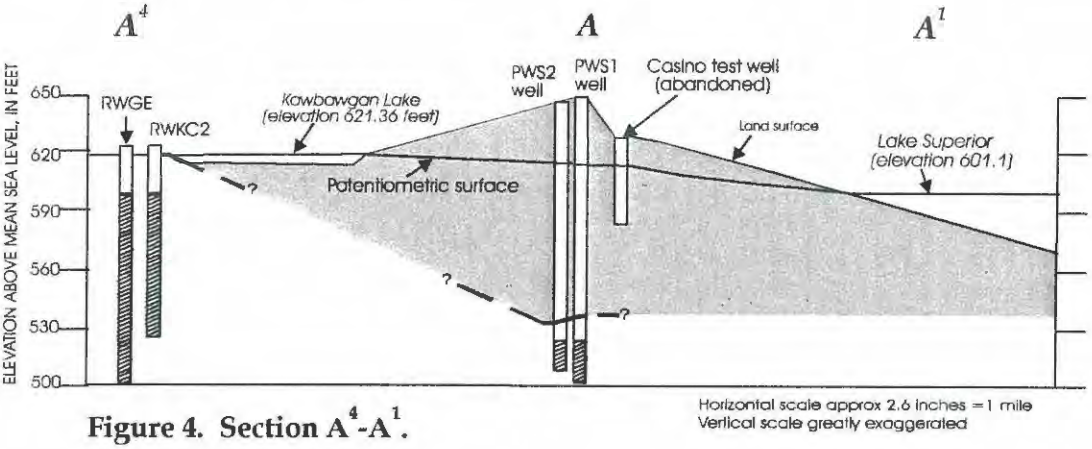


Figure 4. Section A^4-A^1.

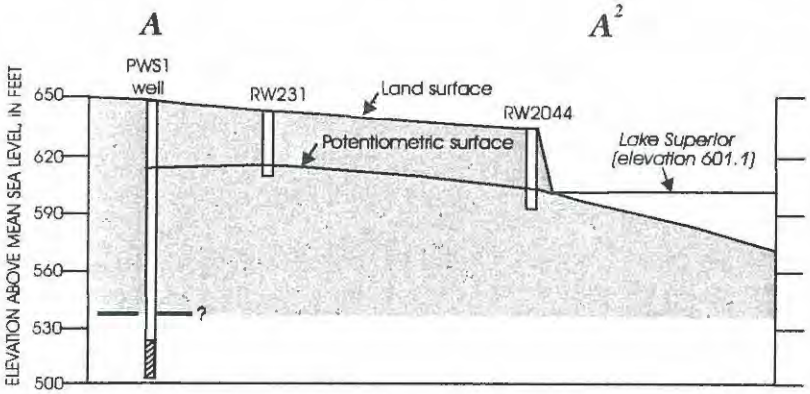


Figure 5. Section A-A^2.

EXPLANATION

UNCONSOLIDATED GLACIAL AND LACUSTRINE SEDIMENTS

Borehole open to Jacobsville Sandstone Formation

CONTACT BETWEEN GLACIAL AND LACUSTRINE SEDIMENTS/ JACOBSVILLE SANDSTONE FORMATION--Dashed where approximately located. Queried where insufficient data available

WELL RW324 is included to show geologic unit location only. Elevation of top of casing and depth to potentiometric surface is unknown

Figure 3, 4, and 5. Generalized hydrogeologic sections showing potentiometric surface and stratigraphic relations of Jacobsville Sandstone Formation and younger geologic units, Kawbawgam Lake area, Marquette County, Michigan. (Line of sections shown in figure 2.)

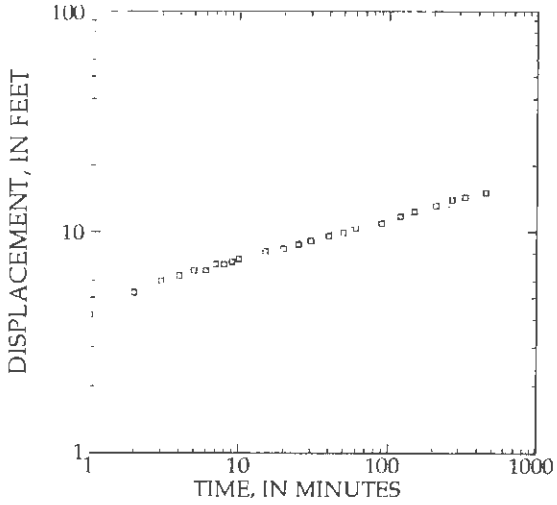


Figure 6a. Aquifer test analysis using the methods of Theis for confined aquifers.

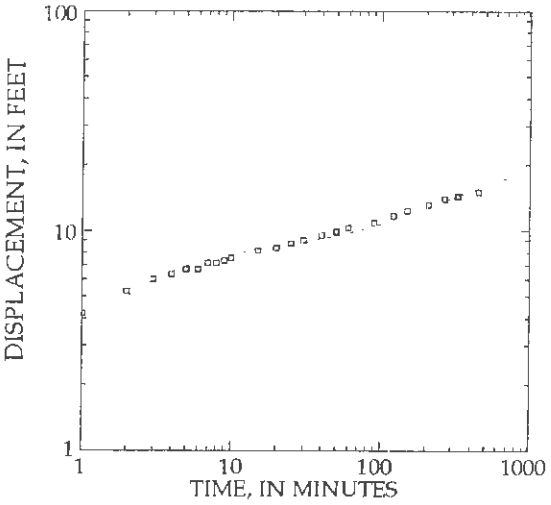


Figure 6b. Aquifer test analysis using the methods of Neuman for unconfined aquifers.

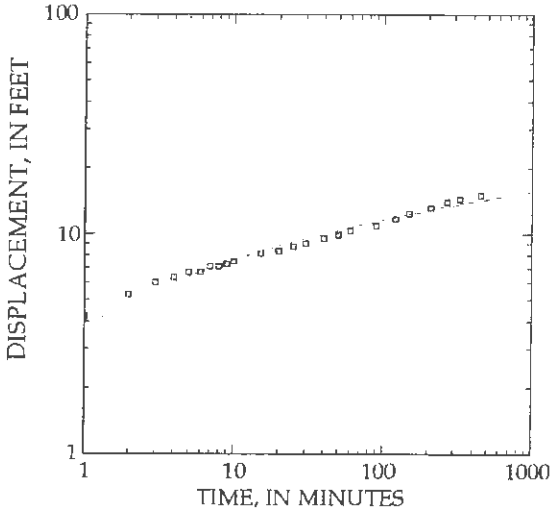


Figure 6c. Aquifer test analysis using the methods of Hantush and Jacob for leaky-confined aquifers.

The upper part of the Jacobsville Sandstone is probably more productive than other parts of the formation. The formation is friable, highly fractured, and parts along bedding planes in outcrop, although it is known to become more massive at depth. The PWS wells, which are completed in the upper 26 to 31 ft of the formation, are much more productive than other wells completed in the formation throughout the Upper Peninsula of Michigan. The PWS wells can produce 100 gpm, but driller's logs of domestic supply wells completed in the formation in the study area record production rates of only 1 to12 gpm (appendix A). Driller's logs of some domestic supply wells completed in the formation logs report full drawdown of water in the borehole after several hours of pumping at rates as low as 1 gpm. Several domestic supply wells with very low yields are located where the formation is near land surface. Because domestic supply wells in Michigan must be cased to a minimum of 25 ft below land surface (Michigan Department of Environmental Quality, 1994), these wells are effectively cased through the most productive zone of the formation.

Aquifer analysis using the methods of Theis (1935) and Hantush and Jacob (1955) use only the thickness of the productive upper part of the Jacobsville Sandstone (30 ft). Aquifer analysis using the methods of Neuman (1974) requires saturated thickness of the entire aquifer package, which includes about 80 ft of the glacial and lacustrine deposits overlying the Jacobsville Sandstone. A resultant total aquifer thickness of 110 ft was used for the unconfined analysis.

Results of the aquifer test analysis are not conclusive. Storativity values ranging from 2.4×10^{-5} to 4.3×10^{-5}, and a specific yield value of 0.001, are quite typical of a leaky-confined or confined aquifer (Freeze and Cherry, 1979). Displacement during the period from 10 to 100 minutes results in a flattened portion of the time-drawdown curve typical of an unconfined aquifer (Neuman, 1975). This relative flattening of the time-drawdown curve typically indicates that delayed-response gravity-drainage of pore spaces in the de-watered part of the aquifer is taking place, resulting in a relative decrease in the drawdown until gravity drainage is complete. Typically, the delayed drainage part of an aquifer test is longer than 90 minutes in duration. Two conditions that could produce a similar response are the interception of a positive boundary such as a surface water body, or a temporary reduction in pumping rate, although nothing in the record suggests that either is applicable to this instance. A clay layer directly overlying the Jacobsville Sandstone, which is present in varying thicknesses in the PWS wells and several of the domestic supply wells in the study area, is absent from several other domestic supply wells, in particular those wells south of Kawbawgam Lake and north of Mangum Road. Although the confining layer probably creates leaky-confined or confined conditions near the PWS, the aquifer is likely unconfined elsewhere within the study area. Hydraulic conductivity in the range of 3 to 30 ft/day (ft/d) is typical of a semi-consolidated sandstone or medium-grained clean sand, respectively (Heath, 1982). Hydraulic conductivity of 30 ft/d in the Jacobsville Sandstone may be the result of fracture-flow and/or extensive leakage into the unit from the overlying glacial and lacustrine aquifer. A study of ground-water resources in Alger County (Vanlier, 1963), which is east of the KBIC study area, reported that most water movement in the Jacobsville Sandstone occurred along fractures and separations in bedding planes.

Water Quality

The quality of water from wells completed in the Jacobsville Sandstone is often poor, with iron levels typically in excess of the USEPA secondary maximum contaminant level of 0.3 mg/L (Environmental Protection Agency, 1995). Water from the formation is also saline in a number of locations, although the source of the salinity is currently not known (D.B.Westjohn, USGS, oral commun.,

1999).

The water from the PWS wells is aesthetically more pleasing than water from the gaming facility well. During routine testing in May 1999, about 1 mg/L iron was present in water from the PWS wells, while 4 mg/L was present in water from the gaming facility well (Scott Helgeson, Indian Health Service, oral commun., 1999).

DESCRIPTION OF WELLS

Water supply wells in the study area are completed in two aquifer units. The KBIC PWS wells are completed in the Jacobsville Sandstone, while a gaming facility well is completed in glacial and lacustrine deposits. Most residential wells are completed in glacial and lacustrine deposits at depths of 60 ft, or less. Several residences south of Lake Kawbawgam have wells completed in the Jacobsville Sandstone, although many of those wells are not currently in use.

Community Water Supply System

The KBIC PWS system comprises two wells supplying about 40 residences. A third well supplies an adjacent gaming facility. An additional well (GF2) was drilled to supply the gaming facility but was never equipped with a pump. The two PWS wells, Nos.1 and 2, are adjacent to a single pump house, where chlorine and fluoride are added prior to distribution (fig. 2).

PWS wells No.1 and 2 were drilled under supervision of Indian Health Services in 1990 and 1991, respectively. Well No.1 is six-inch diameter and completed to a depth of 145 ft and well No. 2 is eight-inch diameter and completed to a depth of 138 ft. Both wells are equipped with 100 gallon-per-minute (gpm) submersible pumps, although they are currently set to pump 50 to 53 gpm (Carl Rasanen, KBIC, oral commun., 1999). The wells are used as required, with one well typically held in reserve to meet firm capacity requirements. The PWS wells are completed in the Jacobsville Sandstone, and the gaming facility well is completed in glacial and lacustrine deposits overlying the Jacobsville Sandstone.

Currently, no other PWS's are known to be withdrawing water from the Jacobsville Sandstone, due to poor yield and/or water quality (C. Thomas, MDEQ, oral commun., 1999). KBIC PWS wells near Baraga, completed in Jacobsville Sandstone have largely been replaced by surface water from the Baraga community water supply. The Sault Ste. Marie Chippewa tribe is currently developing a community water supply system near Sault Ste. Marie with multiple wells completed in the formation (D.B. Westjohn, oral commun., 1999).

Residential Wells

Many residents living in the study area adjacent to tribal lands indicated that the quality of water from their domestic supply wells was either poor or non-potable, primarily due to the presence of high iron, tannin, and hydrogen sulfide. Most, if not all, domestic supply wells currently in use, north of Lake Kawbawgam, are completed in glacial and lacustrine deposits. Two residences on the south shore of Lake Kawbawgam had multiple wells completed in the Jacobsville Sandstone (RWKC1-2, RWGE), but none of the wells are currently in use because of poor water quality and low yield. These wells were cased through the upper 25 ft of Jacobsville Sandstone, which subcrops within 1 to 4 ft of the surface at this location, to meet MDEQ well construction guidelines (Michigan Department of Environmental Quality, 1994). Several wells at locations along Mangum Road (RWA, RWB, RWC) also were completed in the Jacobsville Sandstone, although the status of those wells is not currently known. Two of these wells are open through most of the upper part of the formation, but are located where 26 to 36 ft of clay-rich sediments directly overlie the formation. The clay-rich unit probably inhibits recharge from the overlying unconsolidated sediments to the Jacobsville Sandstone where the clay is semi-continuous.

SIMULATION OF GROUND-WATER FLOW

Conceptual Model

A conceptual model was devised to describe ground-water flow within the KBIC study area. The conceptual model includes the definition of aquifers and confining units, hydrologic boundaries, pumping stresses, and the presumed ground-water flow system.

Geologic units within the study area can be divided into distinct layers based on driller's logs of PWS and domestic water supply wells. The conceptual model for this study was defined as two hydrogeologic units, one consisting of glacial and lacustrine deposits, and the other consisting of the underlying Jacobsville Sandstone. Glacial and lacustrine deposits are thickest in the northwestern part of the study area, thinning considerably toward the south and east. Glacial and lacustrine deposits and upper 30 feet of the Jacobsville Sandstone are assumed to be permeable units while the remainder of the Jacobsville Sandstone is impermeable. Glacial and lacustrine deposits and upper 30 feet of the Jacobsville Sandstone are assumed to be hydraulically connected where the overlying clay layer is thin or absent. Two PWS wells, the gaming facility well, and several residential wells account for all known pumping stresses in the study area. Lake Superior, LeVasseur Creek, and Dorow Creek form the northern, eastern, and western hydrologic boundaries of the ground-water flow system in the study area, respectively. The southern hydrologic boundary is the upland reaches of Dorow and Le Vasseur Creeks.

Numerical Model

A numerical model combines geologic and hydrologic information in order to represent observed conditions as simply and accurately as necessary to fulfill the objectives of a particular study. To simulate ground-water flow in the KBIC study area, the updated U.S. Geological Survey modular three-dimensional finite-difference ground-water flow-model, MODFLOW-96, (McDonald and Harbaugh, 1996) was used. Because this model allows the simulation of steady-state ground-water flow in three dimensions, no ground-water storage or temporal discretization terms are required.

Ground water is withdrawn within the study area from the two PWS wells (typically one PWS well is operating, while the remaining well is on standby), the gaming facility well, and several residential wells. Only water withdrawn by the PWS wells (about 3,740 ft^3/d) and the gaming facility well (estimated at about 4,000 ft^3/d) was included in model simulations; domestic water withdrawals were assumed to be negligible. KBIC pumping records were used to compute withdrawal from PWS wells, and withdrawal from the gaming facility well was based on pump capacity and estimated water use at the gaming facility.

The southern model boundary was altered slightly from that in the conceptual model. The 700 ft (~213 meters) land surface contour (fig. 2), located about 1.5 miles south of Lakes Kawbawgam and LeVasseur, was chosen as the boundary. This boundary is more convenient than the basin boundary, and is far enough from pumping stresses to minimize edge effects in the ground-water flow model. The modeled area was divided to represent differences in recharge and hydraulic conductivity. The northern part is defined as that part of the study area north of Lakes Kawbawgam and LeVasseur, and south of Lake Superior. The southern part is defined as that part of the study area south of Lakes Kawbawgam and LeVasseur and north of the 700 ft land surface contour.

Several additional assumptions were made in order to complete the model. Ground-water flow occurs principally within the glacial and lacustrine deposits and upper 30 ft of the Jacobsville Sandstone, and flows approximately south to north toward Lake Superior, based on surface-water elevations taken from topographic maps of the area and

ground-water levels measured during this study. Ground-water flow is horizontal and both aquifers are assumed to be isotropic. Although vertical and horizontal hydraulic conductivities of geologic materials typically differ, the assumption of the model is that hydraulic conductivities do not vary within a particular plane. No water is assumed to flow into the glacial and lacustrine deposits from the eastern and western boundaries of the northern part of the modeled area. The following sections describe model development and characteristics.

Model and Grid Layers

Land surface information and some surface-water levels for most of the model area were obtained from USGS 7.5- and 15-minute quadrangle maps (Harvey and Skandia quads, and Gwinn quad, respectively). Potentiometric surface information was obtained when water levels in wells and some surface water features were surveyed into datum. Stratigraphic information was determined from available driller's logs for a number of wells within the study area.

The irregularly shaped model area is about 2.5 mile (mi) north to south and 3.2 mi wide east to west (fig. 7). This area is horizontally discretized into an equally spaced grid of cells in 101 columns and 108 rows. Each cell is 200 by 200 ft and represents *average* aquifer properties in the volume of aquifer represented by the cell. The model area is vertically discretized into four layers (fig. 8); initial simulations with two layers poorly represented water levels in the gaming facility well. The glacial and lacustrine deposits were divided into three layers to better represent that pumpage. At the gaming facility well, layer 1 extends from the potentiometric surface to 51 ft below land surface; layer 2 is comprised of the interval from 51 to 55 ft below land surface, which is the screened interval of the well; layer 3 is comprised of the remainder of the aquifer from 55 ft below land surface to the Jacobsville Sandstone contact. The upper three layers, which thin considerably toward the eastern and southern parts of the study area, are primarily absent south of Lakes Kawbawgam and Le Vasseur. Layer 4 consists of the upper 30 ft of the Jacobsville Sandstone.

The potentiometric surface represents the top of the model (fig. 9). It was determined by contouring water level measurements surveyed into datum and additional water-surface altitudes listed for lakes and land surface contour intersections with streams on USGS 7.5- and 15-minute quadrangle maps. Separation of water table and potentiometric surfaces is impossible. Little or no notable variation exists, even where wells completed in both aquifer units, or wells and surface water features, are located in close proximity to one another. The contouring package SURFER (Golden Software Inc., 1994) was used to prepare the potentiometric surface map (fig. 9).

Boundary Conditions

Model boundaries are based on elevations of surface-water features and topographic information. Specified head boundaries, also known as constant head boundaries, are modeled by specifying the head value, which does not change during the simulation, in each cell. No-flow boundaries are modeled by specified flux boundaries where the specified flux is zero.

The entire northern boundary and the parts of the eastern and western boundaries formed by surface-water features consist of specified head cells for all layers of the model (fig. 7). Specified head cells were utilized for all model layers because the surface water bodies comprising those model boundaries either intersect both the glacial and lacustrine and Jacobsville

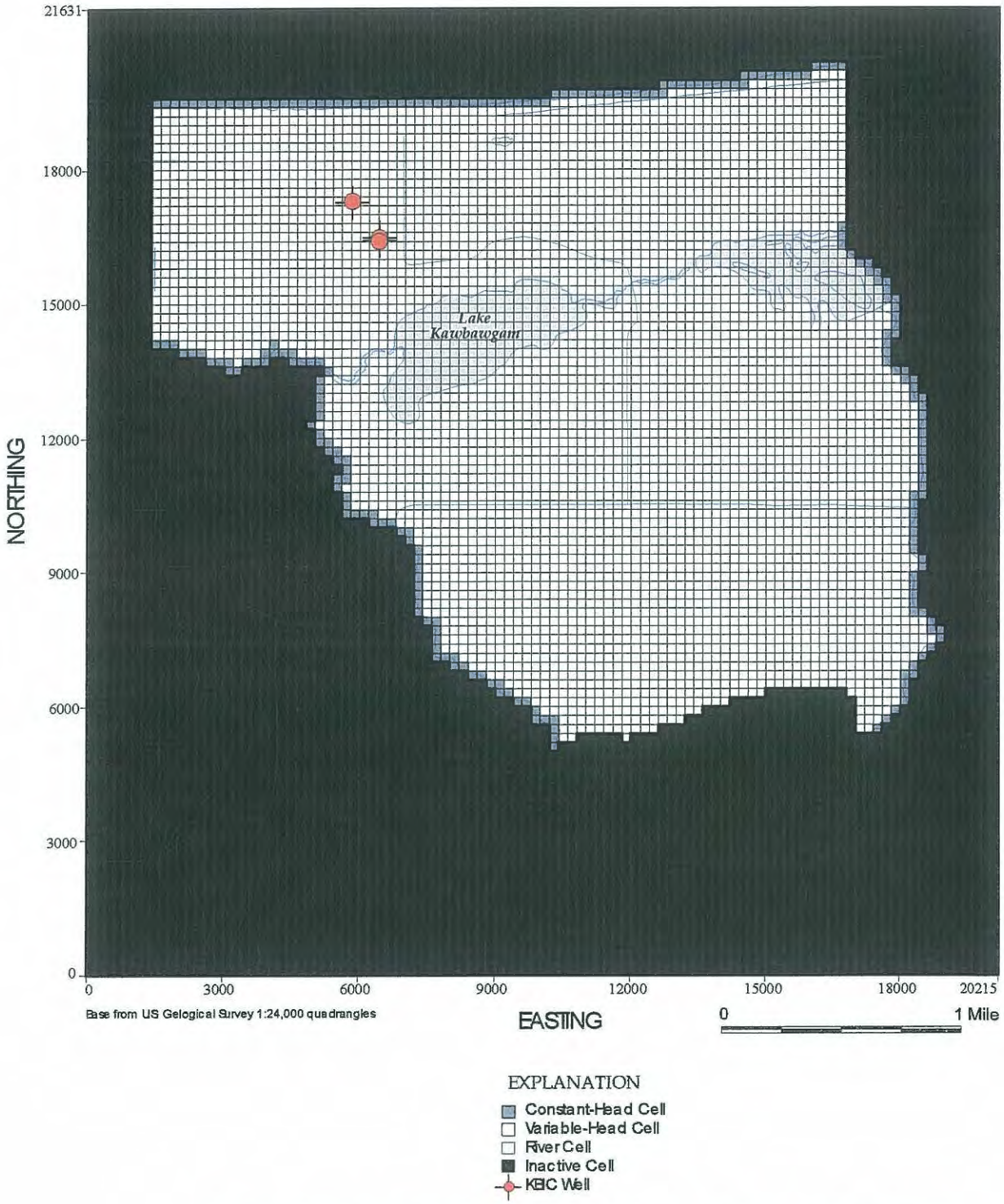


Figure 7. Modeled area showing MODFLOW grid, cell types, and boundaries, Keweenaw Bay Indian Community study area.

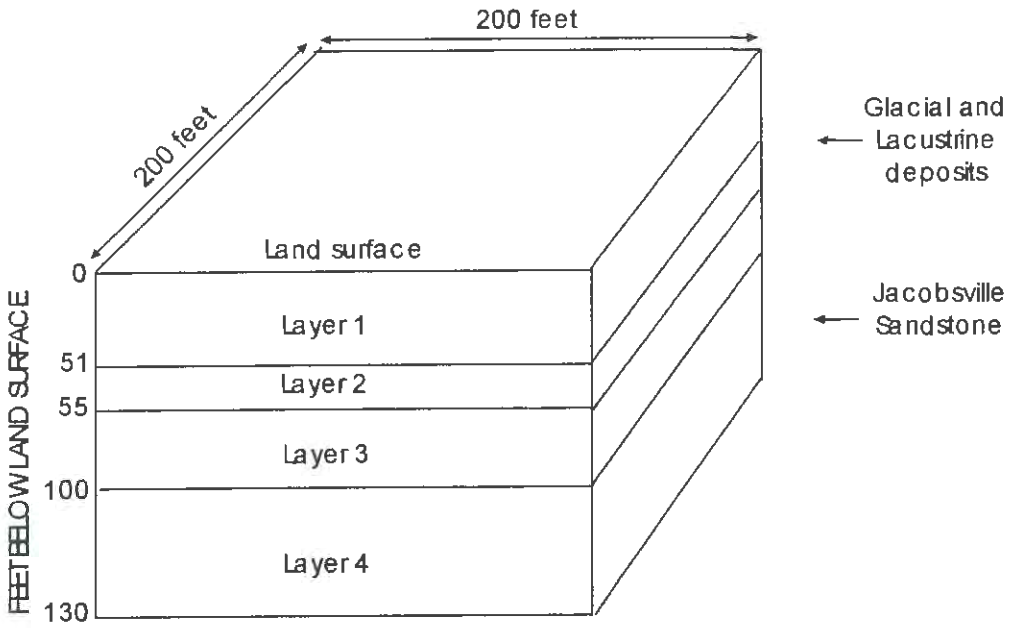


Figure 8. Schematic view of typical model cell, Keweenaw Bay Indian Community study area.

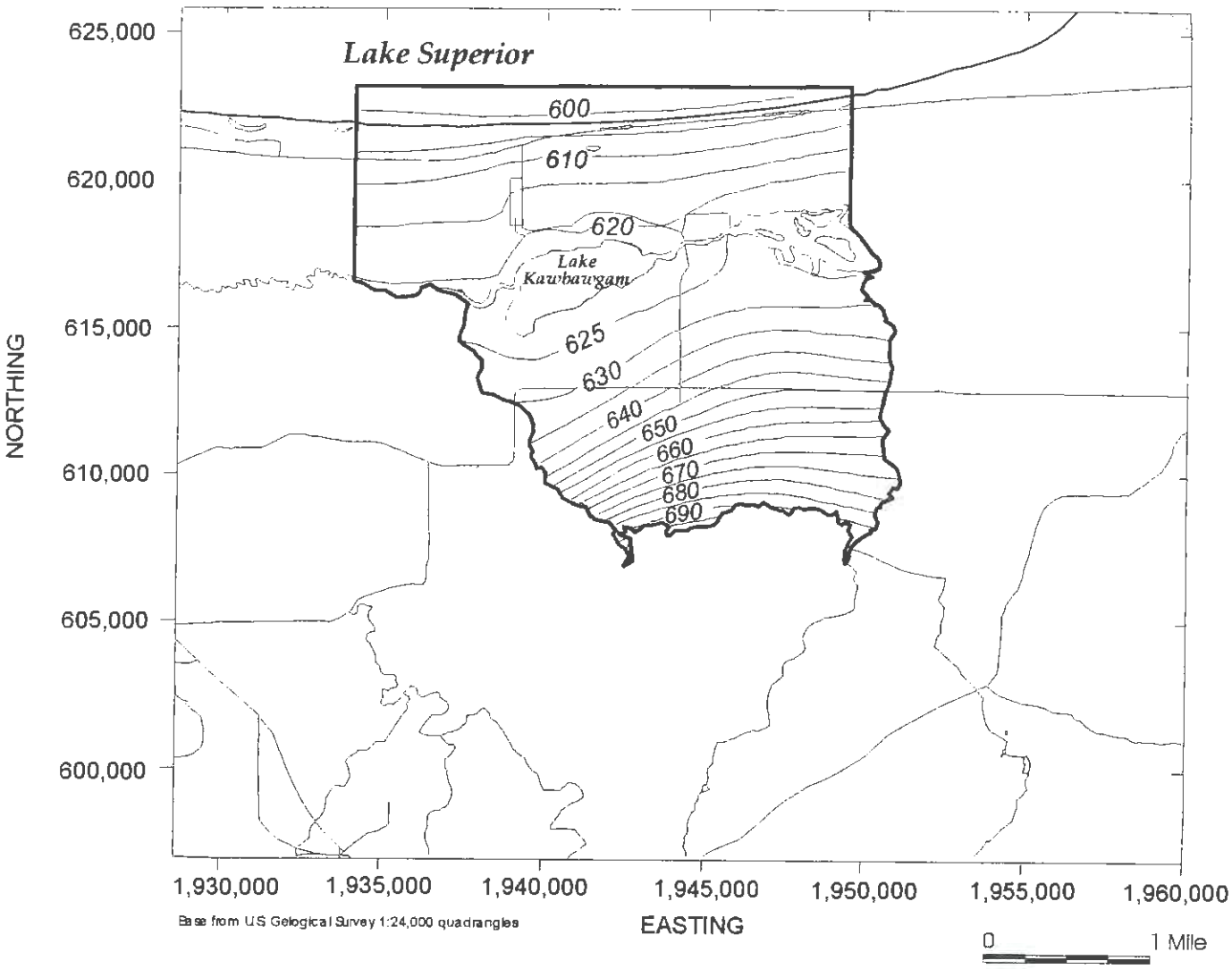


Figure 9. Modeled area showing potentiometric surface without effects of pumping public water supply or gaming facility wells, Keweenaw Bay Indian Community study area.

Sandstone aquifers, or are in close proximity to the Jacobsville Sandstone, permitting recharge of the aquifer unit to occur without restriction. Remaining portions of the eastern and western boundary in the northern part of the model area consist of no-flow cells. Within these areas, ground-water flow in the glacial and lacustrine deposits and Jacobsville Sandstone is parallel to the boundary and toward Lake Superior. The southern boundary in all layers was input as specified head or no-flow cells.

Hydraulic Properties

Hydraulic properties that were input for MODFLOW simulations include hydraulic conductivity and leakance, recharge, and streambed conductance for each layer. Hydraulic conductivity and leakance control ground-water flow through and between model layers, recharge rates determine the magnitude of water movement through the upper part of the modeled area, and streambed conductances control vertical flow of ground water between surface water bodies and aquifer unit(s) intercepted by the water bodies.

Hydraulic conductivities and effective porosity values used in the simulation are summarized in table 2. Hydraulic conductivities were calculated on the basis of the description of geologic units from drillers's logs and ranges of hydraulic conductivities (Fetter, 1988; Heath, 1982), along with aquifer test results for the PWS wells. Vertical hydraulic conductivity equal to 10 percent of the horizontal hydraulic conductivity was chosen as most representative of aquifer properties in the study area following several simulations using a variety of vertical and horizontal hydraulic conductivities. Effective porosity was chosen to realistically represent field conditions with mixed grain sizes typical of glacial and lacustrine deposits and the Jacobsville Sandstone, rather than those listed in various references for a particular grain size.

Simulated hydraulic parameters for layer 4, which represents the Jacobsville Sandstone, do not account for lower hydraulic conductivities thought to be typical of the formation below the upper 30 ft. An additional model layer could be used to represent the lower part of the formation,

Table. 2 Hydraulic parameters used for MODFLOW simulation of ground-water flow, Keweenaw Bay Indian Community, Marquette County, Michigan.
[*, simulation 1, both PWS wells pumping about 1,870 ft^3/d; Kx, horizontal hydraulic conductivity; Kz, vertical hydraulic conductivity; 4^N, cells north of Lakes Kawbawgam and Le Vasseur; 4^S, cells south of Lakes Kawbawgam and Le Vasseur; Southern boundary cells no-flow in all simulations.]

Layer		Simulation 1*		Simulation 2		Simulation 3	
	Effective porosity (in percent)	Kx (ft/d)	Kz (ft/d)	Kx (ft/d)	Kz (ft/d)	Kx (ft/d)	Kz (ft/d)
1,2	10	20	1	20	2	40	4
3	10	20	1	5	.5	5	.5
4^N	5	1.5	.075	30	3	30	3
4^S	5	1.5	.075	15	1.5	15	1.5

but permeability is probably so low that little water moves upward into the productive part of the formation. Leakances were calculated on the basis of layer thickness and vertical hydraulic conductivity of each layer (McDonald and Harbaugh, 1988, p. 5-13). Recharge was assumed to vary over the model area depending on composition of the glacial and lacustrine deposits. In the northern part of the modeled area, where these deposits consist almost entirely of sand, recharge is estimated to be 15 inches per year (in/yr). A previous study of the Sands Plains aquifer in Marquette County, which included ground-water flow model, also used recharge of 15 in/yr (Grannemann, 1984). In the southern part of the model area, where clay-rich tills make up most of the glacial deposits or the Jacobsville Sandstone subcrops near the surface, recharge was reduced to 2 in/yr.

In MODFLOW, streambed conductance is the product of the hydraulic conductivity of the streambed materials, stream length, and stream width, divided by the streambed thickness (McDonald and Harbaugh, 1988, p.6-5). Streambeds are assigned a thickness of 1 ft and a hydraulic conductivity of 5 ft/d, and lakebeds are assigned a hydraulic conductivity of 1 ft/d.

Model Calibration

Model calibration is the process of reducing the difference between simulated and measured heads by adjusting the model input parameters. Calculation of the Root Mean Squared Error (RMSE), which is the average of squared differences between measured and simulated heads, provides a means to compare results of different simulations (table 3). Model fit and sensitivity were investigated by varying hydraulic conductivity in the aquifer units, porosity of the glacial and lacustrine aquifer, and recharge. Variations in some of the parameters resulted in little change to the model (lower sensitivity) while others, e.g., horizontal hydraulic conductivity, resulted in more significant changes (higher sensitivity). The calculated elevations of the potentiometric and water table surfaces were observed while parameters were adjusted, and results were compared with observed heads. Although additional simulations were completed, the three included in table 3 utilize a range of hydraulic parameters thought to be representative of the study area.

Simulation 1 matched measured heads within about 6 ft. Although this simulation matches many heads closely, heads in three wells completed in the Jacobsville Sandstone on the south side of Lake Kawbawgam (RWKC1-2, RWGE) are particularly poorly simulated. In simulation 1, vertical hydraulic conductivities were assumed to be 5 percent of the horizontal values and layer 4 utilized hydraulic conductivity values that were similar to those obtained when the aquifer test data for the PWS wells was analyzed as unconfined (table 1).

Simulation 2 matched measured heads in RWKC1-2 and RWGE more accurately, and in PWS wells less accurately, than simulation 1. However, water levels in the PWS wells were measured after the pumps had been turned off for several hours, allowing the aquifer to return to unstressed conditions; consequently, simulated heads in these wells during pumping simulations are not particularly useful. In simulation 2; vertical hydraulic conductivities were assumed to be 10 percent of the horizontal values; layer 3 is assigned lower hydraulic conductivity values than layers 1 and 2, which is consistent with the interpretation of this layer as confining the underlying Jacobsville Sandstone aquifer in the area of the PWS wells; layer 4 in the northern part of the study area is assigned hydraulic conductivity values obtained when the aquifer test data for the PWS wells was analyzed as leaky-confined (table 1); and hydraulic conductivity of Layer 4 in the southern part of the study area is reduced by 50 percent.

Table. 3 Results of MODFLOW simulation of ground-water flow, Keweenaw Bay Indian Community, Marquette County, Michigan.
[RMSE, root mean squared error; multiple locations shown for Lake Kawbawgam.]

Location	Observed heads, (feet)	Simulation 1 Calculated head (feet)	Simulation 2 Calculated head (feet)	Simulation 3 Calculated head (feet)
RWKC1	622.06	628.25	623.0	623.0
RWKC2	621.58	624.34	621.8	621.8
RWGE	621.80	626.57	622.7	622.6
RW2044	604.38	603.89	604.1	603.4
RW231	616.96	615.53	616.6	615.1
RW240	618.20	616.83	617.9	616.6
RW275	619.32	618.88	619.5	618.6
RW340	620.30	620.80	621.0	620.2
PWS well 2	610.00	609.82	617.2	615.9
PWS well 1	610.00	609.04	615.5	614.2
Casino well (abandoned)	614.72	613.41	614.4	612.9
Lake Kawbawgam	621.06	621.06	621.1	621.1
Le Vasseur Creek at Bridge	621.36	621.80	621.8	621.7
Unnamed lake south of M28	607.00	606.46	606.8	605.7
Lake Kawbawgam	621.00	621.16	621.2	621.1
Lake Kawbawgam	621.06	621.05	621.0	621.0
RMSE, all wells included		2.19	2.31	2.04

Simulation 3 also matched measured heads in RWKC1-2 and RWGE more accurately than simulation 1. Simulation 3 did not match heads in *some* residential wells as well as simulation 2 did, particularly for those wells down-gradient from the PWS wells. Heads in several other wells however, are matched more accurately than simulation 2. Simulation 3 differs from simulation 2 in that hydraulic conductivity of layers 1 and 2 is doubled.

The RMSE is lowest for simulation 3. Results of simulation 2 and 3 (table 3) were chosen as most representative of the aquifer system in the study area; simulated heads matched observed heads more accurately than in other simulations; and hydraulic parameters are thought to accurately represent conditions in the study area. No-flow cells were used as the southern boundary cells, eliminating effects that specified-head cells could have on the model in that part of the study area where the aquifer system is least understood.

A number of model cells went dry in layers 1,2, and 3 during *all* simulations, both south of Lake Kawbawgam and near the eastern boundary in the northern part of the study area. Layer 1 has the largest number of dry cells (fig. 10), although layers 2 and 3 also have some dry cells in the same areas. Dry cells occur in areas where glacial and lacustrine deposits are thin, and the Jacobsville Sandstone subcrops near the surface, or where thick, clay-rich materials directly overlie the Jacobsville Sandstone. Little recharge of the Jacobsville Sandstone aquifer occurs in these areas, with most precipitation running off to surface water bodies in areas where bedrock is near the surface. To verify that dry cells accurately represent hydrologic conditions of the study area, a recharge of 15 in/yr was also applied to the southern part of the study area during one of the simulations. Although this method wetted some cells close to the south shore of Lake Kawbawgam, it had little effect on the rest of the dry cells and resulted in a poor match between calculated and observed heads elsewhere in the model. In simulations included in table 3, recharge of 2 in/yr was used in the southern part of the study area and 15 in/yr was used in the northern part of the study area.

DELINEATION OF CONTRIBUTING AREA

The particle-tracking program MODPATH (Pollock, 1989) can be combined with flow calculated by MODFLOW in each cell to determine the area(s) contributing water to well(s). MODPATH uses a semi-analytical particle-tracking scheme that allows a hypothetical water particle to be tracked as it moves from cell to cell through a steady-state, three-dimensional flow system. Particle paths, and the locations where they enter and leave the simulated ground-water flow system, approximate ground-water flow paths in the aquifer. Particle tracking describes the advective movement of ground water and does *not* incorporate the effects of diffusion, dispersion, and degradation. Therefore, particle tracking is not intended as a substitute for modeling the transport of dissolved chemicals in the ground-water system.

These hypothetical water particles can be tracked down- or up-gradient (referred to as "forward" or "backward" tracking, respectively) until they exit the aquifer, or reach a specified stopping location. In this study, water particles were placed along the faces of each cell containing a community well. These particles were then backward tracked in time through the ground-water flow system for a travel time of 10 years, as specified by USEPA.

When MODPATH was used in conjunction with the results of MODFLOW 96 simulations 1 to 3, they defined similar 10-year contributing areas. As input parameters were varied, some changes to size and shape of the contributing areas occurred; when effective porosity of the glacial and lacustrine aquifer was increased, the size of the contributing areas was reduced slightly; when hydraulic conductivity in the glacial and lacustrine aquifer is increased, contributing areas

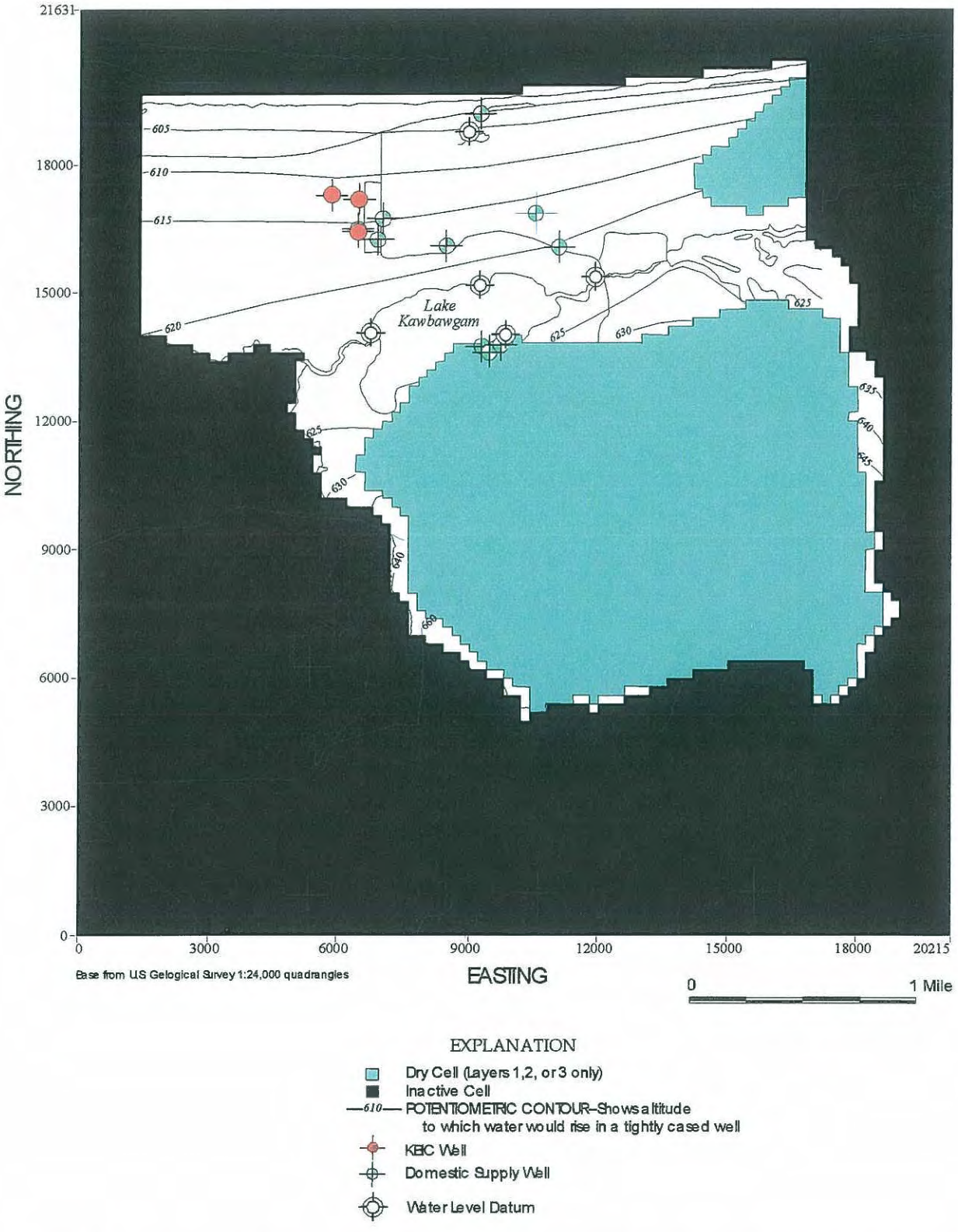


Figure 10. Modeled area showing dry cells in Layer 1, Keweenaw Bay Indian Community study area.

constrict and extend several hundred feet further south; little difference was noted when hydraulic conductivity in the Jacobsville Sandstone aquifer was reduced, and no difference was noted when cell types comprising the southern boundary were changed from no-flow to specified head.

Contributing areas of the PWS and gaming facility wells were obtained by combining results of simulation 2 and 3 (table 3). The contributing area of the gaming facility well was delineated after simulations indicated interference with the PWS wells. The composite 10-year contributing area for the PWS and gaming facility wells comprises about 0.2 mi^2. Sub-surface areas that contribute water to wells are known as the zone of contribution areas. Figure 11 is a section view of the zone of contribution for the PWS wells and figure 12 is a section view of the zone of contribution for the gaming facility well. The zone of contribution for the PWS wells extends from the Jacobsville Sandstone upward into glacial and lacustrine deposits, reaching land surface about 1,200 ft south of the wells and extending into Lake Kawbawgam. The zone of contribution for the gaming facility well is entirely within glacial and lacustrine deposits, extending upward to land surface at the well head and south about 3,300 ft. Figure 2 shows the 10-year contributing areas plotted on the USGS 1:24,000 Harvey and Skandia quadrangle maps that include the KBIC study area.

Model Limitations

The ground-water flow model for the KBIC study area was devised to simulate regional steady-state response of the flow system in the study area to ground-water withdrawal by PWS wells. Hydraulic properties in the aquifers were assumed to be isotropic only within the horizontal plane. Vertical variations in aquifer properties within layers, and any variation in heads or flow within the aquifers, are not represented in the model.

Each grid cell represents average hydrologic and hydraulic properties in the volume of aquifer represented by the grid cell. Thus variations in properties within individual cells cannot be represented. Likewise, flow over distances smaller than the dimensions of the grid cell cannot be accurately represented. Additional geologic and hydrologic data and finer discretization of the model would be needed to simulate smaller-scale flow systems.

Simulated well pumpage is assumed to come from the centers of the grid cells. Accuracy of layer surfaces and hydraulic conductivity estimates are limited by available data.

The bottom of layer 4 in the model is considered impermeable, based primarily on the low permeability of the Jacobsville Sandstone in parts of the formation where it is un-weathered and fractures are not present. For this study, all of the formation below the upper 30 ft of was assumed to meet this criterion.

Model simulations are restricted to steady-state conditions. All stresses within, and inputs to the system, including well pumpage and recharge, remain constant throughout the simulation. No net gain or loss of flow is simulated in the system and no changes in storage occur. This model in its current form cannot be used to simulate transient-flow conditions.

The accuracy of particle-tracking simulations is limited by the accuracy of the numerical model on which the simulations are based, estimates of the effective porosity of the flow system, and approximation of the cell flow velocities to local ground-water flow velocities. Additionally, the particle-tracking program considers ground-water flow by advection only. If the effects of dispersion were included, contributing areas would be larger. Because the model does not specifically describe flow through fractures, ground-water flow and travel times in areas of the Jacobsville Sandstone where fractures exist may *not* be accurately represented.

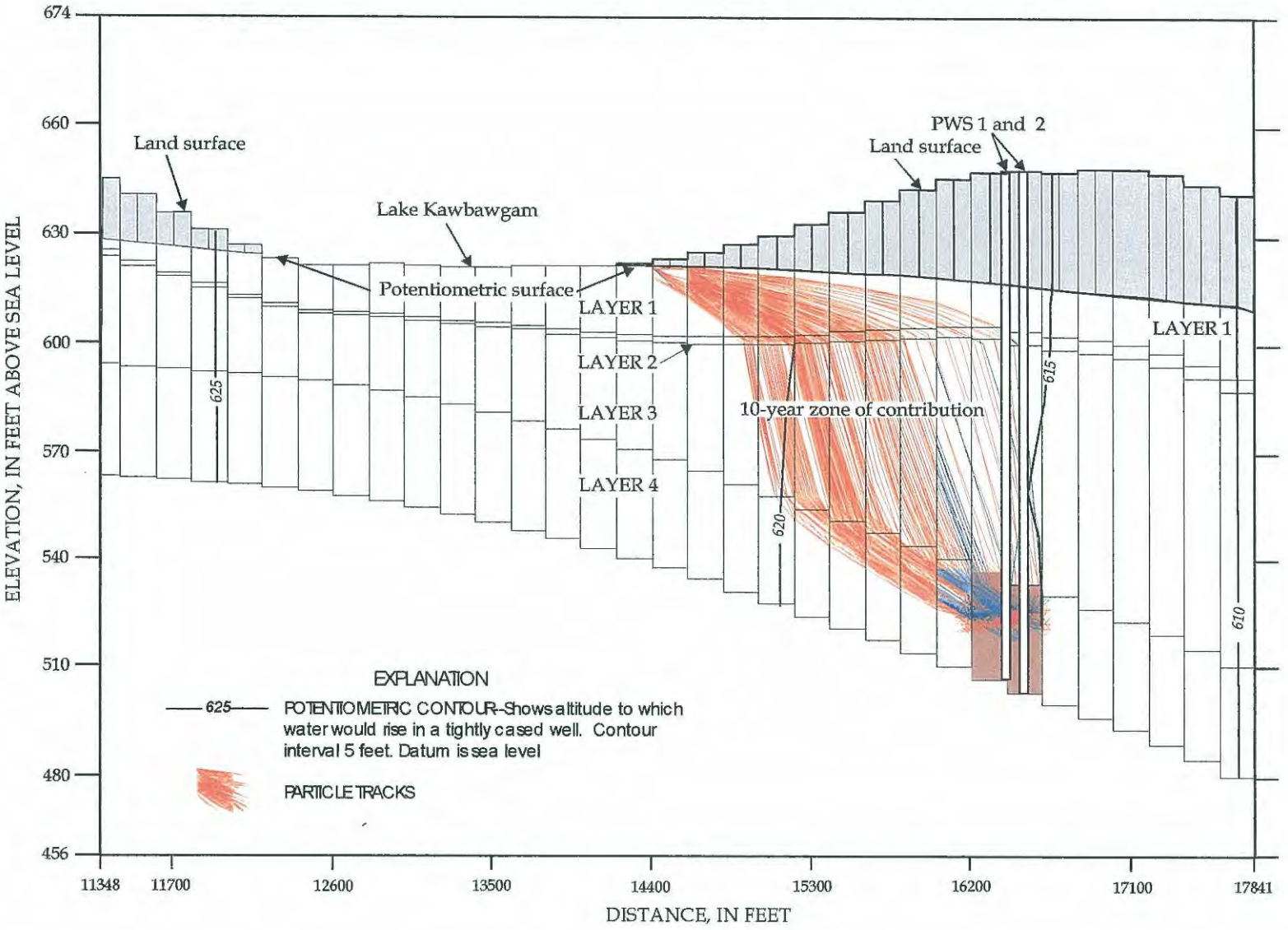


Figure 11. North-south section view of contributing area to Keweenaw Bay Indian Community public water-supply wells.

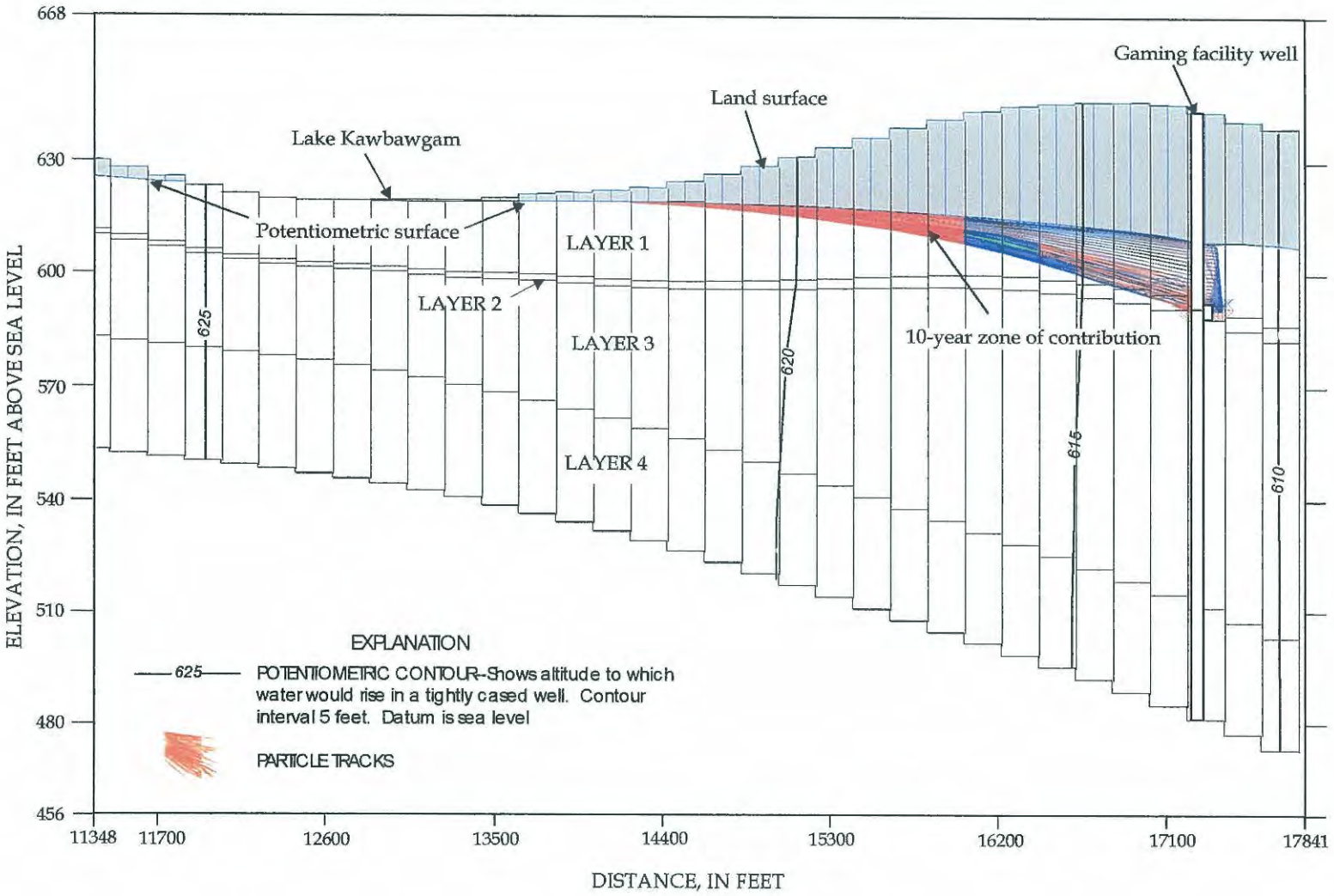


Figure 12. North-south section view of contributing area to Keweenaw Bay Indian Community gaming facility well.

SUMMARY

Keweenaw Bay Indian Community (KBIC) in Marquette County, Michigan has two public water supply (PWS) wells completed in the Jacobsville Sandstone Formation. The PWS wells can pump much more water than other wells completed in the formation throughout the Upper Peninsula of Michigan. In 1998, an U.S. Environmental Protection Agency grant to develop a wellhead protection plan (WHPP) for the PWS wells was awarded to KBIC. As part of the WHPP, U.S. Geological Survey (USGS) delineated the 10-year contributing areas for the PWS wells and KBIC completed the contaminant source inventory using the contributing area delineated by USGS.

Thickness, areal extent, and general lithologic characteristics of the Jacobsville Sandstone and glacial and lacustrine deposits were determined by evaluating driller's logs from two PWS wells, one well supplying a gaming facility, and 13 domestic supply wells located in the study area. Water levels of surface water bodies and ground-water wells were surveyed into datum, and additional surface-water levels were obtained directly from topographic maps. Three hydrogeologic cross-sections intersecting at the KBIC PWS wells were prepared using known data. An aquifer test completed by Indian Health Services in 1991 was analyzed to obtain hydraulic characteristics, and the above information was input into the USGS three-dimensional ground-water flow-modeling program, MODFLOW-96. To calibrate the flow model, several simulations were run using a range of hydraulic conductivities, recharge rates, porosities, and cell types at the southern study area boundary. Two simulations were chosen as representative of the ground-water flow system in the study area. The chosen simulations best matched measured water levels.

The area contributing water to the PWS and gaming facility wells over a period of 10 years was delineated using the particle-tracking program MODPATH in conjunction with the ground-water-flow model prepared in MODFLOW-96. The gaming facility well was also delineated due to potential interference with PWS wells. To conservatively delineate the 10-year contributing area for the KBIC wells, contributing areas from the chosen simulations were combined to produce a composite area. The combined 10-year contributing areas comprise about 0.2 mi^2. The zone of contribution for the PWS wells extends from the Jacobsville Sandstone upward into glacial and lacustrine deposits, reaching land surface about 1,200 ft south of the wells and extending into Lake Kawbawgam. The zone of contribution for the gaming facility well is entirely within glacial and lacustrine deposits, extending upward to land surface at the well head and about 3,300 ft south.

REFERENCES CITED

Environmental Protection Agency, 1993, Guidelines for delineation of wellhead protection areas, EPA-440/5-93-001, p. 1-2.

Environmental Protection Agency, 1995, Drinking water regulations and health advisories, Office of Water.

Farrand, W.R., and Drexler, C.W., 1985, Late Wisconsinan and Holocene history of the Lake Superior Basin, *in* Karrow, P.F., and Calkin, P.E., eds., Quaternary Evolution of the Great Lakes, Geological Association of Canada Special Paper 30, p. 18-32.

Fetter, C.W., 1988, Applied Hydrogeology, Merrill Publishing, 592 p.

Freeze, A.R., and Cherry, J.A., 1979, Groundwater, Prentice-Hall, Inc., 604 p.

Gair, J.E., and Thaden, R.E., 1968, Geology of the Marquette and Sands quadrangles,

Marquette County, Michigan, U.S. Geological Survey, Professional Paper 397, 77 p.
Golden Software, Inc., 1994, SURFER for Windows, 446 p.
Grannemann, N.G., 1984, Hydrogeology and effects of tailings basins on the hydrology of Sands Plains, Marquette County, Michigan, U.S. Geological Survey, Water-Resources Investigations Report 84-4114, 98 p.
Hantush, M.S., and Jacob, C.E., 1955, Plane potential flow of groundwater with linear leakage: American Geophysical Union Transactions, v. 16, p. 519-524.
Heath, R.C., 1982, Basic ground-water hydrology, U.S. Geological Survey, Water-Supply Paper, no. 2220, 81 p.
McDonald, M.G., and Harbaugh, A.W., 1988, A modular three-dimensional finite-difference ground-water flow model: U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 6, Chap. A1, 576 p.
McDonald, M.G., and Harbaugh, A.W., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.
Michigan Department of Environmental Quality, 1994, Michigan water well construction and pump installation code, 1994 revision, 72 p.
Neuman, S.P., 1974, Effect of partial penetration on flow in unconfined aquifers considering delayed gravity response: Water Resources Research, vol. 10, no. 2, p. 303-312.
Neuman, S.P., 1975, Analysis of pumping test data from anisotropic unconfined aquifers considering delayed gravity response: Water Resources Research, vol. 11, p. 329-342.
Pollock, D.W., 1989, Documentation of computer programs to compute and display pathlines using three-dimensional finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 89-381, 188 p.
Theis, C.V., 1935, The relation between lowering of the piezometric surface and the rate and duration of discharge of a well using ground-water storage: American Geophysical Union Transactions, vol. 16, p. 519-524.
Twenter, F.R., 1981, Geology and hydrology for environmental planning in Marquette County, Michigan, U.S. Geological Survey, Water-Resources Investigations Report 80-90, 44 p.
Vanlier, K.E., 1963, Reconnaissance of the ground-water resources in Alger County, Michigan: Michigan Geological Survey Water Investigation 1, 55 p.

Appendix 3

U.S. Geological Survey Source Water Assessment, PWSID # EPA5293303, Kawbawgam Road, Michigan Source Water Assessment Report 72

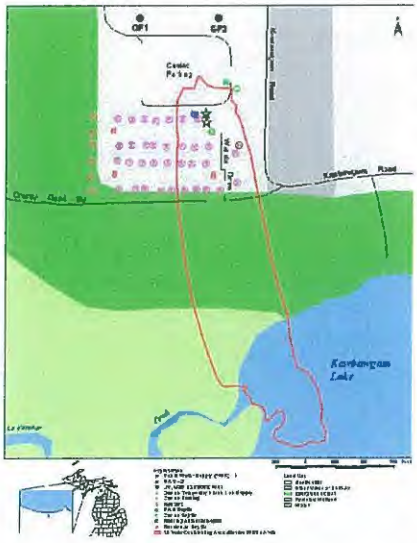
PWSID#: EPA5293303
Kawbawgam Road
Community Water System
Marquette County
Skandia Quadrangle

Importance of Safe Drinking Water: In 1996, Congress amended the Safe Drinking Water Act and provided resources for state agencies to conduct source water assessments by identifying source water areas (SWA), analyzing the sensitivity of the source to natural conditions, conducting contaminant source inventories, and determining the susceptibility of the source to potential contamination. Delineations, sensitivity analyses, contaminant inventories, and susceptibility determinations comprise a "source water assessment." The U.S. Geological Survey (USGS) has compiled information from the area around the public water supply wells that supply the Kawabawgam Road community. This information includes available water-quality data and potential contaminant sources, and describes the ability of the environment to protect the water supply from contamination. This report summarizes those findings.

Water Supply Information: According to records of the Indian Health Service (IHS) and the Kawbawgam Road supply, between 1997 and 2001, water was supplied from two wells at a rate of less than 10,000 gallons per day (Rasanen, 2002). The source of water for the supply is a sandstone bedrock aquifer. The aquifer is covered by a layer of sand with some areas of silty sand and (or) clay and silt. The aquifer is potentially susceptible to contamination by a variety of sources, including point sources (such as leaking underground storage tanks and non-point sources (such as agricultural chemicals). Additional information about potential sources of contamination can be found at:
http://www.epa.gov/OGWDW/swp/sources1.html.

What are the Potential Contaminant Sources? Near the wells, the land is used for commercial purposes and for residential development. South of the wells and the residential area, the land is classified as wooded and wetlands. The southern most part of the area that contributes recharge to the wells is under Kawbawgam Lake. Some lawn chemicals are probably applied to nearby lawns. Each of the residences supplied by the wells has a septic system, as does the adjacent casino and housing authority building. The casino also has a standby generator with fuel storage on-site. The parking lot for the casino is a potential source for runoff, including fuels and other fluids leaking from vehicles. Within the 10-year time of travel to the wells (SWA) identified by the USGS (Weaver and others, 2000) there are no regulated facilities, or facilities with permits to store, handle, or discharge potential contaminants. There are 14 septic systems and a casino, all point sources, and part of the casino parking lot, which is a non-point source. The susceptibility of the source water to contamination is considered low.

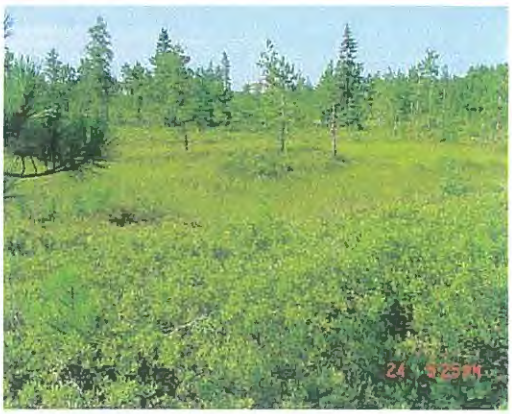
What is the Effect of the Environmental Setting? From Weaver and others (2000): "The source of water for the supply is the Jacobsville Sandstone, a bedrock aquifer. The aquifer is covered by a layer of sand with some areas of silty sand and(or) clayey sand. The upper part of the Jacobsville Sandstone is probably more productive than other parts of the formation. The formation is friable, highly fractured, and parts along bedding planes in outcrop, although it known to become more massive at depth. The Kawbawgam Road wells are completed in the upper 26 to 31 feet of the formation, and are much more productive than other wells completed in the formation throughout the Upper Peninsula of Michigan. The Kawbawgam Road wells are capable of producing as much as 100 gallons per minute." Static water levels are about 35 feet below the surface in the area. Because of the relatively high permeability of overlying sands throughout the source-water area, the geological susceptibility of the source water to contamination is considered high.



What is the Likelihood that Contaminants May Reach this Water Supply? In 1998, to determine the likelihood that contaminants might reach this water supply, and to begin planning a wellhead protection program, the Keweenaw Bay Indian Community (KBIC) was awarded a source-water protection grant from the U.S. Environmental Protection Agency (USEPA) to complete a wellhead protection plan (WHPP). As part of the WHPP, USGS delineated a 10-year contributing area for the public water supply wells using a modular ground-water flow model. The model calculated the rate of water movement downward from the land surface to the aquifer, and the rate of water movement horizontally as saturated flow through the aquifer. The results of these calculations were used to trace the path of water backward, from the open part of the well where water is withdrawn, to the land surface where the water would have originated. Within the SWA described in this report, calculations of travel time and distance were made using information from 13 water-well logs. These calculations, the results of the model, and the available well construction information indicate that the susceptibility of the source water to contamination is low.

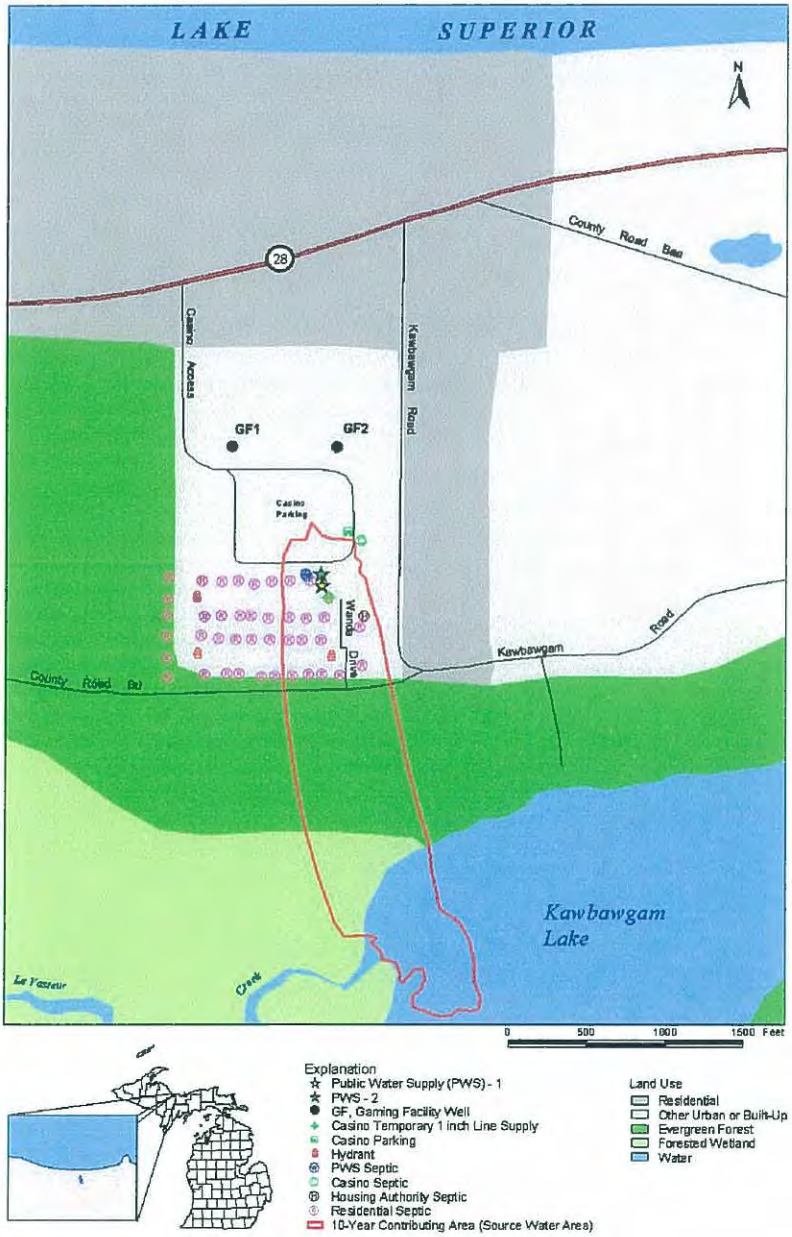
How Can I Act on this Information? The actual susceptibility of the drinking water source of a water supply depends on a number of contributing factors, some of which are only slightly related. Sensitivity is determined from the natural setting of the source and identifies the natural protection afforded to the source water. Susceptibility is determined by identifying those factors within the community's SWA that may pose a risk to the source water. The susceptibility determination provides information with respect to facilities within the SWA or land areas within the SWA that should be given greater priority and oversight in the implementation of a drinking water protection program. The information presented in this source-water assessment provides background information that interested parties can use to develop a source-water protection program. This information can be used to :

1. Increase local awareness of the source of drinking water;
2. Recognize the factors affecting drinking water quality;
3. Focus available resources on sites and areas of greatest concern; and
4. Make land-use decisions compatible with maintaining clean water.



The Kawbawgam Road community should assemble a team to assist in the development and implementation of a source-water protection program that uses this assessment to further protect the Kawbawgam Road SWA. For more information on developing a local source-water protection program, visit: http://www.epa.gov/safewater/protect/assessment.html.

For questions or comments concerning this assessment, contact the Keweenaw Bay Indian Community Natural Resources Department, Office of Water Quality at (906) 524-5757, extension 15.



Data for PWS wells #EPA5293303

Land use percentage, by type:

Residential	0.84%
Evergreen Forest Land	81.5%
Forested Wetland	16.0%
Lakes	1.70%

Total length of roads = 0.38 miles
(Road density is very low)

Pumping rate = 9,600 gallons per day, five year average

Information from USEPA BASINS program regarding Potential Contaminant Sources:

Potential contaminant sources within the source water area (SWA):

Permitted facilities:

None

Point sources:

13 domestic septic systems
1 commercial septic system

Geologic Logs (from Weaver and others, 2000):

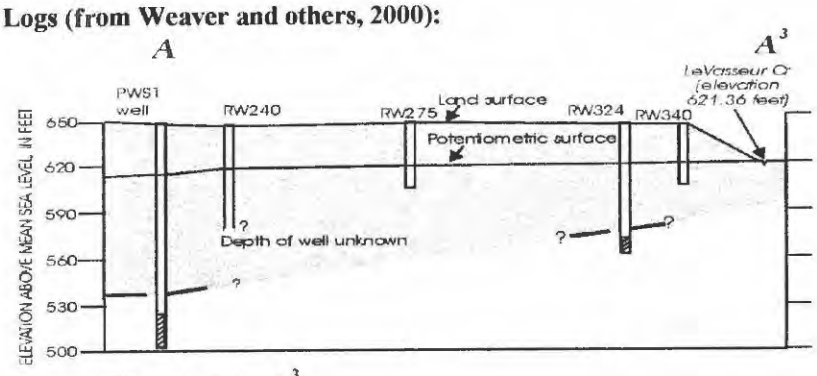


Figure 3. A-A^3

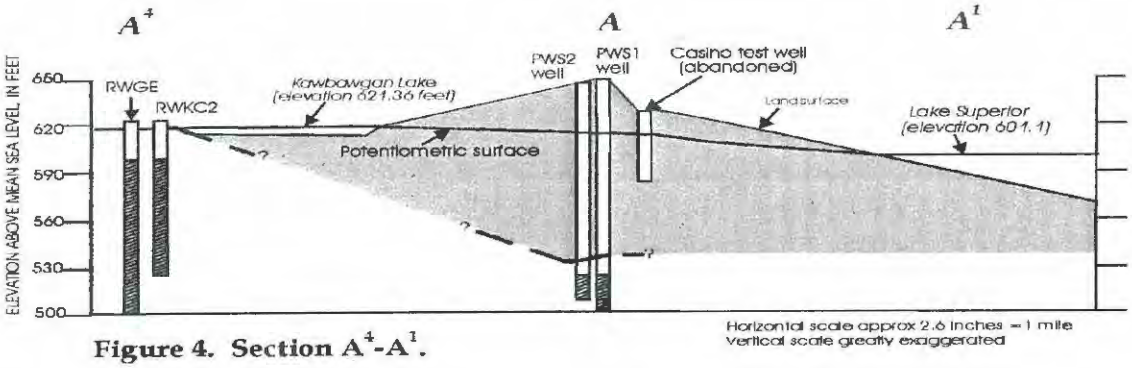


Figure 4. Section A^4-A^1.

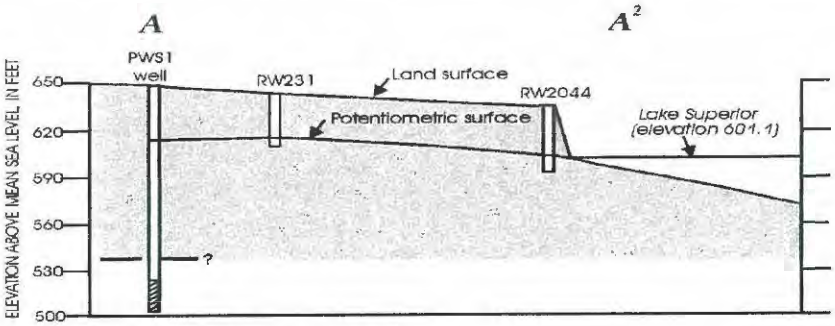


Figure 5. Section A-A^2.

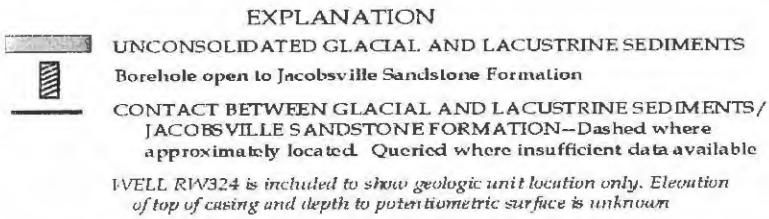


Figure 3, 4, and 5. Generalized hydrogeologic sections showing potentiometric surface and stratigraphic relations of Jacobsville Sandstone Formation and younger geologic units, Kawbawgam Lake area, Marquette County, Michigan. (Line of sections shown in figure 2.)

Location of Geologic Logs (from Weaver and others, 2000):

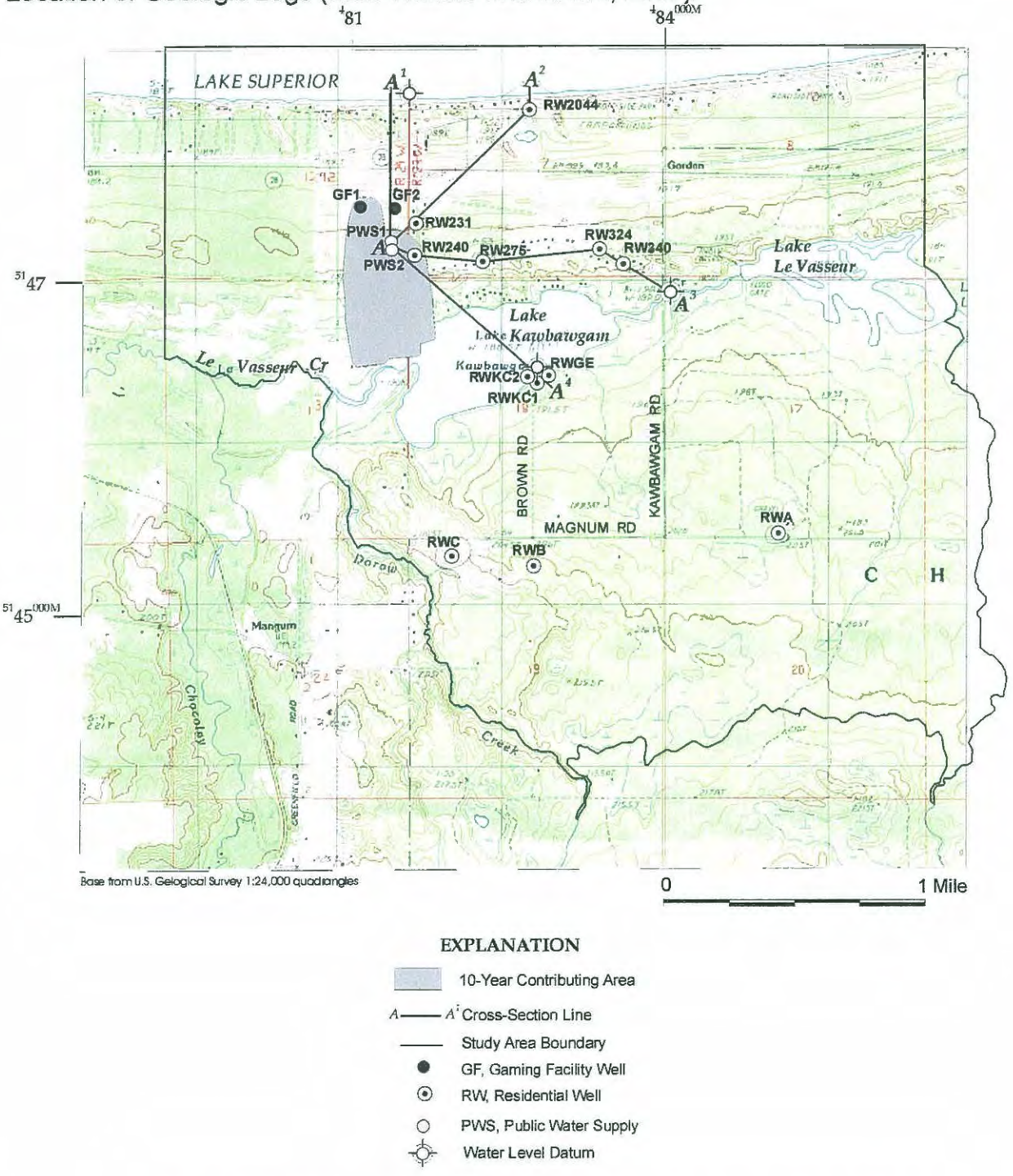
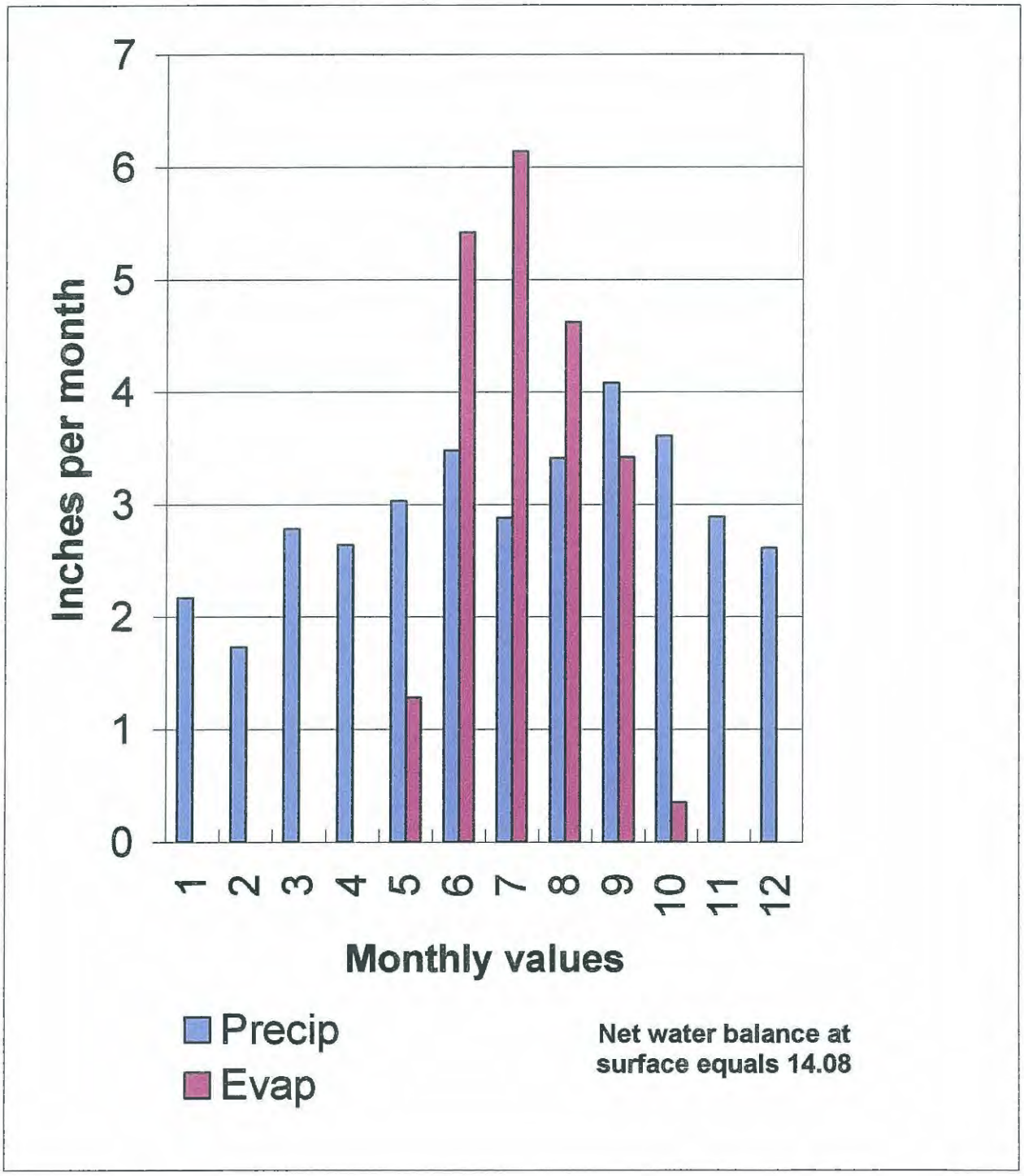
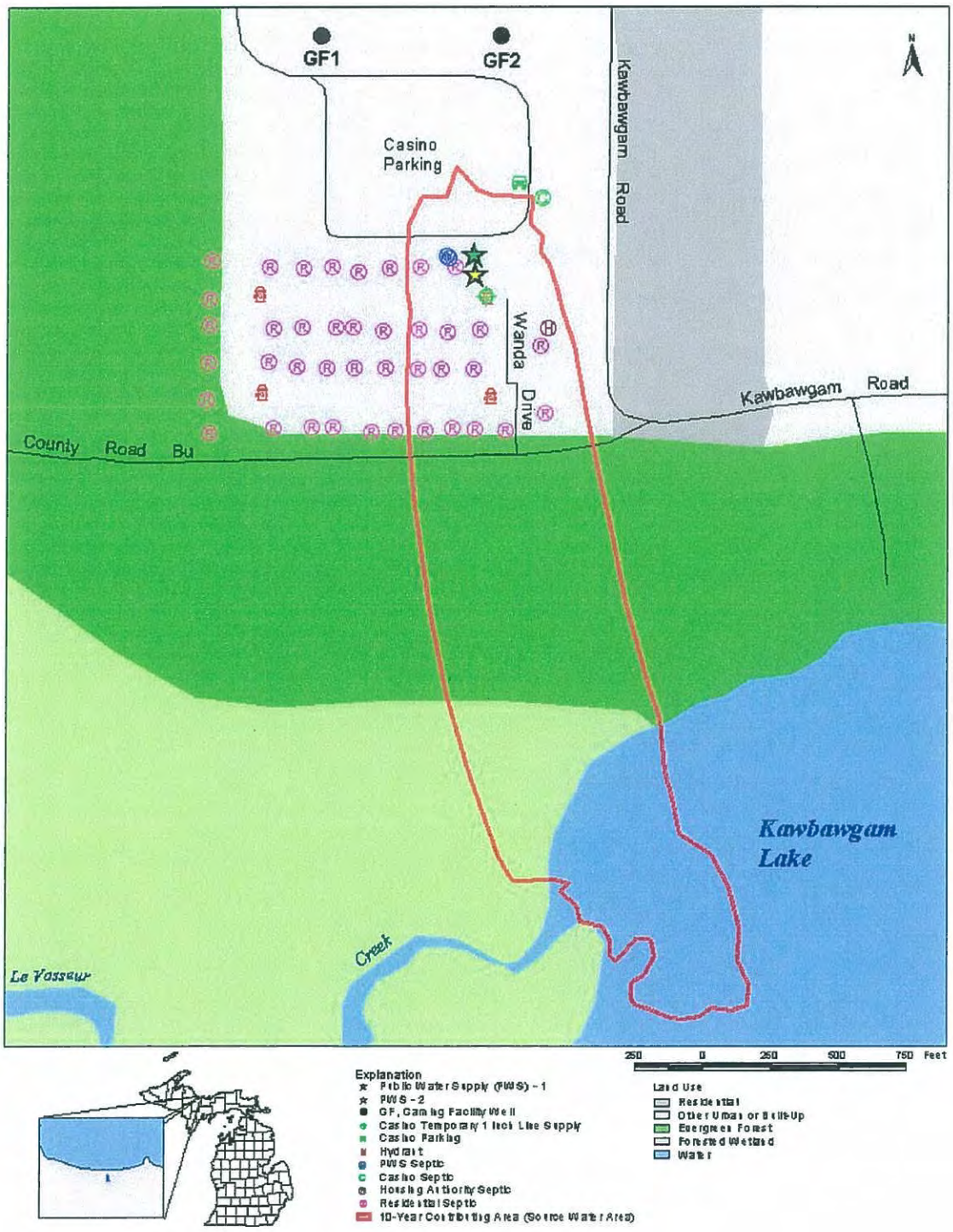


Figure 2. Modeled area plotted on USGS 1:24,000 quadrangle map showing 10-year contributing areas for public water-supply wells and gaming facility wells, Keweenaw Bay Indian Community study area.

Precipitation and Evaporation Data:



Delineated Ten-Year Capture Zone:



History of Raw Water Quality at the Source: Tribal water supplies are required to routinely monitor raw and treated water for a list of contaminants that is determined by USEPA and the Safe Drinking Water Act. A detection of any contaminant may indicate that a pathway exists for contaminants to reach the well. It is important to realize that the results from a given sample only provide information regarding the water quality at the time the sample was collected. Water quality can change with time for a number of reasons. The fact that a water sample does not contain contaminants is no guarantee that contamination will not occur in the future. Conversely, the detection of a contaminant in the past does not indicate that it will occur in the future. Review of water supply records indicates that in general, synthetic and volatile organic compounds are not present in the water, except for four synthetic organic compounds that are the result of the disinfection process. These four compounds are present in quantities ten to one thousand times smaller than the health limit set by the USEPA.

Sensitivity Analysis: Sensitivity is the natural ability of a SWA to provide protection against the contamination of the water supply well(s), and includes physical attributes of the materials in which the well(s) is located. The sensitivity analysis requires consideration of several different variables related to the natural environment, including: well construction; well depth; well age; geology of material in which the well is finished, and through which it passes; pumping rate; and water quality of the source (aquifer).

To perform this analysis, USGS and KBIC collected, researched, and analyzed information from operator reports, soil maps, published reports, historical plant operation data, and raw water quality data. The Kawbawgam wells were drilled in 1990 and 1991, are 145 and 138 ft deep, respectively, and are open to 20.5 and 15 feet of aquifer, respectively. The wells have high geological susceptibility because there is little clay or other fine material in the deposits overlying the aquifer.

Susceptibility Determination: Susceptibility is the relative potential for contamination to reach the water supply well(s) used for drinking water purposes. Whereas the sensitivity of a water supply is the natural ability of the area to protect the well(s) against contamination, the susceptibility determination also takes into account other factors that will affect whether a contaminant reaches the well(s). Whether or not a particular drinking water source becomes contaminated depends on three factors:

(1) The distribution and proximity of potential contaminant sources (PCS) to the source-water area (SWA);
(2) The geology of the SWA; and
(3) The natural protection, or sensitivity, of the source.

In conducting a susceptibility determination, the part of the SWA that yields water to the well is identified – in this case by development of a model of ground water flow (Weaver and others, 2000). PCS within the SWA area are then located. Based on the distribution of PCS within the susceptible area, the type of PCS, and the nature of the chemicals they use or store, PCS are analyzed for the risk they may represent to the water supply well(s). Along with the presence and distribution of PCS, the sensitivity analysis is then used to determine the susceptibility of the water supply. This leads to a susceptibility determination for the water supply. It is important to understand that a system can have low susceptibility relative to some conditions (for example, well construction and location), and high susceptibility because of other conditions (for example, the type of PCS).

All water supplies, regardless of their susceptibility, should consider identified factors that could lead to higher susceptibility in the future, and should prepare a strategy to protect the water supply source. Raising public awareness through signs and other education programs, encouraging proper well construction and the use of best management practices in existing facilities are good ways of ensuring that a surface water source maintains its low susceptibility rating. The Kawbawgam supply wells have low susceptibility related to well construction, contaminant sources, and water quality. The overall susceptibility of the wells is low.

References

Weaver, T.L. Luukkonen, C.L, and Ellis, J.M., 2000, Simulation of ground-water flow and delineation of contributing area to public water supply wells, Keweenaw Bay Indian Community, Marquette County, Michigan: U.S. Geological Survey Water-Resources Investigations Report 00-4050, 25 p., 4 appendixes.

Rasanen, Carl. Water supply operator. Written communication, 23 August 2002.

Appendix 4

Source Water Protection Program Contingency Plan Kawbawgam Road Housing Community Public Water Supply Wells, Keweenaw Bay Indian Community, Marquette County, Michigan

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

By T. L. Weaver

Source Water Protection Program Contingency Plan Kawbawgam Road Housing Community Public Water Supply Wells, Keweenaw Bay Indian Community, Marquette County, Michigan

By T.L. Weaver

GENERAL INFORMATION

The Keweenaw Bay Indian Community (KBIC) housing development on Kawbawgam Road is located in Marquette County, a few miles east of the City of Marquette.

Physical description of public water supply (PWS) wells: The Tribal housing community wells, PWS 1 and PWS 2, were drilled in 1990 and 1991, respectively. PWS 1 has a 6-inch diameter steel casing and is completed to a depth of 145 feet (ft) and PWS 2 has an 8-inch steel casing and is completed to a depth of 138 ft. PWS 1 is open to 20.5 ft of aquifer material (Jacobsville sandstone) and PWS 2 is open to 15 ft of aquifer material. Both wells are equipped with 100 gallon-per-minute (gpm) submersible pumps, but were set to pump at 50 to 53 gpm in 1999 (Carl Rasanen, KBIC, oral commun., 1999). Both wells feed into a single treatment area. Only one well is typically used at a time and the other well is kept on standby to satisfy firm capacity requirements.

SHORT-TERM EMERGENCY WATER SUPPLY OPTIONS

1. Purchase bottled water and distribute to individual homes for potable uses only. It is possible that the PWS wells could be rendered unusable due to dermal and inhalation dangers depending on the nature of the contamination. Should the wells prove to be unusable for any purpose, one or more of the long-term solutions listed below will have to be used.

2. Water could be purchased from either Marquette or K.I. Sawyer PWS, since their systems would likely be unaffected by contamination or other problems that have caused the Kawbawgam Road PWS wells to become unusable. Water would have to be hauled in tank trucks and distributed in some manner to the Tribal housing community.

3. Supply Tribal housing community water system with water from the Gaming Facility. The gaming facility wells have typically provided poorer quality water than the PWS wells (Scott Helgeson, Indian Health Service, oral commun., 1999), with iron concentrations at least 4 times greater than typical from PWS wells. Water quality could be improved with a treatment regimen. It is likely that the Tribal housing community wells and gaming facility wells would be similarly impacted, given the fact that the delineated wellhead protection areas (WHPA) overlap.

4. Install treatment devices at the wellhead to remove contaminant. This may not be possible depending upon the nature of the contaminant. Treatment units may not be available or installed rapidly enough to alleviate immediate needs.

5. Combination of the above.

LONG-TERM ALTERNATIVE WATER SUPPLY OPTIONS

Depending upon the type of contamination, or other problem related to the Kawbawgam Road PWS wells, and other related unknowns, possible long-term options are the following:

1. Construction/installation of a treatment facility at the wellhead that sufficiently removes contaminants.

2. Installation of filtering equipment at point-of-entry locations (i.e., on the taps).

3. Supply Tribal housing community water system with water from the Gaming Facility. The gaming facility wells have typically provided poorer quality water than the PWS, but could be improved with a treatment regimen. As noted in the short-term alternatives, these wells would likely be impacted by any contamination of the PWS wells given the overlap in zones of contribution.

4. Develop a new well field, either within Tribal property boundaries or off-site. It would be necessary to build a water-supply line from the new well field location to the existing treatment facility, or at the very least, to the Tribal housing complex. Cost would depend on development of the new well field, length of the water-supply line, and construction of a new treatment facility, or improving the current treatment facility.

5. Connection with community water supply at the City of Marquette if it is unaffected by the contamination present in the Kawbawgam Road PWS wells. This will be an expensive procedure given the need to transport water over some distance from the City of Marquette.

6. Development of a new surface water intake site, or public water supply wells. Installation of a surface water intake will probably require modifications or replacement of the current treatment plant, but may be cheaper than installing a water-supply line to a connection with the City of Marquette system.

7. Remediation of well field and aquifer. This is typically expensive and may not be completely successful.

8. Combination of the above.

EXISTING POTENTIAL CONTAMINANT SOURCES:

There are several possible sources of contamination within the WHPA; point sources include septic systems for the 14 private residences, housing office, and the gaming facility, and the standby generator at the gaming facility. Non-point sources include lawn chemicals and the parking lot for the gaming facility, because of fuels and other fluids leaking from vehicles. Within the 10-year time of travel (WHPA) to the wells identified by the USGS (Weaver and others, 2000), there are no regulated facilities, or facilities with permits to store, handle, or discharge potential contaminants. The susceptibility of the source water to contamination is considered low.

There are a number of other ways that contaminants can affect source water for the Kawbawgam Road PWS wells. A brief and generalized summary of possible sources is listed below. The following is a detailed list of potential sources of contamination (naturally occurring, agricultural and commercial forestry, residential, municipal, commercial, and industrial sources and

processes), which will be updated/tabulated as time and resources are available. ***Most of the list in inapplicable to the Kawbawgam Road PWS wells but should be considered carefully to avoid overlooking a source.*** The master list of these updates will be a permanent part of the wellhead protection plan (WHPP).

Naturally occurring sources	Potential contaminants
Rocks and soils	e.g., metals, iron, arsenic, magnesium, sulfates, fluorides, etc.
Contaminated water	e.g., bacteria, salts, viruses
Decaying organic matter	Bacteria
Radioactive materials	e.g., mine tailings, radon gas
Natural geological processes	e.g., salt water infiltration of wells

Agricultural/logging sources	Potential contaminants
Animal feedlots, burial areas	e.g., livestock sewage wastes, chemical sprays/dips, viruses, coliform and non-coliform bacteria, nitrates
Crop areas, irrigation sites	e.g, pesticides, petroleum products
Chemical storage	e.g., pesticides, herbicides, fertilizers, petroleum products, solvents, paints, etc.
Farm/logging machinery	e.g., fuel, lubricants, hydraulic oil, solvents
Logging road stream crossing	e.g., sedimentation, petroleum products, etc.

Residential sources	Potential contaminants
Household chemicals	e.g., cleaners, bleach, paint and paint removers, strippers, petroleum products
Lawn and gardens	e.g., pesticides and herbicides, petroleum products
Swimming pools	Chemicals
Septic systems and sewage lines	e.g., sewage, bacteria, viruses, metals, petroleum products, anti-freeze, road salt, chemicals, etc.
Underground storage tanks	home heating oil
Apartments and condominiums	e.g., pool chemicals, pesticides, herbicides, household wastes

Municipal sources	Potential contaminants
Schools, Government buildings, and their grounds	e.g., pesticides, herbicides, solvents, petroleum products, general building wastes
Parks	e.g., pesticides, herbicides, petroleum products
Highways, roads	e.g., herbicides, road salt, petroleum products, etc.
Municipal sewage	e.g., sewage, sludge, treatment by-products, chemicals, bacteria, viruses
Storage, treatment, and disposal ponds and other surface impoundments	e.g., sewage, wastewater, liquid chemical wastes, bacteria, viruses
Sewer overflows	e.g., road runoff, bacteria, viruses
Recycling facilities	e.g., petroleum products, battery acid, anti-freeze, metals, etc.
Landfills	e.g., chemicals, petroleum products, solvents, etc.
Illegal dumps and open burning areas	e.g., chemicals, metals, petroleum products, metals, solvents, etc.
Municipal incinerators, burning areas	e.g., metals, chemicals, sulfur, etc.
Abandoned wells	e.g., petroleum products, etc.
Water supply wells	e.g., surface runoff, chemicals, etc
Drainage wells	e.g., pesticides, herbicides, bacteria, etc.
Sumps and dry wells	e.g., storm run-off water, spilled liquids, dumped liquids, etc.
Artificial ground-water recharge	e.g., storm water runoff, excess irrigation water, treated sewage effluent that may contain detergents, solvents, etc.

Commercial sources	Potential contaminants
Airports and airfields	e.g., fuels, solvents, de-icers, wastes
Auto repair shops	e.g., petroleum wastes, solvents, anti-freeze, acids, etc.
Barber and beauty shops	e.g., perm solutions, dyes, chemicals, etc.
Boat yards and marinas	e.g., fuels, lubricants, solvents, paints, wood preservatives, waxes, etc.
Bowling alleys	e.g., epoxy floor finishes, solvent, cleaning fluids
Automobile dealerships	e.g., petroleum wastes, solvents, anti-freeze, acids, etc.
Car washes	e.g., soaps, detergents, petroleum products, anti-freeze, acids, road salt, etc.
Campgrounds	e.g., sewage, petroleum products, pesticides, household wastes
Carpet stores	e.g., glues and solvents, petroleum products
Cemeteries	e.g., chemicals, petroleum products, herbicides, etc.
Construction areas	e.g., solvents, asbestos, paints, glues, insulation, tars, sealants, chemicals, etc.
Dental facilities	e.g., discharge heavy metals into sanitary sewers
Dry cleaners	e.g., solvents, chemicals, etc.
Furniture refinishers	e.g., paints, stains, solvents
Gasoline dealers	e.g., petroleum products
Hardware and lumber stores	e.g., chemicals, stains, paints, petroleum products, etc.
Heating oil suppliers	e.g., petroleum products including stored materials
Horticultural practices	e.g., herbicides, pesticides, fungicides
Jewelry/metal plating	e.g., sodium and hydrogen cyanide, metallic salts, acids, chromium, etc.
Laundromats	e.g., detergents, bleaches, dyes
Medical institutions	e.g., X-ray developers/fixers, infectious wastes, disinfectants, radioactive wastes, pharmaceuticals, etc.
Office buildings	e.g., building wastes, lawn and garden maintenance chemicals, etc.
Paint stores	e.g., paints, stains, solvents, wood preservatives, etc.
Commercial sources-continued	**Potential contaminants**
Pharmacies	e.g., spilled and returned products
Photography shops and labs	e.g., silver sludge

Print shops	e.g., inks, solvents, photographic chemicals
Railroads	e.g., herbicides, petroleum products, chemicals, etc.
Research laboratories	e.g., X-ray fixers/ developers, infectious/radioactive wastes, disinfectants, pharmaceuticals
Scrap and junk yards	e.g., any wastes from businesses or households such as metals, chemicals, petroleum products, solvents, acids, anti-freeze, etc.
Storage tanks	e.g., any chemical in a storage tank
Transportation services	e.g., petroleum products, solvents, etc.
Veterinary services	e.g., solvents, infectious wastes, vaccines, disinfectants,

Industrial sources	**Potential contaminants**
Material stockpiles (coal, metallic ores)	e.g., acid drainage, metals runoff
Waste tailing ponds/basins	e.g., acids, metals, radioactive ores
Transport and transfer stations	e.g., fuel tanks, repair shop wastes, etc.
Storage tanks (above and below ground)	e.g., petroleum products
Storage, treatment, or disposal ponds & other surface impoundments	e.g., sewage wastewater, liquid chemical wastes, bacteria, viruses
Chemical landfills	e.g., hazardous and no-hazardous liquid wastes
Radioactive waste disposal sites	e.g., radioactive wastes from medical facilities, power plants, or defense operations
Dry wells	e.g., saline water
Injection wells	e.g., oil field brine, chemicals, wastes, etc.

Industrial processes	**Potential contaminants**
Asphalt plants	e.g., metals, chemicals, sulfur, etc.
Communication equipment manufacturers	e.g., acid wastes, metal sludge, etchants, cutting oils, plating wastes
Electronic equipment manufacturers	e.g., cyanides, solvents, acids, paints, PCBs, etchants
Foundries and metal fabricators	e.g., heavy metals, paint wastes, plating wastes, solvents, oils, etc.
Furniture and fixtures manufacturers	e.g., paints, stains, solvents, degreasers
Metal and metal-working shops	e.g., solvents, lubricants, degreasers, metals
Mining operations	e.g., mine spoils, tailings, stamp sands, acids, highly-mineralized water, etc.
Unsealed abandoned mines used for waste pits	e.g., metals, acids, minerals, sulfides, etc.
Paper mills	e.g., metals, acids, chlorine, etc.
Petroleum storage companies	e.g., petroleum products
Industrial pipelines	e.g., corrosive fluids, petroleum products, hydrocarbons, etc.
Photo processing labs	e.g., silver sludge, cyanides, chemicals, etc.
Plastics materials and synthetics producers	e.g., solvents, oils, cyanides, acids, formaldehyde
Publishers, printers, and allied industries	e.g., inks, solvents, dyes, photographic chemicals
Public utilities	e.g., PCB from transformers and capacitors, oils, solvents, metal plating solutions
Sawmills and planers	e.g., wood residue, treated wood preservatives, paints, glues
Stone, clay, and glass manufacturers	e.g., solvents, oils and grease, glazing materials, metal sludge
Welding shops	e.g., oxygen and acetylene, metals
Wood preserving facilities	e.g., wood preservative chemicals, creosote

ZONING REQUIREMENTS

All existing zoning ordinances shall apply. As with many source water areas, much of the contributing area is regulated by a different entity than the Tribe. Because the WHPA is only 0.2 mi^2, it seems likely KBIC can work cooperatively with residents in, or near, the WHPA, and Chocolay Township to assure that health and safety of the source water are considered prior to allowing a PCS into the WHPA. Chocolay Township is zoned, with each parcel assigned one of several different designations. The document describing zoning restrictions is called the Chocolay Township Zoning Ordinance, which is available at the Township Office in Harvey (Randy Yelle, Chocolay Township zoning, oral commun., 2003).

REFRESHER AND PUBLIC AWARENESS PROGRAM

On a regular basis, KBIC Natural Resources Department personnel shall conduct a brief program making all members of the WHPP Group aware of the importance of the WHPP. News bulletins should be aired in local media reminding residents of the importance of being good citizens and watchmen of the source water area (SWA).

Refresher courses should address proper handling and disposal of all potentially hazardous materials found in the SWA.

Regular visits should be made to schools and other community functions to remind the public and create an awareness of the importance of ground-water quality to everyday activities in the surrounding communities utilizing ground water including the Kawbawgam Road housing development.

EMERGENCY PROCEDURES

Notify Immediately:

Water Department personnel at KBIC
Arlan Friisvall, Director (906) 353-6623 (ext. 4126)
Cell (906) 250-3221
Pager (906) 222-2214
Carl Rasenen, Kawbawgam Road water plant operator
(906) 353-7117

KBIC Natural Resources Department: (906) 524-5757

KBIC Tribal Police Department: (906) 353-6626, 524-6699

Marquette County Emergency Services Director: (906) 346-4045

Michigan Department of Environmental Quality, Remediation and Redevelopment Division; Clif Clark, District Supervisor, Upper Peninsula District, (906) 346-8515

U.S. Environmental Protection Agency: (KBIC) Marc Slis Tribal EPA contact (906) 524-5757, Ext. 15, (EPA) Chuck Pycha, Technical contact (312) 887-0259; Dennis Baker, Circuit Rider (231) 271-7492

Emergency and short-term water supply options

Option	Technical and logistical feasibility	Reliability	Political considerations	Cost considerations
Bottled water	Easily obtainable	Good, Does not deal with dermal or inhalation exposure, which may still be present in non-potable use water	Good	Variable, price could be negotiated with suppliers
Tank Trucks	May be available from National Guard or private milk haulers. Milk haulers common given the presence of Jilbert's Dairy in Marquette	Tanks need to be sterile. Milk trucks typically back haul City water after unloading milk	Good	Variable, low capital investment
Conservation	Requires public education. Important to protect priority demand	Depends on voluntary compliance.	Generally positive, except for groups excluded by priority use restrictions. Does not supply all water demands	Low
Obtain water from Gaming Facility wells	Good. A connection between the two systems, or some other means of distributing water to Tribal members would have to be established	Poor to fair, water quality concerns with water from Gaming Facility wells, best solution would be install iron removal unit. Likely to also be contaminated if PWS wells are impacted	Fair, likely to impact availability of water to Gaming Facility	Moderate, depending
Treatment at wellhead	Not always an option. Treatment technologies may not be readily available, if at all	Contaminant specific	Public confidence in treated water	Variable, can be capital intensive

Long-term water supply replacement options

Option	Technical and logistical feasibility	Reliability	Political considerations	Cost considerations
Additional treatment on current supply at the wellhead	Not always an option. Depends on nature of problem, contaminant, etc.	Contaminant specific	Public confidence in treated water	Variable, can be capital intensive
Point-of-use treatment	Variety of systems available. Installation may be problematic. May not be useable for specific contaminant	Good to poor. Inadequate performance is possible. *Not maintenance free.* Does not deal with dermal or inhalation exposure, which may still be present in non-potable use water	Potential conflict over who owns the filters and who does maintenance	Each unit has a fixed cost, plus maintenance cost
Develop new well field	May not be possible on Tribal property depending on extent of contamination at existing well field. May require purchase of off-site property and a connecting pipeline	Good	Public confidence in treated water	Relatively low to High, may require substantial investment in new property and water transmission facilities
Interconnection with another system	Will require approval by Marquette, K.I. Sawyer, or other community for connection. Requires many miles of pipe to nearest connection	Good	Will require Tribe to purchase water from a municipal source, loss of autonomy	High, capital intensive and may require increased rates to customers
Develop intake(s) in Lake Superior	May be difficult, depends on nature of problem at old intake. Will require at least a mile of pipe. Will also require substantial changes to current treatment facilities, although initial water quality is excellent	Good, although subject to security problems	May require acquisition of right of way. If system is developed with excess capacity, water could likely be sold to non-Tribal households around lake Kawbawgam and Gaming Facility since both have historically had poor water quality	High, capital intensive and may require increased rates to customers
Remediation	May not be possible, or may be too expensive in the current funding environment. Developing technology. Depends on degree of contamination	Contaminant specific	May require use of Federal or State Superfund or other clean-up monies	Very expensive in some instances. Can require a long-term commitment of funding and other resources

Appendix 5

Process for completing the inventory of potential contaminant sources (PCS).

The process for completing the inventory included several steps, which are summarized as follows:

1. Reviewed readily available land use maps and historical/current aerial photographs.
2. Plotted relevant information from applicable state and federal regulatory databases including the following lists:
   - MDEQ leaking underground storage tank (LUST) sites.
   - MDEQ registered underground storage tank (UST) sites.
   - MDEQ Environmental Cleanup Site Information System (ECSI) sites; MDEQ Source Information System (for water discharge permit sites including National Pollutant Discharge Elimination System (NPDES) permits, Water Pollution Control Facility (WPCF) permits, storm water discharge permits, and on-site sewage (septic) system permits).
   - MDEQ Underground Injection Control (UIC) database.
   - MDEQ Active Solid Waste Disposal Permits list.
   - Michigan Department of Transportation (MDOT) - Hazardous Materials database.
   - State Fire Marshall registry of above-ground fuel storage tank sites.
   - State Fire Marshall Hazardous Material Handlers and Hazardous Material Incidents (HAZMAT) sites.
   - U.S. EPA BASINS software, version 2.1.
   - U.S. EPA Envirofacts database.
   - U.S. EPA Resource Conservation Recovery Act (RCRA) generators or notifiers list.
   - U.S. EPA RCRA Treatment, Storage, and Disposal Facility (TSDF) Permits list.
   - U.S. EPA National Priorities List (NPL).
   - U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) List.
   - U.S. EPA RCRA Corrective Action Activity List (CORRACTS).
   - U.S. Department of Transportation (DOT) Hazardous Materials Information Reporting System (HMIRS).
   - U.S. EPA Toxic Chemical Release Inventory System (TRIS).
   - U.S. EPA Oil Pollution Act of 1990 Spill Response Atlas.
3. Met with public water supply and IHS officials by phone during September and October, 2001, to identify potential sources not listed elsewhere in databases or on maps, and completed a preliminary inventory form used to compile the SWA base map. Conducted subsequent contacts by email and telephone on numerous occasions to request additional data, clarify data, and discuss results.
4. Land use and/or ownership (for example, residential/municipal; commercial/industrial; agricultural/forest; and other land uses) was mapped and evaluated in relation to PCS,

soil characteristics, and proximity to the intake.

5. Completed final inventory form of PCS and plotted locations of PCS on the base map.

Appendix 6

Tribal community ground-water supply, source water assessment worksheet (used for determining geologic sensitivity and susceptibility, Kawbawgam Road Housing Community public water supply wells, Keweenaw Bay Indian Community, Marquette County, Michigan

Tribal Community Ground Water Supply
Susceptibility Determination Worksheet

(fill out one worksheet for each CWS or each well if wells are screened in different aquifers or are not adjacent)

Name of Supply: Kawbawgam Road **PWSID#:** EPA5293303

Address: 103 Keweenaw Trail, Harvey, MI **County: Marquette**

Well No.(s): PWS1
Well Location(s): Chocolay Township

Well Log(s) Available	(Yes)	No
GPS Location Obtained for Well(s)	(Yes)	No

Geologic Sensitivity - $SWAS_G$

Geologic sensitivity is determined based upon the total thickness of Continuous Confining Material (CCM) or Continuous Partially Confining Material (CPCM). Beginning with a $SWAS_G$ of 30 points, 3 points are deducted for each 5 feet of CCM or 10 feet of CPCM. The CCM must be reported on the well record as 5 feet of continuous material and the CPCM 10 feet of continuous material to provide for a deduction. The summing of CCM layers thinner than 5 feet or CPCM layers thinner than 10 feet is not allowed. Where the point deduction exceeds 30 points, the $SWAS_G$ shall be assigned zero (0) points.

CCM Table: Utilize where well log reports just Aclay≅ or Ashale≅

CCM (feet)	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 45	45 to 49	50 or greater	**CCM Points.**
Points.	0	3	6	9	12	15	18	21	24	27	30	N/A

CPCM Table: Utilize where well log reports mixture of Aclay/sand≅ or "shale/sandstone≅

CPCM (feet)	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100 or greater	**CPCM Points**
Points	0	3	6	9	12	15	18	21	24	27	30	0

30 Points minus the sum of CCM points and the CPCM points - **$SWAS_G$** (total must be greater-than-or-equal-to 0)	30

Well Construction, Maintenance and Use - $SWAS_w$

This portion of the source water assessment score provides an evaluation of the well(s) relative to the grouting, age, casing depth and pumping rate.

Well Grouting

Casing sealed from 10' above screen to surface with grout	Driven casing sealed entire length	Casing sealed from at least 25' BLS to surface	Casing not sealed or status unknown	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	5

Well Age

Constructed after 1994	Constructed 1976 - 1994	Constructed 1967 B 1976	Constructed Pre-1967	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	5

Casing Depth

Well cased 200 feet or greater	Well cased from 100 - 199 feet	Well cased from 25 - 99 feet	Well cased <25 feet or not known	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	5

Pumping Rate

100 gpm or less	101 - 500 gpm	501 B 1000 gpm	Greater than 1000 gpm	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	0

Sum of pts. from grouting, age, casing depth, and pumping rate - $SWAS_w$	15

Water Chemistry and Isotope Data - $SWAS_C$

This portion of the source water assessment score provides an evaluation of the well(s) relative to the presence of nitrates and nitrites, VOC's, SOC's, inorganic chemicals, radionuclides and tritium.

Regulated Contaminants	**Not Detected**	**Detected** to < 2 MCL	**Detected** 2MCL to MCL	**Detected** Exceeds MCL	**Enter Points** Below
Note sample date(s)	0 points	10 points	20 points	50 points	
Nitrates and Nitrites	0				
VOC=s		10			
SOC=s and Pesticides		0			
Inorganics ***except Fluoride***		10			
Radionuclides		10			

Tritium Results

No Test	Tritium @ < 1 TU	Tritium @ > 1 TU	Enter Points Below
0 pts.	-30 pts.	30 pts.	0

Sum of pts. from nitrate/nitrite, VOC's, SOC's and inorganic chemicals, radionuclides and tritium result (total must be greater-than-or-equal to zero) - **$SWAS_C$**	30

Isolation from Sources of Contamination - SWAS$_s$

This portion of the source water assessment score provides an evaluation of the CPWS relative to the wells isolation from Amajor≅ and Astandard≅ sources of contamination. Sources of contamination are also evaluated dependent upon whether they are Apotential≅ or Aknown≅ sources of contamination.

APotential≅ Major Sources of Contamination from the 2 yr. TOT to the 5 yr. TOT

Source of Contamination	Number of Sources	Distance From Well (feet)
Large Scale Waste Disposal	0	N/A
Land Application of Sanitary Wastewater or Sludge	0	N/A
Landfill	0	N/A
Bulk Chemical or Chemical Waste Storage Sites	0	N/A
Under Ground Storage Tank Sites	0	N/A
Other B Describe	0	N/A

			Enter Points Below
Number of Major Sources from 2 yr. TOT to 5 yr. TOT	0	**X 10**	0

APotential≅ Major Sources of Contamination within 200 feet

Number of Major Sources within 2 yr. TOT	0	**X 20**	0

APotential≅ Standard Sources of Contamination within the 2 yr. TOT

Source of Contamination	Number of Sources	Distance From Well (feet)
Storm or Sanitary Sewers	0	N/A
Pipe Lines	0	N/A
Septic Tank or Septic Drain Field	2	80, 120
Cesspools, Seepage Pits or Dry Wells	0	N/A
Parking Lots / Roads	1	110
Surface Water	0	N/A
Other: Describe	0	N/A

			Enter Points Below
Number of Standard Sources within 2 yr. TOT	3	**x 10**	30

AKnown≅Sources of Contamination within the 5 yr. TOT

Source of Contamination	Number Of Sources	Distance From Well (feet)
Act 201 Sites (formerly 307 sites)	0	N/A
Superfund Sites	0	N/A
Leaking Underground Storage Tank Sites	0	N/A

			Enter Points Below
Number of Known Sources within the 5 yr. TOT	0	**x 25**	N/A

Control of Standard Isolation Area

Own/Lease Entire Area	Own/Lease >1/2 Area	Own/Lease <1/2 Area	Enter Points Below
0 pts.	10 pts.	20 pts.	20

Sum of pts. From control and sources of contamination B **$SWAS_S$**	50

Source Water Assessment Score - SWAS

Sum of $SWAS_G$, $SWAS_W$, $SWAS_C$ and $SWAS_S$ = **SWAS**	125

$SWAS_G$: High; $SWAS_W$: Low; $SWAS_C$: Low; $SWAS_S$: Low; SWAS: LOW

Data Sources: 23 August 2002 meeting among Mike Donofrio, Kelly Jacobs, and Carl Rasanen, KBIC, and Mike Sweat, USGS; walk through of community and snpply; CCR; water-quality laboratory reports; well logs; USGS report WRIR 00-4050; USGS GIS coverage including Federal, state, local, and miscellaneous contaminant source databases.

Water Supply Contact: Carl Rasanen **Title:**
Telephone No. (906) 353 7117 Office, (906) 353 7623 Fax
Assessment Completed by: Mike Sweat, U.S. Geological Survey, Lansing, MI
Date: 5 September 2002
Comments: See attached maps for details of source-water assessment area. Refer to Weaver, T.L., Luukkonen, C.L., and Ellis, J.M., 2000, Simulation of ground-water flow and delineation of contributing area to public water supply wells, Keweenaw Bay Indian Community, Marquette County, Michigan: U.S. Geological Survey Water-Resources Investigations Report 00-4050, 25 p., 4 appendixes, for details of delineation of contributing area.

Tribal Community Ground Water Supply
Susceptibility Determination Worksheet

(fill out one worksheet for each CWS or each well if wells are screened in different aquifers or are not adjacent)

Name of Supply: Kawbawgam Road **PWSID#:** EPA5293303

Address: 103 Keweenaw Trail, Harvey, MI **County: Marquette**

Well No.(s): PWS2
Well Location(s): Chocolay Township

Well Log(s) Available	(Yes)	No
GPS Location Obtained for Well(s)	(Yes)	No

Geologic Sensitivity - $SWAS_G$

Geologic sensitivity is determined based upon the total thickness of Continuous Confining Material (CCM) or Continuous Partially Confining Material (CPCM). Beginning with a $SWAS_G$ of 30 points, 3 points are deducted for each 5 feet of CCM or 10 feet of CPCM. The CCM must be reported on the well record as 5 feet of continuous material and the CPCM 10 feet of continuous material to provide for a deduction. The summing of CCM layers thinner than 5 feet or CPCM layers thinner than 10 feet is not allowed. Where the point deduction exceeds 30 points, the $SWAS_G$ shall be assigned zero (0) points.

CCM Table: Utilize where well log reports just Aclay≅ or Ashale≅

CCM (feet)	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 45	45 to 49	50 or greater	**CCM Points.**
Points.	0	3	6	9	12	15	18	21	24	27	30	N/A

CPCM Table: Utilize where well log reports mixture of Aclay/sand≅ or "shale/sandstone≅

CPCM (feet)	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100 or greater	**CPCM Points**
Points	0	3	6	9	12	15	18	21	24	27	30	6

30 Points minus the sum of CCM points and the CPCM points - $SWAS_G$ (total must be greater-than-or-equal-to 0)	24

Well Construction, Maintenance and Use - $SWAS_w$

This portion of the source water assessment score provides an evaluation of the well(s) relative to the grouting, age, casing depth and pumping rate.

Well Grouting

Casing sealed from 10' above screen to surface with grout	Driven casing sealed entire length	Casing sealed from at least 25' BLS to surface	Casing not sealed or status unknown	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	5

Well Age

Constructed after 1994	Constructed 1976 - 1994	Constructed 1967 B 1976	Constructed Pre-1967	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	5

Casing Depth

Well cased 200 feet or greater	Well cased from 100 - 199 feet	Well cased from 25 - 99 feet	Well cased <25 feet or not known	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	5

Pumping Rate

100 gpm or less	101 - 500 gpm	501 B 1000 gpm	Greater than 1000 gpm	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	0

Sum of pts. from grouting, age, casing depth, and pumping rate - $SWAS_w$	15

Water Chemistry and Isotope Data - $SWAS_C$

This portion of the source water assessment score provides an evaluation of the well(s) relative to the presence of nitrates and nitrites, VOC's, SOC's, inorganic chemicals, radionuclides and tritium.

Regulated Contaminants	**Not Detected**	**Detected** to < 2 MCL	**Detected** 2MCL to MCL	**Detected** Exceeds MCL	**Enter Points** Below
Note sample date(s)	0 points	10 points	20 points	50 points	
Nitrates and Nitrites	0				
VOC=s		10			
SOC=s and Pesticides		0			
Inorganics ***except Fluoride***		10			
Radionuclides		10			

Tritium Results

No Test	Tritium @ < 1 TU	Tritium @ > 1 TU	Enter Points Below
0 pts.	-30 pts.	30 pts.	0

Sum of pts. from nitrate/nitrite, VOC's, SOC's and inorganic chemicals, radionuclides and tritium result (total must be greater-than-or-equal to zero) - **$SWAS_C$**	30

Isolation from Sources of Contamination - SWAS$_s$

This portion of the source water assessment score provides an evaluation of the CPWS relative to the wells isolation from A≅major≅ and A≅standard≅ sources of contamination. Sources of contamination are also evaluated dependent upon whether they are A≅potential≅ or A≅known≅ sources of contamination.

A≅Potential≅ Major Sources of Contamination from the 2 yr. TOT to the 5 yr. TOT

Source of Contamination	Number of Sources	Distance From Well (feet)
Large Scale Waste Disposal	0	N/A
Land Application of Sanitary Wastewater or Sludge	0	N/A
Landfill	0	N/A
Bulk Chemical or Chemical Waste Storage Sites	0	N/A
Under Ground Storage Tank Sites	0	N/A
Other B Describe	0	N/A

			Enter Points Below
Number of Major Sources from 2 yr. TOT to 5 yr. TOT	0	**X 10**	0

A≅Potential≅ Major Sources of Contamination within 200 feet

Number of Major Sources within 2 yr. TOT	0	**X 20**	0

A≅Potential≅ Standard Sources of Contamination within the 2 yr. TOT

Source of Contamination	Number of Sources	Distance From Well (feet)
Storm or Sanitary Sewers	0	N/A
Pipe Lines	0	N/A
Septic Tank or Septic Drain Field	2	80, 120
Cesspools, Seepage Pits or Dry Wells	0	N/A
Parking Lots / Roads	1	110
Surface Water	0	N/A
Other: Describe	0	N/A

			Enter Points Below
Number of Standard Sources within 2 yr. TOT	3	**x 10**	30

AKnown≅Sources of Contamination within the 5 yr. TOT

Source of Contamination	Number Of Sources	Distance From Well (feet)
Act 201 Sites (formerly 307 sites)	0	N/A
Superfund Sites	0	N/A
Leaking Underground Storage Tank Sites	0	N/A

			Enter Points Below
Number of Known Sources within the 5 yr. TOT	0	x 25	N/A

Control of Standard Isolation Area

Own/Lease Entire Area	Own/Lease >1/2 Area	Own/Lease <1/2 Area	Enter Points Below
0 pts.	10 pts.	20 pts.	20

Sum of pts. From control and sources of contamination B **$SWAS_S$**	50

Source Water Assessment Score - SWAS

Sum of $SWAS_G$, $SWAS_W$, $SWAS_C$ and $SWAS_S$ = **SWAS**	119

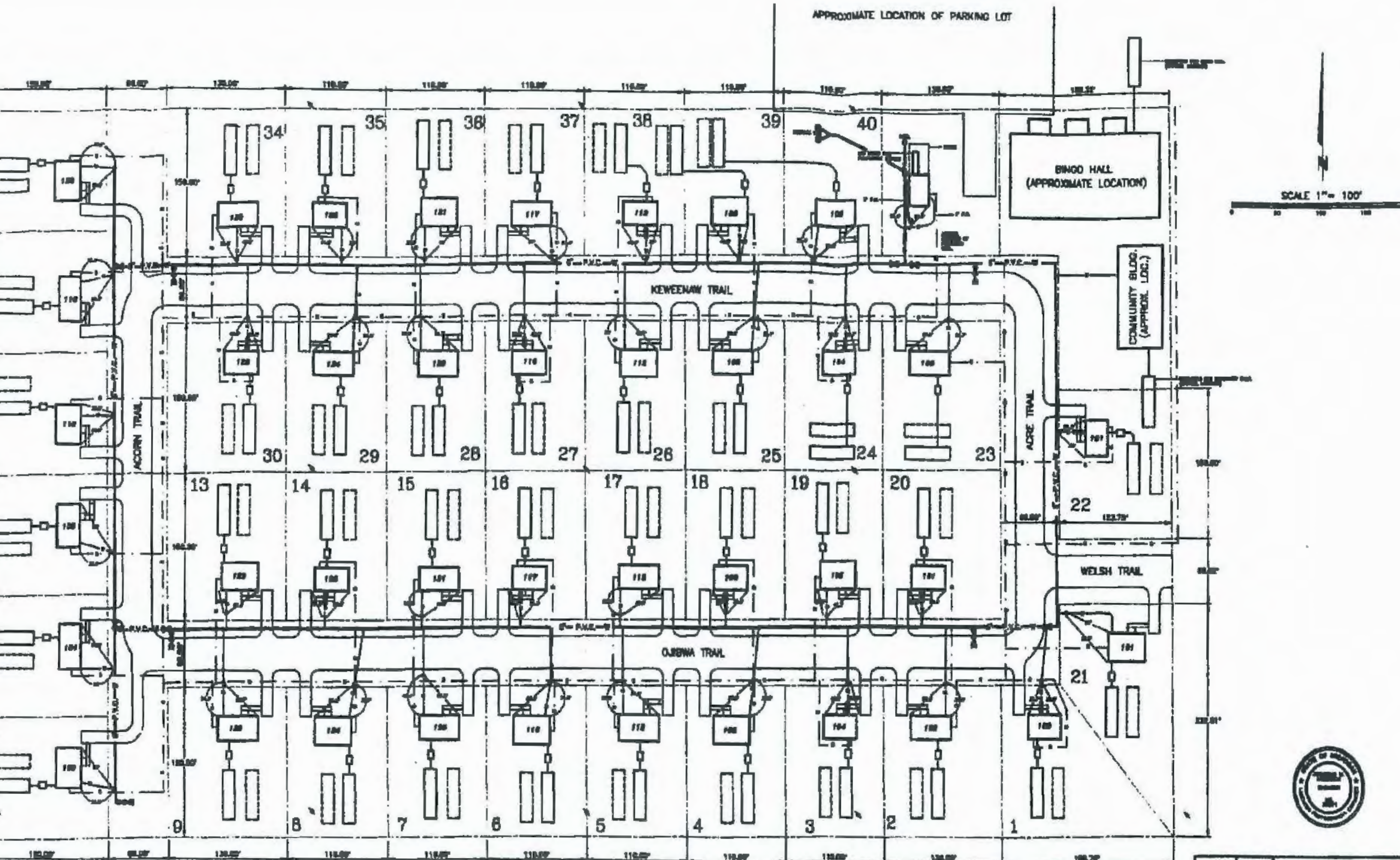
$SWAS_G$: High; $SWAS_W$: Low; $SWAS_C$: Low; $SWAS_S$: Low; SWAS: LOW

Data Sources: 23 August 2002 meeting among Mike Donofrio, Kelly Jacobs, and Carl Rasanen, KBIC, and Mike Sweat, USGS; walk through of community and supply; CCR; water-quality laboratory reports; well logs; USGS report WRIR 00-4050; USGS GIS coverage including Federal, state, local, and miscellaneous contaminant source databases.

Water Supply Contact: Carl Rasanen **Title:**
Telephone No. (906) 353 7117 Office, (906) 353 7623 Fax
Assessment Completed by: Mike Sweat, U.S. Geological Survey, Lansing, MI
Date: 5 September 2002
Comments: See attached maps for details of source-water assessment area. Refer to Weaver, T.L., Luukkonen, C.L., and Ellis, J.M., 2000, Simulation of ground-water flow and delineation of contributing area to public water supply wells, Keweenaw Bay Indian Community, Marquette County, Michigan: U.S. Geological Survey Water-Resources Investigations Report 00-4050, 25 p., 4 appendixes, for details of delineation of contributing area.

Appendix 6

Kawbawgam Rd. Septic Diagram



LEGEND

EXISTING WATER MAIN WITH HYDRANT & GATE VALVE
EXISTING UNDERGROUND GAS LINES
UTILITY POLE
EXISTING 1" P.E. WATER SERVICE LINE
CULVERT
INSULATION
SEPTIC TANK AND DRAINFIELD
DRAINFIELD REPLACEMENT AREA
WELL

NOTE: DRAINFIELDS WERE INSTALLED AS SHOWN ON DRAWING. LOCATIONS CAN BE SCALED FROM DRAWING.

REVISION	DATE	BRIEF
1	8/18/93	"RECORD DWG." INFORMATION A

U.S. DEPARTMENT OF HEALTH & HUMAN
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE

SANITATION FACILITIES CONSTRUCTION
KEWEENAW BAY INDIAN RESERVATION
WATERMAIN EXTENSION "RECORD DWG.
KAWBAWGAM ROAD HOUSING PROJECT
MARQUETTE COUNTY, MICHIGAN
PROJECT NO: BE-91-057

DRAWN BY: ______ CHECKED BY: ______
DATE: 1/31/92 8/18/93 DATE: ______

OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE
BEMIDJI, MINNESOTA

Zeba Public Water Supply
Source Water Assessment and Protection Plan

Keweenaw Bay Indian Community

By M.K. Slis and T. L. Weaver

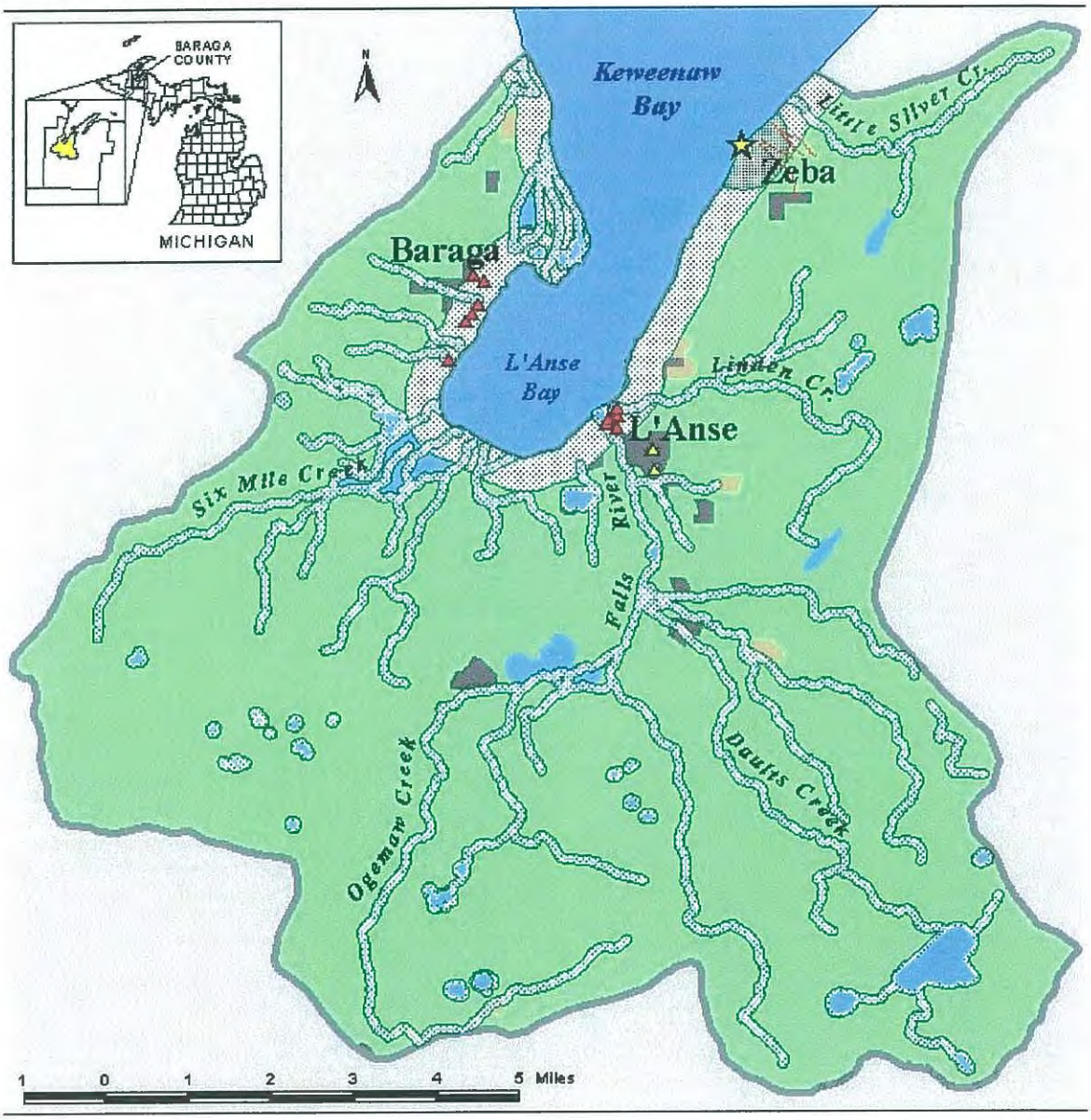


Table of Contents

Zeba Public Water Supply
Source Water Assessment and Protection Plan

By M.K. Slis and T. L. Weaver

INTRODUCTION TO SOURCE WATER PROTECTION OF SURFACE WATER SOURCES

In 1996, Congress re-authorized the Safe Drinking Water Act. Legislation was added that gave the U.S. Environmental Protection Agency (USEPA) oversight over a process whereby source water assessments be performed on all sources of public drinking water. There have been several attempts to provide guidance documents for water suppliers with surface water sources. Needless to say, the complexity of protecting a surface water source is often, if not universally, more difficult than for a ground-water supply. Because of the complex nature of the task, no public water supplies (PWS) in Michigan using a surface water source had completed a source water assessment and protection plan (SWA&PP) at the time this document was being developed for the Zeba water supply of Keweenaw Bay Indian Community (January-February 2003).

An assessment protocol issued in June 2000 for Great Lakes sources was developed by a workgroup comprised of representatives from Great Lakes states, drinking water utilities, and USEPA Region 5 (appendix 1). In September 2001, the Michigan Section of the American Water Works Association and the Michigan Water Environment Association issued a joint position statement detailing their interpretation of source water protection (appendix 2). The assessment protocol was used to develop the Zeba source water assessment plan (SWA) (appendix 3) and the joint position statement was used to guide development of the SWA&PP. Minnesota Department of Health (MDH) is also in the developmental stages of producing a guidance document for the abundant surface water systems in that state. The draft version of the MDH document contains an excellent set of goals that summarize their drinking water priorities (appendix 4). These goals are typical of those of every surface water supplier in the Upper Midwest and are included because of their concise and representative quality. Excerpts from these documents are included in the appendixes, primarily to illustrate the framework on which the ZEBA SWAP and SWA&PP were developed.

A document entitled *Protecting Drinking Water: A Workbook for Tribes* (Totten, 2000) was used to provide an outline for the Zeba SWA&PP.

Protecting Drinking Water: An Example Workbook for Tribes

KBIC and USGS chose Protecting Drinking Water: A Workbook for Tribes, written by Glenn Totten of the Water Education Foundation and funded by USEPA (version dated July 11, 2000; modified by USEPA Region 5 in November 2000) as a drinking water protection

guide. Language in this workbook is similar, if not identical in many sections, to previous documentation provided to Tribes by USEPA. This workbook contains 16 worksheets, which augment information previously gathered during the preparation of the SWA, and collectively form the basis for a SWA&PP that the USEPA is likely to approve. A great deal of information that is contained within the workbook should be updated as necessary to keep the SWA&PP as current as possible. Several worksheets were omitted from the Zeba SWA&PP because they were inapplicable.

B.1 ASSESSMENT AND PUBLIC PARTICIPATION

WORKSHEET 1 Public Participation

Public participation is broken into 5 subcategories: forming a planning committee; adopting a mission, or mission statement; publicizing activities of the planning and advisory committees; drafting ordinances or codes; and notifying tribal members and leaders of the results of the SWA&PP processes. The first two items listed in the public participation part of worksheet 1 have been completed. The SWA has been made available to Tribal members and will be announced in the local papers for private citizen review, in October of 2003. Ordinances, regulations, or codes may follow public notification and would be noted within Worksheet 16, as updates to the plan. Delineation, contaminant inventory, and susceptibility determination are completed as part of SWA.

WORKSHEET 2 Management Group

Worksheet 2 lists members of the team that oversees SWA&PP activities, contact information, and a brief description of how each member will be involved in the SWA&PP activities.

Active groups and/or individuals are listed in the first spreadsheet and secondary groups/individuals are listed in the second spreadsheet. Groups and individuals in the initial list are responsible for maintaining the SWA&PP, and will hereafter be referred to as the Group, while those on the second list play less important roles, such as initial compilation of the SWA&PP. Groups or individuals on the secondary list would be notified about problems with the SWA&PP, or within the source water area, if the initial Group determines that the secondary list groups or individuals need to play a role in efforts to address the problem. Members of the Group will institute provisions and make changes to the contingency plan, if necessary. A contingency plan has been produced as a separate document, complimenting the SWA&PP, and is included as appendix 5.

It should be noted that the majority of population of Baraga County is served by one of three surface water systems that draw from the source water area delineated in the Zeba SWA. Because of the common source water, it would be beneficial for water supply managers from L'Anse and Baraga to be active in the Zeba SWA&PP Group and vice versa.

Management Group, charged with implementation and maintenance of Zeba SWA&PP

Groups to be represented	Name, position, and contact information	How will this person be involved?
Program director	KBIC CEO 906-353-6623 (ext. 4104)	Coordinate Program; ensure that Tribal Groups use best management practices e.g. do not increase development pressure on the current delineated wellhead protection area.
Natural Resources Dept. Director Water Quality Specialist	Mike Donofrio, KBIC Natural Resources Director 906-524-5757 (ext. 13) Marc Slis, KBIC Water Quality Specialist 906-524-5757 (ext. 15)	Coordinate Program. Update WHPP.
KBIC Environmental Specialist	Mike Sladewski, KBIC Environmental Specialist 906-5757 (ext. 14)	Maintain map of SWA/WHPA with updates to PCS list. Assist Group with developing ordinances and codes necessary to protect SWA.
KBIC, Tribal Police Department	Baraga (906) 353-6626 L'Anse (906) 524-6699	Uphold ordinances or codes adopted by KBIC and Group.
KBIC, Housing Authority	(906) 353-6623	Ensure that development activities pose no threat to Source Water Area, e.g., storm water and erosion runoff.
Baraga County Emergency Services Coordinator/Sheriff Department	Baraga County Emergency Preparedness Director (906) 524-7240	Uphold ordinances or codes adopted by Group. Notify Group or KBIC if emergency threatens source water.
Water Plant Operator, Zeba	Arlan Friisvall, Director (906) 353-6623 (ext. 4126) Cell (906) 250-3221 Pager (906) 222-2214	Adjust water treatment plant as necessary to counteract changes in source water quality.
Bureau of Indian Affairs	Jim Ruhl, Hydrologist 612-713-4400, Ext. 1068	Represent BIA as necessary. Update SWA&PP as necessary.
U.S. Dept. of Agriculture, NRCS	Bruce Peterson, District Conservationist (906) 353-8225 (ext 2)	Represent USDS-NRCS on soil-related issues as necessary. Update SWA&PP as necessary.

Secondary group, consisting of non-essential contacts that have either participated in the development of the SWA&PP, or could be contacted for informational purposes.

Groups to be represented	Name, position, and contact information	How will this person be involved?
U.S. Geological Survey	Tom Weaver, Hydrologist (906) 786-0714	Developed the SWA&PP in conjunction with KBIC Environmental Director and Staff.
Michigan Department of Environmental Quality, Remediation and Redevelopment Division	Clif Clark, District Supervisor, Upper Peninsula District, 906-346-8515 clarkcg@michigan.gov	Notify KBIC if emergency threatens source water.
Michigan Department of Environmental Quality, Water Division	Chuck Thomas, Geologist, 906-475-2048	MDEQ Water Division administers the Source Water Protection program for the state and provides oversight for non-Tribal community water supplies.
Mead-Westvaco	906-524-6513	Mead-Westvaco is a primary landholder within the Zeba PWS SWA. Communicate Mead-Westvaco position regarding land-use and management practices with SWA&PP group.
U.S. Coast Guard	Portage Station (Dollar Bay) (906) 482-1520 Marquette (906) 226-3312	Notify KBIC if shipping emergency threatens source water.
Western UP District Health Department	Barry Gibbons, Water System Specialist (906) 482-7382	Assist with dissemination of group findings to non-Tribal community members.
U.S. Environmental Protection Agency	Chuck Pycha, Tribal Technical Contact (312) 886-0259 Dennis Baker, Michigan Circuit Rider (231) 271-7492	Represent U.S. EPA as necessary, assist group with addendums to SWA&PP as a necessary, as well as assistance with Great Lakes spills, land-based discharges, updating potential contaminant sources list.
Bureau of Indian Affairs	Forester Jeff Kitchens 906-353-6692	Represent BIA as necessary. Update SWA&PP as necessary.
Indian Health Service	Sanitarian (Rhinelander Office) (715) 365-5120	Represent IHS as necessary, monitor finished and source water quality at Zeba WTP as necessary. Update SWA&PP as necessary.
Water Plant Operator, L'Anse	Water Plant (906) 524-5880 Pumping Station (906) 524-7230	Adjust water treatment plant as necessary to counteract changes in source water quality.
Water Plant Operator, Baraga	(906) 353-6795 Home (906) 482-7235	Adjust water treatment plant as necessary to counteract changes in source water quality.

Secondary group, consisting of non-essential contacts that have either participated in the development of the SWA&PP, or could be contacted for informational purposes--continued.

Groups to be represented	Name, position, and contact information	How will this person be involved?
Wastewater Treatment Plant Operator, L'Anse	Louis Dudo (906) 524-6906 Jim Venerable (906) 524-7536 Tom Stapleford (906) 524-6714 Mike Lofquist (906) 524-7519	Notify water plant operators of unscheduled/scheduled dumping of wastewater lagoons and any additional information that will be useful to water plant operators prior to discharge.
Wastewater Treatment Plant Operator, Baraga	Lift station, Bob Coen (906) 353-7439 Joe Treadeau (906) 353-7457	Notify water plant operators of unscheduled/scheduled dumping of wastewater lagoons and any additional information that will be useful to water plant operators prior to discharge.

WORKSHEET 3 Mission Statement

This worksheet is used to set goals and includes a mission statement, as well as ideas on how to accomplish them.

The mission (primary goal) of the group is protection of the Source Water Area used by three municipal water systems (Zeba, L'Anse, and Baraga) supplying the majority of the population in Baraga County. Specifically, this SWA&PP is for the Zeba PWS, but L'Anse and Baraga may also develop SWA&PP for their respective water systems in the future. The group should function in a communicative, cooperative, and proactive environment as much as practicable, using best management practices, having an effective emergency response plan that group members know and understand, and maintaining and ***updating the Source Water Assessment and Protection Plan(s) as needed to keep the document(s) current***.

We have increased the likelihood of the Group obtaining their mission/primary goal by breaking it down into a series of smaller, more easily achievable goals. This worksheet lists the Group's goals and ideas and the steps needed to accomplish them.
This is part of the SWA&PP process where community participation may be useful, but not until a mission statement is approved and understood by members of the SWA&PP work group.

A table of goals has been developed with at least the following minimum categories, although the list most likely will contain others, as time progresses. Additions to the list will be noted within Worksheet 16.

Goal	How does group accomplish goal
Survey All properties within SWA for Potential contaminant source (PCS)	Send a voluntary questionnaire to each property owner, detailing project goals and why it is important for them to complete the questionnaire as honestly and thoroughly as possible.
Reduce salt runoff into Keweenaw Bay	Work with local, County, and State Highway agencies to coordinate street sweeping/flushing activities so that salt runoff into Bay is minimized.
Regulate current and future development along Keweenaw Bay to reduce or eliminate harmful materials from entering Bay	Enact zoning ordinances for KBIC Zeba and Baraga communities and work with Village of Baraga to enact similar ordinances (Village of L'Anse and L'Anse Township are zoned).

B.2 DELINEATION

WORKSHEET 4 (SWA) Delineation

The entire watershed area contributing to the south end of Keweenaw Bay was delineated for the Zeba PWS. Justification for delineating the watershed in this manner is detailed in the SWA (appendix 3). Keweenaw Bay, and Lake Superior are large bodies of water with huge watersheds, and obviously some artificial boundary conditions were incorporated to create a manageable area for the SWA and SWA&PP.

WORKSHEET 5 (PWS) Location

Drinking Water Source
Location: Village of Zeba, Michigan; Baraga County
Mailing Address: Zeba Water Plant Operator, 107 Beartown Road, Baraga, Michigan, 49946
Organization: Keweenaw Bay Indian Community
Name of source: Lake Superior (Keweenaw Bay)
Location of intake: N46° 48' 23" W88° 25'25"

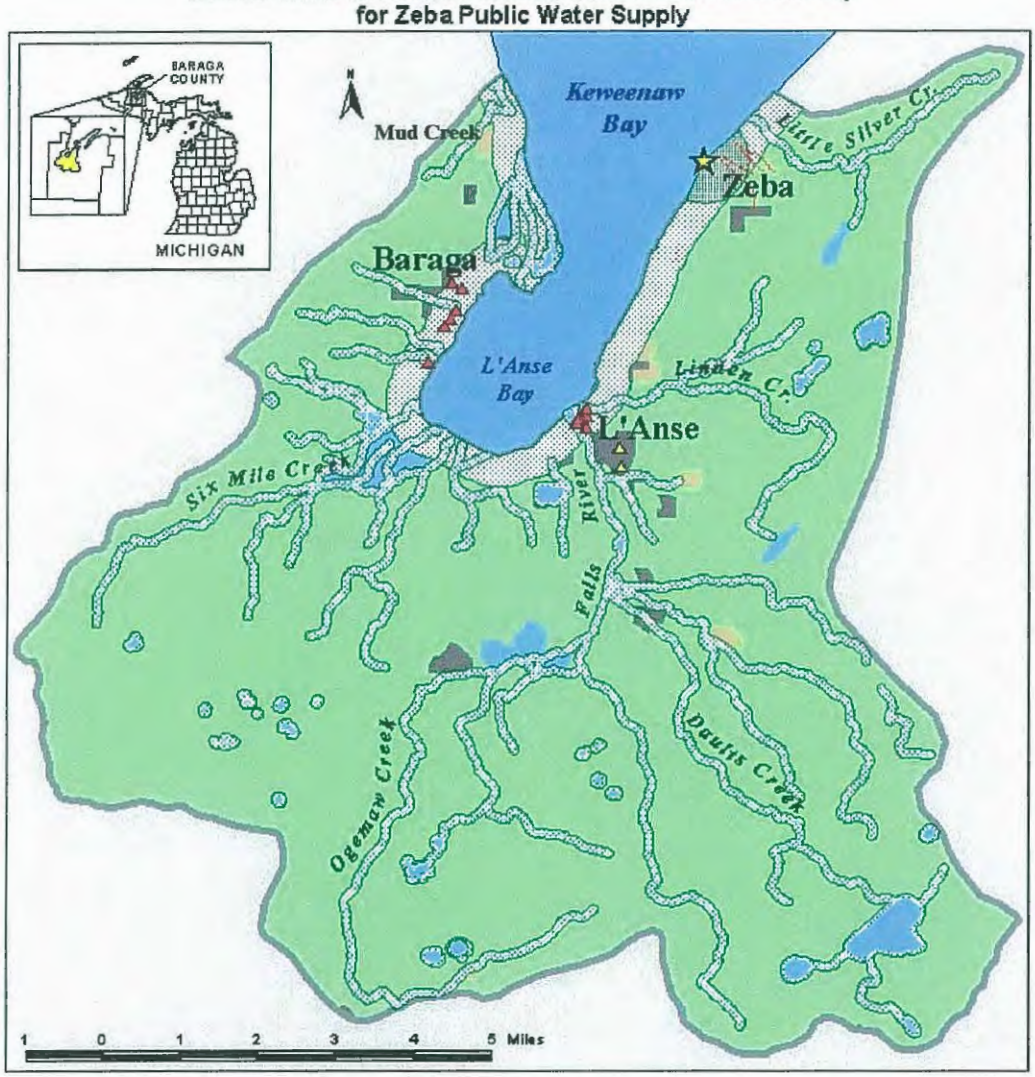
Physical description of intake location: The Zeba water treatment plant and intake were completed in 1987. The intake consists of an 8 inch diameter ductile iron pipe extending 800 feet offshore. The intake terminates in 22 feet of water (based on 1927 datum), 4 feet above the bottom of Keweenaw Bay (Lake Superior).

WORKSHEET 7

Requested information for Worksheet 7 was covered thoroughly in the SWA (appendix 3). The source water area is the entire watershed upstream of the intake, extending on the east side of Keweenaw Bay, northeast to the drainage basin boundary of Little Silver Creek (about 0.7 miles beyond the 3,000 foot Critical Assessment Zone), and on the west side of the Bay northwest to the drainage basin boundary of Mud Creek (figure1.). The 98 mi^2 susceptible area includes the critical assessment zone as well as all the stream basins draining to Keweenaw Bay south of, and including, the Little Silver Creek on the east and Mud Creek on the west side of the Bay.

Figure 1. graphically illustrates potential contaminant sources within the source water area of the Zeba PWS. The entire drainage basin identified as the source water area is shown, with symbols and codes for a number of different layers including critical assessment zone, potential contaminant sources (PCS), susceptible area, land-use, and streams, lakes, and drains.

Source-Water Area and Potential Contaminant Source Map for Zeba Public Water Supply



EXPLANATION

- ZEBA PUBLIC WATER SUPPLY AND 3,000-FOOT CRITICAL ASSESSMENT ZONE
- POTENTIAL CONTAMINANT SOURCE (PCS)
- PCS IN SUSCEPTIBLE AREA
- SOURCE-WATER AREA BOUNDARY
- RIVER OR CREEK
- DRAIN IN PROXIMITY OF INTAKE
- LAKE
- SUSCEPTIBLE AREA

LAND USE

- URBAN OR BUILT-UP LAND
- AGRICULTURAL, RANGE, OR FOREST LAND
- WATER OR WETLAND
- BARREN LAND

B.3 CONTAMINANT INVENTORY

WORKSHEET 9

RECORDS REVIEW FOR CONTAMINANT INVENTORY

Contaminant Source Inventory

Past, current, and potential future sources of contaminants were inventoried to identify several categories of contaminants including microorganisms (bacteria, oocysts, and viruses), inorganic compounds (nitrates and metals), organic compounds (solvents, petroleum compounds, pesticides), and disinfection by-product precursors (trihalomethanes, haloacetic acids).

It is important to remember that sites and areas identified by this process are only **potential contaminant sources** (PCS) to the drinking water. Environmental contamination is not likely to occur when potential contaminants are used and managed properly. In addition, assumptions were made about particular types of land uses and risks associated with those land uses. Assumptions are discussed further in the results portion of this report.

The purpose of the inventory is three fold: 1) provide information on the location of PCS, especially those within the susceptible area; 2) to provide an effective means of educating the public about PCS; and 3) to provide a reliable basis for developing a management plan to reduce potential contaminant risks to the Zeba water supply.

The inventory process attempts to identify potential point-source contaminants within the SWA. It does not include an attempt to identify specific potential contamination problems at specific sites, such as facilities that do not safely store potentially hazardous materials. However, assumptions were made about particular types of land use. For example, it is assumed that rural residences associated with farming operations have specific potential contamination sources such as fuel storage, chemical storage and mixing areas, and machinery repair shops. It should also be noted that although the inventory depicts existing land uses, these are likely to undergo continual change due to normal crop rotation practices. What is irrigated farmland now may be non-irrigated farmland next year, or vice versa. Similar changes in commercial forests prevalent in the Upper Peninsula are also common. Areas harvested at the perceived maturity of the trees and re-planted as part of the process.

The results of the inventory were analyzed in terms of current, past, and future land uses and their relation to the susceptible area and the supply intake. In general, land uses and PCS that are closest to the supply intake and tributaries to the source water pose the greatest threat to a safe drinking water supply. Inventory results are summarized in the SWA, tables 1and 2, and are shown on figure 5.

Potential contaminant sources in the Zeba source water area

Type of potential contaminant source	Number of potential contaminant sources in the Source Water Area	Number of potential contaminant sources in the susceptible area
Hazardous or Solid Waste Site	11	9
Industrial Facilities Discharge Site	4	1
National Priority List Sites	0	0
Permit Compliance System	4	1
Toxic Release Inventory	1	1

WORKSHEET 12 ABANDONED WELL SURVEY

ABANDONED WELL SURVEY

Zeba water system uses surface water exclusively. At the present time, resources will not be used to survey for abandoned wells for the entire SWA. KBIC has conducted an inventory for the Little Silver Creek watershed that requested property owners to list abandoned wells on their property, as well as testing a number of water quality parameters. The responses were voluntary and it is possible that some owners are unaware of abandoned wells on their property. The results of the inventory are included in the following table summarizing the results. Out of a total of 35 addresses surveyed within the Zeba watershed, there were 7 abandoned well locations listed, of which 4 have not been properly abandoned. KBIC also conducted a similar survey in the Herman area and found 2 locations that had abandoned wells but both landowners listed the wells as properly abandoned.

A summary of the findings of the Zeba watershed inventory is attached. The database for the inventory is more complex, with additional categories, and includes identification numbers for each site. This information, particularly the addresses/locations of the wells should be included in the attached table or kept accessible for future reference.

Additional abandoned well information could be included in the SWA&PP at a later date and the following table is included for that purpose. It is possible that KBIC will complete more Integrated Resource Management Plan (IRMP) watershed surveys in the future and this database will be updated as those surveys are completed and as database management time is allocated.

Zeba Watershed Inventory Summary of Results

Total number of homes surveyed: 35

Alkalinity
Percent between 100-200 (indicating stable pH) 80.6
Percent <10 (indicating poorly buffered) 0

Total Coliform
Number of Positive 4
Percent positive 11.1

Conductivity
min 119
max 677
ave 250
median 249

Copper
% violating primary or secondary drinking water standards 0
min ND
max 140
mean 21.5
median 10.6

Hardness
min 10.8
max 190
ave 87
median 100
%soft water 38.9
% moderately hard 27.9
% hard 25
%very hard 2.78

Hydrogen Sulfide
min ND
max 0.13
ave 0.02
median 0.01

% detected the presence of HS- 28.6

Iron
% violating secondary drinking water standards 2.8
min ND
max 0.66
ave 0.11

median 0.054

Lead
% violating primary drinking water standards 38.1
min ND
max 2.4
ave 1.28
median 1.2

Magnesium
min 0
max 17.3
ave 4.73
median 3.69

Manganese
% violating secondary drinking water standards 0
min 0.0029
max 0.3
ave 0.059
median 0.02

Ammonia
min ND
max 0.04
ave 0.025
median 0.025

Nitrate
% violating primary drinking water standards 0
min 0
max 5.65
ave 1.01
median 0.735

Zinc
% violating secondary drinking water standards 2.8
min 0
max 13000
ave 464
median 0.07

pH
% alkaline and potentially caustic according to secondary drinking water standards 20

Zeba Watershed Inventory Summary of Results

% acidic and potentially caustic according to secondary drinking water standards 2.8

ave 8.17
median 8.2
min 6.2
max 9.2

Significant Survey Results
% isolation distance not compliant with current MI standards 8.5

% homes treating their own drinking water 20
Number of Abandoned Wells 7
Number of wells that have been properly abandoned 4
Number of UST discovered 0

WORKSHEET 13 Potential Contaminant Inventory:

WORKSHEET 13 Naturally Occurring Sources

CONTAMINANT INVENTORY CHECKLIST

The workbook has listed a number of potential sources of contamination (naturally occurring, agricultural (to which commercial forestry was added), residential, municipal, commercial, industrial, and industrial processes). These are a standard list and several of the non-applicable categories were removed. Additionally, several non-listed categories were added. Each table will have additional categories appended as necessary.

CONTAMINANT INVENTORY CHECKLIST

Check if present	Naturally occurring sources	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
YES	Rocks and soils	e.g., metals, iron, arsenic, magnesium, sulfates, fluorides, etc.	Iron in unconsolidated deposits and Jacobsville Sandstone aquifer	Entire source water area
YES	Decaying organic matter	e.g., bacteria		Varied, wetlands
POSSIBLE	Radioactive materials	e.g., radon gas	Present in unconsolidated deposits and Jacobsville Sandstone aquifer elsewhere in U.P.	Entire source water area
YES	Natural geological processes	e.g., salt water infiltration of wells	Present in Jacobsville Sandstone aquifer elsewhere in U.P.	Entire source water area

WORKSHEET 13 Agricultural and logging sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Agricultural and logging sources	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
YES	Crop areas, forest irrigation sites	e.g., pesticides, petroleum products	crop areas	varied
YES	Chemical storage	e.g., pesticides, herbicides, fertilizers, petroleum products, solvents, paints, etc.	farms	varied
YES	Farm/logging machinery	e.g., fuel, lubricants, hydraulic oil, solvents	farms and logging operations	varied
YES	Public and logging road stream crossing	e.g., sedimentation, petroleum products, etc.		varied

WORKSHEET 13 Residential sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Residential sources	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
YES	Household chemicals	e.g., cleaners, bleach, paint and paint removers, strippers, petroleum products	all residential locations	Varies
YES	Lawn and gardens	e.g., pesticides and herbicides, petroleum products	some residential locations	Varies
YES	Swimming pools	chemicals	some residential locations	Varies
YES	Septic systems and sewage lines	e.g., sewage, bacteria, viruses, metals, petroleum products, anti-freeze, road salt, chemicals, etc.	some residential locations	Varies
YES	Underground storage tanks	home heating oil	some residential locations	Varies

WORKSHEET 13 Municipal sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Municipal sources	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
YES	Parks	e.g., pesticides, herbicides, petroleum products	L'Anse Park	~ 4 mi.
YES	Highways, roads	e.g., herbicides, road salt, petroleum products, etc.	Roads	Varies
YES	Municipal sewage	e.g., sewage, sludge, treatment by-products, chemicals, bacteria, viruses	L'Anse sewage plant	~ 4 mi.
YES	Storage, treatment, and disposal ponds and other surface impoundments	e.g., sewage, wastewater, liquid chemical wastes, bacteria, viruses	L'Anse sewage plant	~ 4 mi.
YES	Sewer overflows	e.g., road runoff, bacteria, viruses	L'Anse sewage plant/roads	Varies
NO	Recycling facilities	e.g., petroleum products, battery acid, anti-freeze, metals, etc.,		
POSSIBLE	Landfills	e.g., chemicals, petroleum products, solvents, etc.	Celotex landfill?/ Sprinkler area?	~ 8 mi.
YES	Illegal dumps and open burning areas	e.g., chemicals, metals, petroleum products, metals, solvents, etc.		Varied
NO	Municipal incinerators, burning areas	e.g., metals, chemicals, sulfur, etc.		
NO	Abandoned wells	e.g., petroleum products, etc.		
NO	Water supply wells	e.g., surface runoff, chemicals, etc		
NO	Drainage wells	e.g., pesticides, herbicides, bacteria, etc.		
NO	Sumps and dry wells	e.g., storm run-off water, spilled liquids, dumped liquids, etc.		
YES	Artificial ground-water recharge	e.g., storm water runoff, treated sewage effluent that may contain detergents, solvents, etc.		Varies

WORKSHEET 13 Commercial Sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Commercial sources	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
NO	Airports and airfields	e.g., fuels, solvents, de-icers, wastes		
YES	Auto repair shops	e.g., petroleum wastes, solvents, anti-freeze, acids, etc.	Range Auto, Thomas Ford, Kissel Chevy	~ 4-6 mi.
YES	Barber and beauty shops	e.g., perm solutions, dyes, chemicals, etc.	Varies, in L'Anse	~ 4-5 miles
YES	Boat yards and marinas	e.g., fuels, lubricants, solvents, paints, wood preservatives, waxes, etc.	L'Anse and Pequaming	~ 2, 4-5 mi.
YES	Bowling alleys	e.g., epoxy floor finishes, solvent, cleaning fluids	Whirli-Gig	< 1 mi.
YES	Automobile dealerships	e.g., petroleum wastes, solvents, anti-freeze, acids, etc.	Range Auto, Thomas Ford, Kissel Chevy	~ 4-6 mi.
YES	Car washes	e.g., soaps, detergents, petroleum products, anti-freeze, acids, road salt, etc.	L'Anse	~ 6 mi.
YES	Campgrounds	e.g., sewage, petroleum products, pesticides, household wastes	L'Anse Campground	~ 2 mi.
YES	Carpet stores	e.g., glues and solvents, petroleum products	L'Anse	~ 5 mi.
YES	Cemeteries	e.g., chemicals, petroleum products, herbicides, etc.	Indian Cemetery	~ 3-4 mi.
YES	Commercial fishing	e.g., nets set too close to intake could allow bacteria to enter source water	Keweenaw Bay	Varies
YES	Construction areas	e.g., solvents, asbestos, paints, glues, insulation, tars, sealants, chemicals, etc.	Various	Varies
YES	Dental facilities	e.g., discharge of heavy metals into sanitary sewers	L'Anse Dental	~ 4-5 mi.

WORKSHEET 13 Commercial Source Cont.

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Commercial sources-continued	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
NO	Dry cleaners	e.g., solvents, chemicals, etc.		
NO	Furniture refinishers	e.g., paints, stains, solvents		
YES	Gasoline dealers	e.g., petroleum products	L'Anse	~ 5 mi.
YES	Hardware and lumber stores	e.g., chemicals, stains, paints, petroleum products, etc.	L'Anse	~ 6 mi.
NO	Heating oil suppliers	e.g., petroleum products including stored materials		
YES	Horticultural practices	e.g., herbicides, pesticides, fungicides	Golf course	~ 8 mi.
NO	Jewelry/metal plating	e.g., sodium and hydrogen cyanide, metallic salts, acids, chromium, etc.		
YES	Laundromats	e.g., detergents, bleaches, dyes	L'Anse	~ 5 mi.
YES	Medical institutions	e.g., X-ray developers/fixers, infectious wastes, disinfectants, radioactive wastes, pharmaceuticals, etc.	L'Anse	~ 4 mi.
YES	Office buildings	e.g., building wastes, lawn and garden maintenance chemicals, etc.	L'Anse	~ 4 mi.
YES	Paint stores	e.g., paints, stains, solvents, wood preservatives, etc.	L'Anse	~ 4 mi.
YES	Pharmacies	e.g., spilled and returned products	L'Anse	~ 4 mi.
YES	Photography labs	e.g., silver sludges	L'Anse	~ 4 mi.
YES	Print shops	e.g., inks, solvents, photo chemicals	L'Anse	~ 4 mi.
YES	Railroads	e.g., herbicides, petroleum products, chemicals, etc.	L'Anse/Baraga	~ 6 mi.
YES	Research laboratories	e.g., X-ray fixers/ developers, infectious/radioactive wastes, disinfectants, pharmaceuticals	Hospital	~ 2 mi.

WORKSHEET 13 Commercial Source Cont.

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Commercial sources-continued	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
YES	Scrap and junk yards	e.g., wastes such as metals, chemicals, petroleum products, solvents, acids, anti-freeze, etc.	Tasco?	~ 6 mi.
YES	Storage tanks	e.g., any chemical in a storage tank(**chlorine**)	Zeba PWS plant	Present at site
YES	Transportation services	e.g., petroleum products, solvents, etc.	L'Anse	~ 4-5 mi.
NO	Veterinary services	e.g., solvents, infectious wastes, vaccines, disinfectants		

WORKSHEET 13 Industrial Sources

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Industrial sources	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
Possible	Material stockpiles (coal, metallic ores)	e.g., acid drainage, metals runoff	L'Anse	~ 5 mi.
NO	Waste tailing ponds/basins	e.g., acids, metals, radioactive ores		
NO	Transport and transfer stations	e.g., fuel tanks, repair shop wastes, etc.		
YES	Storage tanks (above and below ground)	e.g., petroleum products	Bill's Corner by hospital	~ 3 mi.
YES	Storage, treatment, or disposal ponds & other surface impoundments	e.g., sewage wastewater, liquid chemical wastes, bacteria, viruses	Various	Varies
NO	Chemical landfills	e.g., hazardous and no-hazardous liquid wastes		
NO	Radioactive waste disposal sites	e.g., radioactive wastes from medical facilities, power plants, or defense operations		
NO	Dry wells	e.g., saline water		
NO	Injection wells	e.g., oil field brine, chemicals, wastes, etc.		

WORKSHEET 13 Industrial Processes

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Industrial processes	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
NO	Asphalt plants	e.g., metals, chemicals, sulfur, etc.		
NO	Communication equipment manufacturers	e.g., acid wastes, metal sludges, etchants, cutting oils, plating wastes		
NO	Electronic equipment manufacturers	e.g., cyanides, solvents, acids, paints, PCBs, etchants		
NO	Foundries and metal fabricators	e.g., heavy metals, paint wastes, plating wastes, solvents, oils, etc.		
NO	Furniture and fixtures manufacturers	e.g., paints, stains, solvents, degreasers		
YES	Metal and metal-working shops	e.g., solvents, lubricants, degreasers, metals	Johnson & Berry Mnf.	~ 5 Mi.
NO	Mining operations	e.g., mine spoils, tailings, stamp sands, acids, highly-mineralized water, etc.		
NO	Unsealed abandoned mines used for waste pits	e.g., metals, acids, minerals, sulfides, etc.		
NO	Paper mills	e.g., metals, acids, chlorine, etc.		
NO	Petroleum storage companies	e.g., petroleum products		
YES	Industrial pipelines	e.g., corrosive fluids, petroleum products, hydrocarbons, etc.	Celotex? Sprinkler field	~ 5-6 mi.
NO	Photo processing labs	e.g., silver sludges, cyanides, chemicals, etc.		
NO	Plastics materials and synthetics producers	e.g., solvents, oils, cyanides, acids, formaldehyde		
NO	Publishers, printers, and allied industries	e.g., inks, solvents, dyes, photographic chemicals		

WORKSHEET 13 Industrial Processes Cont.

CONTAMINANT INVENTORY CHECKLIST-continued

Check if present	Industrial processes-continued	Potential contaminants	Potential contaminant source(s)	Distance from Zeba Water Intake
YES	Public utilities	e.g., PCB from transformers and capacitors, oils, solvents, metal plating solutions	L'Anse Power plant	~ 5 mi.
YES	Sawmills and planers	e.g., wood residue, treated wood preservatives, paints, glues	Erickson Lumber	~ 6 mi.
NO	Stone, clay, and glass manufacturers	e.g., solvents, oils and grease, glazing materials, metal sludges		
NO	Welding shops	e.g., oxygen and acetylene, metals		
NO	Wood preserving facilities	e.g., wood preservative chemicals, creosote		

WORKSHEET 14 Permitted and Known Potential Contaminant Sources

The list of PCS in the SWA (appendix 3) was complete with *all known permitted* sites within the source water area (SWA) and is also listed below. It is *not* anticipated that additional permitted PCS will be found within the SWA, although contaminant sources without permits are possible, if not likely. At the present time, no PCS has been found as a result of a windshield survey and resident surveys have not been distributed. Additional PCS sites will be added to the SWA map as they are found. The process for completing the inventory is included as appendix 6.

Permitted potential contaminant source-generators for the Zeba source water area

Site Name/location	*Latitude*	*Longitude*	*Permit Number*	*Approximate distance from PCS to Zeba intake (ft)*	*Reason for Permit*	*Reason for listing as Potential Contaminant Source*
Celotex Corp	N46°45'23"	W88°27'22"	MID006129332	20,000	Release or Manufacturing of Toxic Compounds	Toxic Release Inventory
Baraga WWTP	N46°46'54"	W88°29'30"	MID985631068	19,300	Waste Water and (or) Process Water	Permit Compliance System
UP Power Zeba	N46°45'21"	W88°27'22"	MID980006720	20,200*		
Zeba WWTP	N46°45'18"	W88°27'12"	MID985657048	20,200*		
Baraga WFP	N46°46'50"	W88°29'20"		18,850		
Baraga WWTP	N46°46'54"	W88°29'30"	MI0022250	19,300	Cooling, Process, Treatment, and (or) Waste Waters	Industrial Facilities Discharge System
Baraga Water Treatment Plant	N46°46'50"	W88°29'20"	MI0024881	18,900		
UP Power Zeba	N46°45'21"	W88°27'22"	MI0006092	20,200*		
Zeba WWTP	N46°45'18"	W88°27'12"	MI0020133	20,200*		
Kens Service	N46°46'24"	W88°29'36"	MID044395861	21,200	On-Site Storage	Hazardous or Solid Waste Site
Zeba, Village of Garage	N46°45'31"	W88°27'13"	MID981775422	19,000*		
Pettibone Michigan Corp	N46°45'59"	W88°29'51"	MID006129373	23,500		
MIDOT	N46°44'52"	W88°26'37"	MID980992234	22,000		
Northern Painting and Coatings	N46°46'29"	W88°29'31"	MID001026756	20,600		
Thomas Ford Mercury	N46°45'29"	W88°27'16"	MID017187303	19,300		
Upper Peninsula Power Warden Station	N46°45'24"	W88°27'21"	MID980006720	19,900		
Zeba, Village of	N46°45'05"	W88°26'39"	MID981780141	20,800*		
Baraga Products Inc	N46°46'35"	W88°29'26"	MID106634272	20,000		
Celotex Inc	N46°45'23"	W88°27'22"	MID006129332	20,000		
Nicks Standard Service	N46°45'26"	W88°27'12"	MID041414160	19,500		

*Note that several sites or businesses have more than one type of potential contaminant, which results in them having more than one entry in the table shown above. The distance from the PCS to the water intake is probably erroneous for several of the entries because the permit address appears to be a business office address, rather than the source location. Assumed erroneous distances are identified by a * in the preceding table. It would be prudent for the SWA&PP group to verify the actually location of the PCS, e.g., U.P. Power in Zeba, and obtain GPS coordinates at that time and revise the preceding table, as appropriate.*

There are additional known potential entry points for contamination into the SWA. They include, but are certainly not limited to industrial parks in L'Anse and Baraga and any number of locations within the SWA that are impacted by forestry practices. Forestry practices known to impact the SWA include erosion at stream crossings, spillage of petroleum products, e.g. spilled fuel, hydraulic oils, and lubricants, and application of

pesticides and herbicides on vegetation within the SWA. Unfortunately, the transient nature of the forestry products industry makes locating potential contaminant sites difficult to locate. The exception is stream crossings, which are relatively easy to locate. The KBIC Forestry Department may be able to assist with compilation of these types of locations within the SWA.

B.4 SUSCEPTIBILITY DETERMINATION

The Zeba water treatment plant (WTP) has historically treated the source water to meet drinking water standards with minimal problems or complaints from water consumers. None the less, the system is determined to be ***highly susceptible*** to contamination by virtue of construction characteristics, e.g., depth below water and distance from shore, historical contaminant detections, prevalent soil types, and proximity to known potential sources of contamination (appendix 3, p.7). Typical of most surface water sources, the Zeba PWS would be easily impacted under the right circumstances, whether they are accidental or malicious. The SWA&PP and Contingency Plan (appendix 5) should enable the Zeba PWS operators and KBIC Environmental Staff to react rapidly to problems within the delineated watershed area. The contingency plan has identified a strategy KBIC will follow for supplying an emergency short-term supply of potable water should the Zeba PWS be rendered unusable by either accidental or malicious contamination and considers longer-term alternatives should the system be rendered unusable for an extended period of time.

Historical Contaminant Detections

Total low-service pumping capacity for the Zeba water plant is 30,000 gallons per day (GPD) (Indian Health Service, 1999).). The Zeba WTP serves about 110 service connections, which varies between 300 and 500 residents. Treatment includes tri-media pressure pre-filtration, duplex bag filtration, chlorination, and fluoridation. The WTP has an above-ground, 67,000-gallon (gal), welded-steel standpipe for storage. Water quality is good, but raw water quality occasionally experiences a small increase in turbidity and coliform, possibly related to wind/current conditions, allowing Linden Creek and L'Anse water treatment plant discharges to migrate northward to the Zeba water plant intake (appendix 3, p.8).
Currently, Zeba water plant is undergoing an extensive upgrade to both increase its capacity and to bring it into compliance with current PWS codes and regulations. Upon completion, a narrative covering the upgrades will be included in Worksheet 16.
Monitoring for Volatile Organic Contaminants (VOCs) occurs annually. The next sampling is to occur for the 2003 Compliance Period. Historical (VOC) detections are listed below. In 2002, detections at the Method Detection Limit (MDL) of 0.5ug/L occurred for the following analytes: Xylenes. Trace detections of Dichloromethane were also observed. Monitoring frequency cannot be further reduced and because the detections were at or below the (MDL), the frequency requirement did not increase.

C.1 STRATEGIES FOR PROTECTING DRINKING WATER SOURCES

Building a Source Water Assessment Protection Program

Once a SWA&PP is completed, the focus shifts to protection. New information should be added as it becomes available, as the SWA&PP becomes a "living" document. The SWA&PP uses information collected during the assessment phase to develop community-based strategies for long-term protection of the source water. Public notification and participation play pivotal roles in the process, giving the public input into the process. Protection strategies do not have to represent large departures from current Tribal laws, policies, and restrictions, and could simply require enforcement of current laws, codes, and ordinances. The biggest complication with the source water area for the Zeba water plant is that its Source Water Area extends beyond Tribal control into Keweenaw Bay. The SWA&PP Group plays a key role in the entire process, weighing the advantages and limitations of various management strategies, and assessing their ultimate value to the SWA&PP.

Non-regulatory Strategies

Non-regulatory strategies are considered the least-costly, but possibly less effective method of choice for KBIC, given the limited amount of resources available. The following are just a few examples of the strategies KBIC has used in the past and/or plans to use in the future:

- A continuing public education program for tribal residents within the Source Water Area, as well as non-tribal residents near the Source water Area. This includes dissemination of the (SWA) to inform the public and also programs, flyers and signs that encourage voluntary protection and conservation.
- Water Quality monitoring of Keweenaw Bay. KBIC has been monitoring the bay waters at three sites for 2 years as part of an ongoing, four-year EPA CWA 106 surface water monitoring program. It is hoped that this will continue in the future.
- Land purchase within the Reservation and the Source Water Area is ongoing, depending on funding and availability.

Regulatory Strategies

KBIC has a limited range of regulatory strategies that are available due, in part to the large size of the (SWA) and the limited amount of tribal-owned land within it. In the future, KBIC may consider codes or ordinances that restrict or regulate the use and/or storage of hazardous chemicals or materials, on tribal land. Other strategies such as land-use regulations or codes, buffer zones or setbacks, may be utilized in the future.

WORKSHEET 15 Evaluation of Management Strategies

EVALUATION OF MANAGEMENT STRATEGIES

The following worksheet should be used to help evaluate the worth of various strategies for minimizing or preventing contamination of drinking water sources. It contains a more extensive list than the narrative above.

Option	Advantages	Limitations	Resources needed
Public Education	Inexpensive, simple to implement	Relies on voluntary public response	Brochures, fliers, signs, posters,
Water conservation	Free, little effort required	Relies on voluntary public response	Public education, or a volume-based rate structure.
Keweenaw Bay water monitoring	Advance notice of potential trends/problems	Funding, staff	Funding
Regulation of use/storage of hazardous materials	Addresses possible contaminants, directly. Increases overall safety of the area.	Requires training of staff. Requires monitoring to insure compliance. Relies on current regulations, further regulation could be costly and time-consuming	Enforcement, monitoring, training, equipment, possibly containment facilities.
Land use regulations	Control over more of the (SWA)	Can only regulate tribal land.	Time and funds to adopt new regulations. Area studies.
Land purchase	Greater control over the (SWA)	Costly. Availability of land for purchase.	Funding and available land.
Spill response plans for most significant (PCS's)	Greater control and better response to spills/contamination. Can also be incorporated into the (PWS) contingency plan in the future.	Enforcement requires compliance	Time, staff, funding, training and equipment

WORKSHEET 16

SOURCE WATER PROTECTION PROGRAM CHECKUP

Used to update information and include listing of new, or previously unlisted, surface water intakes, delineations, and facilities in the protected area. Additionally, try to incorporate any changes within the SWA that might increase the potential for contamination, contingency plans, or strategies used to maintain or expand the SWA&PP. Some example questions are included below.

1) List any new facilities in protected areas since the last update.
2) List any changes in existing sites that may increase the potential to contaminate the Keweenaw Bay watershed.
3) Describe changes made to, maintenance performed on, intake structures, piping, etc. to the Zeba water intake.
4) Were contingency plans implemented at any time since last update? If so, what changes, if any, are needed in the contingency plans?
5) Were any new management strategies introduced since previous update? If so, describe the strategies and the reason for their adoption.
6) Describe any environmental changes that have affected the source water and the surrounding land such as forest fires, flooding, etc.

Selected References

Harrington, M.W., 1895, The surface currents of the Great Lakes: U.S. Weather Bureau, Bulletin B.

Lusch, D.P., Rader, C.P., Barrett, L.R., and Rader, N.K., 1992, Aquifer vulnerability to surface contamination in Michigan: Center for Remote Sensing and Department of Geography, Michigan State University, East Lansing, MI, scale 1:1,500,000.

Martin, H.M., 1955, Map of the surface formations of the southern peninsula of Michigan: Michigan Geological Survey, Department of Conservation, Publication 49, scale 1:500,000, 2 sheets.

Michigan Department of Environmental Quality, 1999, State of Michigan source water assessment program, 153 p.

Michigan Section, American Water Works Association and Michigan water Environment Association, 2001, Source water protection, a joint position statement, 2 p.

Miller, J.B. and Twenter, F.R., 1986, Michigan surface-water resources, *in* U.S. Geological Survey, National Water Summary 1985—hydrologic events and surface-water resources: U.S. Geological Survey Water-Supply Paper 2300, p. 277-284.

Milstein, R.L., compiler, 1987, Michigan sesquicentennial, 1837-1987, bedrock geology of northern Michigan: Michigan Department of Natural Resources, Geological Survey Division, scale 1:500,000.

Minnesota Department of Health, 2003, Source water protection guidance document: *an incomplete draft version provided by Beth Kluthe, Minnesota Department of Health,* 42 p.

MIRIS, 2000, Michigan Resource Information System: Michigan Department of Natural Resources, Land and Water Management Division, 2 compact discs, as updated.

National Oceanic and Atmospheric Administration, 2000, Climatological Data, Michigan: U.S. Department of Commerce, 114:13.

Sweat, M.J., 2001, Source water assessment report for the Zeba water supply, Michigan Source Water Assessment Report 70: U.S. Geological Survey – WRD, Michigan Department of Environmental Quality, Drinking Water and Radiological Protection Division, 16 p.

Totten, Glenn, 2000, Protecting drinking water: a workbook for Tribes: Water education Foundation, *and modified by U.S. EPA Region 5*, 108 p.

U.S. Department of Agriculture, 1988, Soil survey of Baraga County area, Michigan: unnumbered report, 306 p., 62 sheets.

U.S. Environmental Protection Agency, 1998, Better assessment science integrating point and nonpoint sources: BASINS Version 2.0. EPA 823-B-98-006, variably numbered.

U.S. Environmental Protection Agency, 2000, Assessment protocol for Great Lakes Sources: final draft (revised 6/6/00) by Great Lakes Protocol Workshop: 6 p.

Van Luven, D.M., Huntoon, J.E., and Maclean, A.L., 1999, Determination of the influence of wind on the Keweenaw Current in the Lake Superior Basin as identified by advanced very high resolution radiometer (AVHRR) imagery: Journal of Great Lakes Research, vol. 25, no. 4, p. 625-641.

Appendices

Appendix 1
Assessment Protocol for Great Lakes Sources-excerpted

Assessment Protocol for Great Lakes Sources-excerpted

In 1996 when the federal Safe Drinking Water Act was reauthorized, legislation was added that requires source water assessments be performed on all sources of public drinking water supplies. The assessments must consider the vulnerability of these public drinking water sources. Assessments of intakes that extend into the Great Lakes present a unique challenge in determining the scope and magnitude of these assessments with limited resources. The intakes for some of these sources extend far enough into a lake to receive no effects from specific shoreline contaminant sources (except possibly air borne contaminants) while others closer to shore do. To provide guidance on how source water assessments should be performed, it will be necessary to address this very basic premise. USEPA may be able to give some assistance by providing access to data bases, developing screening methods and area wide monitoring for general contaminants, general lake responses to airborne contaminants, and other area wide general assistance.

A workgroup from the Great Lakes States is being organized to develop these parameters. This workgroup includes representatives of the Great Lakes States, water utilities with intakes on the Great Lakes, USEPA Region V and other interested parties. There should be consensus among the states and USEPA on the make up of the group. USEPA and the Region V states met on June 16, 1999 to develop a mission statement and a final draft of this protocol. The following mission statement defines the intent of the workgroup.

The mission of the Great Lakes Protocol Workgroup is to develop a consensus amongst the states for a consistent procedure allowing the flexibility necessary to properly conduct source water assessments of our Great Lakes drinking water sources. This flexibility will take into account the variability of these sources and site-specific concerns for determination of source sensitivity and susceptibility.

Initial Survey

An initial survey will be performed at each Great Lakes source to assess local source water impacts. Any criteria or studies that were performed to locate the intake should be reviewed. Senior operators and the plant superintendent at the treatment plant plus other local officials should be interviewed to gain knowledge of the raw water quality fluctuations. Past water quality records from files or existing databases would need to be reviewed and also any data collected through the Information Collection Rule (ICR). Bacteriological quality, alkalinity and turbidity levels are good indicators of localized impacts. If this review indicates that only minor fluctuations occur in raw water quality compared to the lake's background quality, the source is probably not impacted from localized contaminants and the assessment would parallel a general water quality assessment of the total lake with some consideration for potential emergency spills.

The "Great Lakes Surface Water Assessment Survey" form developed with this protocol can be utilized as a screening tool to assist in determining localized impacts. The initial survey should be used to assist with determining procedures to follow in conducting the survey. The assessment procedures will depend upon the type of local impacts, the availability and quality of local data, weather conditions, runoff, etc.

Critical Assessment Zone

To provide some continuity for assessing the Great Lakes intakes, the concept of a "Critical Assessment Zone" (CAZ) around each intake was developed. The two factors used for this zone, which affect the sensitivity of Great Lakes intakes, are the **perpendicular** distance from shore or length of the intake pipeline (L) in feet and the water depth (D) **of the intake structure** in feet. The shallower, near shore intakes are more sensitive to shoreline influences than the off shore, deep intakes. The factor for sensitivity (S) can be calculated by the formula:

$$L \times D = S$$

Generally, S values less than 25,000 represent highly sensitive intakes while S values greater than 125,000 indicate lower sensitivities. This degree of sensitivity can be used by the states as a tool to prioritize assessment activities and assist with the susceptibility determination after taking contaminant sources into account.

The intake's degree of sensitivity combined with information obtained from the survey form and local data such as intake construction, lake bottom characteristics, localized flow patterns, thermal effects and **bethnic nepheloid layers** can be used to complete a sensitivity analysis. **The bethnic nepheloid layer is a zone of suspended sediment kept snspended by the interactions of current and sedimentation. The layer's characteristics around an intake depend on sediment density, water temperature, bottom currents and animal activity.**

The following columns represent Great Lakes intakes with high, medium and low sensitivities. A CAZ is defined as the area from the intake structure to the shoreline and inland. This area includes a triangular water surface and a land area encompassed by an arc from the endpoint of the shoreline distance on either side of the on shore intake pipe location. The shoreline distance (SL) is measured in feet in both directions from the intake pipe location on shore while the distance inland (DI) in feet is determined by subtracting the submerged intake pipe length (L) from the critical assessment zone radius (R). The drawing, which follows, illustrates an example of the Critical Assessment Zone.

Note: ~ indicates square root of parenthesized calculations.

Sensitivity Value	Critical Assessment Zone	Shoreline Distance	Distance Inland

<25,000	3,000 foot radius	$SL=\sim(3000^2-L^2)$	DI=3000-L
25,000-125,000	2,000 foot radius	$SL=\sim(2000^2-L^2)$	DI=2000-L
		L>2000;SL=0	L>2000;DI=0
>125,000	1,000 foot radius	$SL=\sim(1000^2-L^2)$	DI=1000-L
		L>1000;SL=0	L>1000;DI=0

Completing the Assessment

If the assessment indicates the intake is not impacted by potential shoreline contaminants, the assessment should reference general Great Lakes water quality and trends within the source water assessment area. This information has been compiled by several sources such as the U.S. EPA's Great Lakes National Program Office (GLNPO) and the Great Lakes Mass Balance Studies done by the USEPA, the States, and USGS. GLNPO has conducted water and sediment modeling activities using National Oceanic and Atmospheric Administration 5 kilometer grids, which should be useful for modeling potential spill scenarios from sources such as pipelines, and for assessing tributary impacts. Another source could be the Remedial Action Plans for Great Lake Areas of Concern and the Lakewide Management Plans. Some of these sources address contaminants brought forth by air deposition. Total Maximum Daily Loads (TMDLs) should also be referenced, if available.

For systems where the initial survey indicates a potential for shoreline impacts, the assessment becomes more difficult and site specific. The next step would be to provide a delineation of the area that contributes potential impacts through the use of local data and/or the "Critical Assessment Zone" concept. It would then be necessary to assess the impacts in the area and their relative impact on the quality and treatability of the raw water. If a river or stream that discharges into the lake near the intake causes a significant impact, a partial watershed assessment of that river or stream would be necessary. These impacts may not be continual, but may arise only as a result of certain events such as a specific wind direction and intensity, or a river or stream discharge into the lake at a certain flow level. The USEPA BASINS software and USGS SPARROW software may provide data for this determination. There may also be impacts from certain thermal or seasonal conditions. The workgroup should develop criteria to determine "significant impact and level of impact". These issues will require extensive review of the water quality records and in depth interviews with plant personnel.

If the water quality impact is due more to a general lake condition, such as proximity to a shallow bay, wind direction or localized current patterns, the degree of these impacts must be assessed. Interviews with the plant personnel with extensive experience at the plant would be essential. Once the impacts are categorized, assessments must be made for each impact. For example, if a shallow bay causes water quality impacts, these impacts should be noted along with the change in water quality anticipated and the degree and frequency of change. If the quality change results from an algae bloom, the conditions that promote the bloom should be listed, along with the resulting water quality changes and the degree and frequency of the changes. Each impact should be listed in the narrative portion of the assessment.

If the impact results from a discharge on the shoreline, runoff from the shoreline, **local tributary** or location of a facility near the intake, these potential impacts should be listed and assessed. It may be necessary to delineate a susceptible area extending beyond the CAZ, determine the impacts in this area and then assess these impacts. This could become complex depending upon the shoreline assessment. If the impact were from runoff, it would first have to be assessed to determine the degree of impact due to the volume and concentration of contaminants in the runoff. Is the runoff significant? If it were, the potential makeup of the runoff would need to be assessed. For example, is the runoff from farmland? If so, the time of the year would be critical. If it were urban runoff, the types of commercial and industrial establishments in the area would be important. These assessments will be complex and must be designed so they can be altered and expanded, as more information becomes available. The assessment must be dynamic in nature designed for future expansion.

Many bays and tributary mouths in urban or industrialized areas hold deposits of sediment contaminated by metals and organic toxicants. Records of EPA and State environmental management agencies, as well as the U.S. Army Corps of Engineers Harbor Dredging Programs should be evaluated to determine whether an increase in turbidity due to material suspended in such sites might pose a risk.

Wind direction, thermal effects and local current patterns affect many intakes. The affects may be due to a shallow bay, or proximity to a shallow bay, where the bottom sediments are re-suspended into the intake water column or it may direct shoreline runoff over the intake. These impacts can be surveyed by delineating the susceptible area that contributes water to the general area and checking the potential contaminants in the area. Extensive interviews with plant personnel and review of historical records will be necessary. Once the impact has been determined, the assessment of the impact must be made. The list of contaminants associated with each impact must be listed.

Remote sensing, including aerial photograph and satellite imagery, can be extremely revealing both in analyzing a history of events and near real time tracking of tributary and nearshore phenomena.

To complete the assessment, the susceptibility determination should include a general map of the area, **the sensitivity analysis,** delineation of the contributing areas, and listing of the locations of the various impacts along with a narrative that explains these impacts. Three-dimensional hydraulic models can be valuable tools for use in areas where they have been developed.

Before public release of the completed assessment, it should be reviewed with the water supplier for agreement of its contents.

Spill Assessments

Large volumes of materials are transported on the Great Lakes by shipping. Some of these materials are toxic in nature and are subject to accidental spillage during transit and loading. Ships also pose potential risks to intakes through accidental spills of fuel and lubricants.

When doing vulnerability assessments of the intakes, this traffic should be considered. If ships pass in close proximity to an intake, or if there is a nearby commercial loading facility or harbor, procedures should be established to respond to spills from these ships. It would not be possible to predict many specific contaminants from general shipping, but proximity of a particular industry serviced at a local harbor would indicate heightened risk potentials for specific products or supplies. Procedures could be developed for reaction to families of contaminants, such as volatile organic chemicals, pesticides, etc. Previous spills in the vicinity, if any, should be reviewed and assessed. The source should have a contingency plan for guidance in an emergency.

Spills along lakeshores or connecting river shorelines should also be assessed along with potential spills from pipelines, docking facilities, railroad lines, etc. For example, there are numerous chemical plants along the St. Clair River, which connects Lake Huron to Lake St. Clair. These potential sites should first be identified and located on a map if the initial survey indicates there may be impacts from these areas. Procedures then should be developed for assessing and reacting to these types of emergencies. Where possible on the connecting rivers, modeling of the river flows could be used to assess potential impacts on intakes. In these cases, the specific contaminant would normally be known and this information could be used in the assessment.

For intakes located close to the lakeshore lines, again the areas that could significantly impact the intake should be delineated. Potential spill sources in these areas such as industries; disposal facilities, highways, railroads; pipelines, etc. should be located, mapped and assessed. Depending upon the type of potential risk, the specific contaminant may be identifiable, but this may not always be the case. These spills should be considered differently from the routine discharges that may exist. A spill is a unique event, and emergency reaction would be necessary to deal with the potential impact.

Surveys of fixed facilities, pipelines, highway and rail corridors and shipping routes have generally been completed and can be obtained by contacting the local emergency planning committee or the area planning committee. These two groups should have inventories of oil and hazardous materials at fixed facilities and along transportation routes.

Potential Treatment Impacts

The impacts from treatments at the intake should also be included in the assessments. Continual treatment for zebra mussels may cause development of other impacts on the finished water quality. Short-term treatments or impacts such as intake cleaning, dredging, construction, etc should also be included in the assessment.

Summary

An outline of the general methodology to be used for Great Lakes intakes should be a main part of the source water assessment program for states in the Great Lakes Region. Due to the unique nature of each intake, each assessment will be site specific. Assessments of the Great Lakes water quality in general have been done by various agencies and these efforts should

be referenced not duplicated. The site-specific assessments, if done in close cooperation with the treatment plants and local surface water protection agencies, become valuable tools to future operations and planning.

Appendix 2
MSAWWA and MWEA Joint Position Statement

MSAWWA and MWEA Joint Position Statement

The Michigan Section of the American Water Works Association (MSAWWA) and the Michigan Water Environment Association (MWEA) issued a joint position statement in September 2001 detailing their interpretation of source water protection (SWP). The following introduction is largely excerpted from their position statement. Both associations are dedicated to protecting Michigan's waters with members supporting public involvement through awareness, willingness to support clean water activities, and promoting public health and public confidence in drinking water supplies. Source water protection is one of many barriers or safeguards available to a water supplier to protect public health, such as proper intake/well construction and maintenance, water treatment, operator training, and a host of other activities. The position of MSAWWA and MWEA is that wellhead protection (WHP) and SWP are synonymous for ground-water supplies, but that considerably more complex and diverse issues need to be considered for surface water supplies. The MSAWWA and MWEA recommend that communities using surface water sources adopt SWP programs utilizing elements similar to the state defined WHP programs. These seven elements include:

- Defining roles and duties of government units and water supply agencies
- Delineating a source water protection area for each water supply source, based on the state's defined source water area
- Identifying potential contaminant sources within each source water protection area
- Utilizing management approaches for protection of source water, including but not limited to education and regulatory approaches
- Creating contingency plans for public water supply sources including the location of alternate drinking water supplies
- Assuring proper siting of new water sources to minimize potential contamination
- Encouraging public participation

These elements have been applied successfully in WHP programs, and translate directly to SWP. The MSAWWA and MWEA believe that a program of this kind is necessary for protection of local drinking water sources. They do not believe that local efforts by themselves are likely to be sufficient. Although surface and ground waters intermix in the hydrologic cycle, contaminants can be transported much more quickly in surface water than in ground water, and over much greater distances. Responsibility for protection of source water extends far upstream of affected public water supply sources and their local, state, and national boundaries. For these reasons, protection of surface water supplies requires a wider sharing of responsibilities among government units than is typically necessary for WHP. For a SWP program to be effective for surface water supplies, the following issues should be addressed:

- Involvement of and commitment by government units throughout the watershed
- The appropriate source water protection area for a SWP program may encompass an entire watershed, and many potential contaminant sources within that watershed

- Management approaches on a watershed scale may require state, national, or international involvement
- Public participation must include planning and pollution prevention by residents living upstream of the public water supply source

At the local level, SWP is instituted through watershed management plans plus efforts such as hazardous material training, zoning, local ordinances, abandoned well management, illegal connection programs, storm water treatment, street and catch basin cleaning, and public education.

It is important that state, local, and Tribal authorities work together to accurately assess source water susceptibility. Since assessment criteria involve dynamic parameters, source water assessments should be periodically updated to prioritize additional SWP activities.

Appendix 3

U.S. Geological Survey Source Water Assessment, PWSID # 5293302, Zeba Water Supply, Michigan Source Water Assessment Report 70

Source Water Assessment Report for the Zeba Water Supply November 2001

The Village of Zeba Water Treatment Plant
Zeba, Michigan

Prepared for:
Village of Zeba Water Supply
Prepared by:
U.S. Geological Survey, Water Resources Division, Michigan District
Michigan Department of Environmental Quality, Drinking Water and Radiological Protection Division

Michigan Source Water Assessment Report 70

Executive Summary

The purpose of the Source Water Assessment is to analyze the sensitivity and determine susceptibility of a community's source of drinking water to potential sources of contamination.

Sensitivity is determined from the natural setting of the source water (raw water to the water treatment plant), and indicates natural protection afforded the source water. Using procedures established in the Great Lakes Protocol, Michigan Source Water Assessment Program, the moderately deep, offshore intake in Keweenaw Bay for the Zeba source water has a high degree of sensitivity to potential contaminants. When the effects of winds and lake currents, the influence of Linden Creek and the Falls River, and the potential influence of storm drains on the Zeba intake are considered, the Zeba intake is categorized as highly sensitive.

Susceptibility identifies factors within the community's source water area that may pose a risk to the water supply. The susceptibility determination provides information with respect to listed facilities and land areas within the source water area that should be given greater priority and oversight in implementing a source water protection program. The source water area for the Zeba intake includes 20 permits for potential contaminant sources, 14 permits for potential contaminant sources within the susceptible area held by 9 different facilities, 8 storm drains that discharge up-current of the intake, and urban, agricultural, and industrial runoff from the source water area into Keweenaw Bay. The potential contaminant sources, in combination with the highly sensitive intake, indicate that the Zeba source water is highly susceptible to potential contamination.

The Zeba source water is categorized as highly susceptible, given the geography of the source water area and potential contaminant sources within the source water area. However, it is noted that historically, the Village of Zeba Water Treatment Plant has effectively treated this source water to meet drinking water standards. The Village of Zeba has proposed upgrades of its treatment facilities that should mitigate potential threats to its source of drinking water that are identified in this report. This report explains the background and basis for these determinations.

Using this Assessment

Clean, safe drinking water is fundamental to the viability of any community. Protecting the drinking water **source** is a wise and relatively inexpensive investment in your community's future. The overall intent of this assessment is to provide background information for your community to use in developing a local source water protection program. The assessment benefits your community by providing the following:

- ***A basis for focusing limited resources within the community to protect the drinking water source(s).*** The assessment provides your community with information regarding activities within the **source water area (SWA)** that directly affect your water supply. It is within this SWA that a spill or improper use of **potential contaminants** may cause these contaminants to migrate toward the water **intake**. By examining where the source waters are most susceptible to contaminants, and where potential contaminants are located, the assessment clearly illustrates the potential risks that should be addressed.
- ***A basis for informed decision-making regarding land use within the community.*** The assessment provides your community with a significant amount of information regarding where your drinking water comes from (the source) and what the risks are to the quality of that source. Knowing where the resource is allows your community planning authorities to make informed decisions regarding proposed land uses within the SWA that are compatible with both your drinking water resource and the vision of growth embraced by your community.

- *A basis for dealing with future regulations.*
  The assessment has been designed to functionally meet proposed requirements for surface-water supplies. Information needed to address regulatory needs and requirements has been collected and made available to your community through this report.

This source water assessment also provides the basis for a locally developed, voluntary source water protection program. Communities interested in voluntarily developing source water protection programs should contact the Michigan Department of Environmental Quality (MDEQ) or visit the Department web page at http://www.michigan.gov/deq.

Introduction

In 1996, Congress amended the **Safe Drinking Water Act** and provided resources for state agencies to conduct source water assessments by identifying SWAs, analyzing the **sensitivity** of the source to natural conditions, conducting contaminant source inventories, and determining the **susceptibility** of the source to potential contamination. Delineations, sensitivity analyses, contaminant inventories, and susceptibility determinations comprise a "source water assessment." Assessments will be completed for every public water supply source in Michigan. To support this effort, the MDEQ Drinking Water and Radiological Protection Division established a partnership with the U.S. Geological Survey (USGS) to develop a method for conducting source water assessments for surface water supplies (Sweat and others, 2000; Sweat and others, 2001).

The requirements for public water supplies in Michigan to meet United States Environmental Protection Agency (USEPA) **maximum contaminant levels (MCLs)** provide some degree of assurance of safe drinking water; however, all systems are vulnerable to potential contamination. One of the best ways to ensure safe drinking water is to develop a local program designed to protect the source of drinking water against potential contamination. Not only does this add a margin of safety, but it also raises the awareness of consumers and/or the community of the risks of drinking water contamination. It is expected that source water assessment results will provide a basis for developing a source water protection program.

Background

The Village of Zeba is located in Baraga County, on the eastern shore of Keweenaw Bay (fig. 1). The Zeba water treatment plant (WTP) was originally constructed in 1987. The present intake, constructed also in 1987, is an 8-inch (in) diameter ductile iron pipe, extending 800 feet (ft) offshore in 26 ft of water (1927 datum). The intake draws water from Keweenaw Bay through an intake that terminates 4 ft above the bottom of the Bay. Two 25 horsepower centrifugal pumps deliver raw water to the treatment plant. Total low service pumping capacity is 30,000 gallons per day (GPD) (Indian Health Service, 1999). The Zeba WTP serves about 110 service connections, with between 300 and 500 residents. Treatment includes tri-media pressure prefiltration, duplex bag filtration, chlorination, and fluoridation. The WTP has an aboveground, 67,000-gallon (gal), welded-steel standpipe for storage. The current treatment system does not meet the 1990 surface-water treatment rule because of performance problems with the duplex-bag filters. Additional requirements of the long-term I enhanced surface water treatment rule will cause the existing plant to remain out of compliance without proposed modifications and upgrades.

The study area for evaluating the extent of the Zeba water supply SWA includes the lower watershed for Keweenaw Bay, including the communities of Baraga, L'Anse, and Zeba; the Falls River and Linden Creek; and numerous small storm drains on either side of the intake (fig. 1). Sources of information reviewed during this assessment included topographic maps, water supply monthly operation records, USGS and MDEQ reports, on site interviews, private consulting reports, Indian Health Service records, and local, state, and Federal databases. A source-water assessment has been completed for the L'Anse WTP, and is the basis of this assessment.

A new water treatment process was proposed for Zeba in 1999, but has not yet been instituted. A sanitary survey has not been completed for the Zeba WTP. Public water supplies are periodically inspected by MDEQ to identify construction, maintenance, operational or source defects that could make them vulnerable to contamination, particularly from contaminants that are microbial in nature, such as fecal coliforms. Water suppliers are then provided a sanitary survey report that notes any deficiencies in the system, and the state may direct the system to make necessary corrections. Although Indian Health Service (IHS) water treatment facilities are generally exempt from State regulatory requirements, a sanitary survey is an important

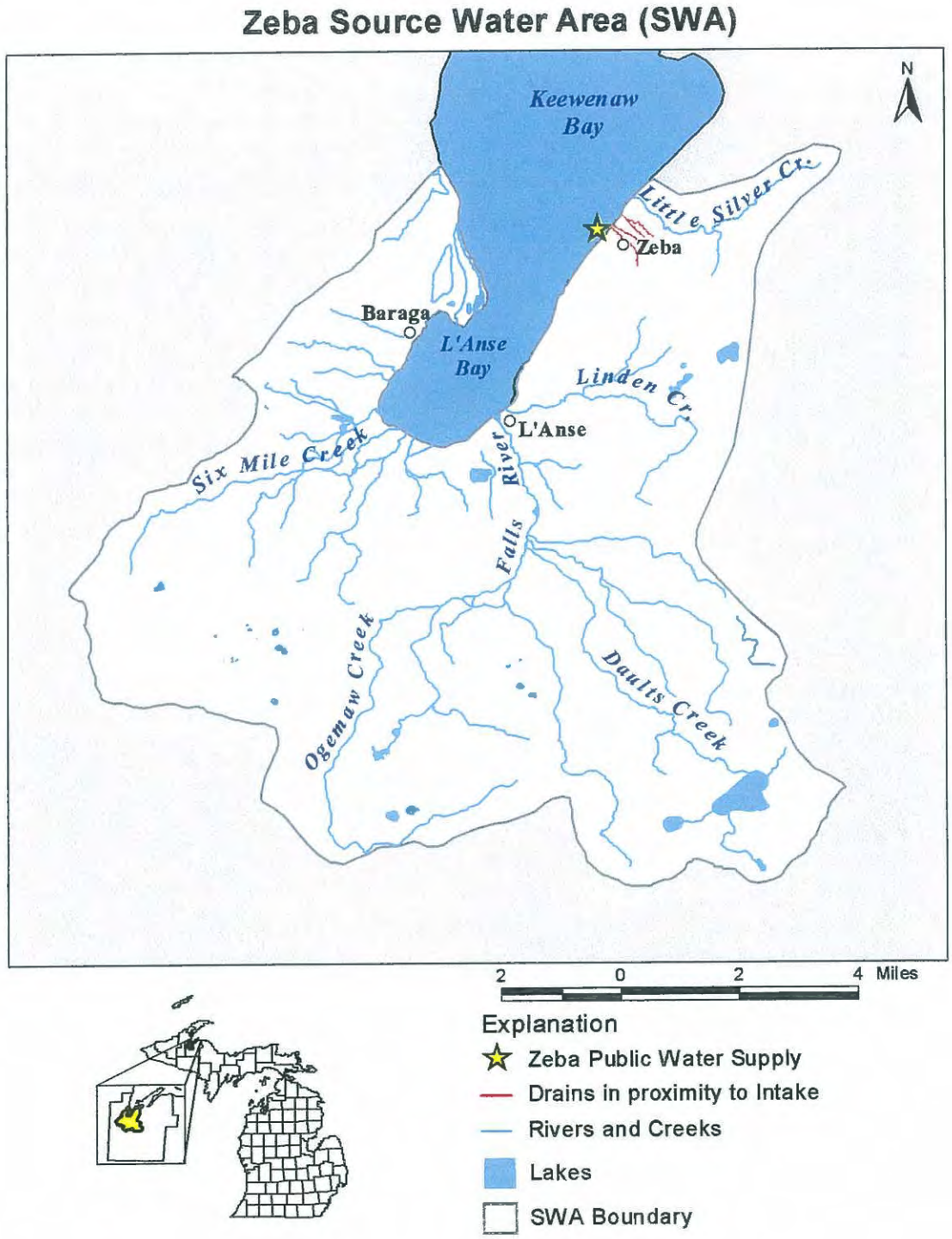


Figure 1. Source-water area for the evaluation of the Zeba water supply, Zeba, Michigan.

part of a safe drinking water program. IHS and Zeba should consider contracting for a sanitary survey once the new water treatment facility is completed.

Climate

The Zeba water supply is located in the Northern Upper Peninsula hydrologic province (Rheaume, 1991), in the Dead-Kelsey watersheds near both the Falls River and Linden Creek (USGS, 1974, 1982). The region experiences temperate summers with moderate to severe winters. Nearby National Weather Service stations report that average annual precipitation for the climatic years 1957-1999 was 43.5 in, and the average for the past 5 years was 34.1 in (NOAA, 1999), with about half of that as snowfall between October and March. Annual average runoff for the Zeba SWA, extrapolated from Miller and Twenter (1986, fig. 1) is 18 to 20 in, with the higher runoff values closer to the west side of Keweenaw Bay.

Source Water Area Geology and Hydrology

The study area for evaluating the extent of the Zeba WTP SWA includes the lower Keweenaw Bay watershed, including the Falls River and Linden Creek (fig. 1). Zeba lies within the Dead-Kelsey watershed, and is situated between L'Anse Bay, the southern end of Keweenaw Bay on Lake Superior, and Pequaming Bay. Adjacent upland areas are primarily thin glaciated deposits, underlain by Keweenawean and St. Croixan sandstones (Martin, 1955; Milstein, 1987). Soils underlying the Zeba SWA are from the Keweenaw, Munising, and Zeba soil complexes (U.S. Department of Agriculture, 1988; BASINS, 1998; MIRIS, 2000). They include sands, sandy loams, and combinations.

Soil permeability is based on the calculated time of travel, in inches per hour (in/hr), for water to move vertically through a saturated soil zone. Soil thickness and permeability values are available in soil survey reports published by the National Cooperative Soil Survey and U.S. Department of Agriculture (1988). Permeability ranges from less than 0.06 in/hr, rated as very slow, to more than 20 in/hr, rated as very rapid.

Very slowly permeable soils significantly reduce the movement of water through the soil zone and, as a result, allow greater time for natural degradation of contaminants. However, such soils also provide for rapid overland transport of contaminants directly to receiving waters, which in turn may affect the water supply intake. In contrast, very rapidly permeable soils allow for rapid infiltration and passage through the soil zone from the surface. Such soils potentially allow rapid transport of contaminants with minimal contact-time available for contaminant breakdown. Erosion and transport of soils by surface waters can cause an increase in turbidity.

Keweenaw Bay from Little Mountain, Baraga County, Michigan

Mean, area-weighted, depth-integrated permeabilities for the Zeba SWA range from 1.3 to as much as 13.0 in/hr. The mean permeability is 7.15 in/hr (Schneider and Erickson, undated, series of 5 maps; BASINS, 1998; MIRIS, 2000). Soil permeabilities range from moderately rapid in the northern part of the SWA to rapid in the southwestern and southeastern parts of the SWA (fig. 2; U.S. Department of Agriculture, 1961; Lusch and others, 1992; BASINS, 1998; MIRIS, 2000). These soils and the plant communities that thrive on them are the source of natural **tannins** and **lignins** to the water. Tannins impart a brown color to the water, and together with naturally occurring lignins (proteins similar to those of egg whites) may cause foam to form on the surface of the water where it is highly oxidized, such as where it flows over rocks, rapids, or dams. In general these naturally occurring tannins and lignins are harmless; however, in addition to coloring the water, they can also impart tastes and odors to the waters when found in sufficient quantities. These natural occurring, organic materials are also precursors that contribute to the formation of trihalomethanes through chlorination at the water treatment plant. Erosion and transport of soils by surface waters can cause an increase in turbidity.

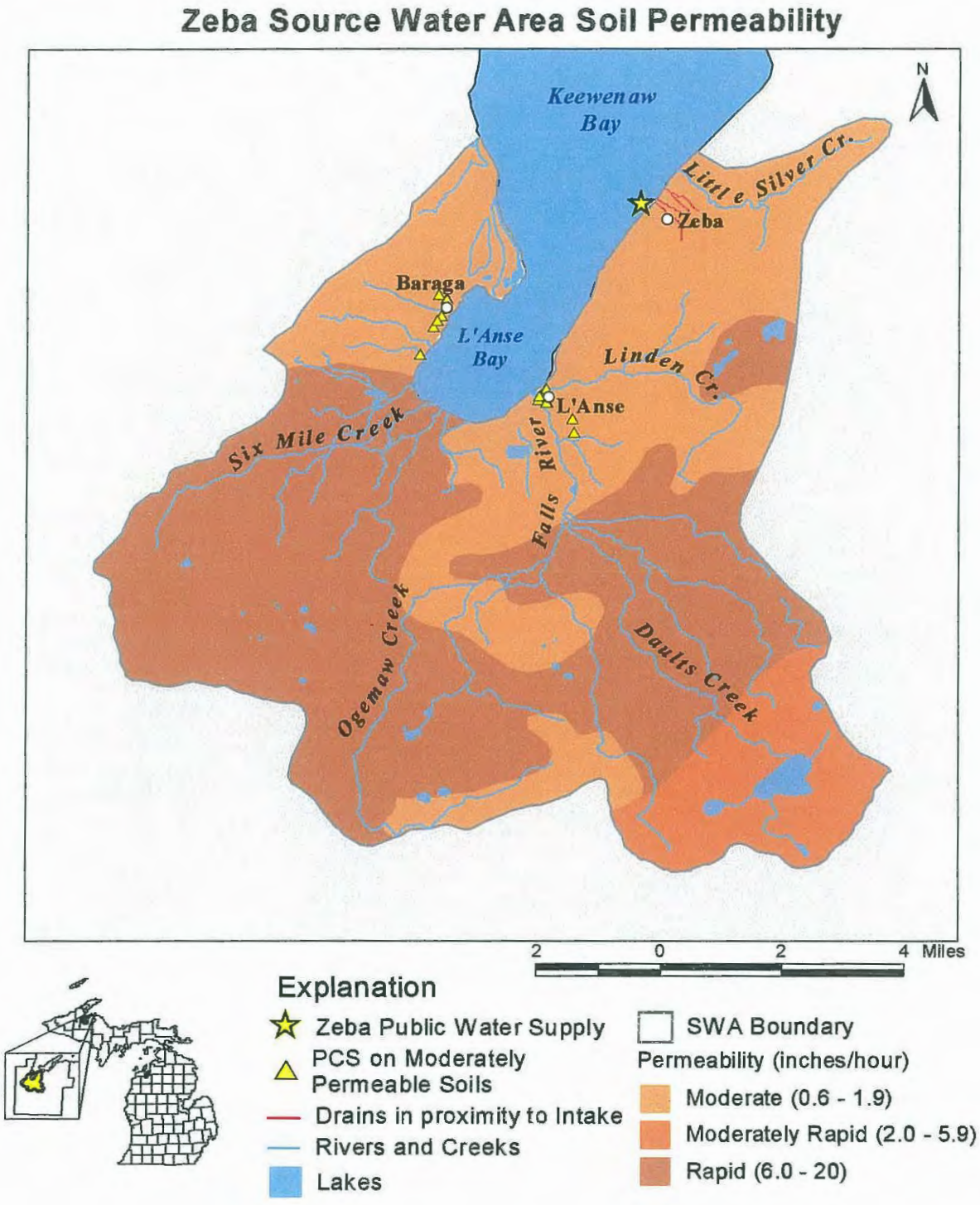


Figure 2. Soil permeability with identified potential point-source contaminant sources within the Zeba source water area, Zeba, Michigan.

The Zeba SWA contains an area of about 98 square miles (mi^2) and is directly connected to L'Anse and Keweenaw Bays. The most significant tributaries to L'Anse Bay from the SWA are the Falls River, with a drainage area of about 45 mi^2, and Linden Creek, with a drainage area of about 12 mi^2. In 1991, 12 discharge measurements were made at 11 sites in the Zeba SWA (Sweat and Rheaume, 1998). Water quality samples were collected at the time discharge measurements were made. In general, water quality met U.S. Environmental Protection Agency (USEPA) maximum contaminant level (MCL) guidelines for drinking water.

Under ambient conditions, currents in L'Anse and Keweenaw Bays are, typically, anticlockwise from the south-southwest (Van Luven and others, 1999; Harington, 1895) and pass over the Zeba WTP intake. Water from the Falls River and Linden Creek flows north from where they discharge to the Bay, and generally do not pass directly over the WTP intake under ambient conditions. Under certain wind conditions, however, lake currents can be altered, causing increases in turbidity and possibly coliforms. Other variations in wind conditions can cause the flow of the Falls River and (or) Linden Creek to pass over the intake, causing changes in water quality and chemistry at the intake.

History of Raw Water Quality at the Source

Public water supplies are required to routinely monitor raw water quality for selected parameters to optimize treatment, and to monitor treated water quality for a list of contaminants that is determined by MDEQ and the Safe Drinking Water Act. A detection of any contaminant may indicate that a pathway exists for contaminants to reach the intake. It is important to realize that the results from a given sample only provide information regarding the water quality at the time the sample was collected. Water quality can change with time for a number of reasons. The fact that a water sample does not contain contaminants is no guarantee that contamination will not occur in the future. Conversely, the detection of a contaminant in the past does not indicate that it will occur in the future.

The Zeba WTP records show that annual water use is about 30,000 gpd. Water quality conditions have been monitored since the plant was constructed. An analysis of wind direction, water and air temperature, precipitation, observed discharge from the Falls River and Linden Creek, and source water chemistry for the L'Anse WTP indicates that there may be an indirect correlation between wind direction and turbidity, and perhaps wind direction and total coliform bacteria. Regression analyses of these data indicated that when the wind is from the west-southwest through west (245-270°) for more than 24 to 36 hours, there is a quantifiable increase in turbidity of the source water after 1 to 2 days, and possibly an increase in total coliforms after 2 to 3 days. This occurs because these sustained winds shift the circulation pattern in the Bay near the intake and cause water from the Falls River and (or) Linden Creek to pass over the intake. This increase in turbidity and total coliforms requires modifications to the treatment process. Because of the proximity of the Zeba WTP and intake to the L'Anse WTP and intake, these conditions are likely true also for Zeba WTP.

Seasonal variations associated with Bay water temperature also cause changes in raw water quality. As Bay waters warm in the spring and cool in the fall, waters in the Bay turnover due to density differences. This turnover results in higher turbidity as bottom sediments are disturbed and enter the water column. Turnover also causes occasional increases in the presence of total coliforms at the L'Anse WTP (Keith Meuller, personal commun., 2000), likely associated with the disturbed bottom sediments. The Zeba WTP periodically tested both raw and treated water for the presence of total coliform bacteria. Results indicate that fecal coliform bacteria are not present in the treated water.

Source Water Assessment Methodology

Technical guidelines for completing source water assessments are contained in the Michigan **Source Water Assessment Program**, Assessment Protocol for Great Lakes Sources (Protocol) (MDEQ, 1999, Appendix L) available at http://www.michigan.gov/deq. In general, an assessment is a process for evaluating a drinking water supply and the potential for its treated water to exceed an MCL due to raw water contamination. A source water assessment considers the SWA, potential sources of contamination within the SWA, conditions of the water supply intake, and susceptibility to contaminants in order to identify potential risks to drinking water quality. Although the Protocol provides the minimum requirements and instructions on how to conduct an assessment, each water supply is unique with respect to how the process is carried out, due to local conditions and information. Sweat and others (2000, 2001) have developed and documented the methodology used in the preparation of this assessment.

Delineating Source Water Areas

Delineation of the SWA is accomplished by using **geographic information system** (GIS) software to map the watershed(s) that have the potential to affect source water at the intake. Using information from the water supply, a **critical assessment zone** (CAZ) is defined for the intake (MDEQ, 1999, Appendix L). A buffer is then created along any shoreline intersected by the CAZ, and from the edge of the CAZ to the mouth of any river(s) that might influence the intake. Finally, the buffer is extended along the shoreline of any river(s) that might influence the intake, from the mouth of the river to its headwaters. The area defined by the CAZ, river and shoreline buffers is termed the **susceptible area.** The susceptible area within the SWA defines locations where a water supply should focus its management strategies and resources to benefit the drinking water resources.

Using the Great Lakes Protocol and the Zeba water supply information:

- The CAZ for the Zeba intake is calculated as:

  800 (the length of the intake in ft.) x 22 (the depth of the intake in ft.) = 17,600 (unitless)
  This results in a CAZ of 3,000 ft (MDEQ, 1999, Appendix L), and the intake is rated as highly sensitive (fig. 3).

- The susceptible area along the shoreline is calculated as:

  The distance the CAZ extends inland (3,000 ft –800 ft = 2,200 ft), from the point the CAZ intersects the shoreline to the western edge of the CAZ. The distance inland was determined from the end or the intake (fig. 4).

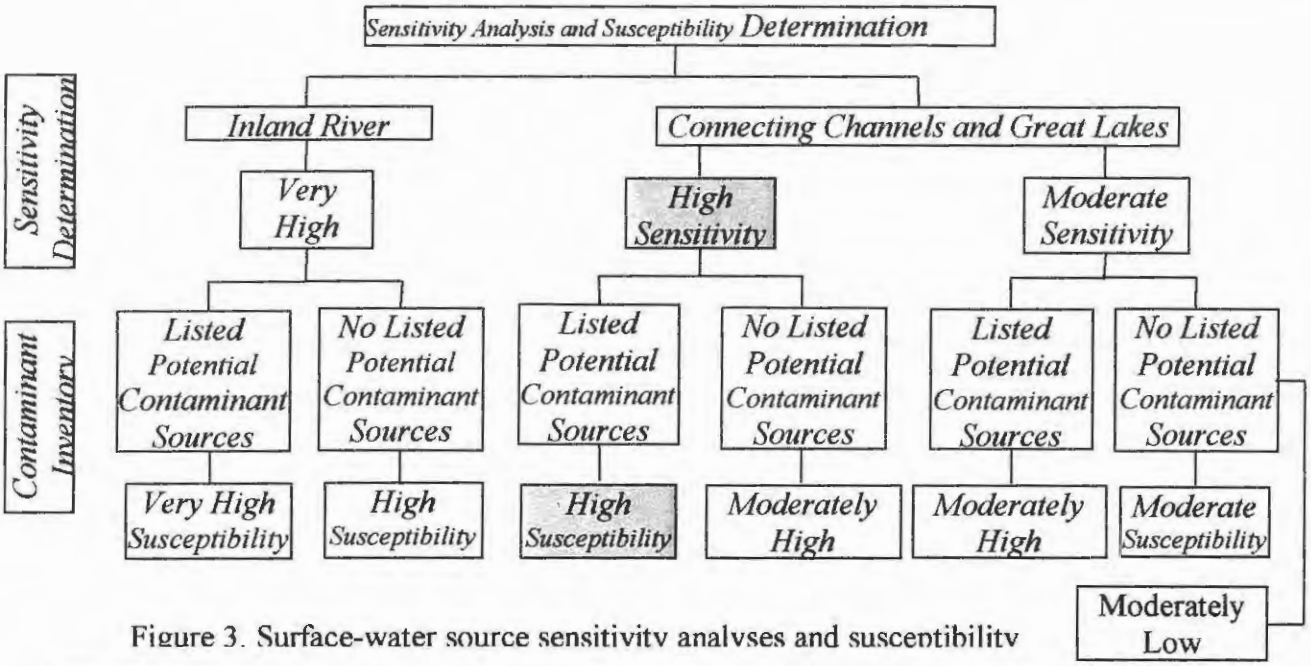


Figure 3. Surface-water source sensitivity analyses and susceptibility

*Moderately Low Susceptibility determination is only applicable to deep, open water Great Lake intakes, free from littoral zone interferences, with excellent raw water quality histories, and where current flows and lake volume provide the potential for large volumes of dilution in the event of a spill or contamination event.

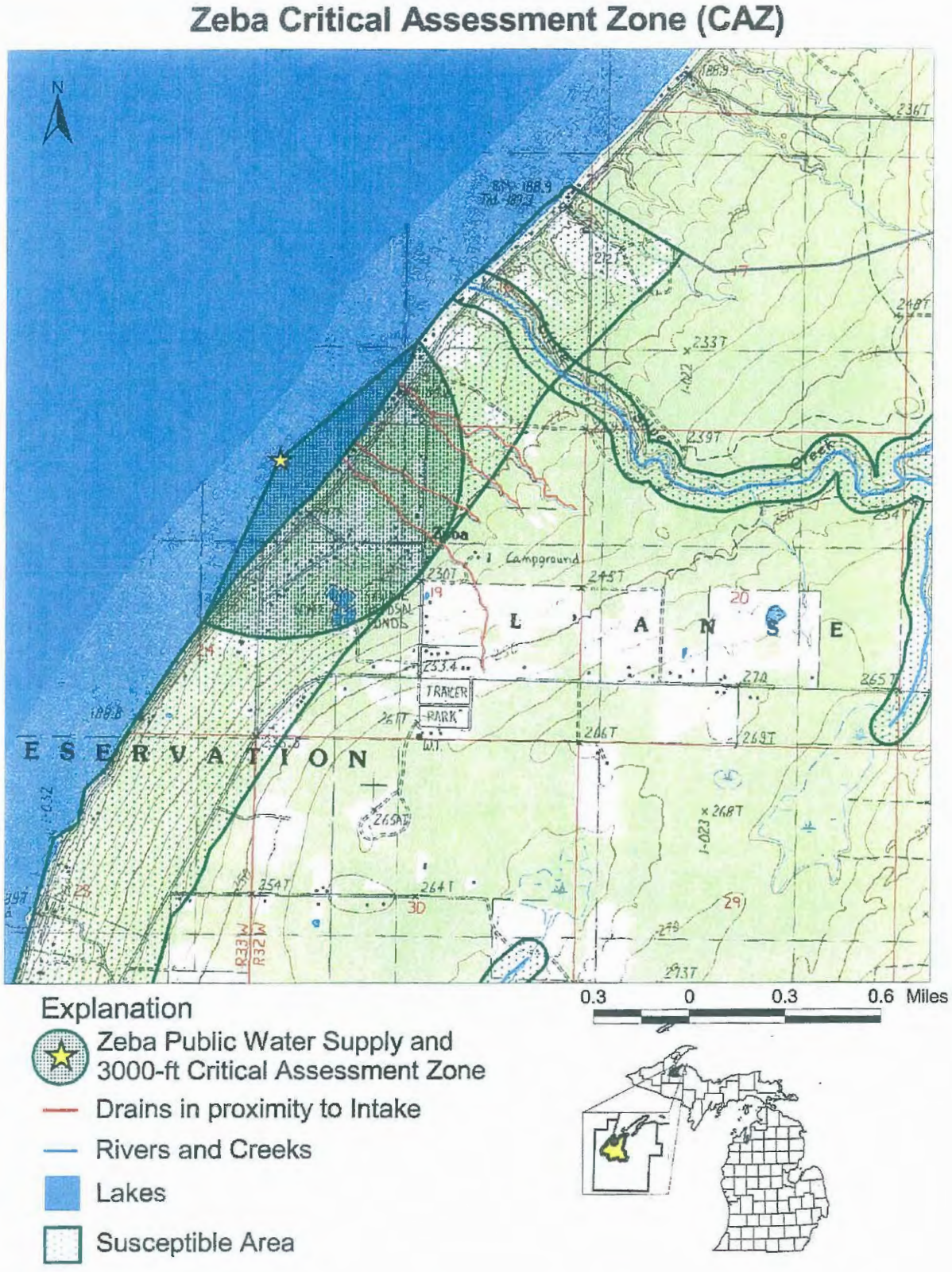


Figure 4. Critical assessment zone for the Zeba, Michigan water supply.

Contaminant Source Inventory

Past, current, and potential future sources of contaminants were inventoried to identify several categories of potential sources of contaminants including microorganisms (bacteria, oocysts, and viruses), inorganic compounds (nitrates and metals), organic compounds (solvents, petroleum compounds, pesticides), and disinfection by-product precursors (trihalomethanes, haloacetic acids).

It is important to remember that sites and areas identified by this process are only **potential contaminant sources** (PCS) to the drinking water. Environmental contamination is not likely to occur when potential contaminants are used and managed properly. In addition, assumptions were made about particular types of land uses and risks associated with those land uses. Assumptions are discussed further in the results portion of this report.

The process for completing the inventory included several steps, which are summarized as follows:

1. Reviewed readily available land use maps and historical/current aerial photographs.
2. Plotted relevant information from applicable state and federal regulatory databases including the following lists:
   - MDEQ leaking underground storage tank (LUST) sites;
   - MDEQ registered underground storage tank (UST) sites;
   - MDEQ Environmental Cleanup Site Information System (ECSI) sites; MDEQ Source Information System (for water discharge permit sites including National Pollutant Discharge Elimination System (NPDES) permits, Water Pollution Control Facility (WPCF) permits, storm water discharge permits, and on-site sewage (septic) system permits);
   - MDEQ Underground Injection Control (UIC) database;
   - MDEQ Active Solid Waste Disposal Permits list;
   - Michigan Department of Transportation (MDOT) - Hazardous Materials database;
   - State Fire Marshall registry of above-ground fuel storage tank sites;
   - State Fire Marshall Hazardous Material Handlers and Hazardous Material Incidents (HAZMAT) sites;
   - U.S. EPA BASINS software, version 2.1.
   - U.S. EPA Envirofacts database;
   - U.S. EPA Resource Conservation Recovery Act (RCRA) generators or notifiers list;
   - U.S. EPA RCRA Treatment, Storage, and Disposal Facility (TSDF) Permits list;
   - U.S. EPA National Priorities List (NPL);
   - U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) List;
   - U.S. EPA RCRA Corrective Action Activity List (CORRACTS);
   - U.S. Department of Transportation (DOT) Hazardous Materials Information Reporting System (HMIRS); and
   - U.S. EPA Toxic Chemical Release Inventory System (TRIS).
   - U.S. EPA Oil Pollution Act of 1990 Spill Response Atlas
3. Met with public water supply and IHS officials by phone during September and October, 2001, to identify potential sources not listed elsewhere in databases or on maps, and completed a preliminary inventory form used to compile the SWA base map. Conducted subsequent contacts by email and telephone on numerous occasions to request additional data, clarify data, and discuss results.
4. Land use and/or ownership (for example, residential/municipal; commercial/industrial; agricultural/forest; and other land uses) was mapped and evaluated in relation to PCS, soil characteristics, and proximity to the intake.
5. Completed final inventory form of PCS and plotted locations of PCS on the base map.

The purpose of the inventory is three fold: first, to provide information on the location of PCS, especially those within the susceptible area; second, to provide an effective means of educating the public about PCS; and third, to provide a reliable basis for developing a management plan to reduce potential contaminant risks to the Zeba water supply.

The inventory process attempts to identify potential point-source contaminants within the SWA. It does not include an attempt to identify specific potential contamination problems at specific sites, such as facilities that do not safely store potentially hazardous materials. However, assumptions were made about particular types of land use. For example, it is assumed that rural residences associated with farming operations have specific potential contamination

sources such as fuel storage, chemical storage and mixing areas, and machinery repair shops. It should also be noted that although the inventory depicts existing land uses, these are likely to undergo continual change due to normal crop rotation practices. What is irrigated farmland now may be non-irrigated farmland next year, or vice versa.

The results of the inventory were analyzed in terms of current, past, and future land uses and their relationship to the susceptible area and the supply intake. In general, land uses and PCS that are closest to the supply intake and tributaries to the source water pose the greatest threat to a safe drinking water supply. Inventory results are summarized in tables 1 and 2, and are shown on figure 5.

Table 1. Potential contaminant sources in the Zeba source water area

Type of potential contaminant source	Number of potential contaminant sources in the Source Water Area	Number of potential contaminant sources in the susceptible area
Hazardous or Solid Waste Site	11	9
Industrial Facilities Discharge Site	4	1
National Priority List Sites	0	0
Permit Compliance System	4	1
Toxic Release Inventory	1	1

Table 2. Potential contaminant source-inventory results for the Zeba SWA

Site Name	***Permit Number***	***Reason for Permit***	***Reason for listing as Potential Contaminant Source***
Celotex Corp[a]	MID006129332	Release or Manufacturing of Toxic Compounds	Toxic Release Inventory
Baraga WWTP[b]	MID985631068	Waste Water and (or) Process Water	Permit Compliance System
UPPower Zeba[c]	MID980006720		
Zeba WWTP[d]	MID985657048		
Baraga WFP[a]			
Baraga WWTP[b]	MI0022250	Cooling, Process, Treatment, and (or) Waste Waters	Industrial Facilities Discharge System
Baraga Water Treatment Plant[e]	MI0024881		
UP Power – Zeba[c]	MI0006092		
Zeba WWTP[d]	MI0020133		
Kens Service	MID044395861	On-Site Storage	Hazardous or Solid Waste Site
Zeba Village of Garage	MID981775422		
Pettibone Michigan Corp	MID006129373		
MIDOT	MID980992234		
Northern Painting and Coatings	MID001026756		
Thomas Ford Mercury	MID017187303		
Upper Peninsula Power Warden Sta[c]	MID980006720		
Zeba Village of	MID981780141		
Baraga Products Inc	MID106634272		
Celotex Inc[a]	MID006129332		
Nicks Standard Service	MID041414160		

Potential Contaminant Source (PCS) map for Zeba,

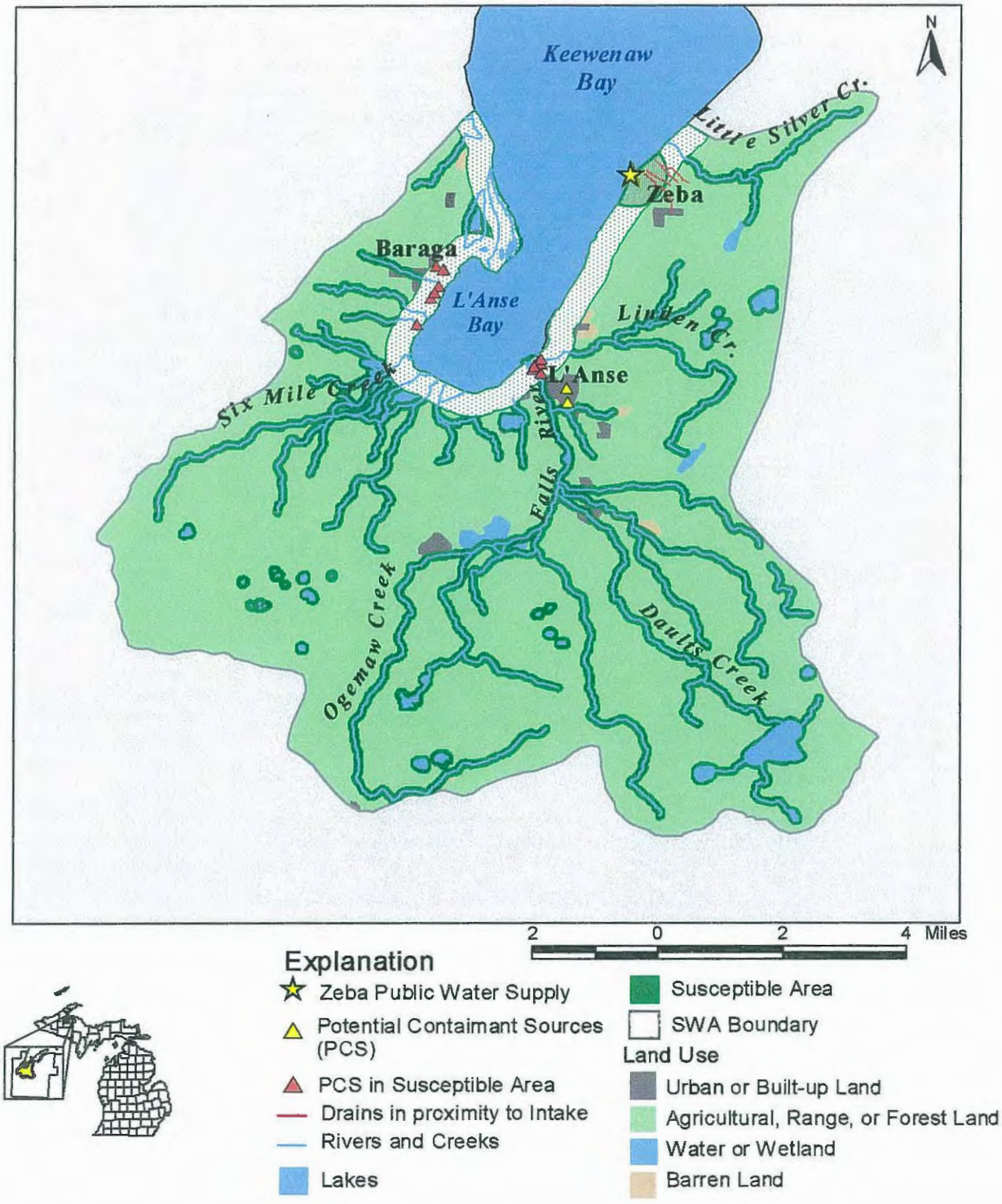


Figure 5. Identified potential point-source contaminant sources within the Zeba source water area, Zeba, Michigan.

Many PCS are readily identifiable because they have a single discharge point, and often a permit is required for these discharges. However, other PCS have diffused, poorly defined discharge locations. These are known as non-point discharges because they occur over large areas and may not be quantifiable by readily accepted methods. These non-point source discharges are difficult to identify and control, and consequently to quantify, yet they are a major source of water pollution (Carpenter and others, 1998). Non-point sources also include atmospheric deposition over water and land, and include urban, rural, and agricultural runoff from areas such as lawns, golf courses, farm fields, pastures, parking lots and roadways. Runoff from these areas can contain many types of pollutants including sediments, metals, organic and inorganic chemicals, viral and bacterial pathogens, pharmaceuticals, and animal wastes. Transportation also represents a non-point source of contamination. Trucking, railroads, and shipping all transport potential contaminants into or through the SWA. An accident causing a spill could lead to potential contaminants entering a storm sewer, or in the case of shipping, directly discharge to Keweenaw Bay. Non-point sources of concern to the Zeba water supply are primarily from agriculture and livestock in the Zeba SWA, and from industrial, commercial, and residential sources in Zeba, L'Anse, and Baraga.

Fifteen storm sewers and (or) drains discharge along the eastern shoreline of Keweenaw Bay. Eight of these drains are up current of the WTP, and 7 are down current of the WTP. The WTP operator reports that discharges from these drains do not affect the raw water at the intake because the flow remains close to shore. The U.S. Environmental Protection Agency (USEPA) has identified no **impaired water bodies** in the Zeba SWA on its Clean Water Act 303(d) list.

In general, PCS within the susceptible area pose greater risks than those outside the susceptible area. The presence of PCS within the SWA indicates potential sources of chemicals that could, if improperly managed or released, affect the water quality at the intake. A small quantity of these chemicals, in some cases a gallon or less, could significantly affect the supply. Also of concern is the location and distribution of these sources with respect to highly permeable soils. The susceptible area consists of primarily forested land, with some wetlands and agricultural lands. Overlaying the PCS locations and the moderately rapid to rapidly permeable soil map for the Zeba SWA indicates that none of the located PCS are located on or very near to areas with moderately rapid to rapidly permeable soils. All PCS within the SWA should be addressed; the susceptibility determination, however, provides the water supply with the tools to focus resources where the greatest risk occurs. The results of the PCS inventory performed for Zeba water supply is shown on figure 5 and is summarized as a function of PCS locations relative to the susceptible area. The inventory results indicate that there are 20 PCS, holding 14 permits for discharge within the susceptible area (table 2).

Sensitivity Analysis

Sensitivity is the natural ability of a SWA to provide protection against the contamination of the water supply intake, and includes physical attributes of lakes, rivers, and soils. The sensitivity analysis requires consideration of several different variables related to the natural environment, for example:

- Water quality history of the source.
- Distribution of moderately rapid to rapidly permeable soils.
- Amount of available water from precipitation or runoff.
- Potential for runoff to affect the intake.
- Nature of the intake, including: depth, distance from shore, age, and materials used.
- Surface water flow patterns in vicinity of intake.

To perform this analysis, USGS, MDEQ, and the operator of the Zeba WTP collected, researched, and analyzed information from the WTP, monthly operator reports, sanitary surveys, soil maps, published reports, and historical plant operation and raw water quality data. The Zeba intake is 800 ft offshore in 26 ft of water, thus it has a CAZ of 3,000 ft, and the CAZ intersects the shoreline. The Michigan SWAP has three categories of sensitivity for surface water sources ranging from moderately sensitive to very highly sensitive. Analysis of this information, using guidelines provided in Sweat and others (2000, 2001), indicates that the Zeba intake is in the middle of this range or highly sensitive (fig. 3). This means that the natural environment offers little protection against contamination of the water supply intake.

Susceptibility Determination

Susceptibility is the relative potential for contamination to reach the public water supply intake used for drinking water purposes. Whereas the sensitivity of a water supply is the natural ability of the area to protect the

intake against contamination, the susceptibility determination also takes into account other factors that will affect whether a contaminant reaches the intake. Whether or not a particular drinking water source becomes contaminated depends on three factors:

(1) The distribution of PCS;
(2) The source water area; and
(3) The natural protection, or sensitivity, of the source.

In conducting a susceptibility determination, the part of the SWA that yields water to the water supply-system intake is identified by establishment of the susceptible area within the source water area. PCS within the susceptible area are then located. Based on the distribution of PCS within the susceptible area, the type of PCS, and the nature of the chemicals they use or store, PCS are analyzed for the risk they may represent to the water supply intake. Along with the presence and distribution of PCS, the sensitivity analysis is then used to determine the susceptibility of the water supply (fig. 3). This leads to a determination of whether the drinking water source is moderately susceptible, highly susceptible, or very highly susceptible to contamination (Sweat and others, 2001). It is important to understand that a system can have low sensitivity relative to some conditions (for example, intake construction and location), and high susceptibility because of other conditions (for example, the type of PCS). In Michigan, surface water sources of drinking water range from moderately low to very-high susceptibility.

When a public water supply is determined to have a moderate, high, or very high susceptibility because of a particular condition or set of conditions, there is a significant risk of contamination of the drinking water source because of that condition or set of conditions. Although the susceptibility determination does not predict when or if contamination will actually occur, it does recognize conditions that are highly favorable for contamination of the supply. In the event of a contaminant release to soils or surface water within the susceptible area, it is very likely that contamination at the intake would occur without completion of remedial actions.

If a public water supply's drinking water source is determined to be highly susceptible, it is recommended that the system identify the condition(s) that lead to the high susceptibility. Immediate steps should be taken to protect the source, and action should be considered to remedy the condition (for example, repairing or replacing faulty intake construction, working directly with facility operators to implement sound management practices, etc.).

All water supplies, regardless of their susceptibility, should consider identified factors that could lead to higher susceptibility in the future, and should prepare a strategy to protect the water supply source. Raising public awareness through signs and other education programs, encouraging proper intake construction and the use of best management practices in existing facilities are good ways of ensuring that a surface water source maintains its moderate susceptibility rating.

Summary and Recommendations

The actual susceptibility of the drinking water source of a water supply depends on a number of contributing factors, some of which are only slightly related. Sensitivity is determined from the natural setting of the source and identifies the natural protection afforded to the source water. Susceptibility is determined by identifying those factors within the community's SWA that may pose a risk to the source water. The susceptibility determination provides information with respect to facilities within the SWA or land areas within the SWA that should be given greater priority and oversight in the implementation of a drinking water protection program.

Sensitivity Analysis: Based on criteria adopted in the Great Lakes Protocol of the Michigan Source Water Assessment Program, the moderately deep, offshore intake for the Zeba Water Treatment Plant has a high degree of sensitivity to potential contaminants. When considering the effects of winds and lake currents, and the influence of Linden Creek and the Falls River, and the potential influence of storm drains up-current from the Zeba Water Treatment Plant are considered, the Zeba intake is categorized as highly sensitive.

Susceptibility Determination: The SWA for the Zeba intake includes 20 listed potential contaminant sources holding 14 permits for discharge within the susceptible area, 8 storm drains that discharge to Keweenaw Bay between Pequaming and L'Anse, and urban, agricultural, and industrial runoff from the Source Water Area. Combining these potential

contaminant sources with the highly sensitive intake yields a highly susceptible determination for Zeba source water (fig. 3).

Effective Treatment: *While it has been determined the Zeba source water is highly susceptible to potential contamination, it is also noted the Village of Zeba Water Treatment Plant has, historically, effectively treated this source water to meet drinking water standards with minimal complaints from the public. This assessment provides the Village with a basis to institute a source-water protection program as another tool to assure the continued safety of its water supply, and to further justify the construction of a new filtration plant to better treat its water. The results of this assessment and the recommendations based on these results are summarized as follows:*

- ***Intake*** - The Zeba Water Supply was originally constructed in 1987. The intake draws water 800 ft from shore, under about 22 ft of water (1927 datum), making it a highly sensitive intake.
- ***Soils*** – Using a mean, area-weighted, depth-integrated permeability estimation, the soil and subsoil material in the SWA range from 1.3 in/hr to as much as 13.0 in/hr. The mean permeability is 7.15 in/hr (Schneider and Erickson, undated, series of 5 maps; BASINS, 1998; MIRIS, 2000). About half of the soils in the Zeba SWA are moderately rapid or rapidly permeable; however, no PCS are located on these soils. These factors combine to make the SWA, and thus the intake, highly sensitive. The community should take steps to evaluate current and future land use in areas of highly permeable soils, particularly those occurring within the susceptible area. Residential areas that have been developed on these soils should be targeted for educational programs identifying steps that residents can take to protect the water supply.
- ***Historical Contaminant Detections*** - There have been no detections of synthetic or volatile organic contaminants in the systems raw water. Inorganic contaminants are typically at lake background levels. Nitrate concentrations are routinely below the detection limit. Positive coliform bacteria detections occur at the L'Anse WTP 2 to 3 days after Baraga empties its sewage lagoons, and the same is likely true of the Zeba WTP. The periodic presence of coliform bacteria is indicative of a relationship between water currents in the Bay and the intake location and runoff and soil conditions, causing the occasional presence of bacteria at detectable levels in the source water. These factors indicate that the SWA, and thus the intake, is highly susceptible.
- ***Sanitary Survey*** - The Zeba water treatment plant is an Indian Health Service facility that went on line in 1987, and as such is not subject to State of Michigan drinking-water regulations. Therefore, a sanitary survey does not exist for the Zeba water supply. It is important that the water supply follow good drinking water treatment and management practices.
- ***Potential Contaminant Sources*** - A review of the PCS inventory and the moderately rapid and rapidly permeable soil distribution indicates that the Zeba SWA has no PCS located on rapidly permeable soils. Within the SWA, there are 14 PCS with a total of 20 discharge permits. It is recommended that the community focus initially on PCS that are within the susceptible area as they pose the greatest potential threat to the water supply. These facilities should be made aware of free technical assistance that is available through MDEQ's pollution prevention programs. Through chemical inventory, waste reduction, and by increasing awareness of best management practices, the risk these facilities pose to source waters can be reduced. The PCS inventory indicates that the source is highly susceptible.
- ***Source Water Assessment*** - The Zeba source water assessment is based on these site-specific parameters:
  1. Definition of a Critical Assessment Zone around the intake for a highly sensitive source;
  2. Definition of a SWA for the Keweenaw Bay and the shoreline near the intake, Linden Creek, and the Falls River;
  3. Wind and current patterns in L'Anse Bay near the Zeba WTP intake and their effects on source water quality; and
  4. Listed and nonlisted potential contaminant sources.
- ***Source Water Protection*** – The Village should initiate source-water protection activities incorporating management plans, chemical containment, spill response, spill response training, and if applicable, an aggressive street cleaning program.

The Zeba WTP and/or the community should assemble a team to assist in the development and implementation of a source-water protection program that uses this assessment to further protect the Zeba source water area.

Selected References

Blumer, S.P., Behrendt, T.E., Ellis, J.M., Minnerick, R.J., LeuVoy, R.L., and Whited, C.R., 2000, Water Resources Data Michigan Water Year 1999: Water-Data Report MI-99-1, 365 p.

Carpenter, S.R., Caraco, N.F., Correll, D.L., Howarth, R.W., Sharpley, A.N., and Smith, V.H., 1998, Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen, Ecological Applications, 8:3, 559-568.

Hamblin, W.K., 1958, the Cambrian sandstones of northern Michigan: Michigan Geological Survey Publication 51, 146 p.

Harrington, M.W., 1895, The surface currents of the Great Lakes: U.S. Weather Bureau, Bulletin B.

Indian Health Service, 1999, Project Summary: Project BE-99-17R, 11p.

Lusch, D.P., Rader, C.P., Barrett, L.R., and Rader, N.K., 1992, Aquifer vulnerability to surface contamination in Michigan: Center for Remote Sensing and Department of Geography, Michigan State University, East Lansing, MI, scale 1:1,500,000.

Martin, H.M., 1955, Map of the surface formations of the southern peninsula of Michigan: Michigan Geological Survey, Department of Conservation, Publication 49, scale 1:500,000, 2 sheets.

Michigan Department of Environmental Quality, 1999, State of Michigan Source Water Assessment Program, 153 p.

Miller, J.B. and Twenter, F.R., 1986, Michigan surface-water resources, *in* U.S. Geological Survey, National Water Summary 1985—hydrologic events and surface-water resources: U.S. Geological Survey Water-Supply Paper 2300, p. 277-284.

Milstein, R.L., compiler, 1987, Michigan sesquicentennial, 1837-1987, bedrock geology of northern Michigan: Michigan Department of Natural Resources, Geological Survey Division, scale 1:500,000.

MIRIS, 2000, Michigan Resource Information System: Michigan Department of Natural Resources, Land and Water Management Division, 2 compact discs, as updated.

National Oceanic and Atmospheric Administration, 2000, Climatological Data, Michigan: U.S. Department of Commerce, 114:13.

Rheaume, S.J., 1991, Hydrologic provinces of Michigan: U.S. Geological Survey Water-Resources Investigation Report 91-4120, 73 p., 1 plate, scale 1:500,000.

Sweat, M.J. and Rheaume, S.J., 1998, Water resources of the Keweenaw Bay Indian Community, Baraga County, Michigan: U.S. Geological Survey Water-Resources Investigations Report 98-4060, 33 p.

Sweat, M.J., Erickson, P.M., and Brogren, B.B., 2000, The Michigan Source Water Assessment Program for Evaluation of Public Surface Water Supplies, in Bryant, Jeff, ed., NWQMC National Monitoring Conference 2000: Monitoring for the Millennium, Austin, TX, April 25-27, 2000.

Sweat, M.J., Brogren, B.B., Loerop, M.W., Jodoin, R.S., and Rossi, T.A., 2002, Michigan's Source Water Assessment Program—Surface-Assessments Leading to Protection Initiatives, *in*, Watershed 2002, Proceedings of Watershed 2002, February 24-27, 2002, Fort Lauderdale, Florida, USA, 1 compact disc.

Sweat, M.J., Brogren, B.B., Jodoin, R.S., and Rossi, T.A., *in press*, The Michigan Source Water Assessment Program – methods for the evaluation of public surface water supplies: U.S. Geological Survey Water-Resources Investigations Report 2001-xxxx.

U.S. Department of Agriculture, 1988, Soil survey of Baraga County area, Michigan: unnumbered report, 306 p., 62 sheets.

U.S. Environmental Protection Agency, 1998, Better assessment science integrating point and nonpoint sources: BASINS Version 2.0. EPA 823-B-98-006, variably numbered.

U.S. Geological Survey, 1974, Hydrologic unit map—1974, State of Michigan: scale 1:500,000, 2 sheets.

-----, 1982, Codes for the identification of hydrologic units in the United States and the Caribbean outlying areas: U.S. Geological Survey Circular 878-A, 115 p.

Van Luven, D.M., Huntoon, J.E., and Maclean, A.L., 1999, Determination of the influence of wind on the Keweenaw Current in the Lake Superior Basin as identified by advanced very high resolution radiometer (AVHRR) imagery: Journal of Great Lakes Research, vol. 25, no. 4, p. 625-641.

GLOSSARY

Critical Assessment Zone (CAZ) – the area from the intake structure to the shoreline and inland, including a triangular water surface and a land area encompassed by an arc from the endpoint of the shoreline distance on either side of the on shore intake pipe location

Geographic Information System (GIS) – a system to capture, store, update, manipulate, analyze, and display all forms of geographically referenced information

Impaired water bodies – water bodies that do not meet minimum specified criteria for use

Intake – the point at which source (raw) water is drawn into a pipe to be delivered to a water treatment plant

Lignins – an amorphous, cellulose-like, organic substance that acts as a binder for the cellulose fibers in wood and adds strength and stiffness to cell walls

Maximum Contaminant Level (MCL) – the maximum permissible level of a contaminant in water that is delivered to any user of a public water system

Potential Contaminant Sources (PCS) – listed and non-listed agricultural sites, businesses, and industries that have the potential to cause contaminants to be introduced into source water

Sensitivity – a measure of the physical attributes of the source area and how readily the attributes protect the intake from contaminants

Source – the water body from which a water supplier gets its water

Source Water Area (SWA) – the land and water area upstream and (or) onshore of an intake that has the potential to directly influence the quality of the water at the intake

Source Water Assessment Program (SWAP)– in Michigan, the process defined by the state Department of Environmental Quality to complete assessments of all the state's public water supplies

Susceptibility –identifies factors that may pose a risk within the community's source water area

Susceptible Area – the area defined by the critical assessment zone and a buffer on either side of any drainages that contribute water to an intake

Synthetic Organic Contaminants (SOC) – manmade organic chemical compounds such as pesticides, etc.

Tannins – naturally occurring phenolic compounds that precipitate proteins, alkaloids, and glucosides from solution that has a yellowish appearance

Volatile Organic Contaminants (VOC) – unnatural, volatile organic chemical compounds such as gasoline components, solvents, degreasers, etc.

Appendix 4

Minnesota Department of Health, Draft Document

Goals For Source Water Protection Planning

The goals of Minnesota's source water protection program for surface water systems is to:

- Address contaminants that can potentially impact the **acute and chronic health of human beings**
- Engage appropriate parties such that **implementation buy-in** is accomplished
- Reduce the incidents of potential drinking water contamination by **establishing barriers of protection** before the source water reaches the treatment plant
- Increase awareness of drinking water protection through **information and education**
- Provide a **sustainable source water resource**
- Provide for **cost-effectiveness**
- Build an **aesthetic acceptance and confidence** by the user
- Accomplish **pollutant reduction** in light of the need to balance demands of multiple users of the resource

Appendix 5

Source Water Assessment and Protection Plan, Contingency Plan, Zeba Public Water System, Keweenaw Bay Indian Community, Baraga County, Michigan.

Source Water Protection Program Contingency Plan Village of Zeba, Keweenaw Bay Indian Community, Baraga County, Michigan

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

By T. L. Weaver

Source Water Protection Program Contingency Plan Village of Zeba, Keweenaw Bay Indian Community, Baraga County, Michigan

GENERAL INFORMATION

The Village of Zeba is located in Baraga County, on the eastern shore of Keweenaw Bay. The Zeba water treatment plant (WTP) was originally constructed in 1987. The present intake, constructed also in 1987, is an 8-inch (in) diameter ductile iron pipe, extending 800 feet (ft) offshore in 26 ft of water (1927 datum). The intake draws water from Keweenaw Bay through an intake that terminates 4 ft above the bottom of the Bay. Two 25 horsepower centrifugal pumps deliver raw water to the treatment plant. Total low service pumping capacity is 30,000 gallons per day (GPD). The Zeba WTP serves about 110 service connections, with between 300 and 500 residents. Treatment includes tri-media pressure pre-filtration, duplex bag filtration, chlorination, and fluoridation. The WTP has an aboveground, 67,000-gallon (gal), welded-steel standpipe for storage. The current treatment system does not meet the 1990 surface-water treatment rule because of performance problems with the duplex-bag filters. Additional requirements of the long-term 1 enhanced surface water treatment rule will cause the existing plant to remain out of compliance without proposed modifications and upgrades.

A new water treatment process was proposed for Zeba in 1999, but has not yet been instituted. A sanitary survey has not been completed for the Zeba WTP.

SHORT-TERM EMERGENCY WATER SUPPLY OPTIONS

1. Water could be purchased from either L'Anse or Baraga public water supplies, if their systems are unaffected by contamination or other problems that have caused the Zeba public water supply (PWS) to become unusable.
2. Purchase water from a nearby community with public water supply wells or a domestic supply well with sufficient capacity to fill tank trucks. It is anticipated that this may require some coordination with L'Anse and Baraga, since it is possible their water intakes will also be impacted.
3. Purchase water from a surface water supply that is unaffected by contamination or other problem, such as City of Houghton or Adams Township.

LONG-TERM ALTERNATIVE WATER SUPPLY OPTIONS

Depending upon the type of surface water contamination, or other problem related to the Zeba PWS, and other related unknowns, possible long-term options are the following:

1. Construction/installation of a treatment facility that sufficiently removes contaminants.
2. Connection with community water supplies at L'Anse or Baraga if they are unaffected by the contamination present in the Zeba PWS. This is an unlikely scenario, given the proximity of the intakes to each other.
3. Development of a new surface water intake site, or public water supply wells.
4. Combination of the above.

EXISTING POTENTIAL CONTAMINANT SOURCES:

Potential contaminant source-inventory results for the Zeba source water area are included in the SWPP.

There are a number of other ways that contaminants can affect source water for the Zeba PWS. A detailed list of potential sources of contamination (naturally occurring, agricultural and commercial forestry, residential, municipal, commercial, and industrial sources and processes), which will be updated/tabulated as time and resources are included in the SWPP.

ZONING REQUIREMENTS

All existing zoning ordinances shall apply. As much as practical, given the 98 mi^2 size of the source water area (SWA) and diverse nature of the communities, Keweenaw Bay Indian Community (KBIC) will work with the Villages of L'Anse and Baraga and also Township Governments to insure that any new construction and development that occurs within the SWA, and in particular the 3,000 ft critical assessment zone near the intake, be completed with the health and safety of the source water in mind.

REFRESHER AND PUBLIC AWARENESS PROGRAM

On a regular basis, KBIC Natural Resources Department personnel shall conduct a brief program making all members of the SWPP Group aware of the importance of the SWPP. News bulletins should be aired in local media reminding residents of the importance of being good citizens and watchmen of the SWA.

Refresher courses should address proper handling and disposal of all potentially hazardous materials found in the SWA.

Regular visits should be made to schools and other community functions to remind the public and create an awareness of the importance of Keweenaw Bay water quality to everyday activities in the surrounding communities including Zeba.

EMERGENCY PROCEDURES

Notify immediately:

Water Department personnel at KBIC, L'Anse, and Baraga
KBIC, Arlan Friisvall, Director (906) 353-6623 (ext. 4126)
Cell (906) 250-3221
Pager (906) 222-2214
L'Anse, Water Plant (906) 524-5880 Pumping Station (906) 524-7230
Baraga, (906) 353-6795 Home (906) 482-7235

KBIC Natural Resources Department: (906) 524-5757

KBIC Tribal Police Department (906) 353-6626, 524-6699

Baraga County Emergency Preparedness Director: (906) 524-7240

Michigan Department of Environmental Quality, Remediation and Redevelopment Division; Clif Clark, District Supervisor, Upper Peninsula District, (906) 346-8515

U.S. Environmental Protection Agency: (KBIC) Kelly Jacobs Tribal EPA contact (906) 524-5757, Ext. 15, (EPA) Chuck Pycha, Technical contact (312) 887-0259; Dennis Baker, Michigan Circuit Rider (231) 271-7492

Emergency and short-term water supply options

Option	Technical and logistical feasibility	Reliability	Political considerations	Cost considerations
Bottled water	Easily obtainable	Good, Does not deal with dermal or inhalation exposure, which may still be present in non-potable use water	Good	Variable, price could be negotiated with suppliers
Tank Trucks	Available from National Guard or private milk haulers	Tanks need to be sterile	Good	Variable, low capital investment
Conservation	Requires public education. Important to protect priority demand	Depends on voluntary compliance.	Generally positive, except for groups excluded by priority use restrictions. Does not all water demand	Low
Treatment at wellhead	Not always an option. Treatment technologies may not be readily available, if at all	Contaminant specific	Public confidence in treated water	Variable, can be capital intensive

Long-term water supply replacement options

Option	Technical and logistical feasibility	Reliability	Political considerations	Cost considerations
Develop new intake(s) in uncontaminated area	May be difficult, depends on nature of problem at old intake. Also may require many miles of piping	Good, although subject to similar security problems as current system	May require acquisition of right-a-way	High
Additional treatment on current supply	Not always an option. Depends on nature of problem, contaminant, etc.	Contaminant specific	Public confidence in treated water	Variable, can be capital intensive
Point-of-use treatment	Variety of systems available. Installation may be problematic. May not be useable for specific contaminant	Inadequate performance is possible. Not maintenance free. Does not deal with dermal or inhalation exposure, which may still be present in non-potable use water	Potential conflict over who owns the filters and who does maintenance	Each unit has a fixed cost, plus maintenance cost
Remediation	May not be possible, or may be too expensive in the current funding environment. Developing technology. Depends on degree of contamination	Contaminant specific	May require use of Federal or State Superfund or other clean-up monies	Very expensive in some instances. Can require a long-term commitment of funding and other resources
Interconnection with another system	Two nearest systems will likely also be impacted by same contamination	Good, if contamination is confined to Zeba intake only	Will require Tribe to purchase water from a municipal source, loss of autonomy	High, capital intensive and may require increased rates to customers

Appendix 6

Process for Completing the Inventory of Permitted and Known Potential Contaminant Sources

Process for Completing the Inventory of Permitted and Known Potential Contaminant Sources

The process for completing the inventory included several steps, which are summarized as follows:

1. Reviewed readily available land use maps and historical/current aerial photographs.
5. Plotted relevant information from applicable state and federal regulatory databases including the following lists:
   - MDEQ leaking underground storage tank (LUST) sites
   - MDEQ registered underground storage tank (UST) sites
   - MDEQ Environmental Cleanup Site Information System (ECSI) sites; MDEQ Source Information System (for water discharge permit sites including National Pollutant Discharge Elimination System (NPDES) permits, Water Pollution Control Facility (WPCF) permits, storm water discharge permits, and on-site sewage (septic) system permits)
   - MDEQ Underground Injection Control (UIC) database
   - MDEQ Active Solid Waste Disposal Permits list
   - Michigan Department of Transportation (MDOT) - Hazardous Materials database
   - State Fire Marshall registry of above-ground fuel storage tank sites
   - State Fire Marshall Hazardous Material Handlers and Hazardous Material Incidents (HAZMAT) sites
   - U.S. EPA BASINS software, version 2.1
   - U.S. EPA Envirofacts database
   - U.S. EPA Resource Conservation Recovery Act (RCRA) generators or notifiers list
   - U.S. EPA RCRA Treatment, Storage, and Disposal Facility (TSDF) Permits list
   - U.S. EPA National Priorities List (NPL)
   - U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) List;
   - U.S. EPA RCRA Corrective Action Activity List (CORRACTS)
   - U.S. Department of Transportation (DOT) Hazardous Materials Information Reporting System (HMIRS)
   - U.S. EPA Toxic Chemical Release Inventory System (TRIS)
   - U.S. EPA Oil Pollution Act of 1990 Spill Response Atlas
6. Met with public water supply and IHS officials by phone during September and October, 2001, to identify potential sources not listed elsewhere in databases or on maps, and completed a preliminary inventory form used to compile the SWA base map. Conducted subsequent contacts by email and telephone on numerous occasions to request additional data, clarify data, and discuss results.
7. Land use and/or ownership (for example, residential/municipal; commercial/industrial; agricultural/forest; and other land uses) was mapped and evaluated in relation to PCS, soil characteristics, and proximity to the intake.

Completed final inventory form of PCS and plotted locations of PCS on the base map.

APPENDIX I:

Spring Cleanup and Household Hazardous Waste Collection Information

Bulky Waste Cleanup

Each year, KBIC holds Spring Cleanup, a free waste collection event as a way to provide a convenient waste service and to reduce the cost of waste disposal to KBIC Tribal members. This is done in hopes of preventing and reducing the open dumping of waste, thereby protecting the environment. This annual event sponsored by the KBIC Tribal Council and KBIC Natural Resources Department, collects bulky waste, such as furniture, toys, and bagged trash, from Tribal households. Prior to 2008, KBIC co-sponsored the Village of Baraga Spring Cleanup, whereby Village residents, including tribal members, hauled their waste to a designated drop-off site. Since 2008, KBIC has organized its own Spring Cleanup offering curbside collection to tribal members, and has proved to be very successful, resulting in the proper waste management and appears to be effective in reducing the KBIC waste stream. Annual waste collection volumes are shown in Table 1.

The KBIC Natural Resources Department coordinates the events with tribal entities providing waste collection and hauling. The KBIC Natural Resources Department also conducts visual waste screening to remove hazardous waste from the waste stream.

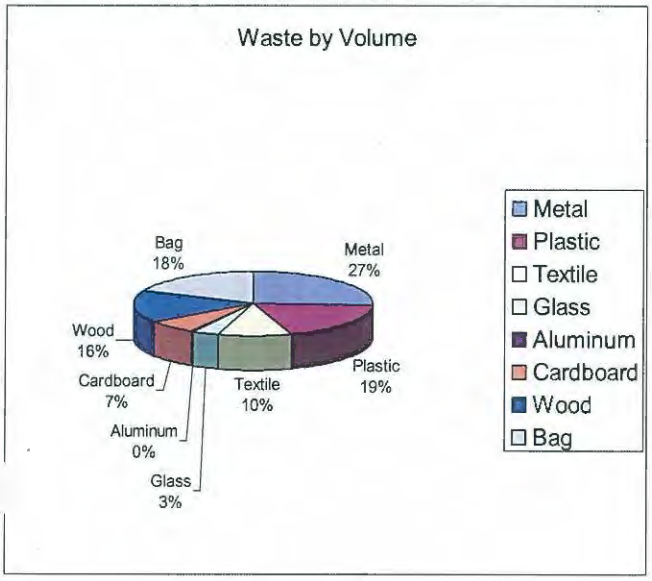
Table 1. Spring Cleanup annual waste volumes, 2004-2011

Year	Event	Unit	Volume (tons)	
2004	VOB Spring Cleanup	474 (loads)		**180**
2005	VOB Spring Cleanup	410 (loads)		**160**
2006	VOB Spring Cleanup	359 (loads)		**158**
2007	VOB Spring Cleanup	320 (loads)		**200**
2008	KBIC Spring Cleanup	80 (households)	40	**100**
	VOB Spring Cleanup	97 (members)	60	
2009	KBIC Spring Cleanup	116 (households)		**45**
2010	KBIC Spring Cleanup	~150 households		**40**
2011	KBIC Spring Cleanup	~150 household		**45**

Trash Talk: 2009 Spring Cleanup Collects 45 Tons of Waste

Each year, KBIC holds Spring Cleanup, a free waste collection event as a way to provide a convenient disposal service and to reduce the cost of waste disposal to enrolled tribal members. This service is also provided in hopes of preventing some open dumping of waste, which helps protect the environment. This annual event sponsored by the KBIC Tribal Council and KBIC Natural Resources Department, collects bulky waste, such as furniture, toys, and bagged trash, from Tribal households. Prior to 2008, KBIC co-sponsored the Village of Baraga Spring Cleanup, whereby residents hauled their waste to a designated drop-off site. Since then, we have coordinated our own Spring Cleanup offering curbside collection, which has proved to be very successful.

This year, the our Spring Cleanup successfully collected and properly disposed of approximately **45 tons** of waste from Tribal households within the L'Anse Reservation, including the Villages of Baraga and L'Anse. The Natural Resources Department coordinated the event and Tribal Construction Company provided waste collection and hauling. The Natural Resources Department also conducted visual waste volume and characterization in order to help determine the type of wastes present in the KBIC waste stream. Knowing what type of waste in in the waste stream helps us identify recycling and reduction opportunities. Recycling could help lower future disposal costs and keep waste out of landfills. Metal was the highest waste type at 27%, followed by plastics at 19%. The results are presented below:



We also compared the waste volume with previous Spring Cleanup waste volumes. The waste volume data shows that the bulky waste collected from tribal households has decreased over time. The annual waste volumes are presented below:

Table 1. KBIC Spring Cleanup total waste disposal volumes 2004-2009

Year	Event	Unit	Total (tons)	
2004	VOB Spring Cleanup	474 (loads)		**180**
2005	VOB Spring Cleanup	410 (loads)		**160**
2006	VOB Spring Cleanup	359 (loads)		**158**
2007	VOB Spring Cleanup	320 (loads)		**200**
2008	KBIC Spring Cleanup	80 (households)	40	**100**
	VOB Spring Cleanup	97 (members)	60	
2009	KBIC Spring Cleanup	116 (households)		**45**

Our Spring Cleanup once again proved to be a successful event, resulting in proper waste management and it appears to be reducing the overall annual KBIC waste stream. If you have questions or comments please call us at the Natural Resource Department (524-5757)

Keweenaw Bay Indian Community; Great Lakes Restoration Initiative Household Hazardous Waste and Electronic Waste Collection Event a Success.

From; Chris Swartz, President
Release date: 08/9/2011
Contact Information: Katherine Kruse; Keweenaw Bay Indian Community Natural Resource Department; 906-524-5757

Baraga County, Michigan – The Keweenaw Bay Indian Community (KBIC), whose Reservation lands border Keweenaw Bay of Lake Superior, hosted a household hazardous waste and electronic waste collection event on June 4th on the grounds of the Ojibwa Casino Resort. This was the first of what is hoped to be an annual household hazardous waste collection effort by KBIC. The collection event was open to tribal members and all non-tribal residents of Baraga County. Over 160 vehicles showed up during the day. More than 350 used electronic devices such as TVs, computers, monitors, and microwaves were collected as well as over 5,000 pounds of household hazardous waste. Wastes collected included used oil, old gasoline, pesticides, mercury, oil filters, car batteries, and other hazardous materials. The event was free of charge for all participants. The collection event was considered a big success by all involved considering that Baraga County only has about 8,860 residents. "We were pleasantly surprised with how many people showed up" said Katherine Kruse, KBIC Environmental Response Program Specialist. "Participation was higher than we thought it would be and a number of people remarked about how happy they were to get rid of waste that they had been accumulating in their house for years. We actually ran out of room in the trucks we received so many used electronic items." One of the most exciting items collected was a jar containing liquid mercury. A total of 15 pounds of mercury were collected during the event. All waste collected will be recycled or disposed of depending upon material type. Proper handling and disposal of hazardous waste materials is a critical part of preventing potential contaminant release to the Lake Superior ecosystem which helps protect this precious resource. Historically the lack of resources in the Baraga County area has meant that regular collection events have simply not been possible. With the help of U.S. EPA Great Lakes Restoration Initiative funding we will be able to establish a regular collection program, leading to increased protections for our wonderful Lake Superior.

Caption: Electronic waste collected at the KBIC Household Hazardous and Electronic Waste collection in June.

Caption: Household and other hazardous wastes collected at the KBIC Household Hazardous and Electronic Waste collection in June.

APPENDIX J:

Resolution KB-1020-2001, Tribal Conservation District Act

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

RESOLUTION
KB-1020-2001

WHEREAS, The Keweenaw Bay Indian Community is a duly recognized Indian Reservation under the Indian Reorganization Act of June 18, 1934, (48 Stat. 984) as amended by the Act of June 15, 1935, (49 Stat.378), and

WHEREAS, The Keweenaw Bay Tribal Council has a vital concern for the welfare of its tribal membership and is authorized to act in all matters that concern the welfare of the Tribe, and

WHEREAS, the protection, preservation and use of the fisheries, wildlife, and plant resources is a priority to the tribal community, and

WHEREAS, the United States Department of Agriculture recognizes the ability of Tribal governments to establish Conservation Districts and manage their natural resources.

NOW THEREFORE BE IT RESOLVED THAT the Keweenaw Bay Tribal Council shall establish the formation of the Keweenaw Bay Indian Community Conservation District Act.

NOW THEREFORE BE IT FURTHER RESOLVED THAT the Keweenaw Bay Tribal Council hereby endorses and directs the Tribal Council Chairman to execute a mutual agreement with the United States Secretary of Agriculture for cooperative conservation of natural resources.

CERTIFICATION

The foregoing resolution was duly adopted by the Keweenaw Bay Tribal Council with a quorum present on this 25th day of October 2001, by a vote of 10 in favor, 0 opposed, and 0 abstaining.

William W Jondreau

William Jondreau, Secretary
Keweenaw Bay Tribal Council

KEWEENAW BAY INDIAN COMMUNITY
CONSERVATION DISTRICT ACT

AN ACT to declare the necessity of creating governmental subdivisions of the tribe, to be known as "Keweenaw Bay Indian Community Conservation District," to engage in conserving and enhancing soil, water, air, animal and plant resources; to establish the Keweenaw Bay Natural Resources Committee, and to define its powers and duties; to provide for the creation of conservation districts; and to provide for the exercise of such powers; to authorize financial assistance to such conservation districts; to declare the effect of this act; and for other purposes.

The People of the Keweenaw Bay Indian Community enact:

Conservation District Act.

Section 1.

This act may be known and cited as the Keweenaw Bay Indian Community Conservation District Act.

Declaration of policy.

Section 2.

Declaration of policy. It is hereby declared to be the policy of the Keweenaw Bay Tribal Council to provide for the conservation of all natural resources of this tribe, and for the control and prevention of soil erosion, and thereby to preserve natural resources, control floods, prevent impairment of dams, reservoirs and free flowing streams, assist in maintaining the navigability of rivers and harbors, preserve fish and wildlife, protect tribal lands, preserve and enhance native species communities, and identify and quantify tribal cultural resources, and protect and promote the health, safety, and general welfare of the people of this tribe.

It is the intent of this Act that Community members/ land users will, through their own initiative, utilize the Keweenaw Bay Natural Resources Committee as a clearinghouse for tribal resource concerns. These concerns will be addressed by the Keweenaw Bay Natural Resources Committee through advice, technical assistance, resource identification, and other corrective actions. The Keweenaw Bay Natural Resources Committee

will keep the Tribal Council informed of the nature and scope of tribal resource issues of which they are apprised.

Definitions.

Section 3. As used in this act:

(A) "District" or "conservation district" means that area defined by the Keweenaw Bay Tribal Council.

(B) "Committee" or "Keweenaw Bay Natural Resources Committee" or "Natural Resources committee" means the agency or governmental subdivision created in Section 4, of this Act.

(C) "Tribe" means Keweenaw Bay Indian Community.

(D) "Agency of this tribe" includes the government of this tribe and any subdivision, agency or instrumentality, corporate or otherwise, of the government of this tribe.

(E) "Keweenaw Bay Indian Community" or "agencies of the Keweenaw Bay Indian Community" or "Community" include the Keweenaw Bay Indian Community, the natural resources staff that assists the Keweenaw Bay Tribal Council, and any other department or instrumentality, corporate or otherwise, of the Keweenaw Bay Indian Community.

(F) "Government" or "governmental" includes the government of the Keweenaw Bay Indian Community, and any subdivision, agency or instrumentality, corporate or otherwise, of either of them.

(G) "Land occupier" or "occupier of land" includes any person of legal age, firm or corporation who shall hold title to, or shall be in lawful possession of any lands within a district organized under this act, whether as owner, lessee, renter, tenant or otherwise.

(H) "Due notice" means notice published at least twice, with an interval of at least 7 days between the 2 publication dates, in a newspaper or other publication of general circulation within the appropriate area, or if no publication of general circulation is available, by posting a reasonable number of conspicuous places within the appropriate area, such posting to include, where possible, posting at public places where it may be customary to post notices concerning tribal affairs generally. Said notice shall be sent by first class mail to the last known mailing address. At any hearing held pursuant to the notice, at the time and place designated in the notice, adjournment may be made from time to time without the necessity of renewing the notice for

such adjourned dates.

(I) "Land owner" includes any person, firm or corporation who shall hold title to or has contracted to purchase any lands lying within a district organized under this act.

Keweenaw Bay natural resources committee; chairman, members; record, rules and regulations.

Section 4. Natural Resources Committee.

(A) There is hereby established, to serve as an agency of the tribe and to perform the Functions conferred upon it in this act, the Natural Resources Committee. The committee shall consist of (8) eight members from geographically different areas within the boundaries of the district. The following shall serve as members of the committee: (1) one Tribal Council member and (7) seven tribal members residing in the district and appointed by the Tribal Council. The committee shall keep a record of its official actions, and may perform such acts, hold such public meetings, and promulgate such rules and regulations as may be necessary for the execution of its functions under this act and subject to approval of the Tribal Council.

Same; administrative officer, experts, employees, office, supplies, etc.

(B) The natural resources committee, subject to approval of the Tribal Council, may employ an administrative officer and such technical experts and such other agents and employees, permanent and temporary, as it may require, and shall determine their qualifications, duties, and compensation. The committee may call upon the office of the tribal attorney for such legal services as it may require. The committee may also call upon the tribal natural resources department, tribal realty department, Bureau of Indian Affairs and any pertinent local, state, or federal staff for assistance. These departments shall participate when reasonable and feasible given due consideration of their other duties. The Committee shall have authority to delegate to its chairman, to 1 or more of its members, or to 1 or more agents or employees, such powers and duties as it may deem proper. At the discretion of the Tribal Council, the committee shall be supplied with necessary office accommodations and shall be furnished with the necessary supplies and equipment.

Same; term, quorum, compensation and expenses.
(C) The Tribal Council member assigned to the committee shall be designated as the chairman. Committee membership is restricted to KBIC members permanently residing within the district. The terms for the first 7 committee members appointed after the effective date of this Act shall be as follows: two members shall be appointed for a one year term, two members shall be appointed for a two year term, and the other three members shall be appointed for three year terms, and after the first appointment each committee member shall be appointed or elected for a period of three years.
A majority of the committee shall constitute a quorum, and the concurrence of a majority in any matter within their duties shall be required for its determination. The members of the committee shall be entitled to expenses, including traveling expenses, necessarily incurred in the discharge of their duties on the committee.
(D) A committee member shall hold office until his successor has been elected and qualified. Vacancies shall be filled by appointment by the tribal council until the next annual meeting at which time a committee member shall be elected or appointed to fill the unexpired or full term.
(E) The tribal council shall prescribe rules and regulations governing the conduct of elections at annual meetings and appointments.
(F) The committee shall furnish to the tribal council, upon request, copies of such ordinances, rules, regulations, orders, contracts, forms, and other documents as they shall adopt or employ, and such other information concerning their activities as it may require in the performance of its duties under this act.
(G) The committee shall provide for the execution of surety bonds for all employees and officers who shall be entrusted with funds or property; shall provide for the keeping of a full and accurate record of all proceedings and of all resolutions, regulations, and orders issued or adopted; and shall provide for an annual audit of the accounts of receipts and disbursements. Any committee member may be removed by the tribal council upon notice and hearing, for neglect of duty or malfeasance in office.

Same; powers and duties.

Section 5.

In addition to the duties and powers hereinafter conferred upon the committee, it shall have the following duties and powers:

(A) To approve, coordinate, and implement the programs of the conservation district organized under tribal laws.

(B) To secure the cooperation and assistance of the Keweenaw Bay Indian Community and any of its agencies, in it's work and to formulate such policies and procedures, as the committee deems necessary relative to the extension of aid in any form from federal, tribal or state agencies.

(C) To disseminate information throughout the tribe concerning it's activities and programs.

(D) To conduct surveys, investigations, and research relating to soil, water, air, plants, and animal resources and to undertake preventative and control measures needed, to publish the results of such surveys, investigations, or research, and to disseminate information concerning such preventative, enhancement and control measures: Provided, however, that in order to avoid duplication of research activities, it shall inform the appropriate tribal department before initiating said research;

(E) To conduct demonstrational/ educational projects within the district on lands owned or controlled by this tribe or any of its agencies, with the cooperation of the agency administering and having jurisdiction thereof, and on any other lands within the district upon obtaining the consent of the owner of such lands or the necessary rights or interest in such lands, in order to demonstrate by example the means, methods, and measures by which all natural resources may be conserved and/ or enhanced;

(F) To carry out preventative, enhancement and control measures within the district including, but not limited to, engineering operations, fish and wildlife improvements, methods of cultivation, the growing of vegetation, changes in use of land, and other measures to achieve purposes listed in declaration of policy, on lands owned or controlled by this tribe or any of its agencies, with the cooperation of the agency administering and having jurisdiction thereof, and on any other lands within the district upon obtaining the consent of the owner of such lands or the

necessary rights or interests in such lands;
(G) To cooperate, or enter into agreements with, and within the limits of appropriations duly made available to it by law, to furnish financial or other aid to, any agency, governmental, tribal or otherwise, or any land owner, or his designated representative, of lands within the district, in the carrying on of natural resources control and prevention operations within the district, subject to such conditions as the committee may deem necessary to advance the purposes of this act;
(H) Subject to Council Approval, to obtain options upon and to acquire on behalf of the Keweenaw Bay Indian Community by purchase, exchange, lease, gift, grant, bequest, devise, or otherwise, any property, real or personal, or rights or interest therein; to maintain, administer, and improve any properties acquired, to receive income from such properties and to expend such income in carrying out the purposes and provisions of this act; and to lease any of its property or interests therein in furtherance of the purposes and the provisions of this act;
(I) To make available, on such terms as it shall prescribe, to land owners, or their designated representatives, within the district, agricultural, natural resources and engineering machinery and equipment, fertilizer, seeds, and seedlings, and such other material or equipment, as will assist such land owners, or their designated representatives, to carry on operations upon their lands for the conservation and/ or enhancement of natural resources;
(J) To construct, improve, and maintain such structures as may be necessary or convenient for the performance of any of the operations authorized in this act;
(K) To develop comprehensive plans for the conservation and/ or enhancement of natural resources and for the control and prevention of soil erosion within the district, which plans shall specify in such detail as may be possible, the acts, procedures, performances, and avoidances which are necessary or desirable for the effectuation of such plans, including the specification of engineering operations, methods of cultivation, the growing of vegetation, fish and wildlife enhancement, cropping programs, tillage practices, and changes in use of land; and to provide to the tribal council such plans and information and bring them to the attention of occupiers of land within the tribal district;

(L) Subject to the approval of the Tribal Council, to take over, by purchase, lease, or otherwise, and to administer, any soil-conservation, erosion-control, or erosion-prevention project located within its boundaries undertaken by the Keweenaw Bay Indian Community or any of its agencies; to manage, as agent of the Keweenaw Bay Indian Community or any of its agencies, any soil-conservation, erosion-control, or erosion-prevention project within its boundaries; to act as agent for the Keweenaw Bay Indian Community, or any of its agencies, in connection with the acquisition, construction, operation or administration of any natural resources project within its boundaries; to accept donations, gifts, and contributions in money, services, materials, or otherwise, and to use or expend such moneys, services, materials, other contributions in carrying on its operations subject to such policies and procedures as adopted by the tribal council, and to accept moneys, gifts, and donations not hereto fore provided for;

(M) To facilitate the free exchange of information between conservation district organized by the State of Michigan pursuant to Public Act 297 of 1937, as amended, and tribal agencies and tribal conservation district to the extent deemed necessary by the Tribal Council for the best interests of the Tribal Conservation District, the committee shall coordinate it's activities with said Michigan and other tribal conservation districts. The Committee may, to the extent possible, participate in Michigan and National district organizations and pursue joint ventures with other conservation district when mutually beneficial.

(N) Subject to the approval of the Tribal Council, agencies of this tribe which have jurisdiction over, or are charged with the administration of, any tribally owned lands, and any other governmental subdivision of the tribe which has jurisdiction over, or is charged with the administration of, any other publicly owned lands, lying within the boundaries of any district, shall cooperate to the fullest extent with the committees in the effectuation of programs and operations undertaken by the district under the provisions of this Act. The Committee shall be given free access to enter and perform work upon such tribally or publicly owned lands.

(O) Subject to Tribal Council approval, the committee may cooperate with and enter into agreement with a county, township,

municipality or other subdivision of state government in order to carry out the provisions of this Act. The Committee may accept materials, equipment, moneys, personnel and other services as the governmental subdivision of the Community.
(P) Members of the committee cannot accept any position created by the committee for which salary is paid, nor may they engage in any business that is promoted by the committee as part of or contributes to the conservation program.

Creation of conservation district; procedure; contents.

Section 6.

The Tribal Council shall create such conservation districts as needed to preserve land lying within its territorial jurisdiction. When creating said districts, the Council shall set forth:
(1) That there is need, in the interest of the public health, safety and welfare, for a conservation district to function in the territory described by the Tribal Council.
(2) A description of the territory to be organized as a district, which description shall not be required to be given by metes and bounds or by legal subdivisions, but shall be deemed sufficient if generally accurate.
(3) A district which includes existing watersheds and agricultural regions and other tribal conservation districts already organized or proposed for organization under this act and such other physical, geographical and economic and social factors as are relevant.

Expansion of additional territory or district.

Section 7.

The Tribal Council may decide at any time to add territory or district boundaries, expand existing district, or re-designate district boundaries.

Powers of district and directors.

Section 8. Discontinuance of district.

At any time 5 years after the organization of the district under the provisions of this act, the Tribal Council may terminate the existence of the district.

Adopted By Keweenaw Bay Tribal Council on 10/25/01.

COOPERATIVE WORKING AGREEMENT
Between the
NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE
And
THE KEWEENAW BAY INDIAN CONSERVATION DISTRICT

For their Cooperation in the Conservation of Natural Resources

THIS AGREEMENT is between the Natural Resources Conservation Service (NRCS), an agency of United States Department of Agriculture (USDA), and the Keweenaw Bay Indian Conservation District, collectively referred to as the parties, to define the roles and responsibilities of the parties.

AUTHORITIES, STATUTES, LAWS

NRCS is authorized to cooperate and furnish assistance to the parties in the conservation of natural resources as referenced in the Soil Conservation and Domestic Allotment Act, 16 U.S.C. 590; The Department of Agriculture Reorganization Act of 1994, Public Law 103-354; and Secretary's Memorandum No. 1010-1, Reorganization of the Department of Agriculture, dated October, 1994.

The Tribal authority for participation is defined in the Keweenaw Bay Tribal Council Resolution # KB-1020-2001 on October 25, 2001.

The purpose of this agreement is to supplement the Mutual Agreement between the United States Department of Agriculture and the Keweenaw Bay Indian Conservation District. This cooperative working agreement documents those areas of common interest of the federal and Tribal partnership in natural resource conservation.

The customers of the parties to this agreement are both tribal & non-tribal individual land-owners/land users, federal and Tribal land management agencies, tribal natural resources staff, groups, and units of government. The parties mutually agree to provide leadership in resource conservation. To accomplish this,

we share a commitment to listen, anticipate and respond to our customers' needs; anticipate, identify, and address issues; maintain decision-making at the lowest level; advocate comprehensive resource management planning, maintain and improve our grass-roots delivery system; build new alliances to expand our partnership; foster economically viable environmental policies; improve the quality of life for future generations; and conserve and enhance our natural resources.

The parties pledge to work together by advancing and practicing teamwork; including input in the decision-making process; communicating, coordinating, and cooperating; sharing opportunities; promoting mutual respect, support, trust, and honesty; and sharing the leadership and ownership, the credit and the responsibility. A mutual goal is to improve our efficiency and effectiveness by putting quality first; empowering people to make decisions; demonstrating professionalism and dedication and striving for continuous improvement.

ROLES AND RESPONSIBILITIES:

PERSONNEL

Each party is responsible for the hiring, management, supervision, development, and evaluation of its own personnel, including creating an environment that supports a diverse work force for NRCS and recognizing Tribal hiring preference in accordance with the Indian Reorganization Act of 1934 (25 U.S.C. 497).

TRAINING

The parties will provide appropriate leadership in administrative and technical training as determined by program needs. Training also includes the orientation of all employees and official in organizational philosophies, programs, authorities, roles and responsibilities of the parties.

State, Federal, and Tribal parties will offer tailored training opportunities to each other.

EMPLOYMENT

The parties will share information to better coordinate individual staffing plans so all the necessary disciplines for adequate program delivery are considered.

Employee evaluations will be done independently by the employing organization/party.

TECHNICAL AND ADMINISTRATIVE ASSISTANCE

The parties will work together to determine the amount of technical and administrative assistance needed and available for program delivery at each level. Such assistance may include contracts, agreements, procurement, watershed planning, personnel, grant writing assistance, engineering assistance, and/or other assistance provided by the parties.

PROGRAM DELIVERY

ANNUAL PLAN

An annual plan will be developed locally with projects and needed budgets that will address the next fiscal year and will be forwarded to the Secretary of Agriculture and Natural Resources Conservation Service, Michigan Conservationist.

NATURAL RESOURCE PLANS

The parties will coordinate with public and private resource groups, other resource agencies, and interested parties to share information and resources used in the development of the Integrated Resource Management Plan for the reservation & applicable 1842 treaty area.

RESOURCE INVENTORIES

The parties agree to identify, define, and coordinate the collection and use of natural resource inventory data.

The creation of soil survey GIS layers will receive high priority.

The parties will cooperate in monitoring and validating the resource inventory data to assure that the data meets the needs of the resource planning and evaluation processes.

CULTURAL RESOURCE AWARENESS

The parties will insure that cultural resources are a part of all documents and that those resources are protected and preserved.

INFORMATION SHARING

The parties will designate who has responsibility for the collection, location of data and the maintenance of particular resource information.

Parties will agree to work toward establishing and maintaining shareable databases.

BOUNDARIES

Keweenaw Bay Indian Conservation District Boundaries will be all the 1842 ceded territory in Michigan including the L'Anse Reservation in Baraga County (see map).

MARKETING

The parties will coordinate their efforts in the communication of program information to their varied customers and clientele groups.

TECHNICAL STANDARDS

The parties will adopt the NRCS Field Office Technical Guide (FOTG) and other science base technical standards, as appropriate.

JOB APPROVAL

Each party will assign conservation practice (job approval) authority to its personnel based on employee knowledge, skill and ability levels and within the party's applicable laws and guidelines.

MAINTENANCE OF STANDARDS

The parties will develop a process to establish and maintain consistent standards.

RECORDS, FACILITIES, AND EQUIPMENT

WORKING SPACE

The Tribe will provide a satellite office space as needed by the Natural Resources Conservation Service per the FACT ACT, Title XXV, and Section 2501.

EQUIPMENT

The parties agree to share equipment for common use within established guidelines and procedures.

RECORDS MANGEMENT

The parties will define legal requirements and limitations for access and use of relevant records. The parties will agree on the maintenance, update, and disposition of relevant records.

FUNDING

The parties will work together to maximize available resources and actively seek funding to accomplish natural resource priorities and programs. Parties will work collectively and cooperatively in all grant writing endeavors pursuing funding for Natural Resource Programs and Projects.

FEE FOR SERVICES

The parties recognize that nonfederal signatories may establish procedures to collect fees, where permissible, for the delivery of such services that are not provided through federal financial or technical assistance.

TORT LIABILITY

The parties will each assume responsibility for the action of their officials or employees acting within the scope of their employment to the extent provided by both tribal and federal laws.

ACCOUNTABILITY

The parties will design and implement an outcome-based evaluation system to determine if both resource and customer needs are being met.

SCOPE OF AGREEMENT

Authority to carry out specific projects or activities will be based on a government-to-government relationship, the transfer of funds, acquisition of services and property; will be established under separate agreement.

CIVIL RIGHTS

The parties will be in compliance with the nondiscrimination provisions contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitate Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Acts of 1975, American with Disabilities Act of 1990, and in accordance with regulations of the Secretary of Agriculture (7 CFR-15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or disability be excluded from participation in , be denied the benefits of or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the Department of Agriculture or any agency thereof, that the Keweenaw Bay Tribe may provide for Tribal hiring preference in accordance with the Indian Reorganization Act of 1934 (U.S.C. 479).

TERMINATION

This agreement can be modified or terminated at any time by mutual consent of all parties by any party giving 60 days written notice to the other parties.

KEWEENAW BAY INDIAN COMMUNITY

By: Leonard Cardinal
(Tribal Chairperson)

Date: 5-23-02

UNITED STATES DEPARMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE

By: Ronald C. Williams
State Conservationist)

Date: 05/23/02

MUTUAL AGREEMENT
BETWEEN THE

UNITED STATES DEPARTMENT OF AGRICULTURE

AND

THE KEWEENAW BAY INDIAN COMMUNITY

For their Cooperation in the
Conservation of Natural Resources

THIS AGREEMENT is between the United States Department of Agriculture (USDA) and the Keweenaw Bay Indian Community

The authority of USDA to enter into this agreement is the Soil Conservation and Domestic Allotment Act 16.590; the Department of Agriculture Reorganization Act of 1994, Public Law No. 103-345; and the Secretary's Memorandum No. 1010-1, dated October 20, 1994. The Keweenaw Bay Tribal authority is defined in the Keweenaw Bay Tribal Resolution KB1020-2001 passed on October 25th, 2001.

STATEMENT OF PURPOSE

The parties have the common objective of assisting people in their efforts to utilize and manage natural resources in accordance with their capabilities and needs for protection and improvement. Each party is independent, has its respective responsibilities, yet recognizes the need to coordinate as a federal, state, and local partnership for the successful delivery of conservation program related to our soil, water, air, plant, animal and human resources. Therefore, the parties will cooperate to implement their respective long-range natural resources conservation programs considering available resources, statutory authorities, and regulations. The parties will develop appropriate agreements to further define this relationship.

IT IS UNDERSTOOD THAT:

Broad-based conservation programs delivered through the cooperation of the USDA, the Keweenaw Bay Indian Community and the Keweenaw Bay Conservation District are vital to the protection of the natural resources, economic stability and well being of our Nations.

The parties reaffirm the relationship between the USDA and the Keweenaw Bay Indian Community. The Secretary will continue, within the terms of various statutes administered by USDA, to carry out broad conservation programs of assistance encompassing technical, research, education, and financial assistance to land owners and users through the Keweenaw Bay Conservation District and the Keweenaw Bay Indian Community.

The parties also recognize and encourage a continued commitment from the Keweenaw Bay Indian Community in aiding administration, coordination, financing, and the delivery of conservation programs through the Keweenaw Bay Conservation District and the Keweenaw Bay Indian Community.

This agreement establishes an enduring basis for cooperation and assistance between the parties to achieve common natural resource conservation goals and objectives. Authority to carry out specific projects or activities, such as the transfer of funds, acquisition of services, and property will be carried out under separate agreements. The parties will encourage other natural resource related agencies to develop similar agreements.

The signatories will be in compliance with the nondiscrimination provisions contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1978 (Public Law 100-259) and other nondiscrimination statues, namely, Section 504 of the Rehabilitate Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Acts of 1975, American with Disabilities Act of 1990, and in accordance with regulations of the Secretary of Agriculture (7 CFR- 15, Subparts A & B),which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or disability be excluded from participation in, be denied the benefits of or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the Department of Agriculture or any agency thereof, that the Keweenaw Bay Indian Community may provide for Tribal hiring preference in accordance with the Indian Reorganization Act of 1934 (U.S.C. 479).

This agreement can be modified or terminated at any time by mutual consent of all parties of by giving 60 days written notice to the others.

This agreement supersedes all previous Memorandums of Understanding.

UNITED STATES DEPARTMENT OF AGRICULTURE	KEWEENAW BAY INDIAN COMMUNITY
By: _____	_____
(Secretary of Agriculture)	(Tribal Chairperson)
Date: FEB 13 2002	Date: 3-1-02

APPENDIX K:

Resolution KB-1152-2003, Integrated Resources Management Plan

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

Resolution KB-1152-2003

WHEREAS, The Keweenaw Bay Indian Community is a duly recognized Indian Reservation under the Indian Reorganization Act of June 18, 1934, (48 Stat. 984) as amended by the Act of June 15, 1935, (49 Stat. 378), and

WHEREAS, The Keweenaw Bay Indian Community has adopted a Constitution and By-laws approved December 17, 1936; and

WHEREAS, The Keweenaw Bay Tribal Council has a vital concern for the welfare of its Tribal membership and is authorized to act in all matters that concern the welfare of the Tribe, and

WHEREAS, The Keweenaw Bay Tribal Council has supported the development of an Integrated Resource Management Plan (IRMP) for the Keweenaw Bay Indian Community and believes integrated resource management is a sound management strategy for the protection of its resources.

NOW THEREFORE BE IT RESOLVED THAT the Keweenaw Bay Indian Community adopts the Integrated Resource Management Plan developed by its' IRMP Team and distributed in January of 2003.

CERTIFICATION

We, William Emery, President, and Susan LaFernier, Secretary of the Keweenaw Bay Indian Community, do hereby certify that this resolution No. KB-1152-2003 to be a true and exact copy as approved by the Tribal Council of the Keweenaw Bay Indian Community at a duly called meeting held on the 1st day of February, 2003, there being a quorum present, by a vote of 10 in favor, 0 opposed, and 1 abstentions, as follows:

Vice President Michael LaFernier, Sr.:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Secretary Susan LaFernier:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Treasurer Amy St. Arnold:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Asst. Secretary Elizabeth Mayo:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Doreen Blaker:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Larry Denomie III:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Gary Loonsfoot Sr.:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Beverly Lussier:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Ann Misegan:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Jennifer Misegan:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Warren Swartz, Jr.:	AYE	NAY	(ABSTAIN)	NOT PRESENT
President William E. Emery (If Required):	AYE	NAY	ABSTAIN	NOT PRESENT

William E. Emery
William E. Emery, President

Susan J. LaFernier
Susan J. LaFernier, Secretary

KEWEENAW BAY INDIAN COMMUNITY

INTEGRATED RESOURCES MANAGEMENT PLAN

Approval Date: 2-12-03

Michael Donofrio, Director
KBIC Natural Resources Department

Approval Date: 2-13-03

William E. Emery, Chairman
Keweenaw Bay Indian Community

By Tribal Resolution No. KB-1152-2003

Approval Date: 2-14-03

Anne E. Bolton, Superintendent
BIA Michigan Agency

Approval Date: 5.29.2003

Larry Morin, Area Director
BIA Minneapolis Area Office

CLARICY A. SMITH
Deputy Regional Director
Midwest Regional Office

INTRODUCTION

KBIC IRMP Vision Statement

"To live in harmony while enhancing and sustaining the resources of the Keweenaw Bay Indian Community for the Seventh Generation."

Integrated Resource Management planning (IRMP) is an initiative endorsed by the Bureau of Indian Affairs. The IRMP process attempts to recognize the complex interrelationships in the natural world. Integrated resource management goes beyond the natural world and incorporates social, cultural, environmental, and economic aspects of the reservation into management decisions. Integrated resource management planning links all decisions that affect a tract of land together so that each decision's impact can be weighed against all others. Integrated resource planning has been adopted by a number of agencies including: USDA Forest Service, Bureau of Land Management, Universities of Vermont and New Mexico and the Center for Holistic Resource Management. The Bureau of Indian Affairs has sponsored IRMP development on several Indian reservations across the United States.

The Keweenaw Bay Indian Community administers the L'Anse and Ontonagon Indian Reservations located within Michigan's Upper Peninsula. These reservations were established through the Treaty of 1854. KBIC also has trust lands in Marquette County. KBIC retains hunting, gathering and fishing rights in the western Upper Peninsula through the Treaty of 1842. The L'Anse Reservation is the Community's principal holdings with over 70,000 acres along the shores of Lake Superior's Keweenaw and Huron Bays. The Community has over 3,150 members with approximately 1,200 residing on the L'Anse Reservation. The total number of tribal and non-tribal residents within the L'Anse Reservation is over 3,600, including the Village of Baraga. The village of L'Anse and its' 2,200 residents lie adjacent to the Reservation. Therefore, this IRMP focuses on a rural community and associated components. Our IRMP targets the L'Anse Indian Reservation, although several references are made about resources outside the reservation but within the western Upper Peninsula.

The Keweenaw Bay Indian Community received IRMP funding from the Bureau of Indian Affairs, U.S. Department of Health and Human Services' Administration for Native Americans program, U.S. Environmental Protection Agency (EPA), and Tribal Council from 1999 to 2003. KBIC began their IRMP with the establishment of a team in September of 1999. Carolee Dodge Francis of Communication Works, Iron Mountain, MI served as the facilitator for our IRMP process. The Team members were trained on IRMP by Don Hall of BIA in December of 1999 and April and September of 2000. Our Team was composed mostly of KBIC Natural Resources Department staff and Natural Resources Committee as well as several other individuals employed by KBIC. Bruce Petersen, USDA Natural Resource Conservation Service and Eric Oliphant and John Banuchie of BIA also played vital roles in contributing to this document. We also believed other major landowners on the Reservation should be included, so we involved representatives from Mead – West Vaco Corporation. They own and manage over 15,000 acres within the L'Anse Reservation. The state of Michigan possesses minimal acres on the L'Anse Reservation. No other federal entity owns land within this Reservation. Although, the state of Michigan, USDA Forest Service, and timber businesses own the majority of land in the western Upper Peninsula and 1842 ceded territory.

Our IRMP Team developed a 20- question survey (Appendix A) in January of 2000 and distributed it to over 1,800 adult Tribal members residing on and off the L'Anse Indian Reservation. The survey was also available to non-Tribal members living in Baraga County, Michigan. We received completed surveys from 786 individuals and utilized respondent's opinions to formulate our IRMP.

This IRMP is organized into several sections or chapters based on Team members comments and through the review of completed IRMP's from Red Lake, White Earth, Bad River, Lac Du Flambeau, and Leech Lake Indian Reservations. Our IRMP is split into the following sections: Environment, Cultural, Fisheries, Wild Rice and Native Plants, Wildlife, Forestry, Enforcement, Recreation, Economic Development, Soils, Water Quality, Roads/ Transportation, Land Acquisition, and Partnership- Education. The reader will find a goal and short introduction associated with each section. We've also assigned benchmarks, impacts of benchmarks and status for each section. While our IRMP does not follow a traditional National Environmental Policy Act format, we believe the obvious alternative for each action is no action at all. We spent several months compiling the benchmarks and appropriate, realistic timelines for completion of each task. A logical alternative for each action would be a delay of one year.

The IRMP Team has consisted of the following members:

Jason Ayres (Land Acquisition)
John Banuchie (Fire Management)
Jeanne Bouschor
Donald Carlson
Robert Curtis
Fred Dakota
Mike Donofrio (Fish and Recreation)
Mike Duschene
Todd Warner
Monique Fox
Carolee Dodge Francis (Consultant)
Violet Friisvall (Enforcement)
Dale Goodreau
Marc Slis (Water Quality and Wetlands)
Gene Mensch (Wildlife)
Eric Oliphant (Forestry and Chemicals)
Bruce Petersen (Soils)
Evelyn Ravindran (Plants)
Mike Sladewski (Air, Solid & Hazardous Waste & Storage Tanks)
Judy Smith
Pauline Spruce (Cultural)
Warren Swartz, Jr.
Paul Tesanovich
Dana Varney & Andy Solka (Mead Corp.)
Robert Voakes, Sr.
Duane Misegan
Jesse Luttenton

We believe this document should serve as a guidance tool for the Tribal Council and respective departments of the Keweenaw Bay Indian Community. We've tailored this plan to serve a ten-year period (2002-2012). We believe revision for the second IRMP should start in 2010, although annual review starting in 2004 would be valuable. A point of contact for comments on this document is the KBIC Natural Resources Department, HC01 Box 120, L'Anse, MI 49946 phone 906-524-5757. This document was revised in December of 2003.

Silver River Watershed Water-Quality Sampling 2445-00370

Objective: The purpose of this project is to gather baseline information on the quality of surface water in the Silver River watershed for Keweenaw Bay Indian Community (a federally recognized, Native American Indian Tribe, hereafter referred to as KBIC) in terms of general characteristics and contaminants. Little data about water quality of the river or its tributaries are known, and to the best of our knowledge, only limited studies of the river or its tributaries has ever been done. Data will establish a baseline of chemical and physical information. The results will be used to determine water quality management needs, develop a long-term monitoring plan, and assist in planning for future development.

The Silver River, which is comprised of five sub-basins, drains a sparsely populated highland area north and east of L'Anse. The Silver River watershed is relatively-high gradient and is located in an area that receives as much as 300 inches of snow during a typical winter. Snowmelt and precipitation runoff can be extreme.

The watershed is under some pressure as a result of residential development, albeit sparse, and is now the site of active metal exploration and test drilling. Sulphide ore deposits containing nickel, zinc, copper, and other base metals are thought to comprise the current exploration targets. KBIC wants to establish a baseline dataset of streamflow, physical parameters including dissolved oxygen, pH, temperature, and specific conductance, and chemical constituents including major ions, trace elements, nutrients, suspended and total solids, and cyanide.

FY2006 Statement of work: Work in FY2006 will consist of streamflow measurements, physical parameter measurements, and water-quality sampling at seven (or possibly eight) sites, including the current USGS Silver River gaging station 04043150. Three rounds of sampling are currently anticipated with two possible scenarios.

High-flow sampling will coincide with spring runoff, when little or no vegetation is present, and movement of sediment and chemical constituents into streams are greatest.

Low-flow sampling will coincide with baseflow conditions, typically occurring in mid- to late-summer. Terrestrial vegetation is greatest during this part of the year and most chemical constituents in streamflow in the smaller streams will be dissolved.

The third sampling will be completed either in late-spring or early summer, as terrestrial vegetation begins to effectively eliminate most sediment movement to the streams and dissolved constituents begin to comprise a greater percentage of material in the stream.

Alternately, a precipitation event could be sampled, pending the availability of USGS staff and timing and duration of the precipitation event. The unique feature of storm-event sampling is the ability to determine constituent input into streamflow during a time period when that input is typically somewhat stable. The resulting data can be compared and contrasted with results from spring high-flow and summer low-flow samples.

TABLE OF CONTENTS

ENVIRONMENTAL

Goal: Assure the public health and environmental quality of the natural resources of the Keweenaw Bay Indian Community ("KBIC").

BIOLOGICAL CONTROL CHEMICALS MANAGEMENT

Just as the KBIC share concerns about the future quality of life for its people and Tribal resources, it is concerned about the use of certain chemicals within its boundaries, and the impacts they can have on the environment. As modern day science provides new solutions to natural resource management problems, many are cost-effective solutions that include application of various types of chemicals, which include those classified as herbicides (vegetation management), pesticides (rodents), insecticides (insects), and fungicides (fungus).

Even though current Tribal management practices do not facilitate the use of chemicals, the possibility for future use is unknown. In anticipation of future use, it is important that procedures are developed to protect the natural resources when chemical use is deemed necessary, and methods are established to monitor environmental impacts of all chemical use that occurs within the boundaries of the Reservation. No management strategies are currently in place within the community to address this issue.

This section of the IRMP provides the framework to better protect the community and natural resources during chemical usage.

Benchmarks

Continue system of data collection on all general and restricted use agricultural chemicals sold or used within the Reservation boundaries.

- Staff is developing a quality assurance plan and standard operation procedures for monitoring and sampling for pesticides.
- Monitoring to improve the database on all general and restricted use agricultural chemicals sold or used within KBIC Reservation boundaries.

Enforce regulation of Chemical Control Code. Enforcement and court procedures will be developed to appropriately respond to violations.

Impacts of Benchmarks

This alternative provides increased data on the impact of pesticide use on the environment within the Reservation. The alternative does provide for the implementation and enforcement of the Keweenaw Bay Indian Community Chemical Control Code. The result is that the Tribe will be better informed about pesticide use on the Reservation. The code will also provide for on-site inspection of distributors and pesticide application sites such as: landowners, golf courses and private and public applicators.

STATUS

Developing guidelines concerning application of chemicals within the boundaries of the Keweenaw Bay Indian Community (including developing/studying other alternatives available, with chemical use to be considered a last resort).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓	✓	✓25%	2005	

Cooperatively working with outside experts to educate the Keweenaw Bay Indian Community about chemicals commonly used today.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%Chemical Application 0% Safe Handling 0% Funding Sources	Ongoing	

Identifying sources of chemical application and safe handling training and funding sources available to Tribal employees.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	33% (100% Chemical Application accomplished)	2004	

Developing monitoring program in cooperation with the KBIC Water Quality Department to evaluate effects upon KBIC water resources during chemical application projects currently occurring adjacent to KBIC lands.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		2005	

AIR QUALITY MANAGEMENT

With it's remote location, many assume that the Keweenaw Bay Indian Community's Reservation suffers little from the detrimental affects of poor regional air quality like an urban area might. Although this appears to be a logical conclusion, it is not yet backed up with scientific data. A full grasp of regional and global transport of pollutants is a science that has yet to be perfected.

The Michigan Department of Environmental Quality and US EPA have conducted only limited monitoring programs within the vicinity of the Reservation. With the highly industrialized areas of Duluth, MN, Superior WI, and Thunder Bay, Ontario located up wind from the Reservation; the potential for detrimental concentrations of air pollutants needs to be consistently examined.

Another problem experienced on the Reservation is the result of pollution emitted from local sources. Although current problems are relatively minimal when compared to other areas, the potential for more problems in the future does exist. The fact that KBIC does not yet have federally enforceable air quality standards in place, or the means to implement them, may worsen the situation.

Benchmarks

Cooperate with other agencies to conduct an inventory of, and resolve concerns with, air pollution sources both on and off the Reservation that affect Tribal members and resources.

- Monitor pollutants of concern, with a particular focus on obtaining background levels of the six EPA listed "criteria pollutants".
- Based upon these background levels, formulate air quality regulations for the Reservation, as needed.
- Monitor indoor air for pollutants affecting human health.

Provide community education and advice regarding air quality concerns.

Impacts of Benchmarks

An inventory of air pollution sources will help identify possible pollutants of concern to monitor.

Background concentrations of various pollutants are required before stricter air quality standards can be implemented.

With EPA approved standards in place, industries both on and off the Reservation will be required to ensure their emissions do not cause the KBIC standards to be exceeded.

STATUS

Inventorying major air pollution sources, both on and off Reservation, which effect Tribal lands, people, and resources.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	Yes, initial process

Drafting enforceable air quality regulations for the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			Ongoing	

Monitoring both Indoor and outdoor air for various pollutants of concern. (Heavy metals, wood stoves and pursue funding.)

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Providing community education and advice in regards to air quality concerns and/or remedies. (Written materials).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	Completed

Coordinating with US EPA, or other agencies, to resolve air quality concerns.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓ Relationship established		Ongoing	

HAZARDOUS WASTE MANAGEMENT

Hazardous wastes are substances that possess one or more of the four hazardous characteristics: ignitability, corrosivity, reactivity, and toxicity. All substances deemed hazardous are classified and regulated as such by the US EPA through the Resource, Conservation and Recovery Act (RCRA). Accordingly, the minimum rules and regulations for the manufacture, use, storage, and disposal of these substances are created and enforced by US EPA. Hazardous wastes most likely to affect the Reservation can be broken down into two categories: industrial and household hazardous wastes.

Industrial hazardous wastes entail a variety of substances used in many manufacturing facilities and small businesses located throughout the Reservation. The most current numbers from EPA indicate that there are 24 licensed hazardous waste generators on the L'Anse Reservation. These substances are tracked from cradle to grave, meaning a paperwork trail keeps track of the exact inventories, use, and consumption of these substances. Monitoring and enforcement is provided for in cooperation with US EPA and the Michigan Department of Environmental Quality.

Household hazardous wastes include substances such as cleaning solvents, motor oils, and batteries. Improper storage, use, and disposal of these products are the major source of hazardous waste pollution on the Reservation. Lack of a convenient and economical disposal method for these substances may lead to environmental problems associated with household hazardous wastes.

Benchmarks

Cooperate with other agencies in identifying and monitoring licensed hazardous material handlers on and near the Reservation.

Provide viable alternatives to current household hazardous waste disposal methods.

Provide community education in regards to disposal methods for common household hazardous wastes.

Impacts of Benchmarks

Monitoring commercial hazardous materials handlers will ensure that hazardous wastes are properly consumed, stored, and disposed of.

A convenient method to dispose of hazardous materials will prevent contamination of the Tribe's resources.

Community education will inform residents of the detrimental effects of improper hazardous materials disposal methods, and suggest environmentally friendly alternatives.

STATUS

Identifying and cataloging existing or potential hazardous waste sites.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Determining current and potential environmental risks at hazardous waste sites.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Providing a convenient and economical household hazardous waste disposal method.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	25	2004 Ongoing	

Coordinating with EPA and State of Michigan for inspection of suspect hazardous waste facilities on the Reservation (as needed).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing Annual	

Coordinating with Baraga County to ensure emergency response plans are both adequate and up to date.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%		Updated annually

Monitoring any hazardous waste clean-up projects undertaken by the State of Michigan. Developing an information and education program to increase KBIC Reservation resident's awareness of hazardous waste.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓			Ongoing

Providing community education in the proper disposal of household hazardous materials.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓	✓		2003/2004 - Education Plan Ongoing	

STORAGE TANKS MANAGEMENT

Storage tanks are any tanks used for the purpose of temporary or long-term storage of fuel products. These tanks can be located either above (AST) or below the ground surface (UST). Although tank design, installation, and leak detection methods have improved vastly in recent years, the potential to have a product leak still exists. Minimum regulations for the registration, design, installation, leak detection, corrosion protection, and maintenance of these tanks and associated piping are outlined in the Code of Federal Regulations and are enforced on the Reservation through cooperation with US EPA and the Michigan Department of Environmental Quality. EPA standards enacted in 1988 have forced owners of underground tanks to comply with higher tank and monitoring method requirements, such as the utilization of double walled tanks, and the presence of leak detection equipment between these two walls. The most current numbers from US EPA indicate that there are currently 19 registered storage tanks located within the L'Anse Reservation.

Benchmarks

Identify and assess all underground storage tanks with a capacity greater than 500 gallons, and above ground storage tanks with a capacity greater than 250 gallons, on or adjacent to the Reservation, and determine if they meet EPA standards.

Comply with federal regulations for the installation, maintenance, and closure of all regulated storage tanks. Coordinate with other agencies to ensure compliance to these regulations.

Periodically inspect storage tanks on the Reservation to ensure installation and maintenance methods comply with EPA regulations. Develop a Tribal program to oversee the clean up of leaking storage tank sites.

Impacts of Benchmarks

Information such as: the number, contents, composition and age of tanks, will be better known by the Tribe.

Compliance with EPA regulations is required under federal law. With Tribal staff properly trained, KBIC would have a person locally available for monitoring and enforcement activities, and would not be forced to rely on EPA staff located in Chicago for these activities.

STATUS

Identifying and assessing all above and underground storage tanks with 500-gallon capacity or more on or adjacent to the Reservation, and determining if they meet EPA standards.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100% Ongoing		Done for known tanks – EPA & DEQ. List available.

Benchmarks

Develop and implement a complete underground and above ground storage tank program. The main focus would be to develop guidelines for installation and monitoring. The program would include: storage tank selection and closure planning, soil and ground water monitoring, and tank certification. Records of daily storage tank activities would be obtained on a regular basis from storage tank operators.

Soil and water contamination monitoring would be coordinated with the Water Quality Manager and other Reservation personnel.

Impacts of Benchmarks

This Benchmark would provide for the regulation of installation and maintenance of UST's and AGST's on the Reservation by the Tribe. All monitoring and certification would be performed by Reservation personnel or contracted services.

STATUS

Developing and implementing Tribal regulations for the installation, maintenance, and closure of all regulated storage tanks.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓	✓	0% (Currently seeking funding)	2008	

Benchmark

Partner and coordinate with other agencies to assure compliance with EPA standards and regulations.

Impact of Benchmark

The Tribe would have input into the enforcement of existing regulations concerning storage tanks on the Reservation.

STATUS

Coordinating with US EPA for inspection and/or enforcement of suspect AST's and UST's on the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Provide related training to tank owners on/ near the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2005	

SOLID WASTE MANAGEMENT

As one of the most visible environmental problems, open dumping, is indeed a concern of KBIC members. Open dump cleanup programs and the annual bulk waste 'spring cleanup' have helped, but the issue continues to be a problem.

The most likely cause of this problem is the lack of a convenient, inexpensive solid waste disposal alternative for those dumping on the Reservation. In addition, a lack of solid waste management codes and enforcement options compound the issue.

Peninsula Sanitation maintains the nearest designated landfill, located in Greenland, MI, approximately 30 miles west of the Reservation. The nearest transfer station is located approximately 30 miles to the north in Houghton, MI. Curbside service does not exist for many on the Reservation. The residents must haul their own solid waste to designated dumpsters, with a fee per bag. There is no solid waste management plan for the Reservation.

Benchmarks

Develop a solid waste management plan for the Reservation.

- Continue to identify solid waste dumpsites within Reservation boundaries.
- Set priorities for clean up of solid waste dumpsites based on protection of public health and risk to environment.
- Assist with administration of the cleanup of solid waste dumpsites in cooperation with other organizations.

Develop enforceable Tribal solid waste management codes; improve procedures of prosecuting persons who illegally dump solid waste.

Conduct a feasibility study regarding more convenient and affordable recycling and solid waste disposal methods.

Develop an educational program that outlines proper recycling and solid waste disposal options and the detrimental effects of illegal dumping.

Impacts of Benchmarks

A solid waste management plan will allow KBIC to plan for present and future solid waste needs.

Identifying open dumps will allow KBIC to monitor these areas, increase enforcement, and assess the impacts these sites may have upon the environment. Cleanup priorities can then be focused upon sites with the greatest human and environmental health impacts.

Development of solid waste codes will give KBIC a legal basis to prosecute those who pollute Tribal lands, and may also help prevent the accumulation of things such as numerous abandoned cars, etc., on any one site.

A feasibility study will be a useful tool in prioritizing which solid waste disposal options to utilize in the future.

An educational program will help increase the awareness of both Tribal and non-Tribal members in regards to the environmental, economic, and social impacts of open dumping.

STATUS

Identifying all solid waste dump sites within Reservation boundaries.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	Ongoing Updated annually.	

Setting priorities for clean up of solid waste dumpsites based on protection of public health and risk to environment.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing - As funding permits	

Assisting with administration of the clean up of solid waste dumpsites in cooperation with other organizations.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%	Ongoing as funding permits	

Benchmark

Provide for the development and initiation of a solid waste clean-up program for the Reservation. This would include solid waste codes, affordable recycling and community education.

Impact of Benchmark

This Benchmark provides for the clean-up of illegal dumps throughout the Reservation.

STATUS

Developing enforceable Tribal solid waste management codes and improving procedures of prosecuting persons who illegally dump solid waste.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50	2005 Technical review/public forum	

Investigating the practicality of more convenient and affordable recycling and solid waste disposal methods.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%	2004	

Developing an educational program that outlines proper recycling and solid waste disposal options and the detrimental effects of illegal dumping.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	25%	2005 Ongoing	

CULTURAL

Goal: Protect cultural practices and resource sites on the Reservation and 1842 Ceded Territory.

CULTURAL RESOURCE MANAGEMENT

The Keweenaw Bay Indian Community includes the L'Anse and Ontonagon Indian Reservations, as well as other lands owned or held in trust within the western Upper Peninsula of Michigan.

KBIC maintains a strong bond with practices passed down from our Native American ancestors and the continuance of those traditions are a high priority for us. We aren't always aware of the cultural aspects of our day to day lives; but our culture, who we are, how we interact with others and where we originated, are reflected through our actions. These beliefs and practices may be termed as within ourselves or internal resources.

The obvious external cultural resources for KBIC are the burial grounds at Sand Point and traditional and modern cemeteries at Assinins and Indian Cemetery Road. Annual POW WOW activities, teachings and Harvest Feast are also demonstrations of our culture. However, our cultural sites exist at various other locations both on and off the reservation. These cultural sites may take many different forms such as gathering areas, fishing and hunting camps, wild rice beds, maple sugar bushes, cooking and living areas, etc. KBIC utilizes various cultural resources management techniques such as a Cultural Committee to inventory, monitor and handle situations which may harm or impact cultural resources.

Benchmark

Develop a database of known sites. Some limited protection efforts have been undertaken. No official regulatory authority has been assumed.

Impact of Benchmark

Information on known sites is being gathered in one central location. The issue of site protection has not been addressed.

Benchmark

Increase efforts to gather data on cultural site locations. Develop and implement Reservation Cultural Resource Protection Code. Hire Native American Graves Protection and Repatriation Act (NAGPRA) / Tribal Historic Preservation Office (THPO) Specialist to implement goals and objectives.

Impact of Benchmark

Provide staff to develop and implement a plan to protect and preserve cultural resources on the Keweenaw Bay Indian Reservation.

STATUS

Acquiring funding to hire a full-time NAGPRA/ THPO Specialist.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50	2004/Ongoing	

Developing a Federally approved Tribal Historic Preservation Office.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	30	2004/Ongoing	

Developing a Tribal Historic/ Cultural Preservation Plan for KBIC.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10	2004/Ongoing	

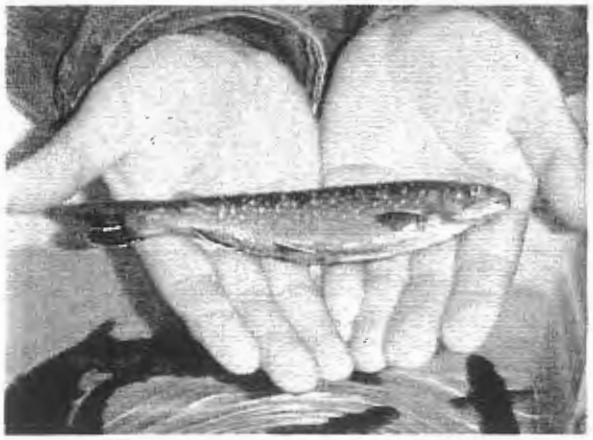
FISHERIES

Goal: Facilitate sustainable harvest of fisheries resources within Lake Superior and 1842 Ceded Territory for Tribal members.

FISHERIES RESOURCE MANAGEMENT

Our traditional territory is composed of several hundred inland lakes and thousands of miles of rivers, streams, and creeks. The area is also adjacent to Lake Superior and borders a few hundred miles of shoreline. The Keweenaw Bay Indian Community (KBIC) licenses 10 to 20 Tribal members who commercially fish the waters of Lake Superior and annually harvest 100-200,000 lbs of fish. Over 700 Tribal members are also annually licensed to harvest fish through subsistence and sport avenues in the western Upper Peninsula.

The fisheries of this region are diverse and contain the following major native species: lake trout, lake whitefish, lake herring, brook trout, lake sturgeon, walleye, northern pike, smallmouth bass, yellow perch, largemouth bass, bluegill, white crappie, black crappie, bullhead species. The following introduced species are also important resources: brown trout, rainbow trout, Chinook salmon, and coho salmon.



KBIC utilizes its Natural Resources Department to manage their hatchery. KBIC has operated a fish hatchery on the L'Anse Indian Reservation since 1989. That program expanded to its present location in Pequaming in 1993. This hatchery has 11 raceways in two buildings capable of rearing 100,000 lake and brook trout yearlings (7-8") annually. The hatchery receives its water source from 3 production wells capable of delivering 900 gallons per minute into the raceways.

The Keweenaw Bay Natural Resources Department (KBNRD") has utilized fishery assessments at several locations since 1989 to provide appropriate fishery recommendations to the Tribal Council. These assessments are supported by the Great Lakes Indian Fish and Wildlife Commission, U.S. Fish and Wildlife Service, Ottawa National Forest, and Michigan Department of Natural Resources. The Tribal Council has adopted three 5-year management plans (1990, 1995, 2000) to manage their Lake Superior commercial fisheries. The Council has adopted subsistence and sport fishing codes to regulate those interests as well.

The KBNRD has stocked western Upper Peninsula lakes and streams annually since 1990. The KBNRD staff have stocked over 1,000,000 lake trout yearlings (7-8") into Keweenaw and Huron Bays of Lake Superior, and have also stocked over 300,000 brook trout of various life history stages (fry to adult) into the Upper Peninsula

in cooperation with the U.S. Fish and Wildlife Service, Ottawa National Forest, and Michigan Department of Natural Resources.

KBIC has developed a wild brook trout strain from the Jumbo River in southern Houghton county. This river is a tributary to the east branch of the Ontonagon River. The Jumbo River trout were selected as a hardy native fish population. Broodstock or adult fish are kept and fingerlings (2-6") are also reared at our hatchery. KBIC obtains fertilized lake trout eggs that are reared to yearling size.

KBIC has provided an isolation hatchery arrangement for the U.S. Fish and Wildlife Service (Service) since 1995. We have raised and isolated wild strains of brook and lake trout for the Service through biennial agreements. These agreements protect the national fish hatchery system from potential wild fish diseases and genetically bolster the national hatchery system. Most recently, the Michigan Department of Natural Resources has also asked KBIC to isolate wild lake trout for their programs.

The Keweenaw Bay Indian Fish Hatchery is vital to providing a sustainable fishery for the sport and commercial interests of all those who enjoy and profit from the fishery. Without the capacity to produce adequate numbers of fingerling and yearling trout for stocking annually, KBIC is unable to protect its vested interest in the Upper Peninsula's fisheries. In addition, fishery assessments and regular reports to the Tribal Council ensure sustainable fisheries for all users.

Benchmarks

Stock annually 100,000 lake trout yearlings into Keweenaw and Huron Bays. Stock annually 40,000 brook trout fingerlings into western Upper Peninsula streams. Stock annually 50,000 walleye fingerlings into western Upper Peninsula inland lakes.

Develop biologically sound management plans for all 1842 ceded waters of Lake Superior and applicable inland lakes and streams by 2005 and 2010.

Conduct stream biological surveys on each watershed every 3-5 years. Conduct fishery surveys for lakes on the Reservation every 3-5 years. Coordinate off-Reservation stream and lake surveys with Ottawa National Forest, MDNR, USFWS, and related researchers.

Conduct annual assessments on Lake Superior according to the protocol outlined in the Great Lakes Fishery Commission's (GLFC) Lake Trout Restoration Plan. Conduct other Lake Superior assessments as dictated by GLFC Lake Superior Technical Committee.

- Gather periodic data from commercial fishermen to assist in management of that fishery.

- Maintain all fishery data into a computer database and compile applicable findings into annual reports.
- Improve and/or maintain fishery habitat for the benefit of native species.

Impacts of Benchmarks

Sustained stocking will yield more fish for the benefit of all concerned.

A 5-year biologically sound management plan for 1842 Ceded waters of Lake Superior in Michigan will enable the Tribal Council to maintain a sustainable fishery.

Lake Superior and Inland fishery assessments will document changes in fish communities and provide data for the Tribal Council to make better-informed decisions.

Catch report and monitoring data from commercial fishermen will enable the Council to make pertinent management decisions.

A computer database and reports will better inform the Council and Community on our fishery resources and other management activities.

Improved fish habitat will sustain native fish communities in the Lake Superior in Michigan region.

STATUS

Formulating and adopting 5-year management plans (2005 and 2010) for the 1842 ceded waters of Lake Superior in Michigan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100%	Ongoing	✓

Performing periodic biological surveys on watersheds impacting the Reservation and developing management plans addressing watershed needs.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		50% Developing Plans	Ongoing	✓

Stocking genetically diverse and disease free hatchery fish into water bodies as deemed appropriate by the management plans and agreements.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100%	Ongoing	

Assessing fishery stocks in Lake Superior in Michigan according to Great Lakes Fishery Commission protocols.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100% Yearly	Ongoing	

WILD RICE AND NATIVE PLANTS

Goal: Manage and expand Reservation wild rice stands and culturally significant plants to sustain the Anishinaabe lifeways of Tribal members.

WILD RICE AND NATIVE PLANTS MANAGEMENT

The Keweenaw Bay Indian Community's (KBIC's) gathering rights are protected under the Treaty of 1842. Tribal members wishing to exercise their Treaty rights near other Reservations obtain approval from that Reservation. Also, there is a memorandum of understanding between the Keweenaw Bay Indian Community and the Ottawa National Forest to facilitate gathering within the Ottawa National Forest boundaries. Pertinent Rules and regulations are updated yearly for protection and utilization of native plants.

Traditionally, gathering done by the Ojibwa people has been for food, ceremony, pharmaceutical, dyes, tools, construction, and basketry (White Earth IRMP, November 1994). New developments have resulted in many substitutes to replace these traditional native plants. However, many Ojibwa people continue to harvest and use native plants in the traditional manner.

Currently, some of the native plants are being used commercially or have the potential for commercial use. Many Tribal members harvest traditional foods for personal use, and, a few sell them; maple syrup, wild rice, and berries (blueberry, cranberry, and raspberry). Ojibwa woodland artwork utilizes many of the native plants; black ash, sweet grass, red willow, balsam needles, and birch bark are a few. Personal and commercial use comes from this art. Also, Christmas trees and balsam boughs are utilized by Tribal members.

The potential for expansion is being encouraged in several ways. The Tribe has started a business development program, hired an economic developer, and is committed to expanding its land base. Also, the Ojibwa Community College started small business classes in 2001 to help interested Tribal members.

Practitioners of traditional medicine are active on the Reservation. There are traditional medicine gatherers and a clinic that regularly visits the people of the Reservation. There are many native plants used for ceremonies by Tribal people. The Great Lakes Ojibwa are often called the "cedar people" for the significance this plant has in our lives. Some of the other sacred plants include; tobacco, sage, and sweet grass. However, the naming and identifying of harvest locations of medicines remains a very sensitive issue.

Identification of native plants is being facilitated in several ways. A guide was made by the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) to provide a scientific document for ethno-botanical use and gives a glimpse into the breadth and depth of Indian knowledge and use (Plants Used by The Great Lakes Ojibwa, 1993). 384 plants used by the Great Lakes Ojibwa are listed with some of their traditional uses, habitats, and descriptions, as well as their Anishinaabe and scientific names. GLIFWC provided this book, along with continuing technical assistance, to Keweenaw Bay Natural Resources Department (KBNRD). KBNRD has held two workshops for native plants; a wild rice workshop in 2001, a third wetlands workshop in August 2002, and a sensitive plant workshop in 2002. Also, in 2001, a two-year plant study was initiated on the Reservation. The plant study involved a plant inventory and interviews of Tribal members. This plant study will help KBNRD management by providing a list of native plants significant to this Tribe and identify sensitive areas on the Reservation that can be protected.

KBNRD uses material provided at technical meetings on exotic invasive plants and control methods. Also, GLIFWC provides funding, supplies, and technical assistance. In 1999, purple loosestrife was identified on the Reservation. In 2000, a purple loosestrife inventory was conducted on the Reservation with funding provided by GLIFWC. In 2001, a plan was initiated to control purple loosestrife thru a combination of manual picking and biological control by *Galerucella* beetle. GLIFWC has also provided KBNRD with herbicides but there is no plan of using these at this time.

There has been concern about disappearance, availability, and location of native plants on the L'Anse Indian Reservation. In 1991, the Keweenaw Bay Natural Resources Department (KBNRD) began to seed wild rice on three of its lakes. It was able to receive monies thru a Bureau of Indian Affairs sponsored cooperative program entitled "Circle of Flight" to do this. The Tribe has continued to receive money yearly from this program for seeding. KBNRD's two-fold objective through seeding is for waterfowl utilization and Tribal harvest. In 1999, Tribal members began wild rice harvesting. In 2001, Robillard Impoundment was created and seeded with wild rice.

Several times in the past, GLIFWC has brought over sweet grass plugs to be distributed to Tribal members to start gardens. In 2002, United States Department of Agriculture (USDA-NRCS) thru its Plant Science Center, initiated contact with the Tribe for the propagation of culturally and medicinally significant plants. An MOA was signed in 2002 (August 29th) to facilitate a working relationship between the two entities. USDA-NRCS is provided with a list of native plants desired by Tribal members and uses their resources to grow these plants to seedling size and bring them to the Reservation for propagation. Also,

the Keweenaw Bay Indian Community is working on starting community gardens.

KBIC recognizes the importance of maintaining a diversity of habitat in management in order to maintain a diverse supply of native plants. KBNRD continues to work with Tribal members, the Tribal Council, and multi-agencies in order to protect gathering capability for future generations of Tribal members.

Benchmarks

Develop an inventory of culturally significant plants on the Reservation.

Develop a culturally significant plant management plan.

- Create a list of culturally significant native plants, which Tribal members would like to have on the Reservation.
- Establish a source of culturally significant native plants from which Tribal members can take starter plants.
- Encourage native plant use among Tribal members, personal and business.
- Provide information on alternative medicinal practices and possibly establish regular clinic hours.

Impacts of Benchmarks

A collection of elder interviews about native plants has been gathered and preserved. These interviews served as a basis for a scientific survey of the Reservation for locations and quantities of culturally significant native plants. The survey was accomplished with the help of traditional medicinal Practitioners, G.L.I.F.W.C. guide, and Ojibwa Community College.

A management plan will be developed based on the findings of the native plants inventory. Also, on and off-Reservation management plans already in place (B.I.A. and U.S. Forest Service) will be respected and worked with.

Currently, many people may not know what is available on and off the Reservation. By making the management plans for native plants available to Tribal members, this will encourage usage by Tribal members.

Giving information on traditional medicinal practices would provide Tribal members with a valuable service. The establishment of regular clinic hours would be a convenience for Tribal members and allow more usage of this practice.

A sign-up list for native plants will be available to Tribal members on an annual basis.

Provide Tribal members with starter plugs of requested native plants that they can use to start their own patches. Starters can come from the Plant Science Center/USDA-NRCS, a future community garden to be established by the Keweenaw Bay Indian Community, or annual plant sales/distributions through the KBIC Tribal Conservation District.

STATUS

Inventorying culturally significant plants on the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%		Ongoing

Developing a culturally significant plant management plan for the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10%	2005	

Promoting native plant use on the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%		Ongoing

Benchmarks

Establish an inventory of exotic invasive plants on the Reservation.

Establish control plans to minimize exotic invasive plants on the Reservation.

Impacts of Benchmarks

Continued monitoring of purple loosestrife areas identified in KBNRD's purple loosestrife survey. Annual use of exotic invasive plant guide during established fieldwork season to identify new exotics.

Continue using control methods established by KBNRD with the help of the Great Lakes Indian, Fish & Wildlife Commission. Create control plans for exotic invasive plants with the technical support of the Great Lakes Indian, Fish & Wildlife Commission.

STATUS

Adapting existing control plans for exotic invasive plant species on the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10%	2004	

Benchmarks

Develop and establish a Wild Rice Plan that includes:

- Reseeding wild rice on selected areas.
- Conducting annual surveys of rice bed productivity and monitor wild rice lake and stream systems.

- Actively managing wild rice lakes to promote increased production. Develop a limited number of wild rice lake management plans to enhance the natural wild rice production while protecting the rice bed ecosystem.
- Constructing and maintaining water control structures on drainage affecting seasonal water levels and possibly utilizing aquatic weed harvester on a limited number of important wild rice beds.
- Improving access on selected lakes.
- Encouraging natural or human use processes to manage wild rice beds.

Impacts of Benchmarks

Reseeding of wild rice on selected areas would improve waterfowl habitat and give back to the Tribal members a culturally important crop.

Annual surveys of rice productivity and monitoring of lake and stream systems would give important background data, which can be used in formulating a management plan.

Through the use of our background data, technical assistance from the Great Lakes Indian, Fish & Wildlife Commission, and related scientific papers, management plans for inland and slough wild rice beds will be developed.

Seasonal manipulation of water control structures would allow water levels to be fluctuated. The use of an aquatic weed harvester would limit competition. These would help provide optimum growing habitat for wild rice.

On wild rice lakes where access is poor, man-made improvements will be constructed and maintained to allow accessibility to Tribal members while keeping in mind the importance of protection of the lake ecosystem. Improvements may consist of docks, limited clearing of trails and vegetation, and road improvements. Also, property access is obtained thru Tribal, Village, or Private entities.

On established wild rice beds, wildlife usage is documented in annual surveys. Nesting habitat is provided for waterfowl. Wild rice chiefs, appointed by the Tribal Council, coordinate and manage harvests, which will be beneficial to the wild rice ecosystem.

STATUS

Developing a wild rice management plan for the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%	2004	

Developing Community Farm/Gardens for education and plant preservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	5%	2004	

WILDLIFE

Goal: Maintain and/or increase biologically diverse wildlife populations on the Reservation and 1842 ceded territory, and provide sustainable harvests of game species for Tribal members.

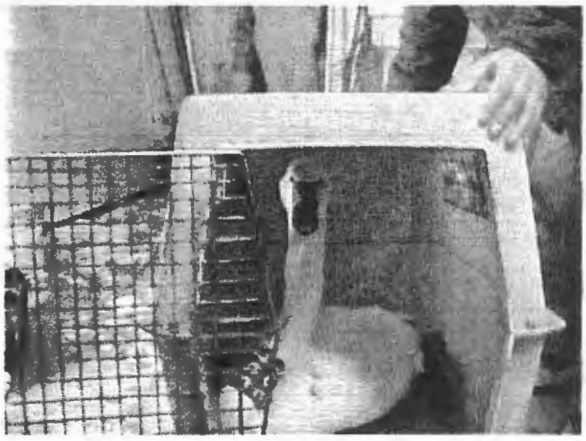
WILDLIFE MANAGEMENT

The traditional areas of the Keweenaw Bay Indian Community (KBIC) support a diverse variety of wildlife habitats and species. The Ojibwa people are committed to protecting the wildlife resources of the area, while simultaneously protecting and enhancing opportunities for Tribal members to exercise wildlife harvesting rights, as well as to observe and enjoy non-game wildlife species.

Over 700 Tribal members obtain annual licenses to hunt and trap game and furbearer species. KBNRD believes it is important to assess hunting and trapping activities of Tribal members in order to better manage the resource. Triennial deer/ bear hunting and furbearer trapping surveys are distributed to licensed Tribal hunters and trappers. The data collected from the surveys are used to estimate total hunting/ trapping effort and harvest and to document and assess concerns and comments from Tribal wildlife harvesters. These efforts will, in turn, assist KBNRD staff and Tribal leadership in updating Tribal hunting and trapping regulations to assure sustained harvest of wildlife.

In addition to game species management, the KBNRD is interested in developing a strategy to protect non-game wildlife species on and near the Reservation. The development of a protected animal ordinance for the Reservation, listing species recognized by the U.S. Fish and Wildlife Service as being threatened or endangered, will further protect sensitive species found in the Keweenaw Bay region.

The KBNRD works closely with the U.S Fish and Wildlife Service, the Michigan Department of Natural Resources, and the Ottawa National Forest (U.S. Forest Service) in monitoring populations of bald eagles, timber wolves, trumpeter swans, fisher, and other species on and near the Reservation.



Efforts in re-establishing populations of rare wildlife species that are or once were native to the region have been made by KBNRD in recent years as well. In particular, trumpeter swans have been reintroduced to waters on and near the Reservation, with assistance from the Bureau of Indian Affairs (BIA) "Circle of Flight" program. Survival and migratory behavior of KBNRD tagged swans has been monitored through radio-telemetric tracking and

observations by the public. The KBNRD will continue to study these birds and explore options for performing similar activities with other species in the future.

Surveying and managing waterfowl populations in the area has been a KBIC priority for over a decade. Funds from "Circle of Flight" are used to monitor and index waterfowl populations and migrations, construct, install and monitor nestboxes for wood ducks and other cavity nesting species, and plant wild rice for Tribal harvest as well as waterfowl forage. Additionally, KBNRD staff assists local and regional agencies (i.e. U.S. Fish and Wildlife Service, Michigan Department of Natural Resources, etc.) by performing surveys which focus on monitoring populations of non-game wildlife. Annual population surveys of sandhill cranes and amphibians are performed on and near the KBIC Reservation.

With growing concern over the potential impacts of diseases on local wildlife (and potentially human) populations, KBNRD has taken steps to assist other agencies (e.g., MDNR, GLIFWC) in monitoring for disease outbreaks in the western Upper Peninsula. In particular, whitetail deer samples have been collected on and near the KBIC Reservation to be tested for Chronic Wasting Disease (CWD). KBNRD staff anticipates expanding disease monitoring efforts in the future, and intends to continue cooperative efforts with other agencies in testing for CWD and other diseases of concern.

The KBNRD is involved with several projects that are aimed to protect, restore and maintain wildlife populations. All are important in strengthening the condition of wildlife populations, and will continue in the future with the sustained support of other agencies and the Ojibwa people.

Benchmarks

Wildlife management practices will continue to be coordinated by the KBNRD Program Director and staff, and in certain instances will be performed in cooperation with various state and federal agencies. Projects will include several aspects of wildlife management, including:

- Monitoring game populations
- Monitoring harvest levels
- Protecting threatened, endangered and culturally sensitive species
- Protecting and/or enhancing various wildlife habitats.

The KBNRD will continue to monitor game harvest through surveying Tribal hunting and trapping license holders triennially. Tribal members (hunters and trappers) will be asked additional questions regarding waterfowl, small game, non-game and/or culturally sensitive species. Various wildlife census surveys will be conducted and analyzed to monitor populations of both game and non-game species. These will include migratory bird surveys, nest box usage studies, and amphibian census. Data obtained from Tribal surveys and

KBNRD assessments will be used in updating Tribal hunting and trapping regulations, and will ultimately allow sustained harvest of game species.

Impacts of Benchmarks

Current KBNRD wildlife population census effort would be maintained, and information obtained from Tribal hunter and trapper surveys would cover a widened variety of wildlife management issues.

STATUS

Conducting periodic (triennial) wildlife, hunting and trapping mail-in surveys of Tribal members.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing 2004	

Updating hunting and trapping regulations to allow sustained harvest of game species.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing Annual	

Benchmark

The KBNRD will develop a protected animal ordinance for the Reservation, listing threatened and endangered species and detailing special management considerations for these organisms.

Impact of Benchmark

Managing wildlife populations on and near-Reservation would diversify and include aspects of maintaining safe harvest levels of game species as well as more closely monitoring and protecting non-game and/or culturally sensitive species.

STATUS

Developing a protected wildlife ordinance for the KBIC Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		2004	

Benchmark

Wetland acquisition, creation and/or restoration projects will continue to be implemented. Other habitat improvement efforts, including installing waterfowl nesting structures and seeding with wild rice and/or other natural and beneficial food sources will also continue.

Enhancement of upland game species habitats on and near the KBIC Reservation would also be implemented through selective timber harvesting, prescription burning regimes, creating food plots, etc.

Impacts of Benchmark

Wetland/waterfowl habitat creation and/or improvement projects would continue to expand, with 10-40 acres of wetlands created/improved and 3-12 nest boxes installed annually. Upland game species habitat enhancement projects would be initiated.

STATUS

Creating and enhancing wetland/waterfowl habitats.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Creating and enhancing upland game species habitats.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			Ongoing	

Benchmark

Wildlife disease monitoring efforts will be made on and near the KBIC Reservation. KBNRD will cooperate with other agencies in testing for diseases that have high potential to detrimentally impact local wildlife (and possibly human) populations.

Impact of Benchmark

Tribal wildlife management practices will be further broadened to encompass population health monitoring.

STATUS

Monitoring on and near Reservation wildlife for diseases.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing Annual	

WETLANDS

Goal: Protect wetlands from degradation within the Reservation.

WETLANDS MANAGEMENT

Wetlands are an integral part of a water resource because they often represent the transition from terrestrial to aquatic systems. "The U.S. Army Corps of Engineers Federal Register 1982 and the EPA [U.S. Environmental Protection Agency] Federal Register 1980 jointly define wetlands as: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (Corps of Engineers, Wetlands Delineation Manual). The Keweenaw Bay Indian Community is drained by several creeks and drainage ditches, which flow to Keweenaw and Huron Bays. The approximately 3,000 acres of wetlands consist of numerous small wetlands, pond edges and lake borders in the community. The wetlands on the Reservation have been identified and delineated in a management plan drafted by Scott Wieting (Inter-Tribal Council of Michigan). The Keweenaw Bay Indian Community and adjoining stakeholders must monitor for further degradation of their wetland areas, as well as adopt an appropriate management plan.

Benchmark

Current plans include continuation of wildlife population monitoring, wetland acquisition, and habitat restoration and improvement projects. The main emphasis will be on wetland dependent species.

Consideration for wetlands will be incorporated into all forestry and agriculture management plans.

Impact of Benchmarks

Waterfowl population census activities will remain at current levels.

STATUS

Developing a mitigation policy that is more stringent than those established by the state and federal governments.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2006	

Establishing a strong Tribal policy that monitors wetland mitigation for compliance with applicable regulations and the achievement of the objectives within the approved mitigation plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2006	

Establishing a specific Tribal designation which offers heightened protection of wetlands that harbor rare or endangered species, or provides crucial habitat for culturally important and/or endangered species, or provides crucial habitat for culturally important and/or endangered and threatened species.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2006	

Benchmark

Wetland acquisition, restoration, and creation efforts would be greatly expanded and increased emphasis would be placed on inventorying and monitoring wetlands within the Reservation.

Impacts of Benchmarks

Wetland restoration projects would be increased to provide up to 100 acres per year of additional wetlands.

These activities would greatly enhance productivity and abundance of wetland wildlife species on the Reservation. The establishment of special management will allow for more efficient restoration and maintenance activities. Rare and unique wetlands would be protected.

STATUS

Inventory wetlands for exotic species and develop a management plan to address the proliferation of these nuisance species if determined to be necessary.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2006	

Developing site-specific wetland quality criteria for use in the evaluation, monitoring and managing of wetlands.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2006	

FORESTRY

Goal: Insure sustainable utilization of all timber and non-timber forest resources for Tribal members, and continue sustainability for forest health, timber quality, and forest diversity while protecting water resources, wildlife habitat, and culturally sensitive areas on the Reservation.

FORESTRY MANAGEMENT

Located within the north-central region of Michigan's Upper Peninsula, the Keweenaw Bay Indian Community is composed of a variety of forest cover types and tree species. The primary type is Northern Hardwoods, with mixed aspen cover types second. The forest is currently made up of trees all about the same age, since most timber stands originated around 1930. This was a period of time in which the Reservation experienced heavy logging, followed by broad, intense wildfires.

Through the use of sustainable forest management methods, future KBIC generations can be guaranteed excellent forest health, timber quality, and forest diversity while protecting water resources, wildlife habitat, and culturally sensitive areas on the Reservation. KBIC has taken the first step in this process, by developing a Forest Management Plan (FMP) in 1997, which has identified the proper measures to be taken while managing the Tribal forest. By building upon the methodology established in the FMP, KBIC Natural Resource managers with the Tribal Council can continue to work toward objectives that will meet the goal of the Tribe's future forest resources.

Benchmark

Harvest timber under sustained yield and even flow management. Inventory and maintain database on approximately 14,000 acres of forest land. Develop annual harvest plans and forest development projects. Prepare timber sales and develop silvi-cultural plans for timber stands. Administer and supervise time sale and forest development contracts. Collect stumpage payments and scale forest products. Provide administration for fuelwood permits and investigate timber trespass cases. Provide secondary wildfire suppression response to the local DNR Forestry office. Continue coordination of wildlife habitat management with Natural Resources Committee and Reservation wildlife biologist.

Impact of Benchmark

Benchmark provides for the general administration of sustained yield management for the Reservation forests.

STATUS

Protecting and enhancing the health, productivity, quality, and diversity of the Tribal forest ecosystem.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100%		✓

Identifying and protecting all "sensitive" areas (i.e., cultural resources, threatened and endangered plant and animal species habitats within designated timber management areas).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%	2004	

Producing revenue and employment opportunities for Tribal members through the harvesting and utilization of forest products.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Protecting water resources through the implementation of Best Management Practices for harvesting operations and road development.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100%	1997 Reference Plan	✓ (Plan on file)

Identifying and protecting forest areas with recreational opportunities.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	25%	2005	

FIRE MANAGEMENT

The Keweenaw Bay Indian Community's Tribal forest resource appears to consist of one that apparently is absent of all fire activity. This is not true, since a closer examination of any stand on the Reservation would reveal that fire has played an important role in the development of today's forest. It has only been over the last 50-60 years that fire has been aggressively suppressed from the natural landscape. Pre-settlement forests were dynamic ecosystems where succession was periodically set back by fire and windstorms. In addition, Native Americans were frequently the ones starting some of these fires in areas where they wanted to manage for favorable vegetation types.

Today, the Reservation consists of only a small amount of fire-related forest cover-types. Since the advent of a successful fire prevention campaign, much of the Tribal forest has had an increase in the amount of "climax" tree species such as Sugar maple, and Hemlock. At the same time, the Reservation has seen a decrease in the amount of successful regeneration of fire-related tree species such as Jack Pine, Red Pine, and Paper Birch. It is now to the point that if a fire were to occur in the Tribal hardwood forest, catastrophic stand losses would result.

The Bureau of Indian Affairs is responsible for wildland fire control on the Trust lands on the L'Anse Reservation. The BIA provides funding for the maintenance of a "Cooperative Agreement" with the Michigan Department of Natural Resources, for the initial protection of all Indian Trust lands within the state, and all associated fire suppression activities and costs undertaken by the MDNR when fires do occur. In addition, the Keweenaw Bay Tribal Council has taken steps forward to create a "Tribal Wildland Firefighting Crew", consisting of members of the Keweenaw Bay Indian Community, who will provide support for fire fighting activities on and off of the Reservation.

Current Fire Management Plans do not address any type of prescribed burning as a management tool. Other miscellaneous burning of debris (burn-barrels, brush piles, etc.) are covered under the "KBIC Burn Permitting Policy". As implementation of the new "National Fire Plan" gets underway, there will be new and expanded opportunities for the Tribe to incorporate fire as a management tool on the Reservation.

Benchmarks

Develop a "Fire Management Plan" for the Keweenaw Bay Indian Community. This will include, but not be limited to: prescribed burning, debris burning, and hazardous fuels reduction. The Plan must meet the criteria established by the National Interagency Fire Center (NIFC) to access fire management program funds annually.

Continue supporting the actions of the KBIC Tribal Council in the development of a Tribal Wildland Firefighting Crew. This will require development of training schedules, physical

fitness testing, equipment acquisition and storage, and meeting national qualifications for firefighting resources. The Tribe should decide what "scale" they want to fight fire (i.e., Type 1 or 2 crew, single resources, Type 6 engine, etc.). Once this is in place, the Tribe will have the support needed to implement other fire management activities on and off of the Reservation.

Impacts of Benchmarks

Continued support of the benchmark, identified above, will allow the KBIC to be more self-sufficient in the decisions it makes when utilizing fire as a management tool on the Reservation, by having the technical, staffing, equipment, and technical and monetary support it is currently lacking in the area of fire use. This is a direction the Tribe has been very interested in going towards, since fire has been historically used by Native Americans for generations. This is reflected in the community's heightened interest in conducting such activities as gathering of food and medicinal plants, on and off of the Reservation.

STATUS

Developing a Fire Management Plan for the Keweenaw Bay Indian Community

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10	2004	

Developing a "Keweenaw Bay Wildland Fire Crew".

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	75%		Ongoing

ENFORCEMENT

Goal: Enhance the regulation, compliance and enforcement policies of KBIC to protect the natural resources of the Reservation and traditional Anishinaabe lifeways.

ENFORCEMENT MANAGEMENT

The territorial jurisdiction of the Keweenaw Bay Indian Community (KBIC) includes all lands within the exterior boundaries of the L'Anse Federal Indian Reservation and all lands held in trust for the Tribe by the United States of America. Further, the KBIC is what is commonly referred to as a Treaty Tribe, meaning that the Tribe has retained certain rights within a particular territory that may be exercised and regulated by the Tribe. Pursuant to the Treaties of 1842 and 1854 with the Lake Superior Chippewa, the Tribe retains territorial jurisdiction over all ceded territory, as defined by this Treaty, that is traditionally the territory of the KBIC for the purposes of hunting, fishing, trapping and gathering. The KBIC exercises civil jurisdiction over all actions which arise where personal jurisdiction is held over one party and arise within the territorial jurisdiction of the Court. Civil jurisdiction over non-Indians is a complex issue. In U.S. v. Montana, the United States Supreme Court announced a general rule that, in the absence of a specific delegation of Tribal authority by Treaty or statute, Indian Tribes lack civil authority over the conduct of non-members on non-Indian land within a Reservation with two exceptions. First, a Tribe may regulate through taxation, licensing, or other means, the activities of non-members who enter consensual relationships with the Tribe or its members such as commercial dealings, contracts, leases, and other arrangements. Secondly, Tribes also retain inherent power to exercise civil authority over the conduct of non-Indians on fee lands within its Reservation when that conduct threatens or has some direct effect on the political integrity, the economic security, or the health and welfare of the Tribe.

Unquestionably, the Keweenaw Bay Indian Community has an inherent interest in the protection and promotion of the health, safety and welfare of its people. The KBIC is concerned with the development and implementation of laws and regulations that protect Tribal resources and the quality of life for future generations. KBIC considers it unconditional that the L'Anse Federal Indian Reservation and the lands created by the Treaty of 1842 are forever the territory of the Keweenaw Bay Indian Community, and, an adulteration of this environment or an ungoverned use of its resources has the potential to cause serious harm to the Tribe.

KBIC holds the authority to regulate, advise, and consult non-Indian entities to protect Tribal resources, as well as the absolute authority to regulate Indians within the same.

Benchmarks

Continued development, implementation and enforcement of the following codes:

1. Environmental Health
2. Pesticide Control
3. Water Quality
4. Wetlands Protection
5. Solid Waste
6. Lakeshore Protection and Sediment control/ erosion
7. Underground and Above-Ground Storage Tank Rules & Regulations
8. Air Quality
9. Water and Sewer
10. Land Use Permitting
11. Fish, Wildlife and Plants (Conservation Enforcement)

Impacts of Benchmarks

Streamline of permitting and regulatory processes

Protect resources that are culturally, environmentally or historically sensitive.

Ensures, through regulation, that Tribal resources are available for future generations.

Promotes and preserves, through regulation, the unique Indian character that is the identity and culture of the L'Anse Indian Reservation as the Tribe's permanent homeland.

STATUS

Reviewing Tribal code and regulations annually to protect the Natural Resources of KBIC.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Developing new environmental protection codes.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Establishing a Tribal Conservation District within the L'Anse Indian Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100%		2002

Establishing land use management ordinances.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		2004	

Expanding upon rules and regulations within the Conservation Enforcement Code, in conjunction with Tribal attorneys, Tribal Court, Natural Resources Committee and the Tribal Council.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		Annual	Ongoing	

RECREATION

Goal: Establish a recreation and tourism program that both supports economic growth and development on the L'Anse Indian Reservation and protects the integrity of the culture and tradition of the Anishinaabe lifeways of KBIC.

RECREATION MANAGEMENT

KBIC's most valuable assets are the recreational opportunities we enjoy in this remote area along Lake Superior. Tribal members participate in various recreational activities including: hunting, fishing, hiking, swimming, boating, skiing, and snowmobiling in the western Upper Peninsula. Other areas are managed cooperatively such as cross ski trails around the Pinery Lakes and snowmobile trails.

One of our most important recreational features is Sand Point. This area contains a marina, campground, lighthouse, beaches, watercross ponds, wild rice beds, and burial grounds. Unfortunately, over 2 miles of beach frontage contains stamp sand from a 20th century copper stamping mill that was located in Keweenaw Bay. In 2001, we received an EPA grant to focus on the assessment of those sands and further development of that property recreational utilization.

The existence of our Casinos and Sand Point require that we promote tourism to support our businesses. We should maintain our involvement in the Baraga County Tourist Association. The management of recreational activities involves a proper balance of resources to the benefit of all user groups.

Benchmarks

Protection and development of recreational opportunities on and off the L'Anse Reservation

Inventory and develop plans for all recreational areas

Hire adequate staff to properly maintain and market our recreation resources

Impacts of Benchmarks-

Sustained use of recreational opportunities

Increased tourism and profitability of Tribal businesses

A better quality of life associated with relaxation and enjoyment of our environment

STATUS

Establishing a Recreation/Tourism task force/committee/board to advise and oversee activities related to recreation and tourism.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2005	

Collaborating with village, township, and county agencies and organizations to incorporate Tribal plans with non-Tribal planning processes.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓ - Not formally		Ongoing	

Assessing recreational opportunities on the Reservation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10%		

Developing a tourism marketing plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2010	

Developing a recreation plan for the Reservation, including areas for development such as Sand Point.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%	2005	

Collaborating with regional organizations and agencies that promote and develop recreation/tourism activities.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓ - Need plan	20%	Ongoing	

ECONOMIC DEVELOPMENT

Goal: Establish a Comprehensive Economic Development Strategy for KBIC that fosters diversified economic growth and security, supports Tribal member employment and Tribal enterprise expansion, and strengthens Tribal sovereignty.

Economic Development Management

IN January 2001, the Tribal Council created the Office of Planning and Development to foster economic growth on the Reservation. The first of two goals of KBIC's economic development efforts is to improve the economic situation of Tribal members and their families. The first goal focuses on the well-being of the individual Tribal member by increasing employment opportunities through job training, job retention and job development. The success of this goal can be measured through employment/ unemployment statistics, the number of training opportunities and programs available to the Community, and the number of new businesses on the Reservation. KBIC's second economic development goal is to enhance the Tribal Community's quality of life by focusing on the prosperity and livability of the Community for the benefit of existing Tribal members and for the next 7 generations. The goal focuses on rebuilding the Community's social fabric through economic development, including the appearance, safety, networks, public places and the sense of a positive momentum within the Community as a whole. The success of this goal, more difficult to measure, will be evident through assessment of the continual, visible changes that make the Community a better place to live through programs, services, perceptions and assets that enhance the Community.

Benchmark- Development of the business infrastructure necessary to attract development to the L'Anse Reservation, while supporting economic growth, diversification and sustainability for KBIC. The business infrastructure includes the development of commercial/ business codes and ordinances, oversight, zoning, environmental regulations, model lease agreements and a dispute resolution procedure that provide supporting incentives to attract business, industry and manufacturing initiatives to the Reservation, therefore creating employment opportunities for Tribal members and their families.

Impacts of Benchmark

Implementation of the business infrastructure will establish, as identified in the plan, a planning and development committee to advise economic planning and development activities. This committee will bring expertise and focus necessary for the creation of a business atmosphere conducive to economic growth, diversification and sustainability. This committee will play an integral role in the development of an economic development strategy, as well as the implementation of the business infrastructure critical for economic expansion.

STATUS

Establishing a planning and development committee/board to advise and oversee economic development activities.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10%	2004	

Developing a Comprehensive Economic Development Strategy (CEDS), and develop the necessary legal documentation for Tribal, non-Tribal and government business/industry to locate on the Reservation (including codes, ordinances, dispute resolution agreement and model lease agreements).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10%	2005	

Establishing a small business development program, along with a Tribal Business Information Center (TBIC).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	20%	2005	

Expanding or enhancing Tribal-owned businesses and enterprises.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Developing a revolving loan fund for new and expanding businesses locating in the Ojibwa Industrial Park.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓		10%	2006	

Providing opportunities for job training for Tribal members in collaboration with Ojibwa Community College and local business/industry.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓		10%	Ongoing	

Collaborating with local, county, state, and regional ED agencies and organizations.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	40%	Ongoing	

SOILS

Goal: Maintain and/or improve the Reservation's soil resources.

SOILS MANAGEMENT

The soil resources found on the Keweenaw Bay Indian Reservation, as well as other KBIC land holdings, will have to provide the community with a number of things well in to the future. By keeping soil erosion in check, soil productivity will be sustained and food and fiber can continue to be produced on Tribally controlled lands by many generations of Tribal members well in to the future. Also, by keeping soil erosion at a minimum, sand and sediment will be greatly reduced in the adjoining creeks and streams thus greatly benefiting fish populations.

Proper building site selection is very dependent on soils limitations. Building foundation stability, sanitary facilities (such as septic tanks and associated drain fields), dwellings with and without basements, small commercial building loading, local roads and streets, lawns and landscaping are all heavily impacted by soils found on-site. Soils affect the kind and amount of vegetation that is available to wildlife for food and cover. They also affect the construction of water impoundments used by wildlife. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created, diversified and improved by planting appropriate vegetation, by maintaining existing plant cover, or by promoting the natural establishment of desirable plant species. Soils limitations should be considered when planning parks, wildlife refuges, nature study areas like Mud Lakes, and other developments for wildlife. By selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of the management needed for each element of the habitat more game and non-game numbers and diversity will result.

The Baraga County Soil Survey, addressing the KBIC Reservation in Baraga County was issued in 1988, has approximately 127 different soil types identified within it. A County-wide soil survey is made by a team of Soil Scientists. They walk over the land and examine the soil with an auger to a depth of five feet. As the Soil Scientist examines each auger full of soil, the Scientist records the properties that affect the use and management of that respective soil. After determining the extent and area of a specific soil, the Soil Scientist marks its exact location on an aerial photograph. When all the soils are mapped in this fashion and their properties are described, the maps and other technical

information are assembled into a publication called the Soil Survey.

The soils found on the KBIC Reservation, as well as on the other Tribal holdings in both Marquette and Ontonagon Counties, range widely in texture, natural drainage, slope, and other characteristics. Generally, soils with steep slopes, droughtiness and poor drainage properties are best suited to woodland and wildlife pursuits. Subsoil in these landholdings that are classified as moderately well drained usually have a restrictive layer that limits the use of forest equipment and makes residential development more costly

On the Keweenaw Bay Indian Reservation located on either side of Keweenaw Bay there are various kinds of soils found in close proximity/association with one another. About 20% of the Baraga County soil survey area is made up of poorly drained mineral soils and very poorly drained organic soils. There are five of these associations found on the Reservation according to the Baraga Soil Survey - "General Soils Map". The first association is the Munising - Yalmer association. These soils are found in nearly level to rolling areas. They are deep, moderately well drained, sandy soils on till plains and moraines. Another association of soils is the Kalkaska–Keweenaw soils. These soils are found in areas that are nearly level to steep in grade. They are deep, well drained to somewhat excessively well drained sands. Generally, this soil association is found on till plains, moraines, and outwash plains. The third association involves the Skanee–Munising–Gay soils. They are found in nearly level to undulating topography. They are deep, moderately well drained to somewhat poorly drained sandy and loamy soils on till plains. The next association is the Kinross–AuGres–Croswell soils that are found in nearly level areas. These soils are deep, poorly drained to moderately well drained sandy soils on outwash plains, lake plains, and till plains. The fifth association is the Munising–Yalmer–Keweenaw soils. These soils are found in nearly level to very steep areas. They are all deep, moderately well and well drained sandy soils on dissected till plains.

There are also areas found on the Reservation that are called "man made" soils. These soil survey mapping units consist of heavily disturbed soils located in construction areas. Due to this reworking and the human intervention of a natural soil site, the Soil Scientists could not classify these soils down to a named soil series level.

Baraga County and the KBIC Indian Reservation, found on both sides of Keweenaw Bay, were soil surveyed by the USDA–NRCS, Natural Resources Conservation Service. This published Soil Survey is not presently available in a digital format that meets SSURGO (Soil Survey Geographic Data Base standards). The USDA-NRCS will only release to the public this level of accuracy in their digitized soil surveys. This high level of accuracy would be useful when examining areas down to 10 to fifteen acres for specific soils limitations.

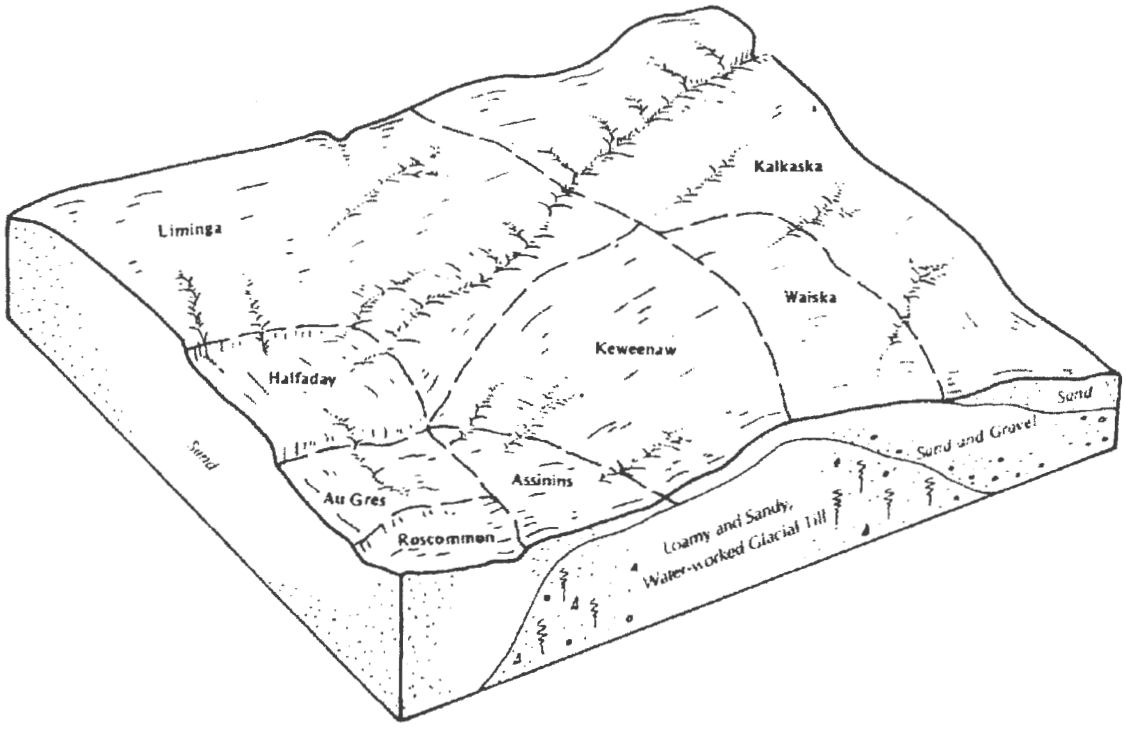
Presently, soils within Baraga County are only available in a GIS format through the Michigan Department of Natural Resources, Michigan Resource Information System known as the MIRIS system. This level of informational accuracy should only be used as a general reference at a watershed or township sized scale. Within three to five years the Baraga County Soil Survey will be digitized to a SSURGO level standard so soils series and their associated limitations

can be identified down to a much smaller scale.

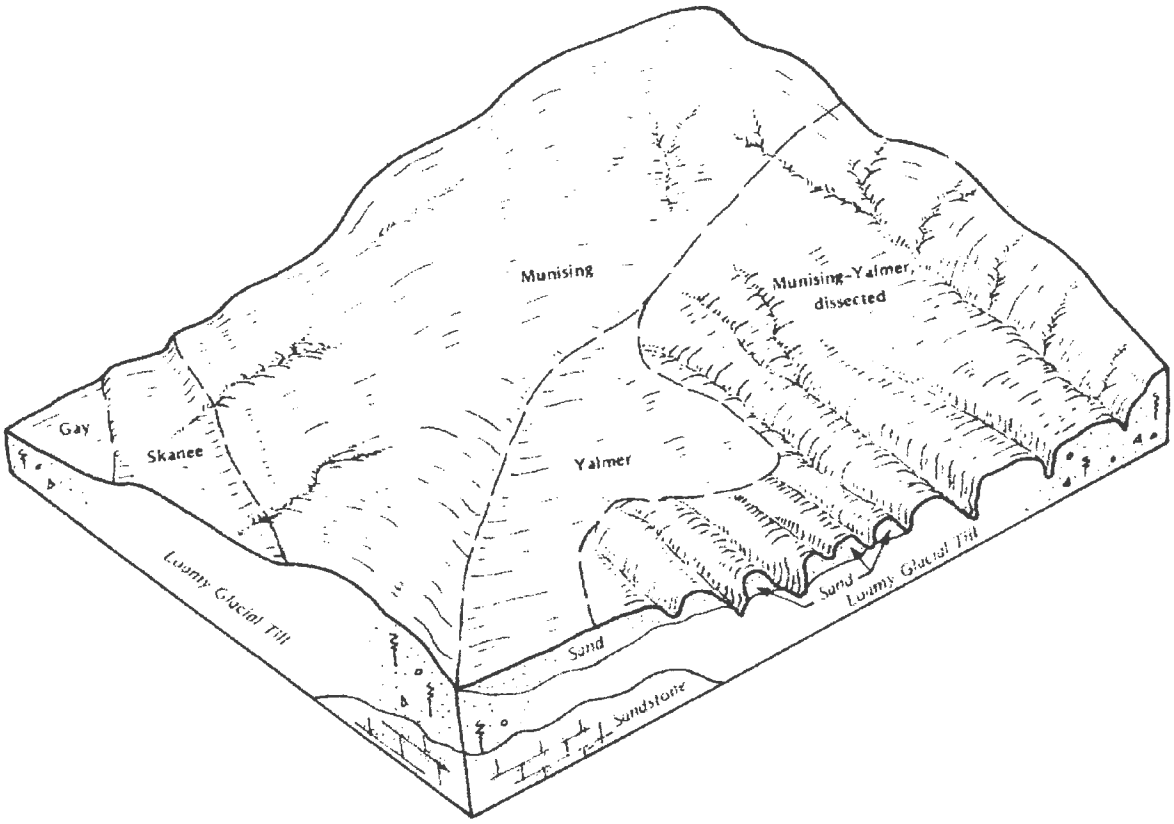
The soils found in the Ontonagon Reservation found near Fourteen Mile Point have not been mapped by the USDA as of this writing. According to the Ontonagon County Soil Survey Crew, based on mapping in adjoining area, they predict that there are dense lake till soils with silty loam and loamy surface textures found in this area. These soils are moderately well to somewhat poorly drained and are found on relatively flat slopes. A Watton Soil Series that is mapped in Houghton County closely resembles the kinds of soils found in this area of Ontonagon County.

AT the Marquette County KBIC Tribal land holdings, a soils series known as Deer Park has been mapped by the USDA Marquette County Soil Survey Crew. The Deer Park Soil Series is an excessively drained sand found on older beach ridges and dunes that have over time been stabilized by vegetation. This kind of very sandy soil is usually found in close proximity to Lake Superior. This Deer Park mapping unit, found at this site, has been designated as having a slopes of 1 to 10%.

An up-to-date soils knowledge is very important when managing Tribal natural resources, pursuing community economic development, or enhancing wildlife numbers and species diversity. The use of a Soil Survey can be of great assistance in the making educated land use decisions. Everyday people make decisions on how to use the land. Each of us is affected directly or indirectly by those decisions. Some are good – others are not.



–Typical pattern of soils and parent material in the Kalkaska-Liminga-Waiska association.



Typical pattern of soils and parent material in the Munising-Yalmer association.

Benchmarks

Coordinate with the USDA – NRCS so a SSURGO level standard, soil survey GIS layer, digital line graph can be produced using existing county-wide mapping for the Reservation and adjacent properties, as well as the other KBIC land holdings.

Develop, enact and enforce a Tribal sediment/erosion control code/ordinance that addresses new construction and land disturbances within the Reservation that could potentially pose a sediment runoff/water pollution problem to both the lands and surface waters of the Reservation.

Input culturally significant plant sites on to soils maps so potential future planting sites for the various plant species can be identified.

Actively apply relevant soils information to all resource planning, economic undertakings and wildlife endeavors undertaken on the Reservation, as well as other KBIC land holdings.

Impacts of the Benchmark

Utilizing a SSURGO level GIS layer the KBNRD plus the other KB Departments, as well as the Tribal Council, will be much better informed about the natural resource conditions that exist on the Reservation. This updated soils layer can supply needed resource information that can be used to improve all the future KB land use decisions.

Once the sediment control/erosion ordinance is empowered on the Reservation, both existing and future water quality problems can be addressed jurisdictionally should voluntary solutions not be successful. The enforcement of this code should benefit the surface water quality found throughout the Reservation.

By having culturally significant plants identified and located on soil survey maps of the Reservation future planting sites can be identified and the possibility of a successful plant establishment can be enhanced.

STATUS

Developing and enforcing wind and water erosion standards that are protective of both Treaty and subsistence usage.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2005	

Procuring a computer digitized soil map of the Reservation and adjacent areas utilizing the published Baraga County Soil Survey.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	2003	

Inventorying and evaluating the 95-acre Sand Point stamp sand site and seek alternative solutions for it's future remediation.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	90%	2004	

WATER QUALITY

Goal: Ensure that all Reservation surface waters are fishable, swimmable, and drinkable in accordance with the EPA Clean Water Act, and Tribal water quality standards; and protect the quality and quantity of groundwater resources for Tribal members.

WATER QUALITY MANAGEMENT

The L'Anse Reservation is located in Baraga County in the northwestern part of Michigan's Upper Peninsula at the southern end of Keweenaw Bay. The Reservation consists of 70,327 contiguous acres which includes approximately 17 miles of Lake Superior shoreline, 80 miles of streams and rivers, 15,000 acres of lakes and 3,000 acres of wetland.

Tribal members expressed, through responses to an IRMP survey, that protection of water quality should be the top priority of the Keweenaw Bay Indian Community. The surface waters within and bordering the Reservation are critical to both human and environmental health. Surface water is the main drinking water source for much of the Community, including citizens in the neighboring villages of Zeba, L'Anse and Baraga. The continuation of commercial and sport fishing, wild rice harvesting, ceremonial/ cultural uses, and other forms of recreation (swimming, boating, etc.) are also dependent upon the quality of these surface waters

A comprehensive program of monitoring and management of this important resource will insure the quality of the water for future generations. The KBIC Natural Resources Department has begun an EPA Clean Water Act program, under Section 106, to develop tailored water quality standards for the Reservation. Surface Water Monitoring of lakes, rivers and streams throughout the Reservation (beginning in 1999) to obtain baseline data has been implemented. A US Geographical Survey (USGS) gaging station has been installed in the Silver River to constantly monitor flow and temperature on a real-time basis. This will provide valuable hydrologic information for KBIC in addition to the current monitoring taking place. KBIC has collected physical, chemical, and biological data on many sites since implementation. Analysis of this baseline data will be used to set our Water Quality Standards. These standards are necessary to insure the health of our water resources for future generations.

The Reservation also contains approximately 800 private wells that area residents depend upon for their drinking water supply. Some of the wells obtain water from a glacial-drift aquifer and the others from an older bedrock aquifer (Doonan and Byerlay, 1973.). Another part of the EPA 106 plan & BIA water resources program is

the development of an aquifer ground water flow model. John Gierke, (professor, Department of Geological Engineering & Sciences at Michigan Technological University) is the consultant for this project. This model will simulate the subsurface flow of water in the Zeba Creek and Silver River Watersheds.

Source Water Assessments and the consequent Source Water Protection Plans (SWPP) have been completed for all public water supply sources of concern on the Reservation. This will further insure the protection of groundwater and surface water resources on the Reservation. Wastewater management would insure protection of human health and environment for Tribal members. EPA and Indian Health Service assist in proper management of wastewater through technical assistance and funding for individual septic systems, as well as public utility collection systems in L'Anse and Baraga. KBIC is a joint owner of the Baraga Wastewater System.

The Natural Resources Department began an EPA 106 program to set tailored water quality standards for the Reservation. A monitoring program of lakes, rivers, and streams to obtain baseline data has been implemented in the Reservation area. Analysis of this data will be used to set the Water Quality Standards. Testing of well water quality is also part of this program and will lead to the development of source water assessment and protection plans. These plans will further protect the drinking water resources of the L'Anse Reservation. Watershed inventories are also included in the objectives.

Benchmarks

Surface Water: The Keweenaw Bay Natural Resources Water Quality staff began collecting and testing surface water samples under the EPA 106 program in 1999. Samples will continue to be collected annually through 2004. These monitoring results will be used to develop specific Water Quality Standards for the Keweenaw Bay Indian Community. Draft Water Quality Standards have already been completed and final implementation is planned to take place by 2005. The Silver River gaging station will continue to be maintained by USGS as they deem necessary, but will give KBIC much needed hydrologic information. Wastewater management will be implemented as needed with assistance from EPA and Indian Health Service.

Ground Water: John Gierke from Michigan Technological University began aquifer studies in 1999 for KBIC. He has finished studies on the Daults, Denomie, and Zeba Creek watersheds and will be completing the Silver River Watershed in 2003. KBNRD staff has surveyed the wells from homeowners in the Denomie and Daults Creek (Herman), Zeba Creek and Silver River watersheds and will continue with the Falls River and Little Carp River watersheds in 2004 and 2005, respectively. Source Water Assessment and Protection Plans will further protect the integrity of both ground water and surface water for the Keweenaw Bay Indian Community.

Impacts of Benchmarks

Water quality standards will become an integral tool to maintain and improve the quality of all water bodies on the Reservation.

The Aquifer Study, along with the Source Water Protection Plans, will give us the opportunity to identify, delineate, and protect groundwater resources.

STATUS

Developing Tribal water quality standards for the L'Anse Federal Indian Reservation will provide for the following:

a) The protection of health of the Anishinaabe people, their cultural lifeways and heritage.

b) Offers special and more stringent protection of pristine and culturally important water bodies.

c) Forbids all new discharges of persistent organic pollutants (such as dioxin) to Reservation waters.

d) Establishes an administrative policy by which complaints, non-compliance and departmental decisions are processed and appealed.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	40%	2006	

Obtaining jurisdictional authority over all surface waters within the Reservation Boundaries.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2006	

Establishing a surface water quality monitoring program for waters within the Reservation boundaries.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	50%	Ongoing	

Establishing an environmental review policy that reviews, approves and monitors all Tribally initiated projects, within the Reservation boundaries, which have the potential to impact the Community's water resources.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		2006	

ROADS / TRANSPORTATION

Goal: Support and promote transportation infrastructure development consistent with traditional Anishinaabe lifeways while at the same time serving the economic development needs of the Keweenaw Bay Indian Community.

ROADS / TRANSPORTATION MANAGEMENT

Roads are the main conveyance to carry out our daily activities. Logically, we think of driving on established state or county roads. That road system is well established and contains notable features like federal highway US 41 that traverses north and south and connects L'Anse to Baraga. M-38 is a state highway that originates in Baraga and heads west towards Ontonagon. Baraga county roads consist of asphalt and gravel roads that lead to our homes. In addition, there are logging roads and private roads that are seasonally utilized by area residents. Currently, we have few roads that are exclusively considered KBIC roads. We have a reciprocal agreement with Mead-West Vaco for the use of each other's roads.

We have a network of roads that ultimately need constant repair and maintenance. This road system is funded by Federal and state taxes as well as BIA. We have to cooperatively fund our road system and support initiatives undertaken by each agency. KBIC is proud to have co-sponsored the replacement of crossings on the Silver River and Zeba Creek. As Tribal members expand their living outside areas serviced by roads, we have to secure funding to increase our standards and integrate with required utilities. Ultimately, roads link us to outside communities and are a normal infrastructure in present society.

Benchmarks

Inventory the roads on the Reservation and seeking funding to maintain and expand our present network.

Cooperate with related agencies for the improvement of our roads.

Develop a road maintenance plan for the Reservation.

Impacts to benchmarks-

Provide avenues for maintaining our current lifestyles.

Expand our use of tribal property and increase housing outside traditional areas.

STATUS

Establishing a Tribal Transportation Advisory Working Group, made up of **Tribal members**, to assist staff in the development and implementation of a long-range transportation plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	2003	

Researching and making further assessment of community needs identified in IRMP survey.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Updating existing Indian Reservation Roads Data.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	Done for 2003 Ongoing. Will be accomplished annually	

Providing necessary education to staff and advisory committee to develop a Long Range Transportation Plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100% through BIA	2003- Ongoing	

Developing a Long Range Transportation Plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	30%	2004	

Implementing a Long Range Transportation Plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			Ongoing	

LAND ACQUISITION

Goal: Increase the land base of the Keweenaw Bay Indian Community, and support and strengthen Tribal sovereignty through the exercising of jurisdictional rights as they pertain to land use within and contiguous to the exterior boundaries of the L'Anse Indian Reservation.

LAND ACQUISITION MANAGEMENT

The Keweenaw Bay Indian Community has faced many of the same adversities as other Tribes across the continent. The settlement of the Europeans brought a way of life that was unknown to the North American Indians. Through centuries of war and an advancing foreign civilization, the North American Indian Tribes lost nearly all lands they once considered home. The Keweenaw Bay Indian Community, aka L'Anse Indian Reservation, established by the 1854 Treaty with the Chippewa, and allotted in the same, lost, through sale, 44,379 (81% of the total land mass of the Reservation) acres from the time the first allotment was patented to present day. Today, like many other Tribes, the Keweenaw Bay Indian Community has the means to purchase back those lands lost over the years. Since 1996, the Keweenaw Bay Indian Community has purchased 2,100 acres within the Reservation boundaries, approximately $200,000 in allotted interests and approximately 198 acres in Marquette County, Michigan.

The Keweenaw Bay Indian Community currently purchases land on a case by case basis, utilizing the existing real estate market and special needs of the Tribe. In anticipation of continued attacks against the Tribe's sovereignty and Treaty rights, we have chosen to become more focused in our efforts to acquire back the L'Anse Reservation and beyond, specifically calling upon it's members through the survey used in preparation of this task. The Land Acquisition efforts of this Tribe will focus on acquiring land that ensures future generations have a place here at home and across the Ceded Territory to exercise their hunting, fishing, gathering and trapping rights. We will attempt to regain those lands that have had significant influences in our history and cultural identity. We will attempt to acquire lands that will be the foundation for jobs and economic opportunity. Finally but not least important, we will attempt to consolidate those allotted interests from the ready, able and willing heirs who wish to sell to the Tribe in an attempt to one day make those lands available to the members of the Keweenaw Bay Indian Community.

Benchmarks

Continued lobbying for the acquisition of land within the exterior boundaries of the Reservation on a case by case basis, including, annual monetary commitments from the Tribal Council to purchase those lands. (Real Estate)

Implement a Land Acquisition Plan consistent with data collected from IRMP Survey results of the Tribal community input which will focus on future developments (economic, environmental, cultural, legal, etc.). (IRMP Team, NR Committee)

Enter into the *Pilot Program for the Acquisition of Fractional Interests* (25 USC 24.2212) (Real Estate)

Acquire wetlands and associated habitats with common natural resource funding, i.e., North American Wetlands Conservation Act.

Impacts of Benchmarks

Continued increase in number of acres owned by the Tribe and maximum awareness of importance of land acquisition throughout the community and how ownership 1) promotes of the exercise of Treaty rights (hunting, fishing & gathering) through physical access to lands to do so, 2) promotes and encourages protection of historically and culturally significant areas, 3) provides for consistent and contiguous land uses without jurisdictional lapses due to checker board ownership, and 4) ensures future generations a place to practice traditional life ways; 5) protect wetlands and other sensitive habitats.

Will continue to purchase lands on a case by case basis but Plan will provide direction and goals to the Tribal Council and staff consistent with those activities identified by survey results and future Tribal needs.

Provides manpower and capitol to acquire fractionated interests in the allotments of the L'Anse Indian Reservation. Over the past three (3) years the Keweenaw Bay Indian Community has acquired nearly $200,000 in fractional interests using mostly internal sources, with some document and manpower support from the Bureau of Indian Affairs. Getting involved with this program means more time and working capitol for KBIC staff to work on acquiring fee lands and ultimately allowing staff to focus on those lands which, through the acquisition plan, will be of the most benefit to the Tribe or at least allow acquisitions to be prioritized. Long term this program moves the Tribe and Tribal members closer to utilizing these allotted lands as opposed to their current stagnant state.

LAND USE MANAGEMENT

To date, decisions on the use of the Community's land has been made for the most part on a case by case basis. Currently, the Tribe grants leases for residential home sites, recreational home sites (camps) and a few commercial sites. Through a Land Use Plan and ordinance, we intend to formally recognize capacities of Tribal lands in all categories of use; recognize and protect those lands held as culturally, environmentally, or historically sensitive; ensure an adequate supply of land for future generations through careful planning and permitting; discourage land development in areas that pose a threat to public health, the Reservation's fisheries and other natural resources; to promote and preserve the unique Indian character, to reduce the potential for conflict between new development and the needs of the members of the Keweenaw Bay Indian Community; to provide for the orderly use of the Tribe's lands; to provide landowners and users of Community lands with consistent standards for Reservation land use activities by providing certainty and stability in land use decision-making; and to protect and enhance the natural beauty and resources of the L'Anse Indian Reservation.

Benchmarks

Development of Land Use Plan & Ordinance outlining procedures that encourage land use and activities that have historically been a part of Reservation life and promote economic and population growth consistent with those same ideas. (IRMP Team, Tribal Attorney, NR Committee)

Adopt the "One-Stop Mortgage Center Initiative in Indian Country" that provides for streamlines mortgage lending on Tribal trust lands. (Real Estate, Housing, Tribal Attorney)

Impacts of Benchmarks

Protection of those lands identified and approved as culturally, historically, and/or environmentally significant.

Protects natural resources from uses not consistent with best management practices.

Streamlines approval process by providing the Tribal Council (approving authority) and staff with the necessary guidelines by which land can be used and eliminating the current approval procedures which are all handled on a case by case basis.

Provides security to lessee, staff and Tribal Council to make better informed decisions on special uses.

Provides legal document on who (which departments) will need to sign off on uses before being taken to Council for approval.

Gives enforcement authority to policing agent(s).

Provides courts with procedures to appropriately handle violations.

Provides a fair and equitable opportunity for use of lands by all Tribal members and provide for the protection of the land and its Reservation for use by future generations.

Document will provide wide range of specific information such as, but not limited to: 1) current, historical, and permitting (zoning) land use maps, others to numerous to list; 2) Identification of properties for: a) Community, b) Government, c) Commercial (Industrial), d) Commercial (Forest Products), e) Residential, f) Recreational, g) Agriculture, h) Special Use, i) Protected, j) Other; 3) History of Land Use; 4) General Provisions; 5) Demographics; 6) Permitted Uses (Leases/Other); 7) Lending Procedures for Lien Priority, Eviction and Foreclosure; 8) Enforcement; 9) Ordinance; 10) Others.

The document will support grant funding opportunities, particularly those funding infrastructure improvements and development. Because the plan will contain significant amounts of demographic data, it may be used as a storage house for such information and a resource tool for Tribal government agencies requiring such information. Because the plan will provide basic information about future growth, it can be used as a business recruitment tool. This plan will also be used as a public relations tool, providing the Reservation's history as well as providing maps and other information pertinent and necessary to tourism.

STATUS

Establishing a Natural Resources Committee to assist KBIC staff in this development and implementation of a land acquisition plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
		100%	Ongoing	2001

Researching and making further assessment of community needs identified in IRMP survey.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Providing necessary education to staff and advisory committee to develop a Land Acquisition Plan (LAP).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		2004–Hard document. Ongoing thereafter.	

Developing a Land Acquisition Plan (LAP).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		2003 – Ongoing	

Implementing a Land Acquisition Plan (LAP).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	2003	

Establishing a Land Use Advisory Committee, made up of Tribal members, to assist staff in the development and implementation of a land use plan.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	Ongoing	

Providing necessary education to staff and advisory committee to develop a land Use Plan (LUP).

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓		30%	Ongoing	

Developing a Land Use Plan (LUP) and ordinance.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓		5-10%	2004	

Implementing a Land Use Plan (LUP) and ordinance.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓			2005	

GIS (GEOGRAPHIC INFORMATION SYSTEM)/GPS (GLOBAL POSITIONING SYSTEM) RESEARCH AND DEVELOPMENT

Currently there are several departments utilizing GIS/GPS within the Tribal Government. GIS/GPS has become a powerful resource for the Natural Resources, Forestry, and Real Estate Divisions and its applications are virtually endless. Using GIS/GPS we can collect geographic data (location of roads, utilities, essentially anything on the surface of the earth), convert it to a useable format, organize it and distribute it in the form of printed maps or digital bitmap files. We currently have several layers of data, including but not limited to: roads; railroads; land ownership; forestry; lakes; wetlands; partial utilities; political boundaries; sections, quarter sections; etc. Bringing all this information into a centralized system with all the data collected from every department being available from one source would provide for easy access to limitless amounts of data.

Benchmarks

Set policy and procedures on how data is collected, organized and distributed.

Continuous update of coverages using internal and external resources.

Organize and staff a GIS/GPS Department.

Impacts of Benchmarks

Having up to date data allowing informative decisions to be made and precise planning data when special circumstances arise.

Full time staff member(s) who will act as data collector, interpreter, organizer and distributor for the entire KBIC, not limited to Natural Resources.

Potential employment/business opportunity for KBIC

Researching and making further assessment of community needs identifies in IRMP survey:

a) Develop a current and historical land use data base, and,

b) Develop a comprehensive GIS/GPS Program

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	10%	2005	

PARTNERSHIP AND EDUCATION

Goal: Foster and increase the coordination and collaboration of natural resources management with other governmental entities and private landowners.

PARTNERSHIP AND EDUCATION MANAGEMENT

The lack of knowledge regarding status of Tribes and Tribal sovereignty, and treaties has been the subject of much public concern and general misunderstanding over the decades. With inadequate knowledge of Tribal resource management and regulations that govern Tribal Treaty rights, individuals may assume that Tribal members hunt, fish, and gather unregulated and with little regard to limits. This ongoing mentality contributes to public confusion and mistrust on all sides. The continuous interaction of positive public controversy will demonstrate that providing people with factual information curbs unnecessary hostility generated from unfounded fears and misinformation.

THe KBIC Ojibwa Community college is a logical vehicle for enhancing partnership and education with the Tribal and non-Tribal Community. The College, located in Baraga, was founded in 1975 and has recently broadened their curriculum to include natural resource management. The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) is also a good source for related educational materials.

Benchmark

Systematically inform Tribal members and the surrounding public through community forums, and television/print media of Treaty rights, Tribal self-regulation of each season's forest and fish harvest along with environmental concerns.

Impacts of Benchmark

Consistent communications with Tribal and non-Tribal individuals effectively counters numerous accusations regarding Treaty rights.

Benchmark

Maintain clearinghouse activities by providing updated and active resource publications that may be mailed to libraries, schools, state and federal policy-makers and to other Tribal government entities. This may be achieved through mailings, community informational booths, displays at a variety of conferences, health fairs, pow-wows and website.

Impacts of Benchmark

To maintain positive communication relationships with Tribal and non-Tribal members in order to expand the knowledge base of community members. This benchmark will address public confusion and clarify information related to Tribal regulations, environmental issues and basic Treaty rights.

Benchmark

Utilize the KBIC Ojibwa Community College and GLIFWC to educate Tribal members and the public on KBIC natural resource management, treaty rights, and tribal self-regulation.

Impacts of Benchmark

Better informed Tribal and non-Tribal individuals about Tribal Natural Resource Management and Ojibwa Community College.

STATUS

Participating in regional and national organizations that promote Tribally compatible resource management.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	Ongoing	

Distributing resource management information to Tribal and non-Tribal members.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	100%	Ongoing	

Collaborating with other natural resource agencies that promote protection and enhancement of natural resources consistent with traditional Anishinaabe lifeways of the Keweenaw Bay Indian Community.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Conducting annual public meetings with adjacent landowners to discuss common concerns, issues or problems.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓		Ongoing	

Expanding Ojibwa Community College curriculum towards tribal natural resource management.

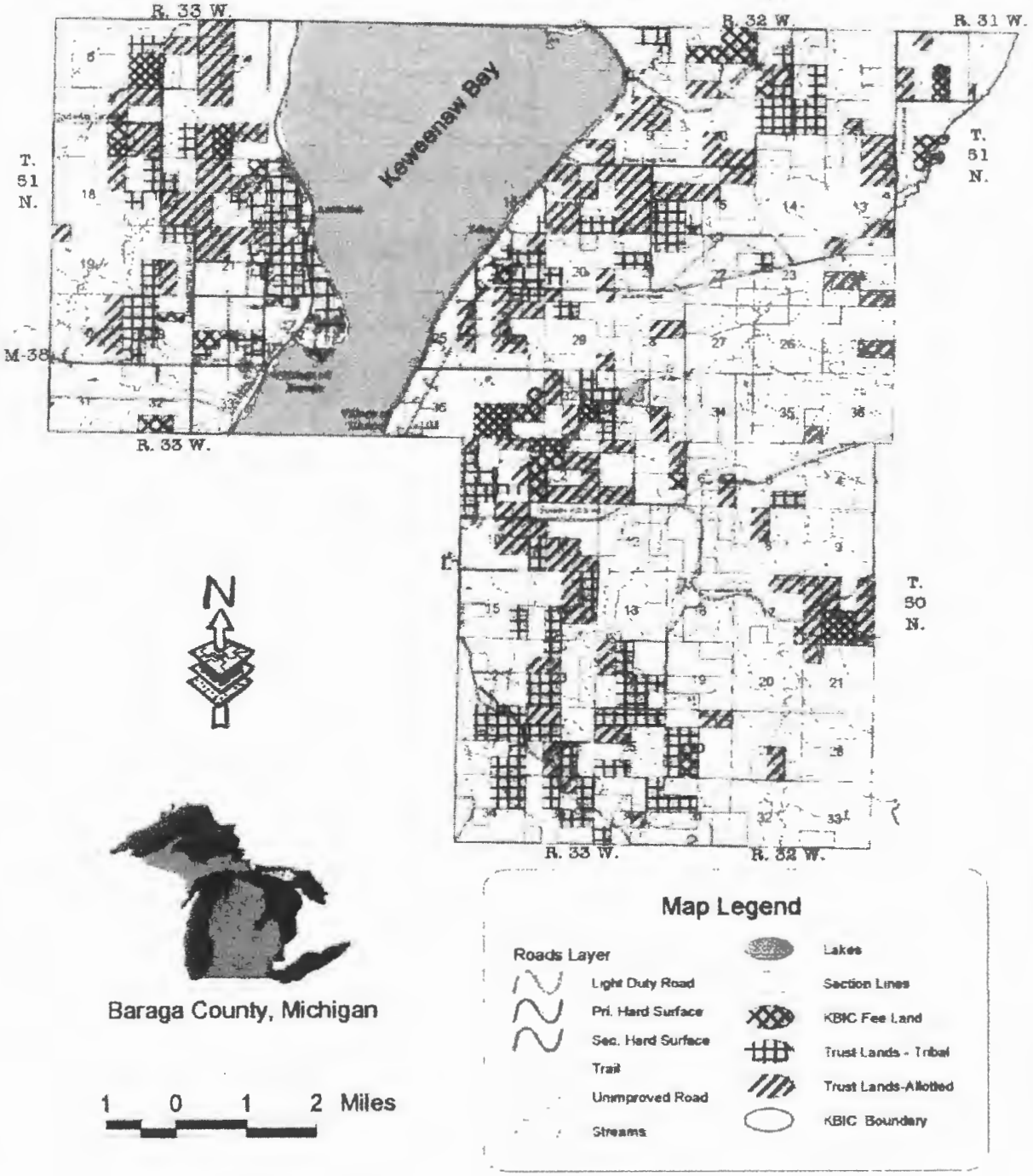
Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
	✓	70%	2004	

Revise master plan for Ojibwa Community College that in part fosters better education regarding natural resource management.

Planning Stages	Initiated	% Accomplished	Proposed Completion	Completed
✓	✓	20%	2005	

MAPS

Keweenaw Bay Indian Community Land Ownership in Baraga Co.



APPENDIX L:

Strategic Plan

VALUE: STRONG FAMILIES

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Traditional family values are taught & practiced at home
7 Religious & spiritual opportunities flourish among Tribal members & families
7 Tribal members get along and work together
7 The *Niiwin Akeaa* Community Center is the hub of Community activity
7 Tribal members use their time & talents to serve as volunteers
7 Affordable homeownership and individual self-sufficiency are a reality for Tribal members
7 Tribal members know the history of our people

GOALS

Goal Statements	Departments	1 yr	5 yr	10 yr
► to provide recognition from the Tribal Council & the Community to new Tribal members of the Keweenaw Bay Indian Community • conduct a ceremony to recognize & honor new members • utilize KBIC newsletter for press release w/member permission	Tribal Council, Enrollment Board, Enrollment Officer, Cultural Committee	2006		
► to support strong family values to create a caring Community that nurtures & supports children & families through new and expanded Tribal programs & services • parenting skills for young/single parents – for all parents • strong family values programs for youth in grades 4 through 6 • more opportunities for families in crisis to receive services • use traditional/cultural family values (culturally appropriate) • implement father parenting skills & family parenting skills • provide assistance for families in turmoil and crisis	Tribal Council, DHHS, Youth Club/Committee, Ojibwa Seniors, KBOCC, Education Dept., Education Committee, Social Services, Cultural Committee, Child Welfare Committee, New Day, KBNRD, NR Committee	X	2008	
► to provide opportunity & support for all Tribal families to flourish and strengthen in a caring, safe and supportive environment • implement a 'war on drugs' including education programs with a strong emphasis on repeat offenders of drug & alcohol abuse • establish follow-up programs that reduce recidivism of 1st time offenders of domestic violence drug/alcohol abuse • increase opportunities for vocational training, job skills, etc • declare our own drug/alcohol awareness, domestic violence awareness and strong families month to support prevention • initiate programs to address prescription drug use/abuse • develop a task force to address this issue	Tribal Council, ALL Tribal Departments, Ojibwa Housing Authority, Community	X	X	2015

VALUE: STRONG FAMLIES - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to provide opportunities for Tribal members to volunteer to assist others & the Community • maintain a volunteer 'bank' of names, talents & availability • recognize Tribal volunteers annually • specialized bank for children related volunteer needs		Tribal Center Front Desk? Tribal Radio Stations, Tribal newsletter, IT & Tribal Website, KBOCC/AISES	X	X	2015
► to provide affordable and flexible day care services for working parents • provide weekend & evening options • provide services on both sides of the bay • need for crisis center daycare services		Education Committee, KBIC Daycare, KBOCC, Social Services, Grant Writer	X	2010	
► to support affordable home ownership opportunities for Tribal families • provide financial literacy and independent, confidential credit counseling services for Tribal members • expand opportunities for financial assistance for home buyers		Ojibwa Housing Authority, Economic Developer	X	X	2015
► to provide more family-centered activities utilizing the Niiwin Akeaa Community Center for the Community • multi-generational focus activities • extended family focused activities • more prevention & drug/alcohol free activities • increase summer programs & services • provide language & culture programs or 'camps'		Youth Program, Youth Committee, DHHS, Culture Committee, Social Services, KBOCC, New Day, Ojibwa Seniors, Community, Child Welfare Committee, KBNRD, NR Committee	X	X	2015

VALUE: SOVEREIGNTY

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Tribal sovereignty is exercised and protected
7 Our land base has expanded significantly
7 KBIC's sovereignty is respected by local governments, agencies, & organizations, and the State and the Federal governments

GOALS

Goal Statements	Departments	1 yr	5 yr	10 yr
► to support a stronger Tribal government for the Keweenaw Bay Indian Community through amendments to the Tribal Constitution & By-Laws • achieve separation of powers within the executive, legislative & judicial branches of the KBIC Tribal government	Tribal Court, Attorney, Constitutional Task Force, Tribal Council, Community.	X	2008	
► to actively pursue the appropriate compensation and/or the reclamation of the Canal Lands Claim	Land Claims Committee, Tribal Council, Tribal Attorney, Realty Officer	X	X	2015
► to address all tax issues affecting the Keweenaw Bay Indian Community	Tribal Council, Tribal Attorney, Realty Officer, Community	X	2010	
► to protect the Treaty Rights of the Keweenaw Bay Indian Community • resolve all home territory and/or Treaty right issues (2010)	Tribal Council, Tribal Attorney, Tribal Court, KBNRD, THPO, Natural Resources Committee, Community	X	X	2015
► to update Tribal codes and regulations in order to protect the assets of the Keweenaw Bay Indian Community • Review existing draft codes • Prioritize needed codes • Tribal employment code (2006) • Tribal gaming regulation • Conservation code • Clean Water Act/Clean Air Act • Economic Development/Business Codes & Regulations	Tribal Council, Tribal Code Writer, Tribal Attorney, Community, Appropriate Department Heads & Staff	X	X	2015

VALUE: SOVEREIGNTY - continued				
Goal Statements	**Departments**	**1 yr**	**5 yr**	**10 yr**
► to enhance, expand and initiate sustainable Tribal enterprises and joint ventures for profitability and to diversify the economic base of the Keweenaw Bay Indian Community • Tribe owned business & enterprises • Tribal member owned business & entrepreneurial initiatives • Joint ventures & partnerships • Community Development Financial Institute (CDFI) • Ojibwa Industrial Park • Small Business Center • Sand Point Recreational Area & Sand Point Lighthouse	Tribal Council, Economic Developer, Realty Officer, Attorney, Community	X	X	2015
► to provide educational opportunities to the non-Tribal community on Tribal government authority, rights & sovereignty • improve communication between KBIC and the media, as well as external governmental agencies & organizations • develop a speakers bureau with specific topics, made available to local governments, schools, agencies & the public for presentations – utilize staff & Community members	Tribal Court, Tribal Council, Constitutional Task Force, KBOCC, Appropriate Department Heads & Staff, Community	X	2007	
► to continue the acquisition of lands within the Reservation and the ceded territory of the Keweenaw Bay Indian Community • implement a land acquisition plan • develop land acquisition policy	Tribal Council, Tribal Realtor & Tribal Attorney, Appropriate Department Heads & Staff	X	X	2015

VALUE: TRADITON/CULTURE

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Our history, culture, language and traditions are preserved and protected
7 Our language, our beliefs and our traditions have been revitalized and our culture enriched
7 A new cultural center advocates our *Anishinaabe* traditions

GOALS

Goal Statements		Departments	1 yr.	5 yr.	10 yr.
► to provide opportunities that support teaching, learning & practicing traditional/cultural ceremonies & spirituality among our Tribal members & in our Communities		THPO, Cultural Committee, Grants, Traditional/Cultural Advisors, knowledgeable people, KBOCC, New Day, Community	X	X	2015
► to have a Cultural Center for the preservation & practice of traditional/cultural ceremonies of the Keweenaw Bay Indian Community		Tribal Council, THPO, Cultural Committee, Grants, Traditional/Cultural Advisors, knowledgeable people, KBOCC, Community	X	2010	
► to have a Tribal Museum to provide opportunities to preserve, teach & learn the history, traditions & culture of the Keweenaw Bay Indian Community		Tribal Council, THPO, Cultural Committee, Grants, Traditional/Cultural Advisors, knowledgeable people, KBOCC, Community	X	2010	
► to attain Federal recognition for our Tribal Historical Preservation Office (THPO) • plan submitted to the National Park Service (2005) * Received Approval of Federal Recognition of KBIC THPO 9/30/2005		Tribal Council, Attorneys, Eco. Dev., THPO, KBNRD, Cultural Committee, Grant Writer, Community	2006		
► to establish a NAGPRA program, including a 1.0 FTE staff position. • seek NPS funding to support a portion of the position		Tribal Council, Eco. Dev., THPO, Cultural Committee, Community, Personnel, Grant Writer	X	2007	

VALUE: TRADITON/CULTURE - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to organize, preserve & document the fine arts & artists of the Keweenaw Bay Indian Community, including but not limited to Native crafts, art, music, literature, story telling & performance arts		Tribal Council, THPO, Cultural Committee, KBOCC, Eco. Dev., Youth Director, Youth Committee, EDC, Community	X	X	2015
► to document an official historical, political history of KBIC and its people, focusing on Federal laws & acts, treaties, & issues of Tribal sovereignty		THPO, Cultural Committee, Tribal Elders, Education Dept, KBOCC, KBNRD, Community	2007		
► to protect & preserve our oral traditions & history, medicines & plants, ceremonial sites, burial sites, settlement & camp sites • Traditional & historical sites • Methods of gathering • Artifacts		Tribal Council, THPO, Cultural Committee, Tribal Elders, Traditional/ Cultural Advisors, knowledgeable people, KBNRD, NR Committee, Ojibwa Seniors, New Day, Community	X	2010	
► to implement a Ojibway Language Program for all ages our Tribal Community to preserve & protect our language and the 'well-briety' (physical, emotional, spiritual, mental) of our *Anishinabek* life ways		Tribal Council, KBOCC, THPO, Cultural Committee, Education Department, Education Committee, Tribal Elders, knowledgeable people, Community	X	X	2015
► to continue to identify, inventory & protect historical, cultural & traditional sites on the L'Anse Indian Reservation & within our ceded territory		Tribal Council, Attorneys, THPO, Cultural Committee, Traditional/Cultural Advisors, knowledgeable people, KBNRD, Community	X	X	2015

VALUE: EMPLOYMENT/BUSINESS

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Tribal enterprises are profitable and support self-sufficiency among our people
7 Our members are employed & have financial security
7 More Tribal members own & operate their own businesses
7 Major industries & businesses are flourishing [in the Ojibwa Industrial Park]

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to lower the Tribal member unemployment rate • provide an additional 100 jobs over 5 years		Tribal Council, Eco. Dev., EDC, TERO, Personnel, Education, HR, Tribal Radio	X	2010	
► to facilitate the creation of coalitions of business, labor & education to develop competency-based education & training programs for Tribal members, targeted to needs of business • vocational training, apprenticeships, on-site/job training • small business skills, counseling programs & trainings • life skills training & job readiness for unemployed/underemployed		KBOCC, TERO, Education Department, Economic Developer, Education Committee, Economic Development Committee, Tribal Radio	X	2010	
► to diversify Tribal economy through the development of sustainable Tribal enterprise and Tribe-owned businesses initiatives • develop a "Think Tank" of interested & experienced people • conduct due diligence • utilize Economic Development Committee (2005) • explore national/international opportunities, i.e., gasoline, cigarettes, federal prisons, banking, green energy, etc. • expand services provided by Pines, KBIC Tire Shop (2008) • expand radio dominance throughout the western/central UP • explore wind/solar energy, biomass & cold weather research • examine the development of "Bear Town" shopping concept • Wireless/broadband services		Tribal Council, Economic Developer, Economic Development Committee, Personnel, TERO, Tribal Radio, Community	X	X	2015
► to attract/recruit industry & manufacturing to the Ojibwa Industrial Park • develop marketing tools (2006) • explore joint ventures & partnerships to attract industry • collaborate w/regional, state, national industrial park initiatives		Economic Developer, EDC, Tribal Realty, Tribal Attorney, Tribal Council, Tribal Radio	X	X	2015

VALUE: EMPLOYMENT/BUSINESS - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to foster a positive entrepreneurial environment for Tribal member-owned business start-up, expansion and retention • develop a Tribal business loan fund (CDFI) • provide business development center for services & programs • support native artisans & crafters • youth entrepreneurial programs • offer incubator store fronts for seasonal businesses • increase opportunities for business training & education services • develop a Tribal member-owned business Chamber of Commerce for the Western Upper Peninsula • provide website links & services to Tribal business owners		Tribal Council, Economic Developer, Economic Development Committee, KBOCC, Education Department, Education Committee, Tribal Radio, Community	X	X	2015
► to eradicate poverty among Tribal members and Tribal families		Economic Developer, TERO, Economic Development Committee, Ojibwa Housing Authority, Grant Writer, KBOCC, Education Department, Education Committee, Community	X	X	2015
► to work cooperatively with local, regional, state & national Tribal & non-Tribal organizations that are economic, business & development focused • DDAs of the Village of Baraga & Village of L'Anse, Baraga County Chamber of Commerce, & Baraga County Tourism • WUPPDR, CUPPAD, Keweenaw Industrial Council, Upper Peninsula Economic Development Alliance, Lake Superior Community Partnership, Marquette County Tourism/Visitors, Northern Initiatives, Marquette Economic Club, etc. • Michigan Economic Development Corporation (MEDC), Michigan Economic Development Association (MEDA), Michigan Rural Development Council, National Indian Business Association (NIBA), Native American Business Alliance (NABA), NAIHC, NCAI, etc • Economic Accord w/Tribes & State of Michigan		Tribal Council, Economic Developer, Economic Development Committee Local Tribes, Community	X	X	2015

VALUE: EMPLOYMENT/BUSINESS - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to foster the growth of tourism & tourism related industry & business on the L'Anse Indian Reservation • develop a tourism/visitors plan (2006) • collaborate w/Baraga County tourism initiatives – including the Baraga Shrine & Blessed Kateria attractions • restore the Sand Point lighthouse & open to the public (2008) • support Native artists & craftsman • enhance Sand Point marina, campground & area (2008) • pursue regional, national & international tours/visitors (2007) • collaborate with other Tribes for tourism initiatives (2006)		Tribal Council, Economic Developer, Economic Development Committee, Casino, Realty Office, Local Tribes, Grant Writer, Tribal Radio, Community	X	X	2015
► to protect Tribal gaming employment through oversight to ensure that Tribal, State & Federal laws are followed appropriately • Implement autonomous Gaming Commission (2006)		Tribal Council, Attorney, Personnel, HR, Gaming Commissioner, Gaming Compliance Officer, Economic Development, Code Writer	X	X	2015
► to develop the internal & external business development foundation to support the growth and development of economic development on the Reservation • approve a Strategies for Economic Development Plan (2006) • support the integration of culture/tradition into economic strategies • separate decision making for business initiatives • adopt appropriate business codes & regulations to attract & support industry & manufacturing locating in the Ojibwa Industrial Park • identify incentive to locate business on the Reservation • address infrastructure needs – sewer, water, roads, energy & transportation that encourage business development • support the development of an Economic Development Corporation (EDC) or Economic Development Enterprise(EDE) • UCC & other appropriate economic codes & regulations		Tribal Council, Code Writer, Attorney, Economic Developer, Economic Development Committee, Tribal Realtor, Grant Writer, Community	X	X	2015

VALUE: HEALTHCARE/GOOD HEALTH

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Affordable healthcare is available to all Tribal members
7 Tribal members are healthy and live a healthy lifestyle
7 Tribal members participate in healthcare education and prevention programs
7 The Tribal healthcare facility has expanded services to meet our health care needs

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to support a wide variety of prevention programs for members of the Keweenaw Bay Indian Community • healthy diet/living for Tribal youth – exercise/nutrition • diabetes, heart disease, cancer • drug/alcohol use/abuse – including prescription drugs • Family planning options • child abuse prevention •		DHHS, Health Board, Tribal Council, Youth Committee, Ojibwa Seniors, New Day, Alcohol Advisory Board, KBOCC, Social Services, Grant Writer, Community	X	X	2015
► to establish a Tribal owned & operated Pharmacy at the Donald A. Lapointe Health & Education Center • conduct a feasibility study (2006) • explore options for Indian medicine pharmacy		DHHS, Health Board, CFO, Tribal Council, Tribal Attorney, Grant Writer, Community, Collaborations	X	2008	
► to expand professional healthcare services offered to Tribal members • optical & dental services (2010) • 1.0 FTE Nutritionist, • Contract Physiatrist – oversee quality assurance/case management on a monthly basis (2006) • medical services – including geriatric, pediatrics, obstetrics (2015) • Specialty Clinics (2015) • 1.0 FTE Accreditation Coordinator to oversee process to completion (2006) • continue the health newsletter		DHHS, Health Board, Tribal Council, Grant Writer, Personnel, Community	X	X	2015

VALUE: HEALTHCARE/GOOD HEALTH - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to have a Wellness Center for the Tribal Community • physical therapist, exercise specialist & trainer		Planning & Development, Tribal Realty Office, Grant Writer, DHHS staff, Community	X	X	2012
► to establish sustainable programs providing traditional medicine and practice services • develop a plan w/ resolution & Council approval (2006) • address Federal TORT • hire a Traditional medicine Practitioner (2007) • provide trainings/teaching within the Community • explore sources/resources for Native medicines • develop recognition & support for traditional medicines		DHHS, Health Board, Cultural Committee, Knowledgeable Traditional Advisors, Grant Writer, Community, KBNRD, Personnel, KBOCC	X	X	2015
► to adhere to the Bemidji Area Health Services Master Plan for the Keweenaw Bay Indian Community		Tribal Council, DHHS, Health Board, P&D, Law Enforcement, Attorney, Community	X	X	2015
► to preserve & improve the administrative capacities of the Donald A. LaPointe Health & Education Center • RPMS • billing & business office • administration • maintain relationships w/ local & regional healthcare facilities		Tribal Council, DHHS, Health Board, Accounting, Grant Writer, Community	X	X	2015

VALUE: EDUCATION

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Every Tribal member has a variety of the best educational opportunities to choose
7 More Tribal members realize their potential through higher educational attainment
7 The Keweenaw Bay Ojibwa Community College achieves accreditation and flourishes

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to reduce the dropout rate of all KBIC students to zero • focus on a stronger presence in the schools • Tribal role models from the Community • expand efforts to include Tribal students in service area counties – Mqt., Houghton, Keweenaw, Iron, Ontonagon, Gogebic, Dickinson • develop task force to identify effective approaches to reduce drop out numbers among Native students		Education Department, Education Committee, Youth Committee, Parents, Community, Personnel, HR, Child Welfare Committee, Community	X	X	2015
► to provide expanded educational opportunities for Tribal children and Tribal youth • establish an Ojibwa language & culture immersion charter school for kindergarten through 4th grade (3rd) • establish a Tribal Charter school on the L'Anse Indian Reservation ✓ develop task force to explore ✓ conduct a feasibility study/market analysis (2007) ✓ survey Community for interest • establish KBIC directed Early Headstart & Headstart programs on the L'Anse Indian Reservation (2007) • address the cost effectiveness of expanding educational opportunities		Tribal Council, Education Department, Education Committee, Cultural Committee, Youth Committee, Grant Writer, Cultural Advisors, KBOCC, Board of Regents, Headstart Programs, Tribal Daycare, Senior Citizens, Community	X	X	2015
► to increase the number of Tribal members who attain higher education degrees • protect the college tuition waiver program for Native Americans • achieve accreditation for KBOCC (2006) • review, update & revise the Tribal Student Sovereign Fund (2007) • establish programs/services to reduce college drop out rates for Tribal members		Tribal Council, Attorneys, KBOCC, Board of Regents, Education Dept., Education Committee, Youth Committee, Parents, Community	X	X	2015

VALUE: EDUCATION - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to increase opportunities for vocational training for Tribal members • develop an expanded vocational/apprentice training program at KBOCC (2007) • establish a job training program for displaced/older workers (2008) • provide training for Tribal staff – i.e., Tribal Conservation Officers, substance abuse counselors, community healthcare providers, etc. • utilize Tribal radio stations for vocational training options • consider Tribal Departments for apprenticeships/internships • develop additional sovereign fund for non-traditional students (older) seeking vocational training (2008) • partner w/ local schools, Michigan Works, & other job shills training programs		Tribal Council, TERO. KBOCC, Education Department, Education Committee, Economic Developer, Eco. Dev. Committee, Tribal Radio, KBNRD, Personnel, HR, Grant Writer	X	2008	
► to expand the KBIC Education Department to provide more programs & services • address needs of college students • increase tutoring opportunities • add 1.0 FTE position • expand K through 5 programs/services • provide diversity education • improve capacity of KBIC tutors • expand tutoring staff & the tutoring program to Tribal children & youth		Tribal Council, Education Department, Education Committee, Grant Writer. Personnel, KBOCC, Youth Committee, Community	X	2008	

VALUE: ENVIRONMENT

Our vision for the Keweenaw Bay Indian Community is a community where –

7 The waters of Lake Superior, inland lakes and streams are the cleanest water in the world
7 Our Community utilizes clean/green energy resources toward self-sufficiency as a Nation
7 The Reservation is clean and free of blight and litter
7 People from all walks of life come & enjoy the beauty of our Reservation
7 The Reservation has a Land Use Management Plan to assist in development
7 Manage our forests for sustainability & profit
7 Honor our traditions and culture through preservation of our homelands

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to provide for the protection, preservation, mitigation and enhancement of the natural resources and environment of the KBIC • Utilize Tribal authority to establish a Clean Air Act and a Clean Water Act within the Reservation and ceded territory (2006) • Establish a Tribal mining ordinance within the Reservation and ceded territory (2006) • Continue natural resource/environmental baseline data for the Reservation and ceded territory (2006) • Continue to improve/expand Tribal fisheries & hatchery operations • Continue to identify & prioritize sites with environment concerns within the Reservation for mitigation, cleanup & reuse • Continue all activities of the Sand Point Master Plan (2008)		Tribal Council, Code Writer, Community, Tribal Attorneys, KBNRD, Natural Resources Committee, Tribal Conservation, Realty Officer, THPO, Economic Developer, Personnel, Community, BIA Forester, Local governments	X	X	2015
► to maintain & share the beauty of our Reservation for our Community & for people from all walks of life • Support sustainable Tribal tourism & local regional tourism • Continue native fish/wildlife protection, enhancement & harvest • Establish natural resource education & attraction programs • Develop wildlife viewing & outdoor recreation opportunities • Support snowmobile/four-wheel trail development • Continue development of the Sand Point recreational area		Tribal Council, KBNRD, Nat. Res. Committee, Economic Developer, EDC, Culture Committee, THPO, Tribal Maintenance, Community	X	X	X

VALUE: ENVIRONMENT - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to identify & protect traditional medicines and plants on the Reservation and within the ceded territory • Identify & inventory existing medicines & plants • Map location of habitats & existing areas for harvest • Develop regulations to protect areas of significance • Cultivate traditional medicines & plants for use		KBNRD, THPO, Nat. Res. Committee, Elders, Culture Committee, KBOCC, knowledgeable people, KBDHHS, Community	X	X	2015
► to insure that all Reservation lands are respected by keeping them clean and free of litter, waste and blight • Establish a comprehensive solid waste management plan • Participate in Tribal, regional & local clean-up events annually – Clean Sweep, Spring Cleanup, beach, watersheds, highways, etc. • Collaborate with local government & groups to recycle old cars, white goods, tires & other materials • Establish Tribal programs for "Adopt-a-Roadway" and/or "Adopt-a-Shoreline" within the Reservation (2006) • Continue efforts to locate & cleanup illegal dump sites		Executive Tribal Council KBNRD, Natural Resource Committee, Tribal Maintenance, New Day, Youth Club, Community, Realty, Volunteers	X	2010	
► to develop management plans and tools necessary to make informed and respectful development & management decisions on Tribal lands • Regularly discuss/review the IRMP (2006) • Develop & approve a land use management plan for KBIC (2008) • Establish a GIS position (2007) & a GIS Department (2010) • Address the disparities between the Tribal wildlife management plan and Michigan's wildlife management plan (2007) • Identify/protect cultural, traditional & historical sites & artifacts on the Reservation & within the ceded territory		Tribal Council, KBNRD, Nat. Res. Committee, THPO, Culture Committee, knowledgeable people, Tribal Elders, Realtor, Economic Developer, Attorney, BIA Forester, Department Heads, Personnel, Community	X	2010	
► to develop a sustainable forest management initiative that is effective, profitable & culturally appropriate • Develop a forestry division within the Keweenaw Bay Natural Resources Department (2007) • Hire a Tribal forester (2007) • Work with other governments/groups on invasive plant & species		Tribal Council, KBNRD, Nat. Res. Committee, Personnel, BIA Forrester, Beartown Firefighters, Community	X	2007	

VALUE ENVIRONMENT continued –					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to conserve our natural resources by utilizing green energy alternatives • Provide resource conservation education to Tribal Staff/Community • Explore alternative energy sources, i.e., solar, wind, biomass, etc • Work with organizations, universities & other groups to evaluate energy self-sufficiency options for Tribal government/members • Expand opportunities to recycle for business, government & community members • Explore options of a Transfer/recycling station		Tribal Council, KBNRD, Nat. Res. Committee, Tribal Maintenance, KBOCC, Tribal Youth, Economic Developer, Community	X	X	X
► to continue to address the water & sewer infrastructure needs of our Community • Maintain a current Sanitation Deficiency Systems (SDS) list to identify needs of service and areas of concern • Collaborate with Indian Health Services & local governments to provide improved & expanded infrastructure services • Coordinate residential & commercial development with long term infrastructure development initiatives		Tribal Council, KBNRD, Economic Developer, Tribal Realtor, EDC, Tribal Maintenance, Assistant CEO, Tribal Attorney, Community	X	X	X
► to actively be involved in initiatives throughout the Great Lakes region that protect our waters – lakes, streams, groundwater, etc. • Actively participate in the Intergovernmental Accord between Federally Recognized Indian Tribes & the State of Michigan concerning protection of shared water Resources • Pursue issues that threaten our water sources • Encourage GLIFWC to pursue water-focused programs/initiatives • Make informed decisions of issues, threats & initiatives that involve our waters throughout the Great Lakes region • Establish management plans & develop Tribal ordinances where needed: wetlands, storm water, comprehensive solid waste, etc • Continue efforts to remove toxics & contaminants that affect our waters within the Reservation & ceded Territories • Address issues of Tribal water rights within the Great Lakes region		Tribal Council, Tribal Attorney, KBNRD, Nat. Res. Committee, Tribal Realtor, Community	X	X	X

VALUE: YOUTH

Our vision for the Keweenaw Bay Indian Community is a community where –

7 A strong mentoring program is provided for our Tribal youth
7 Tribal youth have a variety of organizations and activities for all interests
7 Our Tribal youth are involved & successful in school, at home & in the Community
7 Tribal youth are knowledgeable in traditional skills & ways to combat racism

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to increase the opportunities for youth involved mentoring programs • implement a Tribal youth mentoring program similar to the Big Brother/Sister Program (2008) • establish an active Tribal youth peer mentoring program (2006)		Tribal Council, Social Services, Youth Club, Youth Committee, DHHS, Tribal Police, KBOCC, Community, Tribal Employees/Staff	X	2008	
►to continually improve the quality of, and expand the quantity of, programs & services provided to Tribal Youth • address the transportation problem for youth to participate in after school activities at the Niiwin Akeaa Community Center (2006) • establish an after school program that includes tutoring for grade school age youth (2007) • implement a Tribal youth entrepreneurial program for middle & high school age youth (2007) • expand and enhance the Summer Youth Program to involve the maximum number of Tribal youth (2007) • expand and enhance opportunities for Traditional teaching involving Tribal youth. • establish a Recognition Program for Tribal youth role models • expand recreational opportunities for Tribal youth		Tribal Council, Youth Director, Education Director, Youth Committee, Education Committee, Economic Developer, Economic Development Committee, KBOCC, TERO, Personnel, Cultural Committee, Community	X	X	2015
► to establish a summer college student employment program		Tribal Council, KBOCC, Personnel, Hiring Committee, Education Department,	2006		

VALUE YOUTH continued –

Goal Statements		Departments	1 yr	5 yr	10 yr
► to implement a summer youth Ojibwa language 'emersion' camp program • Collect information on existing language 'emersion' camps in the Great Lakes • Seek funding for the initiative through grants & collaborative efforts • Develop a pilot program curriculum		Youth Committee, Education Department, KBOCC, Culture Committee, Grant Writer, Community	X	2007	
► to address the issues of racism • Support diversity training for school staff, Tribal staff & the Community • Promote public awareness of racism issues		Tribal Council, KBOCC, Education Department, Education Committee, Youth Committee, Personnel, Community	X	X	X

VALUE: ELDERS

Our vision for the Keweenaw Bay Indian Community is a community where –

7 A solvent pension program is provided to all Tribal Elders
7 Elders are respected and a vital part of our Community
7 The Senior Citizen Center has expanded programs & services provided to Elders

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to honor our Tribal Elders • document our Elders with oral histories • involve them in all Community activities • recognize them annually • celebrate them with photos in Tribal Building; features in Tribal newsletters, and at Community events • provide more opportunities for Tribal Elders to share their knowledge • Promote listening & respect of Tribal Elders among youth		THPO, Cultural Committee, Summer Youth Program, Youth Director, Youth Committee, Ojibwa Senior Citizens, Tribal Elders, Powwow Committee, Community	X	X	2015
► to continually improve the quality of, and expand the quantity of, programs & services provided to Tribal Elders • establish a Healthcare Advocate Program (and position) for Tribal Elders and the Disabled (2006) ✓ assist in understanding insurance invoices, billings & payments ✓ provide alternate healthcare funding information & assistance • cover all prescription costs for our Tribal Elders who are 55 years of age & older (2008) • acquire approval from Social Security Administration for 'income disregard' for Tribal members (2008) • improve & update the Tribal Senior Citizens Centers		Tribal Council, DHHS, Social Services, GA, Ojibwa Senior Citizens, Grants, Tribal Elders. Personnel, Attorneys, Summer Youth Program, Ojibwa Housing, Community	X	X	2015
► to develop & maintain a self-sustaining Tribal Assisted Living Facility on the Reservation for Tribal Elders & the Disabled • provide assisted living programs & services for Tribal Elders and the Disabled who live independently (2008)		Tribal Council, Economic Developer, Grants, Housing, Senior Programs, DHHS, Social Services, Tribal Elders, Personnel, Community	X	X	2012

VALUE: SAFETY

Our vision for the Keweenaw Bay Indian Community is a community where –

7 Our Community is a safe place to live

GOALS

Goal Statements		Departments	1 yr	5 yr	10 yr
► to create a safe and healthy Tribal Community free from domestic violence, drug and alcohol use/abuse • support drug-free lifestyles in our Tribal Communities through actions, education, training & awareness programs & services • support alcohol abuse-resistance through actions, education, training & awareness programs & services • address domestic violence abuse through actions, education, training & awareness programs & services • establish a drug abuse/use committee		Tribal Council, DHHS, Social Services, Education, Tribal Law Enforcement, New Day, VOCA, Tribal Court, Alcohol Advisory Board, Community	X	X	2015
► to address safety issues within our Tribal Communities • increase the number of street lights & sidewalks • implement an animal control program • reinstate the Community Policing Program • establish a swimming certification program for Tribal youth • implement a fire safety program in our Communities		Law Enforcement, Tribal Code Writer, Tribal Court, Housing, Youth Director, Youth Committee, Education Dept., Education Committee, Youth, Grant Specialist, Tribal Council, Community	X	2007	
► to address safety issues within our Community related to firearms, ATVs, snowmobile, motorbikes, jet skies, boating & water sports • update & enforce related Tribal codes & regulations • regularly provide safety courses & certification opportunities		Law Enforcement, Tribal Code Writer, Tribal Court, DHHS, Youth Committee, Education Dept., Education Committee Tribal Council, Tribal Realtor, Community	2006		
► to address the hazardous materials & site issues within the L'Anse Indian Reservation • develop/train a certified Tribal Hazardous Materials (HazMat) Team (2006) • continue to identify & prioritize hazardous sites within the Reservation • develop a plan for cleanup & prevention (2005) • develop an Emergency Response Plan (2006)		KBNRD, TERO, Education Department, KBOCC, Grants Specialist, Personnel, Tribal Police, Tribal Conservation, Community	X	X	2015

VALUE: SAFETY - continued					
Goal Statements		**Departments**	**1 yr**	**5 yr**	**10 yr**
► to improve effectiveness of KBIC Tribal law enforcement departments • implement a Tribal Tactical Team (2008) • hire a 1.0 FTE Tribal Criminal Investigator (2006) • support drug programs with a drug dog & handler on staff • initiate better communication between Tribal law enforcement – Tribal Police, Tribal Conservation, GLIFWC Officers, Michigan DNR, local law enforcement • implement a separate KBIC Conservation Department w/KBIC Tribal Conservation Officers (2007) • develop a safety committee for Tribal government (2006) • address issues of gaming related crimes w/a highly trained police officer position (2010) • develop a Community Watch Program – "REZ Watchdogs"		Tribal Council, Tribal Court, Tribal Code Writer, Tribal Police, Tribal Conservation Officers, Attorneys, DHHS, Social Services, Personnel, KBNRD, Ojibwa Housing Authority, Gaming Commission, Gaming Compliance Officer	X	2010	
► to provide safe transportation opportunities		Tribal Council, Tribal Realty, BIA Roads, Transportation Committee, Ojibwa Housing, Tribal Police, Tribal Conservation, Community	X	2010	

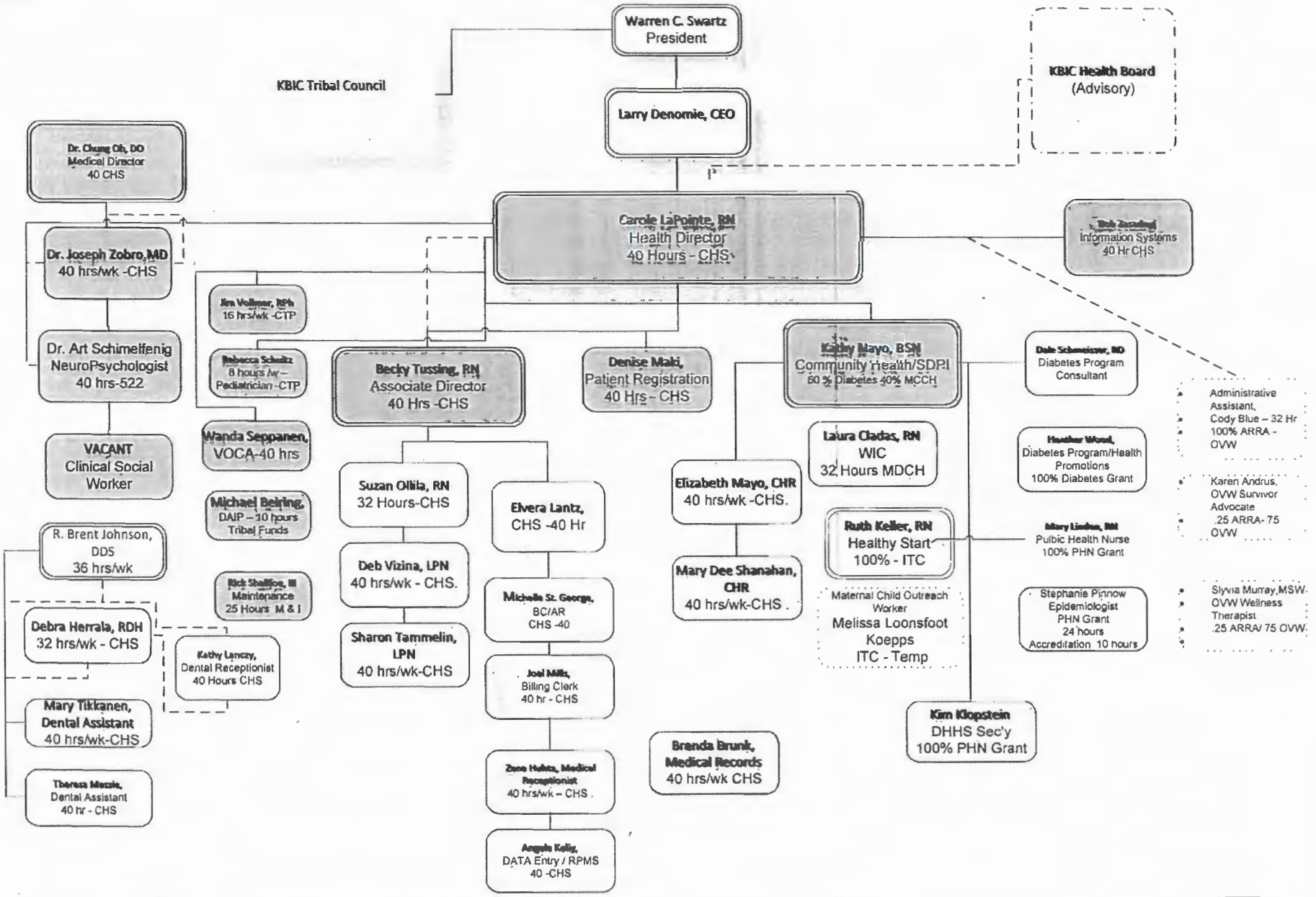
VALUE: GOVERNMENT/LEADERSHIP					
Our vision for the Keweenaw Bay Indian Community is a community where –					
7 Our Community has strong leadership and tribal government 7 There is a Tribal Council code of ethics 7 A new Tribal Center centralizes Tribal government & business operations					
GOALS					
Goal Statements		**Departments**	**1 yr**	**5yr**	**10 yr**
► to adopt a Code of Ethics based on the KBIC Tribal constitution • develop, approve & implement a Code of Ethics document • learn, understand & practice the teachings of the seven grandfathers • lead by example • work more cooperatively among the Council membership • show respect & honor past Tribal elders/leaders w/ recognition plaques/photos in Tribal facilities • hold an annual training retreat for Tribal Council members		Tribal Council, Tribal Attorney	2006	X	X
► to exemplify a Community-focused and Community-driven Tribal Council that is strong, cohesive and effective • to provide opportunities for the Tribal Council & Community to know/understand the Tribal Constitution, By-laws, Treaties, etc., that affect Tribal sovereignty & Council decisions (2006) • to encourage Tribal members to be informed and involved, so they can make educated choices and assist in finding appropriate solutions to Community issues and problems • to have Tribal Council members participate more actively in Community events & activities, particularly with youth and Elders • to maintain current on all Native American issues – locally, nationally and globally • to create a larger Tribal Council chambers (2007) • to retain lobbyist for KBIC in both Washington DC and in Lansing, Michigan (2005)		Tribal Council	X	X	2015

VALUE: GOVERNMENT/LEADERSHIP					
Goal Statements		**Departments**	**1 yr**	**5yr**	**10 yr**
► to annually review the KBIC Comprehensive Strategic Plan • note achievements • review & revise as necessary • identify one year goals • involve Community input		Tribal Council, Tribal Department Heads, Community	X	X	2015
► to improve internal and external communications to effectively administer our Tribal Government • expand/improve the information technology infrastructure • expand/improve internal & external websites (2006) • expand/improve Tribal newsletter • utilize IT to communicate information to staff/employees (2006) • hire a 1.0 FTE public relations position • develop a standard communications style guide (2006)		Tribal Council, IT, Accounting, CEO, Department Heads	X	X	2015
► to require all KBIC Government and Casino employees, Tribal and non-Tribal, to know the history of KBIC, Indian gaming & Tribal government authority as part of their orientation • create a history document of the KBIC		Personnel, HR, Cultural Committee, Gaming Compliance Officer, KBOCC	2007		

VALUE: RESPECT				
Our vision for the Keweenaw Bay Indian Community is a community where –				
7 Our Tribal members respect themselves, each other and Mother earth				
GOALS				
Goal Statements	**Departments**	**1 yr**	**5 yr**	**10 yr**
► to learn, understand & practice the teachings of the seven grandfathers so that they can be honored. • to respect ourselves so that we can respect one another • to consciously live each day in an manner respectful of our surroundings – the earth, the air and the water • to show dignity & respect to all people, places & things • to honor all our relations • to recognize everything that lives • incorporate teachings into management philosophy, including mutual respect and responsibility	Tribal Council, All departments, all employees & all Tribal members	X	X	2015
► to maintain our Tribal cemeteries in a respectful & appropriate manner • employ a sexton that provides maintenance & upkeep (2005) • establish a Cemetery Task Force (2005) • develop a volunteer rooster with specific responsibilities (2005) • establish a Veteran Honoring Memorial (2006) • plot & map our Tribal cemeteries (2006)	Tribal Council, Tribal Maintenance, Ojibwa Senior Citizens, Summer Youth Program, Personnel, Community	2006		
► to conduct an annual event (activity) for the Community, planned & implemented by the Tribal Council • drug/alcohol free event • plan annual event •	Tribal Council	2006		

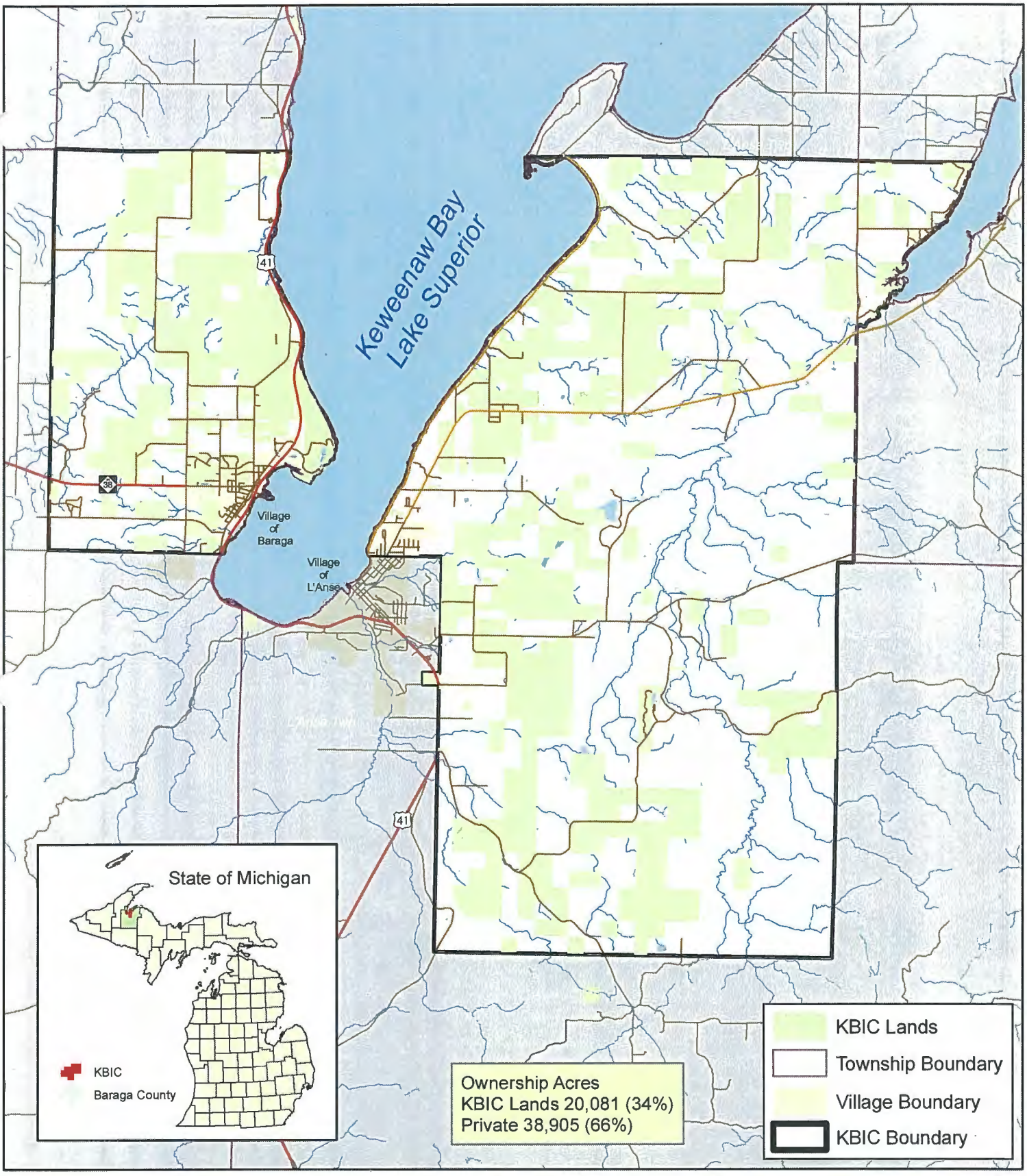
APPENDIX M:

KBIC Health Department Structure


Warren C. Swartz
President
KBIC Tribal Council
KBIC Health Board
(Advisory)
Larry Denomie, CEO
Dr. Chung Oh, DO
Medical Director
40 CHS
Carole LaPointe, RN
Health Director
40 Hours - CHS
Bob Zenobia
Information Systems
40 Hr CHS
Dr. Joseph Zobro, MD
40 hrs/wk -CHS
Jim Vollmer, RPh
16 hrs/wk -CTP
Dr. Art Schimelfenig
NeuroPsychologist
40 hrs-522
Rebecca Schultz
8 hours /wk –
Pediatrician -CTP
Becky Tussing, RN
Associate Director
40 Hrs -CHS
Denise Maki,
Patient Registration
40 Hrs – CHS
Kathy Mayo, BSN
Community Health/SDPI
60 % Diabetes 40% MCCH
Dale Schmeisser, MD
Diabetes Program
Consultant
VACANT
Clinical Social
Worker
Wanda Seppanen,
VOCA-40 hrs
Suzan Ollila, RN
32 Hours-CHS
Elvera Lantz,
CHS -40 Hr
Elizabeth Mayo, CHR
40 hrs/wk -CHS.
Laura Cladas, RN
WIC
32 Hours MDCH
Heather Wood,
Diabetes Program/Health
Promotions
100% Diabetes Grant
Administrative
Assistant,
Cody Blue – 32 Hr
100% ARRA -
OVW
Michael Beiring,
DAIP – 10 hours
Tribal Funds
Deb Vizina, LPN
40 hrs/wk - CHS.
Michelle St. George,
BC/AR
CHS -40
Mary Dee Shanahan,
CHR
40 hrs/wk-CHS .
Ruth Keller, RN
Healthy Start
100% - ITC
Mary Linden, RN
Pulbic Health Nurse
100% PHN Grant
Karen Andrus,
OVW Survivor
Advocate
.25 ARRA- 75
OVW
R. Brent Johnson,
DDS
36 hrs/wk
Rick Shalifoe, III
Maintenance
25 Hours M & I
Sharon Tammelin,
LPN
40 hrs/wk-CHS
Joel Mills,
Billing Clerk
40 hr - CHS
Maternal Child Outreach
Worker
Melissa Loonsfoot
Koepps
ITC - Temp
Stephanie Pinnow
Epidemiologist
PHN Grant
24 hours
Accreditation 10 hours
Sylvia Murray,MSW
OVW Wellness
Therapist
.25 ARRA/ 75 OVW
Debra Herrala, RDH
32 hrs/wk - CHS
Kathy Lanczy,
Dental Receptionist
40 Hours CHS
Mary Tikkanen,
Dental Assistant
40 hrs/wk-CHS
Zona Hulsta, Medical
Receptionist
40 hrs/wk – CHS .
Brenda Brunk,
Medical Records
40 hrs/wk CHS
Kim Klopstein
DHHS Sec'y
100% PHN Grant
Theresa Massie,
Dental Assistant
40 hr - CHS
Angela Kelly,
DATA Entry / RPMS
40 -CHS
June 2010
KBIC Department Of Health & Human Services

APPENDIX N:

Reservation Land Ownership Map



Keweenaw Bay Indian Commuinty

Baraga County, Michigan

0 0.5 1 2
Miles

APPENDIX O:

EPA TAS Designation Letter for Receiving Clean Water Act Section 106 Funding

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JAN 13 1998

REPLY TO THE ATTENTION OF:

R-19J

Frederick Dakota, Chairman
Keweenaw Bay Indian Community
Keweenaw Bay Tribal Center
Baraga, Michigan 49908

Dear Mr. Dakota:

I am pleased to inform you that the Water Division, Region 5, United States Environmental Protection Agency has completed its review of the Keweenaw Bay Indian Community Treatment-as-a-State application. Results of that review, including comments from Office of Regional Counsel, find that all requirements have been met. Consequently, I am designating the Keweenaw Bay Indian Community as eligible for funding under Section 106 of the Clean Water Act.

I applaud the Tribe's interest in protecting its environment and look forward to establishing a long and productive working relationship with the Keweenaw Bay Indian Community.

Sincerely yours,

Valdas V. Adamkus
Regional Administrator

Keweenaw Bay Indian Community Wetlands Map

Lake Superior
Keweenaw Bay

41
38
41

State of Michigan

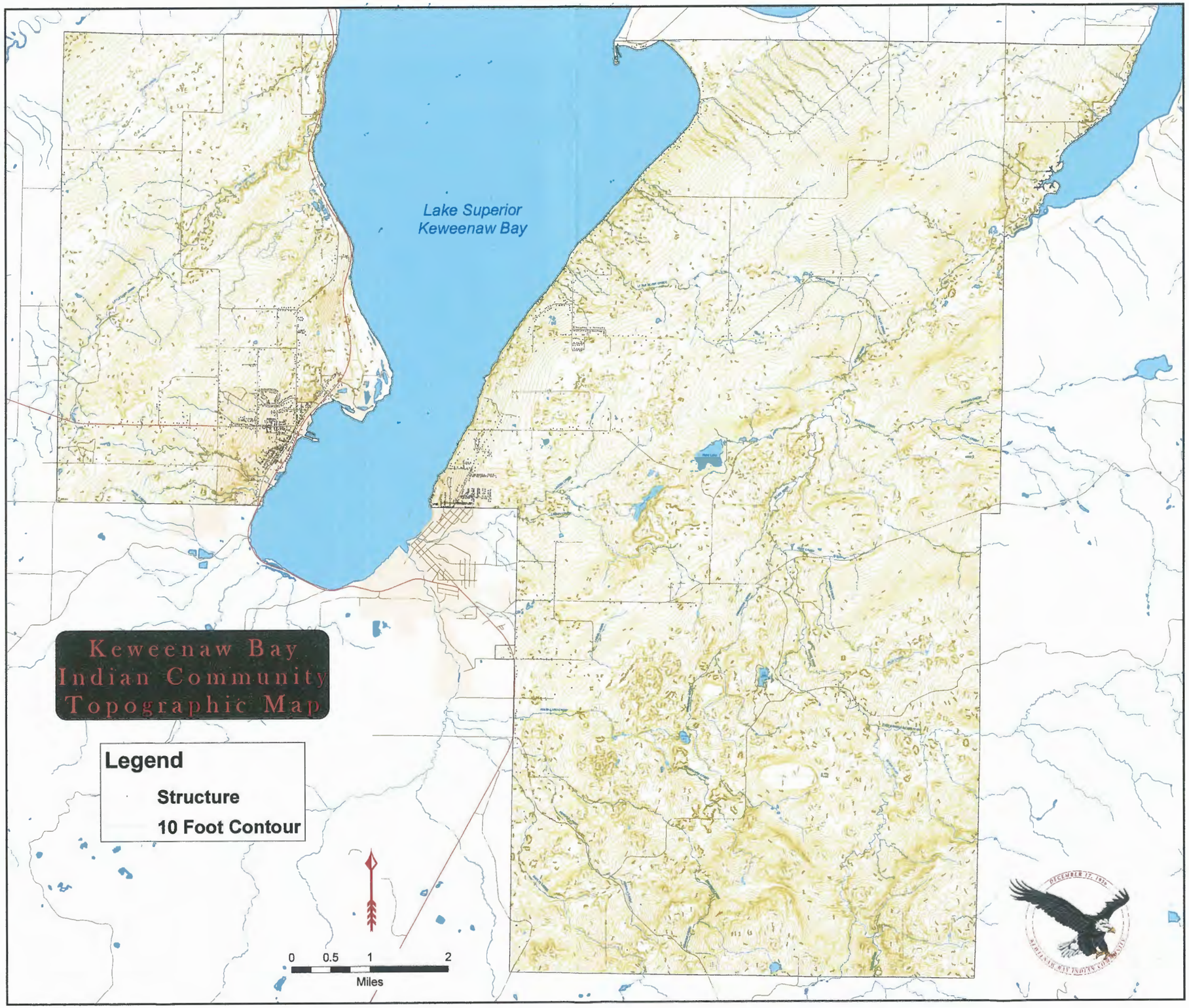
KBIC
Baraga County

River/Stream
Lake
Wetland
KBIC Reservation Boundary

0 0.5 1 2
Miles

Dec.17. 1936
Keweenaw Bay Indian Community

Source: KBIC, Baraga County
Ctreated by: KBIC GIS Office


Lake Superior
Keweenaw Bay
Keweenaw Bay
Indian Community
Topographic Map
Legend
Structure
10 Foot Contour
0 0.5 1 2
Miles

Keweenaw Bay Indian Community Topographic Map

Lake Superior
Keweenaw Bay

41
38
41

State of Michigan

KBIC
Baraga County

Elevation
1803 Ft
470 Ft

0 0.5 1 2
Miles

Dec.17, 1936
Keweenaw Bay Indian Community

Source: KBIC, Baraga County
Created by: KBIC GIS Office

Keweenaw Bay Indian Community Watershed Map

North Branch Otter River
Otter River
Town of Pelkie-Sturgeon River
West Branch Otter River
West Branch Sturgeon River
Silver River
Little Carp River-Frontal Keweenaw Bay
Clear Creek-Sturgeon Creek
Lake Superior
Keweenaw Bay
Village of Baraga
Village of L'Anse
Hickey Creek-Sturgeon River
Falls River
Little Silver Creek-Frontal Keweenaw Bay
Huron Bay
Peterson Creek-Frontal Lake Superior
West Branch Huron River
Peterson Creek-Frontal Lake Superior
Peterson Creek-Frontal Lake Superior
Ravine River
Silver River
Slate River
East Branch Silver River-Silver River
Tioga River-Sturgeon River
Baraga Lake-Peshekee River
Lake Elinor-West Branch Peshekee River
Craig Lake

State of Michigan
KBIC
Baraga County

Lake
River/Stream
KBIC Reservation Boundary
Wetland
Village Boundary

0 0.5 1 2
Miles

Source: KBIC, USGS
Created by: KBIC GIS Office

Forests, Water and People

Drinking water supply and forest lands in Michigan

USDA Forest Service
Northeastern Area
State and Private Forestry

Project Description

In the Northeast and Midwest United States, forests are critically important to the supply of clean drinking water. Protecting and managing forests in source watersheds is an essential part of future strategies for providing clean safe drinking water that citizens can afford. The Forests, Water and People analysis identified private forests that are most important for drinking water supply and most in need of protection from development pressure. This fact sheet gives the results of the analysis for the State of Michigan. For more detailed description of methods, and results for the Northeast and Midwest United States, see the full report.

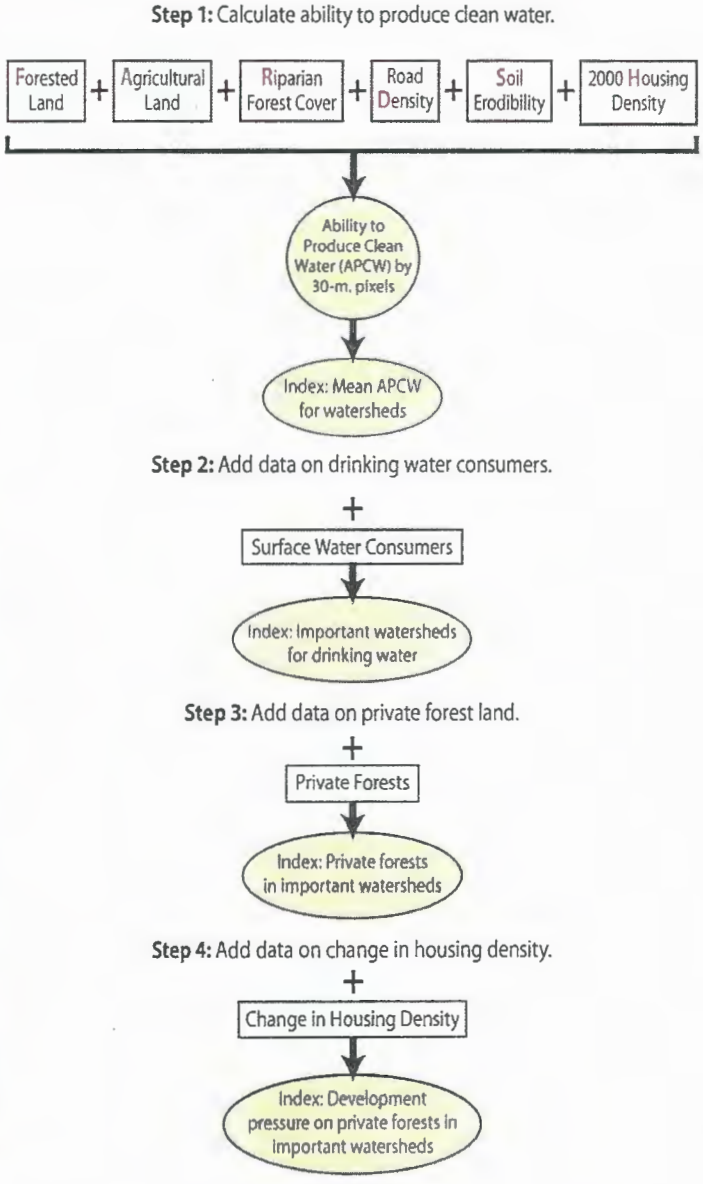
The Process

Through a 4 step GIS-based overlay analysis, four indices were developed for each watershed (see Figure 1).

Photo by Michael Land.

"Water, in all its uses and permutations, is by far the most valuable commodity that comes from the forest land that we manage, assist others to manage, and/or regulate."
Policy Statement, National Association of State Foresters

Figure 1. *Nine layers of GIS data (boxes) were combined in stepwise fashion, to produce four indices (ovals) of watershed importance for drinking water supplies and the need for private forest management to protect those supplies.*



Michigan Results

Highlights

- Michigan's Upper Peninsula watersheds scored above average in each step of the analysis, with the highest scores in step 1. The State contains large protected forest areas in the north and the Upper Peninsula, a large percent of privately owned forest (66 percent), and high development pressure.
- Those Michigan watersheds that ranked highest in their ability to produce clean water (step 1) are located in the Upper Peninsula, and in the northern part of the State. Sixteen watersheds in the Upper Peninsula (or one-quarter of all the State's watersheds) tied for the highest score in step 1.
- In the ability of watersheds to provide drinking water to the most people (step 2), several Michigan watersheds scored above average, particularly those in the Upper Peninsula. The scores were not as high as in other parts of the study area due to the fact that many areas of Michigan get their drinking water from ground water supplies, which are not included in this study. The Detroit, Flint, and Huron watersheds scored the highest.
- In the ability of watersheds to provide drinking water on private lands (step 3), all of the watersheds of the Upper Peninsula and many of the northern Michigan watersheds scored above average because the State has 66 percent privately owned forest land. The highest scoring watershed is the Michigamme, followed by a tie score between Thunder Bay, Brule, Cedar-Ford, and Tacoosh-Whitefish watersheds.
- Most of Michigan's watersheds scored above average in step 4, which ranked watersheds based on their development pressure and land ownership status (private lands ranked higher because they are subject to conversion). The two highest scoring watersheds were the Pine and Huron watersheds. These watersheds averaged in the top sixteen percent of the study area's watersheds.

Table 1. Watershed results for Michigan

Watershed Name	Hydrologic Unit Code	Mean APCW for watersheds	Surface drinking water consumers	% private forest in watershed	% watershed with housing density increase	Index: Development pressure on private forests important for drinking water supply Score (Step 4)	Rank (Step 4)
Pine	04080202	6 of 10	32,560	35 %	21 %	28 of 40	88 of 540
Huron	04090005	5 of 10	114,000	32 %	19 %	28 of 40	88 of 540
Cheboygan	04070004	9 of 10	0	49 %	21 %	27 of 40	109 of 540
Keweenaw Peninsula	04020103	10 of 10	0	84 %	5 %	27 of 40	109 of 540
Thunder Bay	04070006	9 of 10	0	64 %	12 %	27 of 40	109 of 540
Betsie-Platte	04060104	8 of 10	0	49 %	26 %	26 of 40	126 of 540
Boardman-Charlevoix	04060105	8 of 10	0	49 %	29 %	26 of 40	126 of 540
Flint	04080204	5 of 10	124,943	25 %	12 %	26 of 40	126 of 540
Manistee	04060103	9 of 10	0	40 %	19 %	26 of 40	126 of 540
Pere Marquette-White	04060101	8 of 10	0	44 %	20 %	26 of 40	126 of 540
Michigamme	04030107	10 of 10	0	74 %	3 %	25 of 40	148 of 540
Muskegon	04060102	7 of 10	0	44 %	23 %	25 of 40	148 of 540
Au Gres-Rifle	04080101	8 of 10	0	51 %	12 %	25 of 40	148 of 540
Tittabawassee	04080201	7 of 10	0	45 %	24 %	25 of 40	148 of 540
Dead-Kelsey	04020105	10 of 10	0	87 %	3 %	25 of 40	148 of 540
Upper Wisconsin	07070001	10 of 10	0	56 %	6 %	25 of 40	148 of 540
Detroit	04090004	4 of 10	975,810	20 %	9 %	25 of 40	148 of 540
Tacoosh-Whitefish	04030111	10 of 10	0	51 %	7 %	25 of 40	148 of 540
Cedar-Ford	04030109	10 of 10	0	59 %	4 %	24 of 40	169 of 540
Lone Lake-Ocqueoc	04070003	9 of 10	0	57 %	6 %	24 of 40	169 of 540
St. Joseph	04100003	2 of 10	250,000	15 %	17 %	23 of 40	199 of 540
Menominee	04030108	9 of 10	0	50 %	6 %	23 of 40	199 of 540
Black	04070005	9 of 10	0	37 %	10 %	23 of 40	199 of 540
Flambeau	07050002	10 of 10	0	45 %	4 %	23 of 40	199 of 540
Escanaba	04030110	10 of 10	0	49 %	3 %	23 of 40	199 of 540
Thornapple	04050007	6 of 10	0	27 %	30 %	22 of 40	229 of 540
Black-Presque Isle	04020101	10 of 10	0	56 %	2 %	22 of 40	229 of 540
Lower Grand	04050006	6 of 10	0	30 %	26 %	22 of 40	229 of 540

Watershed Name	Hydrologic Unit Code	Mean APCW for watersheds	Surface drinking water consumers	% private forest in watershed	% watershed with housing density increase	Index: Development pressure on private forests important for drinking water supply Score (Step 4)	Rank (Step 4)
Au Sable	04070007	9 of 10	0	32 %	9 %	22 of 40	229 of 540
Brule	04030106	10 of 10	0	52 %	2 %	22 of 40	229 of 540
Sturgeon	04020104	10 of 10	0	49 %	2 %	22 of 40	229 of 540
Fishdam-Sturgeon	04030112	10 of 10	0	36 %	3 %	22 of 40	229 of 540
Betsy-Chocolay	04020201	10 of 10	0	49 %	3 %	22 of 40	229 of 540
Kalamazoo	04050003	6 of 10	0	31 %	22 %	22 of 40	229 of 540
St. Marys	04070001	7 of 10	0	53 %	4 %	22 of 40	229 of 540
Brevoort-Millecoquins	04060107	10 of 10	0	44 %	2 %	22 of 40	229 of 540
Black-Macatawa	04050002	5 of 10	0	33 %	19 %	21 of 40	264 of 540
Lake St. Clair	04090002	1 of 10	11,848	23 %	13 %	21 of 40	264 of 540
Bad-Montreal	04010302	9 of 10	0	52 %	1 %	21 of 40	264 of 540
Carp-Pine	04070002	10 of 10	0	27 %	3 %	20 of 40	289 of 540
Raisin	04100002	3 of 10	26,504	16 %	17 %	20 of 40	289 of 540
Tahquamenon	04020202	10 of 10	0	39 %	1 %	19 of 40	320 of 540
Clinton	04090003	4 of 10	0	29 %	14 %	19 of 40	320 of 540
Manistique	04060106	10 of 10	3,874	26 %	2 %	19 of 40	320 of 540
St. Joseph	04050001	4 of 10	0	21 %	18 %	19 of 40	320 of 540
Upper Grand	04050004	5 of 10	0	25 %	15 %	19 of 40	320 of 540
Kawkawlin-Pine	04080102	5 of 10	0	28 %	12 %	19 of 40	320 of 540
St. Clair	04090001	4 of 10	4,652	22 %	16 %	19 of 40	320 of 540
Waiska	04020203	8 of 10	0	32 %	3 %	18 of 40	337 of 540
Ontonagan	04020102	10 of 10	0	34 %	1 %	18 of 40	337 of 540
Little Calumet-Galien	04040001	3 of 10	0	31 %	11 %	17 of 40	352 of 540
Shiawassee	04080203	4 of 10	0	22 %	10 %	17 of 40	352 of 540
Cass	04080205	5 of 10	0	25 %	9 %	17 of 40	352 of 540
Maple	04050005	4 of 10	0	14 %	17 %	17 of 40	352 of 540
Tiffin	04100006	1 of 10	22,144	12 %	9 %	16 of 40	380 of 540
Kankakee	07120001	3 of 10	43,789	10 %	7 %	16 of 40	380 of 540
Ottawa-Stony	04100001	1 of 10	995	16 %	13 %	15 of 40	394 of 540
Birch-Willow	04080104	2 of 10	0	16 %	5 %	12 of 40	442 of 540
Saginaw	04080206	2 of 10	0	6 %	7 %	12 of 40	442 of 540
Pigeon-Wiscoggin	04080103	2 of 10	0	8 %	4 %	10 of 40	465 of 540

Average or total value for all watersheds listed in Table 1

Mean APCW for watersheds:	6.9	of 10
Important watersheds for drinking water composite score:	8.8	of 20
Private forests in important watersheds composite score:	14.5	of 30
Development pressure on private forests in important watersheds composite score:	21.6	of 40
Forested Land (acres):	24,512,265.3	
Private Forest (acres):	16,175,379.7	
Private Forest Land under Development Pressure by 2030 (acres):	2,225,629.1	
(% private forest land):	13.8%	

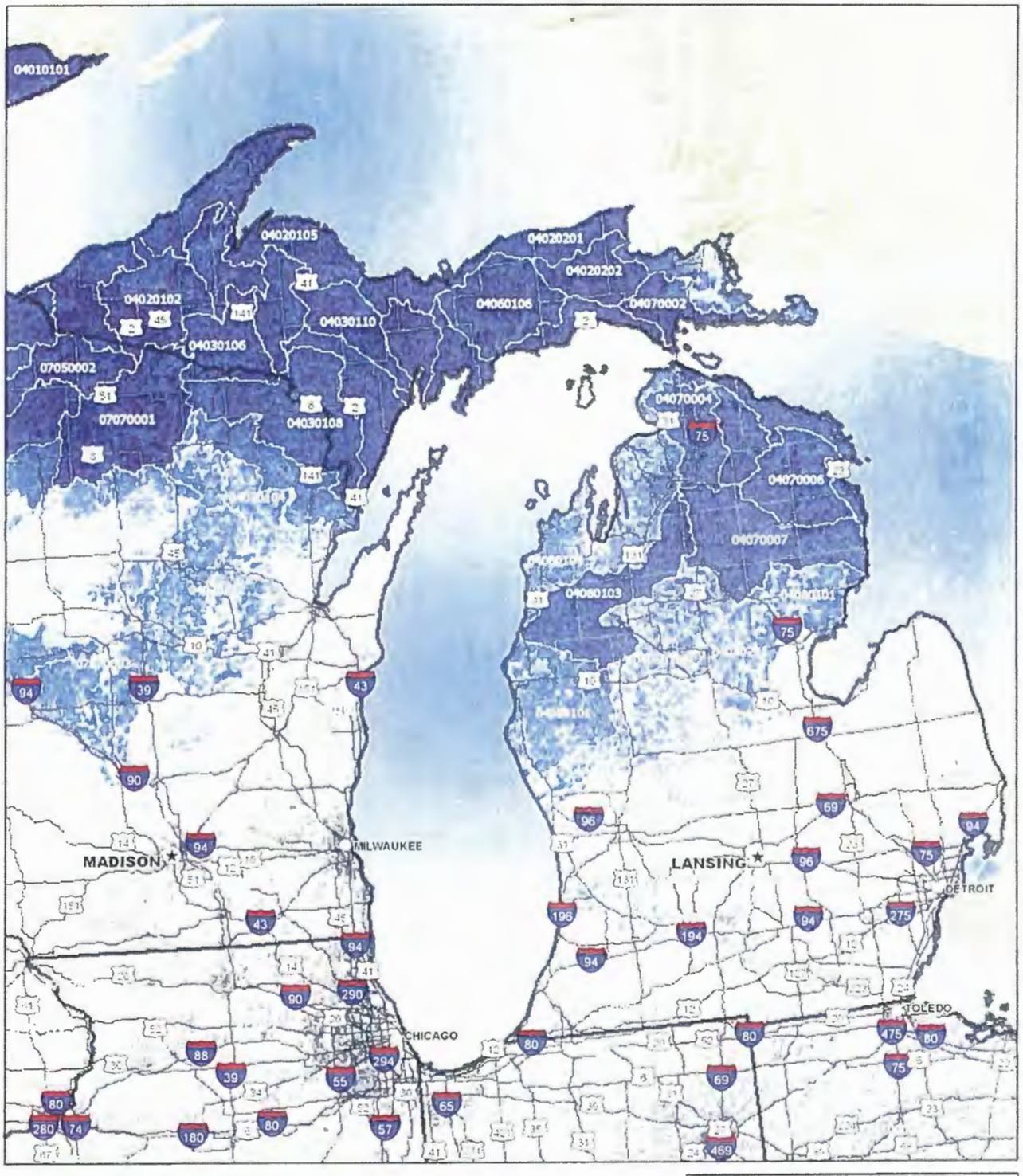
Note: If a watershed fell partially in Michigan, the whole watershed was considered for this project. State results reflect the total acreage for all watersheds that impact that State (this may account for a higher acreage figure than if only lands within State boundaries were considered).

Maps

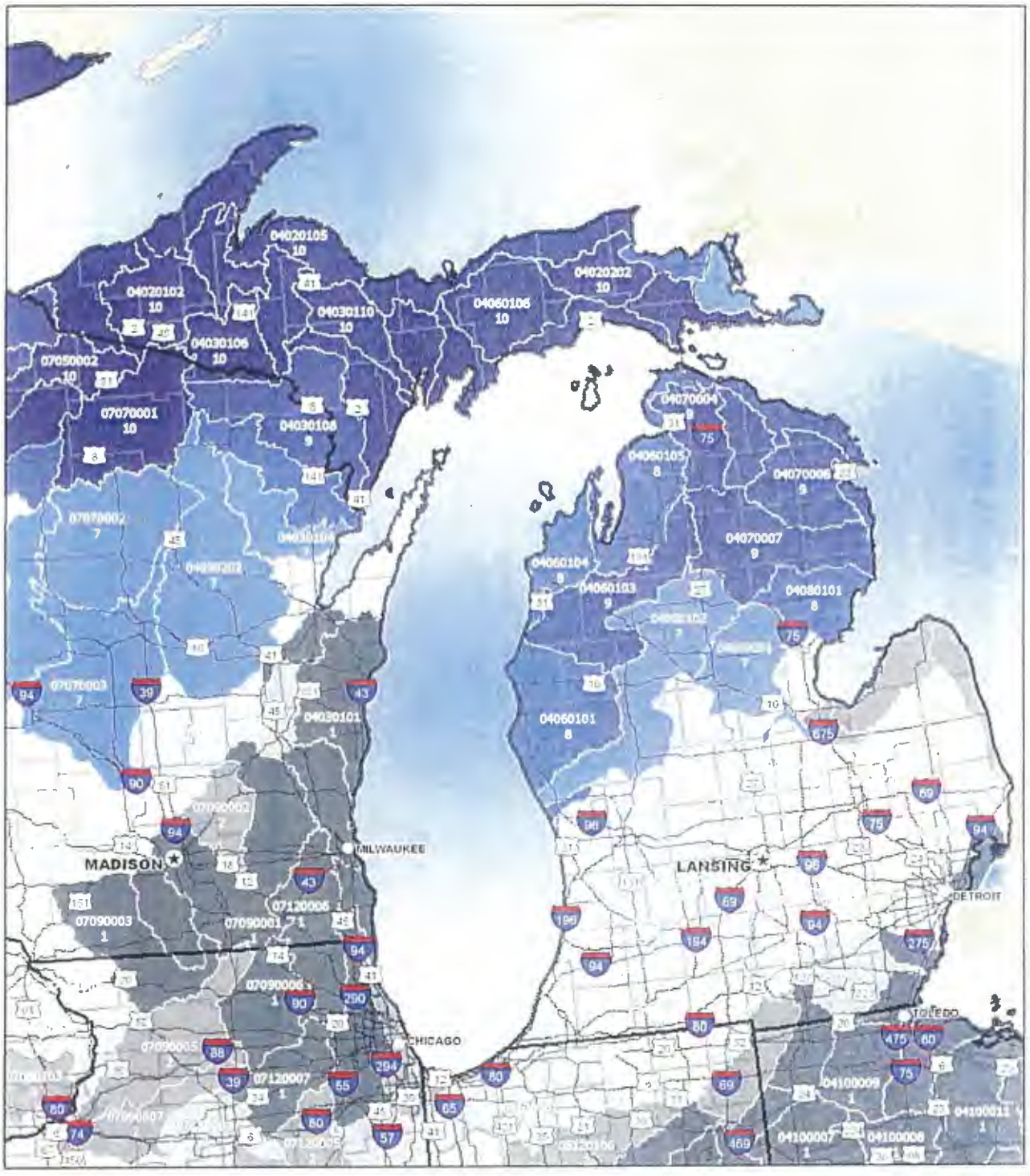
The following maps depict the results of each step in the Forests, Water and People analysis. Each watershed is labeled with the eight-digit HUC and the watershed composite score for the analysis step. (Note: the APCW, 30-m. pixel view does not have a watershed score)

All of the maps were produced by Rebecca Whitney Lilja, Office of Knowledge Management, Northeastern Area State and Private Forestry.

Ability to Produce Clean Water (APCW) (Step 1), 30-m View - Michigan



Mean Ability to Produce Clean Water (APCW) by Watershed (Step 1, Continued) - Michigan



STEP 1 COMPOSITE SCORE

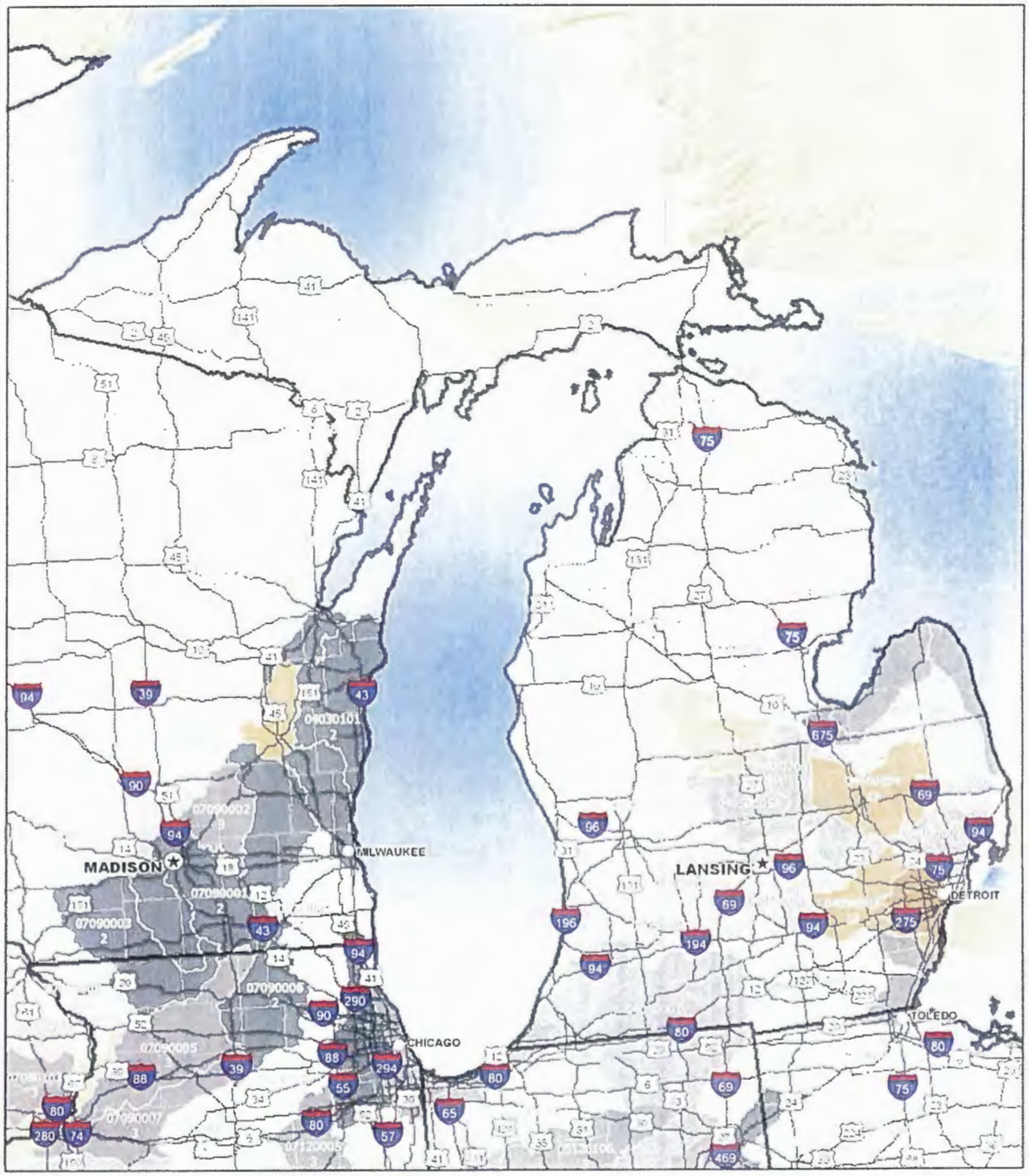
I (Low APCW) — III (High APCW)

Projection: Albers

Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

0 15 30 60 Miles

Importance of watersheds for drinking water supply (Step 2) - Michigan



STEP 2 COMPOSITE SCORE

2 5 10 15 19

(Low APCW and Small number of water consumers)

(High APCW and Large number of water consumers)

Projection: Albers

Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

0 15 30 60 Miles

Importance of watersheds and private forest for drinking water supply (Step 3) - Michigan

Development pressure on private forests in drinking water supply watersheds (Step 4) - Michigan

STEP 4 COMPOSITE SCORE

5 10 15 20 25 30 37

(Low APCV; Small number of water consumers; Low % private forest; and Low development pressure)

(High APCV; Large number of water consumers; High %private forest; and High development pressure)

Projection: Albers

Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

0 20 40 80 Miles

References

Table 2. Datasets used in the Forests, Water and People Analysis

Attribute	Dataset	Source*
Forest land	1992 National Landcover Dataset	U.S. Geological Survey 1999
Agricultural land by watershed	1992 National Landcover Dataset	U.S. Geological Survey 1999
Riparian forest cover by watershed	1:100,000-scale National Hydrography Dataset, buffered to 30 meters	Hatfield 2005
Road density	2002 Bureau of Transportation Statistics (BTS) Roads	U.S. Department of Transportation 2002
Soil erodibility	STATSGO Soil Dataset, kffact	Miller and White 1998
Housing density by watershed	Housing density in 2000	Theobald 2004
Surface drinking water consumers per unit area	Public Drinking Water System (PWS) Consumers by eight-digit HUC; City Drinking water consumers for New York City, Philadelphia, St. Louis, St. Paul, and Washington DC	U.S. Environmental Protection Agency 2005
Private forest by watershed	Protected Areas Database, Version 4; Wisconsin Stewardship Data	Conservation Biology Institute 2006; U.S. Geological Survey, Upper Midwest Environmental Sciences Center 2005
Development pressure per unit area	Housing density in 2000 and 2030	Theobald 2004

*Note: See the full report for complete reference citations.

Watershed Resources

Northeastern Area Watershed— http://www.na.fs.fed.us/watershed

Forest-to-Faucet Partnership—http://www.wetpartnership.org/index.html

Trust for Public Land Source Water Stewardship Project—http://www.tpl.org/

Forests on the Edge—http://www.fs.fed.us/openspace/fote/index.html

American Water Works Association—Professional and Technical Resources—
http://www.awwa.org/Resources/index.cfm?&navItemNumber=1416

Source Water Collaborative—http://www.protectdrinkingwater.org/

Environmental Protection Agency—Surf Your Watershed—http://cfpub.epa.gov/surf/locate/index.cfm

Environmental Protection Agency—Safe Drinking Water Information System—

http://www.epa.gov/enviro/html/sdwis/sdwis_ov.html

This project was a collaborative effort between the Northeastern Area and Dr. Paul K. Barten, Associate Professor, University of Massachusetts-Amherst and Co-director of the Forest-to-Faucet Partnership.

Kathryn Maloney, Director
11 Campus Blvd., Suite 200
Newtown Square, PA 19073
(610) 557-4103 (4177-FAX)
[illegible]

[illegible]/watershed/

Albert H. Todd, Watershed Program Leader
(now Assistant Director
Ecosystem Services and Markets,
Washington, D.C.)
(202) 205-8528
atodd@fs.fed.us

Martina Barnes, Regional Planner
11 Campus Boulevard, Suite 200
Newtown Square, PA 19073
(610) 557-4217 (4136-FAX)
martinabarnes@fs.fed.us

June 2009

http://iaspub.epa.gov/tmdl/w305b_report_v2.huc?p_huc=04020105&p_state=MI
Last updated on Thursday, December 01, 2011

National Assessment Database

Assessment Data for Michigan, Dead-Kelsey Watershed, Year 2002

Other Water Assessment Information

The most current report available for this watershed is 2006.
Data are also available for these years: 2004

Description of this table
For a report glossary please click here.

Click on the Water Name link to get 305(b) Lists/Assessment Unit Information Report

Table Legend:	Water Status is Good	Water Status is Threatened	Water Status is Impaired	Water Status has not been Assessed

Water Name	Assessment Unit ID	Location	Map	State	Water Type	Water Size	Unit	Water Status
BADGER CREEK	MI220602E	Dead River (tourist park impoundment) u/s.	No Mapping Data	MI	RIVER	3	MILES	GOOD
BIG GARLIC RIVER	MI220701B	u/s Lake Superior confluence (including Wilson Creek).	No Mapping Data	MI	RIVER	41	MILES	GOOD
BRICKYARD CREEK	MI220602D	Dead River confluence and u/s to Bishop Pond.	No Mapping Data	MI	RIVER	1.5	MILES	GOOD
CARP CREEK	MI220601C	Vicinity of Ishpeming WWTP; (T48N, R27W, Sec. 34 - NW1/4 of SW1/4)	No Mapping Data	MI	RIVER	.2	MILES	GOOD
CLARK CREEK	MI220602C	Dead River confluence u/s.	No Mapping Data	MI	RIVER	30	MILES	GOOD
CONNORS CREEK	MI220602H	Dead River confluence u/s.	No Mapping Data	MI	RIVER	7	MILES	GOOD
DEAD RIVER	MI220602K	About 20 miles NW of Marquette. Silver Lake Basin confluence	No Mapping Data	MI	RIVER	13	MILES	GOOD

		u/s.						
DEER LAKE (IMP. OF CARP RIVER)%	MI220601B	Located 13 miles west of Marquette in Ishpeming Twp. R27W, T48N, Sec. 27, 28 and 29.	No Mapping Data	MI	FRESHWATER LAKE	906	ACRES	IMPAIRED
FALLS RIVER	MI220805F	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	50	MILES	GOOD
GOLDMINE CREEK	MI220601J	Deer Lake confluence u/s near Ishpeming	No Mapping Data	MI	RIVER	3	MILES	GOOD
HARLOW CREEK	MI220602J	From Lake Superior confluence u/s to include Campeau Creek and Bismarck Creek.	No Mapping Data	MI	RIVER	40	MILES	GOOD
HURON RIVER	MI220703C	From T52N, R30W, Sec. 26 (Big Erics Bridge) to mouth T52N, R29W, Sec. 18.	No Mapping Data	MI	RIVER	6.1	MILES	GOOD
KELSEY CREEK	MI220805J	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	6.5	MILES	GOOD
LINDEN CREEK	MI220805D	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	9	MILES	GOOD
LITTLE CARP RIVER	MI220805I	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	8.5	MILES	GOOD
LITTLE DEAD RIVER	MI220602I	Dead River storage basin confluence u/s (including Zhalkie Creek).	No Mapping Data	MI	RIVER	5	MILES	GOOD
LITTLE GARLIC RIVER	MI220701A	From Lake Superior u/s (watershed).	No Mapping Data	MI	RIVER	23	MILES	GOOD
MENGE CREEK	MI220805G	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	5	MILES	GOOD
MIDWAY CREEK	MI220602F	Dead River confluence u/s.	No Mapping Data	MI	RIVER	3	MILES	GOOD
MULLIGAN CREEK	MI220602G	Dead River confluence u/s.	No Mapping Data	MI	RIVER	23	MILES	GOOD

PINE RIVER	MI220703A	At Huron Mountain Club. Lake Superior confluence u/s to Pine Lake.	No Mapping Data	MI	RIVER	2	MILES	GOOD
RAVINE RIVER	MI220703F	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	26	MILES	GOOD
REANY CREEK	MI220602B	Dead River confluence u/s.	No Mapping Data	MI	RIVER	12	MILES	GOOD
SALMON-TROUT RIVER	MI220703E	Huron Mountain Club - Lake Superior confluence u/s including the E. Branch Salmon-Trout and Snake Creek (watershed).	No Mapping Data	MI	RIVER	33	MILES	GOOD
SILVER RIVER	MI220704A	From Gomanche Creek to mouth.	No Mapping Data	MI	RIVER	6.5	MILES	GOOD
SIX-MILE CREEK	MI220805H	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	10	MILES	GOOD
SLATE RIVER	MI220703B	From headwaters T50N, R31W, Sec. 11 to mouth T51N, R31W, Sec. 8.	No Mapping Data	MI	RIVER	11.8	MILES	GOOD
WHETSTONE CREEK	MI220601D	Vicinity of Marquette.	No Mapping Data	MI	RIVER	1.7	MILES	GOOD
YELLOW DOG RIVER	MI220702A	Independence Lake u/s (watershed).	No Mapping Data	MI	RIVER	73	MILES	GOOD

State Causes of Impairment

Michigan, Dead-Kelsey Watershed

Description of this table

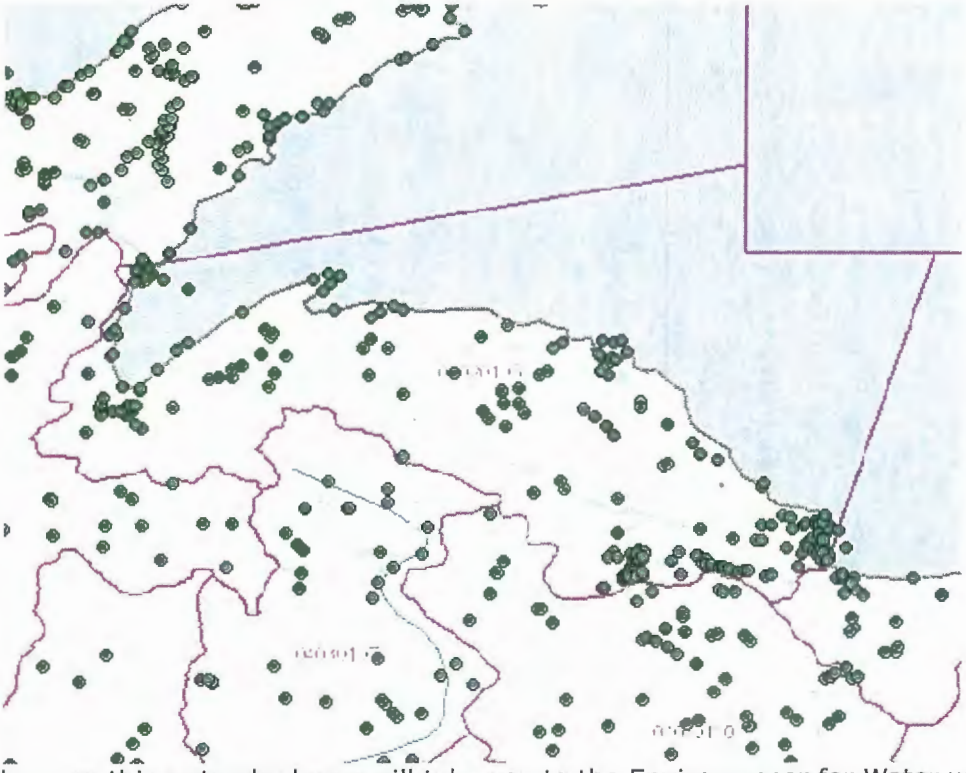
State Cause Name	Size of Assessed Waters with Listed Causes of Impairment							
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Shorelines (Miles)	Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)	Great Lakes Shoreline (Miles)	Great Lakes Open Waters (Squar Miles)
MERCURY	.00	906.00	.00	.00	.00	.00	.00	.00
OTHER METALS	.20	.00	.00	.00	.00	.00	.00	.00

Probable Sources Contributing to Impairment

Michigan, Dead-Kelsey Watershed

Description of this table

State Source Name	Size of Assessed Waters with Probable Sources of Impairment							
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Shorelines (Miles)	Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)	Great Lakes Shoreline (Miles)	Great Lakes Open Waters (Square Miles)
CONTAMINATED SEDIMENTS	.00	906.00	.00	.00	.00	.00	.00	.00
MUNICIPAL POINT SOURCE DISCHARGES	.20	.00	.00	.00	.00	.00	.00	.00



Clicking anywhere on this watershed map will take you to the Enviromapper for Water website, where you can view and map various types of environmental information for the watershed. This information includes Superfund sites, water discharge permits, toxic releases, and more.

http://iaspub.epa.gov/tmdl/w305b_report_v4.huc?p_huc=04020105&p_state=MI&p_cycle=2004
Last updated on Thursday, December 01, 2011

National Assessment Database

Assessment Data for Michigan, Dead-Kelsey Watershed (8 Digit USGS Cataloging Unit), Year 2004

Description of this table
For a report glossary please click here.

Click on the Water Name link to get 305(b) Lists/Assessment Unit Information Report

Table Legend:	Water Status is Good	Water Status is Threatened	Water Status is Impaired	Water Status has not been Assessed

Water Name	Assessment Unit ID	Location	Map	State	Water Type	Water Size	Unit	Water Status
BADGER CREEK	MI220602E	Dead River (tourist park impoundment) u/s.	No Mapping Data	MI	RIVER	3	MILES	GOOD
BIG GARLIC RIVER	MI220701B	u/s Lake Superior confluence (including Wilson Creek).	No Mapping Data	MI	RIVER	41	MILES	GOOD
BRICKYARD CREEK	MI220602D	Dead River confluence and u/s to Bishop Pond.	No Mapping Data	MI	RIVER	1.5	MILES	GOOD
CARP CREEK TO DEER LAKE TO CARP RIVER MOUTH#	MI220601A	Vicinity of Ishpeming.	No Mapping Data	MI	RIVER	29	MILES	IMPAIRED
CLARK CREEK	MI220602C	Dead River confluence u/s.	No Mapping Data	MI	RIVER	30	MILES	GOOD
CONNORS CREEK	MI220602H	Dead River confluence u/s.	No Mapping Data	MI	RIVER	7	MILES	GOOD
DEAD RIVER	MI220602K	About 20 miles NW of Marquette. Silver Lake Basin confluence u/s.	No Mapping Data	MI	RIVER	13	MILES	GOOD
DEAD RIVER	MI220602X	d/s from Forestville and Tourist Park Dams, approximately 4 miles.	No Mapping Data	MI	RIVER	1.5	MILES	NOT ASSESSED
FALLS RIVER	MI220805F	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	50	MILES	GOOD
FORESTVILLE BASIN (DEAD RIVER)	MI220602A	From the Tourist Park Dam u/s to the powerhouse at the west end of the Forestville Reservoir.	No Mapping Data	MI	FRESHWATER LAKE	85	ACRES	IMPAIRED
GOLDMINE CREEK	MI220601J	Deer Lake confluence u/s near Ishpeming	No Mapping Data	MI	RIVER	3	MILES	GOOD

National Assessment Database

About this Database

Assessing Water Quality (Questions and Answers)

The 2004 National Assessment Database(Fact Sheet)

Previous National Water Quality Reports

HARLOW CREEK	MI220602J	From Lake Superior confluence u/s to include Campeau Creek and Bismarck Creek.	No Mapping Data	MI	RIVER	40	MILES	GOOD
HURON RIVER	MI220703C	Lake Superior Huron Bay u/s to Big Erics Bridge.	No Mapping Data	MI	RIVER	6.1	MILES	GOOD
KELSEY CREEK	MI220805J	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	6.5	MILES	GOOD
LAKE INDEPENDENCE	MI220702X	Vicinity of Big Bay.	No Mapping Data	MI	FRESHWATER LAKE	1860	ACRES	IMPAIRED
LINDEN CREEK	MI220805D	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	9	MILES	GOOD
LITTLE CARP RIVER	MI220805I	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	8.5	MILES	GOOD
LITTLE DEAD RIVER	MI220602I	Dead River storage basin confluence u/s (including Zhalkie Creek).	No Mapping Data	MI	RIVER	5	MILES	GOOD
LITTLE GARLIC RIVER	MI220701A	From Lake Superior u/s (watershed).	No Mapping Data	MI	RIVER	23	MILES	GOOD
MCCLURE STORAGE RESERVOIR	MI220602Y	HUC: 0WBLOCN	No Mapping Data	MI	FRESHWATER LAKE	132	ACRES	NOT ASSESSED
MENGE CREEK	MI220805G	Lake Superior L"Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	5	MILES	GOOD
MIDWAY CREEK	MI220602F	Dead River confluence u/s.	No Mapping Data	MI	RIVER	3	MILES	GOOD
MULLIGAN CREEK	MI220602G	Dead River confluence u/s.	No Mapping Data	MI	RIVER	23	MILES	GOOD
ORIANNA BROOK	MI220601I	Division St. u/s to the confluence of Westren Brook.	No Mapping Data	MI	RIVER	1	MILES	GOOD
PINE RIVER	MI220703A	At Huron Mountain Club. Lake Superior confluence u/s to Pine Lake.	No Mapping Data	MI	RIVER	2	MILES	GOOD
RAVINE RIVER	MI220703F	Lake Superior Huron Bay confluence u/s.	No Mapping Data	MI	RIVER	26	MILES	GOOD
REANY CREEK	MI220602B	Dead River confluence u/s.	No Mapping Data	MI	RIVER	12	MILES	GOOD
SALMON-TROUT RIVER	MI220703E	Huron Mountain Club - Lake Superior confluence u/s including the E. Branch Salmon-Trout and Snake Creek (watershed).	No Mapping Data	MI	RIVER	33	MILES	GOOD

SILVER RIVER	MI220704A	Lake Superior Huron Bay u/s to Gomanche Creek confluence.	No Mapping Data	MI	RIVER	6.5	MILES	GOOD
SIX-MILE CREEK	MI220805H	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	10	MILES	GOOD
SLATE RIVER	MI220703B	Lake Superior Huron Bay confluence u/s.	No Mapping Data	MI	RIVER	14	MILES	GOOD
UNNAMED TRIBUTARY TO CARP RIVER, NEAR NEGAUNEE	MI220601E	At RR bridge u/s of the Negaunee WWTP effluent ditch.	No Mapping Data	MI	RIVER	.5	MILES	GOOD
WHETSTONE CREEK	MI220601D	Vicinity of Marquette.	No Mapping Data	MI	RIVER	1.7	MILES	GOOD
YELLOW DOG RIVER	MI220702A	Independence Lake u/s (watershed).	No Mapping Data	MI	RIVER	73	MILES	GOOD

State Causes of Impairment

Michigan, Dead-Kelsey Watershed

Description of this table

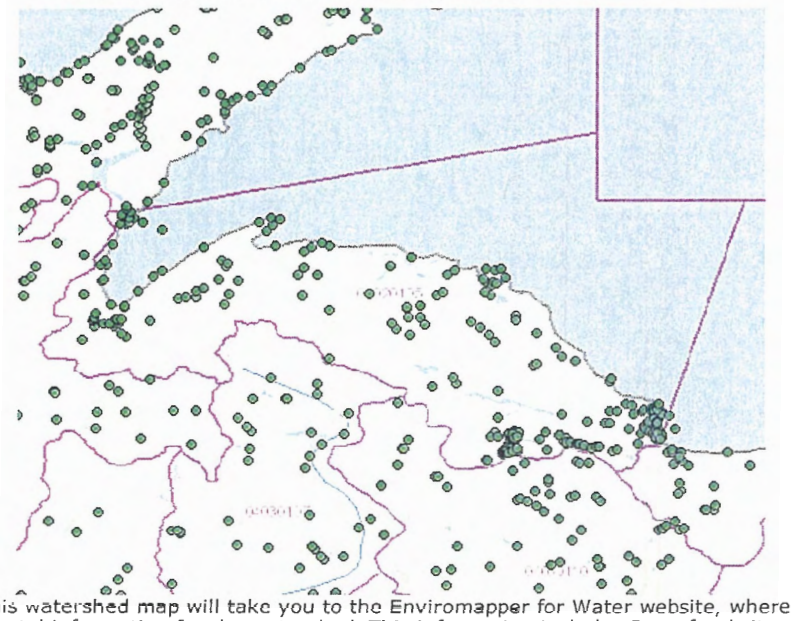
State Cause Name	Size of Assessed Waters with Listed Causes of Impairment								
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Shorelines (Miles)	Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)	Great Lakes Shoreline (Miles)	Great Lakes Open Waters (Square Miles)	Inland Lake Shoreline (Miles)
MERCURY	29.00	.00	.00	.00	.00	.00	.00	.00	.00
MERCURY IN FISH TISSUE	29.00	1,945.00	.00	.00	.00	.00	.00	.00	.00

Probable Sources Contributing to Impairment

Michigan, Dead-Kelsey Watershed

Description of this table

No Probable Sources Contributing to Impairment reported.



Clicking anywhere on this watershed map will take you to the Enviromapper for Water website, where you can view and map various types of environmental information for the watershed. This information includes Superfund sites, water discharge permits,

toxic releases, and more.

http://iaspub.epa.gov/tmdl/w305b_report_v6.huc?p_huc=04020105&p_state=MI&p_cycle=2006
Last updated on Thursday, December 01, 2011

National Assessment Database

Assessment Data for Michigan, Dead-Kelsey Watershed (8 Digit USGS Cataloging Unit), Year 2006

National Assessment Database

- **About this Database**
- **Assessing Water Quality** (Questions and Answers)
- **The 2004 National Assessment Database** (Fact Sheet)
- **Previous National Water Quality Reports**

Description of this table
For a report glossary please click here.

Click on the Water Name link to get 305(b) Lists/Assessment Unit Information Report

Table Legend:	Water Status is Good	Water Status is Threatened	Water Status is Impaired	Water Status has not been Assessed

Water Name	Assessment Unit ID	Location	Map	State	Water Type	Water Size	Unit	Water Status
BADGER CREEK	MI220602E	Dead River (tourist park impoundment) u/s.	No Mapping Data	MI	RIVER	3	MILES	GOOD
BIG GARLIC RIVER	MI220701B	u/s Lake Superior confluence (including Wilson Creek).	No Mapping Data	MI	RIVER	41	MILES	GOOD
BIG PUP CREEK	MI220702B	Little Pup Creek confluence upstream.	No Mapping Data	MI	RIVER	11	MILES	GOOD
BIG PUP CREEK	MI220702D	Little Pup Creek confluence upstream.	No Mapping Data	MI	RIVER	11	MILES	GOOD
BRICKYARD CREEK	MI220602D	Dead River confluence and u/s to Bishop Pond.	No Mapping Data	MI	RIVER	1.5	MILES	GOOD
CARP CREEK	MI220601K	Vicinity of Ishpeming. Deer Lake confluence upstream to just upstream of Stoneville Road.	No Mapping Data	MI	RIVER	5	MILES	IMPAIRED
CARP CREEK TO DEER LAKE TO CARP RIVER MOUTH	MI220601A	Vicinity of Ishpeming.	No Mapping Data	MI	RIVER	29	MILES	IMPAIRED
CEDAR CREEK	MI220703D	Cliff River confluence upstream: vicnity of Northwestern Road.	No Mapping Data	MI	RIVER	8	MILES	GOOD
CEDAR CREEK	MI220703H	Cliff River confluence upstream: vicnity of Northwestern Road.	No Mapping Data	MI	RIVER	8	MILES	GOOD
CLARK CREEK	MI220602C	Dead River confluence u/s.	No Mapping Data	MI	RIVER	30	MILES	GOOD
CONNORS CREEK	MI220602H	Dead River confluence u/s.	No Mapping Data	MI	RIVER	7	MILES	GOOD
DEAD RIVER	MI220602X	d/s from Forestville and Tourist Park Dams, approximately 4 miles.	No Mapping Data	MI	RIVER	1.5	MILES	GOOD
DEAD RIVER	MI220602K	About 20 miles NW of Marquette. Silver Lake Basin confluence u/s.	No Mapping Data	MI	RIVER	13	MILES	GOOD
DEAD RIVER STORAGE BASIN	MI220602L	Impoundment of the Dead River u/s from McClure Storage Basin, Negaunee.	No Mapping Data	MI	RESERVOIR	2704	ACRES	GOOD
DEER LAKE	MI220601B	Located 13 miles west of Marquette in Ishpeming Twp.	No Mapping Data	MI	RESERVOIR	906	ACRES	IMPAIRED
FALLS RIVER	MI220805F	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	50	MILES	GOOD

FORESTVILLE BASIN	MI220602A	From the Tourist Park Dam u/s to the powerhouse at the west end of the Forestville Reservoir.	No Mapping Data	MI	RESERVOIR	85	ACRES	IMPAIRED
GOLDMINE CREEK	MI220601J	Deer Lake confluence u/s near Ishpeming	No Mapping Data	MI	RIVER	3	MILES	GOOD
HARLOW CREEK	MI220602J	From Lake Superior confluence u/s to include Campeau Creek and Bismarck Creek.	No Mapping Data	MI	RIVER	40	MILES	GOOD
HURON RIVER	MI220703C	Lake Superior Huron Bay u/s to Big Erics Bridge.	No Mapping Data	MI	RIVER	6	MILES	GOOD
KELSEY CREEK	MI220805J	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	6.5	MILES	GOOD
LAKE INDEPENDENCE	MI220702X	Vicinity of Big Bay.	No Mapping Data	MI	FRESHWATER LAKE	1860	ACRES	IMPAIRED
LAKE SUPERIOR L'ANSE WATERFRONT PARK BEACH	MI220805B	Keweenaw Bay / Lake Superior, At the intersection of Broad and Front Streets in L'Anse	No Mapping Data	MI	GREAT LAKES SHORELINE	.1	MILES	GOOD
LINDEN CREEK	MI220805D	Lake Superior confluence u/s.	No Mapping Data	MI	RIVER	9	MILES	GOOD
LITTLE CARP RIVER	MI220805I	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	8.5	MILES	GOOD
LITTLE DEAD RIVER	MI220602I	Dead River storage basin confluence u/s (including Zhalkie Creek).	No Mapping Data	MI	RIVER	5	MILES	GOOD
LITTLE GARLIC RIVER	MI220701A	From Lake Superior u/s (watershed).	No Mapping Data	MI	RIVER	23	MILES	GOOD
MCCLURE STORAGE RESERVOIR	MI220602Y	Impoundment of the Dead River west of Marquette u/s of Carrie Road.	No Mapping Data	MI	RESERVOIR	132	ACRES	GOOD
MENGE CREEK	MI220805G	Lake Superior L"Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	5	MILES	GOOD
MIDWAY CREEK	MI220602F	Dead River confluence u/s.	No Mapping Data	MI	RIVER	3	MILES	GOOD
MULLIGAN CREEK	MI220602G	Dead River confluence u/s.	No Mapping Data	MI	RIVER	23	MILES	GOOD
ORIANNA BROOK	MI220601I	Division Street upstream to the confluence of Western Brook.	No Mapping Data	MI	RIVER	1	MILES	GOOD
PINE RIVER	MI220703A	At Huron Mountain Club. Lake Superior confluence u/s to Pine Lake.	No Mapping Data	MI	RIVER	2	MILES	GOOD
RAVINE RIVER	MI220703F	Lake Superior Huron Bay confluence u/s.	No Mapping Data	MI	RIVER	26	MILES	GOOD
REANY CREEK	MI220602B	Dead River confluence u/s.	No Mapping Data	MI	RIVER	12	MILES	GOOD
SALMON TROUT RIVER	MI220703G	Northwestern Road upstream to to Triple A Road.	No Mapping Data	MI	RIVER	4	MILES	IMPAIRED
SALMON TROUT RIVER	MI220703E	Lake Superior upstream to Northwestern Road.	No Mapping Data	MI	RIVER	57	MILES	GOOD
SILVER RIVER	MI220704A	Lake Superior Huron Bay u/s to Gomanche Creek confluence.	No Mapping Data	MI	RIVER	6.5	MILES	GOOD
SIX-MILE CREEK	MI220805H	Lake Superior L'Anse Bay confluence u/s.	No Mapping Data	MI	RIVER	10	MILES	GOOD

SLATE RIVER	MI220703B	Lake Superior Huron Bay confluence u/s.	No Mapping Data	MI	RIVER	14	MILES	GOOD
UNNAMED TRIBUTARY TO CARP RIVER, NEAR NEGAUNEE	MI220601E	At RR bridge u/s of the Negaunee WWTP effluent ditch.	No Mapping Data	MI	RIVER	.5	MILES	GOOD
WHETSTONE CREEK	MI220601D	Vicinity of Marquette.	No Mapping Data	MI	RIVER	1.7	MILES	GOOD
YELLOW DOG RIVER	MI220702C	Marquette County Road 510 upstream to access road off Triple A Road (0.3 miles west of Champion and Michigamme township line; in the Escanaba River State Forest).	No Mapping Data	MI	RIVER	11	MILES	IMPAIRED
YELLOW DOG RIVER	MI220702A	Upstream from Independence Lake	No Mapping Data	MI	RIVER	73	MILES	GOOD

State Causes of Impairment

Michigan, Dead-Kelsey Watershed

Description of this table

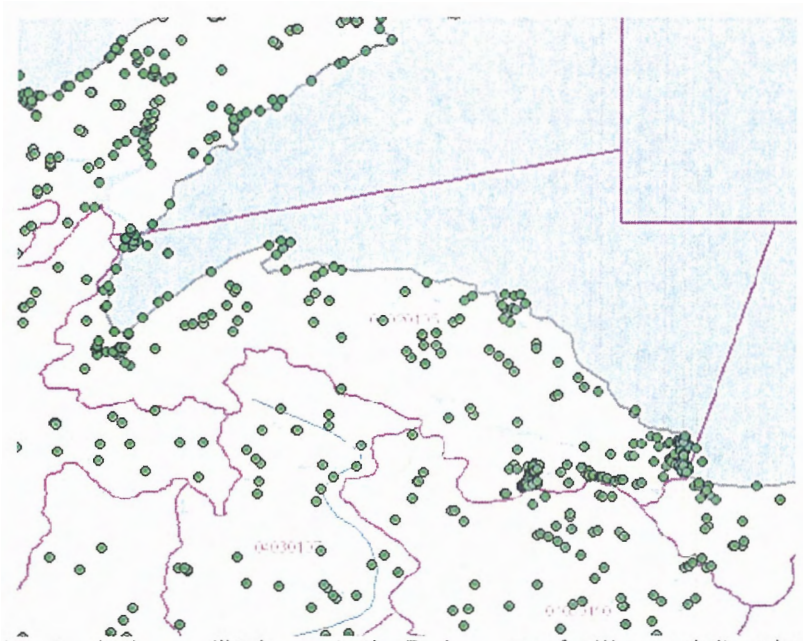
State Cause Name	Size of Assessed Waters with Listed Causes of Impairment									
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Shorelines (Miles)	Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)	Great Lakes Shoreline (Miles)	Great Lakes Open Waters (Square Miles)	Inland Lake Shoreline (Miles)	Great Lakes Connecting Channel (Miles)
MERCURY IN FISH TISSUE	87.00	8,553.00	.00	.00	.00	.00	.00	.00	.00	.00
MERCURY IN WATER COLUMN	60.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

Probable Sources Contributing to Impairment

Michigan, Dead-Kelsey Watershed

Description of this table

State Source Name	Size of Assessed Waters with Probable Sources of Impairment									
	Rivers, Streams, Creeks (Miles)	Lakes, Ponds, Reservoir (Acres)	Bays, Estuaries (Square Miles)	Coastal Shorelines (Miles)	Oceans, Near Coastal Waters (Square Miles)	Wetlands (Acres)	Great Lakes Shoreline (Miles)	Great Lakes Open Waters (Square Miles)	Inland Lake Shoreline (Miles)	Great Lakes Connecting Channel (Miles)
CONTAMINATED SEDIMENTS	29.00	906.00	.00	.00	.00	.00	.00	.00	.00	.00
ATMOSPHERIC DEPOSITION - TOXICS	20.00	1,945.00	.00	.00	.00	.00	.00	.00	.00	.00
SUBSURFACE (HARDROCK) MINING	5.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
MUNICIPAL POINT SOURCE DISCHARGES	29.00	.00	.00	.00	.00	.00	.00	.00	.00	.00



Clicking anywhere on this watershed map will take you to the Enviromapper for Water website, where you can view and map various types of environmental information for the watershed. This information includes Superfund sites, water discharge permits, toxic releases, and more.


Keweenaw Bay Indian Community
Ojibwa Recreational Area
Legend
Sand Point Lighthouse
Wetland Trail (~0.35 miles)
Lake Superior Trail (~1.55 miles)
Wetlands
Lake Campground
Pow Wow Campground
Day Use Area
KBIC L'Anse Reservation
Ponds
Dec. 17, 1936
Keweenaw Bay Indian Community
41
US 41
P
Ojibwa Recreational Area
Baraga
Anse
KBIC
L'Anse Reservation
Wetland/
Natural Area
Hemlock
Cemetery
Camping &
Pow Wow
Area
Wetland Trail
~0.35 Miles
Lake Superior Trail
~1.55 Miles
Cultural
Center
Water
41
Superior
Wetland/
Natural Area
No Camping
Lighthouse
Marina
ICE
Day-Use
Beach & Picnic
Area
Wetland/
Natural Area
Camping
KBIC
L'Anse
Reservation
Minnesota
Michigan
Wisconsin
Lake
Michigan
Lake Erie
Iowa
Illinois
Indiana
Ohio
Maryland
July 2008
Data Taken From: MGDL, KBNRD
0 0.05 0.1 0.2 0.3 0.4 0.5
Miles

APPENDIX P:

Proposed Designated Uses, Draft Water Quality Standards and Reservation Water Resource Information

KEWEENAW BAY TRIBAL SURFACE WATER QUALITY REGULATIONS

Draft Prepared for
Promulgation by the Environmental Protection Agency

by

Carolyn Garcia, Water Quality Specialist
Department of Natural Resources

11/29/99

REVISED BY:

Micah Petoskey, Water Quality Specialist
Department of Natural Resources

3/14/07

Table of Contents

1

Authority, Purpose and Applicability of Regulations

Purpose

The Keweenaw Bay Tribal Water Quality Regulations shall govern water management decisions and activities that affect waters of the Reservation. In addition, these regulations shall serve to recognize, protect and provide for the sacred relationship that exists between the Ojibwa people of the Keweenaw Bay Indian Community and their waters.

These regulations ensure compliance with sections 303 and 518 of the Clean Water Act. These regulations prohibit and regulate unauthorized discharges of substances into the waters of the Reservation and regulates water quality and quantity, and activities that affect water quality, quantity and uses of water of the Reservation.

Intent of Regulations:

The intent of the water quality regulations set forth in this document is to establish water quality requirements applicable to all waters of Reservation. These regulations are intended to protect the public health and welfare, to restore, enhance, and conserve the chemical, physical, and biological integrity of our waters and to protect the natural resources of the Keweenaw Bay Indian Community for present and future generations.

The water quality standards herein represent water quality goals and may not reflect current water quality of all Reservation surface waters. Water quality in certain waters of the Reservation may not meet the water quality standards as a result of natural causes or conditions unrelated to human activities or influence. In cases where waters of the Reservation may have been degraded due to past human activities and influence and attainment of standards in the near future is not economically or technically feasible, these standards shall be used to improve water quality. These standards are the minimum water quality requirements by which the waters of the Reservation are to be managed.

Applicability

These regulations shall apply to all surface waters located within the exterior boundaries of the L'Anse Federal Indian Reservations and all lands held in trust by Keweenaw Bay Indian Community, including waters with reaches flowing through the Reservation, and to all facilities, practices and activities which may affect the quality and quantity of waters of the Reservation located in Baraga, Ontonagon and Marquette counties of Michigan. These standards shall be the primary basis by which all water quality based effluent limits will be established for point sources that effect any waters of the Keweenaw Bay Indian Community.

The water quality standards contained in these regulations are not specifically directed toward off-Reservation waters within the territory claimed or ceded by the Community pursuant to various treaties entered into between Keweenaw Bay Indian Community and the United States.

Severability

Should any provision(s) of these regulations be declared invalid or unconstitutional for any reason, the remainder of these regulations shall not be affected thereby.

Authority

The Keweenaw Bay Indian Community is a federally recognized Indian Tribe exercising inherent sovereign authority over its members and its territories, and has a Reservation created by the 1854 Treaty with the Chippewa, 10 Stat. 1109. The Community is organized pursuant to the provisions of the Indian Reorganization Act of 1934, 48 Stat. 984, 25 U.S. C § 476. Pursuant to that Act, the Community has adopted a Constitution and Bylaws which were duly approved by the Secretary of the United States Department of the Interior on December 17, 1936. Under the Community's Constitution, all executive and legislative powers are vested in a twelve-member Tribal Council. Article VI, Section 1(a) of the Constitution empowers the Tribal Council "to protect and preserve the tribal property, wildlife and natural resources of the Community." In addition, Article VI, Section 1 (n) of the Constitution empowers the Tribal Council "to promulgate and enforce ordinances which are intended to safeguard and promote the peace, safety, morals, and general welfare of the Keweenaw Bay Indian Community by regulating the conduct of trade and the use and disposition of property upon the Reservation."

2

Definitions

Terms defined as used in document

Acute: A stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96 hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute affect is not always measured in terms of lethality.

Adverse Effect: Any deleterious effect to organisms due to exposure to a substance. This includes effects which are or may become debilitating, harmful, or toxic to the normal functions of the organism, but does not include non-harmful effects such as tissue discoloration alone or the induction of enzymes involved in the metabolism of the substance.

Ambient: The background physical, chemical, and biological conditions or characteristics of waters including the course in which it flows and the normal background daily and seasonal variations in weather, climatic, and atmospheric conditions that affect a given waterbody. It includes the levels of pollutants present in ambient water that are not from anthropogenic input sources.

Agricultural and/or Industrial Use: Refer to Chapter 3, herein.

Anthropogenic: Caused by or related to human actions either directly or indirectly.

Antidegradation Policy: This policy is used to protect existing uses and consists of approved antidegradation statements consistent with 40 CFR 131.12 and allow the permitting authority and the Community to determine on a case-by-case basis whether, and to what extent, water quality may be lowered.

Aquatic Community: Refers to any and all animal, plant or other life form which resides during any stage of its life cycle within a waterbody.

Background: The ambient environmental condition.

Bioaccumulation: The process by which contaminants (pollutants) build up over time within the tissues of an organism as a result of uptake from any and all environmental sources. This process is particularly associated with persistent organic contaminants that generally tend to be lipophilic and are not easily metabolized or excreted.

Bioaccumulation Factor (BAF): the ratio liters per kilogram (L/Kg) of a substance's concentration in tissue of an aquatic organism to its concentration in the ambient water, where both the organism and its food are exposed and the ratio does not change substantially over time.

Bioaccumulative Chemical of Concern (BCC): A chemical which upon entering the surface water, by itself or as its toxic transformation product, accumulates in aquatic organisms. Generally, chemicals with

a half-life in the water of less than eight weeks are not BCCs. BCCs listed in 40 CFR 132, table 6A (pg. 15393), as amended, will comprise the definition of all the chemicals identified herein as BCCs.

Bioconcentration: The process by which chemicals become concentrated in the tissues of fish and aquatic invertebrates via direct partitioning across the gills or epithelial tissue.

Biota-sediment accumulation factor (BSAF): The ratio (in kilogram of organic carbon/kilogram of lipid) of a substance's lipid-normalized concentration in tissue of an aquatic organism to its organic carbon-normalized concentration in surface sediment in situations where: 1) the ratio does not change substantially over time, 2) both the organism and its food are exposed, and 3) the surface sediment is representative of average sediment in the vicinity of the organism.

Biological integrity: The ambient biological condition of waters. It includes daily and seasonal variations in the biological condition of a given water and excludes any conditions that are related to human activities or influence.

Carcinogen : A substance which causes an increased incidence of benign or malignant neoplasms in animals or humans, or substantially decreases the time to develop neoplasms.

Carcinogenicity: The ability of a toxicant to cause cancer. Any chemical that significantly increases the risk of any type of cancer is classified as carcinogenic.

Ceremonial, Religious, and Spiritual Uses: Refer to designated uses, chapter 4, herein.

Chemical Integrity: The ambient chemical characteristics of waters. It includes the normal daily and seasonal variations in the chemical constituents and parameters of natural waters and the levels of pollutants present in water that are not from anthropogenic sources.

Chemical of Concern: EPA 'priority list' of pollutants consisting of compounds and families of compounds that are among the most persistent, prevalent, and toxic of chemicals known to man. This list shall be defined herein as the current list consisting of the toxic pollutants identified in 40 CFR 132.6 Table 6, p. 15393, as amended.

Chronic: A stimulus that continues for a relatively long period of time. The term long is considered a relative term which depends on the life span of an organism. The measurement of a chronic effect can be, but is not limited to, reduced growth, reduced reproduction, etc. in addition to lethality.

Chronic Toxicity: The capacity of a chemical to cause adverse effects only after repeated or continuous exposure over an extended period of time.

Cold Water Fishery Use (CW): Refer to designated uses, chapter 4, herein.

The Community: Refers to the Keweenaw Bay Indian Community, a sovereign and federally recognized Indian Tribe of the L'Anse Federal Indian Reservation.

Control Document: Any authorization issued by the appropriate permitting authority to any source of pollutants to waters under its jurisdiction and which specifies conditions under which the source is allowed to operate.

Congener: Refers to a group of compounds that vary in the number of substituents and/or the configuration of these substituents, but share a basic chemical structure.

Contaminant: A harmful chemical or biological substance which can be incorporated into, onto, or be ingested by aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment; or an anthropogenic input that alters any physical, biological or chemical property of the water.

Criteria: Element of the Community's water quality standards, expressed as constituent concentrations or levels, or as a narrative statements, representing a quality of water that supports a particular use.

Critical Habitat: A specific geographic area occupied by a species that is listed in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features essential to the conservation of the species and which may require special management consideration or protection.

Cultural Use: Refer to designated uses, chapter 4, herein.

CWA: refers to the Clean Water Act.

Degradation: Lowering of the existing quality or desired quantity of the waters of the Reservation including, but not limited to, the chemical, physical, and biological characteristics and values associated with waters of the Reservation. Undesirable changes in the beds and banks of waters of the Reservation including, but not limited to, objectionable deposits, changes in the shore lands, changes in wetland vegetation, local ecology, bank stability, shall constitute degradation.

Designated Uses: Those uses specified in water quality standards for each waterbody or segment whether or not such uses are being attained.

Design Flow: The design flow shall be equal to the most restrictive of the twelve (12) monthly 95% exceedence flows, except where the Tribal Council determines that a more restrictive design flow is necessary or where the Tribal Council determines that seasonal design flows may be granted. The 95% exceedence flow is the flow equal to or exceeded 95% of the time for any given or specified month.

Discharge(s): Any addition of any pollutant or combination of pollutants to water. Industrial discharge (s) that meet with background conditions shall constitute a discharge; i.e. any addition of any wastewater or pollutant, even though this discharge water meets with background conditions, is considered a discharge.

Discharger(s): Any person, business, legal entity, or other party who engages in activities resulting in a discharge into waters of the Reservation.

Dissolved Oxygen: The amount of oxygen dissolved in water.

Dissolved Solids: Refers to the amount of materials dissolved in water and is commonly expressed as a concentration in terms of milligrams per liter (mg/L).

DOC: Concentration of dissolved organic carbon expressed as kilograms dissolved organic carbon per liter of water.

Drainage Basin: A waterbody and the land area drained by it.

Effluent: Refers to a wastewater discharge from a point source to the waters of the Keweenaw Bay Indian Community or connecting waters.

Effluent limitations: Any restriction imposed by the Keweenaw Bay Indian Community, EPA, and/or other federal entity, on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into water.

EPA: Refers to the United States Environmental Protection Agency.

Existing Uses: Those uses actually attained by Ojibwa peoples in a waterbody on or after November 28, 1975, whether or not they are included in the water quality standards.

Final Acute Value: A calculated estimate of the concentration of a test material such that 95 percent of the genera have higher Genus Mean Acute Values (GMAVs), as derived from studies where acceptable acute toxicity tests have been conducted with the test material. In cases where the Species Mean Acute Value (SMAV) of a commercially important or critical species is lower than the calculated FAV, then the SMAV will replace the calculated FAV in order to provide protection for that important species.

Food Web: Referring to the interdependent feeding relationships between organisms within a given ecosystem, including, but not limited to, such strategies as herbivorism, carnivorism, parasitism, and symbiotic relationships.

Great Lakes System: All the streams, rivers, lakes and other waterbodies within the drainage basin of the Great Lakes within the United States.

Habitat: The natural locality or geographical range of individuals and/or populations of living organisms. Includes the surrounding living and nonliving ecosystem, e.g. food, cover, and other basic requirements for support and propagation of individuals and populations.

Hydric: Water saturated.

Hypolimnion: If a lake is deep a enough, the water stratifies in to layers created by the differing temperature of the water which alters its density. The upper warm, lighter layer is referred to as the epiliminion. The cool dense layer is referred to as the hypolimnion. The transitional layer between the epilimnion and the hypolimnion is referred to as the thermocline or metalimnion.

Impact: A change in the chemical, physical, or biological quality or condition of a waterbody caused by external sources.

Impair: A detrimental effect on the biological integrity of a waterbody caused by an impact that prevents attainment of the designated use.

Industrial: Refers to an organized business or enterprise and the activities which often produce or emit discharges, emissions, or waste and/or byproducts associated with its existence.

Keweenaw Bay Indian Community: The Keweenaw Bay Indian Community is a federally recognized Indian Tribe.

$\mathbf{K_{ow}}$: Octanol-water partition coefficient of a chemical.

L'Anse Federal Indian Reservation: All land reserved for use and occupied by the Keweenaw Bay Indian Community established by the treaty of 1854. A map of the established exterior boundaries of the L'Anse Indian Reservation can be found in Appendix B.

Littoral Zone: The area of a waterbody that extends from the shore to just above the influence of waves and spray. This zone is characterized in part by the presence of macrophytes and aufwuchs. Aufwuchs refers to the whole community of microscopic organisms such as algae, bacteria, fungi, protozoa and small metazoa which are attached to firm substrates such as rocks.

Lipophilic: Substances that are more soluble in lipid/fatty substances.

Loading: The addition of a substance to a waterbody; the concentration of a substance within a discharge multiplied by the flow of the discharge over a specified time expressed as concentration per unit time.

Loading Capacity: The loading capacity is the greatest amount of loading that a water can receive without violating water quality standards.

macrophyte(s): Refers to the large (macroscopic) plants found in surface waters.

Metabolite: A substance that is the product of biological changes to a chemical.

Micrograms per Liter (ug/l): Equivalent to 10^{-9} kilograms per liter; may also be referred to as parts per billion (ppb).

Milligrams per liter (mg/l): Equivalent to 10^{-6} kilograms per liter; may also be referred to as parts per million (ppm).

Mixing Zone: The portion of a waterbody designated by the Community where a point source or venting groundwater discharge is mixed with the surface waters of the Reservation and certain chronic water quality criteria conditions may be exceeded but acute conditions are prevented. Also, see Chapter 7, herein.

Monitoring: A scientifically designed system of standardized measurements and observations which are used in the ongoing evaluation of a given ecosystem.

Natural Resources Department: The Natural Resources Department of the Keweenaw Bay Indian Community. This department was created by Tribal Council to manage all natural resources within the Reservation.

Navigable Waters Use: Refer to designated uses, chapter 4, herein.

Nonpoint Source Pollution: Pollution sources that are diffuse and do not have a single point of origin and are introduced into a receiving stream or other body of water, from a nonspecific outlet. The pollutants are generally carried by runoff, including urban runoff. This term includes other sources of pollution that generally can not be classified as point sources of pollution. Common sources include agriculture, urban areas, certain industrial activities, construction sites, land disposal, dams and other hydrologic and hydraulic modifications.

Numeric Criteria: Criteria expressed as a concentration of chemicals in water or properties of water that serves to protect a designated use.

OKRW: see Outstanding Keweenaw Bay Indian Community Resource, page 25 and 34-35.

ONRW: see Outstanding National Resource Water, page 24 and 34-35.

Organoleptic Effects: Non-toxicity based criteria for taste and odor which make water and edible aquatic life unpalatable but nontoxic to humans.

Permit: A legal authorization or license which regulates activity within the L'Anse Reservation and is issued by the Community or other appropriate permitting authority.

Permitting Authority: Regulatory authority relative to issuance of permits pursuant to the CWA lies with the Environmental Protection Agency, until such time as permitting authority maybe delegated by the EPA to the Keweenaw Bay Indian Community .

pH: The negative logarithm of the hydrogen ion activity concentrations expressed as moles per liter, the mathematical expression being: $pH = -\log \{H+\}$.

Physical Integrity: The ambient physical condition of a water as it related to the beds and banks of waters, bank stability and sedimentation. It includes the daily and seasonal variations in the physical conditions unrelated to human activities and influence.

Plume: The visible or measurable discharge of a contaminant from a given point of origin.

POC: Concentration of particulate organic carbon expressed as kilogram of particulate organic carbon per liter of water.

Point Source: Any discernable, confined and discrete conveyance from which wastewater is or may be discharged to the waters of the Reservation and may include, but is not limited to, a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other watercraft from which pollutants are or may be discharged.

Pollutant: Refer to the definition of contaminant.

Pollution: Generally, the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects; Under the Clean Water Act, the term is defined as the man-made or man-induced alteration of the physical, biological, and radiological integrity of the water.

Promulgation: The process of drafting, receiving comments, and publishing rules that have the same effect as laws.

Raw Water: refers to waters of the Reservation before treatment.

Receiving Waters: means the waters or watercourse of the Reservation into which an effluent is or may be discharged.

Recreational Use: Refer to designated uses, chapter 4, herein.
The Reservation: Refers to the L'Anse Federal Indian Reservation. Maps of the established exterior boundaries of the L'Anse Indian Reservation can be found in Appendix B.

Riparian Habitat or Zone: An area adjacent to and along a waterbody that often is vegetated and that constitutes a buffer zone between the nearby lands and the water.

Runoff: That part of precipitation, snow melt, or irrigation water that drains off land, in sheet flow, in rivulets, or in defined watercourses, into surface water. This water can carry sediments and pollutants into receiving waters.

Secondary Contact: Activities in which a person's water contact would be limited to the extent that bacterial infections of eyes, ears, respiratory or digestive systems, or urogenital areas would normally be avoided.

Sediment: Soil, sand, gravel, organic matter and minerals which are washed from land into surface water and are eventually deposited upon the bed or bottom of a waterbody.

Sewage: The waste and wastewater discharged into sewers from homes and industry.

Spawning Habitat: Regions and areas within a waterbody including, but not limited to, riffles, beds, backwaters, littoral zones, and wetlands, where fish concentrate breeding activities and eggs are hatched.

Teratogenic: Causing an effect such as developmental malformations.

Thermocline: If a lake is deep a enough, the water stratifies in to layers created by the differing temperature of the water which alters its density. The upper warm, lighter layer is referred to as the epiliminion. The cool dense layer is referred to as the hypolimnion. The transitional layer between the epilimnion and the hypolimnion is referred to as the thermocline or metalimnion.

Total Hardness: The total concentration of calcium and magnesium ion expressed as milligrams of calcium carbonate ($CaCO_3$) per liter.

Toxicant: Refer to the definition of contaminant.

Toxic Substance: A substance, except for heat, that is present in sufficient concentration or quantity that results in harm to plant life, animal life or designated uses.

Tribal Council: Twelve members of an elected governing body of the Keweenaw Bay Indian Community. This body is empowered with authority and jurisdiction over the Keweenaw Bay Indian Community which is dictated by the Constitution and Bylaws of the Keweenaw Bay Indian Community.
Tributary: A river, stream, or creek inlet flowing into a larger waterbody.

Trophic Level: This refers to the arrangement of producer and consumer aquatic organisms into hierarchical feeding levels. These levels are based on the role of an organism within the food web. Each individual level is referred to as a trophic level and is assigned a number.

Turbidity: The presence of organic and/or inorganic particulate matter and/or planktonic organisms in water which results in decreased water clarity causing it to appear unclear, discolored, murky, or opaque.

Uptake: the acquisition of a substance from the environment by an organism as a result of any active or passive process.

Urban runoff: Storm water from city streets and adjacent domestic or commercial properties, construction and other surface disturbance sites, parking lots and other impermeable surfaces. It is one of the means by which terrestrial pollutants are conveyed to receiving waters.

Variance: A temporary exemption from any water quality for specific pollutants granted to an individual entity, corporation, or business.

Warm Water Fishery Use: refer to designated uses, chapter 4, herein.

Wastewater: The liquid waste resulting from commercial, institutional, domestic, industrial, and agricultural activities, also including cooling and condensing waters, sanitary sewage, stormwater run off, and industrial waste.

Water Column: The pelagic/open water in a body of water that is measured from the surface to the bottom sediments.

Water Quality: The chemical, biological, and physical integrity of a body of water.

Water Quality Standard (WQS): The water quality goals of a waterbody, the designated use or uses for that body of water and criteria necessary to protect those uses. Standards can either be State regulations or laws, Federal Regulations, or Water Quality Standards adopted by an authorized Indian Tribe.

Waters of the Reservation: Such accumulations of water, surface and/or underground, natural or artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon the L'Anse Reservation and all lands held in trust by Keweenaw Bay Indian Community. The term does not include any pond, reservoir or facility built for reduction or control of pollution or cooling of water prior to discharge unless the discharge therefrom causes or threatens to cause water pollution. This definition includes, but is not limited to; inland lakes, rivers, streams, creeks, impoundments, and open drains and all other surface waterbodies of water within the boundaries of the Reservation.

Watershed: A watershed is a drainage area or basin in which all land and water areas drain or flow toward a centralized site of collection such as a river, stream, or lake.

Wetlands or Wetland Ecosystems: Transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water; those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in hydric soil conditions. Wetlands generally include swamps, marshes, bogs, muskegs, fens and similar areas.

Whole Effluent: The total effect of an effluent measured directly with a toxicity test.

Wild Rice: *Zizania Palustris aquatica*. A tall, aquatic grass which produces an edible grain and is native to the regional areas of Canada and the northern United States. The harvesting, propagation and protection of wild rice is of significant cultural value to the Keweenaw Bay Indian Community.

Wildlife Use: See Designated Uses Chapter 4, herein.

3

Designated Uses and Affected Waterbodies

Designated Uses:

The following are the designated uses which apply to all surface waters of the Keweenaw Bay Indian Community:

Cold Water Fishery (CW): Waterbodies containing aquatic communities that thrive in relatively cold water or areas which serve as spawning or nursery habitat or areas of overwintering for any cold water fish species. Typical coldwater fish species includes:

i) Trout
ii) Salmon
iii) Whitefish
iv) Cisco (commonly known as the herring)

Warm Water Fishery (WW): Waterbodies containing aquatic communities that thrive in relatively warm water or serve as spawning or nursery habitat for warm water fish species. Typical warm water fish species include:

i) Bass
ii) Pike
iii) Walleye

Wetland (T): Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in hydric souls. Wetlands include, but are not limited to, swamps, marshes, bogs, fens and muskegs.

Wildlife Use (W): Any waters that are capable of providing a water supply, riparian habitat and/or provides for a major dietary food source for the support and propagation of indigenous terrestrial or aquatic wildlife within the Reservation.

Recreational Use: Primary Contact (R^1): The recreational use of any waterbody which involves prolonged direct contact with water to the point of complete submersion and involves the risk of incidental ingestion of water in quantities sufficient to pose a potential health risk. These uses include swimming, water-skiing, surfing, skin/scuba diving, or any other activity which will most likely lead to immersion of the head into the said waterbody. Secondary Contact (R^2): The recreational use of any waterbody where direct contact may but need not occur and does not normally involve immersion including the head nor the incidental ingestion of water. These uses include boating, fishing, sailing, hiking, wading, or any other activity which would not likely lead to complete immersion into the said waterbody.

Ceremonial, Religious, or Spiritual Use (S): To protect and provide for the sacred relationship that exists between the Ojibwa people of Keweenaw Bay Indian Community and their waters, this use includes, but is not limited to, any ceremonial use of water, water-borne based religious practice or spiritual belief of a waterbody. This use also provides for ceremonies and other activities such as, but

not limited to, the Sturgeon Feast, the "Breaking of the Water" ceremony, and any religious prayers or blessings practiced by the people of the Keweenaw Bay Indian Community.

Cultural Uses (C): Waters which are suitable or potentially suitable for cultural, historical or heritage uses by the Ojibwa people of the Keweenaw Bay Indian Community. This includes practices such as, but not limited to, the growing and subsequent harvest of wild rice, harvesting of any aquatic/riparian flora or fauna for medicinal purposes, taking of water for use in traditional ceremonial healing practices and historical feasts.

Navigational Use (N): Applies to all navigable waters. Includes any waterway that has been used, or is susceptible for use by itself or in connection with other waterways, for the transportation of cargo, crew, or use as a highway of commerce.

Public Drinking Water Supply Use (P): Any raw surface water source that, after conventional treatment, provides as a source of safe water for various uses, including but not limited to, human consumption, cooking, food processing, and in food preparation or as an ingredient in foods and beverages for Reservation and lands held in trust by Keweenaw Bay Indian Community.

Agricultural and/or Industrial Use (A): Use of water for agricultural purposes including irrigation of crops, livestock watering, grazing, farming, ranching, and the support of vegetation. Also, the use of water for industrial cooling and processing purposes.

Affected Waters and Associated Designated Uses

The Streams, Creeks, and Lakes listed on the following pages are those affected by Surface Water Quality Standards of the Keweenaw Bay Indian Community. As more than one designated use applies to a given waterbody, the most restrictive water quality standards for one or more of those designated uses shall apply to that waterbody:

LAKE/STREAM/ CREEK NAME	**Designated Uses**										
	CW	**WW**	**T**	**W**	**R**	**S**	**C**	**N**	**P**	**A**	**LOCATION**
Bella Lake Creek	Y		Y	Y	R 2	Y	Y			Y	51N 32W 25
Bishop Lake		Y		Y	R 1	Y	Y	Y			50N 33W 1350N 33W 24
Camp Creek	Y			Y	R 2	Y	Y			Y	51N 32W 25 51N 32W 36
Dakota Creek	Y		Y	Y	R 2	Y	Y			Y	51N 32W 26 51N 32W 25 51N 32W 27 51N 32W 35 51N 32W 36
Daults Creek	Y		Y	Y	R 2	Y	Y			Y	50N 33W 27 50N 33W 22 50N 33W 34

											50N 33W 35
Dead Man's Creek	Y		Y	Y	R[2]	Y	Y				51N 33W 10 51N 33W 15 51N 33W 16 51N 33W 17 51N 33W 21
Denomie Creek	Y		Y	Y	R[2]	Y	Y				50N 33W 22 50N 33W 23 50N 33W 25 50N 33W 36
Gomanche Creek and its tributaries	Y		Y	Y	R[2]	Y	Y			Y	50N 33W 13 50N 33W 12 50N 32W 07 50N 32W 06 50N 33W 19 50N 33W 24 50N 33W 30

LAKE/STREAM/ CREEK NAMES:	**Designated Uses**										
	CW	**WW**	**T**	**W**	**R**	**S**	**C**	**N**	**P**	**A**	**LOCATION:**
Kallio Creek	Y			Y	R^2	Y	Y				51N 32W 14 51N 32W 15 51N 32W 21 51N 32W 22 51N 32W 23
Kelsey Creek	Y			Y	R^2	Y	Y				51N 33W 0751N 33W 12 51N 33W 18
Laughs/Laws/Lost Lake		Y		Y	R^1	Y	Y	Y			50N 32W 18
Linden Creek	Y			Y	R^2	Y	Y			Y	50N 33W 03 50N 33W 02 50N 33W 01 50N 33W 12 50N 33W 11 50N 33W 10 50N 33W 14
Little Carp River	Y		Y	Y	R^2	Y	Y				51N 33W 19 51N 33W 30 51N 33W 20 51N 33W 18 51N 33W 17

											51N 33W 16 51N 33W 09 51N 33W 10 51N 33W 07 51N 33W 08 51N 33W 31
Little Silver Creek	Y		Y	Y	R^2	Y	Y				51N 32W 16 51N 32W 18 51N 32W 17 51N 32W 20 51N 32W 21 51N 32W 15 51N 32W 10

LAKE/STREAM/ CREEK NAMES:	**Designated Uses**										
	CW	**WW**	**T**	**W**	**R**	**S**	**C**	**N**	**P**	**A**	**LOCATION:**
Meadow Creek	Y		Y	Y	R^2	Y	Y			Y	51N 32W 31 51N 32W 29 51N 32W 30 51N 32W 32 51N 33W 3650N 33W 03
Mud Lakes and Sloughs		Y	Y	Y	R^2	Y	Y	Y			51N 33W 15
Mud Lake Creek	Y		Y	Y	R^2	Y	Y			Y	51N 33W 10 51N 33W 15 51N 33W 16 51N 33W 20 51N 33W 21
Page(s) Creek	Y		Y	Y	R^2	Y	Y			Y	50N 32W 06 50N 32W 05 50N 32W 08 50N 32W 09 50N 32W 17
Pekkala Creek	Y		Y	Y	R^2	Y	Y			Y	50N 33W 22 50N 33W 27

											50N 33W 26 50N 33W 35
Pequaming coastal sloughs and wetland	Y		Y	Y	R^2	Y	Y	Y			51N 32W 04 51N 32W 09
Pinery Lakes		Y	Y	Y	R^1	Y	Y	Y		Y	51N 32W 32 50N 33W 02
Robillard Creek	Y		Y	Y	R^2	Y	Y				50N 33W 14 50N 33W 15 50N 33W 23 50N 33W 24 50N 33W 13 50N 33W 25 50N 33W 30
Sand Point Sloughs	Y		Y	Y	R^1	Y	Y	Y		Y	51N 33W 23 51N 33W 26 51N 33W 27

LAKE/STREAM /CREEK NAMES:	**Designated Uses**										
	CW	**WW**	**T**	**W**	**R**	**S**	**C**	**N**	**P**	**A**	**LOCATION**
Silver River and its tributaries	Y		Y	Y	R 1	Y	Y	Y		Y	50N 32W 06 50N 32W 07 50N 32W 18 50N 32W 17 50N 32W 16 50N 32W 21 50N 32W 28 50N 32W 20 50N 32W 29 50N 32W 32 50N 32W 33 51N 32W 34 51N 32W 35 51N 32W 27 51N 32W 28 51N 32W 26

											51N 32W 23 51N 32W 24 51N 32W 13 51N 31W 18 51N 32W 33
Third Lake (including its inlet creek)		Y	Y	Y	R [1]	Y	Y	Y		Y	51N 32W 33
Unlabeled #1 Creek into Huron Bay	Y		Y	Y	R [2]	Y	Y				51N 31W 05 51N 31W 06 51N 32W 01 51N 32W 12
Unlabeled #2 Creek into Huron Bay	Y		Y	Y	R [2]	Y	Y				51N 31W 07 51N 32W 11 51N 32W 12

LAKE/STREAM /CREEK NAMES:	**Designated Uses**										
	CW	**WW**	**T**	**W**	**R**	**S**	**C**	**N**	**P**	**A**	**LOCATION:**
Unlabeled #3 Creek into Huron Bay	Y		Y	Y	R^2	Y	Y				51N 31W 07 51N 32W 12
Unlabeled #4 Creek into Sand Bay	Y		Y	Y	R^2	Y	Y				51N 31W 01 51N 31W 02 51N 31W 11
Unlabeled #5 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 32

Unlabeled #6 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 04
Unlabeled #7 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 09
Unlabeled #8 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 21
Unlabeled #9 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 36
Unlabeled #10 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 24
Unlabeled #11 Lake	Y		Y	Y	R^2	Y	Y				51N 32W 13
Unlabeled #12 Lake	Y		Y	Y	R^2	Y	Y				51N 33W 33
Unlabeled #13 Lake	Y		Y	Y	R^2	Y	Y				51N 33W 31
Unlabeled #14 Lake	Y		Y	Y	R^2	Y	Y				51N 33W 30
Unlabeled #15 Lake	Y		Y	Y	R^2	Y	Y				51N 33W 19
Unlabeled #16 Lake	Y		Y	Y	R^2	Y	Y				51N 33W 05

Unlabeled #17 Lake	Y		Y	Y	R^2	Y	Y				50N 32W 31
Unlabeled #18 Lake	Y		Y	Y	R^2	Y	Y				50N 32W 30

LAKE/STREAM/ CREEK NAMES:	**Designated Uses**										LOCATION:
	CW	**WW**	**T**	**W**	**R**	**S**	**C**	**N**	**P**	**A**	
Unlabeled #20	Y		Y	Y	R^2	Y	Y				50N 32W 06

Lake											
Unlabeled #21	Y		Y	Y	R^2	Y	Y			_	50N 33W 15
Unlabeled #22	Y		Y	Y	R^2	Y	Y			_	50N 33W 23
Unlabeled #23	Y		Y	Y	R^2	Y	Y			_	50N 33W 27
Unlabeled #24 Creek into wetland area	Y		Y	Y	R^2	Y	Y			_	51N 33W 28 51N 33W 29
Unlabeled #25 Creek into disposal ponds	Y		Y	Y	R^2	Y				Y	51N 33W 32 51N 33W 31
Unlabeled #26 Creek from Unlabeled lake owned by the DNR	Y		Y	Y	R^2	Y	Y			_	51N 33W 05 51N 33W 07 51N 33W 08
Unlabeled #27 Creeks into Pequaming Bay	Y		Y	Y	R^2	Y	Y	_		_	51N 32W 04 51N 32W 08 51N 32W 09 51N 32W 17 51N 32W 16 51N 32W 18 51N 32W 19
Unlabeled #28 Creek into Keweenaw Bay	Y		Y	Y	R^2	Y	Y			_	51N 33W 31 51N 33W 32 51N 33W 33
Unlabeled #29 Series of creeks from Aura Rd. into wetland areas	Y		Y	Y		Y	Y	_		_	51N 32W 02 51N 32W 11
Unlabeled #30 Series of creeks into unlabeled lake #6	Y		Y	Y	R^2	Y	Y	_		_	51N 32W 04 51N 32W 10

		LOCATION:

LAKE/STREAM/ CREEK NAMES:	Designated Uses										
	CW	WW	T	W	R	S	C	N	P	A	
Unlabeled #31 creek into Huron Bay	Y		Y	Y	R^2	Y	Y	_		_	51N 32W 01 51N 32W 06
Unlabeled #32 creek into wetland	Y		Y	Y	R^2	Y	Y	_		_	51N 33W 22
West Sleeping River and its Tributaries	Y		Y	Y	R^2	Y	Y	_		Y	53N 38W 28 53N 38W 27 53N 38W 22 53N 38W 23 53N 38W 14
Holland Creek and its Tributaries	Y		Y	Y	R^2	Y	Y	_		Y	53N 38W 26 53N 38W 23
East Sleeping River and its Tributaries	Y		Y	Y	R^2	Y	Y	_		Y	53N 38W 23 53N 38W 14

4

Outstanding Resource Waters

Outstanding National Resource Waters

The following waterbodies have been designated as Outstanding National Resource Waters (ONRW) by the Keweenaw Bay Indian Community:

Waterbody	Location	Waterbody	Location
	50N 32W 06		
	50N 32W 07		
	50N 32W 18		
	50N 32W 17		
	50N 32W 16		
	50N 32W 21		
	50N 32W 28		
	50N 32W 20		
	50N 32W 29		
	50N 32W 32		
	50N 32W 33		
	51N 32W 34		
	51N 32W 35		
	51N 32W 27		
	51N 32W 28		
	51N 32W 26		
	51N 32W 23		
	51N 32W 24		
	51N 32W 13		51N 33W 23
Silver River and its	51N 31W 18	Sand Point	51N 33W 26
tributaries	51N 32W 33	Sloughs	51N 33W 27
	51N 33W 19		
	51N 33W 30		
	51N 33W 20		
	51N 33W 18		
	51N 33W 17		
	51N 33W 16		
	51N 33W 09		
	51N 33W 10		51N 32W 32
Little Carp River	51N 33W 07	Pinery Lakes	50N 33W 02

	51N 33W 08 51N 33W 31			
Waterbody	**Location**		**Waterbody**	**Location**
Mud Lakes and Sloughs	51N 33W 10 51N 33W 15 51N 33W 16 51N 33W 20 51N 33W 21		Denomie Creek	50N 33W 22 50N 33W 26 50N 33W 23 50N 33W 25 50N 33W 36 50N 32W 31
Unlabeled #1 Creek into Huron Bay	51N 31W 05 51N 31W 06 51N 32W 01 51N 32W 12		Unlabeled #2 Creek into Huron Bay	51N 31W 07 51N 32W 11 51N 32W 12
Daults Creek	50N 33W 27 50N 33W 22 50N 33W 26 50N 33W 34 50N 33W 35		Pequaming Bay coastal wetland	51N 32W 04 51N 32W 05

Outstanding Keweenaw Bay Indian Community Resource Waters

All waters, including any portion flowing through or adjacent to, within the exterior boundaries the Reservation and on all lands held in trust by Keweenaw Bay Indian Community, shall be designated as Outstanding Keweenaw Bay Indian Community Resource Waters (OKRW) if not designated as an ONRW. For waters designated as OKRWs, all new discharges of any Bioaccumulative Chemical of Concern (BCC) as defined in 40CFR132, Table 6, as amended, will be prohibited. New or expanded discharges of any Chemical of Concern shall be subject to all applicable provisions in the antidegradation policy of these regulations.

5

Water Quality Standards and Criteria

Description:

To preserve and enhance the quality of the waters of the Reservation and to protect designated and existing uses, the following standards of water quality are established. These standards are established to govern water management decisions within the drainage basins that affect waters of the Reservation. To every extent practical and possible, the following general water quality criteria shall apply to all waters of the Reservation. In instances where more stringent standards for designated waterbodies are set, the stricter numerical standards supersede the general standards.

These standards may not reflect current water quality in all cases. Water quality of certain waters of the Reservation may not meet standards as a result of natural causes or conditions unrelated to human influence. Where waters of the Reservation may have been degraded due to past human activities and attainment of standards in the near future is not economically or technically achievable, these standards shall be used to improve water quality. These standards are the minimum water quality requirements by which the waters of the Reservation are to be managed.

The water quality standards established herein are the minimally acceptable water quality conditions. Water quality shall be equal to or better than these minimal water quality conditions not less than ninety-five (95) percent of the time. Water quality standards shall apply at all flows equal to or exceeding the design flow. The subsequent design flow must be used unless data exists to demonstrate that an alternate design flow is more appropriate. The design flow shall be equal to the most restrictive of the twelve (12) monthly 95% exceedence flows, except where the Tribal Council determines that a more restrictive design flow is necessary or where the Tribal Council determines that seasonal design flows may be granted. The 95% exceedence flow is the flow equal to or exceeded 95% of the time for any given or specified month.

General Standards:

I. Physical Characteristics: The waters of the Reservation shall not have any of the following unnatural physical properties in quantities which are or may become injurious to any designated use or that impairs the aesthetic value of the waterbody:

A. Deposits
B. Color
C. Oil films
D. Floating solids
E. Foams
F. Settleable solids
G. Suspending solids
H. Turbidity

I. Floating debris or other materials as a result of human activity in amounts sufficient enough to be unsightly or cause degradation.

II. Dissolved Solids: The addition of any dissolved solids shall not exceed concentrations which are or may become injurious to any designated use. Point sources containing dissolved solids shall obtain any and all applicable permits. At no instance shall total dissolved solids in the waters of the Reservation exceed a concentration of 500 mg/L as a monthly average nor more than 750 mg/L at any time as a result of controllable point sources. Waters connecting to Keweenaw Bay and waters designated as a public water supply source shall not exceed 50 mg/L of chlorides as a monthly average.

III. Organoleptic Substances: The waters of the Reservation shall contain no taste-producing or odor producing substances in concentrations which impair or may impair their use for a public or agricultural water supply source, as recreational water or impair the palatability of fish as measured by test procedures approved by EPA.

IV. Hydrogen Ion Concentration: The hydrogen ion concentration expressed as pH shall be maintained within the range of 6.5 to 9.0 in all waters of the Reservation. Any artificially induced variation in the natural pH shall remain within this range and shall not exceed 0.5 units of pH. The pH is not permitted to fluctuate in excess of 1.0 pH unit over a 24-hour period for other than natural causes.

V. Nutrients: Reservation waters shall be free from nutrients (e.g. nitrogen and phosphorus) entering the waters as a result of human activity in concentrations that create nuisance growth of macrophytes, fungi, bacteria and algae.

VI. Dissolved Oxygen: For all waterbodies capable of supporting aquatic life, the dissolved oxygen standard will be a daily minimum of 5 mg/L.

VII. Radioactive Substances: Concentrations of radioactive materials shall not exceed the background concentration caused by naturally occurring materials.

VIII. Temperature: The natural daily and seasonal temperature fluctuations of the Reservation waters shall be preserved. In all waters of the Reservation, the point of the temperature measurement normally shall be in the surface 1 meter, however, where turbulence, sinking plumes, discharge inertia or other phenomena upset the natural thermal distribution patterns of receiving waters, temperature measurements shall be required to identify the spatial characteristics of the thermal profile.
Reservation lakes shall not receive a heat load which would:
a) Increase the temperature of the thermocline or hypolimnion or decrease the volume thereof.
b) Increase the temperature of the receiving waters at the edge of the mixing zone more than 3 degrees Fahrenheit above the existing natural water temperature.
Reservation streams, rivers and impoundments naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 5 degrees Fahrenheit above the existing natural water temperature.
Reservation streams, rivers and impoundments naturally capable of supporting coldwater fish shall not receive a heat load which would increase the temperature of the receiving waters at the edge of the mixing zone more than 2 degrees Fahrenheit.

IX. Wild Rice Habitat: Any Reservation water which supports wild rice growth shall not exceed sulfate levels of 10 mg/L.

X. Microorganisms: Reservation waters designated for primary recreational contact shall contain no more than 151 enterococci per 100 mL and no more than 130 Escherichia coli per 100 mL. Compliance

shall be based on monthly samples collected in the manner consistent with Standard Methods for the Examination of Water and Wastewater 20th ed.

XI. Toxic Substances: No release of any substance is permitted into Reservation waters which alone or in combination with other substances, or in combination with other components of discharges, or their breakdown products and/or metabolites, would be acutely or chronically toxic, carcinogenic, teratogenic, injurious, bioaccumulative, bioconcentrating, responsible for adverse physiological responses in human beings and/or aquatic organisms, or which interfere directly or indirectly with designated, existing, or other uses. This provision excludes a discharges associated with an appropriate control document.

Numerical Criteria

Numeric criterion shall apply to all Reservation waters in order to govern water management decisions, activities that affect Reservation waters, and to protect and enhance water quality. Listed in the table that follows are the Chemicals of Concern and their respective numeric criteria for the protection of aquatic life, human health and wildlife. Levels of toxic substances in the surface waters of the Reservation shall not exceed the lowest applicable aquatic life, human health or wildlife value where the applicability of a value is determined by the waters designated use. In the absence of an aquatic life, human health or wildlife value for a given substance, values shall be derived in accordance with the methodology described in 40 CFR 132, Final Water Quality Guidance for the Great Lakes Basin, as amended. Unless otherwise stated, all concentrations expressed in these criteria represent dissolved concentrations to better approximate the bioavailable fraction in the water column.

Toxic Pollutant Numerical Criteria (pp. 1-6, p. 1)

Pollutant	CASRN	Aquatic Life Chronic Toxicity (ug/L)	Aquatic Life Acute Toxicity (ug/L)	Organoleptic Effects (ug/L)	Human Health Criteria (ug/L) *	DWS MCL (ug/L)	Wildlife Chronic (ug/L)
Arsenic (III)	22569-72-8	148 *(GLI)*	340 *(GLI)*				
Acenaphthene	83-32-9	19	48	20			
Acetic Acid	64-19-7	360	3200				
Acetone	67-64-1	1700	15000				
Acrylonitrile	107-13-1	37	330				
Alachlor	15972-60-8	11	150			2	
Atrazine	1912-24-9	7.3	50			3	
Barium	7440-39-3	190	1200			2000	
Benzene (c)	71-43-2	200	890		11 a 220 b	5	
Beryllium*	7440-41-7	App. A	App. A			4	
alpha-BHC	319-84-6				3.3 E-3 a 3.5 E-3 b		
beta- BHC	319-85-7				8.8 E-3 a 9.2 E-3 b		
total BHCs (Hexachlorocyclohexanes)	608-73-1				8.8 E-3 a 9.2 E –3 b		
Boron	7440-42-8	1400	12000				
Bromine	7726-95-6	0.27	2.4				
Bromomethane	74-83-9	35	320				
Butylamine	109-73-9	57	510				
Cadmium	7440-43-9	App. A	App. A			5	
Chlordane (c)	57-74-9	0.029	0.27		1.6 E-7 a , 1.6 E-4 b		
Chlorine	7782-50-5	3.9	19				
Chlorobenzene	108-90-7	47	420		450 a 2200 b	100	
Chloroform	67-66-3	170	1300				
6-Chloropicolinic acid	4684-94-0	26	230				
2-Chlorophenol	95-57-8	22	200	0.1			
4-Chlorophenol	106-48-9	15	140	0.1			
Chromium (III)	16065-83-1	App. A	App. A				
Chromium (VI)	18540-29-9	11*(GLI)*	16*(GLI)*	32			
Cobalt	7440-48-4	100	370				
Copper	7440-50-8	App. A	App. A	1000		1300	
Cyanazine	21725-46-2	110	1000				
Cyanide (as free CN^-)	57-12-5	5.2 *(GLI)*	22 *(GLI)*	44		200	
Cyanides	n/a				600 a 3600 b		
2,4-D (2,4- Diphenyldioxyacetic acid)	94-75-7	220	1400			70	
DDD (c)	72-54-8				6.4 E-4 a , b		
DDE (c)	72-55-9				2.3 E-4 a , b		
DDT (c)	50-29-3	0.0032*(GLI)*	0.029*(GLI)*		1.0E-4 a , b		
DDT and metabolites (c)	n/a						1.1E-5
1,2-Dichlorobenzene	95-50-1	16	140			600	
1,3-Dichlorobenzene	541-73-1	38	210				
1,4-Dichlorobenzene	106-46-7	13	80			75	
3,3'-Dichlorobenzidine	91-94-1						

		4.5	41				
1,2-Dichloroethane	107-06-2	1000	7700			5	
1,1-Dichloroethylene	75-35-4	65	1200			7	
1,2-Dichloropropane	78-87-5	360	3200			5	

..able 1. Toxic Pollutant Numerical Criteria (pp. 1-6, p. 2)

Pollutant	CASRN	Aquatic Life Chronic Toxicity (ug/L)	Aquatic Life Acute Toxicity (ug/L)	Organoleptic Effects (ug/L)	Human Health Criteria (ug/L)*	DWS MCL (ug/L)	Wildlife Chronic (ug/L)
2,4-Dichlorophenol	120-83-2	19	160	0.3			
Dieldrin (c)	60-57-1	0.056 *(GLI)	0.24 *(GLI)		4.6 E-6 a , b		
Diethylamine	109-89-7	20	180				
Di-n-butyl phthalate	84-74-2	9.7	38				
2,4-Dimethylphenol	105-67-9	12	80	400	440 a 5900 b		
Dimethylsulfoxide	67-68-5	1.9E5	1.7E6				
2,4-Dinitrophenol	51-28-5	12	110		55 a 2000 b		
1,4-Dioxane	123-91-1	2.2E 4	2.0E 5				
bis-chloromethyl Ether	542-88-1						
Endrin	72-20-8	0.036 *(GLI)	0.086 *(GLI)	0.17 *		2	
N-ethylaniline	103-69-5	1.8	16				
Ethylbenzene	100-41-4	18	160			700	
bis (2-ethylhexyl) phthalate	117-81-7	0	285				
Fluoranthene	206-44-0	1.6	14				
Fluorene	86-73-7	12	110				
Formaldehyde (c)	50-00-0	120	1000				
Heptachlor	76-44-8				6.7E-4 a 6.8 E-4 b	0.4	
Hexachlorobenzene (c)	118-74-1				3.0 E-4 a , b	1	
Hexachlorobutadiene (c)	87-68-3				0.12 a , b		
Hexachloroethane	67-72-1	8	70		3.8 a 4.4 b		
Hydrogen peroxide	7722-84-1	10	92				
Hydrogen sulfide	7783-06-4	0.088	0.8				
Lead	7439-92-1	App. A	App. A			15	
Lindane (gamma-BHC))	58-89-9		0.95 *(GLI)		0.29 a 0.30 b	0.2	
Lithium	7439-93-2	25	155				
Manganese	7439-96-5	140	1200				
Mercury (II)	n/a	0.77	1.4			2	
Mercury (including methylmercury)	22967-92-6				1.4 E-3 a , b		1.3 E-3
Methylene Chloride (Dichloromethane) (c)	75-09-2	940	8500		47 a 2000 b	5	
Mirex	2385-85-5				4.4 E-4 a , b		
Molybdenum	7439-98-7	800	7200				
Naphthalene	91-20-3	13	100				
Nickel	7440-02-0	App. A	App. A				
4-Nitrophenol	100-02-7	60	540				
N,N-dimethylacetamide	127-19-5	4100	37000				
Nonylphenol	25154-52-3	1.8	6.8				
o-cresol	95-48-7	82	740				

Octylphenol	140-66-9	2	13				
Parathion	56-38-2	0.013 *(GLI)*	0.065 *(GLI)*				
PCBs (as a class) (c)	27323-18-8				1.8 E -5 a , b	0.5	7.4E-5
Pentachlorobenzene	608-93-5				0.12 a , b		
Pentachlorophenol	87-86-5	App. A	App. A	30		1	
Phenanthrene	85-01-8	2.4	21				
Phenol	108-95-2	210	1600	300			
Propylene oxide	75-56-9	220	2000				

Table 1. Toxic Pollutant Numerical Criteria (pp. 1-6, p. 3)

CASRN	(ug/L)	Aquatic Life Chronic Toxicity (ug/L)	Aquatic Life Acute Toxicity (ug/L)	Organoleptic Effects (ug/L)*	Human Health Criteria (ug/L)	DWS MCL (ug/L)	Wildlife Chronic Pollutant
Selenium	7782-49-2	4.6*(GLI)*	17.8*(GLI)*			50	
Silver	7440-22-4	0.54	0.057				
Strontium	7440-24-6	760	6900				
Styrene	100-42-5	160	1400			100	
2,3,7,8-TCDD (dioxin)	1746-01-6				5.7 E-9 a 5.8 E-9 b	3 E -5	3.1E-9
1,2,4,5-Tetrachlorobenzene	95-94-3				0.24 a , b		
1,1,2,2-Tetrachloroethane	79-34-5	380	910				
Tetrachloroethylene	127-18-4	45	360			5	
Tetrachloromethane	56-23-5	150	1300				
Thallium	7440-28-0	10	78			2	
1,2,4-Trichlorobenzene	120-82-1	30	100			70	
1,1,1 Trichloroethane	71-55-6	200	1800			200	
1,1,2-Trichloroethane	79-00-5	500	2800			5	
Trichloroethylene	71-55-6	1800	200		28 a 250 b	5	
2,4,8-Trichlorophenol	88-06-2	4.4	40	2			
Triethylamine	121-44-8	260	1100				
Toluene	108-88-3	140	840		4800 a 3.1 E4 b	1000	
Toxaphene	8001-35-2	0.005	0.15		4.4 E-5 a , b	3	
Vanadium	7440-62-2	12	110				
Xylene	1330-20-7	35	310			10000	
Zinc	7440-66-6	App. A	App. A	5000			

TABLE KEY

*	concentration expressed as total concentration
a	human health criteria for surface water with the designated use as a public drinking water source
b	human health criteria for surface water with the designated use as primary contact recreation
(c)	carcinogen
(class)	Includes all 209 congeners of PCBs

App. A	Refer to Appendix A, § I.A.2-3 for these values
BHC	common name for hexachlorocyclohexanes
CASRN	Chemical Abstracts System Reference Number
DWS	National Primary Drinking Water Standards
E	exponent, for example E-2 = 10^{-2}

(GLI)	Criterion adopted directly from 40 CFR 132.6, Final Water Quality Guidance for the Great Lakes System
MFL	million fibers per liter
MCL	Maximum Contaminant Level
(PAH)	Polycyclic Aromatic Hydrocarbon

TABLE DEFINITIONS

Acute Toxicity	The level of a toxicant, whole effluent or mixture in the ambient water column to which an aquatic community can be exposed briefly without resulting in unacceptable effects. It is equivalent to one half of the final acute value. The averaging period of 1 hour will be used for acute toxicity values.
Chronic Toxicity	The lowest concentration of a toxicant, whole effluent, or mixture that does not cause injurious or debilitating effects in an aquatic organism resulting from repeated long-term exposure to a substance relative to the organism's lifespan.
Organoleptic Effects	Non-toxicity based criteria for taste and odor, which make water and edible aquatic life unpalatable but not toxic to humans.

6

Antidegradation Policy, Variances and Mixing Zones

Antidegradation Policy

This antidegradation policy shall be applicable to any action or activity by any source, point or nonpoint, that is anticipated to result into new or increased loading of pollutants to surface waters of the Keweenaw Bay Indian Community, for which independent regulatory authority exists requiring compliance with water quality standards. Pursuant to these standards, for all waters of the Keweenaw Bay Indian Community, the level of water quality necessary to protect existing uses shall be maintained and protected. Where designated uses of the waterbody are not attained, there shall be no lowering of the water quality with respect to the pollutant or pollutants that are causing the nonattainment. In those cases where a lowering of water quality is associated with a thermal discharge, the decision to allow such degradation shall be consistent with section 316 of the Clean Water Act.

Implementation Procedures

I. Definitions

Bioaccumulative Chemical of Concern (BCC): A chemical which upon entering the surface water, by itself or as its toxic transformation product, accumulates in aquatic organisms. Generally, chemicals with a half-life in the water of less than eight weeks are not BCCs. BCCs listed in 40 CFR 132, table 6.A (pg. 15393), as amended, will comprise the definition of all the chemicals identified herein as BCCs.

Control Document: Any authorization issued by the permitting authority to any source of pollutants to waters under its jurisdiction that specifies conditions under which the source is allowed to operate.

Outstanding National Resource Waters (ONRW): Waters designated in Chapter 8 of this document as Outstanding National Resource Waters shall be consistent with "zero discharge" provisions of the Clean Water Act (PL 92-500, 1972 Amendments). This Ordinance requires that no new or increased discharges will be allowed that enter or effect ONRW's. Absolutely no new discharge water shall enter or affect ONRW designated waters of Reservation. ONRW's shall be guaranteed a unique and high level of protection.

Outstanding Keweenaw Bay Indian Community Resource Waters (OKRW) Waters may be designated as an Outstanding Keweenaw Bay Indian Community Resource Water (OKNW) because of exceptional cultural, aesthetic, recreational or ecological significance. Upon approval of this Ordinance, all waters of the Reservation not designated ONRWs shall be designated as Outstanding Keweenaw Bay Indian Community Resource Waters (OKRW) and shall be maintained and protected as such. For waters designated as OKRWs, all new discharges of any bioaccumulative chemical of concern (BCC) shall be prohibited. New or increases in existing discharges, including those that do not contain any bioaccumulative chemical of concern, shall be subject to all applicable provisions of the antidegradation policy.

II. Guidelines

A. Exclusion from an Antidegradation Review: Changes in loadings of any Chemical of Concern within the existing capacity and processes, and that are covered by the existing applicable control document, are not subject to an antidegradation review. These changes include, but are not limited to: a) Normal operational variability; b) Changes in intake water pollutants; c) Increasing the production hours of the facility, (e.g., adding a second shift); or d) Increasing the rate of production. Also, excluded from an antidegradation review are new effluent limits based on improved monitoring data or new water quality criteria or values that are not a result of changes in pollutant loading.

B. For all waters, the Community and permitting authority shall ensure that the level of water quality necessary to protect existing uses is maintained. In order to achieve this, controls shall be established as necessary on point and nonpoint sources of pollutants to ensure that the criteria applicable to the designated use are achieved in the water and that any designated use of a downstream water is protected. Where water quality does not support the designated uses of a waterbody or ambient pollutant concentrations exceed water quality criteria applicable to that waterbody, the Community and the permitting authority shall not allow a lowering of water quality for the pollutant or pollutants preventing the attainment of such uses or exceeding such criteria.

C. Outstanding National Resource Waters: Waters designated as ONRWs within these regulations will not be subject to any lowering of water quality for economic or social development purposes. Persons currently engaging in discharges or loadings that enter or affect ONRW designated waters of the Reservation shall obtain a Section 401 Certification, if applicable, and the requisite control documents. No new or increased discharges shall be allowed to ONRW designated waters of the Reservation. Temporary (i.e. weeks or months) lowering of water quality may be permitted, as determined on a case by case basis.

D. Outstanding Keweenaw Bay Indian Community Waters (OKRW): For waters designated as OKRW, all new discharges of any BCC will be prohibited. For new or expanded discharges which do not contain any BCCs, the permitting authority may choose to allow a lowering of water quality if, after appropriate public notice, pursuant to 40 CFR 132- Final Water Quality Guidance for the Great Lakes System, and fulfilling the intergovernmental coordination requirements and after due consideration of such technical, economic, social and other criteria in the area in which the water is located, it is demonstrated that there are no feasible and prudent alternatives to a lowering of water quality and the lower water quality is necessary to accommodate important social and economic development. In addition, when allowing a lowering of water quality, the Community and permitting authority shall ensure, through the application of appropriate controls on point and nonpoint pollutant sources, that water quality necessary to protect the associated designated uses is maintained and protected.

Any entity proposing new or increased discharges or loadings that will affect OKRW designated waters of the Reservation shall obtain the requisite control documents. In no case shall any new or increased discharges or loadings be allowed if they interfere with or become injurious to existing and designated uses or they would result in the violation of any applicable narrative or numeric criteria.

III. Antidegradation Demonstration

Any entity seeking to lower water quality of any waterbody of the Reservation or seeking an increase in a discharge of any Chemical of Concern must first submit an antidegradation demonstration for consideration by the Community and the appropriate regulatory authority. The antidegradation demonstration shall include, but may not be limited, to the following:

1. Pollution Prevention Alternative Analysis. Identify any pollution prevention alternatives and techniques that are available to eliminate or significantly reduce the extent to which the increased loading results in a lowering of water quality.
2. Alternative or Enhanced Treatment Analysis. Identify alternative or enhanced treatment techniques that are available that would eliminate the lowering of water quality and their costs relative to the cost of treatment necessary to achieve the applicable effluent limitations.

3. Social and Economic Analysis. Identify the social and economic development benefits to the area in which the waters are located that will be foregone if the lowering of water quality is not allowed.

IV. Antidegradation Decision

If the permitting authority determines that the antidegradation demonstration shows that lowering water quality is necessary to support important social and economic development in the area, then the permitting authority may authorize all or part of the proposed lowering to occur through the establishment of conditions in the control document. Prior to the issuance of a decision, the permitting authority shall publish a notice in a local newspaper and provide a minimum forty-five consecutive day comment period. During this comment period, any tribal member or other interested persons may request a public hearing of such changes or revisions by the permitting authority. The decision to hold a public hearing shall be made in accordance with 40 CFR 25. Upon approval of a public hearing request, the permitting authority shall by public notice in a local newspaper announce the date, time and location of such public hearing and this said public notice shall be published at least forty-five consecutive days prior to the public hearing. Any reports, documents and data relevant to the discussion at the public hearing shall be made available at least thirty days before the hearing at the expense of the permitting authority.

Variances

A variance is a temporary exemption from any water quality standard in situations where the ambient water quality conditions do not meet the water quality standards established herein. No variances will be granted by the Keweenaw Bay Indian Community from any water quality standard as they apply to Reservation waters.

Mixing Zones

I. General Guidelines

A mixing zone is a zone of initial dilution within the immediate area of a point source discharge. The permitting authority may allow for mixing zones, however, the Community retains the right to object to, question and challenge a mixing zone on a parameter by parameter basis. The Keweenaw Bay Indian Community retains the right to determine and insist upon a more restrictive volume or area for mixing zones in cases where it is determined to be necessary. Where a mixing zone is determined to be unnecessary for a discharger to meet compliance with the water quality standards of the Keweenaw Bay Indian Community, a mixing zone will not be allowed.

Exposure in mixing zones shall not cause an irreversible response that results in deleterious effects to populations of aquatic life or wildlife. The mixing zone shall not prevent the passage of fish or fish food organisms in a manner that would result in adverse impacts on their immediate or future populations. Mixing zones must not jeopardize the continued existence of any endangered or threatened species listed under Section 4 of the Endangered Species Act, United States Code, Title 16, Section 1533, or result in the destruction or adverse modification of such species' critical habitat.
As a minimum restriction, WLAs and LAs established in a TMDL, WLAs in the absence of a TMDL and preliminary WLAs for the purposes of determining the need for a WQBELs for the protection of aquatic life, wildlife and himan health from chronic effects shall be calculated assuming a dilution fraction no greater than 25 percent of the stream design flow in flowing waters and a dilution no greater than one part effluent to 10 parts receiving water in nonflowing waters. For effluents consisting of chemical mixtures, Toxicity Equivalency Factors and Bioaccumulation Equivalency Factors shall be determined in a manner consistent with 40 CFR 132, Appendix F, Procedure 4.

II. Mixing Zones: Bioaccumulative and Non-bioaccumulative Chemicals of Concern

There shall be no mixing zones available for new discharges of Bioaccumulative Chemicals of Concern, as defined by 40 CFR 132.6, Table 6.A, as amended, to the waters of the Reservation effective upon the adoption of this ordinance. New discharges shall be defined as 1) a discharge of pollutants to the waters of the Reservation from a building, structure, facility or installation, the construction of which commences after the date this ordinance takes effect or 2) an expanded discharge from an existing discharger that commences after the date this ordinance takes effect. Exempt from this definition are expanded discharges resulting from changes in loadings of any BCC within the existing capacity and processes (e.g., normal operational variability, changes in intake water pollutants, increases in the production hours of the facility, the adding of addition shifts, or increases in the rate of production.) All other discharges of BCCs shall be defined as existing discharges.

Mixing zones for existing discharges of BCCs to the waters of the Reservation will be allowed, however, they are subject to review and modification.

Mixing zones for discharges of non-bioaccumulative chemicals of concern, as defined by 40 CRF 132.6, Table 6.A, as amended, to the waters of the Reservation will be allowed on a case by case basis, however, they are subject to the applicable provisions within the Antidegradation Policy and all applicable guidelines found within 40 CFR 132, Final Water Quality Guidance for the Great Lakes System.

Appendix A: Methodologies for the Development of Aquatic Life, Human Health and Wildlife Criteria and Values

I. General Methodology

For Chemical of Concern as listed in 40 CFR 132, Final Water Quality Guidance for the Great Lakes System §132.6, Table 6, the associated methodology for calculating numeric criteria were adopted herein. For substances that are known carcinogens, only the more stringent cancer values are listed for human health criteria in Chapter 5 of these regulations. For a complete description as to how these criteria values were derived, refer to Appendixes A-C in 40 CFR 132 and Appendix B in this document.

For substances that were identified as Chemical of Concern within 40 CFR 132 but with no CCC and CMC values listed therein, aquatic life numeric criteria was adopted from the state of Michigan's water quality standards (see Appendix B for supporting documents). For chemicals of concern with CCC, CMC and CF values published in 40 CFR 132, Final Water Quality Guidance for the Great Lakes System, aquatic life numeric criteria were derived from those said values. These said criteria are denoted in Chapter 5 as *(GLI)*.

The numerical criteria for organoleptic effects were adopted from the National Recommended Water Quality Criteria, EPA document 822-Z-99-001. The numerical criteria for drinking water standards were adopted from the National Primary and Secondary Drinking Water Regulations. All wildlife numeric criteria were adopted from 40 CFR 132, Final Water Quality Guidance for the Great Lakes System.

II. Hardness and pH dependent Aquatic Life Criteria and Values.

Aquatic life criteria that vary with total hardness or pH are listed in this subsection. Sample standards, associated with a given hardness or pH, are presented herein.

Total hardness is the sum of the calcium and magnesium concentrations expressed as calcium carbonate in mg/L. pH is the negative logarithm of the hydrogen ion activity concentrations expressed as moles per liter, the mathematical expression being: pH = -log {H+}. According the 40 CFR 132 guidelines, ambient or effluent waters with total hardness values greater than 400mg $CaCO_3$/L, 400mg $CaCO_3$/L is to be used in the calculation of the standard.

1. Key to Terms:

**	Total concentration
AC_{aq}	Aquatic Life Acute Toxicity Criterion, dissolved concentration
AC^{d}	Acute Toxicity Criterion, dissolved concentration
AC^{tr}	Acute Toxicity Criterion, total recoverable

CC_{aq}	Aquatic Life Chronic Toxicity Criterion, dissolved concentration
CC^{tr}	Aquatic Life Chronic Toxicity Criterion, total recoverable
exp.	base e exponential function
hd	total hardness, as mg $CaCO_3$/L

2. Hardness Dependent Criteria

Beryllium**

total concentration	formula; results in ug/L	Example criteria for hd of: 50	75	100	150	200
AC_{aq}	AC^{tr} = exp.{2.5279 * [In.(hd)] + -8.572}	3.7	10	22	60	124
CC_{aq}	CC^{tr} = exp {2.5279 * [In (hd)] + -10.7689}	0.41	1.2	2.4	6.7	14

Cadmium:

total dissolved	formula; results in ug/L	Example criteria for hd of: 50	75	100	150	200
AC_{aq}	AC^{tr} = exp.{1.128 * [In.(hd)] + -3.6867}	2.1	3.3	4.5	7.2	9.9
	$AC_{aq} = AC^{tr}$ * 0.85	1.8	2.8	3.8	6.1	8.4
CC_{aq}	CC^{tr} = exp {0.7852 * [In (hd)] + -2.715}	1.4	2.0	2.5	3.4	4.2
	$CC_{aq} = CC^{tr}$ * 0.85	1.2	1.7	2.1	2.9	3.6

Chromium (III)

total dissolved	formula; results in ug/L	Example criteria for hd of: 50	75	100	150	200
AC_{aq}	AC^{tr} = exp.{0.819 * [In.(hd)] + 3.7256}	1022	1424	1803	2513	3181
	$AC_{aq} = AC^{tr}$ * 0.85	869	1210	1533	2136	2704
CC_{aq}	CC^{tr} = exp {0.819 * [In (hd)] + 0.6848}	49	68	86	120	152
	$CC_{aq} = CC^{tr}$ * 0.86	42	59	74	103	131

Copper

total dissolved	formula; results in ug/L	Example criteria for hd of: 50	75	100	150	200
AC_{aq}	AC^{tr} = exp.{0.9422 * [In.(hd)] + -1.700}	7.3	10.7	14	20.5	26.9
	$AC_{aq} = AC^{tr}$ * 0.960	7.0	10	13	20	26
CC_{aq}	CC^{tr} = exp {0.8545 * [In (hd)] + -1.702}	5.2	7.3	9.3	13.2	16.9
	$CC_{aq} = CC^{tr}$ * 0.96	5.0	7.0	8.9	13	16

Lead*

total concentration	formula; results in ug/L	Example criteria for hd of: 50	75	100	150	200
AC_{aq}	AC^{tr} = exp.{1.273 * [In.(hd)] + -1.1098}	50	80	116	194	280

CC_{aq}	$CC^{tr} = \exp\{1.273 * [\ln(hd)] + -3.296\}$	5.4	9.0	13	22	32

Nickel

		Example criteria for hd of:				
total dissolved	formula; results in ug/L	50	75	100	150	200
AC_{aq}	$AC^{tr} = \exp.\{0.846 * [\ln.(hd)] + 2.255\}$	261	367.8	469.2	661.2	843.3
	$AC_{aq} = AC^{tr} * 0.998$	261	367	468	660	842
CC_{aq}	$CC^{tr} = \exp\{0.846 * [\ln(hd)] + 0.0584\}$	29.02	40.9	52.2	73.5	93.8
	$CC_{aq} = CC^{tr} * 0.997$	29	41	52	73	94

Zinc

		Example criteria for hd of:				
total dissolved	formula; results in ug/L	50	75	100	150	200
AC_{aq}	$AC^{tr} = \exp.\{0.8473 * [\ln.(hd)] + 0.884\}$	66.7	93.9	119.8	168.9	215.6
	$AC_{aq} = AC^{tr} * 0.978$	65	92	117	165	211
CC_{aq}	Identical to the Acute Toxicity Criteria Therefore, $AC_{aq} = CC_{aq}$ and $AC^{tr} = CC^{tr}$					

3. pH Dependent Criteria

Pentachlorophenol

		Example criteria for hd of:				
total concentration	formula; results in ug/L	6.5	7.0	7.5	8.0	8.5
AC^t	$AC^t = \exp.1.005\{[pH] + -4.869\}$	5.2	8.5	14	23	38
CC^t	$CC^t = \exp 1.005\{[pH] + -5.134\}$	4.0	6.5	11	18	29

III. Methodology for Development of Human Health Criteria and Values

A. Data Sources

1. For substances listed in 40 CFR §132.6, Table 6, Human Health Criteria was derived according to the methodology described in Appendix B and C of 40 CFR 132. BCF, BAF and K_{ow} values were obtained from one of the following sources:
   a. Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors, EPA-820-B-95-005.
   b. The EPA Ambient Water Quality Criteria documents issued after January 1, 1980.
   c. ECOTOX database available at the USEPA web site http://www.epa.gov/ecotox/.
2. ADE and RAD values were obtained from the U.S. Environmental Protection Agency's IRIS database.

3. The fraction dissolved in water was calculated using the DOC and POC if provided in the study from which the field measured BAF or laboratory BCF were obtained. If no POC or DOC are reported in the study the fraction dissolved in water was presumed to be 1 if the log K_{ow} is 4 or less.

B. Assumptions

Within 40 CFR 132 guideline, several key assumptions are used for the derivation of numerical criteria. They are:

1. Assume an average body weight of 70 kg.
2. Assume an average water consumption of 2L/day. Incidental water consumption associated with recreation activities of 0.01L/day.
3. Assume an average fish consumption rate of 15 g/day. This average is based on an assumed 3.6g/day consumption of fish from trophic level 3 and 11.4 g/day of fish from trophic level 4.

Within this document, the first two assumption relative to body weight and water consumption were adopted into the calculations of Human Health Criteria. However, the assumption of fish consumption was deemed inadequate for the protection of health on the Reservation. According to a study prepared for the Agency for Toxic Substances and Disease Registry by John A. Dellinger, Ph.D., the average fish consumption for a study group of six Ojibwa Reservations in the Upper Great Lakes (which included Keweenaw Bay Indian Community) was 23.58g/day (Dellinger, 1998). This average is based on consumption averages of 8.11 g/day of fish from trophic level 3 and 15.47 g/day of fish from trophic level four. These values were used in all calculations of Human Health Criteria, except where noted otherwise.

Appendix B: *Supporting Documents*

Fish Consumption Calculation

The following is the calculation used to derive the fish consumption rate for the Keweenaw Bay Indian Community. The values used herein were obtained from the "Ojibwa Health Study, Phase II", prepared for the Agency for Toxic Substances and Disease Registry by Dr. John A. Dellinger (Dellinger, 1998).

Average Daily Fish consumption:	23.58 g/day
Annual Consumption of trophic level 3 (TL3):	1912 g/yr
Annual Consumption of trophic level 4 (TL4):	3644 g/yr
Total annual fish consumption (_TL3, TL4):	5556 g/yr
Percent TL3 consumed [TL3/(TL3+TL4)]*100:	34.41%
Percent TL4 consumed [TL4/(TL3+TL4)]*100:	65.59%
g/day TL3 consumed {%TL3*23.58g/day):	8.114 g/day
g/day TL4 consumed (%TL4*23.58g/day):	15.47 g/day

IRIS Values

The following table includes all values for RfDs and Oral Slope values used in the calculation of human health criteria. These values were obtained from the IRIS database, http://www.epa.gov/iris/. Note that n/a refers to not applicable and (c) refers to carcinogen. - refers to not used as the substance is a carcinogen.

Table 1: IRIS Data

SUBSTANCE	CASRN	RfD {(mg/kg)/day}	ORAL SLOPE VALUE
Chlorobenzene	108-90-7	2.0E-2	n/a
2,4-Dimethylphenol	105-67-9	2.0E-2	n/a
2,4-Dinitrophenol	51-28-5	2.0E-3	n/a

Toluene	108-88-3	2.0E-1	n/a

Table 1: IRIS Data continued

SUBSTANCE	CASRN	RfD {(mg/kg)/day}	ORAL SLOPE VALUE
Lindane	58-89-9	3.0E-4	n/a
Hexachlorobutadiene (c)	87-68-3	-	7.8E-2
Hexachlorocylcohexanes (c)	608-73-1	-	1.8
alpha-BHC (c)	319-84-6	-	6.3
beta-BHC (c)	319-85-7	-	1.8
Mirex	2385-85-5	2.0E-4	n/a
Pentachlorobenzene	608-93-5	8.0E-4	n/a
1,2,3,5-Tetrachlorobenzene	95-94-3	3.0E-4	n/a
Heptachlor (c)	76-44-8	-	4.5

Human Health BAFs

The following table contains the BAFs used by the environmental staff of the Reservation to derive human health criteria. These BAFs were obtained from the Great Lakes Water Quality Initiative Technical Support Document for Procedures to Determine Bioaccumulation Factors, EPA 820-B-95-005.

Table 2: Non-Derived BAF_{TL3} and BAF_{TL4}

SUBSTANCE	CASRN	BAF_{TL3}	BAF_{TL4}
Benzene	71-43-2	3	5
Chlorodane	57-74-9	116600	154200
Chlorobenzene	108-90-7	15	24
DDD	72-54-8	97680	243300
DDE	72-55-9	532800	2903000
DDT	50-29-3	376400	1114000
Dieldrin	60-57-1	72610	571000
2,4-Dimethylphenol	105-67-9	5	7
2,4-Dinitrophenol	51-28-5	2	2
Hexachlorobenzene	118-74-1	43690	71080
Hexachlorocyclohexane (total)	608-73-1	1412	2000
Alpha-BHC	319-84-6	1035	1517
Beta-BHC	319-85-7	1411	1999
Hexachloroethane	67-72-1	371	532
Lindane	58-89-9	1926	2636
Methylene Chloride	75-09-2	1	2
Mirex	2385-85-5	353400	1461000
PCBs (class)		321000	1086000

Table 2: Non-Derived BAF_{TL3} and BAF_{TL4} continued

SUBSTANCE	CASRN	BAF_{TL3}	BAF_{TL4}
Pentachlorobenzene	608-93-5	8248	19420
2,3,7,8 TCDD		48490	79420
1,2,3,5 Tetrachlorobenzene	95-94-3	1467	3610
Toluene	108-88-3	11	17
Toxaphene	8001-35-2	498100	665600
Trichloroethylene	71-55-6	7	12

The following table contains baseline BAFs which were calculated by the staff of the Natural Resources Department. These baseline BAFs were derived from either field BAFs, BSAFs, laboratory BCFs, or predicted from K_{ow} 's. The means by which the baseline BAF was derived is indicated by the symbol _. The baseline BAFs values were used to calculate human health criteria for the associated substances listed. The human health criteria were calculated according the guidelines found within Appendixes A-C in 40 CFR 132.

Table 3: Derived baseline BAFs

		Source Data For Derived Baseline BAF			
SUBSTANCE	Baseline BAF_{TL3} / BAF_{TL4}	Field BAF	BSAF	Laboratory BCF	log K_{ow}
Heptachlor	BAF_{TL3} 426455.1053 BAF_{TL4} 360837.0131			_ 9500_a	5.05_b

Footnotes:

a This value obtained from EPA Ambient Water Quality Criteria documents issued after January 1, 1980.

b This value obtained from the National Institute of Health National Toxicity program website. http://ntp-server.niehs.nih.gov.

Calculation of Human Health Criteria for Heptachlor

Givens:

species: fathead minnow
lipid content: 7.6%
measured BCF: 9500
log Kow: 5.05
FCM 3: 3.412 note source below
FCM4 2.887
$f_{fd\ test}$ 1 (assumed as test DOC and POC not given; laboratory study, therefore assume test water with little organic carbon)
$f_{fd\ site}$ = 1/ [1 + (doc)(Kow)/10 + (POC*Kow)] = 1 / [1+(10E5.05*2E-6)/10 + (4E-8*10E5.05)] = 0.97378

From 40 CFR 132, Table B1:

FCM	log Kow	FCM
FCM3	5.0	3.181
FCM3	5.1	3.643
FCM4	5.0	2.612
FCM4	5.1	3.162

therefore, for log Kow of 5.05: (3.643 - 3.181)/2 = 0.231
FCM3 for log Kow 5.05 = 3.181 + 0.231 = 3.412

therefore, for log Kow of 5.05 (3.162-2.612)/2 =0.275
FCM4 for log Kow 5.05 = 2.612 + 0.275 = 2.887

Calculation Baseline BAF:

$\text{Baseline BAF}_{TL3} = \text{FCM3 [BCF/ } f_{fd} - 1] [1/fl]$
$= 426455.1053$

$\text{Baseline BAF}_{TL4} = \text{FCM4 [BCF/ } f_{fd} - 1] [1/fl]$
$= 360837.013157895$

Calculation Final BAF:

$\text{HH BAF}_{TL3} = [(\text{baseline BAF}_{TL3} * 0.0182) + 1](\text{site } f_{fd})$
$\text{HH BAF}_{TL3} = [426455.1053\ (0.0182) + 1\ ]\ (.97378)$
$= 7558.95$

$\text{HH BAF}_{TL4} = [(\text{baseline BAF}_{TL4} * 0.0310) + 1](\text{site ffd})$
$\text{HH BAF}_{TL4} = [360837.013157895(0.0310) + 1](0.97378)$
$= 10893.6$

APPENDIX Q:

Rapid Watershed Assessment

Keweenaw Bay Indian Community Rapid Watershed Assessment News

An Ojibwa Poem

Anishinaabekwe, the Daughters,
You are the keepers of the water.

I am Nibs...water..the sacred source,
The blood of Aki, Mother Earth,
The force filling dry seeds to great bursting.

I am the wombs cradle.
I purify.
Nibi, the lifegiver, forever the Circle's charge
I have coursed through our Mother's veins.

Now hear my sorrow and my pain
In the river's rush, the rain.

I am your grandchildren's drink.
Listen, Daughters, always.

You are the keepers of the water.
Hear my cry, for the springs flow darkly now
Through the heart of Aki.

In the fall of 2007, the Keweenaw Bay Indian Community, working in partnership with the Upper Peninsula Resource Conservation and Development Council, the USDA Natural Resources Conservation Service, the Baraga County Road Commission, the Baraga Conservation District, and the Western Upper Peninsula Planning and Development Region (WUPPDR) began a year-long project to assess the natural resource concerns of all the watersheds that originate and flow across the KBIC Reservation. The project is called the "Keweenaw Bay Rapid Watershed Assessment". Rapid Watershed Assessments (RWA) provide guidance of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders within a watershed. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals. The project study area is approximately 313 square miles with 92 square miles being within the KBIC L'Anse Reservation boundary. During the first phase of the project, staff from WUPPDR are collecting information on land use, land cover types, soil conditions, climate, and socio-economic data. They are also working with staff from the Baraga County Road Commission to survey approximately 115 road crossings within the watershed area. Road crossings have the potential to significantly impact stream quality and fish passage due to erosion and perched culverts. Gathering input from the residents and stakeholders in the watershed regarding their views of priority natural resource concerns and opportunities is an important part of the process and a public meeting has been planned for this purpose (see page 6). The completed resource assessment will be a valuable tool for land owners, resource professionals, and community leaders.

Land Use	Acres	Percent
Agricultural	12019.2	6.0
Barren Land	200.3	0.1
Forest Land	168268.8	84.0
Urban	1201.9	0.6
Water	1602.6	0.8
Wetland	17027.2	8.5

Partners
U. P. Resource Conservation and Development Council

Keweenaw Bay Indian Community

USDA Natural Resources Conservation Service

Western Upper Peninsula Planning and Development Region

Baraga County Road Commission

Baraga Conservation District

The stream crossing at Zeba Creek was remediated with a new arched culvert with a natural bottom designed for fish passage and rock armoring of the creek's outlet below the culvert which dramatically curtailed erosion.

Land Ownership	Acres	Percent
Tribal	58880	29.4
State	15488	7.7
Federal	10048	5.0
Private	115985	57.9

KBIC Rapid Watershed Assessment Landowner Survey

What natural resource issues are most important to you? *(Check as many as you like)*

_____*Water quality* _____*Groundwater Protection* _____*Lake Levels*
_____*Wetland Protection* _____*Poor Land Use Practices* _____*Shoreline Development*
_____*Fish & Wildlife Habitat* _____*Invasive Species Control/Mgmt.* _____*Erosion Control*
_____*Unregulated Development* _____*Endangered/Threatened Species* _____*Forest Pests/Diseases*
_____*Forestry Management. Practices* _____*Other* _____

In your opinion, what are the top three needs/concerns in your community?

1. _____

2. _____

3. _____

Please return your survey to:

U. P. Resource Conservation & Development Council
780 Commerce Drive, Suite C
Marquette, Michigan 49855

2008

Rapid Watershed Assessment, Keweenaw Bay Indian Community

Western Upper Peninsula Planning & Development Regional Commission

10/1/2008

Table of Contents

Appendix A (Maps)

Acknowledgements

The Rapid Watershed Assessment (RWA) was completed in cooperation with USDA, Natural Resource Conservation Service, Upper Peninsula Resource Conservation and Development (RC&D), Western Upper Peninsula Planning & Development Region, Keweenaw Bay Indian Community, Natural Resource Department, Baraga Conservation District and County Road Commission.

Purpose

A RWA is a rapid assessment of a defined watershed project area. The RWA should take no longer than 8-10 months to complete. The information is general in nature and is not to be used as a plan, but rather an initial estimate of where conservation investments would best address the concerns within the watershed. This information should be a solid starting point for local stakeholders to use in a more detailed watershed planning effort.

A RWA has two main components, a watershed resource profile and an assessment matrix. The resource profile is compiled using Geographic Information System (GIS) where applicable and consisted of:

- Introduction
- Population Density
- Physical Description
- Precipitation
- Public Lands
- Land cover/Land use
- Soil Drain Classification
- Land Capability Class
- Common Resource Areas
- Local Resource Concerns

The assessment matrix summarizes current resource conditions and related maintenance costs within the watershed. The assessment matrix contains:

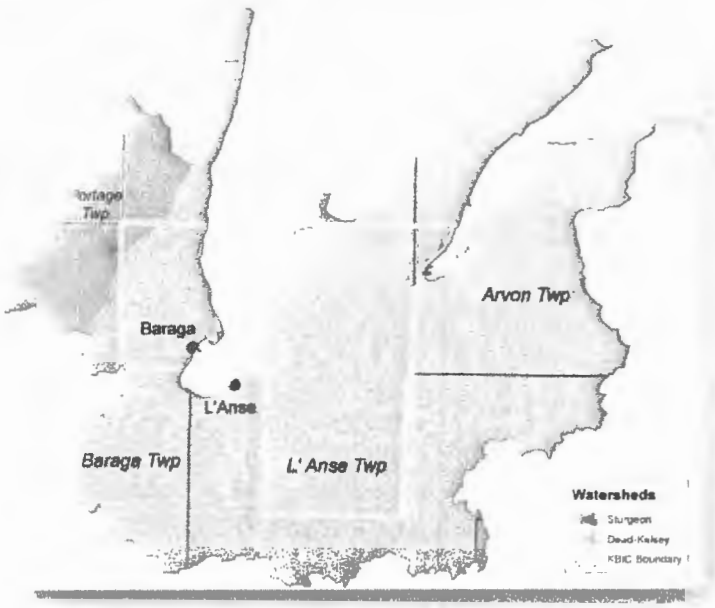
Current Condition Table – detailing the current level of conservation in the watershed.

Future Condition Table – identifying appropriate suites of conservation practices needed to deal with the primary resource concerns for each major land use.

Summary Table – summarizing the various costs associated with the resource management systems developed in the previous step.

Introduction

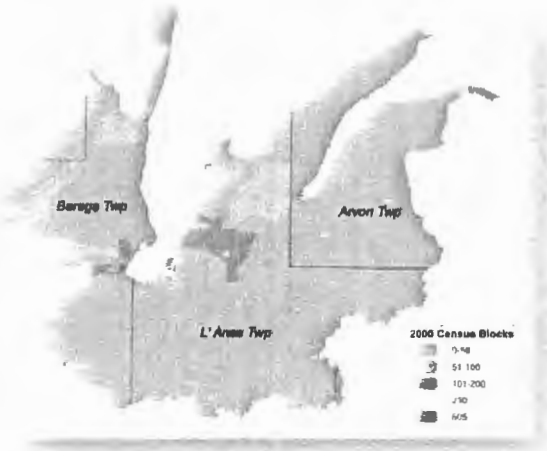
The Keweenaw Bay Indian Community (KBIC) Rapid Watershed Assessment project study area consists of two 8-digit Hydrological Unit Code (HUC) sub-basins, the Dead-Kelsey and Sturgeon Watersheds. Within these watersheds there are 9 sub watersheds which reference the 12-digit HUC. These watersheds are located within Baraga and Houghton Counties in the Western Upper Peninsula of Michigan. The majority of the area is within Baraga County, which drains into Lake Superior's Keweenaw and Huron Bays to the North. In addition, there are 4 townships located in the watershed.



Map 1: Base Map, Appendix 1

The total project area is 313 square miles, with 92 square miles of it being within the KBIC boundary. The greater part of the project (283 square miles) is within the Dead-Kelsey Watershed, the remaining 30 square miles is in the Sturgeon.

According to the 2000 Census, the population of the project area is 7,967, with 46% of that total being tribal members (see Chart 1). The majority of the non-tribal population is centralized within the Village limits of Baraga and L'Anse.



Map 2: Population, Appendix 2

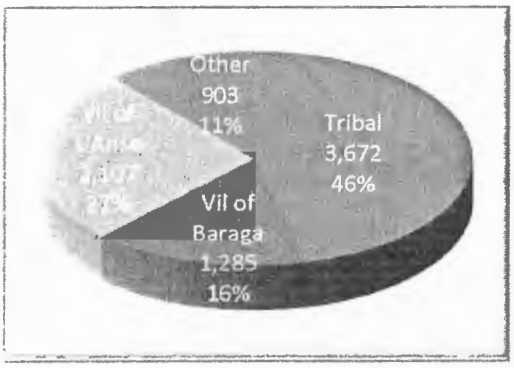


Chart 1: Population

Resource Profile

Physical Description

Sub-Basins and River Systems

The scope of this project incorporates 9 sub-basins. Within the 9 sub watersheds there are 16 perennial rivers and numerous intermittent stream systems. There are 257 miles of perennial rivers and 117 miles of intermittent rivers/streams. In addition, there are a total of 74 miles of coastline of Lake Superior. All but one water system drains into either Keweenaw or Huron Bay of Lake Superior. The Sturgeon River sub-watershed flows into Portage Lake, which is a tributary of Lake Superior. The other main rivers consist of the Silver, Slate, Falls and Ravine River that flow into Lake Superior.

Map 3: Sub Watersheds, Appendix 3

KBIC Rapid Watershed Assessment project area has an average annual precipitation of 32 inches (see Map 4).

Table 1: Watershed Sub-basins

Sub watersheds (HUC 12)	Acres	Square Miles	% of Total Watershed
East Branch Silver River-Silver River	20,200	31.5	10%
Falls River	30,047	46.9	15%
Little Carp River-Frontal Keweenaw Bay	37,999	59.37	19%
Little Silver Creek-Frontal Keweenaw Bay	34,600	54.06	17%
Peterson Creek-Frontal Lake Superior	4,554	7.11	2%
Ravine River	17,303	27.03	9%
Silver River	24,927	38.94	12%
Slate River	11,911	18.61	6%
Town of Pelkie-Sturgeon River	19,370	30.26	10%

Map 4: Precipitation, Appendix 4

Public Lands

The total watershed has nearly 40 square miles of public lands, which accounts for only 13% of the total watershed area. These public lands are either State or Federal and are dispersed throughout the watershed area. The land cover of this publicly owned land is primarily forest land of a mix of northern deciduous and coniferous trees.

Map 5: Public Land, Appendix 5

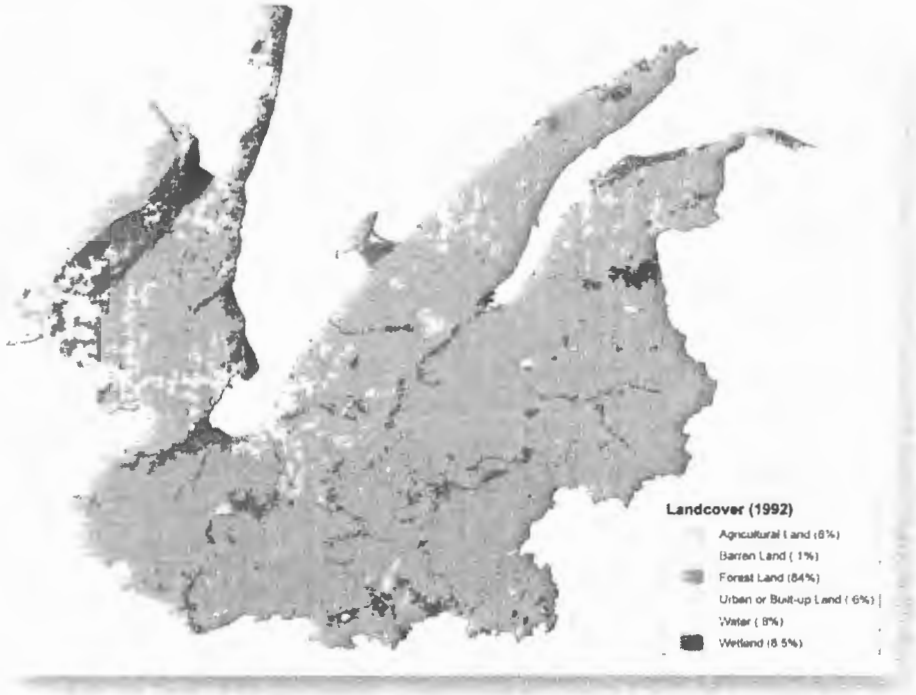
Table 2: Public Lands

Ownership	Acres in Watershed	% in Watershed
State of Michigan	12,597	6.20%
U.S. Government	10,020	5%

Land Cover

The terms land cover and land use tend to be interchangeable. However there are differences. Two land parcels may have similar land cover, but different land use. Land cover refers to the features that cover the land. For example, the land covered by trees, water, or by buildings. The land cover within the project area is primarily forest land accounting for 84% of the coverage, followed by wetland at 8.5%. Land use refers to how land is used by humans. That is, economic use to which land is placed. For an example, forest land used for recreational purposes or commercial forestry or even residential.

The land uses that were depicted within the project area were agriculture and golf course within 1,000 ft of a water body. We saw these land uses as resource concerns which is shown in the resources concern portion of the assessment.



Map 6: Land Cover, Appendix 6

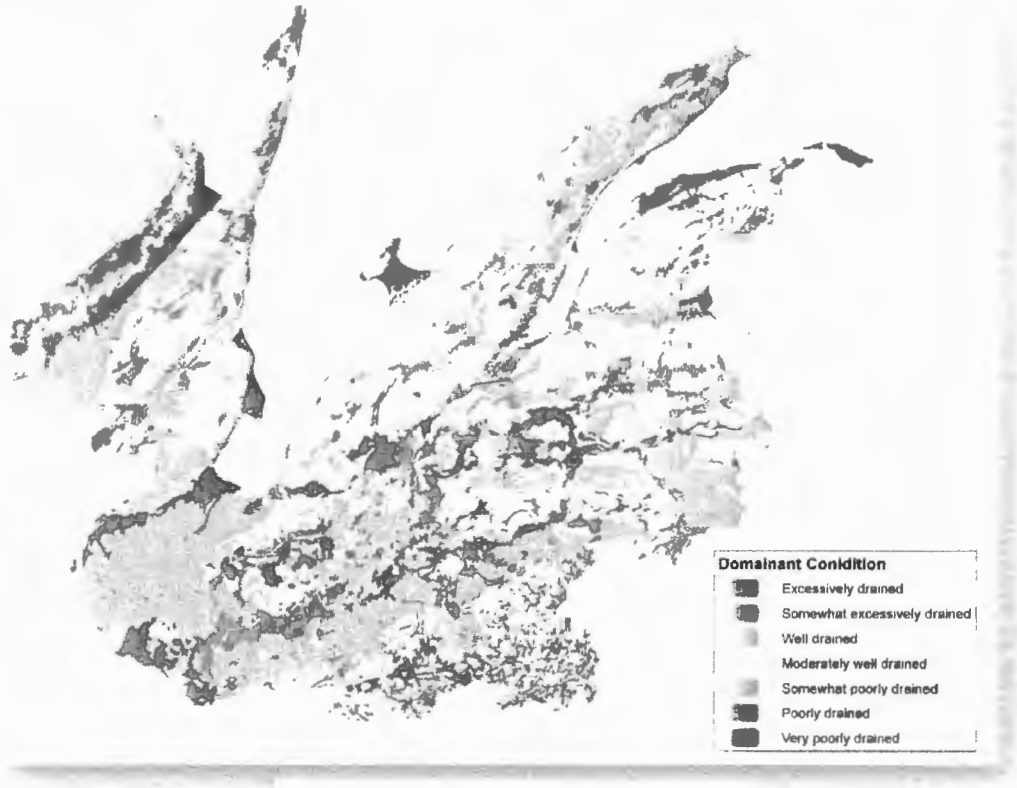
Table 3: Land Cover Classification

Land Cover	Acres in Watershed	% of Watershed
Agricultural	12,849	6.0%
Barren Land	15	0.1%
Forest Land	174,943	84.0%
Urban or Built up Land	1,240	0.6%
Water	1,722	0.8%
Wetland	18,059	8.5%

Soil Drain Classification

Drainage class refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage shown in Map 7 "Soil Drain Classification" are recognized and are defined in the "Soil Survey Manual".



Map 7: Soil Drain Classification, Appendix 7

Table 4: Soil Drain Classification

Domainant Condition	Acres in Watershed	Sq Miles	% of Watershed
Excessively drained	7,231	11.2	3.5%
Somewhat excessively drained	8,165	12.7	4.0%
Well drained	63,912	99.8	31.1%
Moderately well drained	77,187	120.6	37.6%
Somewhat poorly drained	25,484	39.8	12.4%
Poorly drained	11,549	18	5.6%
Very poorly drained	11,809	18.4	5.8%

Land Capability Class

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, forestland, or engineering purposes.

Class codes 1,2,3,4,5,6,7, and 8 are used to represent both irrigated and non-irrigated land capability classes.

Class 1 soils have slight limitations that restrict their use.
Class 2 soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
Class 3 soils have severe limitations that restrict the choice of plants or require very careful management or both.
Class 4 soils have very severe limitations that restrict the choice of plants or require very careful management.
Class 5 soils have little or no hazard of erosion but have other limitations, impractical to remove, that limit their use mainly to pasture, range, forestland, or wildlife food and cover.

Map 8: Land Capability Class, Appendix 8

Class 6 soils have severe limitations that make them generally unsuited to cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover.
Class 7 soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forestland, or wildlife.
Class 8 soils and miscellaneous areas have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for esthetic purposes.

Table 5: Land Capability Class

Nonirrigated Classes	Acres in Watershed	Sq Miles	% in Watershed
Class 2	69,986	109.35	34.0%
Class 3	51,390	80.29	25.0%
Class 4	10,530	16.45	5.0%
Class 5	11,097	17.33	5.0%
Class 6	28,131	43.95	14.0%
Class 7	34,204	53.44	17.0%

Common Resource Areas

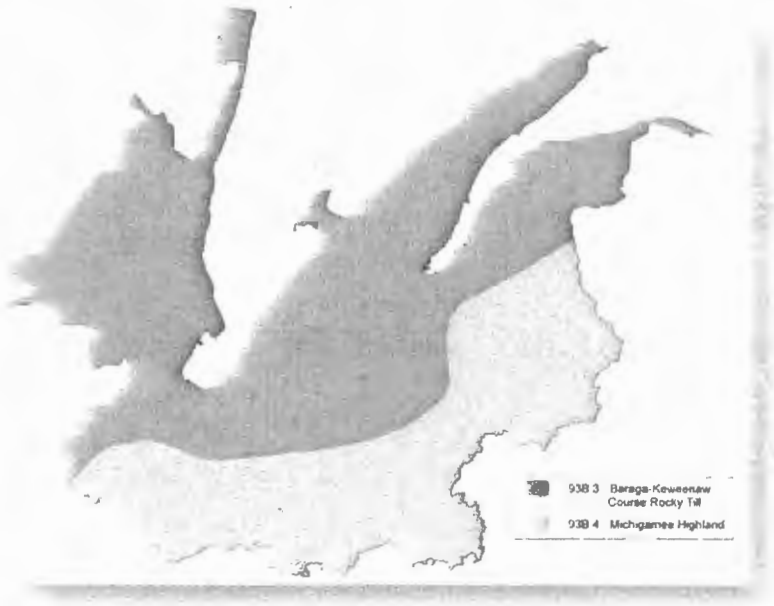
The project area consists of two common resource areas, Baraga-Keweenaw Coarse Rocky Till and Michigamee Highland (see Map 9 "Common Resource Areas").

93B.3 Baraga-Keweenaw Coarse Rocky Till

Nearly level to steep ground moraine and ridges with areas of rock outcrops. Well drained to somewhat poorly drained loamy and sandy soils predominate. Mostly deciduous and coniferous forest. The major land use is woodland and recreation. Primary resource concerns are soil erosion, groundwater quality, surface water quality, forestland productivity, erosion during timber harvest and wildlife habitat.

93B.4 Michigamee Highland

Rock outcrop and nearly level to very steep, deep and moderately deep soils on bedrock controlled uplands. Well drained to somewhat poorly drained loamy soils predominate. Dominant land use is woodland. The primary resource concerns are soil erosion, groundwater quality, surface water quality and forestland productivity.



Map 9: Common Resource Areas, Appendix 9

Table 6: Common Resource Areas

Common Resource Area	Acres in Watershed	Sq Miles	% in Watershed
Baraga-Keweenaw Coarse Rocky Till	133,904	196	64%
Michigamee Highland	75,177	117	36%

Resource Concerns

The main local resource concerns of this project area are fish passages on rivers and sedimentation being deposited at the mouths of rivers flowing into Lake Superior. Road crossings are known areas of sediment input if poorly constructed and drained. Sediment input into Keweenaw and Huron Bays can negatively impact spawning and other fishery habitat in the bays.

The picture to the right shows sedimentation deposit at the mouth of the Ravine River in Huron Bay.

Mouth of the Ravine River into Huron Bay

In addition to sedimentation at the mouths of streams, sedimentation within a stream system is a major concern, as sediment covers spawning gravel and other valuable habitat, causing systems to run wider and shallower, and may increase turbidity of a system, which can increase temperature. Erosion caused by wider and shallower systems removes stream bank shade and filter areas.

A major water quality concern is the industrial development in the form of potential sulfide mining activity in the Silver River watershed, and possibly other watersheds. Mineral exploration firms have been actively completing exploration activities including boreholes in the Silver and Huron River watersheds.

Additional concerns were gathered by a community survey. The results shown in Chart 2 indicate that water quality ranks high in local resource concerns.

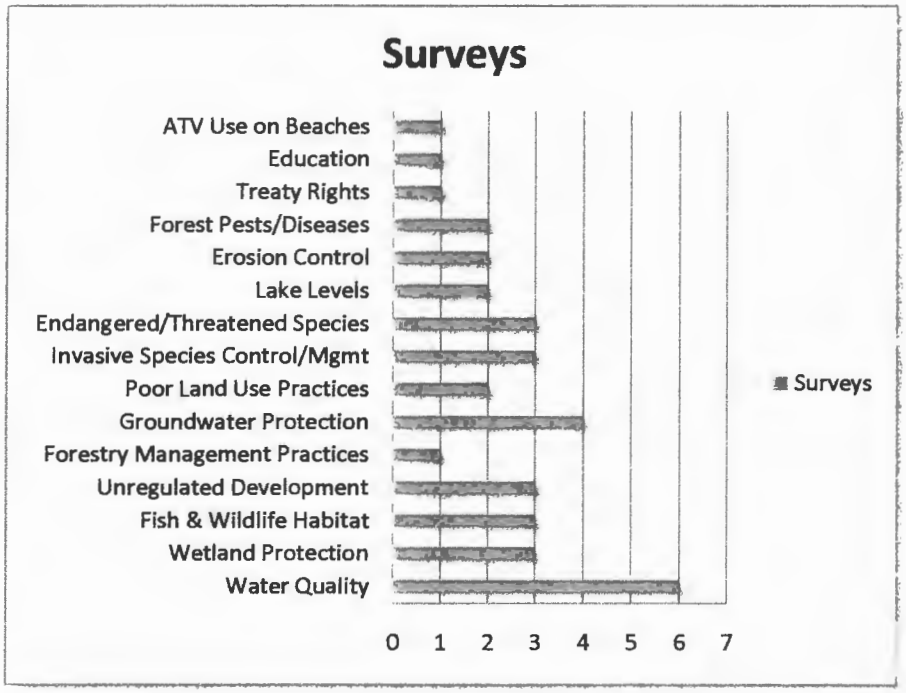


Chart 2: Survey Results

Land Use

Possible land uses of active farmland and golf courses may contribute to non-point source pollution, if adequate prevention measures are not implemented. Increasing the chemicals these land uses encounter places the natural resources of the watershed at higher risk of pollution because of their proximities to bodies of water. Farmland use may also introduce nutrients and bacteria into waters. These land uses are within 1,000 ft of a body of water and are indicated in Map 10.

Map 10: Land Use, Appendix 10

Table 7: Land Use Concerns

Land Use	Acres
Active Farmland	2,202
Golf Courses	58

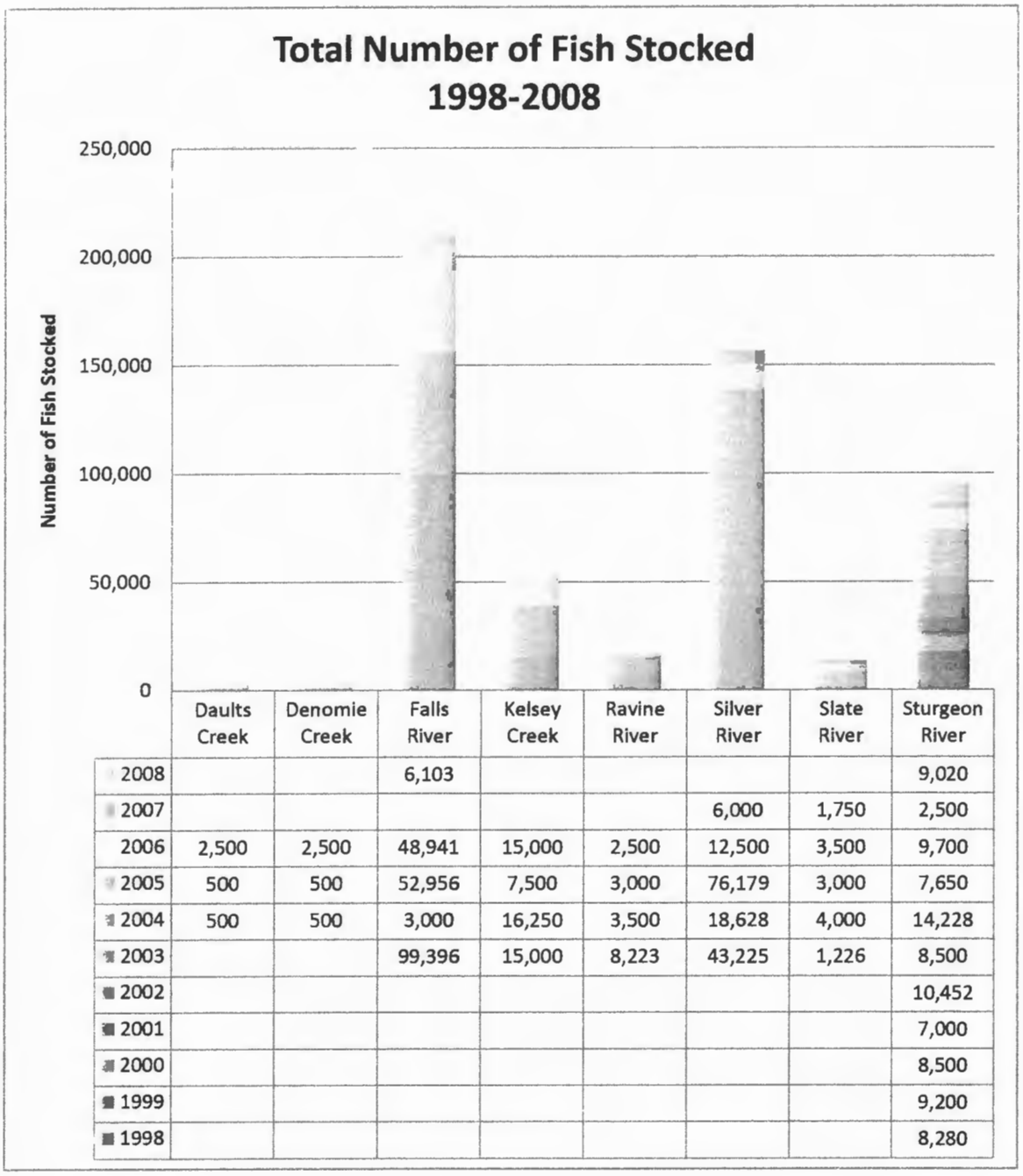
Fish Barriers

Nearly all road crossings of rivers and streams are culverts and bridges that are intended for the purpose of vehicle access. However these crossings can lead to unintended blocking of migration of fish up or down streams. Fish movement within rivers and streams are vital for maintaining healthy populations.

There are a total of 15 fish stocking points within the project area. The Michigan Department of Natural Resources and Keweenaw Bay Indian Natural Resource departments have stocked over 626,424 fish since 1998 (see Chart 3 "Fish Stocking").

A survey was taken of 92 culverts and bridges within the project area. Of these 92 culverts and bridges inventoried, 25 of the culverts had a fish barrier. These fish barriers are affecting 32 miles of perennial rivers and 19 miles of intermittent streams (see Map 11 "Fish Barriers").

Map 11: Fish Barriers, Appendix 11



	Daults Creek	Denomie Creek	Falls River	Kelsey Creek	Ravine River	Silver River	Slate River	Sturgeon River
2008			6,103					9,020
2007						6,000	1,750	2,500
2006	2,500	2,500	48,941	15,000	2,500	12,500	3,500	9,700
2005	500	500	52,956	7,500	3,000	76,179	3,000	7,650
2004	500	500	3,000	16,250	3,500	18,628	4,000	14,228
2003			99,396	15,000	8,223	43,225	1,226	8,500
2002								10,452
2001								7,000
2000								8,500
1999								9,200
1998								8,280

Chart 3: Fish Stocking

Invasive Species

Non-native species have been detected throughout the Upper Peninsula of Michigan and have an adverse affect on the natural environment. Invasive species concerns include sea lamprey, other ballast water invaders, stickleback (three and four spine), goby (tubenose and round), ruffle, Bacterial Kidney Disease (BKD), Viral Hemorrhagic Septicemia (VHS), Whirling Disease (fish diseases/viruses introduced), zebra mussels, and crayfish.

The terrestrial invasive species include buckthorn, purple loosestrife, curly leafed pond weed, spotted knapweed, toad flax, emerald ash borer, pine beetle, and others. These invasive spicies like borers, beetles and non-native plants have the potential to significantly change forest and land cover, which may alter hydrologic regimes.

Some effects of Invasive Species

- Loss of biodiversity as native species are replaced by invader species
- Harm to wildlife and fish habitat by loss of native food sources, nesting habitat, and introduction of disease
- Thick beds of invasive aquatic plants impede boat passage and pose a risk to swimmers
- Invasive plants such as European swamp thistle and Japanese barberry form spiny thickets and impede recreation and hunting access
- Non-native forest pests such as emerald ash borer and hemlock wooly adelgid threaten many forest trees

Sea Lamprey

The U.S. Fish and Wildlife Service (USFWS) Sea Lamprey Control program treats the following infested streams in the KBIC project area: the Ravine, Silver, Falls, and Sturgeon Rivers. The Slate and Six Mile Creek are two that are sometimes infested with sea lamprey and they survey these streams regularly and treat when necessary. There are a total of 72 miles of infested streams and 30 miles of moderately infested streams within the KBIC Rapid Watershed Assessment. These rivers are depicted on Map 12.

Map 12: Sea Lamprey Infested Waters, Appendix 12

Falls River

The Falls River is infested with larval sea lamprey from the mouth up to the waterfall at US-41. The bay is also infested offshore of the Falls River. The USFWS has estimated that approximately 22 acres of silt/sand habitat offshore of the Falls River is contaminated with larval lamprey.

Annual treatments occurred during 1989-1997 and were reinstituted in 2007 after lentic area surveys found extremely high densities, and larval lamprey were found in the stream. In 2008, the bay will be treated with the lampricide granular bayluscide and the stream will be treated with liquid lampricide from the mouth to US-41.

Ravine River

The Ravine River has been treated for larval sea lamprey five times since 1998, and will be treated again in 2008. The main stream is often infested up to the junction of Fossom Creek. Fossom Creek is typically infested up to Roland Lake Road. There are also 12 acres infested offshore of the Ravine and this area will be treated in 2008.

Silver River

The Silver River has been treated for larval sea lamprey nine times in the past 10 years and will be treated in 2008. None of the small tributaries are known to harbor larval lamprey. The lamprey are generally found up to the Silver Falls.

Sturgeon River

The Sturgeon River has been treated for larval sea lamprey four times in the past 10 years. Lamprey distribution on the river is usually up to the Prickett Dam and around the mouth of Clear Creek. This river is generally treated every four or five years if treatments are successful.

Summary of Assessment Matrix

The Keweenaw Bay Indian Community Rapid Watershed Assessment Matrix information was inputted by the Natural Resource Conservation Service (NRCS) Technical Team. The contributors were District and Soil Conservationist assigned to the project area that have knowledge of the local conservation practices. Assistance was also provided by the regional Resource Conservation and Development (RC&D) and State Agricultural Economist.

The team established a baseline of Conservation Practices Physical Effect (CPPE) on the land currently within the project area. These existing practices were used to identify future conditions through an estimated percent increase in participation to deal with primary resource concerns. The estimated costs to install future conservation practices are based on a cost list within the assessment matrix provided by the USDA-NRCS State Agricultural Economist (see Assessment Matrix on following page).

The assessment matrix breaks down the current conditions and forecasts future conditions and costs by estimating the increase of participation in the time frame of implementation. The total average annual costs and present value of total average annual cost over 5 years is indicated within the cost summary.

Assessment Matrix

NRCS

MICHIGAN

Watershed:
Keweenaw Bay Indian Community

Current Conditions	*Total Acres*
Total Crop/Hay/Pasture Land	*12,849*
Total Forest Land	*193,002*
Other Land Use	*2,977*
Typical Management Unit (avg farm size)	*200*
Estimated Current Farm Bill participation %	*2%*

Future Conditions	*Total Acres*
Total Crop/Hay/Pasture Land	*11,500*
Total Forest Land	*194,351*
Other Land Use	*2,977*
Total Watershed Acres with Treatment (Current & New Implementation)	*208,828*
Estimated Acres: New Implementation	*8400*
Estimated increase in Participation (potential participation in time frame for implementation).	*2%*
Total participation Future	*4%*

Cost Summary

Treatment / Investment	*Expected Installation Cost*	*Annual Maintenance Cost*	*Total Average Annual Cost of Investment*
Total Crop/Hay/Pasture Land	*$4,372,528*	*$207,083*	*$955,051*
Total Forest Land	*$2,155,334*	*$106,887*	*$411,671*
Other Land Use	*$3,362,273*	*$164,376*	*$643,388*

Cost Items and Programs	*Costs*	*O&M Costs*
Maintain the Baseline Conservation - Annual Maintenance		*$478,500*
Total Investment at estimated rate of participation	*$9,890,100*	*$478,300*
Potential Investment from Farm Bill Programs	*$4,945,050*	-
Management Incentives (Incentive Payments in yr 2 & 3)	*$650,640*	-
Total Potential Farm Bill Program Costs	*$5,595,690*	-

Operator Investment	*$4,945,100*	*$956,800*
Total Average Annual Costs	*$1,055,100*	
Present Value of Total Average Annual Costs over 5 years	*$4,583,900*	

Note:

Summary numbers rounded to even 100s	*Cost Basis: 2008*	*Discount Rate: 4.875%*	*Time Frame - Years: 5*

Total Effects Score	*1,001*

Sum of CPPE for all practices and resource concerns.

Resource Concerns Selected:	*CPPE*
Wildlife - Threatened and Endangered Fish and Wildlife Species	*29*
Wildlife - Inadequate Food	*104*
Wildlife - Inadequate Cover/Shelter	*103*
Wildlife - Imbalance Among and Within Populations	*91*
Water Quantity - Reduced Capacity of Conveyances by Sediment Deposition	*70*
Water Quantity - Insufficient Flows in Water Courses	*23*
Water Quantity - Excessive Runoff, Flooding, or Ponding	*53*
Water Quantity - Drifted Snow	*9*
Water Quality - Harmful Levels of Heavy Metals in Surface Water	*30*
Soil Erosion - Streambank	*45*
Soil Erosion - Shoreline	*47*
Soil Erosion - Sheet and Rill	*61*
Soil Erosion - Mass Movement	*17*
Soil Erosion - Classic Gully	*47*
Soil Condition - Damage from Sediment Deposition	*44*
Soil Condition - Contaminants - Salts and Other Chemicals	*33*
Plants - Wildfire Hazard	*33*
Plants - Threatened and Endangered Plant Species	*9*
Plants - T&E Plant Species: Declining Species, Species of Concern	*19*
Plants - Noxious and Invasive Plants	*134*

Footnotes/Bibliography

Hydrologic Unit Boundary maps Natural Resources Conservation Service Geospatial Data Gateway. http://datagateway.nrcs.usda.gov/GatewayHome.html

National Land Cover Data (NLCD) – Originator: United States Geological Survey (USGS). Information available http://www.mcgi.state.mi.us/mgdl/ then navigate to geographic extent, County, then 1992 National Land Cover Dataset.

Public Land information is available from Baraga County 911 department 906-524-6911.

Soil Survey Geographic Database (SSURGO) tabular and spatial data were downloaded from Natural Resources Conservation Service Geospatial Data Gateway. http://datagateway.nrcs.usda.gov/GatewayHome.html

Common Resource Area (CRA) map delineations data. http://datagateway.nrcs.usda.gov/GatewayHome.html

Population Statistics were obtained from the US Census Bureau. http://www.esri.com/data/download/census2000_tigerline/

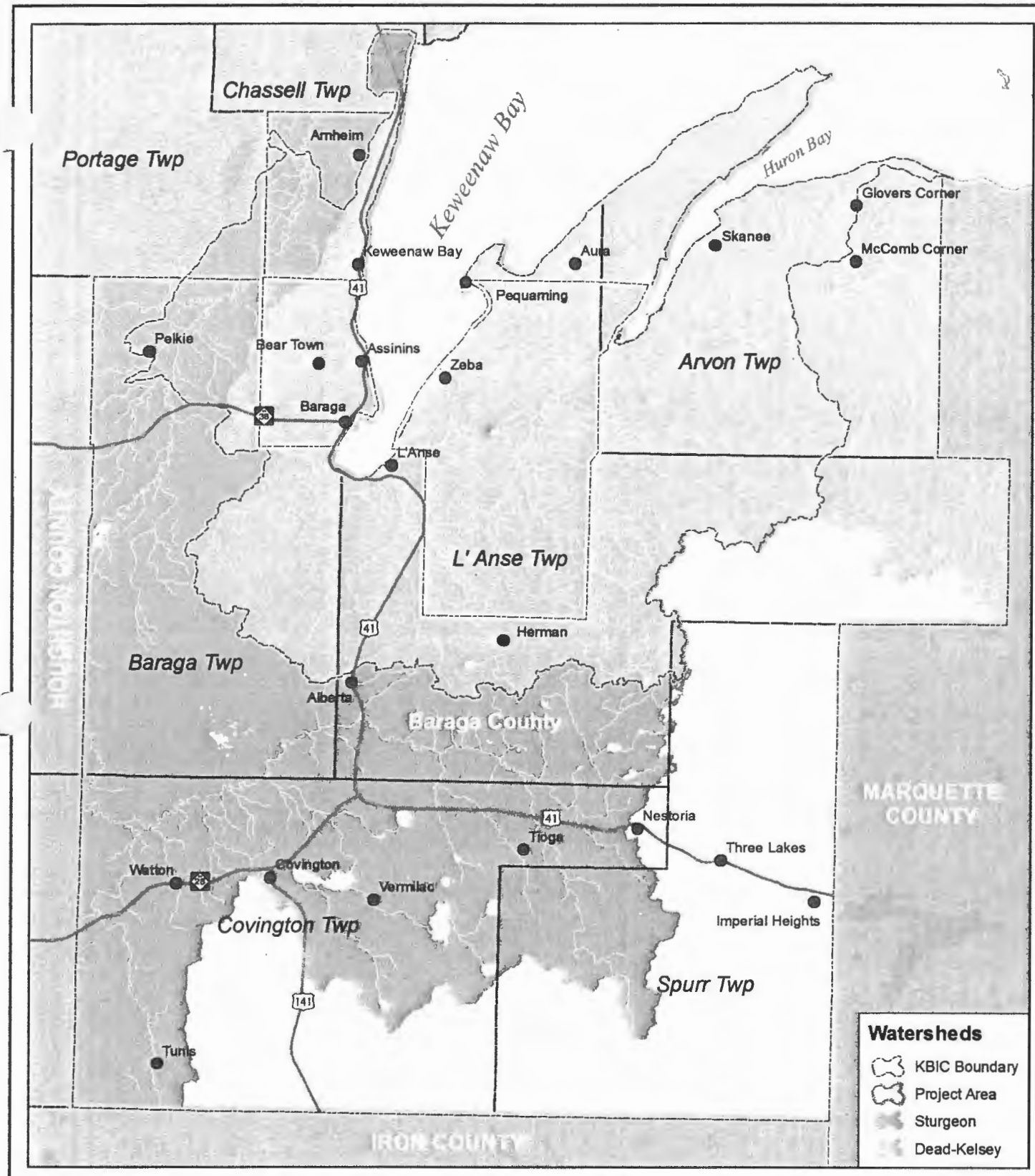
Precipitation dataset was obtained from http://datagateway.nrcs.usda.gov/GatewayHome.html

Land use dataset was derived using 2005 NAIP imagery and consisted of active farm land 1,000 ft from rivers and streams.

Fish stocking table was downloaded from the Michigan Department of Natural Resources. http://www.michigandnr.com/fishstock/

Sea Lamprey information came from the U.S. Fish and Wildlife Service, Marquette, MI

Appendix A



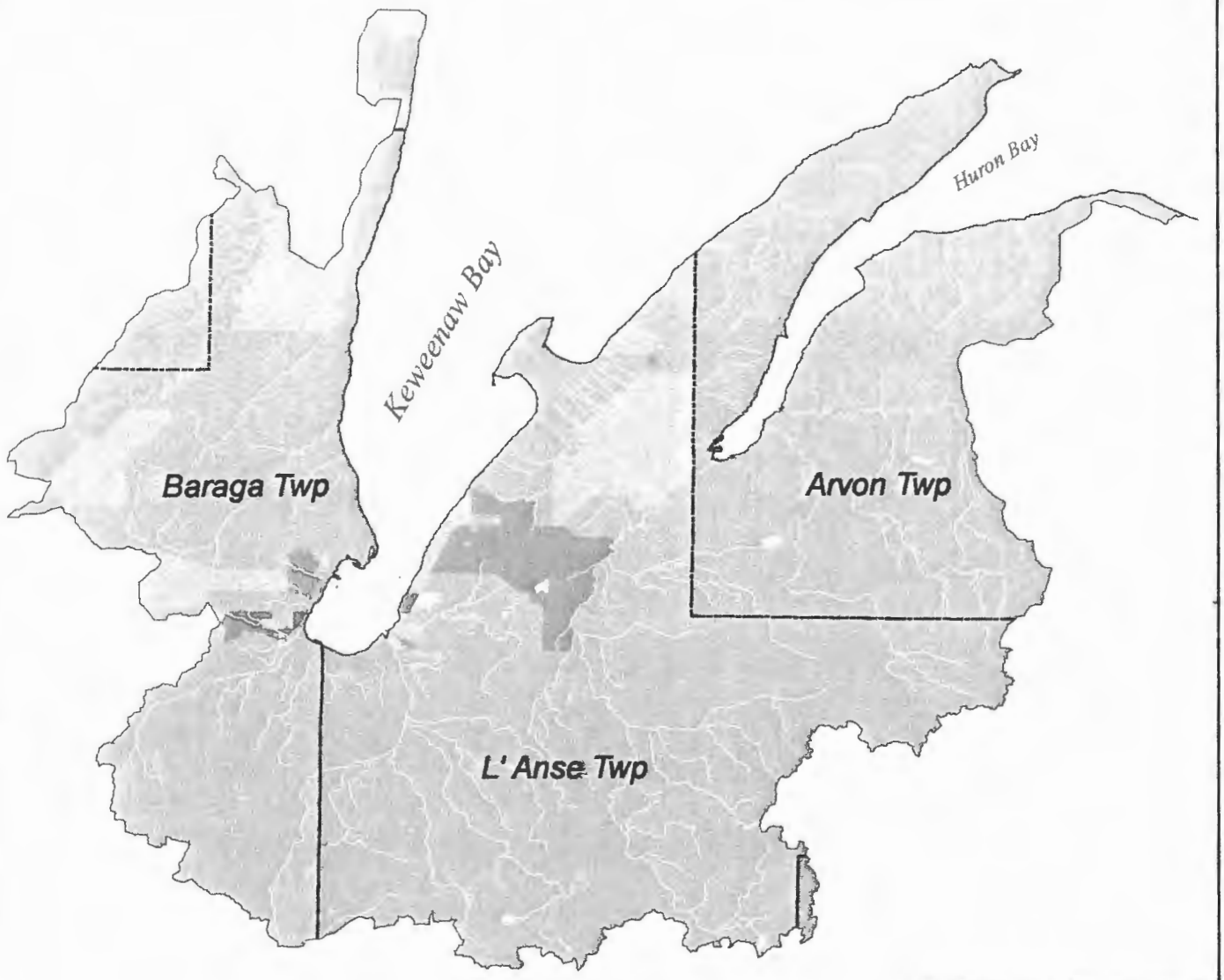
Keweenaw Bay Indian Community

Rapid Watershed Assessment

Base Map (A - 1)

WUPPDR of Michigan

Source: MCGI, USGS, KBIC



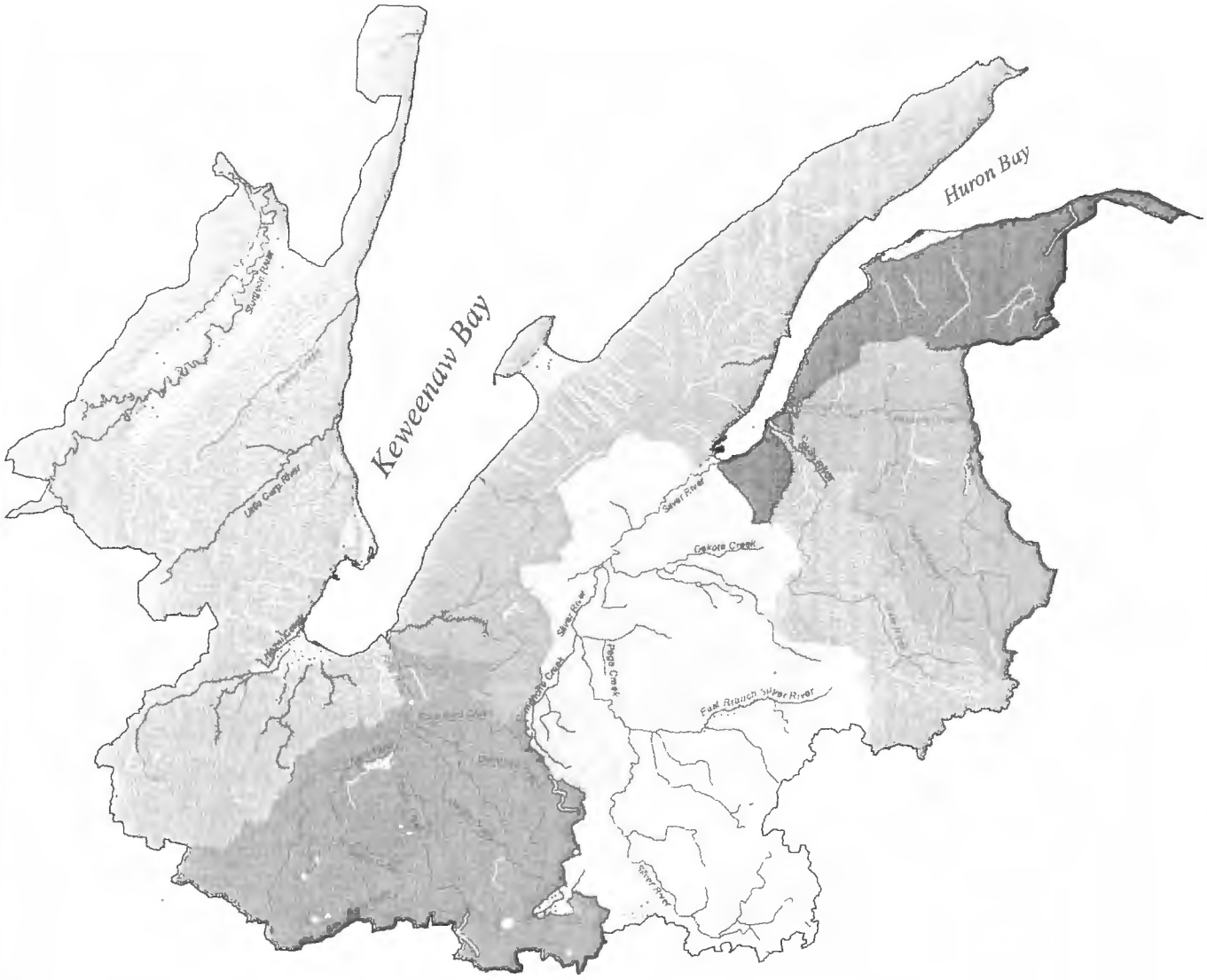
Keweenaw Bay Indian Community

Rapid Watershed Assessment

Population (A - 2)

WUPPDR of Michigan

Source: US Census



Intermittent River/Stream	Little Carp River-Frontal Keweenaw Bay
Perennial River/Stream	Little Silver Creek-Frontal Keweenaw Bay
Lake/Pond	Peterson Creek-Frontal Lake Superior
Swamp/Marsh	Ravine River
Subwatersheds	Silver River
East Branch Silver River-Silver River	Slate River
Falls River	Town of Pelkie-Sturgeon River

N

0 1.5 3 6

Miles

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Sub Watersheds (A - 3)

WUPPDR of Michigan

Source: USGS

Inches
27
29
31
33
35
37
39

N

0 1.5 3 6
Miles

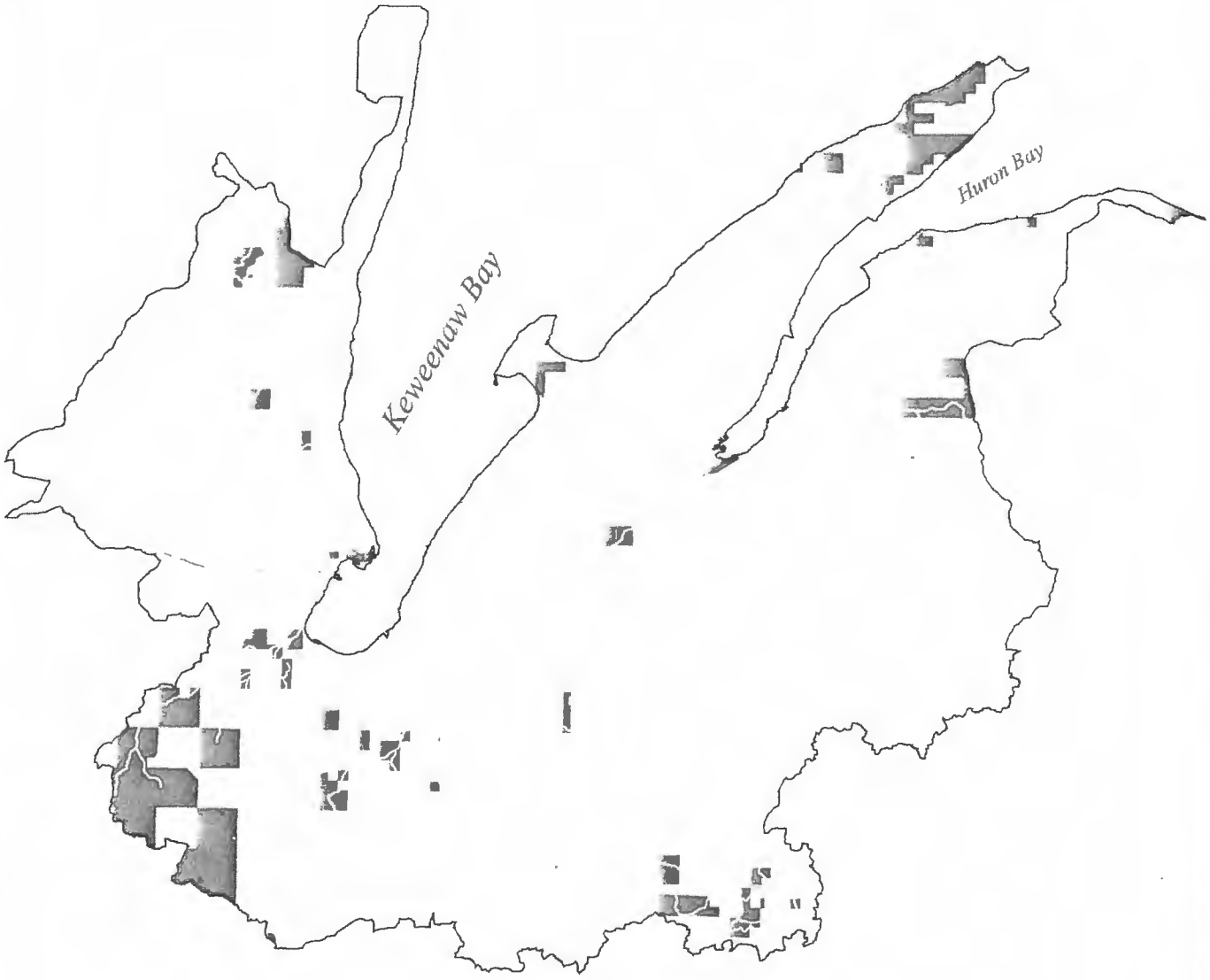
Keweenaw Bay Indian Community

Rapid Watershed Assessment

Annual Precipitation (A - 4)

WUPPDR of Michigan

Source: USDA



State of Michigan 24.2 Sq. Miles

U.S. Government 15.7 Sq. Miles

N

0 1 2 4

Miles

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Public Land (A - 5)

WUPPDR of Michigan

Source: County

Landcover (1992)

- Agricultural Land (6%)
- Barren Land (.1%)
- Forest Land (84%)
- Urban or Built-up Land (.6%)
- Water (.8%)
- Wetland (8.5%)

N

0 1.5 3 6

Miles

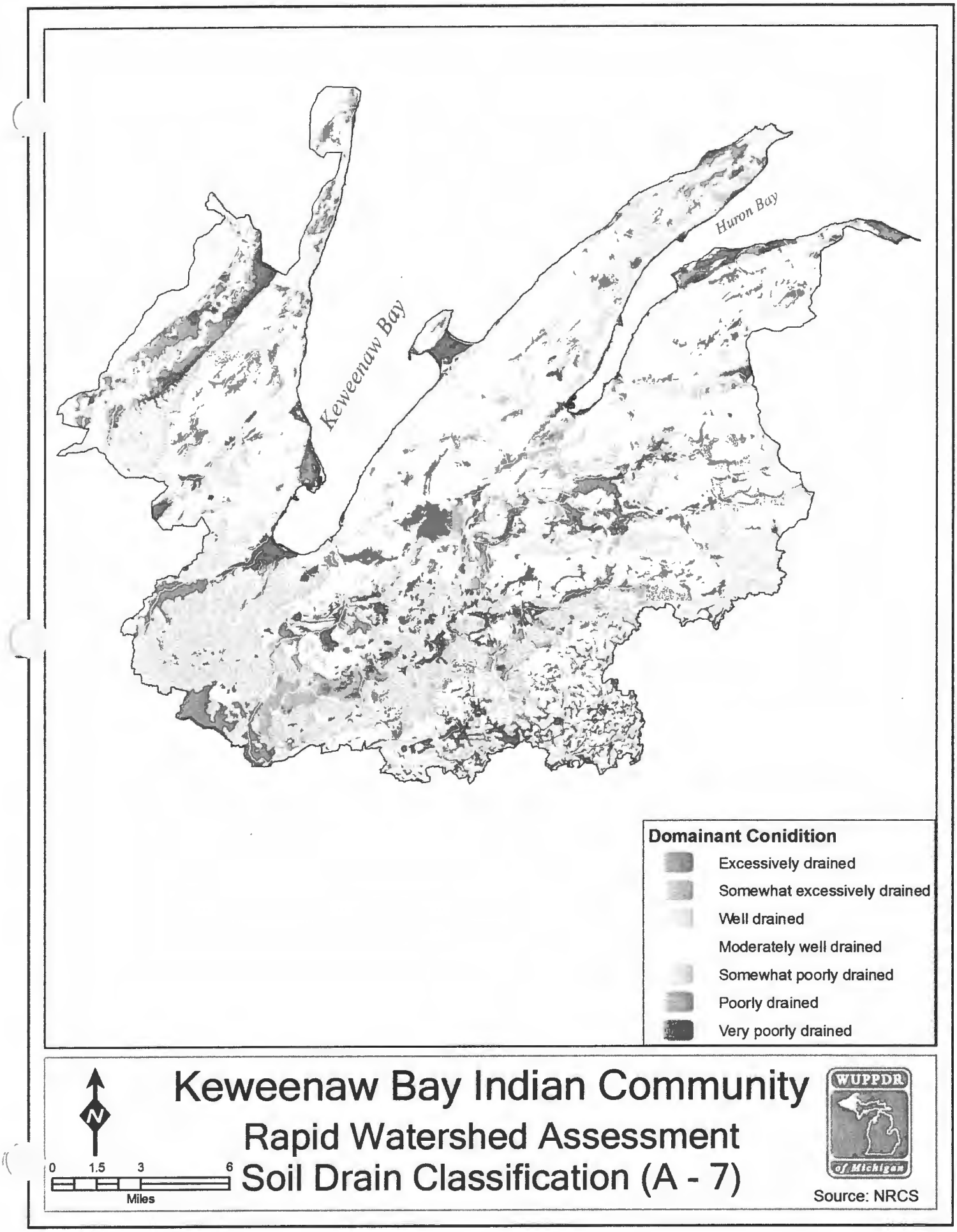
Keweenaw Bay Indian Community

Rapid Watershed Assessment

Land Cover (A - 6)

WUPPDR of Michigan

Source: MCGI



Keweenaw Bay Indian Community

Rapid Watershed Assessment

Soil Drain Classification (A - 7)

WUPPDR of Michigan

Source: NRCS

Nonirrigated Classes

- Class 2
- Class 3
- Class 4
- Class 5
- Class 6
- Class 7

N

0 1.5 3 6

Miles

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Land Capability Class (A - 8)

WUPPDR of Michigan

Source: NRCS Surgo Data

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Common Resource Areas (A - 9)

N

0 1.25 2.5 5

Miles

WUPPDR of Michigan

Source: NRCS

Farmland
Golf Course
Intermittent River/Stream
Perennial River/Stream
Lake/Pond

N

0 1.5 3 6
Miles

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Land Use (A - 10)

WUPPDR of Michigan

Source: USGS

- Fish Barrier in Place
- Open Culvert
- Fish Stocking Sites
- Water Affected by Fish Barrier
- Intermittent River/Stream 280 Miles
- Perennial River/Stream 354 Miles
- Swamp/Marsh

Distance of River/Stream Affected by Fish Barriers

Perennial River: 32 Miles
Intermittent Stream: 19 Miles

Subwatersheds

- East Branch Silver River-Silver River
- Falls River
- Little Carp River-Frontal Keweenaw Bay
- Little Silver Creek-Frontal Keweenaw Bay
- Peterson Creek-Frontal Lake Superior
- Ravine River
- Silver River
- Slate River
- Town of Pelkie-Sturgeon River

N

0 1.25 2.5 5

Miles

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Fish Barriers (A - 11)

WUPPDR of Michigan

Sea Lampery Infested

Sea Lampery Infested Sometimes

Intermittent River/Stream 280 Miles

Perennial River/Stream 354 Miles

Lake/Pond

Swamp/Marsh

Subwatersheds

East Branch Silver River-Silver River

Falls River

Little Carp River-Frontal Keweenaw Bay

Little Silver Creek-Frontal Keweenaw Bay

Peterson Creek-Frontal Lake Superior

Ravine River

Silver River

Slate River

Town of Pelkie-Sturgeon River

Sea Lamprey

72 Miles of Infested
30 Miles of Moderately Infested

N

0 1 2 4
Miles

Keweenaw Bay Indian Community

Rapid Watershed Assessment

Sea Lamprey Infested Waters (A - 12)

WUPPDR of Michigan

Source: USGS

Culvert Inventory Report

Report Module: Culvert Management Analysis

Today's Date: Wednesday, January 21, 2009

Culvert Inventory Report

Culvert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
510	**Road Name:** Alatalo Rd															
ction: Alatalo Rd & Cadeau Rd																
	0.09	1/1/1900	Structural Plate Steel Pipe	Circular	Kelsey Creek	Undefined	Undefined	4'	61'			1	0	32"	False	
scription:																
mo:																
030	**Road Name:** Arvon Rd															
ction: Jack O Lantern Rd & Dynamite Hill Rd																
	-0.059	1/1/1900	Structural Plate Steel Pipe	Arch	Secret Creek	Undefined	Undefined			96"	64"	1	0		False	
scription:																
mo:	Length 80'+ Cover 10'+															
ction: Dynamite Hill Rd & Bardo Rd																
	0.079	1/1/1900	Corrugated Steel Pipe	Circular	Linden Creek	Undefined	Undefined	30"	50'			1	0	24"	False	
scription:																
mo:	Fisg Barrier aprox 10' upstream															
ction: Dynamite Hill Rd & Arvon Rd & Indian Rd																
	0.806	1/1/1900	Structural Plate Steel Pipe	Circular	Pages Creek	Undefined	Undefined	18"	30'			2	0	42"	False	
scription:																
mo:	Both culverts same size															
ction:																
	2.172	1/1/1900	Corrugated Steel Pipe	Circular	Pages Creek	Undefined	Undefined	3'	21'			1	0	20"	False	
scription:																
mo:	Upstream Side Mild crush of pipe															
ction: Huron Bay Peshekee Grade Rd & Arvon Rd																
	3.149	1/1/1900	Undefined	Undefined	Undefined	Undefined	Undefined					0	0		False	
scription:																
mo:																
	3.149	1/1/1900	Other	Other	Slate River	Undefined	Undefined		14'	30'	7'	0	0		False	
scription:																
mo:	Bridge Steel Span															

Culvert Inventory Report

Culvert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act
ction: Arvon Rd & Skanee Rd															
	-1.414	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	26"	35'			1	0	32"	False
scription:															
mo:															
907 **Road Name:** Aura Rd															
ction: Aura Rd & Heltunen Rd															
	-0.014	1/1/1900	Other	Rectangular	Sucker Creek	Undefined	Undefined		120'	6'	6'	1	0		False
scription:															
mo: Cover 10'+ Precast Concrete Culverts															
2528 **Road Name:** Bay Shore Rd															
ction:															
	-0.079	1/1/1900	Other	Rectangular	Kelsey Creek	Undefined	Undefined		16'	12'	5'	1	0		False
scription:															
mo: Bridge															
0008 **Road Name:** Bear Town Rd															
ction: Prison Access Rd & Lindblom Rd & Osterman Ave															
	0.18	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	7'	200'			1	0		False
scription:															
mo:															
ction: Linderman Rd & Bear Town Rd															
	1.148	1/1/1900	Structural Plate Steel Pipe	Arch	Little Carp Creek	Undefined	Undefined		102'	20'	10'	1	0	6'	False
scription:															
mo:															
ction: Cadeau Rd & Bear Town Rd															
	-0.385	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	3'	65"			1	0	8'	False
scription:															
mo: Steel Pipe inside Plastic Pipe															
ction: US 41 & Bear Town Rd															

Culvert Inventory Report

ivert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act
	-0.15	1/1/1900	Other	Horizontal Ellipse	Undefined	Undefined	Undefined		62'	7'	5'	1	0	1'	False
scription:															
mo:	Galvo														
802	**Road Name:** Beesley Rd														
ction:	Echo Harbor Dr & Beesley Rd														
	0.461	1/1/1900	Cast-in-place Concrete Culvert	Rectangular	Undefined	Undefined	Undefined		67'	11'	64"	1	0	6"	False
scription:															
mo:															
506	**Road Name:** Bellaire Rd														
ction:	Froberg Rd & Narhi Rd														
	-0.201	1/1/1900	Corrugated Steel Pipe	Horizontal Ellipse	Undefined	Undefined	Undefined		81'	5'	2'	3	0	5'	False
scription:															
mo:	All 3 culverts same														
ction:	M 38 & Wanttaja Rd & Bellaire Rd														
	-0.195	1/1/1900	Corrugated Steel Pipe	Horizontal Ellipse	Little Carp Creek	Undefined	Undefined		40'	8'	2'7"	1	0	22"	False
scription:															
mo:															
809	**Road Name:** Biltonen Rd														
ction:	Biltonen Rd & Townline Rd														
	0.479	1/1/1900	Corrugated Steel Box Culvert	Circular	Undefined	Undefined	Undefined	32"	50'			2	0		False
scription:															
mo:	Rust on sides and top														
0101	**Road Name:** Blackjack Rd														
ction:	Canadian National Railway & Blackjack Rd														
	-0.856	1/1/1900	Corrugated Steel Pipe	Circular	Falls River	Wingwalls	Projecting	11'	66'	11'	11'	2	0	32"	False
scription:															
mo:	West culvert alot of sedement														
ction:															

Culvert Inventory Report

ivert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	
	-0.66	1/1/1900	Corrugated Steel Pipe	Pipe Arch	Daults Creek	Headwalls	Headwalls		30.5'	9'	5'	2	0	2.5'	False	
scription:																
mo:	East Culvert Signiglfant Sediment															
ction: Canadian National Railway & Blackjack Rd																
	-0.256	1/1/1900	Corrugated Steel Pipe	Circular	Denomie Creek	Undefined	Undefined	5'	60'	5'	5'	2	0	3'	False	
scription:																
mo:	Fish barrier on down stream culvert Culvert not with flow of stream															
2601	**Road Name:** Cadeau Rd															
ction: Alatalo Rd & Cadeau Rd																
	-0.085	1/1/1900	Corrugated Steel Pipe	Circular	Kelsey Creek	Undefined	Undefined	3'	51'		29"	0	0		False	
scription:																
mo:																
2602	**Road Name:**															
ction: Cadeau Rd & Oliver Rd																
	0.604	1/1/1900	Other	Horizontal Ellipse	Kelsey Creek	Undefined	Undefined		61'	4'	2'	1	0	4"	False	
scription:																
mo:	Galvo															
9581	**Road Name:** Celotex Rd															
ction: Celotex Rd																
	0.233	1/1/1900	Other	Rectangular	Silver River	Undefined	Undefined		12'	17'	4'	1	0		False	
scription:																
mo:	Bridge															
2504	**Road Name:** Cemetery Rd															
ction: Cemetery Rd & Sturgeon Rd																
	0.819	1/1/1900	Other	Rectangular	Undefined	Undefined	Undefined		17'	19'	4'6"	1	0	12"	False	
scription:																
mo:	Bridge															
0206	**Road Name:** Cutoff Dump Rd															
ction: Baraga SP Service Road & Cutoff Dump Rd																

Culvert Inventory Report

vert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
	-0.369	1/1/1900	Corrugated Steel Pipe	Circular	Hazel Creek	Undefined	Undefined	4'	47'			1	0	6"	False	
cription:																
no:																
105	**Road Name:** Denomme Rd															
tion: Dynamite Hill Rd & Denomme Rd &																
	-0.15	1/1/1900	Corrugated Steel Pipe	Circular	Secret Creek	Undefined	Undefined	4'				1	0		False	
cription:																
no:	Length 80'+ Cover 10'+															
508	**Road Name:** E River Dr															
tion: E Pine St & E River Dr																
	-0.119	1/1/1900	Corrugated Steel Pipe	Circular	Secret Creek	Undefined	Undefined	5'	54'			1	0	5'	False	
cription:																
no:																
003	**Road Name:** Ford Rd															
tion: Skanee Rd & Ford Rd																
	1.18	1/1/1900	Other	Arch	Kallio Creek	Undefined	Undefined		68'	8'	80"	1	0	7"	False	
cription:																
no:	GalvoAl															
503	**Road Name:** Gristmill Rd															
tion: M 38 & Gristmill Rd & Schwalm Rd																
	-0.457	1/1/1900	Corrugated Steel Pipe	Circular	Gristmill Creek	Undefined	Undefined	7'	82'			1	0	6'	False	
cription:																
no:																
910	**Road Name:** Haataja Rd															
tion: Pikes Peak Rd & Haataja Rd																
	-0.755	1/1/1900	Structural Plate Steel Pipe	Arch	Undefined	Undefined	Undefined		67'	80"	45"	1	0	9"	False	
scription:																
no:	Grate upstream side															
0504	**Road Name:** Hamar Rd															

Culvert Inventory Report

vert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
tion: Hamar Rd & Usitalo Rd																
	-0.316	1/1/1900	Structural Plate Steel Pipe	Horizontal Ellipse	Undefined	Undefined	Undefined		46'	12'	5'6"	1	0	2'8"	False	
cription:																
no:																
703	**Road Name:** Huron Rd															
tion: Portice Rd & Huron Rd & Swanberg Rd & Lower Rd																
	-0.663	1/1/1900	Corrugated Steel Pipe	Arch	Gulskoog Creek	Undefined	Undefined		79'	9'	6'	2	0	4'	False	
cription:																
no:																
008	**Road Name:** Indian Cemetery Rd															
tion: Roth Rd & Indian Cemetery Rd																
	-0.219	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	3'				1	0		False	
cription:																
no:	Length 60'+ Cover 10'+															
tion:																
	0.422	1/1/1900	Other	Circular	Undefined	Undefined	Undefined	32"	60'			0	0	16"	False	
cription:																
no:	Plastic Culvert															
106	**Road Name:** Indian Rd															
tion: Indian Rd & Herman Rd																
	0.003	1/1/1900	Pre-Cast Concrete Pipe	Circular	Undefined	Undefined	Undefined	2'	65'			1	0	20"	False	
cription:																
no:																
tion: Unknown Rd & Indian Rd																
	-0.339	1/1/1900	Pre-Cast Concrete Pipe	Circular	Undefined	Undefined	Undefined	16"	40'			1	0	2'	False	
cription:																
no:																
901	**Road Name:** Karschney Rd															
tion: Unknown 07 01 001																

2:57 PM
sion 6.8.6

Culvert Inventory Report

lvert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
	0.193	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	25"				1	0	6"	False	
cription:																
no:																
801	**Road Name:** Kyro Rd															
ction:																
	-0.075	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	5'	41'	5'	5'	1	0	4"	False	
cription:																
no:																
535	**Road Name:** Lee Rd															
ction: Lee Rd & Dynamite Hill Rd																
	0.141	1/1/1900	Corrugated Steel Pipe	Circular	Secret Creek	Undefined	Undefined	4'				1	0	6'	False	
cription:																
no:	Length 80'+															
102	**Road Name:** Marksman Rd															
ction: Marksman Rd & Zeba Rd																
	0.034	1/1/1900	Structural Plate Steel Pipe	Circular	Undefined	Undefined	Undefined	53"				1	0	6'	False	
cription:																
no:	Length 80'+															
ction:																
	0.155	1/1/1900	Undefined	Undefined	Undefined	Undefined	Undefined					0	0		False	
cription:																
no:																
ction:																
	0.164	1/1/1900	Structural Plate Steel Pipe	Circular	Undefined	Undefined	Undefined	53"				1	0		False	
cription:																
no:	Length 80'+ Cover 10'+ Downstream Perch 36" Water enters culvert at 90 degree angle															
2307	**Road Name:** Menge Rd															
ction: Canadian National Railway & Menge Rd																

2:57 PM

sion 6.8.6

Culvert Inventory Report

vert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
	-1.091	1/1/1900	Other	Rectangular	Undefined	Undefined	Undefined		12'	22'	30"	1	0		False	
cription:																
no:	Bridge Steel Span															
tion:	Canadian National Railway & Menge Rd															
	-0.904	1/1/1900	Other	Rectangular	Undefined	Undefined	Undefined		12'	23'	39"	1	0		False	
cription:																
no:	Bridge Steel Span															
tion:																
	0.13	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	2'	34'			1	0	16"	False	
cription:																
no:	Grate Upstream															
tion:																
	0.139	1/1/1900	Structural Plate Steel Pipe	Circular	Undefined	Undefined	Undefined	3'	34'			1	0	12"	False	
cription:																
no:	Grate Upstream															
tion:																
	0.532	1/1/1900	Structural Plate Steel Pipe	Circular	Boyers Creek	Undefined	Undefined	4'	35'			3	0	11"	False	
cription:																
no:	Other 2 culverts Cor-Steel Length 34' Size 2' Cover 27"															
502	**Road Name:** Messner Rd															
tion:																
	-0.145	1/1/1900	Undefined	Arch	Kelsey Creek	Undefined	Undefined		20'	11'		1	0	5"	False	
cription:																
no:																
667	**Road Name:** N 4th St															
tion:	Division St & N 4th St															
	-0.009	1/1/1900	Cast-in-place Concrete Culvert	Arch	Undefined	Undefined	Undefined			25'	7'	1	0		False	
cription:																
no:	Length 80'+															

Culvert Inventory Report

ivert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
301	**Road Name:** N Front St															
ction: N Front St & River St																
	-0.025	1/1/1900	Cast-in-place Concrete Culvert	Rectangular	Undefined	Undefined	Undefined		24'	40'	4'	1	0		False	
scription:																
mo:	Bridge Steel Span															
ction:																
	0.008	1/1/1900	Cast-in-place Concrete Culvert	Arch	Undefined	Undefined	Undefined			30'	4'	1	0	3'	False	
scription:																
mo:	Length 80'=															
606	**Road Name:** Nelson Rd															
ction: Ohman Rd & Nelson Rd																
	-0.064	1/1/1900	Corrugated Aluminum Pipe	Arch	Peterson Creek	Undefined	Undefined		40'	42"	30"	1	0	7"	False	
scription:																
mo:																
006	**Road Name:** Nestoria Herman Rd															
ction: Lystila Rd & Herman Rd & Nestoria Herman Rd																
	0.03	1/1/1900	Other	Arch	Daults Creek	Undefined	Undefined		33'	13'	55"	0	0	12"	False	
scription:																
mo:	Steel Arch lining concrete															
605	**Road Name:** Ohman Rd															
ction: Ohman Rd & Nelson Rd																
	0.26	1/1/1900	Corrugated Aluminum Pipe	Arch	Peterson Creek	Undefined	Undefined		47'	4'	32"	1	0	1'	False	
scription:																
mo:																
541	**Road Name:** Old 41															
ction: US 41 & Old 41 & Prison Camp Rd																

Culvert Inventory Report

ivert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
	1.41	1/1/1900	Corrugated Steel Pipe	Circular	Taylor Creek	Headwalls	Projecting	1'	45'	1'	1'	1	0	5'	False	
cription:																
no:	Upstream Headwall Collapsed															
306	**Road Name:** Old 41 Rd															
tion:	Old 41 Rd & Sturgeon Rd															
	0.229	1/1/1900	Masonry Culvert	Arch	Kelsey Creek	Undefined	Undefined		56	20'	5'6"	1	0	23"	False	
cription:																
no:	Sediment Barrier Upstream Side needs to be removed Concrete Arch Culvert															
tion:	Helberg Rd & Old 41 Rd															
	-0.016	1/1/1900	Other	Circular	Undefined	Undefined	Undefined	32"	71'	32"	32"	1	0	20"	False	
cription:																
no:																
606	**Road Name:** Paulson Rd															
tion:																
	0	1/1/1900	Other	Other	Ravine River	Undefined	Undefined		12'	41'	7'	0	0	0	False	
cription:																
no:	Bridge															
304	**Road Name:** Pequaming Rd															
tion:	Whirligig Rd & Pequaming Rd															
	0.282	1/1/1900	Other	Circular	Undefined	Undefined	Undefined	18"	50'			1	0	8"	False	
cription:																
no:	Plastic Culvert															
tion:	Pequaming Rd & Marksman Rd															
	-0.298	1/1/1900	Structural Plate Steel Pipe	Arch	Undefined	Undefined	Undefined		51'	5'	3'	1	0	15"	False	
cription:																
no:	Large Perch Downstream															
tion:																

Culvert Inventory Report

vert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
	0.005	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	5'				1	0		False	
cription:																
no:	Length 80+' approx Cover 10'+ approx															
tion: Johnson Rd & Pequaming Rd																
	0.333	1/1/1900	Structural Plate Steel Pipe	Arch	Little Silver Creek	Undefined	Undefined			16'	80"	1	0		False	
cription:																
no:	Length 80'+ Cover 10'+															
tion: Pikes Peak Rd & Pequaming Rd																
	-0.009	1/1/1900	Structural Plate Steel Pipe	Circular	Undefined	Undefined	Undefined	53"				1	0	4'	False	
cription:																
no:	Length 80'+ Stream enters 45 degrees plus															
tion: Pequaming Rd & Aura Rd																
	0.132	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	24"	50'			1	0	5"	False	
cription:																
no:																
tion:																
	0.189	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	24"	46'			1	0	9"	False	
cription:																
no:	Downstream side pipe crushed Grate on upstream side															
tion: Pequaming Rd & Second Sand Beach Rd & Ford Dr																
	-0.374	1/1/1900	Pre-Cast Concrete Pipe	Circular	Undefined	Undefined	Undefined	16"	45'			1	0	1'	False	
cription:																
no:																
tion: Pequaming Rd & Aura Rd																
	0.911	1/1/1900	Undefined	Undefined	Undefined	Undefined	Undefined					0	0		False	
cription:																
no:																
tion: Pequaming Rd & Second Sand Beach Rd & Ford Dr																

Culvert Inventory Report

ert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	V Pr
	-0.077	1/1/1900	Cast-in-place Concrete Culvert	Rectangular	Undefined	Undefined	Undefined		47'	13'	4'	1	0	1"	False	

cription:
o:

09 **Road Name:** Pikes Peak Rd

tion: Pikes Peak Rd & Pequaming Rd

	0.383	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	2'				1	0		False

cription:
o: Length 80'+
Cover 10'+
Dumping around and in stream Trash and animal carcases both sides in stream

04 **Road Name:** Poor Farm Rd

tion: Poor Farm Rd & Herman Rd

	0.194	1/1/1900	Corrugated Aluminum Pipe	Circular	Denomie Creek	Undefined	Undefined		36.5'	3.5'	29"	0	0	6"	False

cription:
o:

tion:

	-0.18	1/1/1900	Corrugated Aluminum Pipe	Circular	Pekkala Creek	Projecting	Projecting	5'	70'	5'	5'	1	0	24"	False

cription:
o:

806 **Road Name:** Prison Camp Rd

tion: Prison Camp Rd & Alberta Rd

	-1.422	1/1/1900	Corrugated Steel Pipe	Circular	Ogemaw Creek	Projecting	Projecting	4'	36'	4'	4'	1	0	30"	False

cription:
o: Metal Grat on up stream culvert to keep debris out of culvert
Fish Barrier Yes

tion:

	-0.273	1/1/1900	Corrugated Steel Pipe	Circular	Ogemaw Creek	Projecting	Projecting	6'	50'	6'	6'	1	0	26"	False

cription:
o: Fish barrier Yes
Angle of Culvert not same angle of creek

601 **Road Name:** Ravine Rd

Culvert Inventory Report

vert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
tion: Ravine Rd & Roland Lake Rd																
	0.256	1/1/1900	Corrugated Steel Pipe	Circular	Roland Lake	Undefined	Undefined	4'	46'			1	0	10"	False	
cription:																
no:																
tion:																
	0	1/1/1900	Other	Other	Ravine River	Undefined	Undefined		12'	24'	78"	0	0		False	
cription:																
no:	Bridge															
802	**Road Name:** River St															
tion: N Main St & River St																
	0.003	1/1/1900	Cast-in-place Concrete Culvert	Rectangular	Undefined	Undefined	Undefined			22'	5'	1	0	3'	False	
cription:																
no:	Unknown Length Culvert runs beneath buildings 100'+															
022	**Road Name:** Roland Lake Rd															
tion: Witz Rd & Lower Skanee Rd																
	0.477	1/1/1900	Other	Other	Undefined	Undefined	Undefined		17'	24'	21"	0	0	0	False	
cription:																
no:	Bridge Witz MArina															
tion: Sawmill Rd & Greenhouse Rd & Church Rd & Roland Lake Rd																
	0.83	1/1/1900	Structural Plate Steel Pipe	Arch	Fossoms Creek	Undefined	Undefined		51'	7'	55"	3	0	32"	False	
cription:																
no:	All 3 culverts have upstream grates															
903	**Road Name:** Saari Rd															
tion:																
	-0.424	1/1/1900	Other	Circular	Undefined	Undefined	Undefined	4'				1	0		False	
cription:																
no:	Length 80'+ Cover 10'+ Galvo Culvert															
604	**Road Name:** Sawmill Rd															

Culvert Inventory Report

vert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	P
tion: Sicotte Rd & Paulson Rd & Sawmill Rd																
	0.649	1/1/1900	Other	Circular	Ravine River	Undefined	Undefined	3'	49'			2	0	6"	False	
cription:																
no:	Second Culvert 2' Size 49' Length 6" Cover Plastic both															
905	**Road Name:** Second Sand Beach Rd															
tion: Hebbard Ave & Second Sand Beach Rd																
	-0.53	1/1/1900	Structural Plate Steel Pipe	Circular	Undefined	Undefined	Undefined	54"				1	0		False	
cription:																
no:	Length 80'+															
519	**Road Name:** Shippy Rd															
tion: Shippy Rd & Bear Town Rd																
	0.474	1/1/1900	Other	Horizontal Ellipse	Undefined	Undefined	Undefined		58'	5'	3'	1	0	9"	False	
cription:																
no:	Galvo Sediment Barrier Needs Removed															
214	**Road Name:** Shrine Rd															
tion:																
	-0.143	1/1/1900	Corrugated Steel Pipe	Circular	Boyers Creek	Undefined	Undefined	32"	16'			1	0	1"	False	
cription:																
no:																
105	**Road Name:** Silver Rd															
tion: Indian Rd & Silver Rd																
	0.302	1/1/1900	Other	Circular	Undefined	Undefined	Undefined	1'	30'			1	0	13"	False	
cription:																
no:	Steel Pipe															
306	**Road Name:** Skanee Rd															
tion:																

Culvert Inventory Report

ert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	V Pr
	0.008	1/1/1900	Undefined	Undefined	Undefined	Undefined	Undefined					0	0		False	

cription:
o:

tion: Skanee Rd & Falls Rd

	0.201	1/1/1900	Cast-in-place Concrete Culvert	Rectangular	Kallio Creek	Undefined	Undefined			6'	6'	0	0		False	

cription:
o:
Length 80'+
Cover 10'+
Concrete rebar exposed on structure

tion: Townline Rd & Skanee Rd &

	-0.053	1/1/1900	Other	Rectangular	Undefined	Undefined	Undefined			8'	6'	1	0	6'	False	

cription:
o: Length 80'+

tion: Thompson St & Skanee Rd

	-0.11	1/1/1900	Cast-in-place Concrete Culvert	Rectangular	Slate River	Undefined	Undefined		40'	70'	8'	1	0	3'	False	

cription:
o:
Bridge

99 **Road Name:** Sturgeon Rd

tion: Old 41 Rd & Sturgeon Rd

	-0.189	1/1/1900	Masonry Culvert	Arch	Kelsey Creek	Undefined	Undefined		54'	20'	7'	1	0	3'	False	

cription:
o:
Concrete Arch Bridge
Sediment Barrier needs to be removed

207 **Road Name:** Superior Ave

tion: Buckland Dr & Superior Ave

	0.017	1/1/1900	Other	Other	Undefined	Undefined	Undefined		81'	4'	4'	1	0	6'	False	

cription:
o:
One side concrete wall
One side corr steel pipe

518 **Road Name:** Tervo Rd

tion:

Culvert Inventory Report

ert ID	Distance from Int:	Date Built	Type	Shape	Waterway	Entrance Structure	Exit Structure	Size	Length	Span	Rise	# of culverts	Skew Angle	Depth of Cover	Inland Lakes and Streams Act	V Pr
	-0.114	1/1/1900	Corrugated Steel Pipe	Arch	Undefined	Undefined	Undefined		40'	5'	3'	1	0	9"	False	

ription:
o:

06 **Road Name:** Waisanen Rd

ion: Koski Rd & Waisanen Rd

	-0.217	1/1/1900	Corrugated Steel Pipe	Circular	Undefined	Undefined	Undefined	25"	77'			1	0	6'	False	

ription:
o:

USGS
science for a changing world

Prepared in cooperation with Keweenaw Bay Indian Community

Water Quality and Hydrology of the Silver River Watershed, Baraga County, Michigan, 2005–08

Scientific Investigations Report 2010–5050

U.S. Department of the Interior
U.S. Geological Survey

Water Quality and Hydrology of the Silver River Watershed, Baraga County, Michigan, 2005–08

By Thomas L. Weaver, Daniel J. Sullivan, Cynthia M. Rachol, and James M. Ellis

Prepared in cooperation with Keweenaw Bay Indian Community

Scientific Investigations Report 2010–5050

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

U.S. Geological Survey, Reston, Virginia: 2010

Suggested citation:
Weaver, T.L., Sullivan, D.J., Rachol, C.M., and Ellis, J.M., 2010, Water quality and hydrology of the Silver River Watershed, Baraga County, Michigan, 2005–08: U.S. Geological Survey Scientific Investigations Report 2010–5050, 66 p.

Contents

Figures

Tables

Appendixes

Inset Boxes

Conversion Factors, Vertical Datum, and Abbreviations

Multiply	By	To obtain
	Length	
inch (in.)	25.40	millimeter (mm)
millimeter (mm)	0.03937	inch (in.)
inch (in.)	2.54	centimeter (cm)
centimeter (cm)	0.3937	inch (in.)
foot (ft)	0.3048	meter (m)
meter (m)	3.281	foot (ft)
mile (mi)	1.609	kilometer (km)
	Area	
acre	0.4047	hectare (ha)
square mile (mi^2)	2.590	square kilometer (km^2)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
cubic foot per second per square mile [$(ft^3/s)/mi^2$]	0.01093	cubic meter per second per square kilometer [$(m^3/s)/km^2$]
inch per year (in/yr)	25.40	millimeter per year (mm/yr)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

°F=(1.8×°C)+32

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

°C=(°F-32)/1.8

In this report, altitude or elevation refers to vertical distance above the National Geodetic Vertical Datum of 1929 (NGVD 29)—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called sea level Datum of 1929.

Runoff is the quantity of water that is discharged, or "runs-off" from a drainage basin during a given time period. Runoff data in this study are reported as mean discharge per unit of drainage area in cubic feet per second per square mile [$(ft^3/s)/mi^2$].

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

Concentrations of chemical constituents in water and sediments are given in milligrams per liter (mg/L), micrograms per liter (µg/L), nanograms per liter (ng/L), micrograms per gram (µg/g), or micrograms per kilogram (µg/kg). For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million.

Abbreviations

Water year is the 12-month period from October 1 through September 30. The water year is designated by the calendar year in which it ends. For example, the year starting October 1, 2008 and ending September 30, 2009 is called the "2009 water year."

AMLE	adjusted maximum likelihood estimation
AMV	aquatic maximum value
DOC	dissolved organic carbon
FCV	final chronic value
GLEAS	Great Lakes Environmental Assessment Section
HCV	human cancer value
HNV	human non-cancerous value
KBIC	Keweenaw Bay Indian Community
LRL	laboratory reporting level
LT-MDL	long-term method detection limit
MDEQ	Michigan Department of Environmental Quality
MDL	method detection limit
MRL	minimum reporting level
NFM	national field manual
NOAA	National Oceanic and Atmospheric Administration
NWIS	National Water Information System
NWQL	National Water Quality Laboratory
QAPP	Quality-Assurance Project Plan
QA/QC	quality assurance/quality control
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PEC	probable effect concentration
TEC	threshold effect concentration
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VA	visual accumulation
WV	wildlife value

Water Quality and Hydrology of the Silver River Watershed, Baraga County, Michigan, 2005–08

By Thomas L. Weaver, Daniel J. Sullivan, Cynthia M. Rachol, and James M. Ellis

Abstract

The Silver River Watershed comprises about 69 square miles and drains part of northeastern Baraga County, Michigan. For generations, tribal members of the Keweenaw Bay Indian Community have hunted and fished in the watershed. Tribal government and members of Keweenaw Bay Indian Community are concerned about the effect of any development within the watershed, which is rural, isolated, and lightly populated. For decades, the area has been explored for various minerals. Since 2004, several mineral-exploration firms have been actively investigating areas within the watershed; property acquisition, road construction, and subsurface drilling have taken place close to tributary streams of the Silver River.

The U.S. Geological Survey, in cooperation with Keweenaw Bay Indian Community, conducted a multi-year water-resources investigation of the Silver River Watershed during 2005–08. Methods of investigation included analyses of streamflow, water-quality sampling, and ecology at eight discrete sites located throughout the watershed. In addition, three continuous-record streamgages located within the watershed provided stage, discharge, specific conductance, and water-temperature data on an hourly basis.

Water quality of the Silver River Watershed is typical of many streams in undeveloped areas of Upper Michigan. Concentrations of most analytes typically were low, although several exceeded applicable surface-water-quality standards. Seven samples had concentrations of copper that exceeded the Michigan Department of Environmental Quality standards for wildlife, and one sample had concentrations of cyanide that exceeded the same standards. Concentrations of total mercury at all eight sampling sites exceeded the Great Lakes Basin water-quality standard, but the ratio of methylmercury to total mercury was similar to the 5 to 10 percent found in most natural waters. Concentrations of arsenic and chromium in bed sediments were near the threshold-effect concentration. A qualitative ecological assessment of fishes and macroinvertebrates showed that intolerant salmonids were present at most sampled sites, and macroinvertebrate communities were indicative of near-excellent or excellent conditions at all eight sites. This baseline information will aid in an ongoing monitoring effort designed to protect the water resources of the Silver River Watershed.

Introduction

The Silver River is located in the northeastern part of Baraga County in the Upper Peninsula of Michigan (fig. 1).

Much of the western half of the Silver River Watershed lies within the Keweenaw Bay Indian Community (KBIC) Reservation, although the majority of the land within the watershed is not tribally owned at the present time (2009). Water plays an integral role in the lives of KBIC Tribal members who have fished and hunted on Lake Superior, Keweenaw and Huron Bays, and waters in the Silver River Watershed for generations. Chippewa (or Ojibwa) Indians have lived in the northern Great Lakes Basin for centuries and have depended upon the Great Lakes and tributary streams for sustenance and transportation since their arrival.

Until recently, most water-resource management issues within the Silver River Watershed have been related to logging activities, with typical problems related to stream crossings and erosion. In 2004, however, exploration for metal-bearing deposits within the watershed began in earnest, spurred on by a worldwide surge in metal prices.

Tribal government and members of KBIC are concerned about the short-term effects of mining within the Silver River Watershed, including additional vehicular traffic, access-road building, surface-plant construction, dust, and erosion. Potential long-term effects include destruction of forests and wetland areas and degradation of water quality within the Silver River, Huron, and Keweenaw Bay Watersheds and ultimately, Lake Superior. The U.S. Geological Survey (USGS) entered into a cooperative agreement with KBIC to (1) evaluate streamflow and water quality, (2) conduct an ecological assessment of the Silver River Watershed, (3) establish a database of baseline conditions, and (4) address concerns of KBIC tribal government and members. The study was conducted during 2005–08, and the results of that effort are summarized in this report.

Purpose and Scope

The purpose of this study was to (1) sample field water-quality parameters, major ions, nutrients, trace metals, cyanide, and suspended solids from eight sites within the Silver

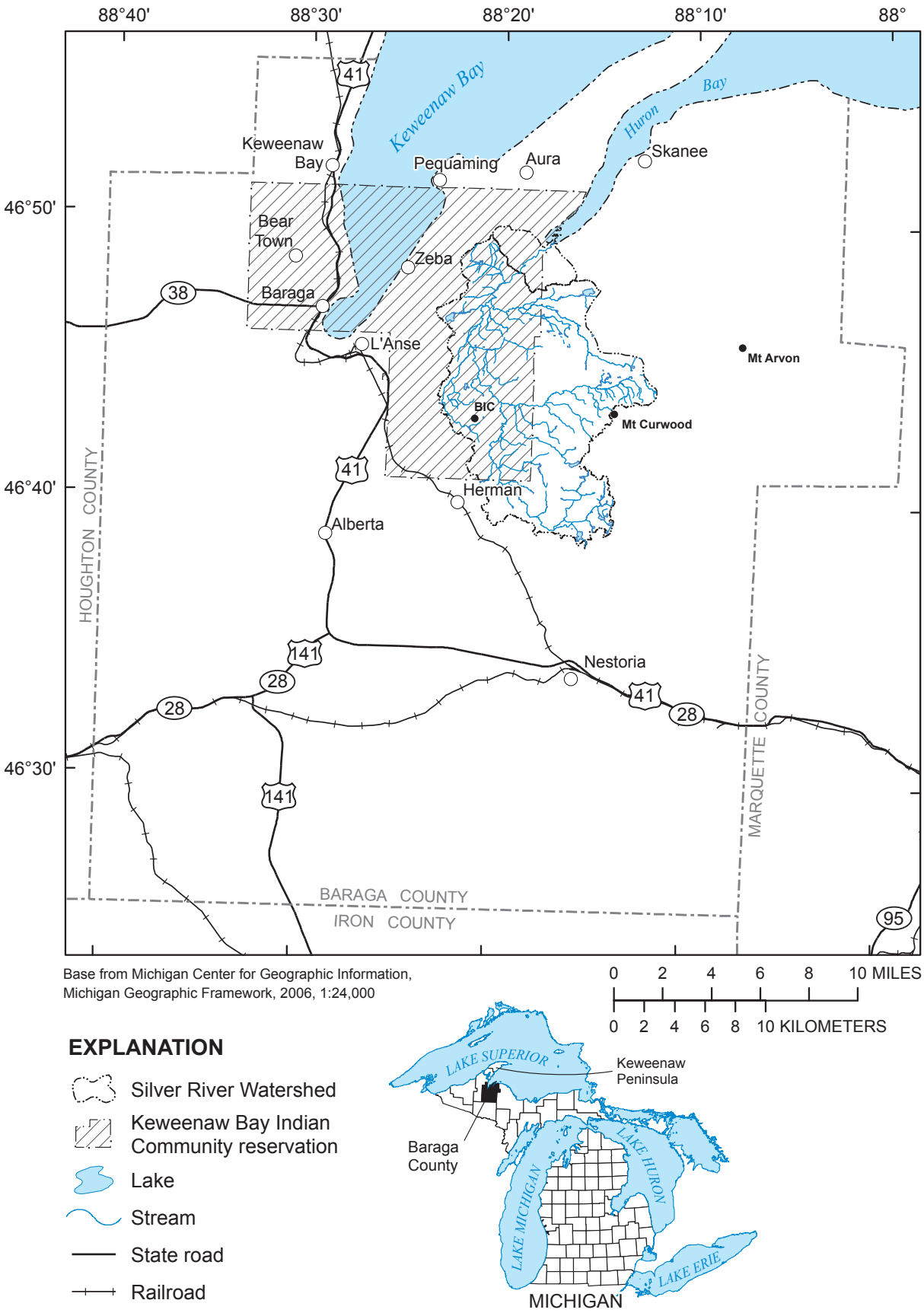


Figure 1. Location of Silver River Watershed study area, Baraga County, Michigan.

River Watershed during the period 2005–08; (2) establish a baseline surface-water-quality database; (3) describe generalized hydrologic and geologic characteristics of the Silver River Watershed; and (4) measure streamflow at all the sampling sites. Data from previous studies were used to augment the present study, primarily for the purpose of describing hydrology and geology of the watershed. Data collected during this study include streamflow, field water-quality parameters, water-quality samples, and quality-assurance samples at eight sites.

The study was modified somewhat in the later part of the 2008 water year, when KBIC added an ecological component to the study. Sampling of fish tissue for metals analysis and age-dating, bed-sediment sampling for size and metals analysis, and invertebrate sampling and identification were completed in August 2008; the results are summarized in this report.

Previous Studies and Data-Collection Efforts

Few studies of the Silver River Watershed are known. The USGS conducted a geochemistry study of stream sediments and groundwater wells in the Upper Peninsula of Michigan, as well as surrounding states, primarily to document the presence of uranium, but the analysis also included a number of different metals. A total of 566 stream-sediment and 611 groundwater samples were collected during 1978–79 (Smith, 1997). The USGS also conducted a study of water resources of KBIC (Sweat and Rheaume, 1998).

USGS and KBIC have cooperatively operated a continuous-record streamgage on the Silver River at Skanee Road (04043150) since October 2001 (fig. 2). A water temperature sensor was installed at the site in May 2002 and operated year-round until October 2005, when a multi-probe with water temperature and specific conductance sensors was installed. For quality-assurance and calibration purposes, the multi-probe is operated only from April through November. Stage, discharge (streamflow), specific conductance, and water-temperature data are available on the USGS National Water Information System (NWIS) website at *http://waterdata.usgs.gov/nwis*.

In October 2007, a continuous-record streamgage was installed at the downstream Gomanche Creek site at Indian Road (04043140) and in September 2008 another continuous-record streamgage was installed at the upstream Silver River site (04043126) (fig. 2). At the time of gage installation, multi-probes with water temperature and specific conductance sensors also were installed at both sites. The multi-probes have an operational period of April through November, which mimics the multi-probe at streamgage 04043150. Data for streamgages 04043126 and 04043140 also are available in the USGS NWIS database.

Michigan Technological University through its Aqua Terra Tech student enterprise group, contracted with KBIC to produce groundwater and surface-water flow models of the Silver River Watershed (France and others, 2005; Trahan and others, 2005). The major purpose of constructing the surface-water flow model appears to have been to calibrate the groundwater-flow model. There are some inconsistencies in the surface-water model that are acknowledged by the authors.

Environmental staff from KBIC have been measuring water temperature, dissolved oxygen, specific conductance, and pH, and collecting bacteriological samples at nine sites in the watershed since 1999 (fig. 2).

Several investigations of bedrock geology in the study area previously were completed. Dean Rossell of Kennecott Minerals Company prepared a concise description of their exploration at a site known as the BIC, which includes a full list of relevant geologic references in the area (Rossell, 2008).

Description of the Study Area

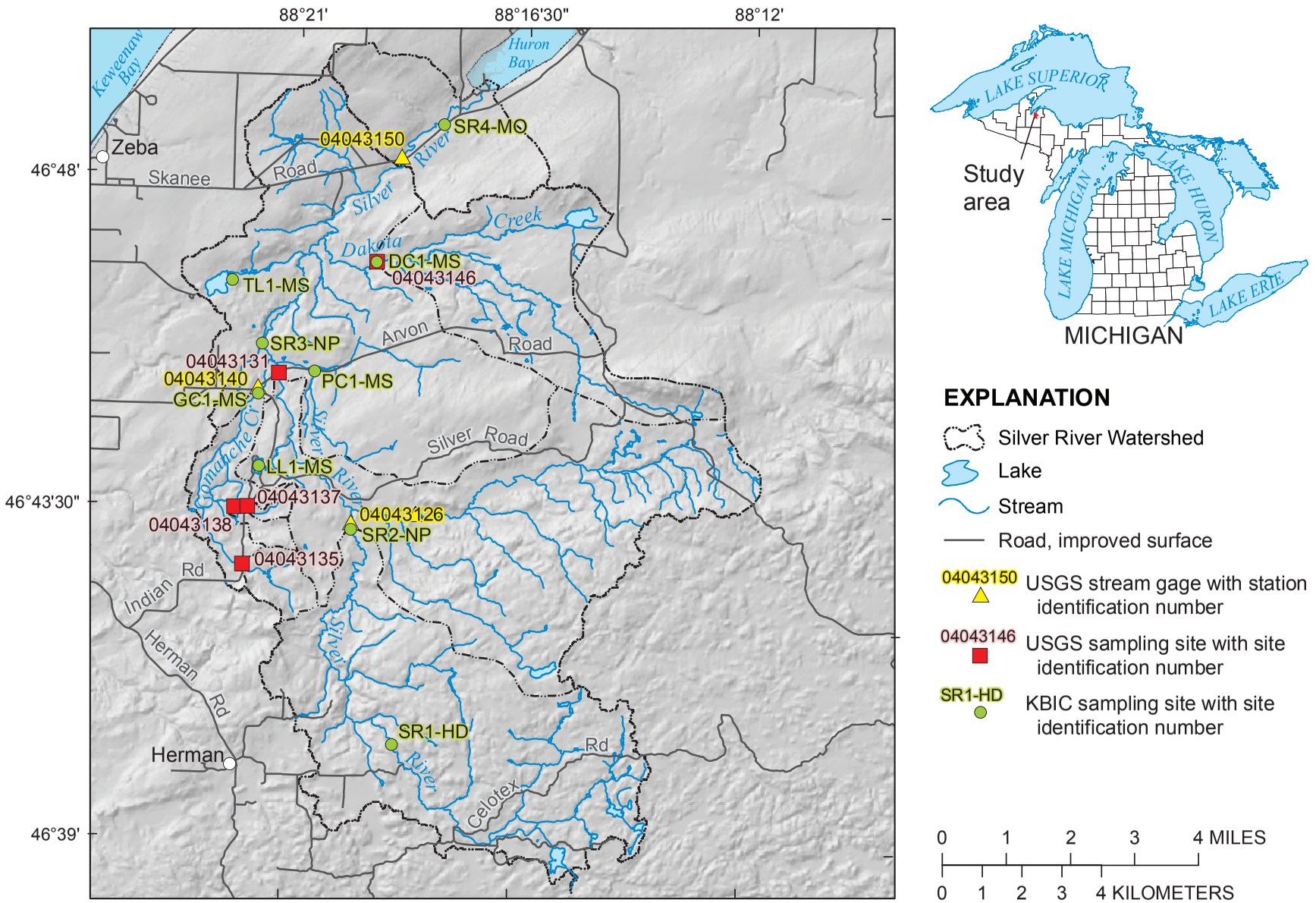
The Silver River Watershed comprises nearly 69 mi^2 located entirely within Baraga County in the Upper Peninsula of Michigan (fig. 1). The river is composed of several branches and tributaries that drain the northeastern part of the county. Most of the western half of the watershed, including the mouth at Huron Bay, is located within the traditional reservation of KBIC. Altitude of land surface within the watershed ranges from about 602 ft at the mouth to about 1,900 ft near Pages Creek in the eastern part of the watershed. The Keweenawan BIC deposit is hosted in a bedrock high that comprises the highest hill near Indian Road, at an altitude of about 1,540 ft. Branches of Gomanche Creek that drain either side of the Keweenawan BIC deposit flow beneath Indian Road at altitudes of 1,214 and 1,263 ft. High gradients are typical in parts of most of the tributary streams; several spectacular gorges, falls, and rapids cut into the Michigamme Slate are located on the Silver River between Arvon Road and the mouth.

Land cover in the study area is summarized in table 1 and shown on figure 3. No major cities are located within or near the study area, although the Village of L'Anse (fig. 1), with a population of 2,107 (2000 Census), is located several miles

Table 1. Land cover in the study area, Baraga County, Michigan (Michigan Department of Natural Resources, Forest, Mineral, and Fire Management Division, 2003).

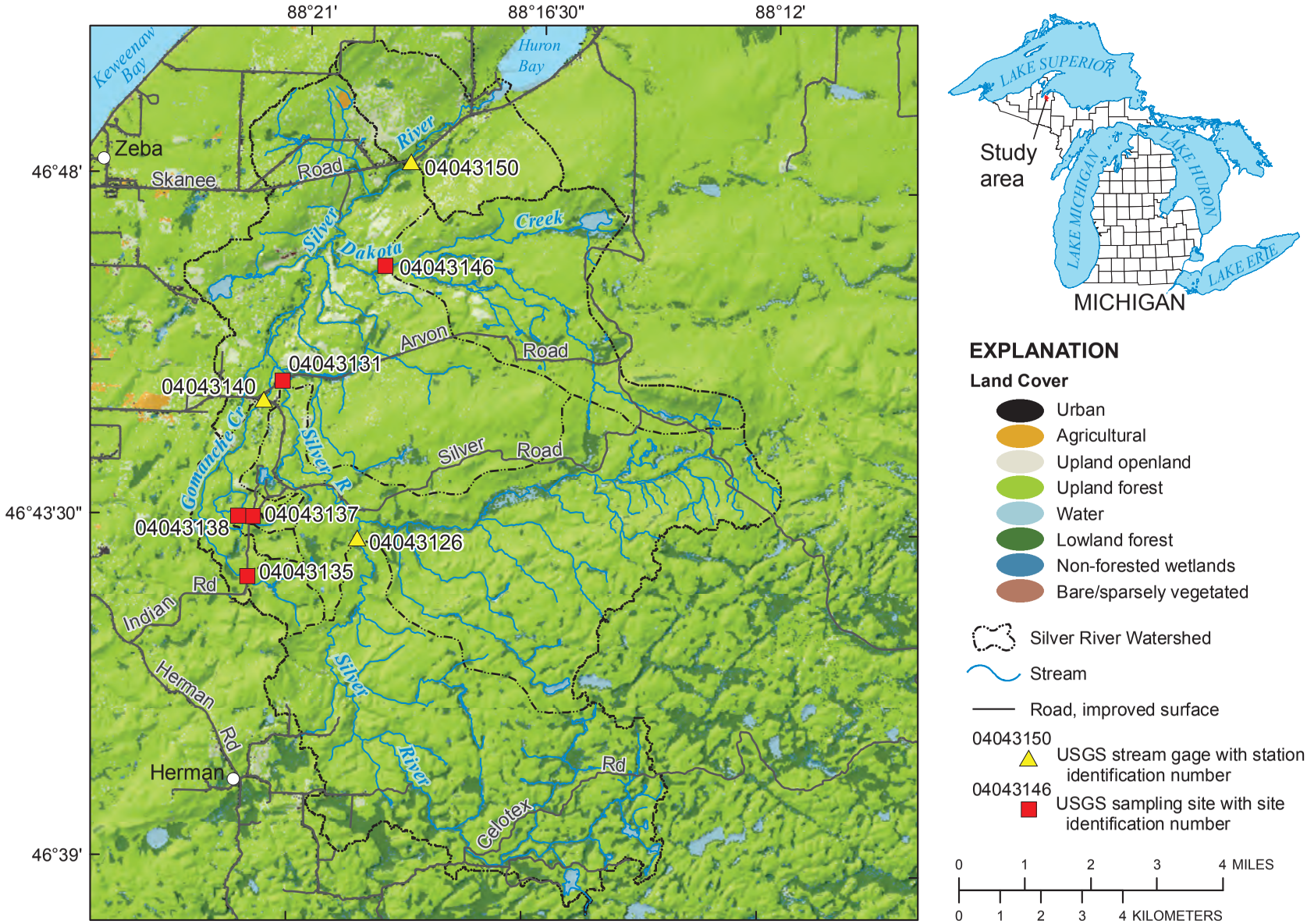
[<, less than; numerical values in the table are rounded and total is not exactly 100 percent]

Land-cover type	Percentage of study area
Urban	0.6
Agricultural	<.1
Upland open land	5.3
Forest	92.0
Water	1.2
Wetlands	.9
Bare/sparsely vegetated	<.1



Elevation data from U.S. Geological Survey, EROS data center, 1999, 1:24,000
Hydrologic divides modified from Michigan Department of Environmental Quality, 1998, 1:24,000
Hydrologic features, roads, and locations from Michigan Center for Geographic Information, 2006, 1:24,000

Figure 2. Silver River Watershed showing topographic features, U.S. Geological Survey (USGS) surface-water gaging stations and sampling sites, and Keweenaw Bay Indian Community (KBIC) surface-water sampling sites, Baraga County, Michigan.



Land cover from Michigan Department of Natural Resources, 2003
Elevation data from U.S. Geological Survey, EROS data center, 1999, 1:24,000
Hydrologic divides modified from Michigan Department of Environmental Quality, 1998, 1:24,000
Hydrologic features, roads, and locations from Michigan Center for Geographic Information, 2006, 1:24,000

Figure 3. Silver River Watershed showing land cover, topographic features, and U.S. Geological Survey (USGS) surface-water gaging stations and sampling sites, Baraga County, Michigan.

west of the watershed on Keweenaw Bay. Nearly the entire watershed is composed of forested upland, with little development, except for some low-density residential housing along roads, particularly near the mouth at Huron Bay. Logging and recreation are the principal land uses within the study area.

Climate

Temperature, precipitation, and snowfall data were measured by a National Oceanic and Atmospheric Administration (NOAA) cooperative climate observer at Herman, MI (located just south of the study area; NOAA station 203744) (fig. 1). All climatic data for 2005–08 measured at Herman were accessed at the National Climatic Data Center (2008) or (David Pearson, Hydrologist, National Oceanic and Atmospheric Administration, written commun., 2009).

The climate of the Silver River Watershed study area is typical of the northern Great Lakes Basin. Sweat and Rheaume (1998) reported an average annual precipitation of 100 cm (39.4 in.) and mean monthly temperatures ranging from about -11 to about 17°C (12 and 63°F, respectively). Annual precipitation measured at the NOAA station at Herman for 2005–08 was 38.0, 25.2, 36.6, and 34.7 in., respectively, and mean monthly temperatures ranged from 5.6 to 65.8°F. Mean monthly and annual temperatures and monthly and annual total precipitation (rain and rain-equivalent snowfall) for the NOAA station at Herman are included in tables 2 and 3, respectively.

Seasonal variability of precipitation in the watershed is appreciable. Most precipitation falls from May through November, and the least water-equivalent precipitation typically falls from December through April. Mean air temperature for the years 1971–96 is 40.4°F (National Climatic Data Center, 2002), which is nearly equivalent to mean air temperatures measured at Herman during 2005 and 2006, 40.8 and 39.5°F, respectively (monthly air temperatures were not available for all months during 2007–08). Temperature and precipitation data also have been collected at the KBIC fish hatchery at Pequaming, Michigan (fig. 1), since 2004.

Table 2. Mean monthly and mean annual temperature for 2005–08, measured by the National Oceanic and Atmospheric Administration observer at Herman, Michigan.

[--, incomplete data available; data are in degrees Fahrenheit]

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
2005	9.5	18.3	19.9	41.9	48.6	65.1	65.7	64.5	60.2	47.3	30.3	18.1	40.8
2006	24.2	12.5	22.6	41.1	49.9	58.1	65.8	60.7	49.8	36.2	30.9	22.3	39.5
2007	13.5	5.6	25.5	31.7	52.5	60.3	62.4	62.0	--	--	27.9	15.5	--
2008	15.3	8.9	18.2	29.4	38.9	53.2	56.9	--	--	39.6	27.4	10.5	--

Table 3. Monthly and annual precipitation for 2005–08, measured by the National Oceanic and Atmospheric Administration observer at Herman, Michigan.

[data are in inches]

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
2005	1.15	2.15	2.19	2.42	3.70	4.33	2.65	1.76	3.68	6.64	5.14	2.15	38.0
2006	2.08	1.85	2.00	1.65	3.39	1.44	3.28	2.02	1.62	2.64	1.50	1.78	25.2
2007	2.16	1.06	1.71	2.94	2.07	2.23	2.15	1.61	7.63	8.89	1.83	2.42	36.7
2008	1.66	.99	1.72	3.76	2.36	3.08	7.54	1.93	4.33	3.03	2.67	1.66	34.7

Geologic Setting

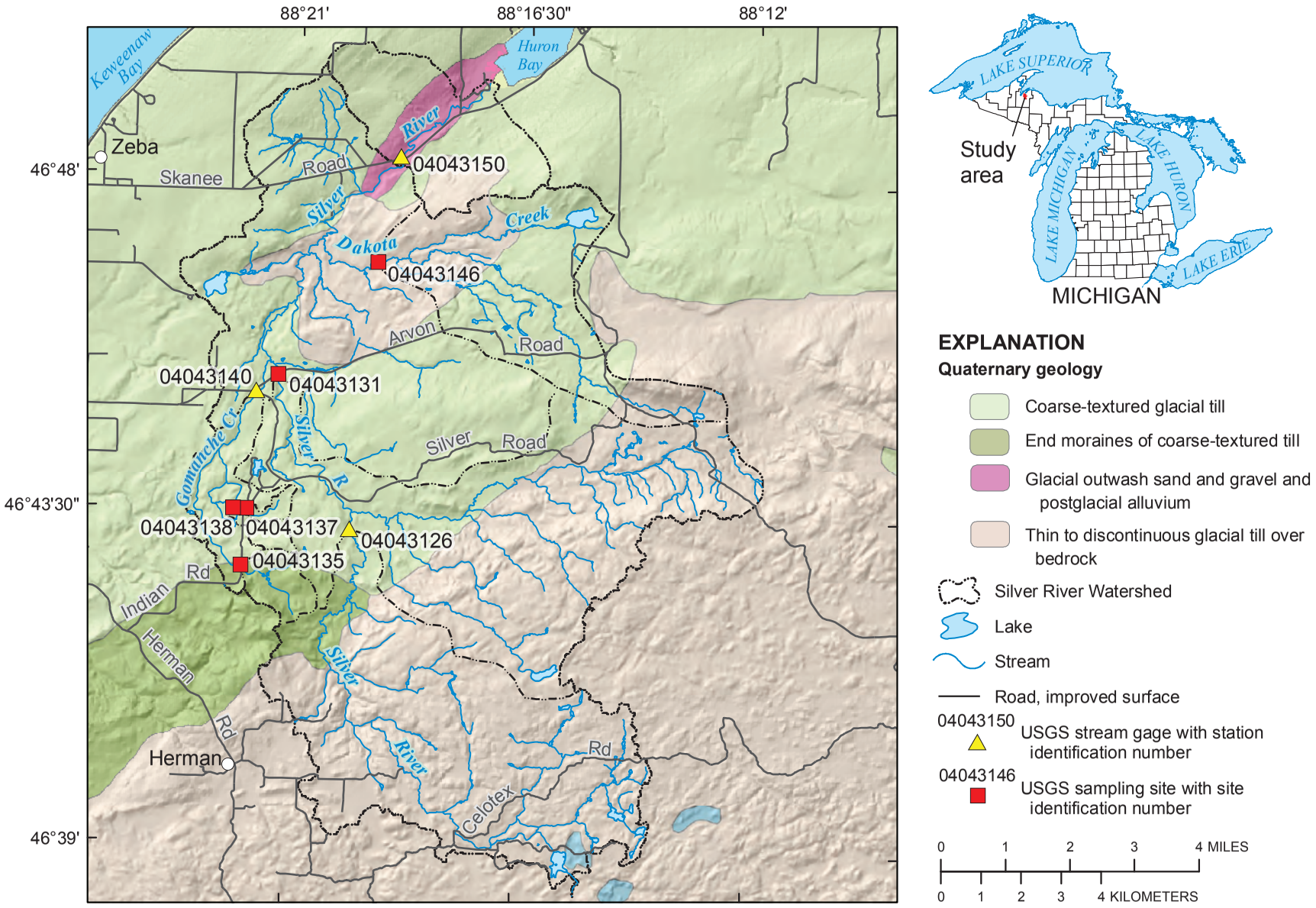
The land-surface features in Baraga County are affected by the underlying Archean and Precambrian bedrock features and unconsolidated glacial deposits, which overlie the bedrock (Doonan and Byerlay, 1973). Topography of the study area (fig. 2) is quite rugged when compared with most of Michigan. Altitude of land surface ranges from about 600 ft at the mouth of the Silver River to about 1,979 ft at Mt. Arvon, in the eastern part of the county, which is the highest point in Michigan (fig. 1).

Glacial Sediments

With the exception of some areas where bedrock outcrops at the land surface, landforms including outwash plains, moraines, and till plains created by Pleistocene glacial advance and retreat (melting) are the predominant geomorphologic features of the present-day Upper Peninsula of Michigan, including Baraga County (Farrand and Bell, 1982) (fig. 4). The glacial history of the study area is complex, similar to most other glaciated areas of the Upper Midwest. Based on numerous studies, multiple episodes of Wisconsinan-age glaciation, beginning around 75,000 years ago (Illinois State Geological Survey, 2009), are known to have occurred in the study area. Earlier glacial advances also covered the study area, but glacially derived sediments, which compose most of the present-day unconsolidated deposits overlying bedrock in the study area, are primarily attributed to late Wisconsinan readvances, which occurred as recently as 9,900 years ago. As the ice advanced from the present-day Lake Superior Basin, it formed into lobes and flowed south and west. Baraga County was covered by the Keweenaw Lobe, which was a sublobe separated from the main Superior Lobe by highlands in the Keweenaw Peninsula (fig. 1), northwest of Baraga County. The Keweenaw Lobe moved southwestward in Keweenaw Bay and then spread generally southeastward onto the highlands (Doonan and Byerlay, 1973). As the Keweenaw Lobe melted back to the position of the Keweenaw Moraine, a series of proglacial ponded-meltwater lakes formed, including the area now known as the Baraga Plains. The Marinesco Moraine, which predates the Keweenaw Moraine, trends roughly east-west, approximately parallel with and immediately south of State Highway M-28 (fig. 1), and covers the southern third of the county. A smaller, northeastward-trending landform was mapped by Leverett (1929) as the Covington Moraine. The location of the Covington Moraine is roughly parallel to the Keweenaw Moraine and simply may be a landward extension of that landform deposited during the last re-advance around 9,900 years before present. Holocene (post-glacial) sediments largely are confined to areas adjacent to surface-water bodies, including the area near the mouth of the Silver River.

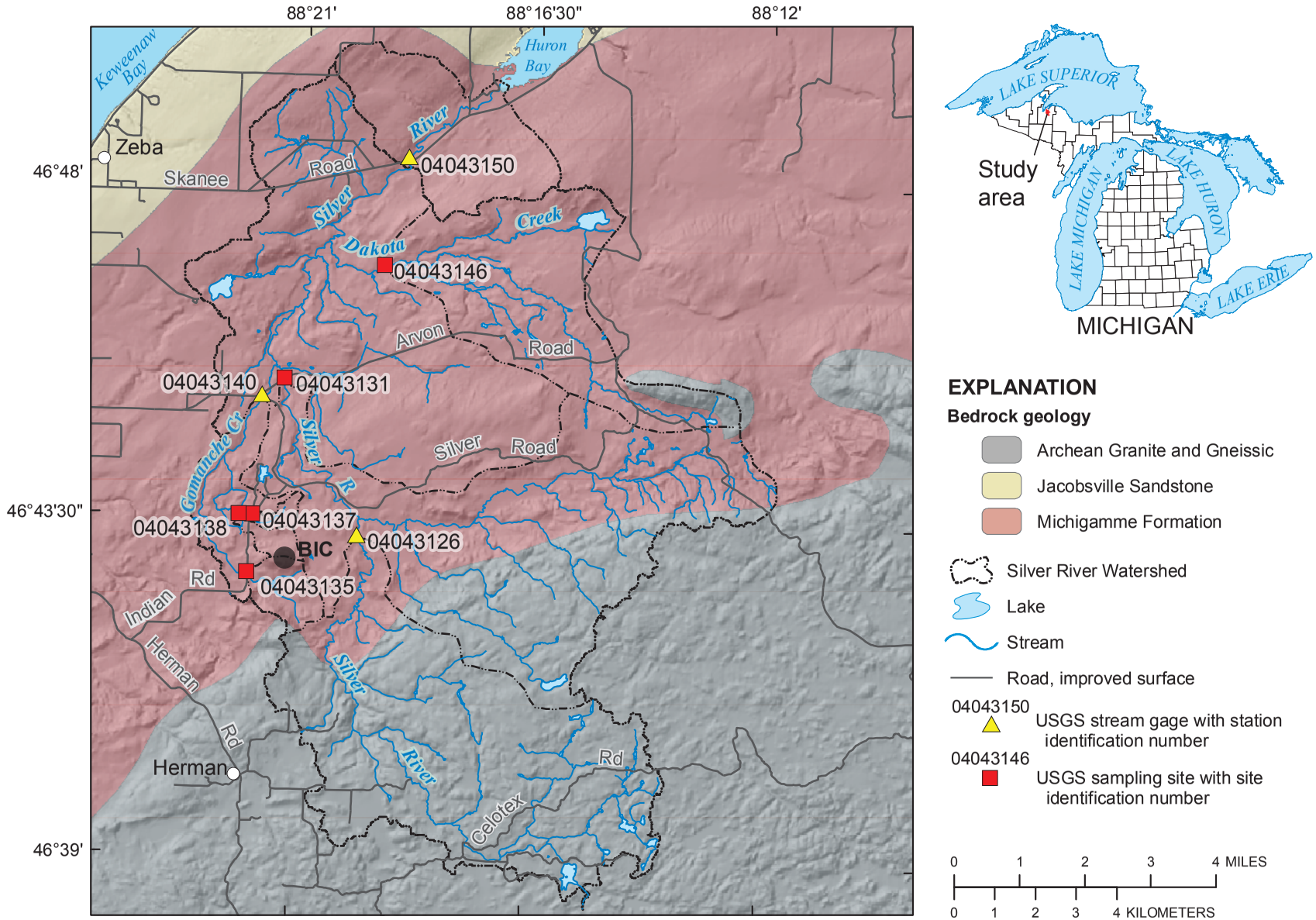
Bedrock

The oldest rocks primarily are composed of Lower Precambrian granite and granitic gneiss, and Archean gneisses (Cannon and Ottke, 1999). This bedrock unit stands several hundred feet higher than surrounding bedrock formations and comprises the area called the Peshekee Uplands by Doonan and Byerlay (1973). The two highest points in Michigan, which are both in Baraga County (Mt. Arvon at about 1,979 ft and Mt. Curwood at about 1,978 ft), are both composed of this bedrock unit (fig. 1). Mt. Curwood is located within the study area, although Mt. Arvon is not. The most prolific bedrock unit in the study area is the Middle Cambrian (Animikean) Michigamme Slate, which subcrops (stratigraphically highest bedrock unit) immediately under unconsolidated sediments or outcrops (found at the surface) in the largest part of Baraga County (fig. 5). This unit appears to be a metamorphosed turbidite sequence that is primarily composed of slate, but also contains lesser amounts of quartzite, graywackes, and banded-iron formations in lower sections. The Michigamme Slate outcrops at the Silver River at Arvon Road site (site 04043131) and at the Silver River near L'Anse streamgage (04043150), where it forms the low-water control. Upper Precambrian (Keweenawan) rocks primarily composed of the Jacobsville Sandstone unit are found near the shore of Huron and Keweenaw Bays. In addition to sandstone, the Jacobsville Sandstone also contains interbedded siltstones and shales. Outcrops of Jacobsville Sandstone are visible at the shoreline along U.S. Highway 41 at L'Anse and again near Keweenaw Bay, as well as many other places on or near the shore of Lake Superior. The bedrock unit comprising the Keweenaw BIC (fig. 5) is an ultramafic/mafic intrusive body believed to be about Keweenawan age as well (Rossell, 2008). The BIC intrudes near the contact of the Archean rock and the Michigamme Formation and rises to about 300 ft more than the surrounding terrain, at an altitude of about 1,540 ft, cross-cutting the Michigamme Formation.



Quaternary geology from Michigan Natural Features Inventory and Michigan Department of Natural Resources, 1998, 1:500,000
Elevation data from U.S. Geological Survey, EROS data center, 1999, 1:24,000
Hydrologic divides modified from Michigan Department of Environmental Quality, 1998, 1:24,000
Hydrologic features, roads, and locations from Michigan Center for Geographic Information, 2006, 1:24,000

Figure 4. Silver River Watershed showing Quaternary geology, topographic features, and U.S. Geological Survey (USGS) surface-water gaging stations and sampling sites, Baraga County, Michigan.



Bedrock geology from Michigan Department of Environmental Quality, Geologic Survey Division, 1987, 1:500,000
Elevation data from U.S. Geological Survey, EROS data center, 1999, 1:24,000
Hydrologic divides modified from Michigan Department of Environmental Quality, 1998, 1:24,000
Hydrologic features, roads, and locations from Michigan Center for Geographic Information, 2006, 1:24,000

Figure 5. Silver River Watershed showing bedrock geology, topographic features, and U.S. Geological Survey (USGS) surface-water gaging stations and sampling sites, Baraga County, Michigan.

Methods of Data Collection and Analysis

An unpublished Quality-Assurance Project Plan (QAPP) was prepared by the USGS Michigan Water Science Center and KBIC environmental staff, and approved by the USGS National Water Quality Laboratory (NWQL) and the U.S. Environmental Protection Agency (USEPA) Region 5 prior to data collection. All data collection and analyses were performed, as described in the QAPP, by USGS and KBIC employees at eight sampling sites within the watershed. Geographic-location information and drainage and wetland areas for the eight sites are included in table 4.

Streamflow was measured using methods described in Carter and Davidian (1968) and Rantz and others (1982), and water-quality data were collected using methods described in the USGS National Field Manual (NFM) for the Collection of Water-Quality Data (variously dated) (available online at *http://pubs.water.usgs.gov/twri9A*). Water-quality samples were processed at the USGS NWQL following their Quality Assurance/Quality Control (QA/QC) plan with the following exceptions; cyanide samples were analyzed by a USGS-approved contract laboratory, and unfiltered total and methylmercury samples collected in September 2008 were analyzed by the USGS Wisconsin Mercury Research Laboratory in the Wisconsin Water Science Center. Fish-tissue samples were collected and processed using methods described in Moulton and others (2002) and analyzed by laboratories at Texas A&M University. The fish otoliths, which are parts of the ear, were age dated by a contract laboratory specializing in that procedure. Invertebrate sampling, preservation, and identification followed Michigan Department of Environmental Quality (MDEQ) qualitative biological- and habitat-survey protocols for wadeable streams and rivers (2007). Bed-sediment samples were collected and processed using methods described in USGS NFM Chapter A8, analyzed for metals at the USGS NWQL, and analyzed for grain-size distribution at the Kentucky Water Science Center Sediment Laboratory.

Streamflow

Streamflow was measured using a current meter or calculated using a stage-discharge rating at all of the data-collection sites during this study, and results are summarized in appendix 1. In addition, streamflow has been monitored on a real-time basis at the Silver River near L'Anse streamgage (04043150) since the beginning of the study. Two additional continuous-record streamgages were established after the study began: Gomanche Creek at Indian Road (04043140) on October 31, 2007, and the Silver River upstream of the East Branch (04043126) on October 1, 2008. Historic and current stage and streamflow data from the continuous-record streamgages are available online at several USGS websites including *http://mi.water.usgs.gov* and *http://waterdata.usgs.gov/nwis/sw*. Sampling locations for this study include streamgages, which are equipped with stage recorders, and miscellaneous sites, hereafter referred to simply as "site", which are not equipped with any equipment.

Table 4. U.S. Geological Survey site number, station name, latitude, longitude, drainage area, and wetland area for water-quality sampling and streamflow-measurement sites in the study area, Baraga County, Michigan.

[USGS, U.S. Geological Survey; mi2, square mile; NA, not applicable; numerical values in the table are rounded to the nearest hundredth, except drainage areas and percentages, which are rounded to the nearest tenth]

USGS site number	USGS station name	Latitude in degrees	Longitude in degrees	Drainage area, in mi²	Wetland area in mi²	Percentage of basin composed of wetlands
04043126	Silver River upstream of East Branch near L'Anse	46.72	88.33	16.8	4.69	27.9
04043131	Silver River at Arvon Road near L'Anse	46.76	88.36	34.5	8.08	23.4
04043135	Upper Gomanche Creek at Indian Road near Herman	46.71	88.36	.9	.19	20.9
04043137	East Branch Tributary to Gomanche Creek near Herman	46.72	88.36	.2	.08	38.4
04043138	West Branch Tributary to Gomanche Creek near Herman	46.72	88.37	.3	.08	27.1
04043140	Gomanche Creek at Indian Road near L'Anse	46.75	88.36	3.5	.75	21.9
04043146	Dakota Creek at Trail Crossing near L'Anse	46.78	88.32	8.4	1.34	15.9
04043150	Silver River near L'Anse	46.80	88.32	64.7	12.46	19.2
Study area total		NA	NA	69.8	12.80	18.3

Streamflow was measured at all sampling sites concurrent with water-quality sampling, with the exception of the Silver River at Arvon Road (site 04043131), which is very rocky and steeply graded for hundreds of feet upstream and downstream of the bridge. At medium to high streamflow, the river becomes too deep to wade and extremely turbulent near the Arvon Road bridge, precluding the prudent use of a suspended current meter as well as a depth-integrated sampler.

Standard USGS techniques were used to measure streamflow (Carter and Davidian, 1968; Rantz and others, 1982), typically with a current meter and wading rod. Each streamflow measurement was given a rating by the hydrographer, ranging from poor to excellent, which is intended to convey the accuracy of a given measurement. A number of factors are considered when rating a discharge measurement, including but not limited to characteristics of the measurement cross section, spacing and number of observation verticals, distribution of flow in the cross section, variability of velocity during the timed interval, and extent of change in stream elevation during the discharge measurement.

The USGS streamgage 04043150 at Silver River near L'Anse was established in October 2001 and was the only site within the Silver River Watershed with a stage-discharge rating during this study. A continuous-record streamgage at Gomanche Creek (04043140) was established in October 2007 but its stage-discharge rating was not fully developed until fall 2008, after all sampling for this study was complete. Typically, a stage-discharge rating is established after streamflow has been measured over a range of stage (gage height) at the site and updated as needed to reflect changes in channel configuration and control over time. A stage-discharge rating table lists a streamflow or discharge for each stage (typically in 0.1 or 0.01 ft increments). At a continuous-data streamgage with an active stage-discharge rating, such as streamgage 04043150, which records stage every hour, the calculated streamflow values are useable with an acceptable level of confidence even though they were not specifically measured, except during site visits.

Water-Quality Sampling

Water-quality data were collected using standard techniques and methods described in the USGS NFM (available online at *http://pubs.water.usgs.gov/twri9A*). Water-quality samples were analyzed at the USGS NWQL following the USGS NWQL QA/QC plan with the following exceptions: cyanide samples were analyzed by a USGS approved contract laboratory, and unfiltered total mercury and methylmercury samples collected in summer 2008 were analyzed by the USGS Wisconsin Mercury Research Laboratory in the Wisconsin Water Science Center.

Spring sampling proceeded ice out (when ice is fully melted on the streams) and was completed as soon as sites became accessible and streamflow was low enough not to damage sampling equipment. Spring sampling in all years was accomplished prior to active vegetation growth. Summer (or low-flow) sampling was accomplished after the streams reached baseflow conditions and while vegetation was still in the growth stage (before any killing frosts). Samples also were collected July 25 and 26, 2006, immediately following a quick-moving thunderstorm that dumped about 2 in. of rain on the field area (National Climatic Data Center, 2008). Field water-quality parameters (pH, specific conductance, concentration of dissolved oxygen, and water temperature) were measured using a multi-parameter meter, which was calibrated daily following the procedure outlined in the USGS NFM. Samples were collected using a proto-cleaned sampler suitable to the particular streamflow conditions at each site. In shallow, low-velocity streams, this typically was accomplished by use of a handheld grab-sample bottle (the sample bottle is held by hand below the top of the water surface), but at wadeable sites with greater depth and higher velocity streamflows, a DH81 sampler and equal-width-increment protocol were used. At unwadeable sites, typically during spring sampling, either a D-95 depth-integrated sampler or a weighted-point sampler was used. The weighted-point sampler was used only as a last resort, when turbulence or streamflow conditions precluded using the D-95 owing to concerns about equipment damage or loss (typically at site 04043131).

Water-Quality Reporting Levels and Analysis

The NWQL has established reporting levels for various analytical procedures (Oblinger-Childress and others, 1999), and this section largely is excerpted from that report. In the following sections of this report, tabulated data are reported as "uncensored," "censored," or "estimated." Uncensored data are data reported as an unqualified numerical value. Censored data are reported as less than a particular reporting level; for example, < 0.12 milligrams per liter (mg/L). Censored data result from the analyte either not being present or, if seemingly present, an inability to conclusively identify it. Estimated data are reported as qualified numerical values with an "E" before the number; for example, E0.057. Estimated values can be less than, at, or greater than the analytical reporting level. An estimated value less than the reporting level means that the analyte can be identified and measured, but with less than 99-percent confidence that it is present. Estimated values at or above the analytical reporting level can result from a poor-performance record of the analyte with the analytical method, matrix interference, or small sample volume.

Reporting levels used by the USGS NWQL are minimum reporting level (MRL), method detection limit (MDL), long-term method detection limit (LT-MDL), and laboratory reporting level (LRL). The MRL is the lowest measured concentration of an analyte that can be reliably reported. The MDL is the minimum concentration that can be measured and reported with a 99-percent confidence that the analyte is present. The LT-MDL is derived from the standard deviation of a minimum of 24 MDL spike samples over an extended period. The LRL generally is equal to twice the LT-MDL. The probability of reporting an analyte as nondetected when it is present is less

than 1 percent at the LRL. The LRL is used when the NWQL determines that an MRL is no longer appropriate to a specific analyte or analytical method. Concentrations measured between the LRL and LT-MDL are reported as estimated concentrations.

For constituents with censored values, summary statistics were calculated by use of the adjusted maximum likelihood estimation (AMLE) method (Helsel and Hirsch, 2002). This approach is used when the uncensored data follow a known distribution, which for environmental data usually is a log-normal distribution (Helsel, 2005a). By relying on the detected data to define a hypothetical log-normal distribution that extends below the reporting levels of the analysis, summary statistics that are assumed to represent the whole sample population (uncensored and censored alike) were estimated based on this distribution. Unbiased statistics result from this method if the uncensored data fit an exact log-normal distribution and if the sample size is large (24 or more concentrations greater than the reporting level; Helsel and Hirsch, 2002).

Before the AMLE approach was applied, data were carefully scrutinized to ensure that the applicable reporting limits were used in the analysis. Helsel (2005b) stressed caution when examining data that contained censored and estimated values and described the occurrence of insider censoring as being situations where data measured as less than the detection limit are reported as being less than the quantitation, or reporting limit, but the "estimated" values are used for analysis with the same weight as uncensored values even though these values are less than the quantitation limit. This creates an uneven dataset where some data are censored at a higher level than others. For statistical applications, like AMLE, data that should be analyzed at a lower detection level are raised to the same analytical level as the quantitation level, resulting in an upward bias. To remove the bias, the MDL was used as the detection limit for analytes that contained both estimated values and non-detected values (table 5).

Streambed Sediment and Biological Data

Streambed-sediment samples were collected and processed using methods described in the USGS NFM Chapter A8 (available online at *http://pubs.water.usgs.gov/twri9A*) and were processed at the USGS Sediment Laboratory located at the Kentucky Water Science Center, Louisville, Ky. Fish-community and fish-tissue samples were collected and processed using methods described in Moulton and others (2002). Macroinvertebrate sampling, preservation, and identification followed the MDEQ Great Lakes Environmental Assessment Section (GLEAS) 51 procedure for qualitative-biological and habitat-survey protocols for wadeable streams and rivers (2007). The GLEAS 51 procedure has been used extensively

Table 5. Select U.S. Geological Survey National Water Quality Laboratory method detection limits, by sampling date.

[mg/L, milligrams per liter; µg/L, micrograms per liter]

Constituent and unit of measurement	Method detection limit (MDL)										
	Overall range	May 2005	July 2005	April 2006	July 2006	September 2006	April 2007	July 2007	September 2007	October 2007	April 2008
Ammonia (mg/L)	0.005–0.02	0.02	0.02	0.02	0.005	0.005	0.01†	0.01	0.01†	0.01	0.01†
Antimony (µg/L)	.3–.10	.10	.10	.10	.10	.10	.03	.03	.03	.07	.07
Beryllium (µg/L)	.004–.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.004
Cadmium (µg/L)	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
Chloride (mg/L)	.06–.10	.10	.10	.10	.10	.10	.06	.06	.06	.06	.06
Chromium (µg/L)	.02–.40	.40	.40	.02	.02	.02	.06	.06	.06	.06	.06
Fluoride (mg/L)	.05–.06	.05	.05	.05	.05	.05	.05	.05	.05	.06	.06
Lead (µg/L)	.04–.06	.04	.04	.04	.04	.04	.06	.06	.06	.04	.04
Molybdenum	.06–.20	.20	.20	.20	.20	.20	.06	.06	.06	.06	.1
Nitrate plus nitrite (mg/L)	.02–.30	.30	.30	.30	.30	.30	.30	.30	.30	.02	.02
Nitrite (mg/L)	.001–.004	.004	.004	.004	.001	.001	.001	.001	.001	.001	.001
Orthophosphate (mg/L)	.003–.009	.009	.009	.009	.009	.009	.009	.003	.003	.003	.003
Phosphorus (mg/L)	.002–003	.002	.002	.002	.002	.002	.003	.003	.003	.003	.003
Selenium (µg/L)	.02–.2	.2	.2	.04	.04	.04	.04	.04	.04	.02	.02
Zinc (µg/L)	.3–.9	.3	.3	.3	.3	.3	.3	.3	.3	.9	.9

† MDL for streamflow-gaging station 04043135 was 0.003

in Michigan for several years and consists of separate qualitative evaluations of the fish community, macroinvertebrate community, and the habitat quality, completed in that order to minimize disruption of the sampled communities.

Sediment samples were composites of samples collected by hand with a Teflon scoop from each of 5 to 10 depositional zones (submerged during low streamflow) along a reach of approximately 150 m. Samples were collected from the upper 2 cm (most recent, oxidized layer), and the amount collected depended upon the relative size of the depositional zone. Deposits of fine-grained sediment were sought out and sampled; thus, concentrations represent conditions in depositional areas of the streams, not the average concentrations for sediment throughout the stream reach. A bulk (<2 mm fraction) sample was removed and submitted for particle-size analysis from the composited samples from each site. The remaining sediment was wet-sieved in the field, and the fine (<0.063 mm) fraction was submitted for trace-element analysis.

Methods for collection and processing of biota (Moulton and others, 2002) included use of plastic implements (Teflon, polypropylene, or polyethylene) where appropriate for trace-element sampling. Quality-control procedures for the collection and processing of biota and sediment included collection of approximately 15-percent replicate samples and the use of clean techniques to minimize potential contamination. Fish for community and tissue analyses were collected by use of direct-current electrofishing gear. Depending upon stream depth, stage, and other factors, either backpack-mounted or towed-barge electrofishing units were used. The target organism for tissue analysis was the brook trout (*Salvelinus fontinalis*). After capture, the fish were rinsed in native water, weighed, and measured for total length. Otoliths were collected for age determination. Fish fillets were removed, placed in precleaned glass jars with Teflon-lined lids, frozen on dry ice, and shipped to the laboratory for analysis.

Hydrology of the Silver River Watershed

The hydrology of the Silver River Watershed was investigated by making discrete streamflow measurements at all eight sampling sites and installing three continuous-record streamgages. Annual mean streamflow and mean annual runoff are now known for each of the continuous-record streamgages showing differences between stream segments. In addition, if loading calculations are required in the future, each water-quality sample has an associated streamflow.

Streamflow

During this study, streamflow was either measured using a current meter; acoustic Doppler velocimeter; or water-tight container of known capacity, such as a plastic 1-gal. bucket; or calculated using a stage-discharge rating concurrent with water-quality sampling at all of the data-collection sites. The results are summarized in appendix 1. In addition, streamflow has been monitored on a real-time basis at the Silver River near L'Anse streamgage (04043150) since the beginning of the study. Two additional continuous-record streamgages were established during the study period: Gomanche Creek at Indian Road (04043140) on October 31, 2007, and the Silver River upstream of the East Branch (04043126) on October 1, 2008. Historic and current stage and streamflow data from the continuous-record streamgages are available online at various USGS websites including *http://mi.water.usgs.gov* and *http://waterdata.usgs.gov/nwis/sw.*

Silver River Upstream of East Branch

The Silver River upstream of the East Branch confluence flows under a steel and timber bridge on an unnamed, unimproved road owned by Plum Creek Timber Company (fig. 2). The drainage basin includes an area of about 16.8 mi^2. The stream channel is low gradient near the bridge and upstream for several hundred feet. Tag alders and other bushes dominate the near-shore vegetation. Water-quality sampling and streamflow measurements both are easily made at this location, which has a gravel-channel bottom except near the bridge, where the channel is quite rocky, including some large boulders (fig. 6). Average runoff will be available after the stage-discharge rating is developed. A continuous-record streamflow gage and a water-quality monitor to measure water temperature and specific conductance (streamgage 04043126) were installed and made operational at this location on September 25, 2008 (fig. 7).

Silver River at Arvon Road

The drainage basin of Silver River at Arvon Road (site 04043131) includes an area of about 34.5 mi^2 (fig. 2). The site is located several miles downstream of the confluence with the East Branch Silver River and a few hundred yards upstream of the confluence with Gomanche Creek, which occurs near the center of a spectacular series of rapids and falls where both streams are deeply incised into the Michigamme Slate. Arvon Road crosses Silver River on a high-capacity modern concrete bridge demonstrative of the importance of the forest-products industry in this remote location. The reach upstream and downstream of the bridge is high-gradient and composed of numerous riffles of rocks and boulders (fig. 8). During periods of low streamflow, the area immediately downstream of the bridge is pooled behind a riffle, but the channel bottom and banks are strewn with boulders that make water-quality sampling and streamflow measuring difficult. During moderate flows, a number of the pools are suitable for water-quality sampling, although useable streamflow-measuring sections are less plentiful. During times of high runoff, sampling is difficult at this site and streamflow measurement is impossible without incurring equipment damage.

Upper Gomanche Creek at Indian Road

The drainage basin of upper Gomanche Creek at Indian Road (site 04043135) includes an area of about 0.9 mi^2 (fig. 2). Gomanche Creek flows through a steel culvert under Indian Road at this site. Upstream of the road, the deeply incised channel typically is less than 6-ft wide and consists of a series of riffles and pools flowing through a cedar forest (fig. 9). A number of the pools are suitable for water-quality sampling, although good quality streamflow-measuring sections are less plentiful. This part of Gomanche Creek drains the south side, and perhaps part of the west side, of the bedrock high comprising the BIC.

East Branch Tributary to Gomanche Creek at Indian Road

The East Branch Tributary to Gomanche Creek at Indian Road (site 04043137) drains an area of 0.2 mi^2 (fig. 2). The East Branch Tributary flows through a steel culvert under Indian Road at this site. Upstream of the road, the deeply incised channel typically is less than 3-ft wide and consists of a series of riffles and pools (fig. 10). Several of the pools are suitable for water-quality sampling, although good-quality streamflow-measuring sections are nonexistent. The stream originates in wetlands located on the northeast side of the bedrock high comprising the BIC. The stream is not shown on topographic maps until it crosses an abandoned logging railroad grade about 0.5-mi downstream of the wetland; however, it was found to be flowing downstream of the wetland when it was checked during the study period. The stream appears to drain the north and east sides of the bedrock high.

West Branch Tributary to Gomanche Creek

The West Branch Tributary to Gomanche Creek (USGS site 04043138) drains an area of about 0.3 mi^2 and is located about 0.25-mi west of site 04043137 (fig. 2). The sampling location is located upstream of a steel culvert where the West Branch Tributary flows under an unnamed logging road about 0.25-mi west of Indian Road. Parts of this stream are incorrectly shown on topographic maps, as is the East Branch Tributary. Unfortunately, it appears that remote-sensing techniques used to produce topographic maps have resulted in logging roads near these two streams being illustrated as streams, and conversely, streams illustrated as logging roads. The wetland where the west tributary appears to originate is located west of Indian Road, and west northwest of the bedrock high comprising BIC, but the stream follows a different route than the one illustrated on topographic maps from there to the sampling site and then downstream for a few hundred more yards. This stream appears to drain part of the northwest side of the bedrock high.

Upstream from the road crossing, the channel typically is less than 3-ft wide and consists of a series of riffles and pools, which are suitable for water-quality sampling (fig. 11) but poor for measuring streamflow during much of the year. The reach 75 to 150-ft downstream of the logging-road crossing has the highest-quality streamflow-measuring sections. A container of known volume (1-gal plastic pail) and stopwatch were used to accurately measure streamflow during low-flow periods, because appreciable fall exists on the downstream end of the culvert.

Gomanche Creek at Indian Road

Gomanche Creek at Indian Road drains an area of 3.5 mi^2 (fig. 2). The precast-concrete culvert-style bridge at the site was installed after the previous bridge was washed out on May 12, 2003, when a dam at Lost Lake (shown on fig. 2 as KBIC sampling site LL1-MS) failed during a localized, multi-inch rainfall event (fig. 12). The same storm system moved east, washing out two dams in the Dead River Watershed in Marquette County, resulting in appreciable property and environmental damage. The channel at the downstream side of the bridge is straight for about 75 ft, and conditions for water-quality sampling and streamflow measurements are good during typical streamflows. A continuous-record streamflow gage and water-quality monitor to measure water temperature and specific conductance (streamgage 04043140) were installed upstream of the culvert and made operational October 31, 2007 (fig. 13).

Annual mean streamflow for 2008 was 4.8 ft^3/s, or 1.05 $(ft^3/s)/mi^2$ of drainage area. Mean annual runoff for 2008 was 14.32 in.

Dakota Creek at Trail Crossing

Dakota Creek at Trail Crossing (site 04043146) drains an area of about 8.4 mi^2, flowing across an unnamed logging road about 3.7-mi northeast of site 04043131 (fig. 2). Bedrock is mapped as being close to the surface throughout much of the Dakota Creek Watershed (Doonan and Byerlay, 1973) but no outcrops were apparent near the sampling site, where the channel typically is sand and gravel with a series of cobble/boulder riffles. A number of good water-quality sampling sites and streamflow-measuring sections are available within several hundred feet of the trail crossing (fig. 14).

Silver River near L'Anse

The Silver River near L'Anse streamgage (04043150) is located on Skanee Road about 8-mi northeast of L'Anse and about 1-mi upstream of the mouth at Huron Bay (fig. 2). The drainage basin of the Silver River at L'Anse encompasses an area of 64.7 mi^2 (about 69 mi^2 at the mouth). A continuous-record streamgage has been operating at the site since

October 2001. A water-temperature sensor was installed in May 2002 and operated until October 2005 when it was replaced by a multiparameter probe measuring specific conductance and water temperature. Water-quality samples and streamflow measurements are obtained at the site by either wading or using a bridge crane and suspended D-95 sampler or current meter off the bridge. Conditions for sampling and measuring are good at all stages. Annual mean streamflow for the period 2002–08 is 82.9 ft^3/s or 1.3 $(ft^3/s)/mi^2$ of drainage area. Mean annual runoff for the period 2002–08 is 17.3 in.

Water year 2008 was somewhat wetter than other years with annual runoff of 1.5 $(ft^3/s)/mi^2$ of drainage area or 20.4 in. for the year. Highest streamflow for the period of record at the site is 3,180 ft^3/s, which occurred May 12, 2003, after the dam at Lost Lake (located in the Gomanche Creek Watershed) failed during an extremely heavy, localized rainfall event. Stream stage has been higher than the underside of the bridge twice since the gage became operational. Lowest streamflow for period of record at the site is 3.5 ft^3/s, which occurred several days in mid-August 2007; lowest streamflow during 2008 was 7 ft^3/s.

Figure 6. U.S. Geological Survey hydrologic technician examining low-water control downstream of bridge at USGS streamgage 04043126 prior to ecological sampling. (Photograph by J.A. Wilkinson, U.S. Geological Survey)

Figure 7. U.S. Geological Survey streamgage at upper Silver River (04043126) during installation. (Photograph by M. A.A. Holmio, U.S. Geological Survey)

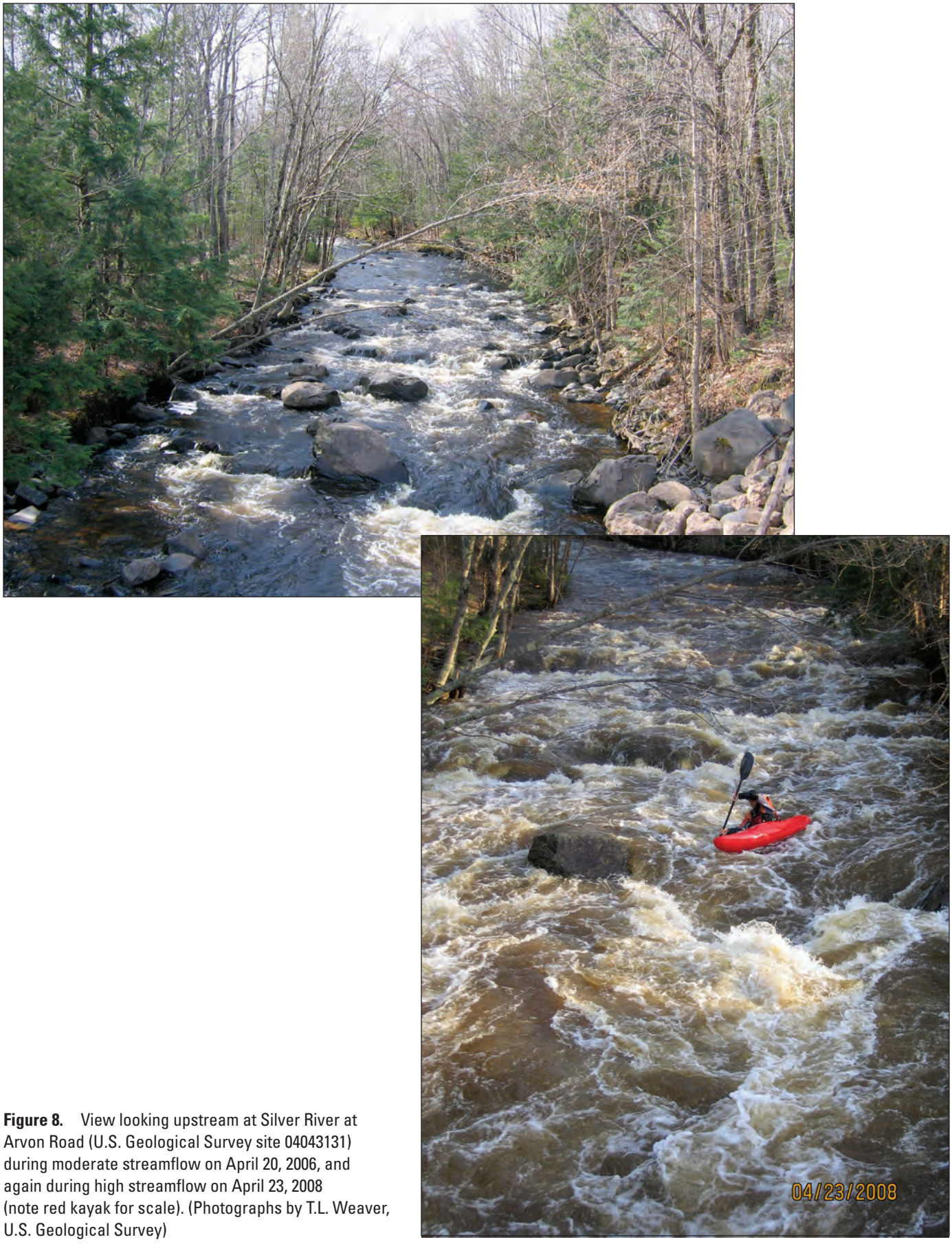


Figure 8. View looking upstream at Silver River at Arvon Road (U.S. Geological Survey site 04043131) during moderate streamflow on April 20, 2006, and again during high streamflow on April 23, 2008 (note red kayak for scale). (Photographs by T.L. Weaver, U.S. Geological Survey)

Figure 9. View looking upstream at upper Gomanche Creek at Indian Road (U.S. Geological Survey site 04043135) from Indian Road, May 10, 2005. (Photograph by T.L. Weaver, U.S. Geological Survey)

Figure 10. View looking upstream at East Branch Tributary to Gomanche Creek at Indian Road (U.S. Geological Survey site 04043137) from Indian Road, May 10, 2005. (Photograph by T.L. Weaver, U.S. Geological Survey)

Figure 11. View looking upstream at West Branch Tributary to Gomanche Creek (U.S. Geological Survey site 04043138) from unnamed logging road, May 11, 2005. (Photograph by T.L. Weaver, U.S. Geological Survey)

Figure 12. View looking upstream at a concrete culvert at the Indian Road crossing of Gomanche Creek (U.S. Geological Survey streamgage 04043140), May 11, 2005. (Photograph by T.L. Weaver U.S. Geological Survey)

Figure 13. U.S. Geological Survey streamage at Gomanche Creek at Indian Road (04043140). (Photograph by T.L. Weaver, U.S. Geological Survey)

Figure 14. Dakota Creek at unnamed logging-road crossing (U.S. Geological Survey site 04043146), May 12, 2005. (Photograph by T.L. Weaver, U.S. Geological Survey)

Water Quality of Streams in the Silver River Watershed

Factors that affect water quality of a stream are complex and interrelated. Geological and geomorphic characteristics of the watershed, as well as hydrological and biological components of the ecosystem, all affect the water chemistry.

The tributaries to the Silver River drain a geomorphically diverse watershed (figs. 4 and 5). Water-quality samples were collected 10 times at eight locations during the period May 2005–April 2008. An additional set of samples was collected in September 2008 for mercury analysis only. The database developed from this study provides useful information to enhance future stream-monitoring, data-collection, and interpretive efforts.

Field Water-Quality Parameters, Major Ions, Alkalinity, Nutrients, Metals, and Cyanide

A summary of sampling periods and USGS NWQL lab codes and schedules used for this study are provided in table 6. Streamflow, field water-quality parameters, major ions, suspended solids, nutrients, metals, and cyanide are summarized in appendix 1.

Field Water-Quality Parameters, Major Ions, and Alkalinity

Water samples from streams in the Silver River Watershed ranged from 6.7 to 8.5 for pH and 23 to 270 µs/cm for specific conductance (the lowest pH and conductance typically, but not exclusively, was measured during spring sampling). Concentrations of chloride ranged from an estimated 0.11 to 1.67 mg/L, indicating little effect from septic systems or road-deicing salt. By comparison, Weaver and Fuller (2007) noted a maximum concentration of chloride of 270 mg/L in 141 measurements made at the Clinton River in Mt. Clemens in Lower Michigan from 1973 to 1995. Water samples can be classified as soft, medium, and hard (Hem, 1985, p. 159), with concentrations of hardness reported as calcium carbonate ranging from 12 to 130 mg/L (average hardness is about 55 mg/L, which is soft). Concentrations of calcium, magnesium, and other dissolved solids (residue on evaporation at 180ºC) ranged from 35 to 149 mg/L throughout the study area, with highest concentrations typically occurring within the Gomanche Creek Watershed. Alkalinity, which is a measure of the capacity to react with and to neutralize acid (Hem, 1985), enables prediction of how easily acid rain can affect water quality of a specific water body. Alkalinity, in most natural waters, is related to higher levels of dissolved carbon dioxide species (carbonate and bicarbonate). Alkalinity data from the Silver River Watershed are expressed in equivalent calcium carbonate units; alkalinity ranged from 5 to 126 mg/L. The Silver River sites are considered moderate to non-sensitive to acid rain when compared to Wisconsin's alkalinity standards for surface-water bodies (Michigan currently (2009) does not have a standard for alkalinity of surface-water bodies) (table 7). Upstream parts of the watershed appear to be most susceptible, particularly during snowmelt/spring runoff, when alkalinity is lowest.

Nutrients

One indicator of the water quality of a stream is its biological productivity. Biological productivity may be altered from a stream's natural state when human activities cause an increase in nutrients. Levels of nutrients above a natural "baseline" most commonly result from the effects of septic systems or sewers and agricultural and domestic application of fertilizers. Sewage effluent is the largest single source of phosphorus in natural waters (Hem, 1985); however, the Silver River Watershed is sparsely populated with only a few homes near enough to the river to affect nutrient levels. Therefore, it

Table 6. U.S. Geological Survey National Water Quality Laboratory codes, schedules, and respective analytes used for sampling in the Silver River Watershed, Michigan, 2005–08.

[LC, lab code; NA, not applicable; °C, degrees Celsius; <, less than]

Sampling period	LC or schedule	Analyte
2005–08	Schedule 2701	Major inorganics
2005–08	Schedule 2702	Low-level nutrients
2005–08	Schedule 2044	Trace elements
2005–October 2007	NA	Cyanide
2005–July 2007	LC 165	Residue on evaporation, dried at 105°C
2005–July 2007	LC 169	Residue on evaporation, dried at 180°C
September 2007–08	NA	Suspended sediment, sieve diameter <0.063 millimeters
September 2007–08	NA	Suspended sediment, concentration
September 2008	NA	Total mercury, unfiltered
September 2008	NA	Methylmercury, unfiltered

Table 7. Sensitivity of surface-water bodies to acid rain; guidelines for Wisconsin (Wisconsin Department of Natural Resources, 2004).

[Alkalinity is in units of milligrams per liter as calcium carbonate (CaCO3); >, greater than]

Sensitivity	Alkalinity
High	0-2
Moderate	>2-10
Low	>10-25
Nonsensitive	>25

is reasonable to assume that nutrient levels measured during this study are representative of non-perturbed or natural "baseline" conditions.

Laboratory analyses showed concentrations of ammonia plus organic nitrogen in unfiltered water ranging from an estimated 0.06 to 0.52 mg/L at all sites except East Branch Tributary to Gomanche Creek site (04043137), which had concentrations ranging from 0.41 to 0.65 mg/L. Concentrations of nitrate plus nitrite in filtered water ranged from 0.02 to 0.23 mg/L at all sites except West Branch Tributary to Gomanche Creek (04043138), which had a concentration of 0.47 mg/L on October 31, 2007. Concentrations of total phosphorus in unfiltered water ranged from an estimated value of 0.004 to 0.05 mg/L at all sampling sites except 04043137, which had concentrations that were all less than 0.01 mg/L (0.013 to 0.086 mg/L). Concentrations of nutrients in the Silver River Watershed are low, indicating little, if any, septic-system or agricultural-waste effect in the watershed during the time of this study.

Nickel and Copper

Concentrations of nickel ranged from 0.1 to 1.57 µg/L, with the highest concentrations found in samples from the upper Silver River, East Branch Tributary to Gomanche Creek, and downstream Gomanche Creek sites. Concentrations of copper ranged from an estimated value of 0.26 to 22.9 µg/L, with the highest concentrations found in samples from the upper Silver River (22.9 µg /L) and Dakota Creek (16.3 µg /L). There appears to be a correlation between high concentrations of copper and high streamflows at the other six sites, but this was not the case at the two sites with the highest concentrations. Erosion and runoff also are highest during periods of high streamflow; however, both high-concentration samples were collected during a period of low streamflow in September 2006. One possible scenario is that the streams are in direct contact with copper-bearing geologic materials upstream of the two sites with the highest concentrations. Seven samples had concentrations of copper that exceeded the MDEQRule 57 water-quality standard aquatic-maximum value of 7.6 µg/L (Michigan Department of Environmental Quality, 2008), including three samples from the East Branch Tributary to Gomanche Creek site (04043137).

Mercury

Some streams and lakes in northern Baraga and Marquette Counties are known to have elevated concentrations of mercury in game fish, but the source of the mercury is unknown. The Michigamme Slate is known to be locally anomalously enriched in Hg with vales as high as 1.6 parts per million (ppm). Likewise, mineral prospectors have reported cinnabar from time to time. Atmospheric deposition of mercury is probably the dominant source of mercury to the Silver River Watershed although some concealed bedrock sources may also be in contact with parts of the streams. (W.F. Cannon, U.S. Geological Survey, written commun., 2009)

Investigations initiated in the late 1980s in the northern-tier states of the U.S., Canada, and Nordic countries found that fish, mainly from nutrient-poor lakes and often in very remote areas, commonly have high levels of mercury. More recent fish-sampling surveys in other regions of the U.S. have shown widespread mercury contamination in streams, wetlands, reservoirs, and lakes. To date (2009), 33 states have issued fish-consumption advisories because of mercury contamination (Krabbenhoft and Rickert, 1995). (See inset box on page 22.)

The USGS Wisconsin Water Science Center houses the Mercury Research Laboratory (USGS MRL) and team. Prior to September 2008, samples from the Silver River Watershed sites were analyzed using the mercury-analytical schedule at the USGS NWQL. The September 2008 samples were analyzed using the USGS MRL protocol and laboratory. All sites were sampled for unfiltered total mercury and methylmercury, and those results are summarized in table 8. Unfiltered samples contain both dissolved and particulate forms of mercury.

Table 8. Concentrations of total mercury and methylmercury in unfiltered water samples from the Silver River Watershed, Michigan.

[USGS, U.S. Geological Survey; SW, surface water; --, measurement not recorded; QA, quality-assurance sample; all concentrations are in nanograms per liter]

USGS station number	Parameter	Concentration of unfiltered total mercury	Concentration of unfiltered methylmercury	pH, in standard units	Ratio of methylmercury to total mercury
4043126	SW	3.44	0.38	7.5	0.11
4043131	SW	2.74	.33	7.9	.12
4043135	SW	4.52	.24	8.1	.05
4043137	SW	5.48	.25	7.9	.05
4043138	SW	2.43	.28	8.6	.12
4043140	SW	1.31	.18	--	.14
04043146	SW	1.84	.20	8.1	.11
04043146	QA	<.04	<.04	8.1	--
04043150	SW	2.43	.28	7.7	.12

Mercury Cycling in Aquatic Systems

The following discussion of mercury in the environment largely is excerpted from Krabbenhoft and Rickert (1995). This discussion is provided to explain the complexities of mercury in the environment. There are many sources of mercury in the environment, both natural and anthropogenic. Natural sources include volcanoes, natural mercury deposits, and volatilization from the ocean. The primary human-related sources include coal combustion, chlorine alkali processing, waste incineration, and metal processing. Best estimates to date (2009) indicate that human activities have about doubled or tripled the amount of mercury in the atmosphere, and the atmospheric burden is increasing by about 1.5 percent per year.

Mercury-cycling pathways in aquatic environments are very complex. The various forms of mercury can be converted from one to the next; most important is the conversion to methylmercury (CH3Hg+), which is the most toxic form. Ultimately, mercury ends up in sediments, in fish and wildlife, or back into the atmosphere (fig. 15).

With the exception of isolated cases of known point sources, the ultimate source of mercury to most aquatic ecosystems is deposition from the atmosphere, primarily associated with rainfall. Although atmospheric deposition contains the three principal forms of mercury, the majority is inorganic (Hg(II), ionic mercury). Once in surface water, mercury enters a complex cycle in which one form can be converted to another. It can be brought to sediments by particles settling and then later released by diffusion or resuspension. It can enter the food chain, or it can be released back into the atmosphere by volatilization.

Concentrations of dissolved organic carbon (DOC) and pH have a strong effect on the ultimate fate of mercury in an ecosystem. Studies have shown that for the same species of fish taken from the same region, increasing the acidity of the water (decreasing pH) and (or) the DOC content generally results in higher concentrations of mercury in fish. At the time this report was written, many scientists believe that higher acidity and DOC levels enhance the mobility of mercury in the environment, thus making it more likely to enter the food chain.

The exact mechanism(s) by which mercury enters the food chain largely remain unknown and probably vary among ecosystems. We do know, however, that certain bacteria play an important early role. Studies have shown that bacteria that process sulfate (SO4) in the environment take up mercury in its inorganic form and through metabolic processes convert it to methylmercury. The conversion of inorganic mercury to methylmercury is important for two reasons: (1) methylmercury is more toxic than inorganic mercury and (2) organisms require considerably longer time to eliminate methylmercury than inorganic mercury. At this point, the methylmercury-containing bacteria may be consumed by the next higher level in the food chain, or the bacteria may release methylmercury into the water where it can quickly adsorb to plankton, which also are consumed by the next level in the food chain.

The lowest concentration of total mercury was sampled at the downstream Gomanche Creek site streamgage (04043140), and the highest concentration was sampled at the East Branch Tributary to Gomanche Creek site (04043137). The lowest concentration of methylmercury also was sampled at streamgage 04043140, and the highest concentration was sampled at the upstream Silver River streamgage (04043126). The highest ratio of methylmercury to total mercury was at site streamgage 04043140. Although concentration of mercury in several of the sites is high, the ratio of methylmercury to total mercury is similar to the 5 to 10 percent found in most natural waters (M.E. Brigham, U.S. Geological Survey, written commun., 2009). Typically, watersheds with larger percentages of wetlands have a greater percentage of methylmercury. The National Wetlands Inventory Database (U.S. Fish and Wildlife Service, 1994) indicates that wetlands upstream of the sampling sites comprise about 16 to 38 percent of each subwatershed (table 4).

There is a Great Lakes Basin water-quality standard for total mercury in water of 1.8 ng/L to protect human health from consumption of aquatic organisms (U.S. Environmental Protection Agency, 1995a) and 1.3 ng/L to protect wildlife health (U.S. Environmental Protection Agency, 1995b). All samples exceed both of those standards; however, it should be noted that these are single-point samples taken during a period of low streamflows. Additional samples over the range of streamflow and conditions would need to be collected to confirm the persistence of the contamination or the need for a health or fishing advisory.

Cyanide

Measured concentrations of cyanide ranging from 0.0024 to 0.0058 mg/L were detected at least once at all sites except the downstream Silver River streamgage (04043150), and several sites had multiple detections. All concentrations were less than the LRL (0.010 mg/L), and several were at or near the MDL of 0.0024 mg/L. A sample collected on July 26, 2005, at the East Branch Gomanche Creek site (04043137) had a concentration of 0.0058 mg/L, which exceeds the MDEQ Rule 57 water-quality standard final chronic value of 0.0052 mg/L (Michigan Department of Environmental Quality, 2008).

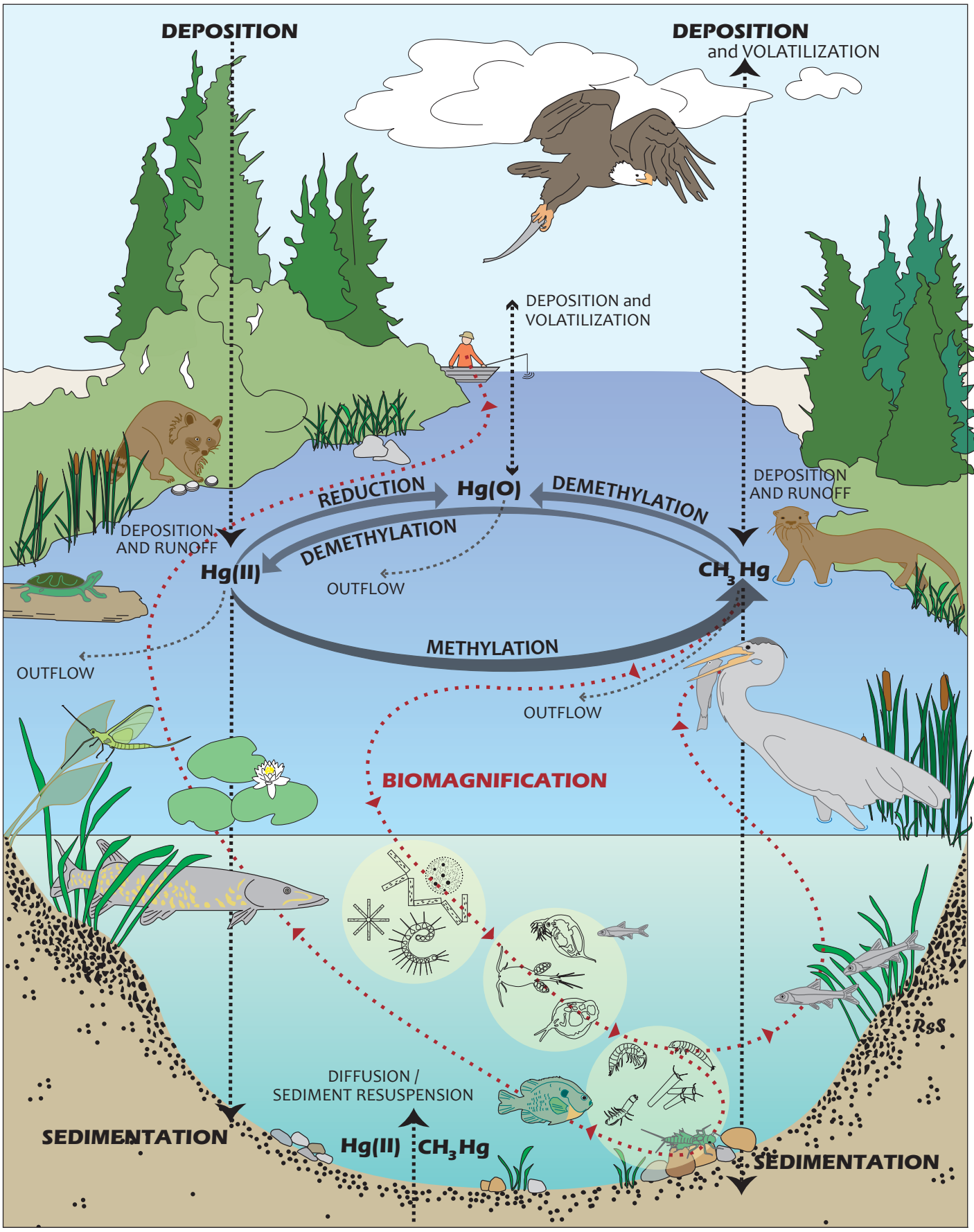
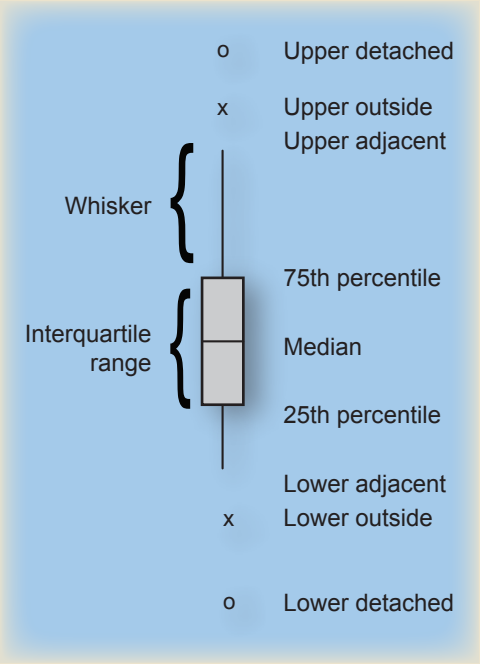


Figure 15. Aquatic mercury cycle illustrating the complexities of mercury-cycling pathways in aquatic environments.

The Elements of a Boxplot



Boxplots provide a means to visualize the summary statistics of data. A quick glance at a boxplot would show the range in data values and whether the data are skewed. The main element of the boxplot is the box itself, whose top and bottom are defined by the 75th and 25th percentiles, respectively. The median (or 50th percentile) typically is represented by a line that cuts across the box. The difference between the 75th and 25th percentiles is known as the Interquartile Range (IQR).

Lines extending up and down from the box are called whiskers, and their lengths are defined by the upper and lower adjacent values. The upper adjacent is equal to the maxiumum data value that is equal to or less than the 75th percentile + (1.5 x IQR); the lower adjacent is equal to the minimum data value that is is equal to or greater than the 25th percentile - (1.5 x IQR).

The upper outside value is outlier data whose value is greater than the upper adjacent value, but less than the 75th percentile + 2 (1.5 x IQR). The upper detached value is outlier data whose value is greater than this upper outside bounds.

The lower outside value is outlier data whose value is less than the lower adjacent value, but greater than the 25th percentile - 2 (1.5 x IQR). The lower detached value is outlier data whose value is even less thanthis lower outside bounds.

Boxplot statistics estimated below the largest laboratory method detection limit are represented by a dashed outline.

Statistical Analysis of Water-Quality Data and Comparison to Water-Quality Guidelines

Over the course of this study, laboratory methods changed as analytical equipment was replaced or updated, resulting in differing MDLs being used for sample analysis. This is important to note when employing the AMLE method for the calculation of summary statistics. Several of the analytes had detected and estimated concentrations present in enough samples for summary statistics to be calculated, even though most of the concentrations were below their respective detection limits. Summary statistics could not be calculated using the AMLE method for cyanide, mercury, and silver owing to each having an insufficient number of detected concentrations present in an adequate number of samples (appendix 1). Summary statistics of water-quality data collected as part of this study were calculated and graphed as boxplots. Although boxplots such as these appear complex, they convey a great deal of information succinctly (inset box page 24) (figs. 16–18).

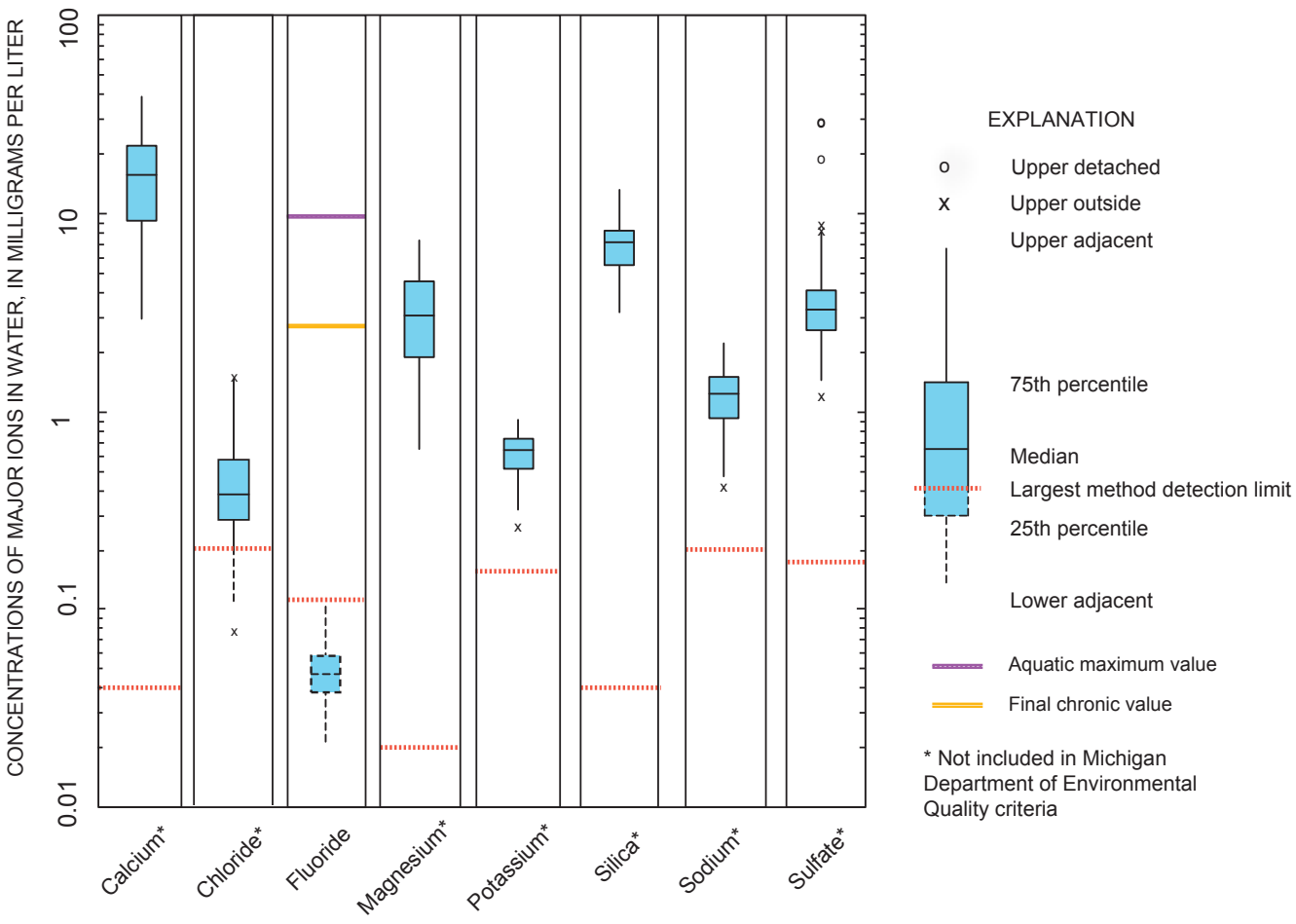


Figure 16. Concentrations of major ions in 80 water-quality samples, Silver River Watershed, Michigan, 2005-08

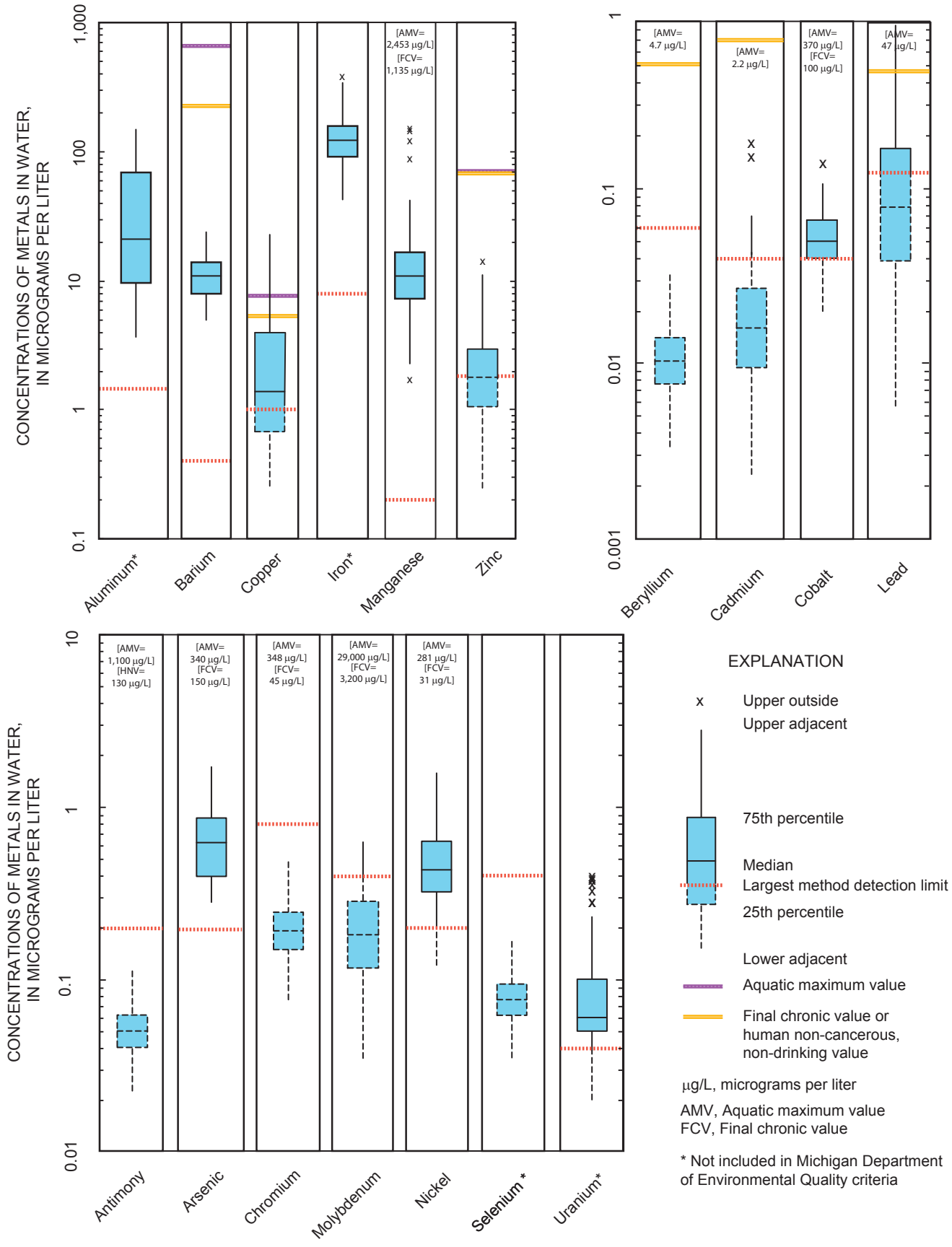
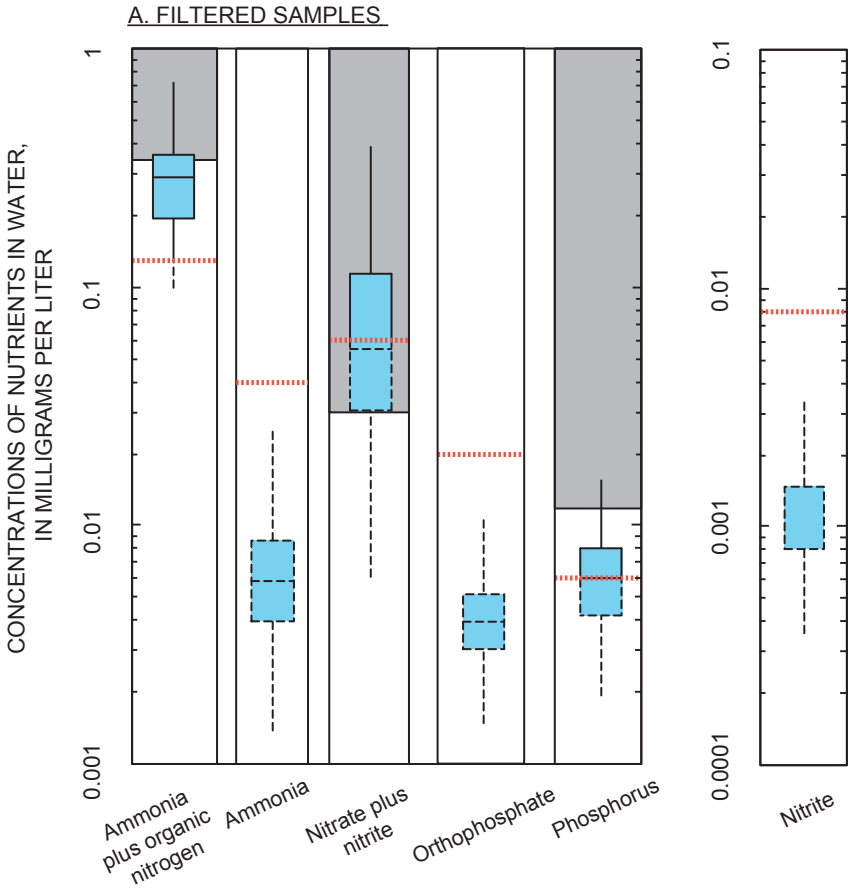


Figure 17. Concentrations of metals in 80 water-quality samples, Silver River Watershed, Michigan, 2005-08.



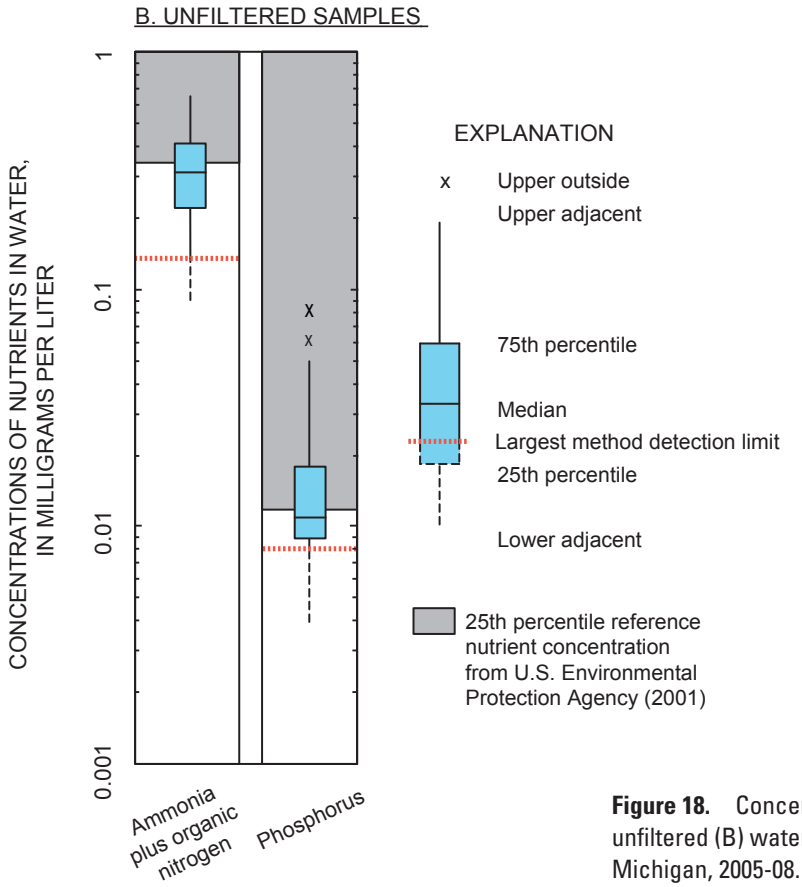


Figure 18. Concentrations of nutrients in 80 filtered (A) and unfiltered (B) water-quality samples, Silver River Watershed, Michigan, 2005-08.

In 2006, MDEQ adopted rules defining water-quality standards for the Great Lakes, connecting channels, and all other surface-water bodies in Michigan (Michigan Department of Environmental Quality, 2006a). The MDEQ rules provide selected water-quality criteria for cancerous and non-cancerous human consumption (drinking) and exposure (non-drinking), final chronic exposure, and wildlife and aquatic-ecosystem protection values (table 9). Although most of the Silver River Watershed is sparsely populated, a diverse population of wildlife and aquatic creatures lives within the watershed, and the Silver River drains into Huron Bay, itself a part of Lake Superior. KBIC is concerned that tribal members and others fishing, hunting, and living within the watershed are aware of any health concerns presented by surface-water quality degradation.

The human cancer value (HCV) is the maximum ambient-water concentration that a lifetime of direct exposure (either through consumption or from water-related recreation activities) or consumption of fish exposed to this concentration will represent a risk of contracting cancer of 1 in 100,000. The human non-cancerous value (HNV) represents the maximum ambient-water concentration at which adverse non-cancerous effects are not likely to occur from a lifetime of exposure through consumption or recreation activities or consumption of fish from these waters. The final chronic value (FCV) represents the concentration below which injurious or debilitating effects to an aquatic organism will not result after repeated long-term exposure. The wildlife value (WV) represents the maximum ambient-water concentration below which adverse effects are not likely to occur to mammal and bird populations through a lifetime exposure either through direct consumption or through exposure within their food supply (Michigan Department of Environmental Quality, 2006a).

For any given water-quality constituent, the recommended use of the criteria above involves selecting the most conservative value (lowest concentration) between the cancerous and non-cancerous human exposure and the WVs. Since the Silver River is not used as a water-supply source, it is not necessary to include the cancerous and non-cancerous human-consumption criteria in this comparison. This conservative value is compared to the average concentration of the samples (Brenda Sayles, Michigan Department of Environmental Quality, oral commun., 2009).

The aquatic maximum value (AMV) represents the highest constituent concentration in ambient water that an aquatic community can briefly be exposed to without detriment (Michigan Department of Environmental Quality, 2006a). The AMV is compared to the maximum concentration of the samples (Brenda Sayles, Michigan Department of Environmental Quality, oral commun., 2009). HNVs, FCVs, and AMVs are listed for fluoride and all analyzed metals except aluminum, iron, selenium, and uranium. HCV and WV are not available for any of the analytes. All fluoride samples were well below the defined criteria (fig. 16). The AMV criteria for metals are dependent upon the calculated hardness of water, and an average hardness concentration of 54.8 mg/L was used for the calculations. Of the metal analytes, only copper exceeded the criteria; 13 of 80 copper samples exceeded the FCV and 7 of those exceeded the AMV as well (appendix 1, table 9, fig. 17).

Table 9. Human non-cancerous, final chronic, and aquatic-maximum criteria values for select constituents as defined by the Michigan Department of Environmental Quality (Michigan Department of Environmental Quality, 2006b).

[µg/L, micrograms per liter; mg/L, milligrams per liter; ND, not defined]

Constituent	Human non-cancerous value	Final chronic value	Aquatic maximum criteria value
Antimony (µg/L)	130	240	1,100
Arsenic (µg/L)	280	150	340
Barium (µg/L)	160,000	231	659
Beryllium (µg/L)	1,200	.52	4.7
Cadmium (µg/L)	130	.80	2.2
Chromium (µg/L)	9,400	45	348
Cobalt (µg/L)	ND	100	370
Copper (µg/L)	38,000	5.4	7.6
Fluoride (mg/L)	ND	2.7	9.8
Lead (µg/L)	190	5.3	47
Manganese (µg/L)	59,000	1,135	2,453
Molybdenum (µg/L)	10,000	3,200	29,000
Nickel (µg/L)	210,000	31	281
Zinc (µg/L)	16,000	71	70

As of June 2009, MDEQ had not adopted criteria for nutrients, although the USEPA had developed criteria for total nitrogen, total phosphorus, turbidity, and chlorophyll *a* (U.S. Environmental Protection Agency, 2001). Nutrient criteria have not been developed for ammonia plus organic nitrogen and nitrate plus nitrite nitrogen, though these analytes were included in this study, and 25th percentiles were reported within the USEPA's nutrient-criteria document. The USEPA recommended that these percentiles should be used as references and not specifically as water-quality criteria; however, according to Haack and Duris (2008) it is possible that these 25th-percentile values will be used if quality criteria are established in the future. Table 10 presents the 25th-percentile values for Nutrient Ecoregion VIII, subecoregion 50 streams, which include the Silver River Watershed (U.S. Environmental Protection Agency, 2001).

For the filtered samples, concentrations of nutrients in 33 of the 80 samples analyzed for ammonia plus organic nitrogen were equal to or greater than the 25th-percentile value; all but 2 of the samples analyzed for nitrate plus nitrite were equal to or exceeded the 25th-percentile value; and 2 of the 80 samples analyzed for total phosphorus were equal to or greater than the 25th-percentile value. For the unfiltered samples, 35 of the 80 samples analyzed for ammonia plus organic nitrogen were greater than the 25th-percentile value; and for samples analyzed for total phosphorus, 39 of the 80 samples were equal to or greater than the corresponding 25th-percentile values (table 9, fig. 18). Notably, 8 of 10 filtered samples and all 10 unfiltered samples collected at the East Branch Tributary to Gomanche Creek exceeded the 25th-percentile value for ammonia plus organic nitrogen criteria.

Bed-Sediments Analysis

Bed sediments were sampled at seven of the eight sites in conjunction with fish-tissue sampling in August 2008. The Silver River at Arvon Road site (04043131) was excluded owing to lack of suitable sediments at the site. Bed-sediment samples were collected and processed using methods described in the USGS NFM Chapter A8 (available online at *http://pubs.water.usgs.gov/twri9A*). The samples were analyzed for 42 metals and other selected elements at the USGS NWQL and for grain-size distribution at the Kentucky Water Science Center Sediment Laboratory.

Bed-sediment samples were composites of samples collected by hand with a Teflon scoop from each of 5 to 10 depositional zones (submerged during low streamflow) along a reach of approximately 150 m. Samples were collected from the upper 2 cm (most recent, oxidized layer), and the amount collected depended upon the relative size of the depositional zone. Deposits of fine-grained sediment were targeted for sampling; thus, concentrations represent conditions in depositional areas of the streams, not the average concentrations for sediment throughout the stream reach. A bulk <2-mm fraction was removed from the composited sample from each site for particle-size analysis. The rest of the sample was wet-sieved in the field, and the fine (<0.063 mm) fraction was collected for trace-element analysis.

Results of the metals analysis are presented in appendix 2. Notably, two sites (upstream Gomanche Creek (04043135) and Silver River near L'Anse streamgage (04043150)) did not have concentrations of any elements that ranked highest overall among the seven sites. Conversely, three sites (West Branch Tributary to Gomanche Creek (04043138), Dakota Creek (04043146), and upper Silver River (04043126)) had the highest concentrations of many of the elements (27, 11, and 8, respectively). West Branch Tributary to Gomanche Creek had the highest concentrations of mercury, uranium, vanadium, and zinc. Dakota Creek had the highest concentrations of the rare-earth elements cerium and lanthanum, as well as rubidium and cesium. The upper Silver River and West Branch Tributary to Gomanche Creek had identical concentrations of nickel, niobium, and scandium, and the West Branch Tributary to Gomanche Creek and Dakota Creek had identical concentrations of cadmium. Figure 19 illustrates statistical analyses of the concentrations of bed sediment for all but bismuth, silver, and sulfur, which were below MDLs at all sampling sites. Once again, boxplots were chosen to most concisely present the data.

Table 10. Ambient water-quality criteria for select nutrients as defined by the U.S. Environmental Protection Agency within Nutrient Ecoregion VIII, Sub-ecoregion 50 (U.S. Environmental Protection Agency, 2001).

[All values are in milligrams per liter]

	Ammonia plus organic nitrogen	Nitrate plus nitrite nitrogen	Total nitrogen	Total phosphorus
25th percentile	0.33	0.03	0.44	0.012

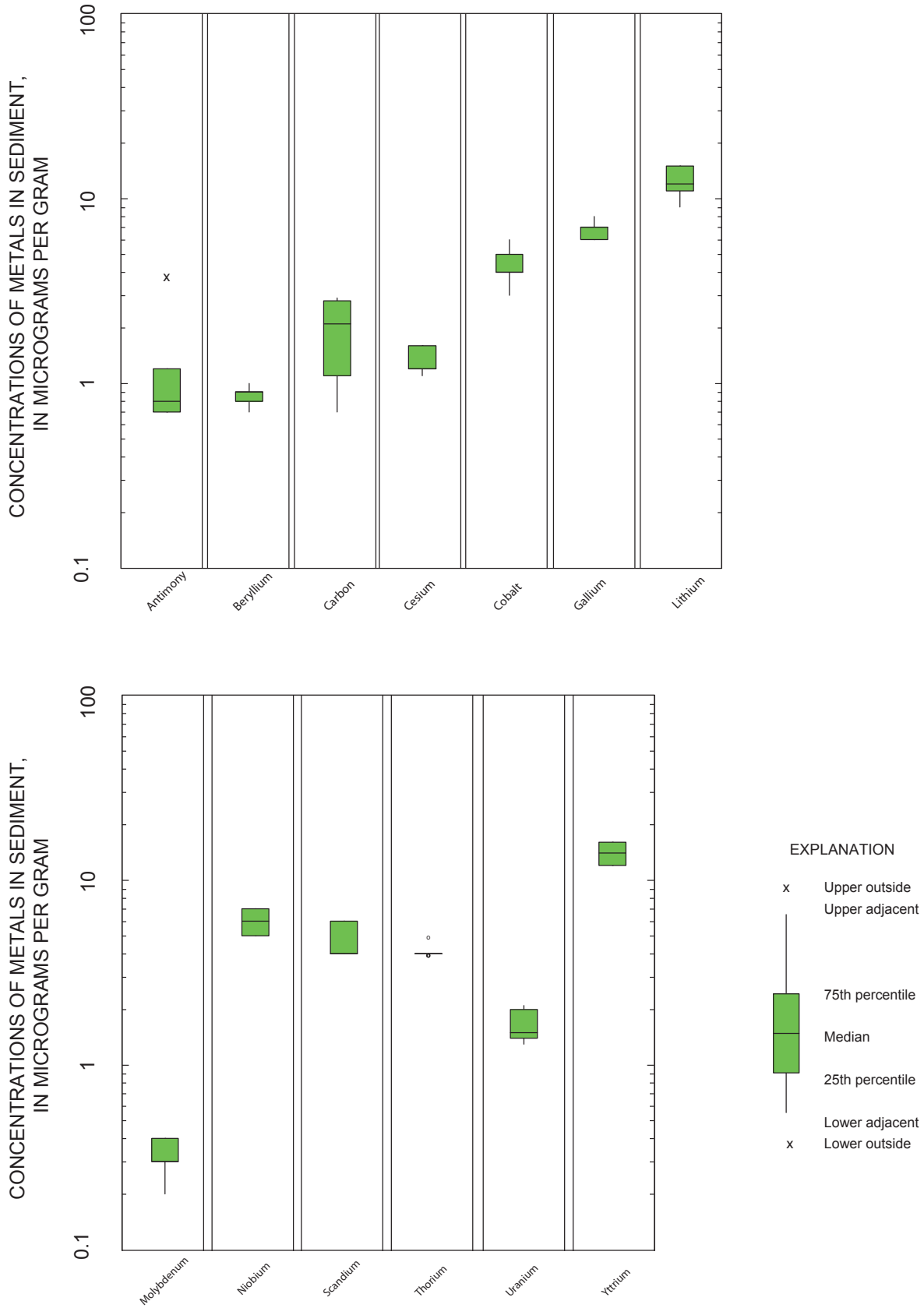


Figure 19. Concentration of metals in seven bed-sediment quality samples, Silver River Watershed, Michigan, 2005-08.

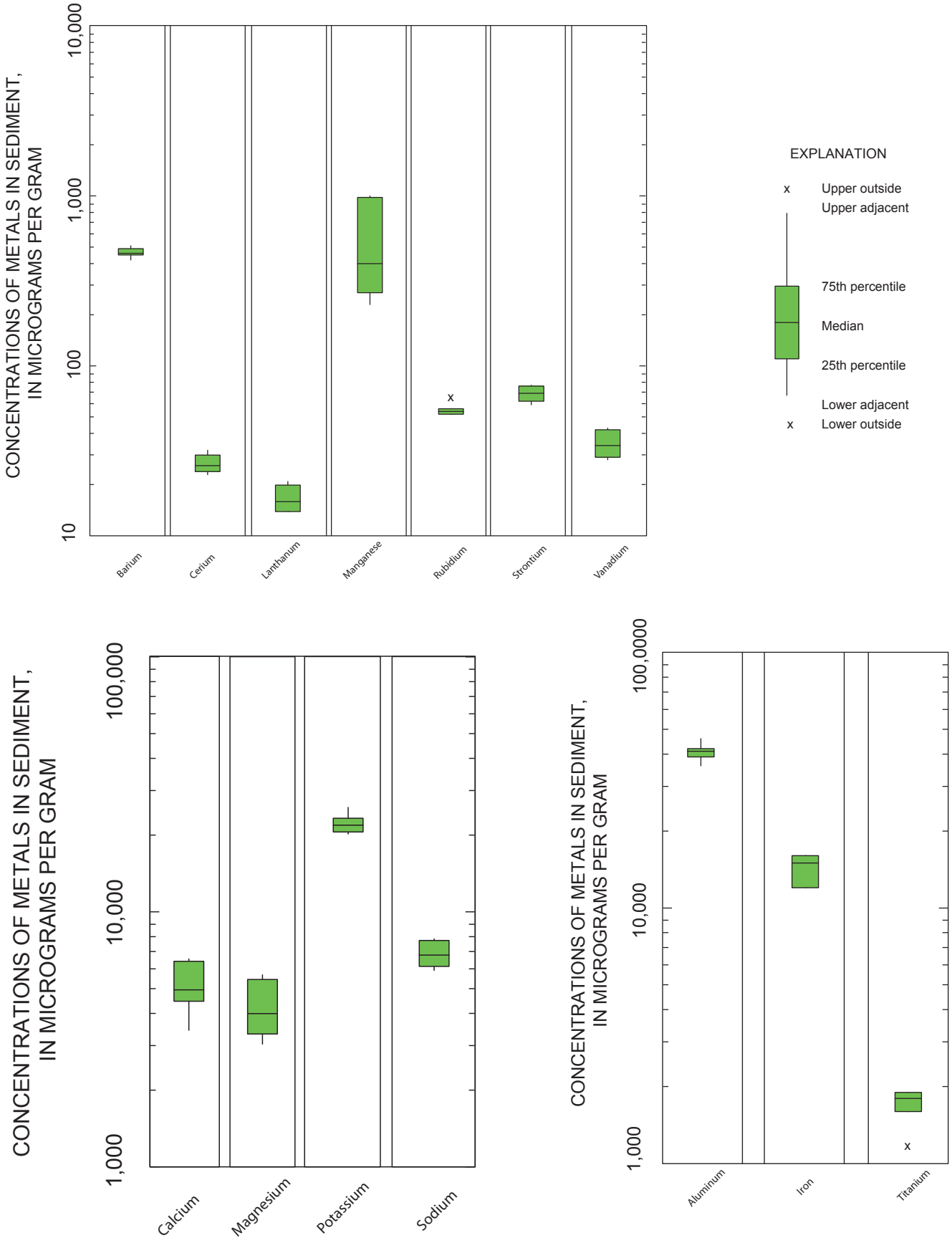


Figure 19. Concentration of metals in seven bed-sediment quality samples, Silver River Watershed, Michigan, 2005-08.—Continued

Comparison to Sediment-Quality Guidelines

Sediment-quality guidelines often are built around concerns about specific groups of contaminants such as organochlorine insecticides, industrial organochlorine compounds such as polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs). Chemical analyses for this study focused on determining the concentrations for a full suite of metals, for which sediment-quality guidelines have been developed for only a small, select group of metals in sediments collected from freshwater streams and lakes.

MacDonald and others (2000) developed two criteria for bed sediment in freshwater environments: the threshold-effect concentration (TEC), which represents the concentration above which adverse effects on biota are expected, and the probable-effect concentration (PEC), which defines the concentration above which adverse effects on biota are expected to occur frequently. These criteria were developed through a consensus-based analysis of six other numerical sediment-quality guidelines. Metals for which TECs and PECs have been defined are arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc (table 11). All samples were below their corresponding TECs, although concentrations of arsenic and chromium approached their respective TECs (appendix 2 and fig. 20).

Table 11. Consensus-based sediment-quality guidelines for freshwater ecosystems (MacDonald and others, 2000).

[TEC, threshold effect concentration; µg/g, micrograms per gram; PEC, probable effect concentration]

Constituent	TEC, in µg/g	PEC, in µg/g
Arsenic	9.79	33
Cadmium	.99	4.98
Chromium	43.4	111
Copper	31.6	149
Lead	35.8	128
Mercury	.18	1.06
Nickel	22.7	48.6
Zinc	121	459

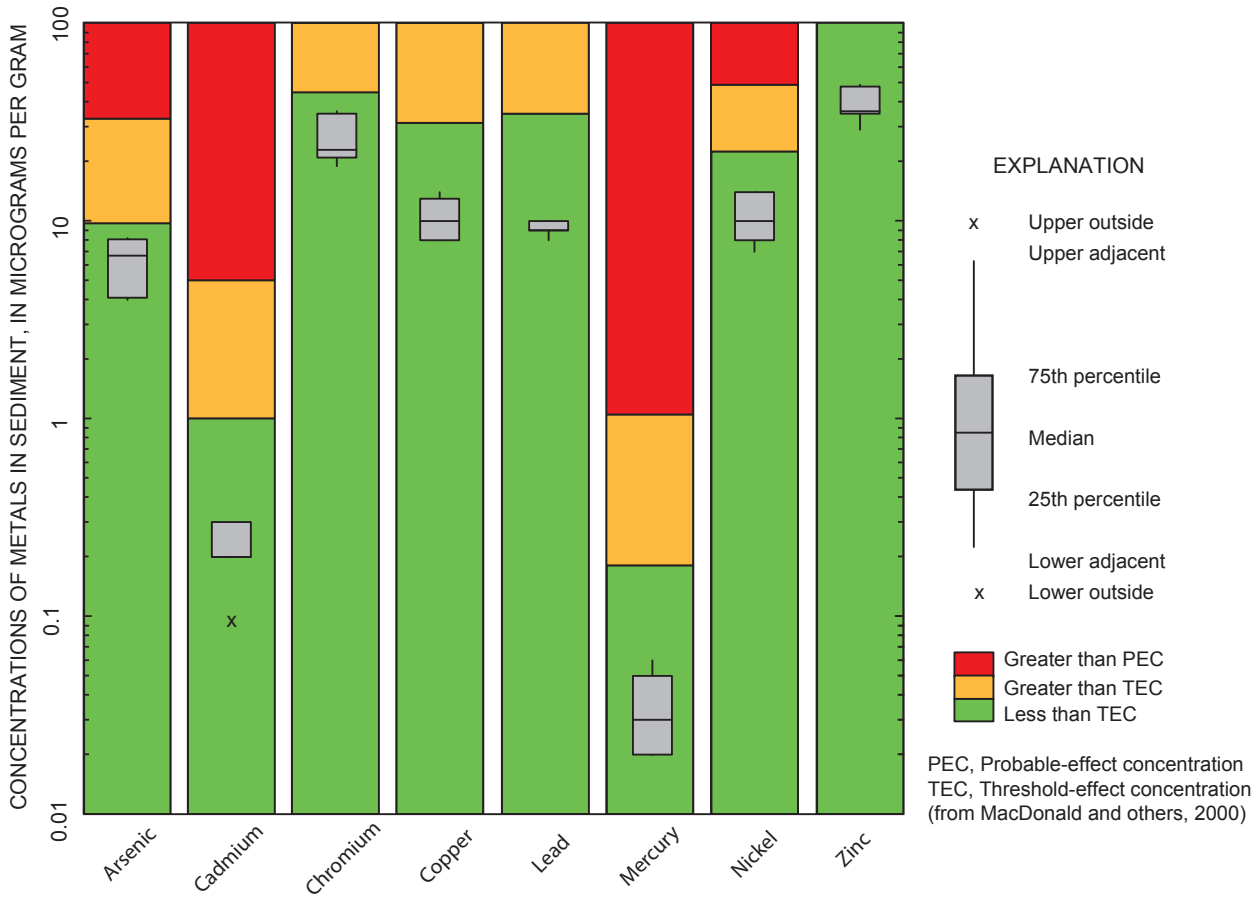


Figure 20. Concentration of metals in seven bed-sediment samples compared to sediment-quality guidelines, Silver River Watershed, Michigan, 2005-08

Grain-Size Distribution

Analysis of grain-size distribution over time provides an important measure of physical changes within a watershed. Erosion and mass wasting, both natural and anthropogenic, can result in considerable changes in grain-size distribution within a watershed. This can occur gradually or catastrophically, depending upon the sediment source(s) being introduced into the stream.

Results of the grain-size distribution of bed sediments are shown in table 12. The silt and clay-size fraction (all sediments <0.063 mm) composed about 20 percent or less of the analyzed sediments in all of the streams and less than 7 percent in three streams (upper and lower Gomanche Creek (04043135 and 04043140, respectively) and East Branch Tributary to Gomanche Creek (04043137)). All sites except Dakota Creek (04043146) and Silver River near L'Anse (04043150) had visual accumulation (VA)-tube fractions (grain size 0.063 to 1.0 mm) ranging from about 71 to 87 percent. The laboratory noted that not enough sample material was available for either of those sites and the VA tube was not used. It is noteworthy that all the streams have 20 percent or less silt/clay-sized materials, demonstrative of the high gradient typical throughout the watershed, which rapidly washes any fine-grained sediment out of the system.

Ecological Investigation

An ecological investigation of the Silver River sites that complements other parts of this study was conducted during August–September 2008. The investigation was completed using a modified version of the MDEQ GLEAS procedure 51, which is a qualitative-biological and habitat-survey protocol for wadeable streams that has been employed extensively in Michigan for several years (Michigan Department of Environmental Quality, 2007). The GLEAS 51 protocol consists of separate qualitative evaluations of the fish community, the macroinvertebrate community, and the habitat quality, completed in that order to minimize disruption of the sampled communities. The study team and KBIC Natural Resources Department chose the GLEAS 51 procedure for ease of application and comparison with other streams throughout the Upper Peninsula previously surveyed by the MDEQ. In the GLEAS 51 procedure, each survey station is described by up to three numbers or metrics; one each for the fish, macroinvertebrates, and habitat. An excellent-quality stream for the ecoregion would have the most metrics performing like an excellent site, while a poor-quality stream would have substantially different metrics. Use of metrics creates a uniform and systematic evaluation for each site with the result expressed as a single numerical value that easily is comparable to other sites. For this study, the habitat-assessment part of the GLEAS 51 procedure was not completed owing to budget constraints, as well as to the unaltered, inaccessible condition of most of the watershed.

Fishes

Much of the Silver River Watershed primarily is a coldwater fishery, with one or more species of salmonids present at several of the sampling sites. The GLEAS 51 protocol for coldwater fisheries is much simpler than for warm-water fisheries. Target streams are evaluated for the presence of at least 50 fish and the relative abundance of anomalies and salmonids collected (Michigan Department of Environmental Quality, 2007). For this study, the fish community part of the GLEAS 51 procedure was modified, targeting a single intolerant fish species (brook trout) as described in the next paragraph, although all shocked fish in each sampling reach were measured and identified. After a thorough reconnaissance of all eight water-quality sampling sites, the USGS and KBIC elected to sample reaches at the following four sites: upstream Silver River (04043126), Gomanche Creek (04043140), Dakota Creek (04043146), and Silver River near L'Anse (04043150). A summary of fish communities collected at the four sites is shown in table 13. Additional sites downstream of Silver River at Arvon Road (04043131) and upstream and downstream of Silver River near L'Anse streamgage (04043150) also were sampled, but stream conditions at those locations were either poor (no fish habitat) or channel composition (depths; high gradients; channels composed entirely of slaty bedrock) made electrofishing difficult to impossible.

USGS and KBIC crews used a combination of backpack and barge-shocking units to conduct the survey, targeting native (not hatchery stocked) 3- to 4-year-old brook trout (*Salvelinus fontinalis*), with some success in Gomanche Creek (two fish) and Dakota Creek (three fish). Low-conductivity

Table 12. Bed-sediment grain-size distribution for selected sites in the Silver River Watershed, Michigan.

[All values are in percent of total; silt/clay is grain sizes less than 0.063 mm; visual accumulation tube is grain sizes 0.063 to 1.0 millimeter; sieve is grain sizes 1.0 to 4.0 millimeters]

	U.S. Geological Survey site number						
	4043126	4043135	4043137	4043138	4043140	4043146	4043150
Silt/clay	12.3	4.5	5.7	20.2	15.4	11.1	6.5
Visual accumulation tube	83.1	70.8	86.6	73.2	82	0	0
Sieve	4.6	24.7	7.7	6.6	2.6	88.9	93.5

Table 13. Summary of fish communities collected at sites in the Silver River Watershed, Michigan.

[USGS, U.S. Geological Survey]

USGS station number	Number of fish collected	Number of fish species collected	Number and type of Salmonid species collected	Tissues collected?
04043126	40	5	0	No
04043140	16	1	1 (brook trout)	Yes
04043135	52	4	1 (brook trout)	Yes
04043150	74	11	4 (brook trout, rainbow trout, coho salmon, pink salmon)	No

waters at all sites made the electrofishing equipment somewhat less efficient than is ideal for fish capture; however, taking into account that capture efficiency may have biased total fish counts, it was clear that fish populations at all the sites were low. Sampling at the downstream-most site on the Silver River (streamgage 04043150) produced the largest number of individuals and the most species of all the sites; however, all the brook trout captured at this site were fin clipped indicating they were hatchery-bred fish introduced by stocking. Since the residence time of hatchery fish in a stream is uncertain, and thus, exposure to any potential contaminants in the stream is unknown, no fish from this site were submitted for tissue analysis. Fish filets were processed on site (fig. 21) and analyzed for metals at Texas A&M University; results of the metal analyses are presented in table 14. Fish otoliths, which are small parts located in the head of fish that assist with hearing, accrete layers of calcium carbonate and gelatinous matrix throughout the fish's life. The accretion rate varies with growth of the fish, often less growth in winter and more in summer, which results in the appearance of rings that resemble tree rings. By counting the rings, it is possible to determine the age of the fish in years. Fish otoliths were examined by two independent laboratories. Three samples met the targeted-age criteria (3 to 4 years of age): one sample was dated 2 years of age; and one sample was destroyed while being mounted for analysis, and its age is unknown. No notable concentrations of metals were detected in any of the five fish analyzed. Presence of brook trout at all but the upstream Silver River site is an indication of good water quality in much of the watershed. Brook trout are intolerant of poor water quality, low dissolved-oxygen concentrations, and water temperatures greater than 21-23°C.

Figure 21. U.S. Geological Survey employees processing adult brook trout at Dakota Creek (site 04043146), August 26, 2008. (Photograph by T.L. Weaver, U.S. Geological Survey)

Table 14. Concentrations of trace-elements in brook-trout tissue samples taken from the Silver River Watershed, Michigan.

[ID, identification; <, less than; all concentrations in micrograms per kilogram]

Property or constituent	Concentration				
Lab number	T8060-001	T8060-002	T8060-003	T8060-004	T8060-005
Sample ID	1A	1B	2A	2B	2C
Stream name	Dakota	Dakota	Gomanche	Gomanche	Gomanche
Metals					
Silver	<0.00955	<0.00965	<0.00955	<0.00938	<0.00966
Arsenic	1.1	1.29	2.98	1.81	1.38
Boron	<.478	<.482	<.477	<.469	<.483
Barium	.124	<.096	.449	.094	<.097
Beryllium	<.0478	<.0482	<.0477	<.0469	<.0483
Calcium	497	647	657	555	612
Cadmium	<.0191	<.0193	.0204	<.0188	<.0193
Cobalt	<.0191	<.0193	<.0191	<.0188	<.0193
Chromium	.251	<.193	.192	<.188	<.193
Copper	1.74	1.53	9.82	1.86	1.74
Iron	21.8	20.7	23.4	14.6	11
Mercury	.661	.553	.451	.373	.409
Potassium	18,700	18,500	19,300	17,100	18,500
Magnesium	1,280	1,320	1,410	1,310	1,340
Manganese	.592	.656	1.11	.769	.686
Molybdenum	<.0955	<.0965	<.0955	<.0938	<.0966
MOIST-Grav	74.4	76.2	68.4	71.5	68.5
Sodium	1,110	1,100	1,260	1,150	1,010
Nickel	.131	<.0965	<.0955	<.0938	<.0966
Phosphorus	10,700	10,800	11,200	10,500	10,800
Lead	.103	.0911	.128	.0563	.0673
Sulfur	8,580	8,920	9,110	8,490	8,400
Antimony	<.0478	<.0482	<.0477	<.0469	<.0483
Selenium	1.91	1.65	2.09	2.16	1.94
Silicon	8.81	7.67	15.7	9.57	9.14
Tin	<.0955	<.0965	<.0955	<.0938	<.0966
Strontium	.306	.328	.449	.272	.299
Titanium	6.02	4.22	2.99	2.15	1.98
Thallium	<.00955	<.00965	<.00955	<.00938	<.00966
Vanadium	<.478	<.482	<.477	<.469	<.483
Zinc	35	35.6	47.8	37.5	36.6

Macroinvertebrate Sampling

Macroinvertebrates were collected from all eight sampling sites on September 16 and 17, 2008. Following the GLEAS 51 procedure, samples were collected from all available habitats using either a D-frame kick net (fig. 22) or they were hand-picked. Fixed substrates were scrubbed with a small brush to dislodge organisms, as necessary. Samples were taken from all velocity regimes within the study reach as well, with consideration given to sampling all regimes proportionally to their relative abundance. The target quantity of organisms 300 ± 60 was met or exceeded at all sites except the Silver River at Arvon Road (04043131), which primarily is composed of boulders and bedrock, with less-suitable macroinvertebrate habitat than the other sites. The macroinvertebrate samples were preserved in ethanol and brought back to USGS offices where they were examined, sorted, and classified.

Figure 23 shows a sorting tray in the field with insects and detritus prior to removal of detritus.

Scoring is simple. For streams within the northern lakes and forests category, which all parts of the Silver River Watershed fall under, the following metrics apply: poor is -9 or less, acceptable is -4, and excellent is 5 and greater. Six of the sites scored excellent, with scores of 6 or 7, while two were slightly less than excellent. The upstream Silver River at streamgage 04043126 scored 4, which is not surprising given the channel is sandy and low-gradient, vegetation is dominated by tag elders and other bushes, and no salmonids were observed during electrofishing. More surprisingly, the downstream Gomanche Creek site (streamgage 04043140), which is fairly high-gradient, wooded, harbored brook trout, and certainly appears to be better habitat than the upstream Silver River site, scored 3. Appendix 3 is a summary of the macroinvertebrate-sampling results.

Figure 22. U.S. Geological Survey employee using a D-frame kick net for macroinvertebrate sampling at Dakota Creek (site 04043146). (Photograph by D. A. Burdett, U.S. Geological Survey)

Figure 23. Macroinvertebrates and detritus in sorting tray. (Photograph by D. A. Burdett, U.S. Geological Survey)

Summary and Conclusions

The U.S. Geological Survey, in cooperation with Keweenaw Bay Indian Community, conducted a study during 2005–08 to (1) evaluate baseline hydrology and water quality, (2) conduct an ecological assessment of the Silver River Watershed, and (3) address tribal concerns. Streamflow was measured; water-quality samples were collected; and an ecological assessment was conducted at eight locations within the central and western parts of the 69-square mile Silver River Watershed. The U.S. Geological Survey and Keweenaw Bay Indian Community cooperatively operate three real-time streamgages and water-quality monitors within the watershed; two were installed as a complement to this study. Water-quality sampling was done 2 to 3 times per year, including, at a minimum, once shortly after ice-out in the spring and once during the summer baseflow period. Additional samplings during the year were coordinated by the U.S. Geological Survey and Keweenaw Bay Indian Community to encompass different runoff and streamflow scenarios, for example, immediately following a heavy summer precipitation event in 2006.

The water-quality characteristics of the streams within the Silver River Watershed are typical of many streams flowing through sparsely populated areas in the central Upper Peninsula of Michigan. Of note, seven samples had copper concentrations exceeding Michigan wildlife standards, and one sample had concentrations of cyanide that exceeded the same standards. Concentrations of total mercury at all eight sampling sites, from a low-flow sampling in 2008, exceeded the Great Lakes Basin water-quality standards, but the ratio of methylmercury to total mercury was similar to the 5 to 10 percent typical in most natural waters. Concentrations of arsenic and chromium in bed sediments were near the threshold-effect concentration. An ecological assessment analyzing fish and macroinvertebrate communities, by use of a modified version of the Michigan Department of Environmental Quality Great Lakes Environmental Assessment Section 51procedure, was conducted in 2008. Numbers of intolerant, coldwater salmonids were noted at all but one sampling site, and six of the eight sites scored excellent for their macroinvertebrate communities (the remaining two sites scored slightly less than excellent).

Additional water-quality data were collected by the U.S. Geological Survey and Keweenaw Bay Indian Community during 2009, and all three real-time streamflow-gaging and water-quality monitoring sites continue to operate. This report will aid in an ongoing monitoring effort designed to protect the water resources of the Silver River Watershed.

Acknowledgments

Special thanks are extended to the staff at KBIC, including previous and current water-quality specialists, Marc Slis and Micah Petosky, respectively, for their assistance in the preparation and review of the QAPP, help in establishing sampling sites, and assistance throughout the project. Todd Warner, Director, KBIC Natural Resources is thanked for his oversight of the project since inception. Dean Burdett, Matt Holmio, Steve Horton, and John Knudsen, USGS Michigan Water Science Center, Escanaba Field Office; Rick Jodoin and Lori Fuller, USGS Michigan Water Science Center; and Amanda Bell and Barb Scudder, USGS Wisconsin Water Science Center are thanked for their assistance to the authors with many aspects of report preparation.

References Cited

Cannon, W.F., and Ottke, Doug, 1999, Preliminary digital geologic map of the Penokean (early Proterozoic) continental margin in northern Michigan and Wisconsin: U.S. Geological Survey Open-File Report 99–547, 1 CD-ROM, accessed October 20, 2009, at *http://pubs.usgs.gov/of/1999/of99-547/*.

Carter, R.W., and Davidian, Jacob, 1968, General procedure for gaging streams: U.S. Geological Survey Techniques of Water-Resources Investigations, book 3, chap. A6, 13 p., accessed October 20, 2009, at *http://pubs.usgs.gov/twri/twri3-A6/*.

Doonan, C.J., and Byerlay, J.R., 1973, Ground water and geology of Baraga County, Michigan: State of Michigan Geological Survey Water Investigation 11, 26 p.

Farrand, W.R., and Bell, D.L., 1982, Quaternary geology of northern Michigan: Ann Arbor, Mich., University of Michigan, Department of Geological Sciences, scale 1:500,000.

France, G.M., Bendall, K.A., and Lefevre, M.L., comps 2005, Groundwater flow model of the Silver River Watershed, Keweenaw Bay Indian Community, Baraga County, Michigan: [Houghton, Mich.] Michigan Technological University, Aqua Terra Tech, 8 p.

Haack, S.K., and Duris, J.W., 2008, Chemical and microbiological water quality of subsurface agricultural drains during a field trial of liquid dairy manure effluent application rate and varying tillage practices, Upper Tiffin Watershed, southeastern Michigan: U.S. Geological Survey Open-File Report 2008–1189, 38 p., accessed October 20, 2009, at *http://pubs.usgs.gov/of/2008/1189/*.

Helsel, D.R., 2005a, Nondetects and data analysis—Statistics for censored environmental data: Hoboken, N.J., Wiley, 250 p.

Helsel, D.R., 2005b, Insider censoring—Distortion of data with nondetects: Human and Ecological Risk Assessment, v. 11, p. 1127–1137.

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, accessed May 27, 2009, at *http://pubs.usgs.gov/twri/twri4a3/*.

Hem, J.D., 1985, Study and interpretation of the chemical characteristics of natural water (3d ed.): U.S. Geological Survey Water-Supply Paper 2254, 264 p.

Illinois State Geological Survey, 2009, Timetable of Quaternary glacial and interglacial events, accessed on November 23, 2009, at *http://www.isgs.uiuc.edu/research/glacial-geology/timetable.shtml.*

Krabbenhoft, D.P., and Rickert, D.A., 1995, Mercury contamination of aquatic ecosystems: U.S. Geological Survey Fact Sheet 216–95, 4 p., accessed October 20, 2009, at *http://pubs.usgs.gov/fs/1995/fs216-95/*.

Leverett, Frank, 1929, Moraines and shore lines of the Lake Superior Region: U.S. Geological Survey Professional Paper 154–A, 72 p.

MacDonald, D.D., Ingersoll, C.G., and Berger, T.A., 2000, Development and evaluation of consensus-based sediment-quality guidelines for freshwater ecosystems: Archives of Environmental Contamination and Toxicology, v. 39, p. 20–31.

Michigan Department of Environmental Quality, 2006a, Part 4—Water quality standards: Lansing, Mich., Michigan Department of Environmental Quality, Water Bureau, Water Resources Protection, 62 p., accessed May 27, 2009, at *http://www.michigan.gov/documents/deq/wb-swas-rules-part4_254149_7.pdf*

Michigan Department of Environmental Quality, 2006b, Rule 57—Water quality values: Lansing, Mich., Michigan Department of Environmental Quality, Surface Water Assessment Section, accessed May 27, 2009, at *http://www.michigan.gov/deq/0,1607,7-135-3313_3686_3728-11383--,00.html*

Michigan Department of Environmental Quality, 2007, Qualitative biological and habitat survey protocols for wadeable streams and rivers (May 2007 rev.): Lansing, Mich., Michigan Department of Environmental Quality, Surface Water Quality Division, Great Lakes Environmental Assessment Section Procedure Number 51, 51 p.

Michigan Department of Environmental Quality, 2008, Rule 57—Water quality values, accessed July 9, 2008, at *http://www.michigan.gov/documents/deq/wb-swas-rule57_210455_7.xls*

Michigan Department of Natural Resources, Forest, Mineral and Fire Management Division, 2003, IFMAP/GAP Upper Peninsula Land Cover.

Moulton, S.R., II, Kennen, J.G., Goldstein, R.M., and Hambrook, J.A., 2002, Revised protocols for sampling algal, invertebrate, and fish communities as part of the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 02–150, 75 p., accessed October 21, 2009, at *http://pubs.usgs.gov/of/2002/ofr-02-150/*.

National Climatic Data Center, 2002, Monthly station normals of temperature, precipitation, and heating and cooling degree days, 1971–1996: Asheville, N.C., National Climatic Data Center.

National Climatic Data Center, 2008, Monthly station normals of temperature, precipitation, and heating and cooling degree days, 2005–08: Asheville, N.C., National Climatic Data Center.

Oblinger-Childress, C.J., Foreman, W.T., Connor, B.F., and Maloney, T.J., 1999, New reporting procedures based on long-term method detection levels and some considerations for interpretations of water-quality data provided by the U.S. Geological Survey National Water-Quality Laboratory: U.S. Geological Survey Open-File Report 99–193, 19 p., accessed October 21, 2009, at *http://water.usgs.gov/owq/OFR_99-193/index.html*

Rantz, S.E., and others, 1982, Measurement and computation of streamflow—Volume 1, Measurement of stage and discharge: U.S. Geological Survey Water-Supply Paper 2175, 284 p., accessed October 21, 2009, at *http://pubs.usgs.gov/wsp/wsp2175/*.

Rossell, Dean, 2008, Geology of the Keweenawan BIC Intrusion, *in* Bornhorst, T.J., and Klasner, J.S., eds., Proceedings of the 54th Institute on Lake Superior Geology, Volume 54, Part 2: Field Trip Guidebook, p. 181–199.

Smith, S.M., 1997, National geochemical database—Reformatted data from the National Uranium Resource Evaluation (NURE) Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) Program (ver. 1.40): U.S. Geological Survey Open-File Report 97–492, accessed October 21, 2009, at *http://pubs.usgs.gov/of/1997/492/index.html*

Sweat, M.J., and Rheaume, S.J., 1998, Water resources of the Keweenaw Bay Indian Community, Baraga County, Michigan: U.S. Geological Survey Water-Resources Investigations Report 98–4060, 33 p.

Trahan, Melissa, Ward, Adam, Culberson, Shannon, Kreving-haus, Andrea, and LeFevre, Greg, 2005, Hydrologic model of the Silver River Watershed, Baraga County, Michigan: [Houghton, Mich.] Michigan Technological University, Aqua Terra Tech, 23 p.

U.S. Environmental Protection Agency, 1995a, Great Lakes water quality initiative technical support document for human health criteria and values: Washington, D.C., U.S. Environmental Protection Agency, Office of Water, EPA 820–B95–007.

U.S. Environmental Protection Agency, 1995b, Great Lakes water quality initiative technical support document for wild-life criteria: Washington, D.C., U.S. Environmental Protec-tion Agency, Office of Water, EPA 820–B95–009.

U.S. Environmental Protection Agency, 2001, Ambient water quality criteria recommendations—Information supporting the development of State and Tribal nutrient criteria, rivers and streams in Nutrient Ecoregion VIII: Washington, D.C., Office of Water, EPA 822–b-01–015, 142 p.

U.S. Fish and Wildlife Service, 1994, National wetlands inventory, accessed October 21, 2009, at *http://www.fws.gov/wetlands/*.

U.S. Geological Survey [variously dated], National field man-ual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1–A9, accessed October 21, 2009, at *http://water.usgs.gov/owq/FieldManual/*.

Weaver, T.L., and Fuller, L.M., 2007, Stream-water qual-ity during storm-runoff events and low-flow periods in the St. Clair River/Lake St. Clair Basin, Michigan: U.S. Geological Survey Open-File Report 2007–1201, 13 p., accessed October 21, 2009, at *http://pubs.usgs.gov/of/2007/1201/*.

Wisconsin Department of Natural Resources, 2004, Surface-water-quality standards and policy, Table 9, Sensitivity of lakes to acid rain, accessed March 18, 2010, at *http://learningstore.uwex.edu/assets/pdfs/G3582.pdf*

Appendixes

Appendix 1*A*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Silver River upstream from East Branch near L'Anse, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043126									
Sampling date		**5/12/2005**	**7/27/2005**	**4/19/2006**	**7/26/2006**	**9/12/2006**	**4/24/2007**	**7/25/2007**	**9/12/2007**	**10/31/2007**	**4/24/2008**
Record number		**501159**	**501600**	**600154**	**601531**	**602668**	**700670**	**701614**	**702328**	**800002**	**800225**
Streamflow, instantaneous	ft^3/s	18	5.1	61	6.8	3.7	140	2.8	8	22	E130
Dissolved oxygen, unfil	mg/L	12.3	9.3	11.9	8.4	10.2	10.2	7.8	10.5	10.2	11.4
pH, unfil	standard units	7.7	8.2	6.8	7.4	7.8	7	7.8	7.9	7.3	6.8
Specific conductance	µs/cm	60	116	34	125	144	25	144	132	54	23
Water temperature	ºC	5.4	17	8.6	20.9	11.8	7.3	23.3	10.4	7.5	6
Hardness, water, fil	mg/L	33	60	15	59	70	12	71	68	28	10
Calcium, water, fil	mg/L	9.63	18	4.41	17.5	20.6	3.54	20.8	19.7	8.23	2.96
Magnesium, water, fil	mg/L	2.12	3.64	.974	3.78	4.38	.78	4.59	4.49	1.89	.659
Potassium, water, fil	mg/L	.37	.67	.32	.66	.58	.33	.7	.68	.4	.36
Sodium, water, fil	mg/L	.87	1.27	.54	1.28	1.43	.5	1.51	1.42	.86	.43
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	30	59	12	55	70	6	68	62	20	5
Bicarbonate, water, fil, incremental titration	mg/L	36	71	15	66	84	7	82	75	24	6
Chloride, water, fil	mg/L	.2	.27	<.20	.26	.32	.15	.29	.39	.33	.29
Fluoride, water, fil	mg/L	<.10	E.05	<.10	E.05	E.06	<.10	E.06	E.07	<.12	<.12
Silica, water, fil	mg/L	5.05	7.31	3.92	8.5	8.14	3.68	7.95	8.5	6.28	4.11
Sulfate, water, fil	mg/L	2.32	3.44	2.38	3.85	4.02	2.25	3.74	5.58	3.23	2.26
Residue on evaporation, dried at 105oC, unfil	mg/L	60	83	43	70	89	54	76	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	54	75	46	77	92	46	82	88	63	35
Residue, total nonfilterable	mg/L	<10	<10	<10	<10	<10	11	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.28	.19	.33	.17	.15	.45	.13	.18	.41	.31
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.31	.19	.32	.22	E.06	.45	.16	.17	.41	.41
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	E.007	E.006	<.020	<.020	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	E.04	E.03	<.06	.09	<.06	E.03	E.04	E.04	.04	.13
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.001	<.002	<.002	<.002	E.002	E.002	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	<.006	E.004	<.006	E.004	E.005	<.006	E.004
Phosphorus, water, fil	mg/L	.006	.005	.007	.006	E.003	E.005	E.004	E.004	.007	.008
Phosphorus, water, unfil	mg/L	.013	.008	.015	.012	.004	.029	.01	E.006	.012	.05

Appendix 1*A*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Silver River upstream from East Branch near L'Anse, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043126									
Sampling date		**5/12/2005**	**7/27/2005**	**4/19/2006**	**7/26/2006**	**9/12/2006**	**4/24/2007**	**7/25/2007**	**9/12/2007**	**10/31/2007**	**4/24/2008**
Record number		**501159**	**501600**	**600154**	**601531**	**602668**	**700670**	**701614**	**702328**	**800002**	**800225**
					Metals						
Aluminum, fil	µg/L	57	14.9	95	19.6	12.6	152	10.9	9	114	136
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	E.05	E.05	E.05	<.14	<.14
Arsenic, fil	µg/L	.6	1.3	.35	1.2	1.1	.37	1.7	1.2	.71	.3
Barium, fil	µg/L	8	10	7	14	15	7	12	10	9	5
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	.01	.01
Cadmium, fil	µg/L	<.04	<.04	E.02	E.03	.06	E.03	<.04	<.04	<.04	E.04
Chromium, fil	µg/L	<.8	<.8	.24	.18	.18	.27	.16	.18	.34	.27
Cobalt, water, fil	µg/L	.072	.081	.068	.05	.05	.06	.05	.04	.08	.07
Copper, water, fil	µg/L	.9	.6	4.6	9.1	22.9	5.9	.67	E.36	1.1	1.1
Iron, fil	µg/L	191	179	146	118	118	157	156	180	301	120
Lead, water, fil	µg/L	.11	.08	.22	.57	1.17	.33	E.07	<.12	.14	.17
Manganese, fil	µg/L	14.8	14.9	7.4	16.4	11	7.8	19.2	11.6	20.2	8.8
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	E.005	<.010	<.010	<.010	
Molybdenum, fil	µg/L	<.4	E.4	<.4	E.4	.4	<.1	.5	.4	E.1	<.2
Nickel, fil	µg/L	.38	.94	.67	.5	1.4	.43	.24	.31	.42	.48
Selenium, fil	µg/L	<.4	<.4	E.06	E.07	E.04	E.06	E.07	.09	.1	.09
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	1.2	.8	3.3	5.1	14.7	3.8	1.9	1.1	E1.7	4.7
Uranium (natural), fil	µg/L	.05	.1	E.03	.08	.11	E.03	.09	.1	.05	.02
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	62	77	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	3	4	--
Cyanide	mg/L	N.D.	N.D.	N.D.	N.D.	E.0030	N.D.	N.D.	N.D.	N.D.	--

Appendix 1*B*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Silver River at Arvon Road near L'Anse, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043131									
Sampling date		**5/11/2005**	**7/27/2005**	**4/20/2006**	**7/26/2006**	**9/12/2006**	**4/24/2007**	**7/25/2007**	**9/11/2007**	**10/30/2007**	**4/24/2008**
Record number		**501157**	**501597**	**600155**	**601529**	**602666**	**700668**	**701613**	**702325**	**800004**	**800223**
Streamflow, instantaneous	ft^3/s	35	8.9	E115	18	4.3	E260	3.2	9.8	41	--
Dissolved oxygen, unfil	mg/L	11.8	9.3	10.6	8.5	10.3	11.8	8.3	9.5	11.6	10.6
pH, unfil	standard units	7.8	8.1	7.7	8	7.8	7	8	8	7.5	6.9
Specific conductance	µs/cm	67	121	39	117	151	31	151	134	59	64
Water temperature	ºC	9.6	14.6	10	19.5	11.8	6.5	21	11.5	8.1	8.5
Hardness, water, fil	mg/L	34	64	19	55	75	15	73	69	29	12
Calcium, water, fil	mg/L	10.2	19.4	5.67	16.4	22.3	4.5	21.6	20.5	8.38	3.52
Magnesium, water, fil	mg/L	2.17	3.75	1.22	3.3	4.57	.989	4.66	4.43	1.9	.786
Potassium, water, fil	mg/L	.49	.64	.39	.66	.61	.39	.7	.71	.47	.44
Sodium, water, fil	mg/L	.91	1.35	.64	1.2	1.49	.57	1.58	1.47	.89	.47
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	30	61	14	50	73	10	71	61	20	7
Bicarbonate, water, fil, incremental titration	mg/L	37	74	17	60	89	12	85	74	25	9
Chloride, water, fil	mg/L	.21	.41	E.11	.58	.49	.22	.49	.6	.35	.29
Fluoride, water, fil	mg/L	<.10	<.10	<.10	<.10	<.10	<.10	<.10	E.06	<.12	<.12
Silica, water, fil	mg/L	4.65	6.82	3.66	6.59	7.74	3.81	6.84	7.6	6.33	4.3
Sulfate, water, fil	mg/L	2.18	2.88	2.47	3.38	3.57	2.48	3.63	7.11	3.28	2.42
Residue on evaporation, dried at 105oC, unfil	mg/L	52	87	49	90	99	53	78	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	58	82	42	75	101	50	90	101	68	41
Residue, total nonfilterable	mg/L	<10	11	<10	12	<10	17	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.29	.17	.29	.23	.13	.42	.14	.26	.37	.33
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.29	.21	.32	.52	.12	.41	.17	.3	.37	.39
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	E.007	E.006	<.020	<.020	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	<.06	<.06	<.06	E.05	<.06	E.04	<.06	<.06	E.02	.13
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.002	<.002	<.002	<.002	E.002	E.002	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	<.006	E.005	<.006	E.005	E.005	E.003	E.005
Phosphorus, water, fil	mg/L	.006	.004	.007	.008	E.004	E.005	E.004	E.004	E.006	.008
Phosphorus, water, unfil	mg/L	.011	.009	.01	.045	E.004	.028	E.008	E.008	.01	.035

Appendix 1*B*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Silver River at Arvon Road near L'Anse, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043131									
Sampling date		**5/11/2005**	**7/27/2005**	**4/20/2006**	**7/26/2006**	**9/12/2006**	**4/24/2007**	**7/25/2007**	**9/11/2007**	**10/30/2007**	**4/24/2008**
Record number		**501157**	**501597**	**600155**	**601529**	**602666**	**700668**	**701613**	**702325**	**800004**	**800223**
					Metals						
Aluminum, fil	µg/L	37.3	9.6	73.9	15.4	4.4	117	6	8.3	93.7	109
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	E.13	.07	E.05	E.05	<.14	E.08
Arsenic, fil	µg/L	.5	.9	.36	.85	.86	.36	1.1	.97	.56	.31
Barium, fil	µg/L	7	10	6	12	12	6	12	10	7	6
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	.01	.01
Cadmium, fil	µg/L	E.03	<.04	E.03	E.03	<.04	E.03	<.04	<.04	E.02	E.03
Chromium, fil	µg/L	<.8	<.8	.2	.15	.12	.26	.13	.13	.29	.25
Cobalt, water, fil	µg/L	.054	.068	.061	E.03	.07	.06	E.03	E.04	.06	.06
Copper, water, fil	µg/L	.8	.5	2.1	6.8	3.8	4.5	.65	.42	E.89	8.1
Iron, fil	µg/L	151	103	132	83	91	145	56	138	243	115
Lead, water, fil	µg/L	E.06	<.08	.12	.23	.15	.2	E.06	<.12	.11	.26
Manganese, fil	µg/L	6.9	2.3	5.9	7.4	2.6	5.7	3.7	3	12.4	6
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010
Molybdenum, fil	µg/L	<.4	E.4	<.4	E.3	.4	<.1	.5	.4	E.1	<.2
Nickel, fil	µg/L	.34	.94	.66	.52	.24	.43	.24	.28	.34	.45
Selenium, fil	µg/L	<.4	<.4	E.06	.08	E.05	.09	E.05	.08	.09	.08
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	1	E.4	2.5	3.8	1.6	3.7	1.2	1.5	2.2	4.3
Uranium (natural), fil	µg/L	E.04	.09	E.03	.06	.14	E.03	.09	.09	.04	02
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	75	85	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	1	6	--
Cyanide	mg/L	N.D.	E.0026	N.D.	N.D.	E.0036	E.0029	N.D.	N.D.	N.D.	--

Appendix 1*C*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, upper Gomanche Creek at Indian Road near Herman, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043135									
Sampling date		**5/10/2005**	**7/26/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501152**	**501595**	**600148**	**601525**	**602662**	**700664**	**701609**	**702321**	**800006**	**800218**
Streamflow, instantaneous	ft^3/s	0.77	0.19	1.2	0.76	0.08	3.6	E.05	0.25	0.48	7.3
Dissolved oxygen, unfil	mg/L	9.1	8.6	11.2	8.3	11.3	10.2	7.2	8.9	9.8	10.8
pH, unfil	standard units	7.5	7.7	8.4	7.9	8.5	7.3	7	7.7	7.4	6.9
Specific conductance	µs/cm	92	154	71	121	188	66	215	175	89	42
Water temperature	ºC	14	15.4	8.3	17.7	9.6	9.8	17.2	11	7.6	6.5
Hardness, water, fil	mg/L	48	90	35	57	91	32	92	88	44	19
Calcium, water, fil	mg/L	14.1	27.5	10.2	16.8	27.6	9.2	27.8	25.9	12.8	5.51
Magnesium, water, fil	mg/L	3.19	5.25	2.28	3.67	5.45	2.1	5.59	5.69	2.91	1.38
Potassium, water, fil	mg/L	.84	.71	.64	.71	.72	.7	.82	.66	.57	.62
Sodium, water, fil	mg/L	1.28	1.41	.95	1.36	1.8	.92	1.8	1.83	1.18	.64
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	43	89	30	54	89	26	90	55	37	13
Bicarbonate, water, fil, incremental titration	mg/L	52	107	37	66	108	32	109	67	45	16
Chloride, water, fil	mg/L	.24	E.17	.24	.2	.3	.31	.29	.31	.33	.27
Fluoride, water, fil	mg/L	<.10	E.06	E.06	<.10	E.05	<.10	<.10	E.06	<.12	<.12
Silica, water, fil	mg/L	5.51	8.11	5.26	5.66	10.2	5.07	10.5	8.41	7.51	5.63
Sulfate, water, fil	mg/L	2.07	2.02	2.94	4.62	4.23	3.17	4.34	30	5.59	2.86
Residue on evaporation, dried at 105oC, unfil	mg/L	63	112	62	73	121	63	117	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	59	116	62	71	114	67	108	123	77	49
Residue, total nonfilterable	mg/L	<10	<10	<10	<10	<10	<10	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.31	.33	.28	.37	.14	.41	.19	.3	.34	.35
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.32	.34	.31	.46	.15	.48	.19	.28	.34	.38
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	<.010	E.007	<.020	E.013	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	<.06	.11	E.03	E.04	.18	<.06	.15	E.05	<.04	.23
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	<.002	<.002	<.002	E.002	E.002	<.002	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	<.006	.006	E.003	E.006	E.004	<.006	E.004
Phosphorus, water, fil	mg/L	.006	.007	.006	.008	E.002	E.005	.008	E.004	E.005	.011
Phosphorus, water, unfil	mg/L	.012	.02	.01	.017	.006	.024	.011	.009	.009	.018

Appendix 1*C*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, upper Gomanche Creek at Indian Road near Herman, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043135									
Sampling date		**5/10/2005**	**7/26/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501152**	**501595**	**600148**	**601525**	**602662**	**700664**	**701609**	**702321**	**800006**	**800218**
					Metals						
Aluminum, fil	µg/L	27.7	11.3	34.8	13.1	4.7	59	5.7	7.1	58.8	114
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	.06	E.04	E.06	<.14	<.14
Arsenic, fil	µg/L	.7	1.4	.59	1.2	1.1	.58	1.4	1.1	.76	.37
Barium, fil	µg/L	11	13	8	12	11	9	14	16	10	7
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	E.01	E.01
Cadmium, fil	µg/L	<.04	<.04	<.04	<.04	<.04	<.04	<.04	<.04	<.04	E.03
Chromium, fil	µg/L	<.8	<.8	.21	.14	.12	.3	E.09	.12	.29	.28
Cobalt, water, fil	µg/L	.059	.106	.054	.05	.04	.05	E.02	.04	.05	.05
Copper, water, fil	µg/L	1.2	.5	2.5	1.7	.68	5.3	E.36	.58	1.4	1.5
Iron, fil	µg/L	137	108	135	192	50	120	56	77	167	86
Lead, water, fil	µg/L	E.06	<.08	.08	E.05	<.08	.25	<.12	<.12	E.06	E.04
Manganese, fil	µg/L	9.9	42.1	6.4	26.6	35.6	5.5	38.8	31.1	17	4.1
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	E.007
Molybdenum, fil	µg/L	E.3	.7	E.2	E.3	.5	.2	.6	.4	.4	E.1
Nickel, fil	µg/L	.65	1.48	.94	.45	.21	.61	.18	.43	.56	.51
Selenium, fil	µg/L	<.4	<.4	E.07	E.07	.08	.09	E.04	.08	.1	.09
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	.9	.6	1.3	.93	<.60	3	.74	1.8	<1.8	E1.5
Uranium (natural), fil	µg/L	.09	.29	.06	.08	.39	.06	.41	.16	.09	.05
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	77	83	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	4	2	--
Cyanide	mg/L	N.D.	N.D.	N.D.	E.0046	N.D.	N.D.	N.D.	N.D.	N.D.	--

Appendix 1*D*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, East Branch Tributary to Gomanche Creek at Indian Road near Herman, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043137									
Sampling date		**5/10/2005**	**7/26/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501153**	**501596**	**600150**	**601527**	**602664**	**700666**	**701611**	**702322**	**800008**	**800220**
Streamflow, instantaneous	ft^3/s	0.24	0.02	0.31	0.12	0.02	1	E.02	0.03	0.14	1.1
Dissolved oxygen, unfil	mg/L	8	8.4	9	7.6	7.1	9	6.7	8.4	9.5	9.7
pH, unfil	standard units	7.4	7.9	7	7.8	7.8	6.9	6.9	7.6	7.3	7.6
Specific conductance	µs/cm	85	146	67	100	203	66	242	164	87	43
Water temperature	ºC	15.5	15.8	13.5	20.9	12	11.1	19.3	11.8	7.9	8
Hardness, water, fil	mg/L	46	86	33	49	110	34	110	84	45	21
Calcium, water, fil	mg/L	13.8	26	10.1	14.5	32.2	10.2	32.5	25.1	13.7	6.29
Magnesium, water, fil	mg/L	2.71	5.01	1.91	3.21	6.28	1.93	6.51	5.22	2.65	1.26
Potassium, water, fil	mg/L	.58	.63	.51	.27	.68	.55	.83	.65	.5	.44
Sodium, water, fil	mg/L	1.17	1.56	.93	1.07	1.85	.93	1.92	1.73	1.13	.65
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	41	83	28	45	104	25	106	63	32	15
Bicarbonate, water, fil, incremental titration	mg/L	50	101	34	55	126	31	129	76	40	19
Chloride, water, fil	mg/L	E.17	E.12	.25	<.20	.29	.42	.37	.46	.56	.28
Fluoride, water, fil	mg/L	<.10	E.06	E.08	<.10	E.05	<.10	E.08	E.07	<.12	<.12
Silica, water, fil	mg/L	3.2	8.13	4.22	4.21	13.2	4.37	13.1	9.2	7.79	4.91
Sulfate, water, fil	mg/L	1.25	1.46	2.53	2.06	2.34	3.11	2.32	19.4	5	2.6
Residue on evaporation, dried at 105oC, unfil	mg/L	68	115	61	72	191	--	166	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	75	110	64	69	133	75	142	125	99	47
Residue, total nonfilterable	mg/L	<10	<10	<10	<25	<20	14	43	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.38	.45	.41	.56	.29	.49	.29	.43	.72	.47
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.41	.44	.49	.61	.48	.58	.6	.54	.65	.45
Ammonia, water, fil	mg/L as N	<.04	E.02	<.04	.011	.021	<.020	.022	E.013	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	<.06	.1	<.06	<.06	.11	E.03	.2	E.05	E.02	.07
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.001	.002	<.002	E.002	.002	E.002	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	<.006	.01	E.003	.007	E.006	<.006	E.004
Phosphorus, water, fil	mg/L	.007	.013	.007	.01	.009	E.004	.007	.006	.008	.01
Phosphorus, water, unfil	mg/L	.016	.021	.013	.018	.065	.033	.086	.025	.013	.023

Appendix 1*D*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, East Branch Tributary to Gomanche Creek at Indian Road near Herman, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043137									
Sampling date		**5/10/2005**	**7/26/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501153**	**501596**	**600150**	**601527**	**602664**	**700666**	**701611**	**702322**	**800008**	**800220**
					Metals						
Aluminum, fil	µg/L	26.5	9.8	54.6	15.2	14	62.4	6.2	11.4	88.1	121
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	.06	<.06	E.06	<.14	<.14
Arsenic, fil	µg/L	.4	.9	.39	.75	.87	.38	67	.63	.55	.32
Barium, fil	µg/L	10	15	9	13	19	10	18	17	10	6
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	.02	.01
Cadmium, fil	µg/L	<.04	<.04	E.03	E.03	<.04	E.03	E.02	<.04	E.02	E.03
Chromium, fil	µg/L	<.8	<.8	.21	.12	.11	.27	E.08	.13	.39	.32
Cobalt, water, fil	µg/L	.064	.144	.056	.06	.1	.04	.07	.08	.05	.04
Copper, water, fil	µg/L	.6	E.3	7.8	11.1	6.6	10.2	E.26	.41	1.2	1.1
Iron, fil	µg/L	119	339	113	192	177	112	147	148	248	128
Lead, water, fil	µg/L	E.04	E.05	.29	.43	.37	.29	<.12	<.12	E.08	E.07
Manganese, fil	µg/L	15.1	126	5.9	39.1	158	5.7	152	92.2	19.7	3.1
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	E.006
Molybdenum, fil	µg/L	<.4	E.3	<.4	<.4	E.2	.1	.4	.2	E.2	E.1
Nickel, fil	µg/L	.49	1.16	1.06	.73	.38	.57	.18	.3	.57	.32
Selenium, fil	µg/L	<.4	<.4	E.06	.08	E.06	.11	<.08	E.07	.14	.08
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	1.1	.9	4	7.3	3.3	5.4	1.2	1.8	E1.5	2.3
Uranium (natural), fil	µg/L	E.02	.07	E.02	E.02	.1	E.03	.11	.05	.05	.03
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	71	75	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	2	1	--
Cyanide	mg/L	N.D.	E.0058	N.D.	N.D.	N.D.	E.0025	N.D. at 1350 N.D. at 1400	N.D.	N.D.	--

Appendix 1*E*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, West Branch Tributary to Gomanche Creek near Herman, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043138									
Sampling date		**5/11/2005**	**7/26/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501156**	**501598**	**600149**	**601526**	**602663**	**700665**	**701610**	**702324**	**800007**	**800219**
Streamflow, instantaneous	ft^3/s	0.2	0.01	0.38	0.03	0.01	1.2	E0.00	0.03	0.27	2.2
Dissolved oxygen, unfil	mg/L	10.7	8.7	10.6	7.5	9.3	10.4	7	9.4	10.2	9.9
pH, unfil	standard units	7.7	8	7.2	7.9	8.4	7.1	6.7	7.6	7.3	7.2
Specific conductance	µs/cm	74	106	60	101	110	60	141	138	74	43
Water temperature	ºC	8.1	15.1	9.2	18.2	11.2	8.6	18	11.1	8.4	9
Hardness, water, fil	mg/L	39	60	29	49	52	31	60	65	37	20
Calcium, water, fil	mg/L	11.6	18.4	8.48	15	15.7	9.25	18.2	19.5	11	5.9
Magnesium, water, fil	mg/L	2.43	3.35	1.78	2.85	3.05	1.91	3.59	3.99	2.24	1.3
Potassium, water, fil	mg/L	.52	.67	.45	.42	.58	.54	.77	.62	.37	.54
Sodium, water, fil	mg/L	1.04	1.31	.93	1.09	1.36	1.05	1.46	1.41	1.12	.71
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	35	57	23	40	51	23	60	35	25	15
Bicarbonate, water, fil, incremental titration	mg/L	43	69	28	49	62	28	72	42	30	18
Chloride, water, fil	mg/L	.2	.24	.29	E.17	.29	.56	.34	.38	.49	.41
Fluoride, water, fil	mg/L	<.10	<.10	E.06	<.10	<.10	<.10	E.05	E.05	<.12	<.12
Silica, water, fil	mg/L	6.68	9.61	6.3	7.61	10.2	6.21	11.9	8.66	7.83	5.69
Sulfate, water, fil	mg/L	2.13	2.68	3.39	5.72	3.12	3.42	3.1	29.4	5.25	2.77
Residue on evaporation, dried at 105oC, unfil	mg/L	62	82	51	75	74	72	112	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	65	81	47	70	68	77	73	107	68	53
Residue, total nonfilterable	mg/L	<10	<10	<10	<11	<20	<10	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.32	.26	.33	.45	.19	.42	.2	.26	.44	.36
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.31	.26	.34	.41	.29	.46	.19	.28	.41	.38
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	E.009	E.007	<.020	024	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	<.06	.11	<.06	E.03	.1	.07	.12	E.04	.47	.28
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.001	<.002	<.002	E.002	E.002	E.001	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	E.004	E.006	E.004	.009	E.005	E.003	E.004
Phosphorus, water, fil	mg/L	.004	.009	.005	.009	E.004	E.004	.009	E.004	E.006	.008
Phosphorus, water, unfil	mg/L	.009	.011	.007	.015	.01	.02	.014	E.007	.008	.018

Appendix 1*E*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, West Branch Tributary to Gomanche Creek near Herman, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043138									
Sampling date		**5/11/2005**	**7/26/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501156**	**501598**	**600149**	**601526**	**602663**	**700665**	**701610**	**702324**	**800007**	**800219**
					Metals						
Aluminum, fil	µg/L	39.5	14.8	60.7	25.1	11.8	82.1	9.7	12.4	77.5	101
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	E.05	E.04	.07	<.14	<.14
Arsenic, fil	µg/L	.3	.8	.3	.68	.67	.32	.85	.53	.42	.28
Barium, fil	µg/L	8	11	7	11	10	7	12	13	9	6
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	.01	<.01
Cadmium, fil	µg/L	<.04	<.04	E.02	<.04	<.04	E.02	<.04	<.04	<.04	E.03
Chromium, fil	µg/L	<.8	<.8	.21	.2	.22	.29	.13	.19	.3	.25
Cobalt, water, fil	µg/L	.047	.102	.051	.04	.04	.04	.05	.04	.04	.04
Copper, water, fil	µg/L	1.5	.5	6.7	3.9	5.7	2.2	.47	.81	2.6	1.5
Iron, fil	µg/L	92	121	57	70	51	69	90	52	76	55
Lead, water, fil	µg/L	E.05	<.08	.37	.14	.3	<.12	<.12	<.12	<.08	E.04
Manganese, fil	µg/L	10.3	39.8	4.2	9	13.2	3.1	35.9	15.7	7.2	1.8
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	E.006	<.010	<.010	<.010	E.008
Molybdenum, fil	µg/L	<.4	E.2	<.4	E.2	<.4	.1	.2	.2	E.2	E.1
Nickel, fil	µg/L	.34	.91	1.04	.39	.31	.36	.12	.28	.35	.31
Selenium, fil	µg/L	<.4	<.4	.09	.12	E.05	.14	<.08	.08	.15	.09
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	1.5	E.5	5.6	1.7	2.9	1.4	4.8	3.2	2.7	E1.4
Uranium (natural), fil	µg/L	E.04	.08	.04	.05	.08	.06	.06	E.04	.07	05
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	55	50	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	3	2	--
Cyanide	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	E.0025	N.D.	N.D.	--

Appendix 1*F*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Gomanche Creek at Indian Road near L'Anse, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043140									
Sampling date		**5/11/2005**	**7/27/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501155**	**501599**	**600151**	**601528**	**602665**	**700667**	**701612**	**702323**	**800005**	**800221**
Streamflow, instantaneous	ft^3/s	3.3	1.5	5.2	2.4	1	16	1.1	1.8	3.8	30
Dissolved oxygen, unfil	mg/L	12.6	10.1	14	8.9	10.6	10.4	8.4	10.1	10.3	10.6
pH, unfil	standard units	8.1	8.3	7.5	7.7	7.8	7.8	8.4	8.2	7.8	7.6
Specific conductance	µs/cm	158	228	118	192	241	101	270	229	153	64
Water temperature	ºC	8.8	12.1	12.7	18.4	11.5	6.3	19.2	10.6	8.8	8.5
Hardness, water, fil	mg/L	84	120	59	94	120	51	130	120	79	30
Calcium, water, fil	mg/L	25.6	38.2	18.1	28.6	37.8	15.6	38.7	37.5	23.9	9.08
Magnesium, water, fil	mg/L	4.84	6.71	3.45	5.49	7.04	2.96	7.35	7.24	4.7	1.86
Potassium, water, fil	mg/L	.78	.86	.69	.69	.85	.74	.79	.88	.72	.64
Sodium, water, fil	mg/L	1.33	1.69	1.12	1.45	1.72	1.11	1.71	1.65	1.43	.76
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	78	120	55	92	121	44	126	115	63	26
Bicarbonate, water, fil, incremental titration	mg/L	94	144	67	112	148	54	152	138	76	32
Chloride, water, fil	mg/L	.46	<.20	.54	.41	.55	.51	.53	.62	.6	.42
Fluoride, water, fil	mg/L	<.10	E.08	E.06	<.10	<.10	<.10	E.09	E.07	<.12	<.12
Silica, water, fil	mg/L	8.3	10.6	7.25	8.97	10.8	6.52	10.7	10.5	9.05	5.86
Sulfate, water, fil	mg/L	3.38	4.32	3.82	3.77	4.96	3.76	4.96	8.44	5.78	3.31
Residue on evaporation, dried at 105oC, unfil	mg/L	108	136	91	107	--	85	144	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	111	127	77	115	149	87	144	149	114	61
Residue, total nonfilterable	mg/L	<10	<10	11	<10	<10	12	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.2	.1	.25	.23	.11	.34	.14	.14	.31	.35
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.22	.15	.29	.28	.12	.42	.11	.14	.31	.4
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	<.010	E.007	<.020	E.010	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	.07	.15	.06	.1	.15	E.04	.16	.13	.09	.15
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.001	<.002	<.002	E.001	E.002	E.001	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	E.004	.006	E.004	.008	E.006	E.003	E.004
Phosphorus, water, fil	mg/L	.005	.005	.005	.008	<.004	E.003	E.006	E.003	E.004	.01
Phosphorus, water, unfil	mg/L	.014	.011	.011	.013	E.004	.025	.011	.008	.009	.03

Appendix 1*F*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Gomanche Creek at Indian Road near L'Anse, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043140									
Sampling date		**5/11/2005**	**7/27/2005**	**4/18/2006**	**7/25/2006**	**9/11/2006**	**4/23/2007**	**7/24/2007**	**9/11/2007**	**10/31/2007**	**4/23/2008**
Record number		**501155**	**501599**	**600151**	**601528**	**602665**	**700667**	**701612**	**702323**	**800005**	**800221**
					Metals						
Aluminum, fil	µg/L	16.6	7.9	29.2	16	6.6	34.4	8.9	6.7	23.3	84.7
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	.06	E.03	E.03	<.14	<.14
Arsenic, fil	µg/L	.7	.9	.62	1	.72	.53	1.1	.86	.76	.41
Barium, fil	µg/L	11	15	11	14	16	9	16	15	12	7
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	E.01	.01
Cadmium, fil	µg/L	<.04	<.04	E.03	<.04	E.02	<.04	<.04	<.04	<.04	.08
Chromium, fil	µg/L	<.8	<.8	.19	.16	.23	.25	.19	.19	.28	.27
Cobalt, water, fil	µg/L	.068	.099	.087	E.03	.04	.04	E.02	E.04	.05	.05
Copper, water, fil	µg/L	.9	.7	4.8	4.1	4.2	1.5	E.31	E.27	E.98	1.6
Iron, fil	µg/L	142	82	113	73	57	98	42	74	170	112
Lead, water, fil	µg/L	E.05	<.08	.14	.21	.22	<.12	<.12	<.12	E.07	E.08
Manganese, fil	µg/L	22.1	18.1	12.3	9.1	12.9	9.4	7.9	12	19.3	5.7
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010
Molybdenum, fil	µg/L	E.3	E.3	E.2	E.3	E.3	.2	.3	.3	.2	E.1
Nickel, fil	µg/L	.57	1.57	1.3	.42	.3	.34	.1	.24	.32	.37
Selenium, fil	µg/L	<.4	<.4	E.07	.09	.09	.1	<.08	.09	.1	.08
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	E.6	E.5	2.6	3.8	2.3	1.2	E.50	1.2	E1.7	2.1
Uranium (natural), fil	µg/L	.2	.4	.14	.23	.37	.07	.34	.29	.17	.05
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	75	33	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	1	1	--
Cyanide	mg/L	E.0035	N.D.	N.D.	N.D.	N.D.	N.D. at 1600 E.0032 at 1610	N.D.	E.0024	N.D.	--

Appendix 1*G*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Dakota Creek at trail crossing near L'Anse, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043146									
Sampling date		**5/12/2005**	**7/28/2005**	**4/19/2006**	**7/26/2006**	**9/12/2006**	**4/24/2007**	**7/25/2007**	**9/12/2007**	**10/30/2007**	**4/24/2008**
Record number		**501158**	**501601**	**600152**	**601530**	**602667**	**700669**	**701615**	**702327**	**800003**	**800224**
Streamflow, instantaneous	ft^3/s	6.1	0.83	11	3.4	0.57	27	0.35	1.4	9.6	55
Dissolved oxygen, unfil	mg/L	11.2	8.9	14.7	8.6	10.4	11.2	7.4	10.2	11.1	10.6
pH, unfil	standard units	7.9	7.9	7.6	7.9	8	7.9	7.3	7.8	7.3	7.4
Specific conductance	µs/cm	66	109	61	99	123	51	125	115	68	38
Water temperature	ºC	5.5	15.1	8.1	18.4	11	7.4	18.2	10.2	8.1	8.5
Hardness, water, fil	mg/L	34	56	27	48	57	24	60	57	32	18
Calcium, water, fil	mg/L	10.3	17.7	8.21	15	17.8	7.33	18.4	17.2	9.62	5.4
Magnesium, water, fil	mg/L	2.02	2.94	1.59	2.58	3.11	1.43	3.34	3.28	1.88	1.11
Potassium, water, fil	mg/L	.57	.83	.59	.91	.82	.53	.9	.9	.64	.59
Sodium, water, fil	mg/L	1.06	1.41	1	1.14	1.41	.92	1.5	1.55	1.1	.72
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	29	54	20	44	57	17	51	47	29	13
Bicarbonate, water, fil, incremental titration	mg/L	36	65	25	53	69	20	62	57	35	15
Chloride, water, fil	mg/L	.34	.4	33	.51	.62	.6	.57	.8	.55	.49
Fluoride, water, fil	mg/L	<.10	<.10	E.07	<.10	E.05	<.10	<.10	E.06	<.12	<.12
Silica, water, fil	mg/L	6.11	7.32	5.53	7.15	7.82	5.43	7.58	7.92	7.54	5.86
Sulfate, water, fil	mg/L	2.63	2.48	3.36	2.67	3.04	4.34	3.19	9.05	3.81	2.9
Residue on evaporation, dried at 105oC, unfil	mg/L	47	77	51	66	81	47	88	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	59	70	55	59	78	58	84	87	61	36
Residue, total nonfilterable	mg/L	<10	<10	<10	<10	<10	<10	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.27	.2	.34	.36	.17	.42	.15	.25	.35	.33
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.3	.23	.31	.37	.18	.38	.18	.25	.38	.36
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	<.010	<.010	<.020	<.020	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	.07	.18	.1	.1	.11	E.05	.17	E.06	.12	.1
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.002	<.002	<.002	<.002	.002	E.001	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	<.006	E.005	<.006	E.005	E.006	<.006	E.004
Phosphorus, water, fil	mg/L	.006	.005	.006	.01	.005	E.003	<.006	E.005	E.006	.008
Phosphorus, water, unfil	mg/L	.011	.012	.011	.02	.007	.012	.009	E.007	.011	.018

Appendix 1*G*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Dakota Creek at trail crossing near L'Anse, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043146									
Sampling date		**5/12/2005**	**7/28/2005**	**4/19/2006**	**7/26/2006**	**9/12/2006**	**4/24/2007**	**7/25/2007**	**9/12/2007**	**10/30/2007**	**4/24/2008**
Record number		**501158**	**501601**	**600152**	**601530**	**602667**	**700669**	**701615**	**702327**	**800003**	**800224**
					Metals						
Aluminum, fil	µg/L	30.3	9.5	48.6	17.4	12.6	81	6.7	11.8	59.2	100
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	.07	E.04	E.04	<.14	<.14
Arsenic, fil	µg/L	.4	.5	.35	.7	.36	.35	.46	.56	.42	.34
Barium, fil	µg/L	10	16	9	15	19	9	17	14	11	8
Beryllium, fil	µg/L	<.06	<.06	<.06	<.06	<.06	<.06	<.06	<.06	.01	.01
Cadmium, fil	µg/L	<.04	<.04	<.04	E.03	.06	<.04	<.04	<.04	<.04	E.02
Chromium, fil	µg/L	<.8	<.8	.26	.2	.12	.28	E.11	.17	.29	.29
Cobalt, water, fil	µg/L	.06	.081	.072	.05	.05	.05	.04	.05	.05	.05
Copper, water, fil	µg/L	1.4	.9	2.5	5.5	16.3	2.2	1.1	.83	1.4	1.8
Iron, fil	µg/L	286	287	182	416	140	152	121	304	271	129
Lead, water, fil	µg/L	.1	<.08	.09	.32	.41	E.11	<.12	<.12	E.06	E.08
Manganese, fil	µg/L	10.9	11.9	8.6	12.9	10.8	7.7	15.7	12.7	13.9	7.5
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	
Molybdenum, fil	µg/L	<.4	<.4	<.4	<.4	<.4	E.1	.2	.2	E.1	<.2
Nickel, fil	µg/L	.39	.96	.87	.53	.82	.5	.3	.46	.43	.45
Selenium, fil	µg/L	<.4	<.4	E.07	.1	.09	.1	E.07	.1	.11	.1
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	1	2.6	1.5	2.8	8.1	7.9	.98	.89	2.1	E1.7
Uranium (natural), fil	µg/L	.04	.06	.05	.05	.08	05	.05	.06	.06	.05
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	19	67	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	7	1	--
Cyanide	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	E.0024	N.D.	N.D.	N.D.	--

Appendix 1*H*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Silver River near L'Anse, Baraga County, Michigan.

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043150									
Sampling date		**5/11/2005**	**7/28/2005**	**4/19/2006**	**7/26/2006**	**9/13/2006**	**4/25/2007**	**7/26/2007**	**9/12/2007**	**10/30/2007**	**4/24/2008**
Record number		**501154**	**501602**	**600153**	**601532**	**602669**	**700671**	**701616**	**702326**	**800001**	**800222**
Streamflow, instantaneous	ft^3/s	61	12	137	30	11	217	6.5	16	71	625
Dissolved oxygen, unfil	mg/L	11.7	9.8	12	8.8	8.6	11.5	6.7	10.8	12.1	12.1
pH, unfil	standard units	7.9	8.2	7.5	8.1	7.9	7.2	7.8	8.3	7.5	7.2
Specific conductance	µs/cm	86	148	55	138	181	46	192	163	77	32
Water temperature	ºC	10.5	18.3	10.3	23.5	12.1	6.6	22.9	12	5.9	6
Hardness, water, fil	mg/L	45	78	24	67	89	23	91	84	38	15
Calcium, water, fil	mg/L	13.3	23.7	7.28	20.1	26.7	6.76	26.9	24.8	11.4	4.52
Magnesium, water, fil	mg/L	2.74	4.48	1.49	4.07	5.32	1.44	5.73	5.28	2.35	.97
Potassium, water, fil	mg/L	.61	.81	.48	.77	.76	.45	.9	.79	.55	.5
Sodium, water, fil	mg/L	1.26	1.74	.79	1.62	2.03	.82	2.21	1.97	1.17	.59
Alkalinity, water, fil, incremental titration	mg/L as $CaCO_3$	39	75	18	61	95	18	99	73	30	11
Bicarbonate, water, fil, incremental titration	mg/L	48	90	22	74	116	21	120	88	36	13
Chloride, water, fil	mg/L	.59	1.1	.32	1	1.4	.46	1.67	1.34	.73	.5
Fluoride, water, fil	mg/L	<.10	E.07	.11	<.10	E.07	<.10	E.07	E.07	<.12	<.12
Silica, water, fil	mg/L	5.77	7.05	4.66	7.31	8.41	4.62	7.29	7.89	7.08	4.81
Sulfate, water, fil	mg/L	2.46	3.19	2.82	3.7	3.83	3.22	3.92	8.08	4.01	2.59
Residue on evaporation, dried at 105oC, unfil	mg/L	64	100	58	84	112	56	98	--	--	--
Residue on evaporation, dried at 180oC, unfil	mg/L	65	94	45	87	111	49	117	108	76	42
Residue, total nonfilterable	mg/L	<10	<10	<10	<10	<10	<10	<10	--	--	--
Nutrients											
Ammonia plus organic nitrogen, water, fil	mg/L as N	.24	.2	.29	.2	.13	.38	.15	.18	.35	.3
Ammonia plus organic nitrogen, water, unfil	mg/L as N	.29	.18	.27	.29	E.09	.32	.23	.21	.35	.35
Ammonia, water, fil	mg/L as N	<.04	<.04	<.04	<.010	E.006	<.020	<.020	<.020	<.020	<.020
Nitrate plus nitrite, water, fil	mg/L as N	E.04	<.06	E.03	E.04	E.03	E.03	E.04	E.04	.04	.13
Nitrite, water, fil	mg/L as N	<.008	<.008	<.008	E.001	<.002	<.002	<.002	.002	E.001	E.001
Orthophosphate, water, fil	mg/L as P	<.02	<.02	<.02	<.006	.006	E.003	E.004	E.005	<.006	E.004
Phosphorus, water, fil	mg/L	.006	E.004	.006	.007	E.003	E.004	E.003	E.003	.018	.009
Phosphorus, water, unfil	mg/L	.009	.007	.012	.011	.005	.018	.011	E.005	.009	.042

Appendix 1*H*. Physical properties and concentrations of major elements, solids, nutrients, metals, suspended solids, and cyanide, Silver River near L'Anse, Baraga County, Michigan.—Continued

[ft^3/s, cubic foot per second; E, estimated value; unfil, unfiltered; mg/L, milligrams per liter; µs/cm, microseimens per centimeter; ºC, degrees Celsius; fil, filtered; $CaCO_3$, calcium carbonate; <, less than; --, no data; N, nitrogen; P, phosphorous; µg/L, micrograms per liter; mm, millimeter; N.D., analyte not detected at method detection limit]

Property or constituent		U.S. Geological Survey station 04043150									
Sampling date		**5/11/2005**	**7/28/2005**	**4/19/2006**	**7/26/2006**	**9/13/2006**	**4/25/2007**	**7/26/2007**	**9/12/2007**	**10/30/2007**	**4/24/2008**
Record number		**501154**	**501602**	**600153**	**601532**	**602669**	**700671**	**701616**	**702326**	**800001**	**800222**
					Metals						
Aluminum, fil	µg/L	32.7	7.8	72.1	12.6	4.5	87.2	3.7	5.4	69	105
Antimony, fil	µg/L	<.20	<.20	<.20	<.20	<.20	.11	E.05	E.05	<.14	<.14
Arsenic, fil	µg/L	.5	.8	.38	.77	.62	.41	.9	.74	.54	.36
Barium, fil	µg/L	12	18	8	16	20	8	24	18	10	5
Beryllium, fil	µg/L	E.05	<.06	<.06	<.06	<.06	<.06	<.06	<.06	.01	.01
Cadmium, fil	µg/L	E.02	<.04	E.02	<.04	E.02	.04	<.04	<.04	.04	.33
Chromium, fil	µg/L	E.4	<.8	.22	.13	.12	.24	E.11	.14	.28	.27
Cobalt, water, fil	µg/L	.068	.082	.064	.04	.04	.06	.05	.05	.06	.06
Copper, water, fil	µg/L	1	.6	3.1	.75	2	5.2	.69	.48	1.4	1.3
Iron, fil	µg/L	140	98	122	126	97	120	85	144	240	129
Lead, water, fil	µg/L	E.05	<.08	.11	<.08	.13	.44	<.12	<.12	.16	.1
Manganese, fil	µg/L	10.3	7.6	9.9	12.2	8.2	7.5	28.2	11	14.7	5.8
Mercury, fil	µg/L	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	<.010	
Molybdenum, fil	µg/L	E.2	E.4	<.4	E.3	E.3	.1	.4	.3	E.1	<.2
Nickel, fil	µg/L	.52	1.15	.81	.27	.43	.5	.23	.36	.49	.36
Selenium, fil	µg/L	<.4	<.4	E.06	.08	E.06	.09	E.07	.09	.1	.08
Silver, fil	µg/L	<.2	<.2	<.2	<.2	<.2	<.1	<.1	<.1	<.1	<.1
Zinc, fil	µg/L	.8	.7	2.1	1.6	2.6	15.1	.89	1.7	2.6	2
Uranium (natural), fil	µg/L	.06	.15	.05	.1	.18	.07	.15	.15	.06	.03
					Suspended sediment						
Suspended sediment, sieve diameter	Percent <0.063 mm	--	--	--	--	--	--	--	50	33	--
Suspended sediment concentration	mg/L	--	--	--	--	--	--	--	1	1	--
Cyanide	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	--

Appendix 2. Physical properties and concentrations of major elements, nutrients, and metals in bed-sediment samples, Silver River Watershed, Michigan.

[°C, degrees Celsius; mm/Hg, millimeters of mercury; µS/cm @ 25°C, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; NA, not analyzed; mg/kg, milligrams per kilogram; µg/g, micrograms per gram]

Constituent	Units	U.S. Geological Survey station identification number						
		04043126	04043135	04043137	04043138	04043140	04043146	04043150
Strontium, bed sediment, dry weight	µg/g	62	73	69	76	77	62	59
Sulfur, bed sediment, dry weight	In percent	.01	.02	.02	.03	.02	.03	.02
Thorium, bed sediment, dry weight	µg/g	4	4	5	4	4	4	4
Uranium, bed sediment, dry weight	µg/g	1.5	2.0	1.4	2.1	1.5	1.8	1.3
Vanadium, bed sediment, dry weight	µg/g	42	29	28	43	34	36	31
Yttrium, bed sediment, dry weight	µg/g	12	14	12	16	16	16	14
Zinc, bed sediment, dry weight	µg/g	48	36	36	49	35	38	29
Calcium, bed sediment, dry weight	µg/g	4,450	5,230	4,930	6,530	6,390	4,660	3,420
Potassium, bed sediment, dry weight	µg/g	20,200	23,300	20,600	21,700	21,900	25,700	22,200
Magnesium, bed sediment, dry weight	µg/g	5,650	3,920	3,310	5,420	3,980	4,010	3,020
Sodium, bed sediment, dry weight	µg/g	6,540	6,950	6,760	7,830	7,710	6,100	5,880
Carbon (inorganic plus organic), bed sediment, dry weight	Percent, by weight	.70	1.6	2.1	2.9	2.4	2.8	1.1
Bismuth, bed sediment, dry weight	µg/g	NA	.06	.06	NA	.06	.06	.06
Cerium, bed sediment, dry weight	µg/g	25	27	23	30	26	32	24
Gallium, bed sediment, dry weight	µg/g	7	7	6	8	7	7	6
Lanthanum, bed sediment, dry weight	µg/g	14	18	14	20	16	21	14
Rubidium, bed sediment, dry weight	µg/g	52	56	52	56	53	64	54
Cesium, bed sediment, dry weight	µg/g	1.3	1.2	1.2	1.6	1.2	1.6	1.1

Appendix 3*A*. Results of macroinvertebrate sampling, Silver River upstream of East Branch near L'Anse, Baraga County, Michigan.

U.S. Geological Survey station 04043126	
Taxa	**Quantity of individuals**
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Baetidae	2
Ephemerellidae	45
Heptageniidae	33
Leptophlebiidae	97
Odonata	
Anisoptera (dragonflies)	
Aeshnidae	3
Cordulegastridae	1
Zygoptera (damselflies)	
Calopterygidae	6
Plecoptera (stoneflies)	
Perlodidae	32
Pteronarcyidae	4
Megaloptera	
Corydalidae (dobson flies)	5
Trichoptera (caddisflies)	
Brachycentridae	13
Hydropsychidae	51
Limnephilidae	3
Molannidae	1
Philopotamidae	22
Coleoptera (beetles)	
Dytiscidae (total)	4
Elmidae	25
Diptera (flies)	
Athericidae	5
Chironomidae	20
Simuliidae	7
Tipulidae	7
TOTAL INDIVIDUALS	391

Appendix 3*A*. Results of macroinvertebrate sampling, Silver River upstream of East Branch near L'Anse, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043126		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	22	0
NUMBER OF MAYFLY TAXA	4	0
NUMBER OF CADDISFLY TAXA	5	0
NUMBER OF STONEFLY TAXA	2	1
PERCENT MAYFLY COMPOSITION	45.27	1
PERCENT CADDISFLY COMPOSITION	23.02	0
PERCENT DOMINANT TAXON	24.81	0
PERCENT ISOPOD, SNAIL, LEECH	1.28	1
PERCENT SURFACE AIR BREATHERS	1.02	1
TOTAL SCORE		4

Appendix 3*B*. Results of macroinvertebrate sampling, Silver River at Arvon Road near L'Anse, Baraga County, Michigan.

U.S. Geological Survey station 04043131	
Taxa	**Quantity of individuals**
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Baetidae	32
Ephemerellidae	6
Heptageniidae	24
Leptophlebiidae	28
Siphlonuridae	5
Odonata	
Anisoptera (dragonflies)	
Aeshnidae	4
Plecoptera (stoneflies)	
Pteronarcyidae	6
Taeniopterygidae	13
Megaloptera	
Corydalidae (dobson flies)	7
Trichoptera (caddisflies)	
Brachycentridae	2
Glossosomatidae	2
Helicopsychidae	7
Hydropsychidae	1
Limnephilidae	1
Philopotamidae	17
Coleoptera (beetles)	
Chrysomelidae (adults)	2
Elmidae	17
Diptera (flies)	
Athericidae	2
Ceratopogonidae	1
Chironomidae	15
Simuliidae	16
TOTAL INDIVIDUALS	209

Appendix 3*B*. Results of macroinvertebrate sampling, Silver River at Arvon Road near L'Anse, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043131		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	22	0
NUMBER OF MAYFLY TAXA	5	1
NUMBER OF CADDISFLY TAXA	6	1
NUMBER OF STONEFLY TAXA	2	1
PERCENT MAYFLY COMPOSITION	45.45	1
PERCENT CADDISFLY COMPOSITION	14.35	0
PERCENT DOMINANT TAXON	15.31	1
PERCENT ISOPOD, SNAIL, LEECH	.48	1
PERCENT SURFACE AIR BREATHERS	.96	1
TOTAL SCORE		7

Appendix 3*C*. Results of macroinvertebrate sampling, upper Gomanche Creek at Indian Road near Herman, Baraga County, Michigan.

U.S. Geological Survey station 04043135	
Taxa	**Quantity of individuals**
ANNELIDA (segmented worms)	
Hirudinea (leeches)	2
ARTHROPODA	
Crustacea	
Isopoda (sowbugs)	1
Insecta	
Ephemeroptera (mayflies)	
Baetidae	18
Caenidae	
Ephemerellidae	12
Heptageniidae	15
Leptophlebiidae	51
Odonata	
Anisoptera (dragonflies)	
Aeshnidae	1
Cordulegastridae	14
Plecoptera (stoneflies)	
Capniidae	7
Leuctridae	41
Hemiptera (true bugs)	
Gerridae	2
Megaloptera	
Corydalidae (dobson flies)	
Sialidae (alder flies)	6
Trichoptera (caddisflies)	
Hydropsychidae	8
Leptoceridae	6
Limnephilidae	6
Philopotamidae	10
Polycentropodidae	45
Coleoptera (beetles)	
Elmidae	4
Diptera (flies)	
Athericidae	1
Ceratopogonidae	17
Chironomidae	30
Simuliidae	4
Tabanidae	1
Tipulidae	13
TOTAL INDIVIDUALS	315

Appendix 3*C*. Results of macroinvertebrate sampling, upper Gomanche Creek at Indian Road near Herman, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043135		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	24	1
NUMBER OF MAYFLY TAXA	4	1
NUMBER OF CADDISFLY TAXA	5	0
NUMBER OF STONEFLY TAXA	2	1
PERCENT MAYFLY COMPOSITION	30.48	1
PERCENT CADDISFLY COMPOSITION	23.81	0
PERCENT DOMINANT TAXON	16.19	1
PERCENT ISOPOD, SNAIL, LEECH	.95	1
PERCENT SURFACE AIR BREATHERS	.63	1
TOTAL SCORE		7

Appendix 3*D*. Results of macroinvertebrate sampling, East Branch Tributary to Gomanche Creek at Indian Road near Herman, Baraga County, Michigan.

U.S. Geological Survey station 04043137	
Taxa	**Quantity of individuals**
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Ephemerellidae *Epherella*	43
Heptageniidae *Stenonema*	13
Leptophlebiidae	
Paraleptophlebia	39
Odonata	
Anisoptera (dragonflies)	
Cordulegastridae	9
Plecoptera (stoneflies)	
Leuctridae *Leuctra*	10
Hemiptera (true bugs)	
Gerridae	2
Megaloptera	
Sialidae (alder flies)	4
Trichoptera (caddisflies)	
Hydropsychidae	34
Lepidostomatidae	6
Philopotamidae	10
Rhyacophilidae	24
Coleoptera (beetles)	
Hydrophilidae (total)	1
Elmidae	3
Diptera (flies)	
Ceratopogonidae	20
Chironomidae	50
Ptychopteridae	1
Thaumaleidae	2
TOTAL INDIVIDUALS	308

Appendix 3*D*. Results of macroinvertebrate sampling, East Branch Tributary to Gomanche Creek at Indian Road near Herman, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043137		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	18	1
NUMBER OF MAYFLY TAXA	3	1
NUMBER OF CADDISFLY TAXA	4	0
NUMBER OF STONEFLY TAXA	1	1
PERCENT MAYFLY COMPOSITION	30.84	1
PERCENT CADDISFLY COMPOSITION	24.03	0
PERCENT DOMINANT TAXON	16.23	1
PERCENT ISOPOD, SNAIL, LEECH	.00	1
PERCENT SURFACE AIR BREATHERS	1.30	1
TOTAL SCORE		7

Appendix 3*E*. Results of macroinvertebrate sampling, West Branch Tributary to Gomanche Creek near Herman, Baraga County, Michigan.

U.S. Geological Survey station 04043138	
Taxa	**Quantity of individuals**
ANNELIDA (segmented worms)	
Oligochaeta (worms)	2
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Baetidae	13
Ephemerellidae	82
Leptophlebiidae	31
Odonata	
Anisoptera (dragonflies)	
Cordulegastridae	2
Plecoptera (stoneflies)	
Perlodidae	15
Hemiptera (true bugs)	
Gerridae	1
Megaloptera	
Corydalidae (dobson flies)	1
Trichoptera (caddisflies)	
Glossosomatidae	6
Hydropsychidae	23
Limnephilidae	26
Molannidae	2
Philopotamidae	8
Coleoptera (beetles)	
Chrysomelidae (adults)	2
Diptera (flies)	
Athericidae	5
Ceratopogonidae	1
Chironomidae	84
Tipulidae	7
MOLLUSCA	
Pelecypoda (bivalves)	
Unionidae (mussels)	2
TOTAL INDIVIDUALS	314

Appendix 3*E*. Results of macroinvertebrate sampling, West Branch Tributary to Gomanche Creek near Herman, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043138		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	20	1
NUMBER OF MAYFLY TAXA	3	1
NUMBER OF CADDISFLY TAXA	5	0
NUMBER OF STONEFLY TAXA	1	1
PERCENT MAYFLY COMPOSITION	40.13	1
PERCENT CADDISFLY COMPOSITION	20.70	0
PERCENT DOMINANT TAXON	26.75	0
PERCENT ISOPOD, SNAIL, LEECH	.32	1
PERCENT SURFACE AIR BREATHERS	.96	1
TOTAL SCORE		6

Appendix 3*F*. Results of macroinvertebrate sampling, Gomanche Creek at Indian Road near L'Anse, Baraga County, Michigan.

U.S. Geological Survey station 04043140	
Taxa	**Quantity of individuals**
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Baetidae *Pseudocloeon*	11
Ephemerellidae Ephemerlla	28
Heptageniidae *Stenonma*	21
Heptageniidae *Rhitrogena*	35
Leptophlebiidae *Paralephlebia*	48
Odonata	
Anisoptera (dragonflies)	
Aeshnidae	1
Cordulegastridae	3
Plecoptera (stoneflies)	
Nemouridae	23
Perlodidae	16
Pteronarcyidae *Pteronarcella*	1
Taeniopterygidae	1
Trichoptera (caddisflies)	
Brachycentridae	1
Glossosomatidae	1
Hydropsychidae	31
Polycentropodidae	4
Coleoptera (beetles)	
Elmidae	8
Diptera (flies)	
Athericidae	29
Ceratopogonidae	5
Chironomidae	11
Ephydridae	1
Simuliidae	4
Tipulidae	17
TOTAL INDIVIDUALS	300

Appendix 3*F*. Results of macroinvertebrate sampling, Gomanche Creek at Indian Road near L'Anse, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043140		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	22	1
NUMBER OF MAYFLY TAXA	5	1
NUMBER OF CADDISFLY TAXA	4	0
NUMBER OF STONEFLY TAXA	4	0
PERCENT MAYFLY COMPOSITION	47.67	0
PERCENT CADDISFLY COMPOSITION	12.33	0
PERCENT DOMINANT TAXON	16.00	0
PERCENT ISOPOD, SNAIL, LEECH	.00	1
PERCENT SURFACE AIR BREATHERS	.00	0
TOTAL SCORE		3

Appendix 3*G*. Results of macroinvertebrate sampling, Dakota Creek at trail crossing near L'Anse, Baraga County, Michigan.

U.S. Geological Survey station 04043146	
Taxa	**Quantity of individuals**
ANNELIDA (segmented worms)	
Hirudinea (leeches)	2
Oligochaeta (worms)	2
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Baetidae	3
Ephemerellidae	9
Heptageniidae	32
Leptophlebiidae	51
Odonata	
Anisoptera (dragonflies)	
Cordulegastridae	4
Gomphidae	2
Plecoptera (stoneflies)	
Peltoperlidae	23
Perlidae	13
Pteronarcyidae	1
Hemiptera (true bugs)	
Gerridae	1
Megaloptera	
Corydalidae (dobson flies)	8
Sialidae (alder flies)	3
Trichoptera (caddisflies)	
Hydropsychidae	31
Lepidostomatidae	1
Limnephilidae	6
Philopotamidae	44
Coleoptera (beetles)	
Elmidae	13
Diptera (flies)	
Athericidae	19
Ceratopogonidae	5
Chironomidae	24
Simuliidae	3
Tipulidae	21
MOLLUSCA	
Pelecypoda (bivalves)	
Unionidae (mussels)	1
TOTAL INDIVIDUALS	324

Appendix 3*G*. Results of macroinvertebrate sampling, Dakota Creek at trail crossing near L'Anse, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043146		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	26	1
NUMBER OF MAYFLY TAXA	4	1
NUMBER OF CADDISFLY TAXA	4	0
NUMBER OF STONEFLY TAXA	3	1
PERCENT MAYFLY COMPOSITION	29.32	1
PERCENT CADDISFLY COMPOSITION	25.31	0
PERCENT DOMINANT TAXON	15.74	1
PERCENT ISOPOD, SNAIL, LEECH	1.23	1
PERCENT SURFACE AIR BREATHERS	.31	1
TOTAL SCORE		7

Appendix 3*H*. Results of macroinvertebrate sampling, Silver River near L'Anse, Baraga County, Michigan.

U.S. Geological Survey station 04043150	
Taxa	**Quantity of individuals**
PORIFERA (sponges)	1
ANNELIDA (segmented worms)	
Oligochaeta (worms)	3
ARTHROPODA	
Insecta	
Ephemeroptera (mayflies)	
Baetiscidae	2
Baetidae	9
Ephemerellidae	11
Heptageniidae	77
Leptophlebiidae	37
Odonata	
Anisoptera (dragonflies)	
Cordulegastridae	1
Gomphidae	5
Zygoptera (damselflies)	
Calopterygidae	1
Plecoptera (stoneflies)	
Perlidae	9
Perlodidae	9
Megaloptera	
Corydalidae (dobson flies)	10
Trichoptera (caddisflies)	
Brachycentridae	6
Helicopsychidae	10
Hydropsychidae	86
Lepidostomatidae	4
Limnephilidae	5
Philopotamidae	13
Coleoptera (beetles)	
Elmidae	44
Diptera (flies)	
Athericidae	7
Ceratopogonidae	4
Chironomidae	18
Culicidae	1
Simuliidae	1
Tipulidae	13
TOTAL INDIVIDUALS	388

Appendix 3*H*. Results of macroinvertebrate sampling, Silver River near L'Anse, Baraga County, Michigan. —Continued

U.S. Geological Survey station 04043150		
Metric	**Value**	**Score**
TOTAL NUMBER OF TAXA	27	0
NUMBER OF MAYFLY TAXA	5	1
NUMBER OF CADDISFLY TAXA	6	1
NUMBER OF STONEFLY TAXA	2	1
PERCENT MAYFLY COMPOSITION	35.05	1
PERCENT CADDISFLY COMPOSITION	31.96	1
PERCENT DOMINANT TAXON	22.16	0
PERCENT ISOPOD, SNAIL, LEECH	.26	1
PERCENT SURFACE AIR BREATHERS	.26	1
TOTAL SCORE		7

APPENDIX S:

Wetlands, Wildlife and Wild Rice Information

Keweenaw Bay Indian Community Wildlife Corridor Map

Lake Superior
Keweenaw Bay

Huron Bay

41

38

Village of Baraga

Village of L'Anse

Local Rd
Highway
Wildlife Cooridor
KBIC Reservation Boundary
Village Boundary

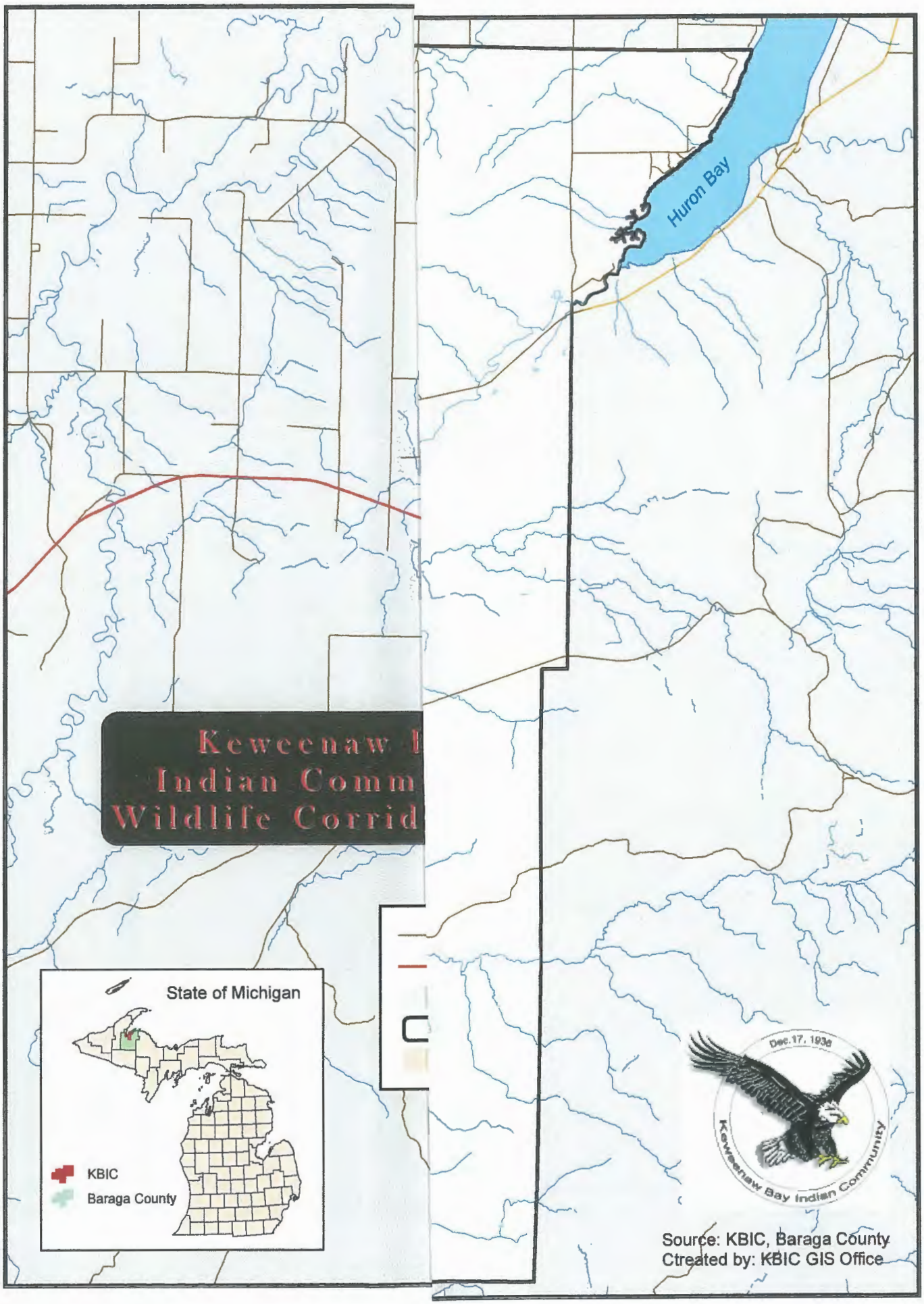
0 0.5 1 2
Miles

State of Michigan

KBIC
Baraga County

Dec.17, 1936
Keweenaw Bay Indian Community

Source: KBIC, Baraga County
Created by: KBIC GIS Office


Huron Bay
Keweenaw
Indian Comm
Wildlife Corrid
State of Michigan
KBIC
Baraga County
Dec. 17, 1936
Keweenaw Bay Indian Community
Source: KBIC, Baraga County
Created by: KBIC GIS Office

Wetlands

Common Name	Scientific Name
Wolf	*Canis lupus*
Coyote	*Canus latrans*
Red Fox	*Vulpes vulpes*
Gray Fox	*Urocyon cinereoargenteus*
Domestic Dog	*Canis familiaris*
Bobcat	*Lynx rufus*
Otter	*Lutra canadensis*
Skunk	*Mephitis mephitis*
Fisher	*Martes pennanti*
Marten	*Martes americana*
Mink	*Mustela vison*
Weasel	*Mustela spp.*
Badger	*Taxidea taxus*
Beaver	*Castor canadensis*
Muskrat	*Ondatra zibethicus*
Porcupine	*Erethizon dorsatum*
Red Squirrel	*Tamisasciurus hudsonicus*
Chipmunk	*Tamius striatus*
Flying Squirrel	*Glaucomys spp.*
Snowshoe hare	*Lepus americanus*
Raccoon	*Procyon lotor*
White-tailed deer (adult and fawn)	*Odocoileus virginianus*
Moose	*Alces alces*
Bear (mature, immature, cub)	*Ursus americanus*

Birds

Common name	Scientific Name
Alder Flycatcher	*Empidonax alnorum*
American Bittern	*Botaurus lentiginosus*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
American Tree Sparrow	*Spizella arborea*
Bald Eagle	*Haliaeetus leucocephalus*
Barred Owl	*Strix varia*
Bay Breasted Warbler	*Dendroica castanea*
Blackburnian Warbler	*Dendroica fusca*
Black-Throated Blue Warbler	*Dendroica caerulescens*
Black-Throated Green Warbler	*Dendroica virens*
Black-and-White Warbler	*Mniotilta varia*
Blue Jay	*Cyanocitta cristata*
Brewers Blackbird	*Euphagus cyanocephalus*
Broadwinged Hawk	*Buteo platypterus*
Brown Creeper	*Certhia americana*
Brown Headed Cowbird	*Molothrus ater*
Bufflehead	*Bucephala albeoia*
Canada Warbler	*Wilsonia canadensis*
Canada Goose	*Branta canadensis*
Cape May Warbler	*Dendroica tigrina*
Gray Catbird	*Dumetella carolinensis*
Cedar Waxwing	*Bombycilla cedrorum*
Cerulean Warbler	*Dendroica cerulea*
Chestnut-Sided Warbler	*Dendroica pensylvanica*
Chickadee, Black capped	*Poecile atricapillus*
Chipping Sparrow	*Spizella passerina*
Common Merganser	*Mergus merganser*
Common Yellowthroat	*Geothlypis trichas*
Connecticut Warbler	*Oporornis agilis*
Crow, American	*Corvus brachyrhnchos*
Dark-eyed Junco	*Junco hyemalis*
Downy Woodpecker	*Picoides pubescens*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Phoebe	*Sayornis phoebe*
Eastern Wood Peewee	*Contopus virens*
Golden-Crowned Kinglet	*Regulus satrapa*
American Goldfinch	*Spinus tristis*
Golden Winged Warbler	*Vermivora chrysoptera*
Grackle, Common	*Quiscalus quiscula*
Gray Cheeked Thrush	*Catharus minimus*
Great Gray Owl	*Strix nebulosa*

Green Heron	*Butorides virescens*
Great Horned Owl	*Bubo virginianus*
Great Blue Heron	*Ardea herodias*
Greater Yellow Legs	*Tringa melanoleuca*
Great Crested Flycatcher	*Myriarchus crinitus*
Hairy Woodpecker	*Picoides villosus*
Hermit Thrush	*Catharus guttatus*
Herring Gull	*Larus argentatus*
Hooded Merganser	*Lophodytes cucullatus*
Humming bird, Ruby Throated	*Archilochus colubris*
Indigo Bunting	*Passerina cyanea*
Killdeer	*Charadrius vociferus*
Belted Kingfisher	*Ceryle alcyon*
Least Bittern	*Ixobrychus exilis*
Least Flycatcher	*Empidonax minimus*
Le Contes Sparrow	*Ammodramus leconteii*
Lincoln's Sparrow	*Melospiza lincolnii*
Loon, Common	*Gavia immer*
Magnolia Warbler	*Denroica magnolia*
Mallard	*Anas platyrhynchos*
Marsh Wren	*Cistothorus palustris*
Mourning Warbler	*Oporornis philadelphia*
Mourning Dove	*Zenaida macroura*
Nashville Warbler	*Vermivora ruficapilla*
Northern Harrier	*Circus cyaneus*
Northern Parula	*Parula americana*
Northern Waterthrush	*Seiurus noveboracensis*
Northern Flicker	*Colaptes auratus*
Ovenbird	*Seiurus aurocapillus*
Palm Warbler	*Denroica palmarum*
Pilieated Woodpecker	*Dryocopus pileatus*
Pine Warbler	*Dendroica pinus*
Pine Siskin	*Spinus pinus*
Prothonatory Warbler	*Protonotaria citrea*
Purple Finch	*Carpodacus purpureus*
Raven, Common	*Corcus corax*
Red Eyed Vireo	*Vireo olivaceus*
Red-Tailed Hawk	*Buteo jamaicensis*
Red-Winged Blackbird	*Agelaius phoenicus*
Ring-billed Gull	*Larus delawarensis*
Ring-Neck Duck	*Aytha collaris*
Red-Breasted Nuthatch	*Sitta canadensis*
Rose Breasted Grosbeak	*Pheucticus ludovicianus*
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*

Ruby Crowned Kinglet	*Regulus calendula*
Ruffed Grouse	*Bonasa umbellus*
Rusty Blackbird	*Euphagus carolinus*
Sandhill Crane	*Grus canadensis*
Scarlet Tanager	*Piranga olivacea*
Sharpshinned Hawk	*Accipiter striatus*
Snipe, Common	*Gallinago gallinago*
Solitary Sandpiper	*Tringa solitaria*
Song Sparrow	*Melospiza melodia*
Sora Rail	*Porzana carolina*
Spotted Sandpiper	*Actitis macularia*
Swainson's Thrush	*Catharus ustulatus*
Swamp Sparrow	*Melospiza georgiana*
Tennessee Warbler	*Vermivora peregrina*
Tree Swallow	*Tachycineta bicolor*
Trumpeter Swan	*Cygnus buccinator*
Upland Sandpiper	*Bartramia longicauda*
Veery	*Catharus fuscescens*
Virginial Rail	*Rallus limicola*
Warbling Vireo	*Vireo gilvus*
Whip-poor-will	*Caprimulgus vociferus*
White Breasted Nuthatch	*Sitta carolinensis*
White Crowned Sparrow	*Zonotrichia albicollis*
White Throated Sparrow	*Zonotrichia leucophrys*
Wilson's Warbler	*Wilsonia pusilla*
Winter Wren	*Troglodytes troglodytes*
American Woodcock	*Scolopax minor*
Wood Duck	*Aix sponsa*
Wood Thrush	*Hylocichla mustelina*
Yellow-Rumped Warbler	*Denroica coronata*
Yellow Warbler	*Dendroica petechia*
Yellow-Bellied SapSucker	*Sphyrapicus varius*
Yellow-Throated Vireo	*Vireo flavifrons*
Yellow-Bellied Flycatcher	*Empidonax flaviventris*
Oriole, Baltimore	*Icterus galbula*
Blue-headed vireo	*Vireo solitarius*
Double-Crested Cormorant	*Phalacrocorax auritus*
Eastern Bluebird	*Sialia sialis*
European Starling	*Sturnus vulgaris*
Evening Grosbeak	*Coccothraustes vespertinus*
Gray Jay	*Perisoreus canadensis*
Hooded Warbler	*Wilsonia citrina*
House Finch	*Carpodacus mexicanus*
Northern Mockingbird	*Mimus polyglottos*

Osprey	*Pandoin haliaetus*
Pied-Billed Grebe	*Podilymbus podiceps*
Red-Bellied Woodpecker	*Melanerpes carolinus*
Redpoll, Common	*Acanthis flammea*
Turkey Vulture	*Cathartes aura*
Vesper Sparrow	*Pooecetes gramineus*
Wild Turkey	*Meleagris gallopavo*

Keweenaw Bay

Natural Resources Department

Keweenaw Bay Indian Community
Waterfowl Index Report
And Wild Rice Report

Results For 2010

By

Pamela Nankervis
Evelyn Ravindran

November 2010

Keweenaw Bay Indian Community
Natural Resources Department

14359 Pequaming Road
L'Anse, Michigan 49946

contacted and asked to remove some derelict machinery he had on tribal property. A trail was cleared from the Old U.S. 41 to the channel connecting upper and lower lakes. Floating docks on upper western lake were maintained. Permanent water quality and depth gauging stations were added to an upper and lower lake site. Also, permanent sites were made for measuring wild rice crop densities. In 2009, an additional trail was cleared ıd a series of floating docks were installed to allow access to a small island. There was also maintenance completed on the observation tower to improve steps to the upper observation deck.

Pinery Lakes has been removed as of 2009 from the waterfowl survey route due to the low water levels and lack of activity. Pinery lakes are more suitable for shorebirds as one of the two lakes became mud flats and the second lake is extremely shallow (< 12"). A family of beaver was still attempting to maintain two lodges on the property but is not expected to remain there. Also, a fire spread through the area in 2009 and burned a total of 685 acres that encompassed the survey site.

Head of the Keweenaw Bay is located between L'Anse and Baraga where KBIC owns a 25 acre parcel of wetland associated with Menge Creek (labeled as Head of Bay/Menge Creek on Figure 1). Due to the important ecological functions of the entire wetland and open water located here, surveillance of waterfowl was conducted annually from 2004 to 2010. Wild rice plantings were done annually from 2004 to 2009. Interstate highway 41 travels around the bay with a several gravel parking areas established along the edges of the wetland. Several private homes are also built along the head of the bay.

Huron Bay is located in the northeast corner of the KBIC L'Anse Indian Reservation. KBIC currently owns a 112 acre parcel of wetland. There is a network of sloughs, shallow water tributaries and deep open water ($\geq$ 6 ft) that is visited annually by hundreds of migrating waterfowl. Monitoring was initiated in 2007 to see if Huron Bay should be added as long-term surveillance point. Access and viewing stations need to be addressed to make this a more thorough survey site. Numbers of waterfowl sighted may not accurately depict how many are actually on site due to various inlets that are not visible from the current viewing locations. A at would be the most effective way to access the sloughs where hundreds of migrating waterfowl stopover to rest and feed. Therefore, much of the waterfowl data is obtained weekly from local duck hunters and we greatly appreciate their time and care in counting the waterfowl and reporting back to us. This issue will be considered for future project proposals.

sheet (Appendix 1). On many days, two observers conducted the survey, and conferred with each other before information was recorded.

Viewing took place from specified observation points. The number of species and individuals seen on the water and flying overhead were recorded for each visit. When two observers went to different observation points at the same site, they prearranged and conferred at the end of the site survey before recording information to keep from overlapping observations. Prearrangement included: selecting observation points so all areas were covered without overlapping, noting time and directions of flyovers, and dividing equipment and reference material. Sightings of endangered bird species, culturally significant species, and other points of interest were also recorded.

Results

In 2010, waterfowl surveys took place weekly for 14 consecutive weeks at the Head of Keweenaw Bay, 12 weeks at Mud Lakes and Sand Point, and 11 weeks at Huron Bay. The average number of waterfowl observed per site visit of 62.3 waterfowl seen per visit in 2010 was most similar to 2007 (64.2 waterfowl per visit) and higher than last year's average of 24.1 waterfowl observed per visit in 2009 (Figure 2). Please note that Pinery Lakes was removed from the survey in 2008 due to low numbers of waterfowl and lack of water. Huron Bay was added as a site in 2006 and is visited by large flocks of migrating waterfowl compared to numbers detected at other survey sites such as Pinery Lakes and probably explains most of the increased detections beginning in 2006. Equipment upgrades to more consistent use of scopes and high-powered binoculars may also partly explain the overall increase in detection of species and numbers from 2000 to 2010 which make it easier to see and discern waterfowl species from a distance. If more efficient methods are found to survey Huron Bay more easily, the number of detections will probably increase again.

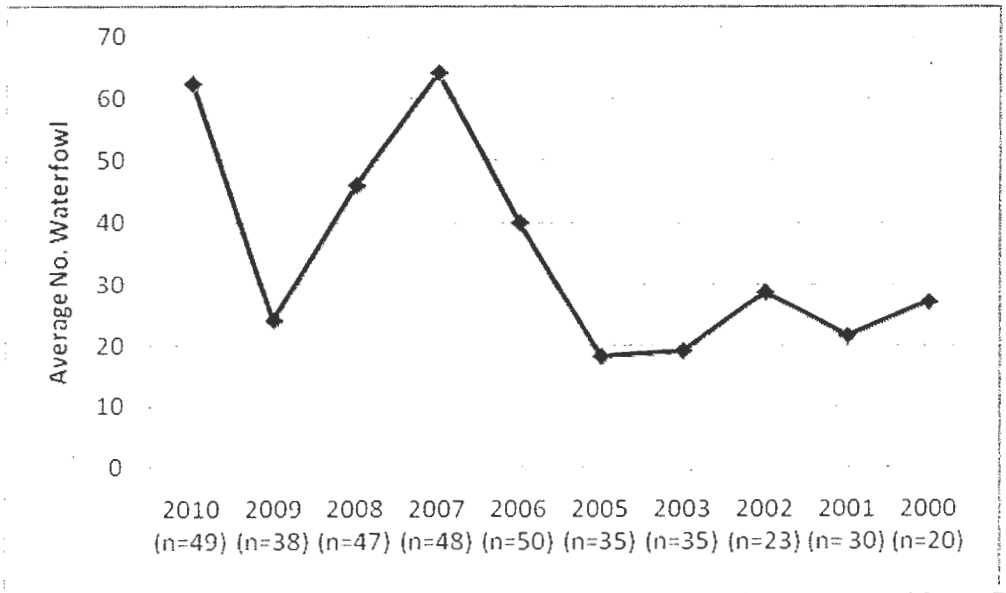


Figure 2. Average number of waterfowl detected per visit by year, 2000 through 2010. Data is unavailable for 2004. (n = total number of site visits)

Overall, there have been a grand total of 27 species of waterfowl identified between 2000 and 2010. The total number of species detected in 2010 was 16 species compared to 20 detected in 2009. Species diversity ranges from 9 to 21 total species being detected between 2000 and 2010 with the lowest detection of species in 2002 and the greatest number of species detected in 2007, respectively (Figure 4).

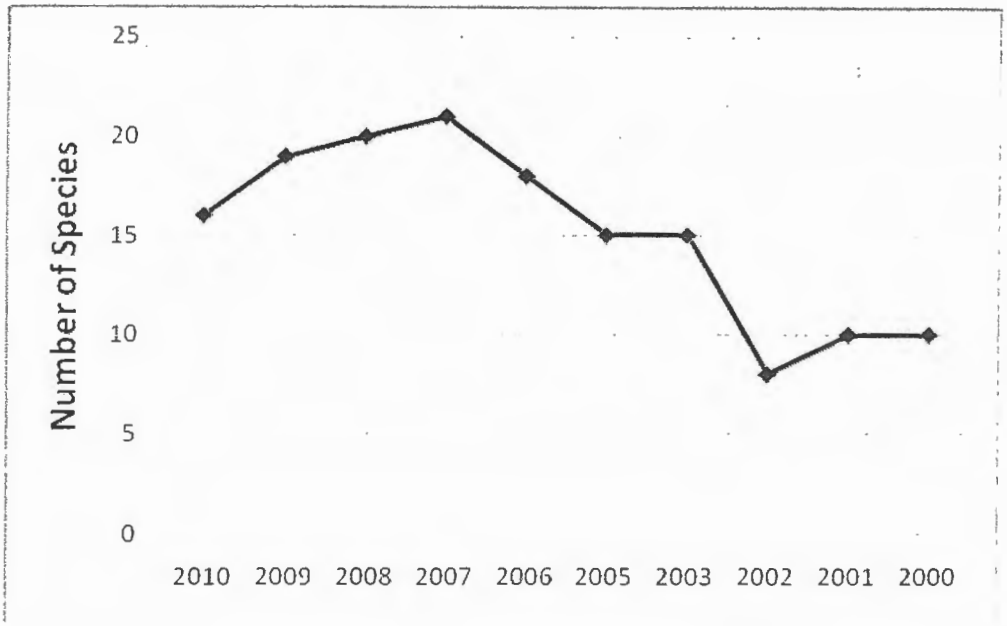


Figure 4. Number of species detected by year, 2000 through 2010. (Data is unavailable for 2004)

Diversity of waterfowl observed per site from greatest to least in 2010 was: Keweenaw Bay with 14 species, Huron Bay with 11 species, Sand Point with 7 species and Mud Lakes with 4 species detected. Overall, Keweenaw Bay and Huron Bay have the greatest numbers of species detected (Figure 5).

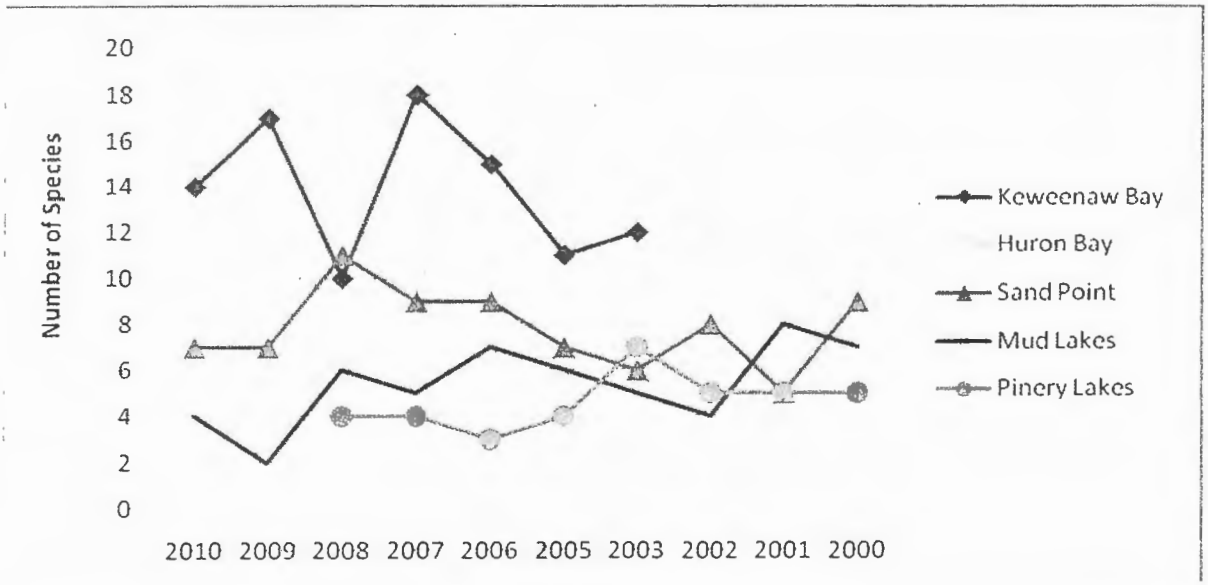


Figure 5. Comparisons of species diversity between years and study sites, 2000 through 2010 (data is unavailable for 2004).

Appendix 1. Datasheet
Appendix 2. Species List by Year, 2000 through 2010

Wild Rice Management and Restoration

Wild rice (manoomin) is the "food that grows on water", whose presence fulfilled the prophecies foretold in the Anishinaabe's migration from the east. It is used in our daily lives, ceremonies, and feasts (Our Manoomin, Our Life). It is also recognized as a preferred source of food for migrating waterfowl and has high ecological value for both wildlife and fish habitat. It can also help to maintain water quality by securing loose soil and tying up nutrients. The amount of wild rice in the western U.P. has declined from historic levels due mainly to water fluctuations for logging and hydro dams over the past century. In 1991, there wasn't any wild rice present in our area, although historically it was thought to have been here and on lakes in areas named "Rice Lake". Peter David, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), assisted our Natural Resources Department in identifying suitable lakes, providing technical assistance, and a source for green seed. In 2003, The Keweenaw Bay Tribal Council affirmed the community's interest in a wild rice program on the L'Anse Indian Reservation (KBIC Integrated Resource Management Plan). It is our hope is to have self-sustaining wild rice populations.

Our original focus was on three wetland systems: Sand Point Sloughs, Pinery Lakes, and Mud Lakes. In 1999, we expanded to include Robillard Impoundment. In 2004, we became cooperators with The Cedar Tree Institute in The Manoomin Project. In 2005, we began test plots in other areas and checked into possible partnerships outside of the reservation boundaries, in ceded territory (Table 1). In 2007, we partnered with US rest Service, Lac Vieux Desert (LVD), and USDA- NRCS on a cooperative wild rice seeding project for several lakes in Ottawa National Forest. In 1999, Huron Bay is a larger area which we began seeding. Since 1991, we have planted thousands of pounds of wild rice at selected sites (Table 2). Future plans include test seeding Parent Lake, an additional area in Baraga County which was checked as a potential cooperative project with MDNR. Zeba Creek, a tribally accessible site mentioned in GLIFWC's 1994 Wild Rice Enhancement Survey is also a waterbody having wild rice potential.

wild rice crops were also taken. In instances where the coverage is greater than sparse an estimate of coverage was made with a gps unit, pictures, and arc view mapping.

Areas with wild rice present

Huron Bay
Huron Bay has a possible 35 acres of wetlands with favorable conditions for wild rice, the largest wetland site bordering the reservation. There are numerous waterfowl using this area and tribal land borders this wetland. In 2009, wild rice was planted over 10 acres for the first time. This year, wild rice came up in all the areas planted and it was decided to concentrate our 2010 planting on this site. This is a promising future area we will continue to plant.

Sand Point Sloughs
Sand Point Sloughs had approximately 5 acres of wild rice in the main area, an increase from the last three years. The main slough still had large muskrat houses which are partially composed of the plants. There is pickerelweed near the north end of the sloughs, which may pose a future problem. Past estimates of coverage, water depths, and plant sizes (table 3). Crop coverages were estimated by eye and pictures. Sample plots were taken this year, algae and elodea were present within the measured plots. No wild rice was seen at Hidden Lake or the Lighthouse Pond. Water levels have gone up from the last two years but are still low and channel to lake is closed with sand (still current fluctuations); there is a sizeable sandbar in main sloughs which may have flowering rush. Phragmites were found in parts of the slough but identified as a native species. Eurasian watermilfoil was identified at a nearby pond.

Table 3. Averages for Sand Pt. Sloughs Wild Rice Crop (main 8 acre lake)

Site	1999	2000	2001	2002	2003	2004	2007	2010
Sample size	5	3	4	3	5	2	4	5
Density (stalks/.5 sq. m)	97	98	100+	95	114	81.5	52	
Tillers	2	2	2	2	2	1.5	1	
Coverage (acres)	4	4	4.8	2.1	3.2	2	3	5
Water depth (inches)	27	12	20	21	17	24.5	6.4	12
Plant size (inches)	45	61	69	56	61.5	57	61	66

Menge and Kelsey Creek Wetlands
Crop densities continue to grow and wild rice is a major component of aquatic plants at these two sites but crops still cover slightly less than half the lake and are considered sparse. Averages were taken for both areas. Menge Creek wetlands had a high number of waterfowl using area and many of the plants were cropped. This is a highly visible area on the reservation. Kelsey Creek wetlands have a lot of beaver activity and damming of creek. The pond near the Brunk Camp was a beaver made impoundment, the east end was dammed up with small trees and branches and west end had a large beaver home. Access to all the water sites is difficult (camp road, logging road, cross-country ski trail), and a four-wheeler/snowmobile would be advisable for large plantings. Canoe access is very difficult. The remote access and mature woods surrounding the area offers future wildlife refuge possibilities. Most likely there are large numbers of waterfowl here also but this site isn't included on the regular waterfowl monitoring due to its difficult access and remoteness.

Menge Kelsey

showed potential for future self-sustaining wild rice beds. The small amount of established wild rice this year was possibly due to the cold, late spring, which likely means most of the seed remained dormant and did not germinate. In 2008 and 2009, members of KBIC and Forest Service staff hand-broadcasted seed in all three lakes, in hopes of increasing the amount of wild rice. Rice was annually monitored for presence and additional rice seed will be hand-broadcast again in areas that could benefit from another year of seeding in 2011. Once established, the wild rice beds should become self-sustaining, assuming conditions remain favorable. These new wild rice beds, though relatively small in size, will help restore this important aquatic plant to the lakes and wetlands of the Ottawa National Forest and the ceded territory (Randall Wollenhaup, Ottawa National Forest).

The Manoomin Project 2004-2007
Cedar Tree Institute put forth a collaborative effort supported by KBIC for a three-year historic planting of wild rice in eight lakes and wetlands in Marquette and Alger Counties. During this time at risk youth were involved in over 1000 hours of community service to carry out this initiative. Several outcomes of this initiative were; youth learned the history and plant life of wild rice, were introduced to Northern Michigan Ojibway cultures, and were part of the planting of wild rice. Staff and volunteers from Project Weave, the Marquette Juvenile Court, The Central Lake Superior Watershed Partnership, and the Cedar Tree Institute planted 1900 pounds of wild rice seed on the following waterbodies: Harlow Lake, the Peshekee River, Lake Levasseur, Laughing Whitefish River, Harkins Lake, Dead River, Keweenaw Bay, and Sand Lake. Peter David, GLIFWC, checked several of the seven lakes seeded in The Manoomin Project and let KBIC know that wild rice was present in 2007, these lakes weren't checked in 2008. In 2009, Peter David checked some of the lakes but conditions were unknown in 2010.

Yellowdog Plains beaver ponds
Yellowdog Plains beaver ponds were checked by private individuals and wild rice was present in 2007-10.

Areas without wild rice present

Clear Lake
A small amount of rice was planted in 2008 at this site and there weren't any plants seen the last two years. It was noted that shoreline was unsuitable for future plantings. There have been several other small wetland areas planted in the past by Natural Resources Committee members; US-41 pond, Bishop L. wetland, Indian Rd. wetlands are a few which have had success. Lightfoot Bay is a larger area which was planted one year only and not rechecked. In 2011, these areas will be checked for wild rice presence and suitability for continued efforts.

Pequaming wetland
Pequaming wetland was planted with a small amount of rice in 2009 but there wasn't any present in 2010. This wetland is very difficult to access and most likely will be abandoned for future plantings.

Mud Lakes
There were large numbers of water lilies, water shield, and pondweed observed in these lakes. Wild rice has grown here in past years and there were a few plants two years ago, with work this is a possible location for the future. Rakes would need to be used to lower plant competition. The current access road on the east end of the upper lakes is actually lower than the lake water level. In 2008, attempts were made to clear the culvert to allow drainage but the area filled back in. In order to repair the road, USDA-NRCS recommends getting adequate road fill and build the road up with a good gravel surface. Annual maintenance work is needed on the stop-log control structure; screen placement and clearing the debris from the culvert going to Lake Superior. In 2008, we cleared the debris from the culvert but were unable to remove the welded screen to check for blockages. The control structure had 5 slats in place for a total of 33 inches; 4-7", 1-5". The slats were taken out to help drop the water level in the lakes for spring.

Appendix 1. Datasheet used to collect waterfowl index data in 2010.

2010 Waterfowl Index Form

Keweenaw Bay Natural Resources Department
Keweenaw Bay Indian Community

Date: _____ **Site(s):** _____

Time: _____ **Observer(s):** _____

Weather Code:	Conditions
0	clear sky/ fair
1	partly cloudy
2	mostly cloudy
3	overcast
4	overcast with light rain
5	moderate to heavy rain
6	Snow
7	other (please note:_____)

Wind Code:	Conditions	Indicators
0	<1mph	smoke rises vertically
1	1-3mph	wind direction shown by smoke drift
2	4-7mph	wind felt on face/ leaves rustle
3	8-12mph	leaves and small twigs in constant motion
4	13+mph	raises dust, leaves, loose paper, small twigs

Wind Direction (if possible)_____

Air Temperature_____

Other Notes: _____

_____

Species	Number	Comments

Keweenaw Bay Indian Community
Department of Natural Resources

Waterfowl Index Report
2008

By Evelyn Ravindran and Pamela J. Nankervis

Introduction

The Keweenaw Bay Natural Resources Department (KBNRD) has conducted a waterfowl index during the fall from 1994-2007. Sites were chosen on the L'Anse Indian Reservation (Baraga County, MI) and on KBIC owned lands to observe waterfowl utilization: Sand Point Sloughs, Pinery Lakes, Mud Lakes, Head of Keweenaw Bay, and most recently Huron Bay (Fig.1). Four sites have been improved (wild rice planting, water control structures and/or nesting structures) for waterfowl utilization. This waterfowl index was modeled from a program described by U.S. Fish and Wildlife Service (USFWS) personnel from Ashland, WI. Since 1991, KBNRD has received annual funding from a Bureau of Indian Affairs sponsored cooperative program entitled "Circle of Flight". Circle of Flight has supported this fall survey and various other activities which benefit area waterfowl and the wetlands they inhabit.

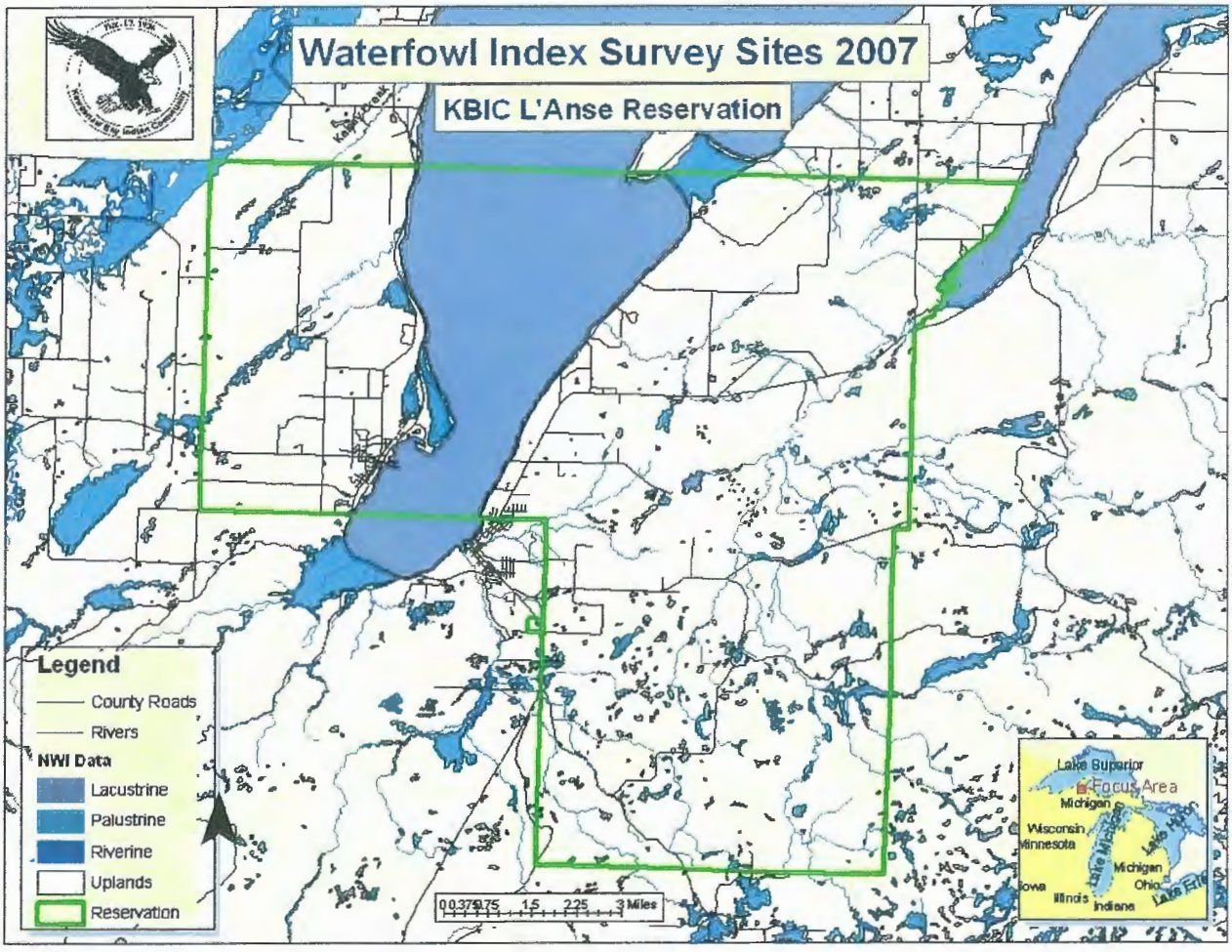


Figure 1. 2007 Waterfowl Survey Sites located on the Keweenaw Bay Indian Community, L'Anse Reservation.

Sand Point Sloughs is a backwater slough connected to Lake Superior which experiences regular seiches (Fig. 2). This slough is relatively shallow (water less than 6 feet) with minor shoreline development. On the eastern end of the Sand Point Sloughs, there is tribal development of the public beach area. Electric lines and permanent outlet boxes were installed, a gravel access road was widened, and gravel was leveled for a parking area. This construction was completed during the summer of 1996. Since this time, a stamp sand remediation project has been ongoing at the public beach area. In 2006, Electric lines were removed, stamp sands were covered with fresh top soil, the smallest northern pond (NP) was filled in, and a gravel walking trail was created. Plans are currently being made to revegetate the area including the shore of the small southern pond (SP).

On the south side of the Slough, a lighthouse was purchased by the Keweenaw Bay Indian Community in 1994 and is currently used as an office. A small lake (Hidden Lake), attached by a short channel, near the mouth of the Sand Point Sloughs is also considered to be part of this site. Hidden lake also has shallow (<6 feet) water. In 1997, a floating dock was added and anchored as a bridge, to improve access to this back sloughs area. In 1998, a 180 foot long marsh walk was added to allow access to Hidden Lake and KBNRD released two juvenile trumpeter swans. In 1999, wild rice was harvested by tribal members for the first time. In 2000, the trail going from the main road near the northern end of the main sloughs area was cleared and cleaned up. Permanent water quality and depth gauging stations were added to the main slough area and Hidden Lake. Also, permanent sites were made for measuring wild rice crop densities.

Figure 2. Map of Sand Point Sloughs including locations of waterfowl observation points in blue and the smallest northern pond (NP) that was filled and the small southern pond (SP) that is planned for native plant revegetation.

Mud Lakes is a series of small lakes (<5 acres) which are shallow in most areas (water <6 feet), but have small deep water pockets (water 6 to 11 feet). In 1998, many projects were completed at this site: 1) a contractor installed a culvert and added some fill to a ditch in the access road; 2) an entrance gate was also placed on the access road; 3) a 12 foot high observation tower was built on a high stretch between the eastern and western lakes; and 4) several beaver dams were removed at the

outlet of Mud Lakes. In 1999, the following projects were completed: 1) an access road was made to the outlet; 2) a water control structure was installed at the outlet; 3) several beaver where removed; and 4) water levels were lowered in all lakes. In 2000, water levels were manipulated several times by removing and adding slats at the water control structure. The channel outflow going under the dirt road near the upper eastern lake was dredged and gravel added to keep it from plugging up. Overall water level appeared to be down from shoreline vegetation. A nearby landowner was contacted and asked to remove some derelict machinery he had on tribal property. A trail was cleared from the Old U.S. 41 to the channel connecting upper and lower lakes. Floating docks on upper western lake were maintained. Permanent water quality and depth gauging stations were added to an upper and lower lake site. Also, permanent sites were made for measuring wild rice crop densities.

Pinery Lakes consists of two inland lakes with shallow (less than 6 feet) water. In 1997 several projects were completed at this site: 1) a 24 foot long floating dock was added to the upper Pinery Lake to improve access; 2) a 4 foot diameter culvert and stabilization rock were added between the upper and lower Pinery Lakes to provide a crossing between the lakes and allow water flow between the lakes; and 3) two smaller culverts were installed at the outlet of the lower Pinery Lake to help maintain water levels suitable for wild rice. Due to low water levels and no obvious inlet or outlet for water management, the floating dock was removed in 2005. No wild rice is currently present..

Head of the Keweenaw Bay is located between L'Anse and Baraga where KBIC owns a 25 acre parcel of wetland. Due to the important ecological functions of the entire wetland and open water located here, surveillance of waterfowl has been conducted and wild rice plantings were done annually from 2004 to 2006. Interstate highway 41 travels around the bay with a several gravel parking areas established along the edges of the wetland. Several private homes are also built along the head of the bay.

Huron Bay is located in the northeast corner of the KBIC L'Anse Indian Reservation. KBIC currently owns a 112 acre parcel of wetland with purchase of more property being negotiated. There is a network of sloughs, shallow water tributaries and deep open water ($\geq$ 6 ft) that is visited annually by hundreds of migrating waterfowl. Monitoring was initiated in 2007 to see if Huron Bay should be added as long-term surveillance point.

Methods

In Michigan's western Upper Peninsula, the usual time to begin waterfowl surveys is late September. The waterfowl index began in late September 2008 and concluded at the end of November when lakes were frozen at each site. The survey was conducted weekly at or near dawn. Weather conditions in the specified areas were observed and noted.

Three Bausch and Lomb 15x-60x Zoom Telescopes and Tasco 7 x 42mm binoculars were used to observe waterfowl. "Ducks at a Distance", federal waterfowl identification guide and an Audubon handbook titled "Eastern Birds" were used in species identification. All information was recorded on a waterfowl index data sheet (Appendix). On most days, two observers conducted the survey, and conferred with each other before information was recorded.

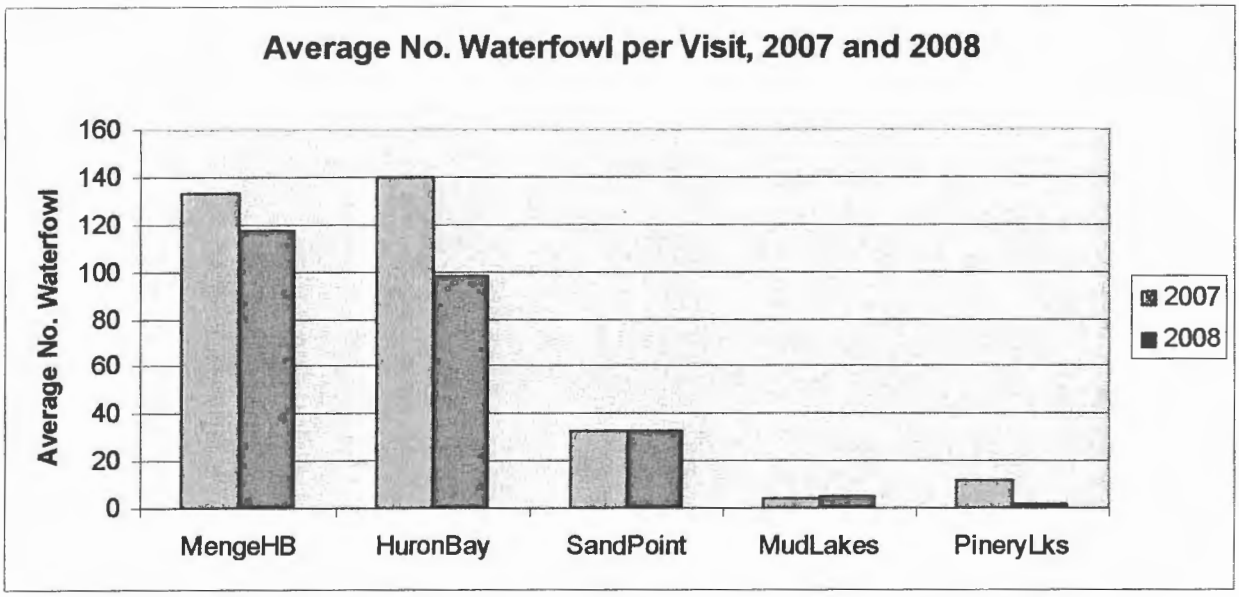
Viewing took place from specified observation points. The number of species and individuals seen

on the water and flying overhead were recorded for each visit. When two observers went to different observation points at the same site, they prearranged and conferred at the end of the site survey before recording information to keep from overlapping observations. Prearrangement included: selecting observation points so all areas were covered without overlapping, noting time and directions of flyovers, and dividing equipment and reference material. Sightings of endangered bird species, culturally significant species, and other points of interest were also recorded.

Results

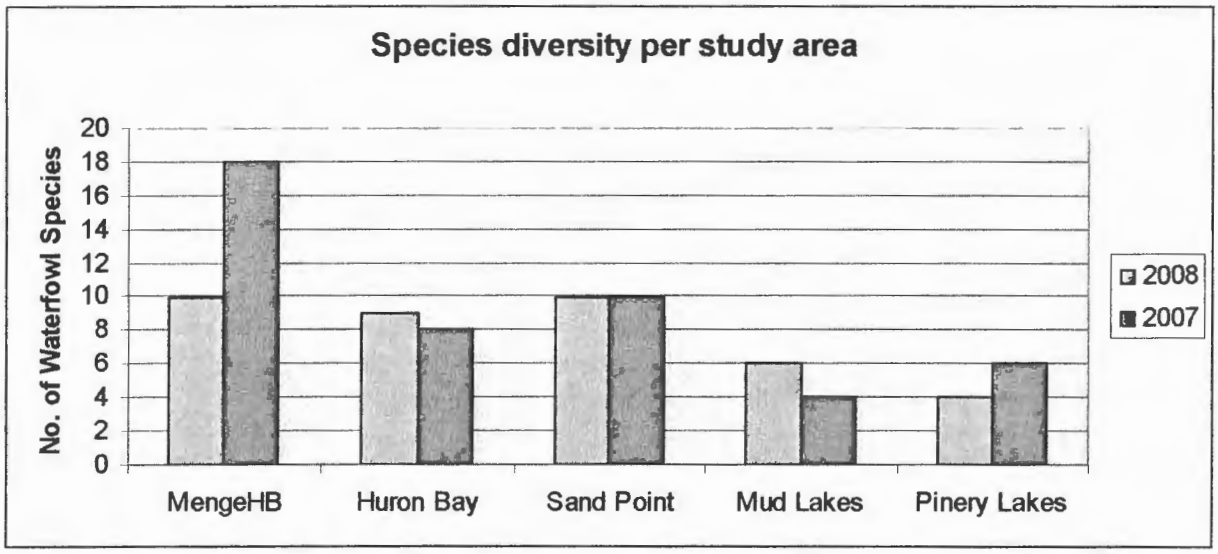
In 2008, waterfowl surveys took place weekly for 11 consecutive weeks at the Head of Keweenaw Bay; 10 consecutive weeks at Pinery Lakes, Mud Lakes, and Sand Point and 6 weeks at Huron Bay on a bi-weekly schedule. The total number of waterfowl observed was 2156 compared to 3081 in 2007. The greatest average number per visit was seen at the Head of Keweenaw Bay in 2008, versus the greatest average number seen per visit in 2007 at Huron Bay (Figure 2).

Figure 2.



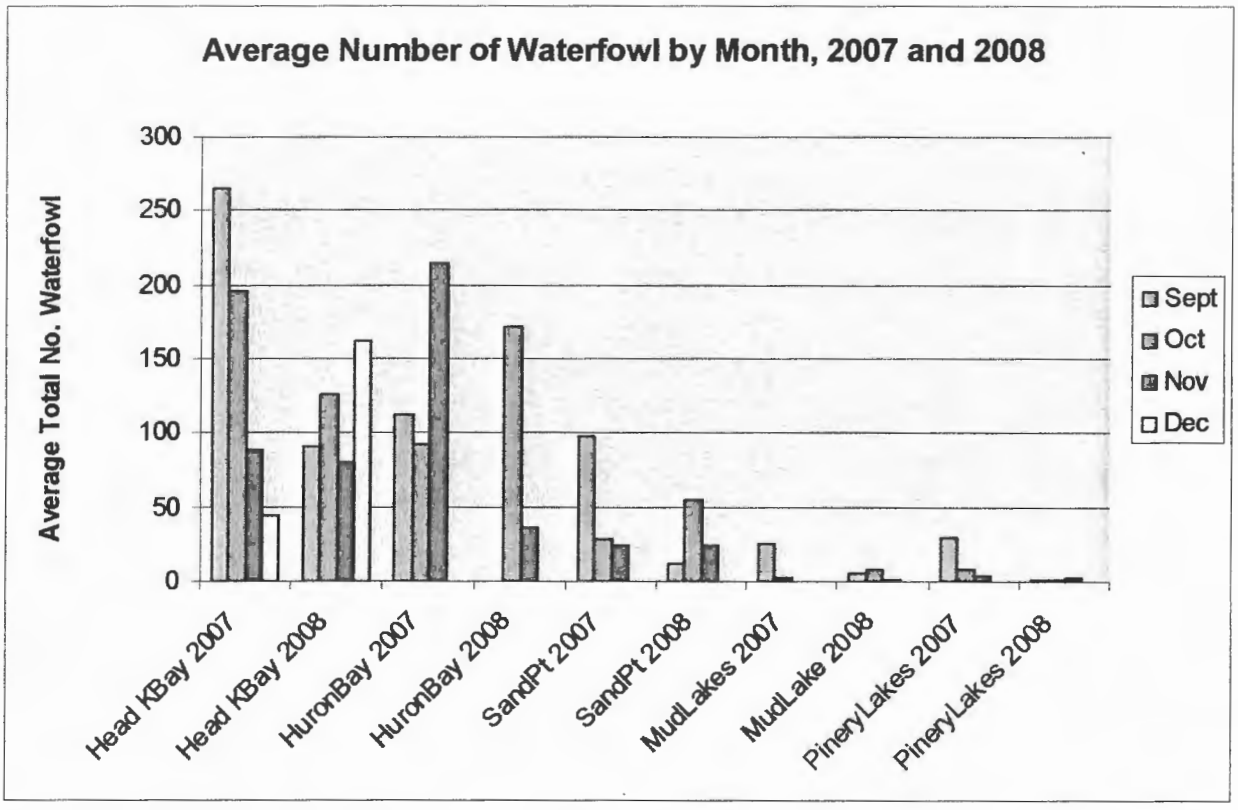
The greatest species diversity observed was at the Head of Keweenaw Bay and Sand Point Sloughs with 10 species of waterfowl observed in 2008. The lowest species diversity was observed at Pinery Lakes with only 4 species observed. This is comparable to 2007, although there were three fewer species seen overall in 2008 (n= 19) than in 2007 (n = 22) (Figure 3).

Figure 3.



Monthly total waterfowl observed show a similar trend with greatest numbers of waterfowl being observed at the Head of Keweenaw Bay and Huron Bay (Figure 4).

Figure 4.



Ten species of waterfowl totaling 1170 were observed at the Head of Keweenaw. These species,

listed in order from greatest to least abundance (n) were: American Coot (420), Canada Goose (227), Mallard (312), Black Duck (149), Greater/Lesser Scaup (25), Blue Wing Teal (15), Common Merganser (11), Goldeneye (6), Ringneck (3), and Redhead (2).

At Huron Bay, eight different species were identified for a total of 587 waterfowl. These species, listed in order of greatest to least abundance (n) were: Greater/Lesser Scaup (282), Goldeneye (100), Bufflehead (64), Mallard (58), Redhead (39), Common Merganser (26), Greenwing Teal (10), and Trumpeter Swan (6).

At Sand Point, nine species of waterfowl were observed, listed in order of greatest to least abundance (n) : Canada Goose (268), Wood Duck (34), Mallard (11), American Coot (6), Common Loon (4), Goldeneye (3), American Wigeon (3), Ring Neck (2), and Red Breasted Merganser (1).

At Mud Lakes, five species of waterfowl were observed, listed in greatest to least abundance: Canada Geese (17), Mallard (15), Wood Duck (10), American Coot (4), Double Crested Cormorant (1), and a Bufflehead (1). Canada Geese were observed as flyover and have not been observed to use Mud Lakes in previous years either.

At Pinery Lakes, four species of waterfowl were observed, listed from greatest to least abundance: Hooded Merganser (10), Mallard (4), Bufflehead (2) and Wood Duck(2). The water levels have diminished over the years, but are extremely low following drought conditions. There were fewer wood ducks observed here this year, only 2 in 2008 compared to 11 in 2007.

Species that showed an increase in abundance in 2008 over last year's 2007 totals are Goldeneye, Common Merganser, and Wood Duck. Species that showed a decrease in abundance this year were most notably the Blue Winged Teal, Redhead and Hooded Mergansers (Figure 5).

Wild Rice Management and Restoration

Wild rice (manoomin) is the "food that grows on water", whose presence fulfilled the prophecies foretold in the Anishinaabe's migration from the east. It is used in our daily lives, ceremonies, and feasts (Our Manoomin, Our Life). It is also recognized as a preferred source of food for migrating waterfowl and has high ecological value for both wildlife and fish habitat. It can also help to maintain water quality by securing loose soil and tying up nutrients. The amount of wild rice in the western U.P. has declined from historic levels due mainly to water fluctuations for logging and hydro dams over the past century. In 1991, there wasn't any wild rice present in our area, although historically it was thought to have been here and on lakes in areas named "Rice Lake". Peter David, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), assisted our Natural Resources Department in identifying suitable lakes, providing technical assistance, and a source for green seed. In 2003, The Keweenaw Bay Tribal Council affirmed the community's interest in a wild rice program on the L'Anse Indian Reservation (KBIC Integrated Resource Management Plan). It is our hope is to have self-sustaining wild rice populations.

Our original focus was on three wetland systems: Sand Point Sloughs, Pinery Lakes, and Mud Lakes. In 1999, we expanded to include Robillard Impoundment. In 2004, we became cooperators with The Cedar Tree Institute in The Manoomin Project. In 2005, we began test plots in other areas and checked into possible partnerships outside of the reservation boundaries, in ceded territory

(Table 1). In 2007, we partnered with US Forest Service, Lac Vieux Desert (LVD), and USDA-NRCS on a cooperative wild rice seeding project for several lakes in Ottawa National Forest. Since 1991, we have planted thousands of pounds of wild rice at selected sites (Table 2). Additional areas in Baraga County will be checked into for possible future seeding including Zeba Creek wetlands and Parent Lake. These are two tribally accessible sites and Parent Lake is mentioned in GLIFWC's 1994 Wild Rice Enhancement Survey as a lake having wild rice potential and possibilities as a cooperative project with MDNR.

Table 1. Acreage of lakes at each site on the L'Anse Indian Reservation.

Site	Acres of lakes
Sand Point Sloughs	21
Mud Lakes	11
Pinery Lakes	28
Robillard Impoundment	3
Kelsey Creek wetlands	10
Menge Creek wetlands	10
Gomanche Creek wetlands	0.6
Pakkala Creek wetlands	0.3
Indian Road pond	2
Laughs Lake	15
US 41 wetland (1 acre)	1

Table 2. Pounds of wild rice planted at sites in 1991 thru 2008.

Site	1991-1997	98	99	00	01	02	03	04	05	06	07	08
Sand Point Sloughs	1772	0	0	0	120	0			273	430	0	0
Mud Lakes	560	346	243	433	240	0			0	0	0	0
Pinery Lakes	2799	281	167	0	300	0			0	0	0	0
Robillard Impoundment	0	0	0	0	400	360	0	0	0	0	0	0
Menge Creek wetlands	0	0	0	0	0	0	0	40	311	372	137	346
Pakkala Creek wetlands	0	0	0	0	0	0	0	20	0	0	0	0
Indian Road pond	0	0	0	0	0	0	0	20	0	0	0	0
Kelsey Creek wetlands	0	0	0	0	0	0	0	0	94	233	149	201
Gomanche Creek wetlands	0	0	0	0	0	0	0	0	30	108	59	53
Manoomin Project	0	0	0	0	0	0	0	900	400	600	0	0
Laughs Lake	0	0	0	0	0	0	0	0	0	170	101	102
Yellowdog Plains	0	0	0	0	0	0	0	0	0	207	0	0
US 41 wetland (1 acre)	0	0	0	0	0	0	0	0	0	38	0	0

Ottawa Project	0	0	0	0	0	0	0	0	0	0	350	509
Clear Lake	0	0	0	0	0	0	0	0	0	0	0	13

Monitoring

Wild rice seed can lie dormant for up to 5 years. Wetlands that have had wild rice present or action taken upon it within the last 5 years are surveyed annually for the presence of wild rice (survey form attached). Pictures of wild rice crops were also taken. In instances where the coverage is greater than sparse an estimate of coverage was made with a gps unit, pictures, and arc view mapping.

Areas with wild rice present

Sand Point Sloughs

Sand Point Sloughs had approximately 3 acres of wild rice in the main area, similar to last year. There is a continuing increase in the crop next to the main slough. Past estimates of coverage, water depths, and plant sizes (table 3). Crop coverages were estimated by eye and pictures. Sample plots weren't taken this year. In past years, algae and elodea were present within the measured plots. No wild rice was seen at Hidden Lake or the Lighthouse Pond. Water levels are still very low and channel to lake is periodically closed; there is a sizeable sandbar in main sloughs. Phragmites were found in parts of the slough but identified as a native species.

Table 3. Averages for Sand Pt. Sloughs Wild Rice Crop (main 8 acre lake)

Site	1999	2000	2001	2002	2003	2004	2007
Sample size	5	3	4	3	5	2	4
Density (stalks/.5 sq. m)	97	98	100+	95	114	81.5	52
Tillers	2	2	2	2	2	1.5	1
Coverage (acres)	4	4	4.8	2.1	3.2	2	3
Water depth (inches)	27	12	20	21	17	24.5	6.4
Plant size (inches)	45	61	69	56	61.5	57	61

Menge and Kelsey Creek Wetlands

Crop densities continue to grow and wild rice is a major component of aquatic plants at these two sites but crops still cover less than half the lake and are considered sparse. Menge Creek wetlands had a high number of waterfowl using area and many of the plants were cropped. This is a highly visible area on the reservation. Kelsey Creek wetlands have a lot of beaver activity and damming of creek. The pond near the Brunk Camp was a beaver made impoundment, the east end was dammed up with small trees and branches and west end had a large beaver home. Access to all the water sites is difficult (camp road, logging road, cross-country ski trail), and a four-wheeler/snowmobile would be advisable for large plantings. Canoe access is very difficult. The remote access and mature woods surrounding the area offers future wildlife refuge possibilities.

Laughs Lake

While much of the lake is deeper than 6 feet, the area near the outlet is suitable and test seeding was done here 2006-2008. Wild rice grew in areas planted and waterfowl were observed using the lake. This lake was purchased by the tribe as

Gomanche and Pakkala Creek wetlands and Indian Road pond
Wild rice is present at these three sites, in the case of the Indian/Herman Road pond over half of the lake is covered but these are sites are an acre or smaller and crop density wasn't measured. Waterfowl were observed at the remote Gomanche wetlands and Indian Road pond.

Mud Lakes
There were some wild rice plants observed in the upper eastern lake but there is a lot of plant competition. Wild rice has grown here in past years and with work this is a possible location for the future. Rakes would need to be used to lower plant competition. The current access road on the east end of the upper lakes is actually lower than the lake water level. Attempts were made to clear the culvert to allow drainage but the area filled back in. In order to repair the road, USDA-NRCS recommends getting adequate road fill and build the road up with a good gravel surface. Annual maintenance work is needed on the stop-log control structure; screen placement and clearing the debris from the culvert going to Lake Superior. In 2008, we cleared the debris from the culvert but were unable to remove the welded screen to check for blockages. The control structure had 5 slats in place for a total of 33 inches; 4-7", 1-5". The slats were taken out to help drop the water level in the lakes for spring.

Off reservation cooperative project sites
Ottawa National Forest
The Ottawa National Forest has an objective in its forest plan to "maintain and/or expand the quantity and ecological health of wild rice beds." With this in mind, the Ottawa partnered with the KBIC, GLFWC, LVD, and USDA-NRCS in 2007 to establish wild rice (*Zizania aquatica*) on several small lakes within the Ottawa. In September of 2007, members of KBIC, the Lac Vieux Desert Band of Lake Superior Chippewa (LVD), and Forest Service staff, seeded wild rice in Lake Sainte Kathryn, Lake Thirteen, and Kunze Lake. Seeding of rice in these lakes was originally planned for three consecutive years over 10 acres, in order to provide the best chance for establishing self-sustaining rice beds. These lakes were monitored in 2008 to determine the results from the first year of seeding. All three lakes had small amounts of wild rice within the seeded areas, which showed potential for future self-sustaining wild rice beds. The small amount of established wild rice this year was possibly due to the cold, late spring, which likely means most of the seed remained dormant and did not germinate. On September 30, 2008 members of KBIC and Forest Service staff hand-broadcasted seed in all three lakes, in hopes of increasing the amount of wild rice. The rice will be monitored again in 2009, and additional rice seed will be hand-broadcast again in areas that could benefit from another year of seeding. Once established, the wild rice beds should become self-sustaining, assuming conditions remain favorable. These new wild rice beds, though relatively small in size, will help restore this important aquatic plant to the lakes and wetlands of the Ottawa National Forest and the ceded territory (Randall Wollenhaup, Ottawa National Forest).

The Manoomin Project 2004-2007
Cedar Tree Institute put forth a collaborative effort supported by KBIC for a three-year historic planting of wild rice in eight lakes and wetlands in Marquette and Alger Counties. During this time at risk youth were involved in over 1000 hours of community service to carry out this initiative.

Several outcomes of this initiative were; youth learned the history and plant life of wild rice, were introduced to Northern Michigan Ojibway cultures, and were part of the planting of wild rice. Staff and volunteers from Project Weave, the Marquette Juvenile Court, The Central Lake Superior Watershed Partnership, and the Cedar Tree Institute planted 1900 pounds of wild rice seed on the following waterbodies: Harlow Lake, the Peshekee River, Lake Levasseur, Laughing Whitefish River, Harkins Lake, Dead River, Keweenaw Bay, and Sand Lake. Peter David, GLIFWC, checked several of the seven lakes seeded in The Manoomin Project and let KBIC know that wild rice was present in 2007, these lakes weren't checked in 2008.

Yellowdog Plains beaver ponds
Yellowdog Plains beaver ponds were checked by private individuals and wild rice was present in 2007 and 2008.

Areas without wild rice present

Pinery Lakes
There has been no rice observed since 2003 on these lakes. Water levels have dropped to a point where there is no longer a connecting channel between lakes or observable inlets or outlets. There has been 5 years without wild rice observed on these lakes and it is unnecessary to check in 2009.

US-41 pond
In 2006, we gave 38 pounds of wild rice to members of our Natural Resources Committee to test plant. There was no wild rice observed at this site from the shoreline for the last two years. This site will likely continue to be unproductive.

Robillard Impoundment
No wild rice has been observed here since 2003 and the impoundment has been reduced to a creek. Rebuilding of the Robillard Impoundment hasn't taken place. The U.S. Army Corp of Engineers had questions on Robillard Impoundment, which KBIC has answered. Michigan Department of Natural Resources surveyed Robillard Creek and they have reservations on permitting the rebuilding of this water control structure for wildlife habitat enhancement. There position is that the impoundment would create a temperature rise in the stream that would negatively affect the brook trout in the stream. KBIC conducted an investigation of the fish community assemblage. Unless there are plans to rebuild, this site does not need to be checked in 2009.

Wild Rice Harvesting Efforts
Crop density was considered to be large enough and KBIC gave permission for harvesting. Tribal members harvested an estimated finished amount from Sand Pt. Sloughs from 1999-2002: 57lbs, 150lbs, >100lbs, and 60-70lbs. Robillard Impoundment had one harvest in 2002 with 80 lbs. of finished rice. KBIC currently owns equipment to harvest and process its own wild rice: 6 ricing canoes with equipment (6 duckbills, 12 paddles, foam, and tie-downs), a parching pan, and thrasher. In 2001, the Tribal Council named Sandy Dowd our 2nd wild rice chief and Alice Hadden was posthumously named our first wild rice chief in honor of their efforts. In 2004, this honor has been passed on to Eleanor Moede. Our department consults and keeps in touch with Eleanor Moede, KBIC wild rice chief, on activities involving wild rice.

Due to lack of areas to harvest within the reservation boundaries, outside areas were looked at. In

2003, 380 pounds of green seed were purchased with tribal funds and processed for community gatherings (134 lbs. of finished), 80 lbs. in 2004. In 2004, GLIFWC website was checked for rules and regulations and aerial maps. Dallas Gropengiser offered to show several ricing lakes he is familiar with in Villas County, Wisconsin but plans didn't work out for harvesting. The main reason mentioned by tribal members for not going to Wisconsin for harvesting was the travel time. In 2007, Bob Evans showed staff several established rice beds near Watersmeet where harvesting is possible: Ontonagon River, Crooked Lake, and Sucker Lake. In 2008, Lac Vieux Desert hosted a mini wild rice camp on Lac Vieux Desert and tentative plans were made for another camp in 2009.

Waterfowl hunting (Chapter 5) and wild rice gathering (Chapter 6) are managed and regulated by Tribal Code Title 10, Hunting, Fishing, Trapping, and Gathering ("Title 10"). Both activities require tribal members to have a tribal hunting, fishing, trapping, and gathering cards. Special permits aren't given for waterfowl but tribal members follow Federal Migratory Game Birds Regulations. Periodic surveys are given to hunters to summarize activity every few years. GLIFWC addresses these regulations in an annual meeting. Wild rice harvesting areas are designated by the Wild Rice Chief (Eleanor Mode) each year in August.

LaDuke, Winona and Brian Carlson. Our Manoomin, Our Life, The Anishinaabeg Struggle to Protect Wild Rice.

Keweenaw Bay Indian Community Integrated Resource Management Plan (Resolution No. KB-1152-2003)

Dlutkowski, Lisa. 1994 Wild Rice Surveys in the Upper Pensinsula. Great Lakes Indian Fish & Wildlife Commission.

Wollenhaup, Randall. Ottawa National Forest. 2008 summary of cooperative project.

Ecotone. The Cedar Tree Insitute. Jon Magnuson 2007.

2002 Keweenaw Bay Tribal Waterfowl Index and Wild Rice Update.

Keweenaw Bay Indian Community Tribal Code of Law: Title 10 Hunting, Fishing, Trapping and Gathering. Revised by the Keweenaw Bay Tribal Council at Special Council sessions conducted on March 31st, April 3rd, April 28th, and September 8th of the year 2003.


Manoomin
Wild Rice

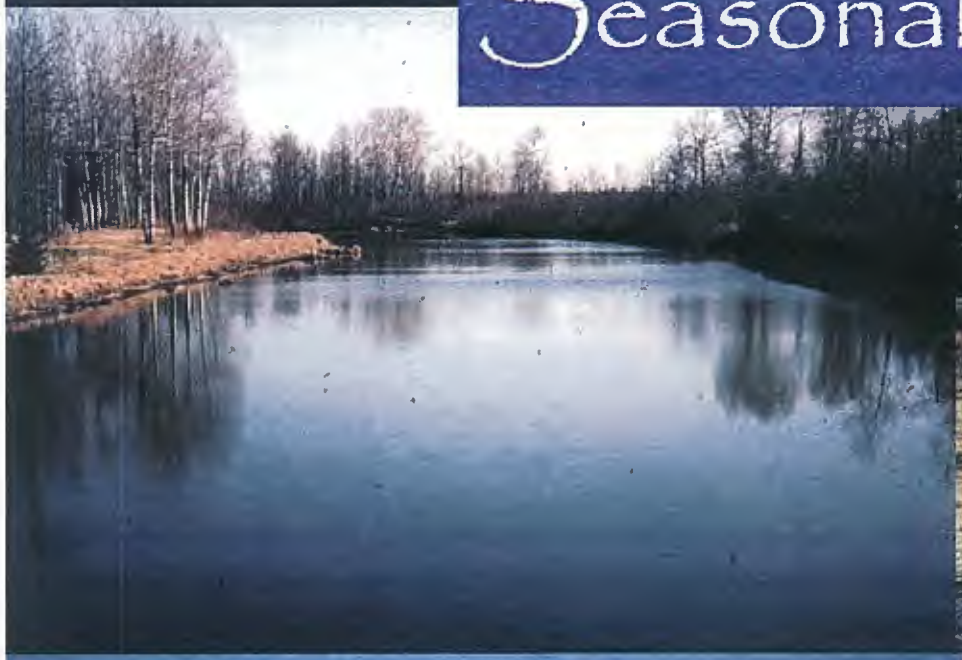
An Annual, Aquatic Grass

Habitat Preferences

- Water depths in 0.5-3 foot range
- Water not acidic or darkly stained
- Annual water level fluctuations not excessive but year-to-year conditions not too stable
- Organic, mucky substrate (preferred)
- And, rice requires gently....

Flowing Water

Seasonal Variation



Annual Variation

A North American Resource

Tremendous Value Ecologically,

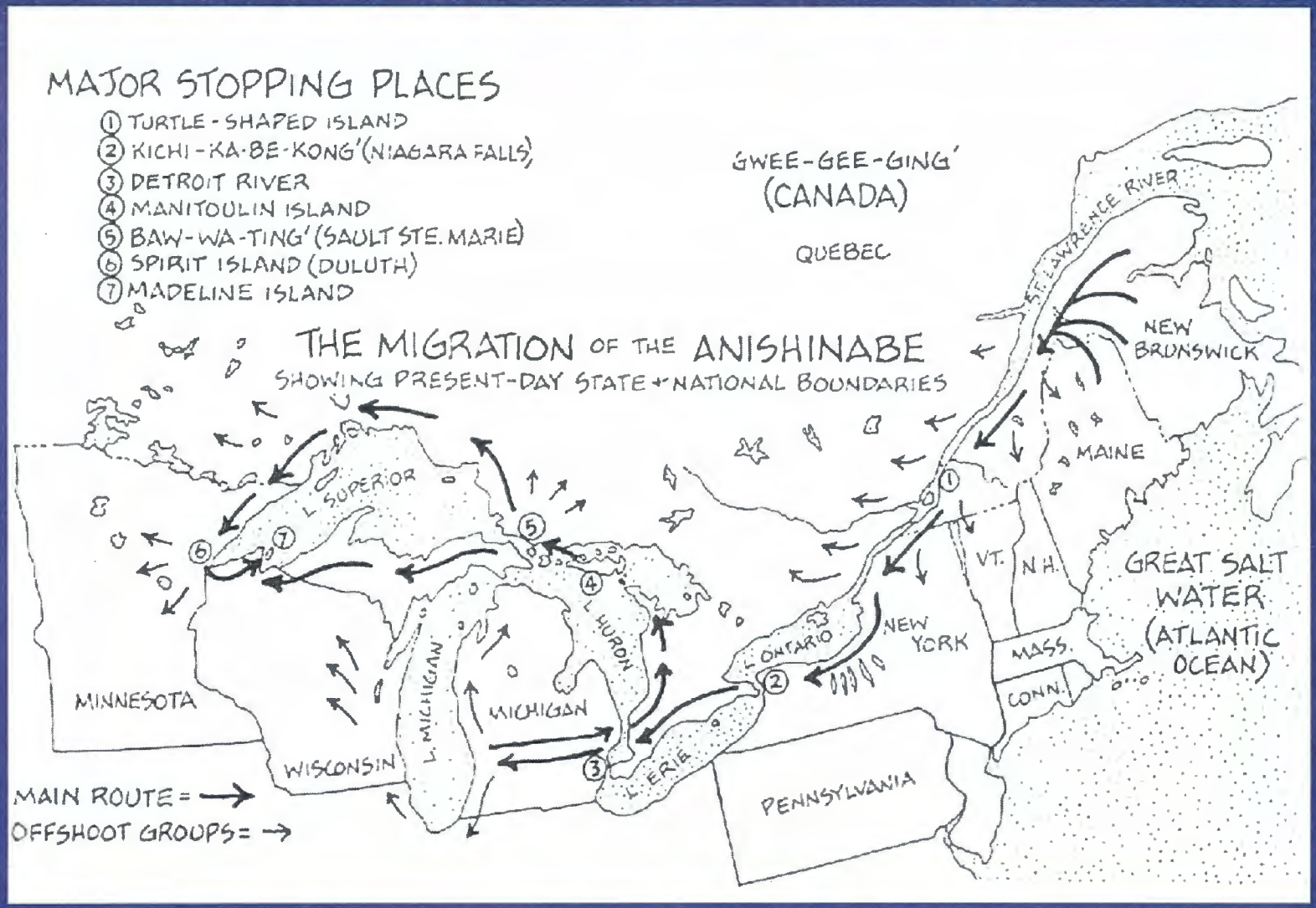
Nutritive Values

(per 100g)

	Wild Rice	White Rice
Protein (g)	10.5	6.9
Total Dietary Fiber (g)	5.7	1.6
Calcium (mg)	21.0	13.0
Magnesium (mg)	177.0	33.0
Phosphorus (mg)	433.0	116.0
Potassium (mg)	427.0	68.0
Zinc (mg)	6.0	1.1

and Culturally.

The Anishinabe (Ojibwe) Migration Story



From the Mishomis Book, by Edward Benton-Banai

A Long History of Harvest

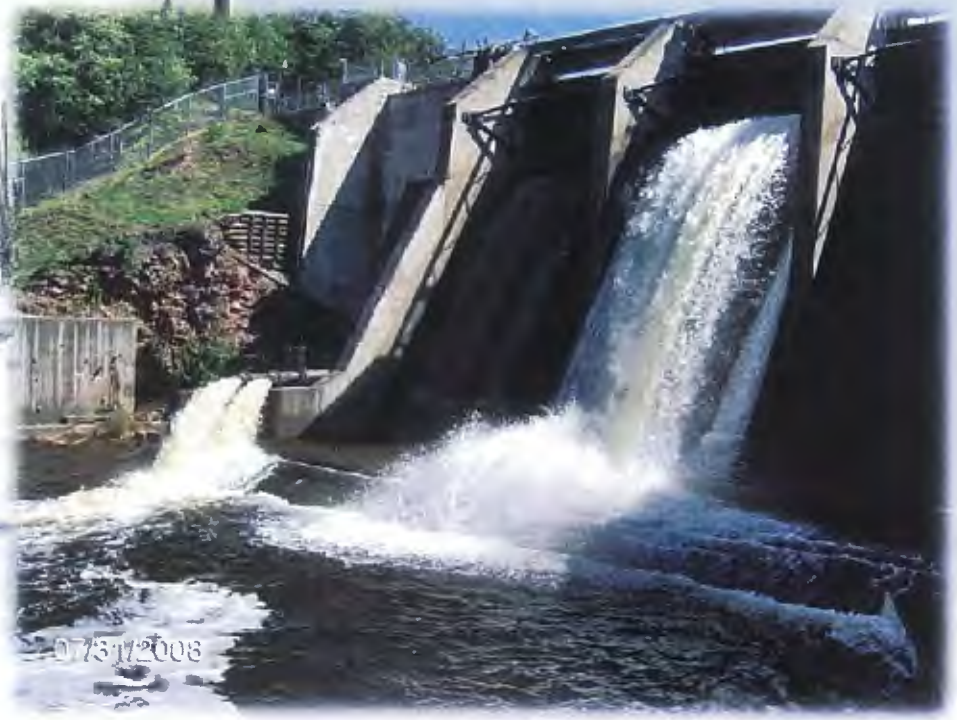
Photo courtesy of
Minnesota Historical Society

Photo courtesy of
Wisconsin Historical Society

Loss of Wild Rice in Michigan's Upper Peninsula

Photo Courtesy of the Library of Congress

Photo of Prickett Dam, MI



Lake States National Forests and Chippewa Ceded Territories: Treaties of 1836, 1837, and 1842

Keweenaw Bay Wild Rice Restoration

- Growing Conditions
- Ownership of shoreline
- Accessibility

Planting

- Minimum of 3 years
- Fall
- 50 lbs. per acre

Monitoring

- Presence or Absence
- Coverage and Density
- Condition of Wild Rice

- Water quality and depth
- Other Plant Competition
- Activity-Animal and People

Pounds of wild rice planted by KBIC

Site	1991-1997	98	99	00	01	02	03	04	05	06	07	08	09	10
Sand Point Sloughs	1772	0	0	0	120	0			273	430	0	0	0	0
Mud Lakes	560	346	243	433	240	0			0	0	0	0	0	0
Pinery Lakes	2799	281	167	0	300	0			0	0	0	0	0	0
Robillard Imp.	0	0	0	0	400	360	0	0	0	0	0	0	190	0
Menge Cr. Wetlands	0	0	0	0	0	0	0	40	311	372	137	346	356	0
Pakkala Cr. Wetlands	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Indian Road pond	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Kelsey wetlands	0	0	0	0	0	0	0	0	94	233	149	201	0	0
Gomanche Creek wetlands	0	0	0	0	0	0	0	0	30	108	59	53	0	0
Manoomin Project	0	0	0	0	0	0	0	900	400	600	0	0	0	0
Laughs	0	0	0	0	0	0	0	0	0	170	101	102	126	0
Yellowdog Plains	0	0	0	0	0	0	0	0	0	207	0	0	0	0
US 41 wetland (1 ac)	0	0	0	0	0	0	0	0	0	38	0	0	0	0
Ottawa Project	0	0	0	0	0	0	0	0	0	0	350	509	518	0
Clear Lake	0	0	0	0	0	0	0	0	0	0	0	13	0	0
Pequaming Wetland	0	0	0	0	0	0	0	0	0	0	0	0	25	0
Huron Bay Wetland	0	0	0	0	0	0	0	0	0	0	0	0	585	299

Annual Priorities

- Partnership Project in Progress
- Request from Natural Resources Committee
- Availability of Green Seed
- Budget
- Waterbody

Abandoned Sites

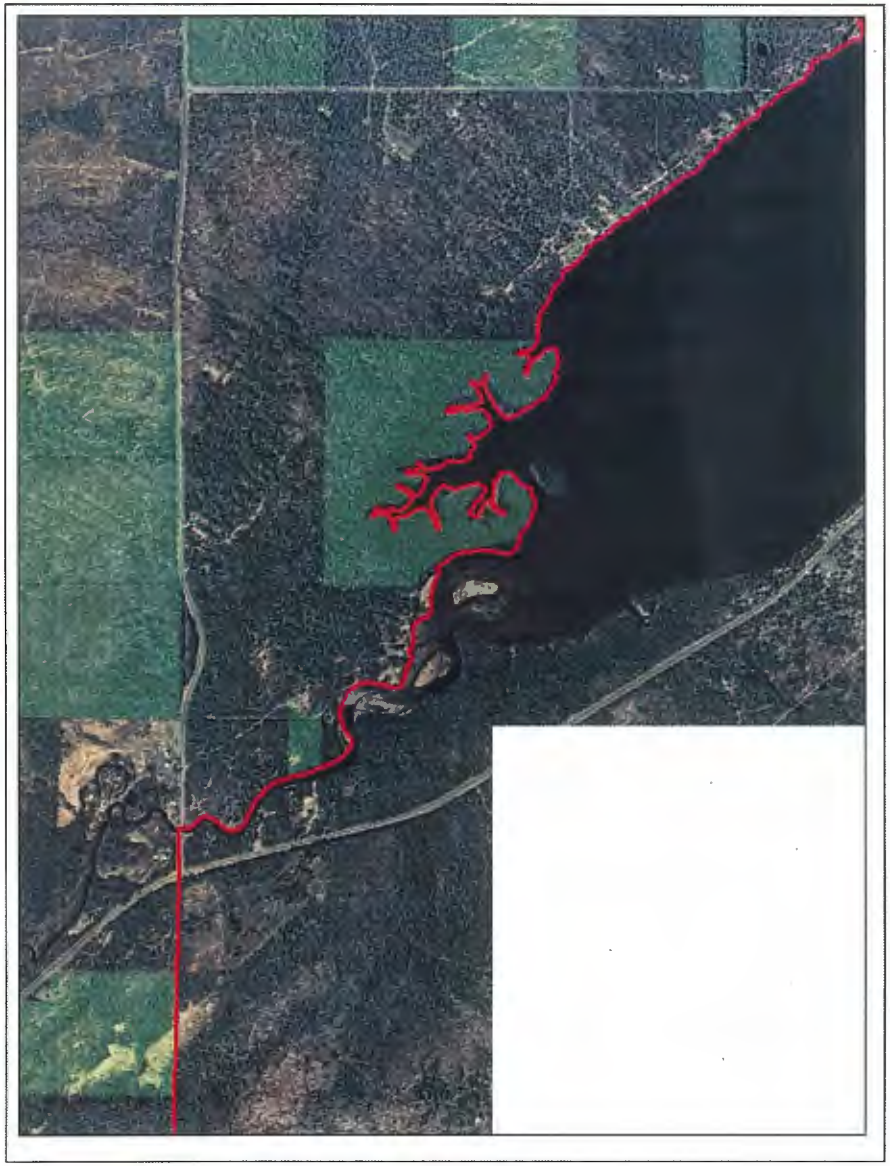
- Absence of wild rice or extremely sparse
- Water quality change
- Competition
- Budget

Small Wetlands

- Important for waterfowl
- Annual monitoring
- Plant if there is an abundance of wild

Robillard

Huron Bay



Partnerships in Restoration

Ottawa Lakes Project

Huron River watershed

The Manoomin Project

- US Forest Service
- USDA-NRCS
- Lac Vieux Desert
- Cedar Tree Institute

Sand Point Sloughs

Sand Point Sloughs Harvest

Sand Point Sloughs Processing

Assistance


Rice Bay, Lac Vieux Desert


Crooked Lake, Sylvania Wilderne
AUG 12 2009


Misery Bay, Lac Vieux Desert
AUG 12 2009


Ontonagon River, northeast of Waters

Megwetch

•Keweenaw Bay Indian Community, Rice Chiefs, Cultural Committee and Tribal Council for being supportive of the restoration of this important species.

•Lisa David, Great Lakes Indian Fish and Wildlife Commission wild rice biologist, for sharing slides and information on northern Michigan wild rice beds.

•Peter David, Great Lakes Indian Fish and Wildlife Commission wild rice biologist, for his technical support and finding us green seed annually.

•Roger LaBine, Lac Vieux Desert, for the hosting of annual camps

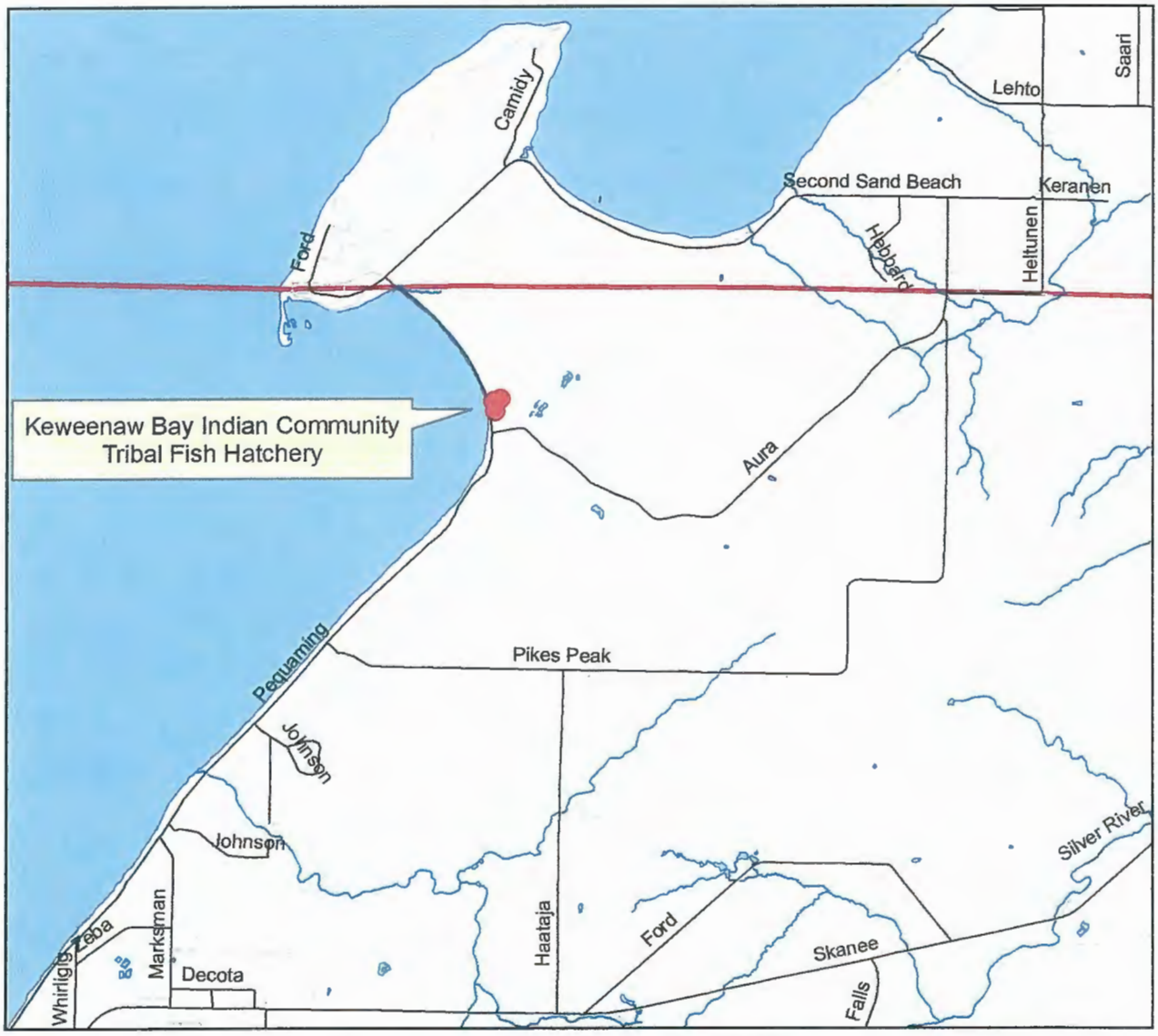
•USDA Wild Rice Establishment Conservation Sheet, April 2001
•GLIFWC Wild Rice Seeding Guidelines
•Dlutkowski, Lisa. 1994 Wild Rice Enhancement Survey for the Western U.P. GLIFWC
•LaDuke, Winona and Brian Carlson. Our Manoomin, Our Life, The Anishinaabeg Struggle to Protect Wild Rice.
•2010 Keweenaw Bay Indian Community Waterfowl Index and Wild Rice Report.
•Keweenaw Bay Indian Community Tribal Code of law: Title 10 Hunting, Fishing, Trapping and Gathering. 2003.

APPENDIX T:

KBIC Hatchery Profile, Walleye Rearing Facility Profile, Stocking Data and Information

Keweenaw Bay Indian Community
Tribal Fish Hatchery

Cartographer: Micah Petoskey



0 0.3 0.6 1.2 1.8 2.4 Miles

Legend

- Roads
- Railroad
- Rivers
- Unamed Roads
- Reservation Boundary
- Lakes
- Tribal Fish Hatchery

N W E S

Keweenaw Bay Indian Community
Hatchery Maintenance Facility Description Form - 2011

Hatchery name: Keweenaw Bay Indian Community (KBIC) Pequaming Fish Hatchery

Hatchery location: Reservation: L'Anse Indian Reservation **State:** Michigan

Hatchery Operator: KBIC **Water source:** Groundwater

Year(s) when constructed: 1989 **Year operation began:** 1989

Authorization(s) and funding source(s) for hatchery construction: Tribal hunting and fishing tribal license revenues and gaming revenues funded construction.

Estimated total investment in all hatchery facilities and equipment: $850,000

Current operations funding source(s): 1) KBIC gaming and tribal hunting/fishing license revenues; 2) BIA hatchery maintenance funds.

Ownership status of hatchery and land upon which hatchery is situated: Both are KBIC owned

Number of Tribes whose members derive benefits from hatchery products: 6 of the 1842 Treaty tribes derive benefits from our fish stocking in inland streams and Lake Superior portions of 1842 ceded territory.

Non-Indian entities who derive benefits from hatchery products: Lake Superior fishing charters, area businesses relying on sport fishers, non-Indian fishers in Lake Superior and Western U.P., Otttawa National Forest, Michigan DNR.

Assessment of contributions of hatchery products to Indian and non-Indian fisheries and economies: Positive year round area tourism impact (e.g. Baraga County annual Lake Trout Festival; winter ice-fishing for lake trout in Keweenaw Bay); Positive impact for Tribal commercial fishers as NRD staff find our hatchery lake trout present in commercial harvests during harvest monitoring. Positive impact for Ottawa National Forest and forest users through cooperative stocking of brook trout.

Current fish species worked with: Lake Trout, coaster brook trout, stream resident brook trout, walleye

Hatchery production capacities and current target production levels by species (Note and explain any differences between hatchery capabilities and current target levels): Production is at maximum of capacity in our hatchery; 50,000 lake trout yearlings (5-8"); 40,000 Jumbo River strain stream resident brook trout (4-6"), 2,000 Jumbo River strain stream resident brook trout broodstock; 6,000-7,000 Siskiwit Bay strain coaster brook trout (4-6"). A new KBIC walleye rearing pond facility at a separate location began production in 2009. Facility has two ponds and a total annual rearing capacity of approximately 25,000 walleye fingerlings.

Prepared by: Todd Warner
Natural Resource Director
Keweenaw Bay Indian Community

Date: January 22, 2011

Keweenaw Bay Indian Community
Walleye Rearing Facility Description Form - 2011

Facility name: Keweenaw Bay Indian Community (KBIC) Walleye Rearing Facility

Facility location: Reservation: L'Anse Indian Reservation **State:** Michigan

Operator: KBIC **Water source:** Surface Water

Year(s) when constructed: 2008 **Year operation began:** 2009

Authorization(s) and funding source(s) for hatchery construction: Tribal hunting and fishing tribal license revenues and gaming revenues funded construction, along with USDA-EQIP, USDA-RBEG, and USFWS Tribal Wildlife Grant Program.

Estimated total investment in walleye facility and equipment: $450,000

Current operations funding source(s): KBIC gaming and tribal hunting/fishing license revenues.

Ownership status of facility and land upon which facility is situated: Both are KBIC owned

Number of Tribes whose members derive benefits from walleye products: 6 of the 1842 Treaty tribes derive benefits from our walleye stocking in Lake Superior portions of 1842 ceded territory.

Non-Indian entities who derive benefits from walleye facility products: Lake Superior fishing charters, area businesses relying on sport fishers, non-Indian fishers in Lake Superior and Western U.P., Otttawa National Forest, Michigan DNR.

Assessment of contributions of walleye facility products to Indian and non-Indian fisheries and economies: Positive year round area tourism impact as walleye are a popular game fish targeted by tourists and local sport fishers; Positive impact for tribal harvesters who harvest for both cultural and sustenance reasons. Positive impact for tribal community through harvest of walleye by tribal members for seniors and their families.

Current fish species worked with at our Walleye Rearing Facility: Walleye (Lake Trout, coaster brook trout, stream resident brook trout are reared at our separate hatchery facility).

Walleye facility production capacities and current target production levels by species (Note and explain any differences between hatchery capabilities and current target levels): Our walleye rearing pond facility began production in 2009. Facility has two ponds and an apparent total annual rearing capacity of approximately 25,000 walleye fingerlings. We have only operated for 2-years which is not long enough to determine what our maximum capacity is for the rearing ponds.

Prepared by: Todd Warner
Natural Resource Director
Keweenaw Bay Indian Community

Date: January 22, 2011

Summary of fish Keweenaw Bay Indian Community stocked or had stocked by agreement, from 1993-2010.

Summary of brook trout stocked in 2010.

Number	Location	Stocked	Agency
15,800	Bluff Creek	April/July	KBIFH
7,000	Cascade Creek	April	KBIFH
3,000	House Creek	April	KBIFH
6,000	Perch River	April/July	KBIFH
5,000	Sidnaw Creek	April	KBIFH
3,000	Spargo Creek	April	KBIFH
3,000	Stony Creek	April	KBIFH
5,000	W.B. Sidnaw	April	KBIFH
16,249	Kelsey Creek	May	IRNFH
15,902	Zeba Creek	May	IRNFH
300	Bishop Lake	July	KBIFH
1,000	Dault's Creek	July	KBIFH
1,000	Denomme Creek	July	KBIFH
4,500	Falls River	July	KBIFH
5,830	Lake Superior	July	KBIFH
3,000	Menge Creek	July	KBIFH
324	Ontonagon River	July	KBIFH
2,000	Ravine River	July	KBIFH
6,500	Silver River	July	KBIFH
2,000	Slate River	July	KBIFH
1,000	Smith Creek	July	KBIFH
1,185	Sturgeon River	July	KBIFH
500	Sucker Creek	July	KBIFH
500	Trap Rock River	July	KBIFH
700	Two-mile Creek	July	KBIFH

32,151 2010 yearclass coasters
5,330 2009 yearclass coasters
46,000 2010 yearclass Jumbo River strain
25,185 2009 yearclass Jumbo River strain
1,000 2008 yearclass Jumbo River strain
624 2007 yearclass Jumbo River strain
110,290 Total

Total number of brook trout stocked by year.

1997	9,947
1998	12,696
1999	35,967
2000	124,074
2001	101,134 + 32,717 eggs
2002	97,963
2003	94,171
2004	68,700
2005	64,359
2006	71,088
2007	56,522
2008	72,284
2009	64,592
2010	110,290

Total **983,787 + 32,717 eggs**

Summary of lake trout stocked in 2010.

Number	Location	Stocked	Agency
6,151	Baraga	December	KBIFH

6,151 2010 yearclass Apostle Island strain

Total number of lake trout stocked by year.

1993	6,762	
1994	89,693	
1995	125,313	
1996	115,360	
1997	109,685	
1998	109,042	
1999	125,741	
2000	101,715	
2001	101,800	+ 88,324 eggs
2002	98,910	+ 3,000 fry
2003	99,901	+ 50,347 eggs
2004	90,360	
2005	91,805	
2006	50,259	
2007	72,770	+20,000 fry +44,277 eggs
2008	28,442	+12,600 eggs
2009	53,395	
2010	6,151	

Total **1,477,104 + 195,548 eggs and 23,000 fry**

Summary of walleye stocked in 2010.

Number	Location	Stocked	Agency
3,971	Pike Bay	July	KBIFH
2,821	Papin Road	July	KBIFH
3,371	L'Anse Dock	July	KBIFH
2,418	Buck's Dock	July	KBIFH

Total number of walleye stocked by year.

2002	31,426	+100,000 fry
2003	64,282	+100,000 fry
2009	16,450	
2010	12,581	

Total **124,739 +200,000 fry**

Summary of large mouth bass stocked.

Number	Location	Stocked	Agency

Total number of large mouth bass stocked by year.

2003	500

Total **500**

PRESS RELEASE – CHRIS SWARTZ - KEWEENAW BAY INDIAN COMMUNITY PRESIDENT

Keweenaw Bay Indian Community; 2010 Walleye, Brook Trout, and Lake Trout Stocking Milestones
2010 was another good year for the Keweenaw Bay Indian Community Natural Resource Department stocking program.

Walleye Rearing and Stocking; For many years our Community has wanted to develop a walleye rearing and stocking program to raise walleye for stocking into locals waters. Construction of our walleye rearing facility finished in 2008, and in 2009 we started raising walleye for stocking. The first year produced 16,450 walleye, 3-6 inches in size, which we stocked into Keweenaw and Huron Bays. 2010 was a tough year for walleye programs. Unusual spring weather seemed to affect walleye spawning success in many areas. We did however manage to produce 12,581 walleye, 3 -7 inches in size, which were stocked into the Pike Bay area of Portage Lake, and into Keweenaw and Huron Bays. Our Natural Resource Department staff thinks that many of these walleye should start reaching harvest size over the next 2-4 years. We are very proud to have this walleye stocking program operating successfully and are looking forward to continuing to build on our initial sucess.

Brook Trout; Since 1997 our Community has been stocking brook trout to restore depleted populations in the western Upper Peninsula of Michigan. The brook trout we raise for stocking is a Lake Superior basin strain we developed from the Jumbo River in the Ottawa National Forest. In 2010 we stocked 72,809 Jumbo River brook trout into selected streams in the western Upper Peninsula. Brook trout stocked varied from fry size to 6 inches in length. In addition to our Jumbo River brook trout we also stock Siskiwit Bay strain coaster brook trout into local waters. Coaster brook trout were once common along the south shore of Lake Superior, but are now fairly rare since overfishing, habitat degradation, and non-native species introductions severely reduced their numbers to a few remnant populations. In 2010 we stocked a total of 37,481 coaster brook trout into Keweenaw Bay area waters.

Since we began our brook trout rearing program in 1997, our Natural Resource Department has stocked a total of 983,787 brook trout into Western Upper Peninsula streams and rivers to help restore populations of this native trout to the area.

Lake Trout; Since 1993 our Community has raised and stocked lean lake trout into Lake Superior to help restore populations to self sustaining levels. In December of 2010 our Lake Trout stocking program

passed the 1.5 million mark for total lake trout stocked into Lake Superior since 1993. Since the founding of our Natural Resource Department our lake trout rearing and stocking program and our hatchery facility have been active participants in the Fishery Restoration Plan for Lake Superior developed by the Great Lakes Fishery Commission and we're very proud of our participation. According to our Natural Resource Department staff the lake trout that we stock make up about 50% of the lean lake trout present in lower Keweenaw Bay, helping to make Keweenaw Bay one of the best lake trout fisheries in Lake Superior. For further information please contact our Natural Resource Department at (906) 524-5757.

(Photo credit; Keweenaw Bay Indian Community Natural Resource Department)

Keweenaw Bay Indian Community; 2011 Walleye Stocking

From; Chris Swartz, President

Release date: 08/09/2011

Contact Information: Gene Mensch; Keweenaw Bay Indian Community Natural Resource Department; 906-524-5757

Baraga County, Michigan – In 2011 the Keweenaw Bay Indian Community (KBIC), Natural Resource Department walleye program had another successful year. The walleye rearing and stocking program began in 2008 and was developed to support walleye population restoration efforts in the western Lake Superior area and tribal walleye harvest activities. KBIC's current rearing capacity consists of 2 rearing ponds, each approximately 1/2 acre in size. Capacity expansion plans are being developed to add additional acreage to the current facility. 2011 walleye stocking to date include 275,000 walleye fry stocked into Portage Lake, 6,000 walleye fry stocked into Lower Keweenaw Bay, and 38,000 walleye fingerlings 2 to 4 inch in size divided between Huron Bay, Keweenaw Bay, and Portage Lake. "We're pretty happy with the results of this year's rearing effort," stated Gene Mensch, KBIC Fish and Wildlife Biologist. "It seems like we learn a little more about how to get the maximum production from our facility every year." The Natural Resource Department is currently conducting experimental extended growth rearing with an additional lot of walleye and additional stocking may be completed. The KBIC walleye program plan meets KBIC goals and objectives and broader basin-wide objectives for Lake Superior identified by the Great Lakes Fishery Commission and other organizations to support healthy sustainable native fish communities and we're proud of our success.

The hatchery was established in October of 1989. Initially housed in a tribal garage north of L'Anse, Michigan, the hatchery quickly outgrew that building. The hatchery moved to its present 14 acre location on Pequaming Bay of Lake Superior in March of 1993. This lake trout facility was completed in the fall of 1993. A brook trout facility and related storage buildings were completed in 1997.

The goal of the Keweenaw Bay's hatchery is to rear native fish for stocking into Lake Superior and adjacent streams. The hatchery presently targets the rearing of lake and brook trout. The hatchery receives 800 gallons/minute of pure well water from three deepwater wells. Production capacity is rated at 120,000 lake trout yearlings (6-8" fish) and 40,000 brook trout fingerlings. The facilities contain 64 Health incubation trays for the trout eggs, ten 100-200 gallon fry tanks, and eleven 1,500 gallon fiberglass raceways. The hatchery has a completely automated security and alarm system. This hatchery also has a 1,000 gallon fish tank distribution truck and a 200 gallon distribution tank mounted on a trailer. The entire facility is housed in 5 buildings.

The Keweenaw Bay Indian Community has invested over $700,000 in this facility to date, with half of these funds stemming from gaming profits, an indication on the Tribe's commitment to these facilities. This commitment involves not only re-stocking efforts, but tribal participation in fishery assessments, development of pertinent multi-agency fishery restoration plans, and cooperative work towards achieving a healthy fishery habitat.

APPENDIX U:

KBIC Greenhouse, and Native and Invasive Plant Species Information

Control Methods

Manual/Mechanical

* Pulling/Digging
* Mowing
* Cutting
* Girdling
* Fire/burning

Chemical control training

Chemical

* Herbicides

Biological

* Insects (beetles/weevils)
* Fungi

Galerucella beetle

Note: KBNRD prefers to use manual/mechanical and biological control whenever possible. Chemical control is only used when other control methods have not been successful.

What can you do to help?

* Stick to native plant species when landscaping around your property. For example, plant a sugar or red maple instead of the ornamental Norway maple to beautify your yard.
* Encourage use of native plant seed for roadsides and ditches
* Remove all invasive/non-native species from your property
* Plant native species for livestock feed
* Properly clean boats and lawn equipment before and after use

Landscaping with native plants

Cooperative Weed Management

The following agencies and organizations (in addition to KBNRD) represent a collaborative effort to combine resources and skills to help protect our natural resources from invasive species in Baraga county.

* Rip-It-Up
* U.S. Forest Service (USFS)
* Baraga Conservation District
* Michigan Department of Natural Resources (MDNR)
* Keweenaw Invasive Species Management Association (KISMA)
* Cedar Tree Institute
* Great Lakes Indian Fish and Wildlife Commission (GLIFWC)
* Midwest Invasive Plant Network (MIPN)
* Superior Watershed Partnership

KBNRD green house

Natural Resources Department
Keweenaw Bay Indian Community
14359 Pequaming Road
L'Anse, MI 49946

Phone: 906-524-5757
Fax: 906-524-5748

Invasive Plant Species: Identification and Control

Natural Resources Department
Keweenaw Bay Indian Community
14359 Pequaming Road
L'Anse, MI 49946

What is an Invasive Species?

An ***invasive species*** is a species that is not native to an ecosystem and may cause economic or environmental harm or harm to human health (USDA). Invasive species can be algae, plants, animals, invertebrates, or microbes (i.e. disease) and can be aquatic or terrestrial. There are more than 85 non-native species known in the Lake Superior basin. Non-native species are not always invasive (causing harm).

How do they get here?

* Introduced as ornamentals or food for livestock
* Improper cleaning of boats or lawn equipment
* Ballast water discharge (aquatic)
* Soil containing non-native plant seed (often used to vegetate roadsides)
* Garden "escapees"

The problem with invasive species

Invasive plants are typically more aggressive than native species and quickly outcompete native plants for space and resources. As a result an area once covered by native plants can quickly become a monoculture of invasive species.

Species of Concern

The following species of concern have been identified on the reservation. Assessment of distribution and location and/or potential control methods are being developed for these species.

Purple loosestrife

Purple Loosestrife (*Lythrum salicaria*) is a perennial that spreads rapidly in wetland ecosystems, degrading the quality of the wetland. KBIC has identified purple loosestrife in several locations on the L'Anse Indian Reservation. KBIC decided to use biological control, *Galerucella* beetles, at three areas. KBIC conducts annual monitoring and control of purple loosestrife within reservation boundaries.

Species of Concern

Spotted knapweed

Spotted Knapweed (*Centaura stoebe*) with its ability to spread in dry, sandy areas is an invasive seen in increasing numbers at Sand Point and alongside roads. Manual control at Sand Point has been done by KBIC youth crews with Superior Watershed Partnership and Ojibwa Community College volunteers. Plants are being dug up and disposed of and 2011 plans are to begin replacing with native plants and seed.

Eurasian watermilfoil (*Myriophyllum spicatum*) is a submerged aquatic plant native to Europe, Asian, and northern Africa that has been known in North American since the 1940's. It was first identified in Lake Superior in 2006. Eurasian watermilfoil grows rapidly in the spring and out competes our native plants for sunlight and space. An assessment of watermilfoil at Sand Point and manual/biological control will take place summer 2011.

Eurasian watermilfoil

Japanese barberry

Japanese Barberry (*Berberis thunbergii*) is native to Japan and was first introduced to the U.S. in the late 1800's. It is found in a variety of habitats and as an ornamental. Japanese barberry has been noted during forestry work in several areas on the reservation. Large quantities are concentrated over multiple ownership lands near the tribal walleye pond property connected to the L'Anse school property.

Several species of **exotic honeysuckle** (*Lonicera* spp.) have been introduced to the U.S. from Asia. Honeysuckle is a perennial vine that can quickly crowd out native plant species. At least one species of exotic honeysuckle has been identified on the reservation. Recommended control methods include removal of seedlings or small plants, herbicide application and burning.

Bell's honeysuckle

Species of Concern

Marsh thistle

Marsh thistle (*Cirsium palustre*) is native to Europe and is an aggressive colonizer in a variety of habitats from wet areas to agricultural fields. Plants can grow over 6ft tall and are spiny with whitish hairs. Recommended control methods include hand pulling, mowing, herbicides, and the weevil *Rhinocyllus conicus*.

Giant knotweed (*Polygonum sachalinense*) is an herbaceous perennial that can grow up to 12ft tall. It is native to Japan and was introduced as an ornamental and for erosion and forage control. This plant grows in various sites including. Dense stands quickly form and choke out native vegetation and clog small waterways. Recommended control methods are the same as those for exotic honeysuckle.

Giant knotweed

Common buckthorn

Common buckthorn (*Rhamnus cathartica)* and **glossy buckthorn** (*Rhamnus frangula*) are tall shrubs native to Eurasia. Buckthorn is found in a variety of habitats. They grow quickly and crowd out native plants. Recommended control methods include burning, girdling, and use of herbicides (or some combination of several methods).

Watch List

Common reed (*Phragmites australis*) is a perennial wetland grass native to Europe. *Phragmites* grows in dense stands, crowding out native species and causes other disturbances and hazards. Treatments include herbicide application followed by mechanical removal.

Common reed

Garlic mustard

Garlic mustard (*Alliaria petiolata*) is native to Europe and was introduced to the U.S. in the 1800's. Garlic mustard is found in upland forests, roadsides, trail edges, and disturbed areas. It prefers shady, mesic areas with alkaline soil. It may be found in other conditions).

Scientific Name	Common Name
Abies balsamea	balsam fir
Acer rubrum	red maple
Ace saccharum	sugar maple
cer spicatum	mountain maple
Actaea sp.	baneberry
Actaea rubra	red baneberry
Agrimonia sp.	agrimony
Agrostis hyemalis	ticklegrass
Alisma plantago-aquatica	water-plantain
Alopecurus aequalis	short-awned foxtail
Anaphalis margaritacea	pearly everlasting
Anemone canadensis	Canada anemone
Anemone quinquefolia	wood anemone
Aralia nudicaulis	wild sarsaparilla
Arisaema triphyllum	jack-in-the-pulpit
Asclepias incarnata	swamp milkweed
Aster lanceolatus	eastern lined aster
Aster lateriflorus	side-flowering aster
Aster macrophyllus	big-leaved aster
Aster puniceus	swamp aster
Aster umbellatus	tall flat-top white aster
Aster sp.	aster
Asteraceae	aster family
Athyrium filix-femina	lady fern
Betula alleghaniensis	yellow birch
Betula papyrifera	paper birch
idens cernuus	nodding bur-marigold
Bidens frondosus	common beggar-ticks
Bidens sp.	beggar-ticks, tickseed
Botrychium sp.	grape-fern, moonwort
Brachyelytrum erectum	long-awned wood grass
Brasenia schreberi	water shield
Bromus ciliatus	fringed brome
Bromus sp. (maybe non-native)	brome (maybe non-native)
Calamagrostis canadensis	blue-joint grass
Calla palustris	water-arum
Callitriche palustris	water-starwort
Calopogon tuberosus	grass-pink
Caltha palustris	marsh-marigold
Campanula aparinoides	marsh bellflower
Chara sp.	stonewort (alga)
Chelone glabra	turtlehead
Chrysosplenium americanum	golden saxifrage
Cicuta bulbifera	water hemlock
Cinna latifolia	wood reedgrass
Circaea alpina	small enchanter's-nightshade
Cirsium palustre	**marsh-thistle**
rsium sp. (some may be non-native)	thistle (some may be non-native)
Cladium mariscoides	twig-rush
Clematis virginiana	virgin's bower

Scientific Name	Common Name
Clintonia borealis	bluebead-lily
Coptis trifolia	goldthread
Cornus canadensis	bunchberry
Carex arctata	sedge
Carex brunnescens	sedge
Carex canescens	sedge
Carex chordorrhiza	sedge
Carex crinita/gynandra	sedge
Carex cryptolepis	sedge
Carex diandra	sedge
Carex disperma	sedge
Carex exilis	sedge
Carex gracillima	sedge
Carex hystericina	sedge
Carex intumescens	sedge
Carex lacustris	sedge
Carex lasiocarpa	sedge
Carex leptalea	sedge
Carex leptonervia	sedge
Carex limosa	sedge
Carex livida	sedge
Carex oligosperma	sedge
Carex pauciflora	sedge
Carex paupercula	sedge
Carex pedunculata	sedge
Carex retrorsa	sedge
Carex scabrata	sedge
Carex stipata	sedge
Carex stricta	sedge
Carex trisperma	sedge
Carex utriculata	sedge
Carex sp.	sedge
Carex (sect Ovales)	sedge
Carex (sect Stellulatae)	sedge
Daucus carota	**queen-anne's lace**
Drosera intermedia	sundew
Drosera rotundifolia	round-leaved sundew
Dryopteris carthusiana	spinulose woodfern
Dryopteris cristata	crested shield fern
Dryopteris intermedia	evergreen woodfern
Dryopteris sp.	woodfern
Dulichium arundinaceum	three-way sedge
Eleocharis ovata	spike-rush
Eleocharis smallii	spike-rush
Eleocharis sp.	spike-rush
Elymus sp.	wild-rye
Epigaea repens	trailing arbutus
Epilobium leptophyllum	fen willow-herb
Epilobium sp.	willow-herb
Epipactis helleborine	**helleborine**
Equisetum arvense	common horsetail
Equisetum fluviatile	water horsetail
Equisetum palustre	marsh-horsetail

Scientific Name	Common Name
Equisetum scirpoides	dwarf scouring rush
Equisetum sylvaticum	woodland horsetail
Equisetum sp.	horsetail
riocaulon septangulare	pipewort
Eriophorum spissum	cotton-grass
Eriophorum tenellum	cotton-grass
Eriophorum virginicum	tawny cotton-grass
Eriophorum sp.	cotton-grass
Eupatorium maculatum	joe-pye weed
Eupatorium perfoliatum	common boneset
Euthamia graminifolia	grass-leaved goldenrod
Fragaria virginiana	wild strawberry
Fraxinus nigra	black ash
Fraxinus pennsylvanica	red ash, green ash
Fraxinus sp.	ash
Galium asprellum	rough bedstraw
Galium tinctorium	stiff bedstraw
Galium sp.	bedstraw
Gaultheria hispidula	creeping snowberry
Gaultheria procumbens	wintergreen
Gentiana sp.	gentian
Geum sp.	avens
Glyceria borealis	northern manna grass
Glyceria canadensis	rattlesnake grass
Glyceria grandis	reed manna grass
Glyceria striata	fowl manna grass
lyceria sp.	manna grass
Gymnocarpium dryopteris	oak fern
Hepatica americana	round-lobed hepatica
Heracleum lanatum (H. maximum)	cow-parsnip
Hieracium sp. (possibly non-native)	hawkweed (possibly non-native)
Hypericum sp.	St. John's-wort
Hystrix patula	bottlebrush grass
Impatiens capensis	spotted touch-me-not
Iris versicolor	wild blue flag
Juncus brevicaudatus	rush
Juncus canadensis	Canadian rush
Juncus effusus	soft-stemmed rush
Juncus sp.	rush
Lamiaceae	mint family
Laportea canadensis	wood nettle
Larix laricina	tamarack
Leersia oryzoides	cut grass
Lemna minor	small duckweed
Linnaea borealis	twinflower
Ludwigia palustris	water-purslane
Lycopodiella inundata ycopodium inundatum)	bog clubmoss
Lycopodium lucidulum (Huperzia lucidula)	shining clubmoss
Lycopodium obscurum	ground-pine

Scientific Name	Common Name
Lycopus americanus	common water horehound
Lycopus uniflorus	northern bugle weed
Lycopus sp.	bugle weed
Lysimachia terrestris	swamp candles
Lysimachia thyrsiflora	tufted loosestrife
Lysimachia sp.	loosestrife
Lythrum salicaria	**purple loosestrife**
Maianthemum canadense	Canada mayflower
Matteuccia struthiopteris	ostrich fern
Mentha arvensis	wild mint
Menyanthes trifoliata	buckbean
Mimulus ringens	monkey-flower
Mitchella repens	partridge berry
Mitella nuda	naked mitrewort
Myosotis sp. (possibly non-native)	forget-me-not (possibly non-native)
Nuphar variegata	yellow pond-lily
Onoclea sensibilis	sensitive fern
Orthilia secunda	one-sided pyrola
Osmunda cinnamomea	cinnamon fern
Osmunda claytoniana	interrupted fern
Osmunda regalis	royal fern
Osmunda sp.	fern
Oxalis sp.	wood-sorrel
Parthenocissus sp.	creeper
Petasites frigidus (P. palmatus)	sweet-coltsfoot
Phalaris arundinacea (some may be non-native)	reed canary grass (some may be non-native)
Phegopteris connectilis (Thelypteris phegopteris)	northern beech-fern
Pinus banksiana	jack pine
Picea glauca	white spruce
Picea mariana	black spruce
Picea sp.	spruce
Pinus resinosa	red pine
Pinus strobus	white pine
Poaceae	grass family
Poa palustris	fowl meadow grass
Pogonia ophioglossoides	rose pogonia
Polygonum amphibium	water-smartweed
Polygonum cilinode	fringed false buckwheat
Polygonum hydropiper	water-pepper
Polygonum sp.	smartweed
Pontederia cordata	pickerel weed
Populus balsamifera	balsam poplar
Populus tremuloides	trembling, quaking aspen
Potamogeton epihydrus	ribbon-leaved pondweed
Potamogeton gramineus	pondweed
Potamogeton natans	pondweed
Potentilla norvegica	rough cinquefoil
Potentilla palustris	marsh cinquefoil
Prenanthes alba	white lettuce

Scientific Name	Common Name
Prunus serotina	wild black cherry
Prunella vulgaris	**lawn prunella**
Pteridium aquilinum	bracken fern
uccinellia pallida	puccinellia
Pyrola elliptica	large-leaved shinleaf
Pyrola sp.	pyrola
Quercus rubra	red oak
Ranunculus acris	**common buttercup**
Ranunculus sp. (possibly non-native)	buttercup (possibly non-native)
Rhynchospora alba	beak-rush
Rhynchospora capillacea	beak-rush
Rhynchospora fusca	beak-rush
Rubus pubescens	dwarf raspberry
Rumex orbiculata	great water dock
Rumex sp. (possibly non-native)	dock (possibly non-native)
Sagittaria sp.	arrowhead
Sanguinaria canadensis	bloodroot
Sarracenia purpurea	pitcher-plant
Scheuchzeria palustris	arrow-grass
Scirpus atrovirens	bulrush
Scirpus cespitosus	bulrush
Scirpus cyperinus	wool-grass
Scirpus microcarpus	bulrush
Scirpus validus	softstem bulrush
cirpus sp.	bulrush
Scutellaria galericulata	common skullcap
Scutellaria lateriflora	mad-dog skullcap
Senecio aureus	golden ragwort
Sium suave	water-parsnip
Smilacina trifolia	false mayflower
Solanum dulcamara	**bittersweet nightshade**
Solidago canadensis	Canada goldenrod
Solidago flexicaulis	broad-leaved goldenrod
Solidago uliginosa	bog goldenrod
Solidago sp.	goldenrod
Sparganium americanum	American bur-reed
Sparganium sp.	bur-reed
Spirodela polyrhiza	great duckweed
Symplocarpus foetidus	skunk-cabbage
Tanacetum vulgare	**garden tansy**
Taraxacum officinale	**common dandelion**
Thalictrum dasycarpum	purple meadow-rue
Thelypteris palustris	marsh fern
Thuja occidentalis	northern white cedar
Tilia americana	basswood
Triadenum fraseri	marsh St. John's-wort
Trientalis borealis	starflower
illium cernuum	nodding trillium
suga canadensis	hemlock
Typha sp. (some may be non-native)	cattail (some may be non-native)

Scientific Name	Common Name
Ulmus americana	American elm
Urtica dioica	nettle
Utricularia intermedia	flat-leaved bladderwort
Utricularia vulgaris	great bladderwort
Utricularia sp.	bladderwort
Vaccinium macrocarpon	large cranberry
Vaccinium oxycoccos	small cranberry
Vaccinium sp.	cranberry
Verbena sp.	vervain
Veronica sp. (some may be non-native)	speedwell (some may be non-native)
Viola sp.	violet
Xyris montana	yellow-eyed-grass
Zizania aquatica	wild-rice
Abies balsamea	balsam fir
Acer rubrum	red maple
Acer saccharum	sugar maple
Betula alleghaniensis	yellow birch
Betula papyrifera	paper birch
Fraxinus nigra	black ash
Fraxinus pennsylvanica	red ash, green ash
Fraxinus sp.	ash
Larix laricina	tamarack
Picea glauca	white spruce
Picea mariana	black spruce
Picea sp.	spruce
Pinus banksiana	jack pine
Pinus strobus	white pine
Populus balsamifera	balsam poplar
Populus tremuloides	trembling, quaking aspen
Prunus serotina	wild black cherry
Thuja occidentalis	northern white cedar
Tilia americana	basswood
Tsuga canadensis	hemlock
Ulmus americana	American elm
Abies balsamea	balsam fir
Acer rubrum	red maple
Acer saccharum	sugar maple
Acer spicatum	mountain maple
Alnus incana var. americana	tag alder
Amelanchier sp.	sugar plum, juneberry
Andromeda glaucophylla	bog rosemary
Aronia prunifolia	black chokeberry
Betula alleghaniensis	yellow birch
Betula papyrifera	paper birch
Chamaedaphne calyculata	leatherleaf
Cornus sericea	red osier dogwood
Corylus cornuta	beaked hazelnut
Cornus sp.	dogwood

Scientific Name	Common Name
Fraxinus nigra	black ash
Fraxinus pennsylvanica	red ash, green ash
Fraxinus sp.	ash
ex verticillata	winterberry, Michigan holly
Kalmia polifolia	bog laurel
Larix laricina	tamarack
Ledum groenlandicum	Labrador tea
Lonicera canadensis	American fly honeysuckle
Myrica gale	sweet gale
Nemopanthus mucronatus	mountain holly
Picea glauca	white spruce
Picea mariana	black spruce
Picea sp.	spruce
Pinus banksiana	jack pine
Pinus resinosa	red pine
Pinus strobus	white pine
Populus balsamifera	balsam poplar
Populus tremuloides	trembling, quaking aspen
Prunus serotina	wild black cherry
Prunus virginiana	chokecherry
Prunus sp.	cherry
Rhamnus alnifolia	alder-leaved buckthorn
Ribes lacustre	swamp black currant
Ribes triste	swamp red currant
Ribes sp.	currant
Rosa palustris	swamp rose
osa sp.	rose
Rubus idaeus	raspberry
Rubus sp.	Rubus
Salix pedicellaris	bog willow
Salix sp.	willow
Sambucus canadensis	common elderberry
Sambucus sp.	elderberry
Spiraea alba	meadowsweet
Taxus canadensis	Canada yew
Thuja occidentalis	northern white cedar
Tilia americana	basswood
Tsuga canadensis	hemlock
Ulmus americana	American elm
Vaccinium angustifolium	blueberry
Vaccinium myrtilloides	Canada blueberry
Viburnum lentago	nannyberry
Viburnum opulus var. americanum	highbush cranberry
Sphagnum spp.	peat mosses

Keweenaw Bay Indian Community
Strategic Timber Harvesting Plan

*** FY 2005-2010 ***

Prepared for

United States Department of the Interior
Bureau of Indian Affairs
&
Keweenaw Bay Indian Community

Prepared by

Jeff Kitchens
Michigan Agency Forester

INTRODUCTION & PURPOSE

The Keweenaw Bay Indian Community (KBIC) has three areas of land, the L'anse Reservation in Baraga, MI, the Marquette Casino located on a parcel of land in Marquette County, MI, and both tribal and allotted lands scattered throughout Ontonagon county. The L'Anse Reservation was created by the Treaty of 1854. Originally composed of 54,664 acres, most of this acreage was allotted to individuals. By 1910, most of the commercial timber had been cut, and many areas were exposed to extensive wildland fires. Currently KBIC has 14,735.48 acres of trust land (22 in Marquette and 600 in Ontonagon) and over 3,500 acres of fee lands, many of which are in application for trust. Approximately 85% of the total acreage is forested.

In 1976, the BIA-Michigan Agency was created in Sault Ste. Marie, MI. Prior to that, forestry activities were coordinated from the Great Lakes Agency, in Ashland, Wisconsin. Until 1991, the Baraga Field Office consisted of a forester, forest technician, clerk/typist, and two conservation officers. Since then, federal budget cuts have reduced the office staff to only that of the forester and a fuels technician. In the mid 1990s KBIC received federal funding to contract the development of a Forest Management Plan (FMP) with Michigan Technological University, School of Forestry. Final approval of the plan was achieved in April 1997. The plan was composed of an inventory analysis, forest resource protection plan, forest benefits economic analysis, and a timber management program implementation plan.

According to the Timber Management Program Implementation Plan for the Keweenaw Bay Indian Community (KBIC), final revision 1996, it is the goal of the tribe to maintain and enhance health, productivity, and diversity of its forest land holdings while producing revenue and employment opportunities for tribal members by harvesting wood products and providing for recreation opportunities. According to records attained from the Bureau of Indian Affairs (BIA) Michigan Agency Forestry Office, from 1990 to 2004 1,980 acres were harvested for a total volume of 17,682.08mbf (see table 1 below). Of the total acres treated, 850 were tribal trust, whereas 1,130 were allotments held in trust. The total value of timber sales completed from 1990 to 2004 was $682,688.61.

Table 1: Acreage, volumes, and values of contracted timber sales at KBIC from 1990 to 2004.

Year*	Total Tribal Trust Acres	Total Tribal Trust Volume	Total Tribal Trust Value	Total Allotment Trust Acres	Total Allotment Trust Volume	Total Allotment Trust Value	Total Trust Acres	Total Trust Volume	Total Trust Value
1990	120	106.77mbf	$11,299.80				120	106.77mbf	$11,299.80
1991	80	196.39mbf	$2,803.45				80	196.39mbf	$2,803.45
1992	120	349.87mbf	$4460.23				120	349.87mbf	$4,460.23
1993	160	1412.29mbf	$26,514.72				160	1412.29mbf	$26,514.72
1994				40	774.00mbf	$21,162.24	40	774.00mbf	$21,162.24
1995	40	248.88mbf	$8,733.12	80	800.37mbf	$23,773.19	120	1049.25mbf	$32,506.31
1996**							0	0.00mbf	$0.00
1997	80	1274.14mbf	$44,647.28	80	729.36mbf	$20,169.31	160	2003.50mbf	$64,816.59
1998				80	173.45mbf	$11,892.88	80	173.45mbf	$11,892.88
1999	120	588.70mbf	$15,195.85	80	827.33mbf	$21,588.49	200	1416.03mbf	$36,784.34
2000				440	4,719.60mbf	$196,610.83	440	4,719.60mbf	$196,610.83
2001	130	976.87mbf	$51,541.99	80	1,087.56mbf	$38,412.51	210	2064.43mbf	$89,954.50
2002**							0	0.00mbf	$0.00
2003				120	2,206.07mbf	$122,360.52	120	2,206.07mbf	$122,360.52
2004				130	1,210.43mbf	$61,522.20	130	1,210.43mbf	$61,522.20
14 Year Average	60	368.14mbf	$11,799.75	80	894.87mbf	$36,963.73	140	1,263.01mbf	$48,763.47
Total	850	5,153.91mbf	$165,196.44	1,130	12,528.17mbf	$517,492.17	1,980	17,682.08mbf	$682,688.61

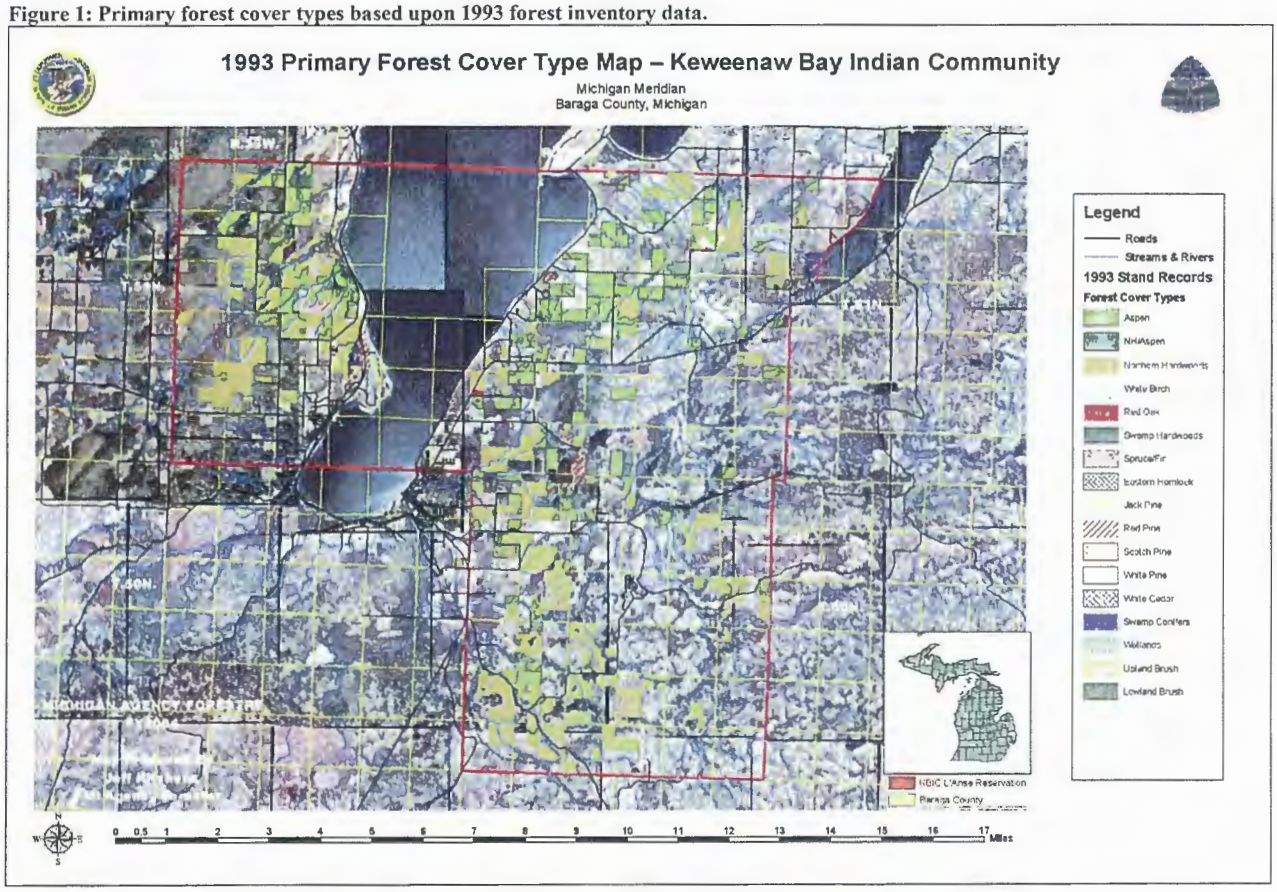
***: Year was determined by the date on the report for timber cut for each individual timber sale contract. This does not necessarily show an accurate distribution of harvested volumes and values/year.**

****: Although 1996 and 2002 show zero values for column totals, products were being harvested during these years. However, no reports of timber cut were completed or sales closed during those years.**

From 1991 through 1993 a stand exam inventory of KBIC forested trust lands was conducted to determine volume, value, and diversity of timber resources within the reservation. Valuable information in regards to priority of timber

related activities (e.g. thinning, timber sale, planting, etc.) and suggestions toward silvicultural prescriptions was collected and eventually inputted into a digital database (see figure 1 below). According to this data, of the 13,934 acres of commercial timber present in 1993 68% (9,501 acres) were considered at high risk, overstocked, or mature and ready for a commercial cut. Fifty-two percent (7,252 acres) of commercial timber acreage was identified as a priority 1 by the 1991-1993 stand exam data (see figure 2 below).

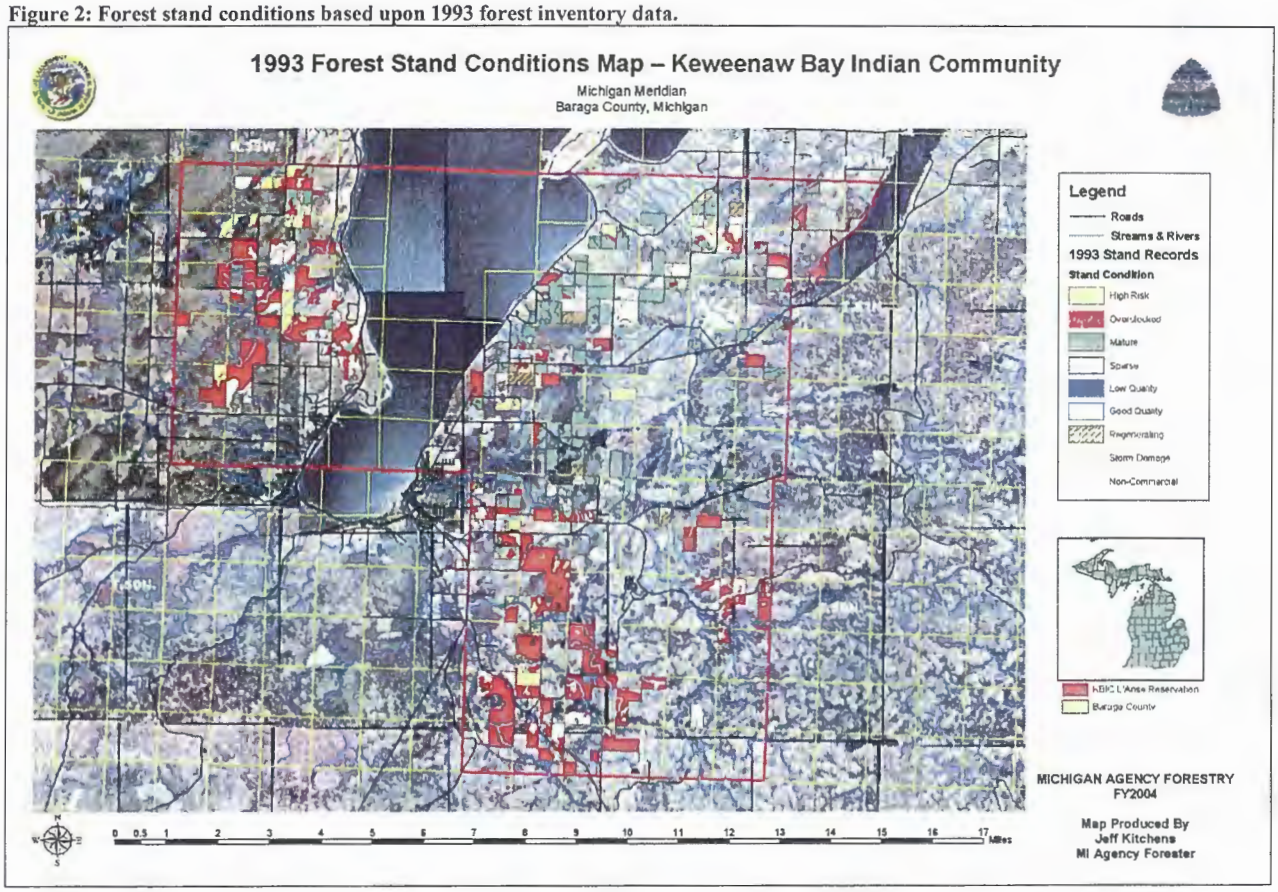
Figure 1: Primary forest cover types based upon 1993 forest inventory data.



Another important issue was the fact that around 4,000 acres were considered high-risk or mature aspen (*P. tremuloides* and *P. grandidentata*). These were stands with a significant component of mature to overmature aspen, greater than 50 years old, of which most had begun to decline and would no longer be merchantable in the next 10 to 20 years. A recent aspen sale on KBIC lands grossed a total of $26,851 from the aspen component alone, which covered an estimated 43 acres. Based upon the above numbers there is a high risk that KBIC tribal members and heirs to Allotments within the KBIC reservation could loose $1 to $2 million from aspen not commercially harvested prior to its decline.

Aspen is not the only commercial product at risk. Over two thousand acres of mixed northern hardwood were identified as needing some sort of treatment. Most of these stands identified were considered ready for a commercial, as opposed to a precommercial or timber stand improvement thinning. Although accurate numbers are not available for determining the total volumes and subsequent values from loss of merchantable northern hardwood timber due to overstocked stands and decline, it is conceivable that dollar amounts would be equal, if not more, to the money lost from unharvested declining aspen.

Figure 2: Forest stand conditions based upon 1993 forest inventory data.



Give the information presented above it is clear that something needs to be done to better manage KBIC's timber resource and increase harvesting rates. If average timber harvesting activities remain the same it will take at least 40 years to complete the harvesting of all priority one stands within forested trust lands on the KBIC reservation and over 50 years to bring all overmature, mature, and high-risk stands into healthier more productive conditions (e.g. to have them meet their silvicultural goals).

Currently the calculated annual allowable cut (AAC) for commercial timberland on the L'Anse reservation is 3,000mbf. However, the AAC has only been met once in the last 14 years. About 140 to 160 acres on average are cut annually resulting in volumes much lower than the AAC. This plan suggests that the 400 to 500acres/year need to be treated to reduce the backlog of commercial timber needing to be harvested. Along with this the AAC for the KBIC L'Anse Reservation should be increased from 3,000mbf to over 4,000mbf. The accelerated cut program should reduce the number of years it would take to cut priority 1 stands from 40 years to less than 20.

The objectives of the following plan are to:

1. Catch the value of declining forest stands
2. Reduce the backlog of acres not harvested to meet the AAC.
3. Increase overall forest health and productivity
4. Increase timber sale preparation and administration efficiency
5. Increase tribal involvement and education in regards to the timber management program on the L'Anse Reservation of the Keweenaw Bay Indian Community.

This plan is not a forest management plan and in no way does it replace the current forest management plan. It is simply a strategic timber harvesting plan aimed at meeting the guidelines, goals, and objectives outlined by the current KBIC forest management plan. This plan does not account for forest development projects such as timber stand improvement projects (TSI) and plantings.

TIMBER HARVESTING PLAN

The following five sections identify harvesting schedules/plans on an annual basis for 2005 through 2010. Table 2 summarizes these sections. Dates for both setup and harvest cover two-year rather than one-year periods. This was done to account for possible changes in the harvest schedule as well as time lags that often occur between the time a timber sale is sold and actually cut. Acres listed in table 2 are not necessarily the final number of acres to be treated in a timber sale. These acres do not account for non-forested areas and wetlands, buffers around waterways and roads, and areas of non-merchantable timber. The actual acreage to be treated in a single timber sale may be much less than is currently listed in table 2.

Three different forestry prescriptions are suggested in table 2; hardwood thinning, aspen clearcut, and aspen removal. They are described below.

- **Hardwood Thinning**: Individual hardwood trees are marked throughout a stand for removal. Most trees are marked because of defect, presence of disease, are at risk from declining, are mature or overmature, and/or because they will allow healthier, more vital trees to grow better. This is in no way like a clearcut.
- **Aspen Clearcut**: Aspen is an interesting species in that it can reproduce from seed, but also from small buds (sprouts) located on the roots. What is even more interesting is that aspen trees in an aspen stand are not "individuals", but all part of the same root system. Most often aspen does not regenerate well enough from seeds to maintain a population. However, aspen does very well when the overstory is removed. The biology and physiology of this is complicated, but basically aspen stores a great deal of energy in its roots. When the overstory is killed, that energy is used to initiate the growth of its root sprouts and perpetuate new trees. Because aspen roots are all connected, the removal of a few individual trees does not create enough of an energy release to start all the new individuals growing. Therefore, to successfully restock/regenerate a dying, mature aspen stand, the best way is to kill off the overstory and allow the roots (which remain alive) to grow the next generation of trees. Aspen clearcuts are good for wildlife, especially woodcock, which is a species noted as declining in the Upper Peninsula.
- **Aspen Removal**: Taking into account what was said above, sometimes it is not prudent to clearcut whole aspen stands. This is especially true when an aspen stand has transitioned to a mixed hardwood stand. Once an aspen stand has become a mixed hardwood stand it can be hard to maintain the aspen component. In a case like this it is best to cut down and remove all mature aspen so as to catch their economic value, while leaving behind young and intermediate aged individuals. However, in some cases small 5acre clearcuts within an established hardwood stand can rejuvenate patches of aspen, thus preserving the aspen component, while maintaining most of the established hardwoods.

All proposed timber sales will comply with the KBIC Forest Management Plan, BIA CFR 25, Best Management Practices (as outlined in both Michigan and Wisconsin forest management guidelines), and NEPA. All sales proposed in sections 2-5 will require archeological surveys in the form of shovel tests prior to advertisement. These tests will be coordinated through the BIA MI Agency forestry office. However, the MI Agency forestry office will be required to work directly with the KBIC tribal historical preservation office (THPO) in the planning of all archeological surveys. The SHPO will also be consulted with prior to advertising any timber sale described below. The KBIC cultural resource committee has already been consulted regarding this plan and will be further included as the planning processes continue. If any cultural resources are encountered during a timber sale, all operations will be closed down until further consultation from KBIC and SHPO representatives is acquired.

Natural, like cultural, resources will also be monitored and protected. Wetlands and waterways will be protected through the use of Best Management Practices (BMPs) and buffers of approximately 100ft on either side of the lake, river, or stream. However, some buffers may be adapted to best match the local topography (e.g. be increased to cover an entire drainage or wet area). All water quality monitoring by the KBIC Natural Resources Department (NRD) will be supported and encouraged. For all timber sales, conifers such as hemlock, white pine, cedar, and spruce, which can provide valuable wildlife habitat, will be maintained at appropriate stocking levels regardless of the prescription. Oak, given its high cultural and resource value, will also be protected and favored on all sites. The USF&W will be consulted in regards to all planned timber sales. Furthermore, the KBIC NRD office will be notified prior to the start of any and all harvesting activities.

Logging operations will be restricted to dry and/or frozen ground and rutting will not be permitted. No new roads will be established and all routes maintained for trucks and other heavy equipment will be closed upon completion

of harvesting activities. Aesthetics will be taken into account on all timber sales. Buffers of approximately 300ft will be used along well-traveled roadways and high-use recreations areas (e.g. ski trails). However, in areas where stand densities may not be high, buffers may be increased so as to prevent unwanted visual disruptions.

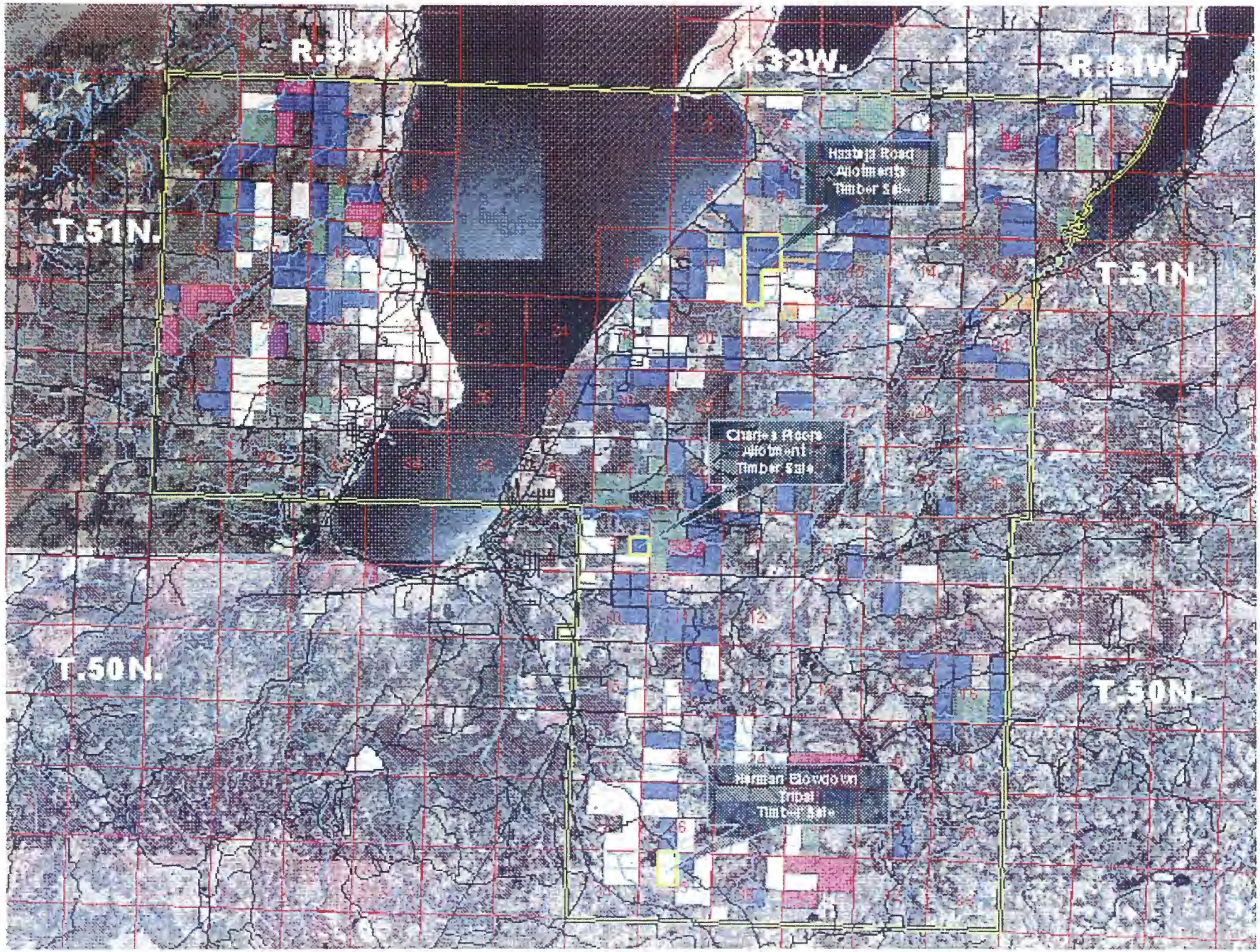
All timber sales approved on tribal trust lands, which are not allotted to individual heirs, will only be open to contractors who are certified as tribal business according to the regulations established by KBIC. All timber sales approved on Allotments in trust will be subject to open market bidding processes.

Table 2: A five-year summary of commercial timber sale projects on the KBIC L'Anse Reservation.

Unit Name	Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
SECTION 1								
Herman Blowdown	Tribal	E ½ NW ¼ Sec35 T50N R33W	80	308	42, 43, 44 45, 46, 47	Hardwood Thinning	FY04-05	FY05-06
Charles Picore	Allotment	NE ¼ SW ¼ Sec 3 T50N R33W	40	306	856	Aspen Clearcut & Hardwood Thinning	FY04-05	FY05-06
Haataja Road Allotments*	Allotment	S ½ NW ¼ Sec 16 T51N R32	240	305	807 806 820-824	Aspen Clearcut & Hardwood Thinning	FY04-05	FY05-06
SECTION 2								
Dault's Creek 1	Tribal	E ½ NW ¼ Sec 27 T50N R33W	80	308	1, 2, 3 4, 5	Hardwood Thinning & Aspen Clearcut	FY05-06	FY06-07
Herman Road 1	Tribal	NE ¼ SE ¼ Sec 27 T 50N R33W	40	308	8, 9, 11	Hardwood Thinning	FY05-06	FY06-07
North Beartown Road Allotments**	Allotments	W ½ Sec 4 & N ½ NW ¼ T51N R33W	400	302	801 – 819, omit 814	Aspen Clearcut & Hardwood Thinning	FY05-06	FY06-07
SECTION 3								
Dault's Creek 2	Tribal	W ½ NE ¼ Sec 27 T50N R33W	80	308	2, 4, 6, 7	Hardwood Thinning & Aspen Clearcut	FY06-07	FY07-08
Herman Road 2	Tribal	SE ¼ SE ¼ Sec 27 T 50N R33W	40	308	8, 9, 11	Hardwood Thinning	FY06-07	FY07-08
Dynamite Hill Road Allotments***	Allotments	NW ¼ Sec 10 & S ½ SE ¼ Sec 3 T50N R33W	240	306 & 307	904, 905 912 801-807	Aspen Removal & Hardwood Thinning	FY06-07	FY07-08
SECTION 4								
Dault's Creek 3	Tribal	E ½ NE ¼ See27 T50N R33W	80	308	6, 8, 58	Hardwood Thinning & Aspen Clearcut	FY07-08	FY08-09
Herman Road 3	Tribal	SE ¼ SE ¼ Sec 27 T 50N R33W	40	308	8, 9, 11	Hardwood Thinning	FY07-08	FY08-09
Linden Creek Allotments****	Allotments	Sec 1& 2 T50N	240	306	865-888	Aspen Clearcut & Hardwood Thinning	FY07-08	FY08-09
SECTION 5								
Industrial Park Tribal	Tribal	NW ¼ Sec 29 T51N R33W	240	301	14, 15 16	Hardwood Removal For Development	FY08-09	FY09-10
Herman Road 4	Tribal	SW ¼ SW ¼ Sec36 T50N R33W	40	308	55, 56	Hardwood Thinning	FY08-09	FY09-10
Pikes Peak Road Allotments*****	Allotments	Sec 10 & 15 T51N R32W	240	303 & 304	814 818, 819 820, 830	Aspen Clearcut & Hardwood Thinning	FY08-09	FY09-10
		Total:	**2,120**					

*** (Mary Cardinal, Charlotte Pine, & Helen Funke)**
**** (Awkewayzence Allotments, Louis Jendreau, & Catherine Negawnosawqua)**
***** (Delia Pecore, Yabewaywedung, & Kawbebonoka)**
****** (Catherine Valentine, Sophia Lamson, & Rosalie Robillard)**
******* (Mawdwaysenoquay, Rosa Burns, & Daniel Skye)**

SECTION 1: FY 2005-2006 HARVEST PLAN

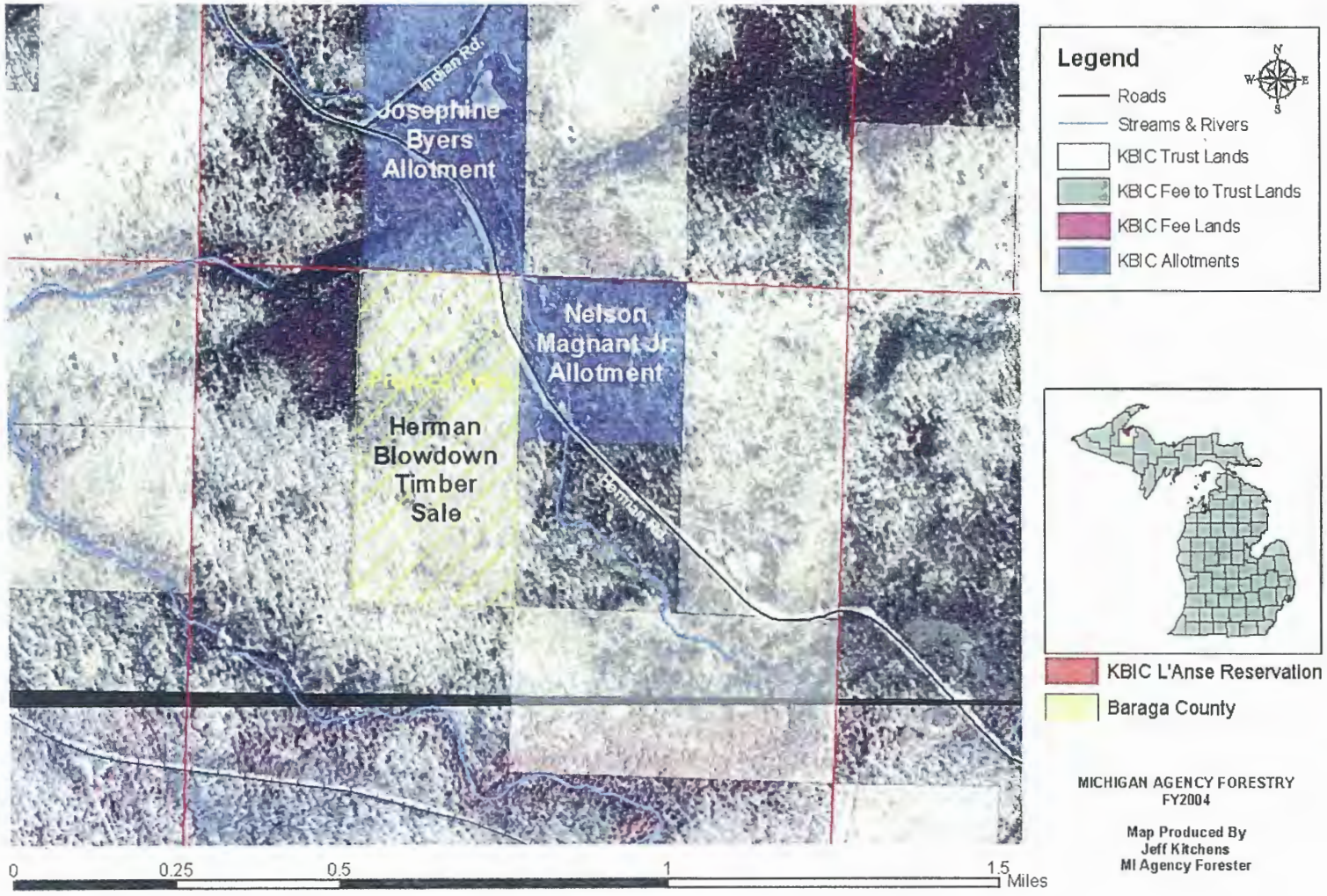


Herman Blowdown

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	E ½ NW ¼ Sec35 T50N R33W	80	308	42, 43, 44 45, 46, 47	Hardwood Thinning	FY04-05	FY05-06

Herman Blowdown Tribal Timber Sale – Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian, Section 35,
the NE 1/4 of the NW 1/4,
L'Anse Township, Baraga County, Michigan (80 acres).

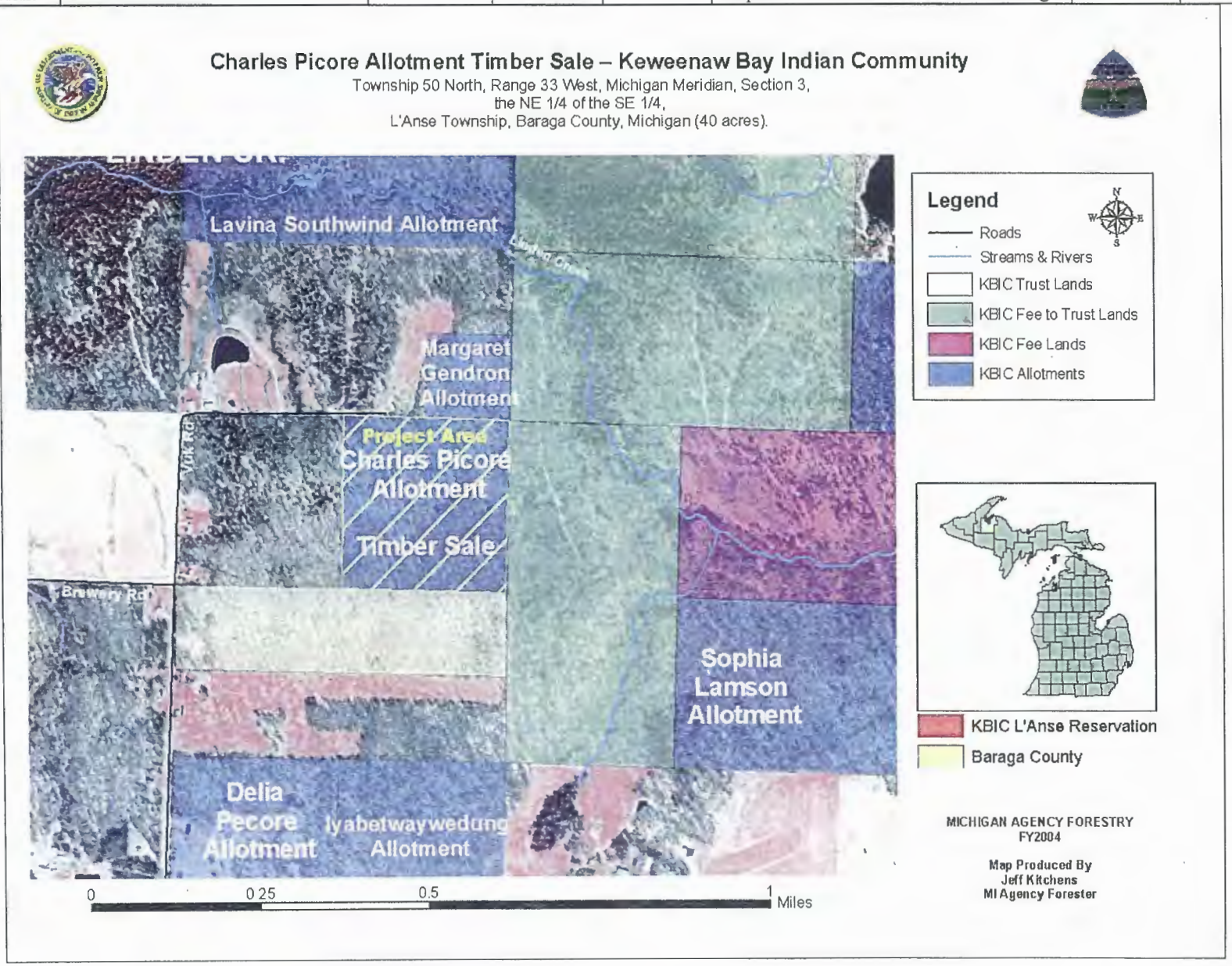


MICHIGAN AGENCY FORESTRY
FY2004

Map Produced By
Jeff Kitchens
MI Agency Forester

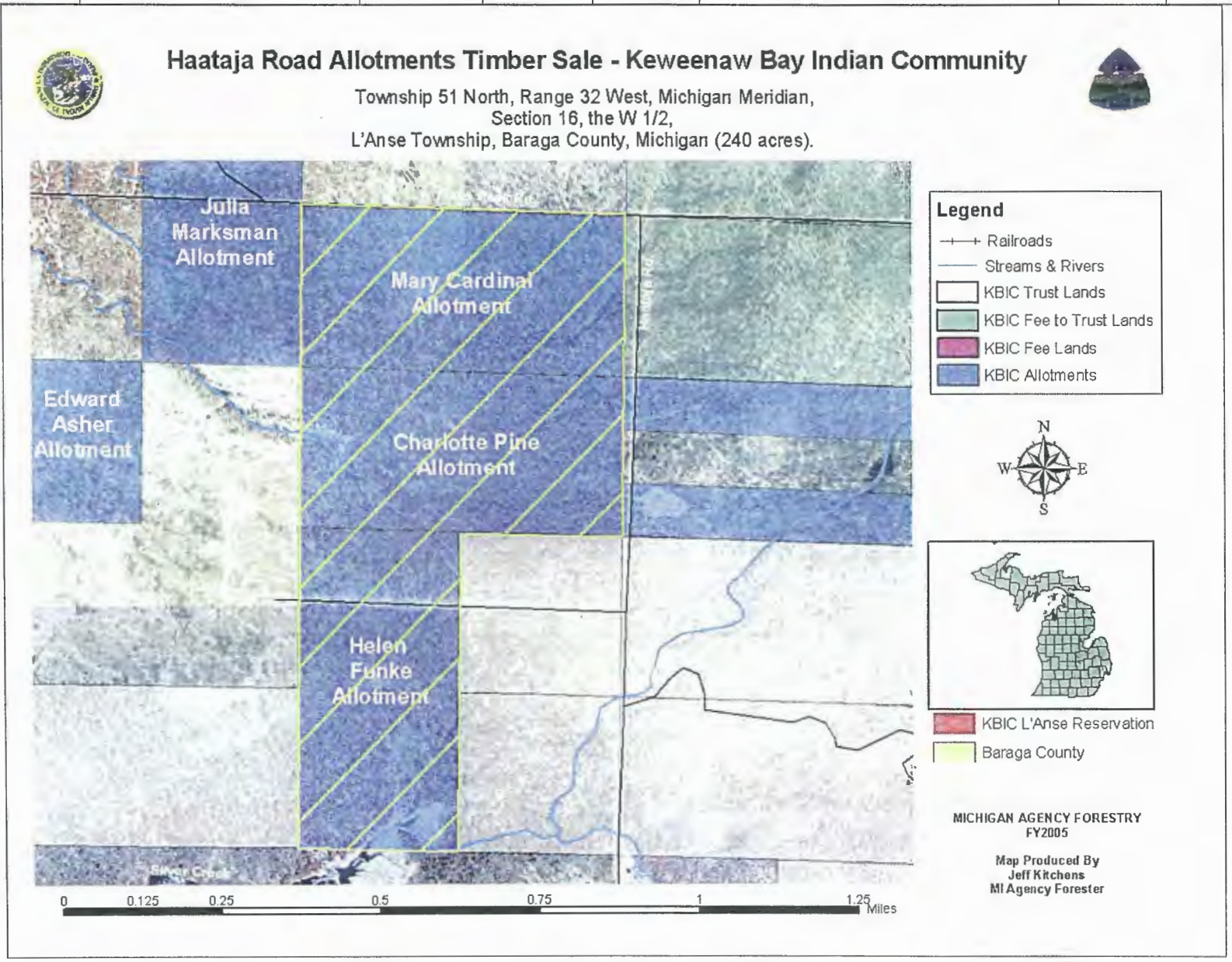
Charles Picore

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Allotment	NE ¼ SW ¼ Sec 3 T50N R33W	40	306	856	Aspen Clearcut & Hardwood Thinning	FY04-05	FY05-06

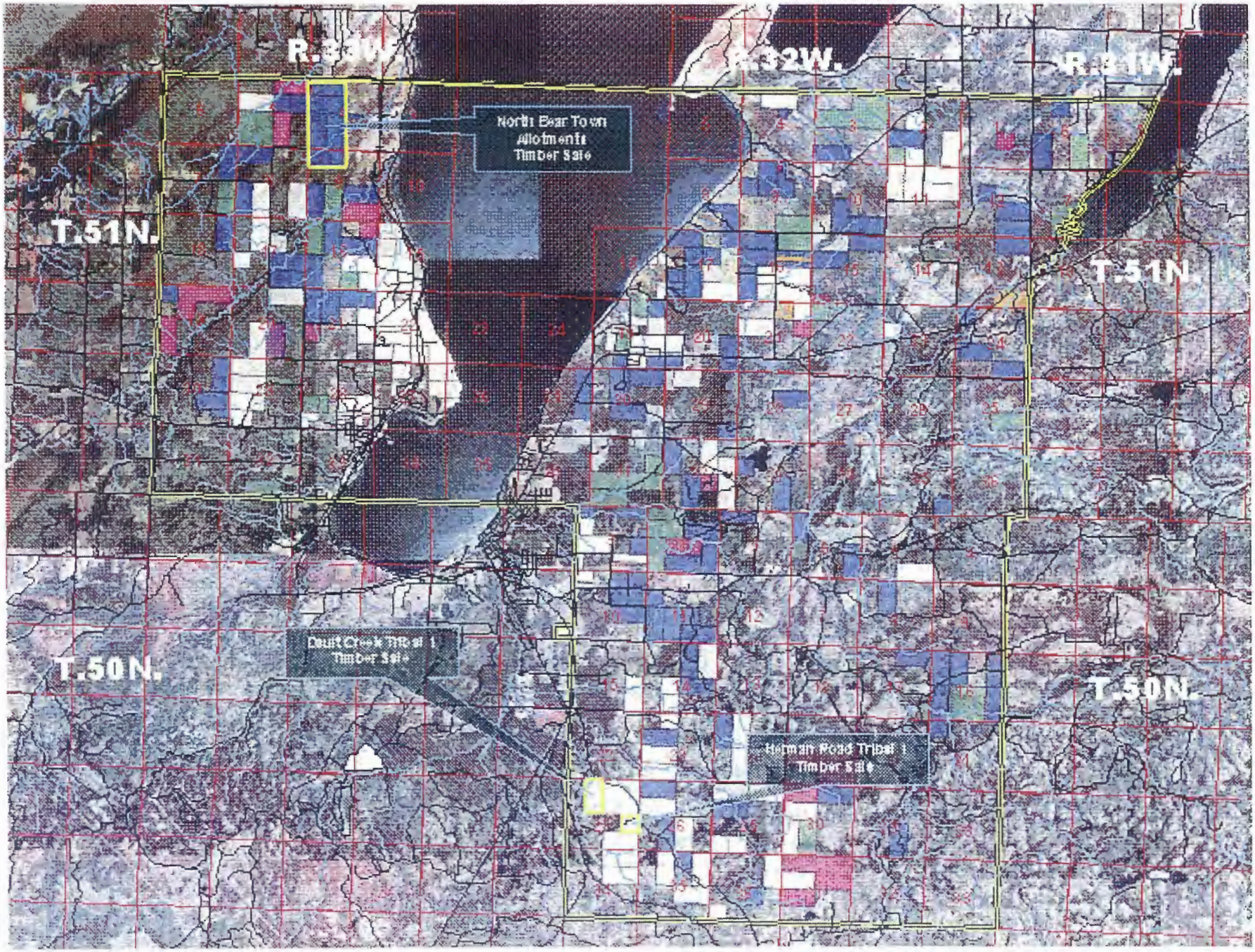


Haataja Road Allotments

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Allotment	S ½ NW ¼ Sec 16 T51N R32	240	305	807, 806 820-824	Aspen Clearcut & Hardwood Thinning	FY04-05	FY05-06



SECTION 2: FY 2006-2007 HARVEST PLAN

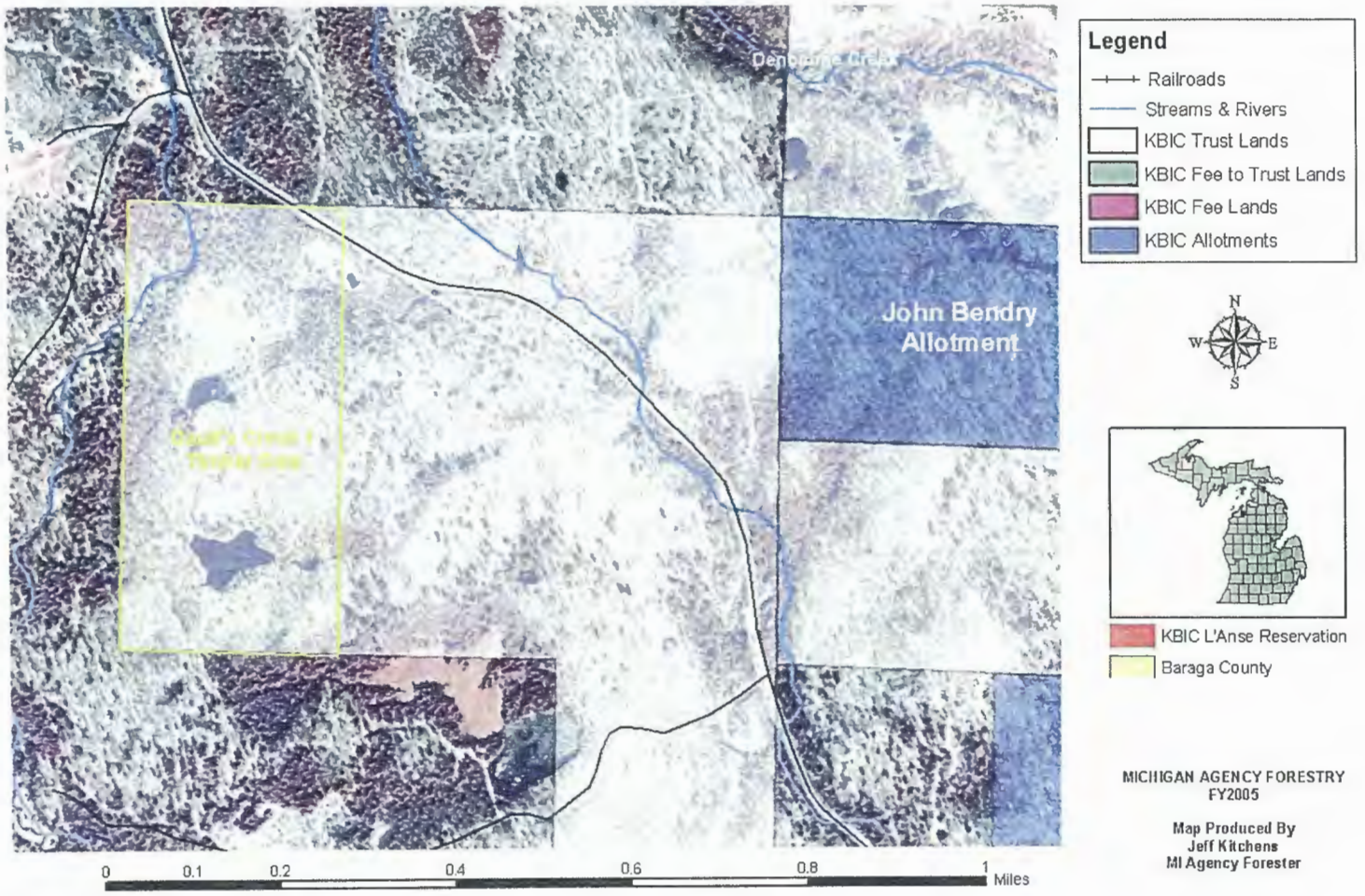


Dault Creek 1

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	E ½ NW ¼ Sec 27 T50N R33W	80	308	1, 2, 3 4, 5	Hardwood Thinning & Aspen Clearcut	FY05-06	FY06-07

Dault's Creek 1 Timber Sale - Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian,
Section 27, the W 1/2 of the NW 1/4,
L'Anse Township, Baraga County, Michigan (80 acres).

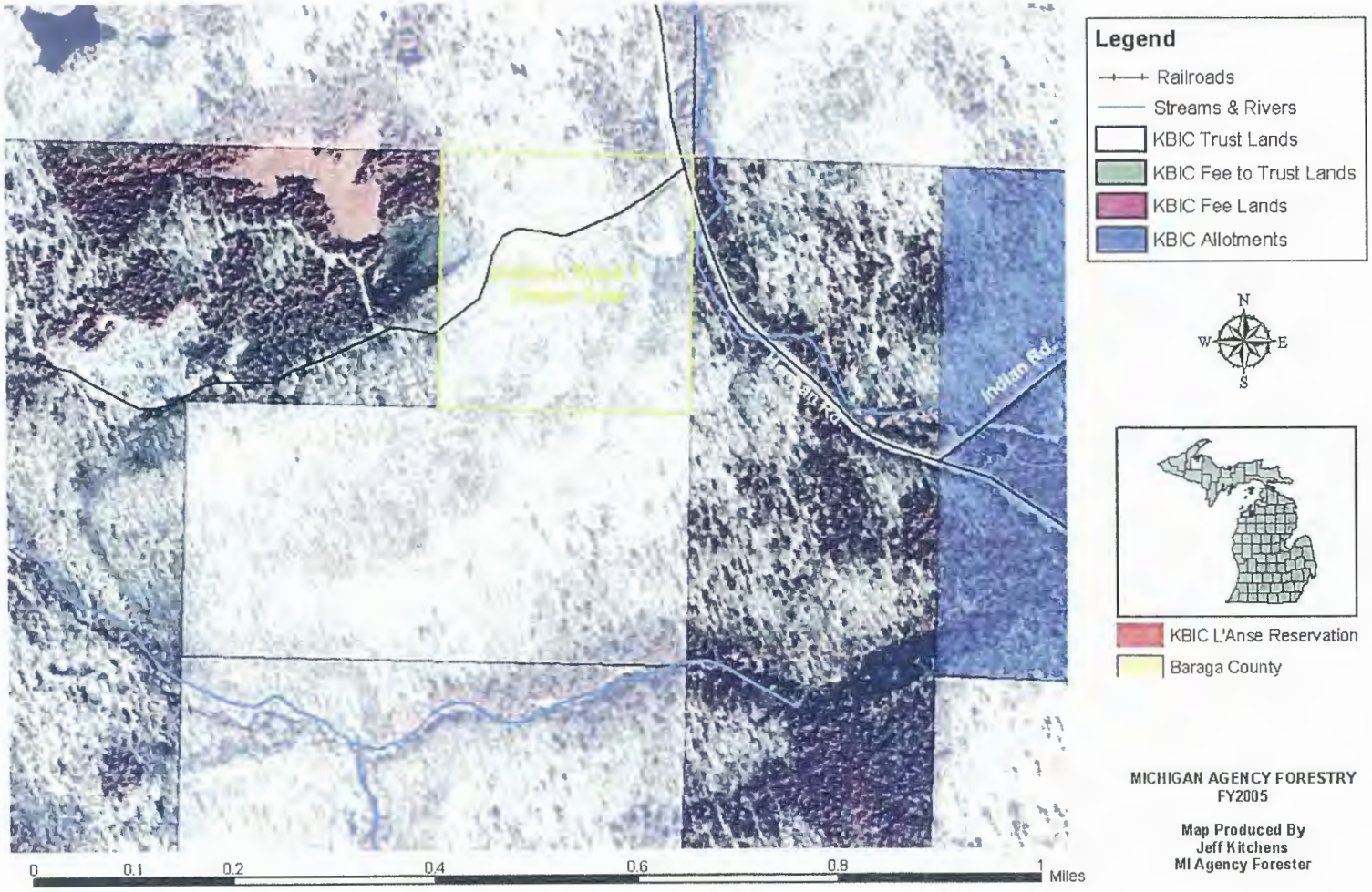


Herman Road 1

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	NE ¼ SE ¼ Sec 27 T 50N R33W	40	308	8, 9, 11	Hardwood Thinning	FY05-06	FY06-07

Herman Road 1 Timber Sale - Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian,
Section 27, the NW 1/4 of the SE 1/4,
L'Anse Township, Baraga County, Michigan (40 acres).



Legend

- Railroads
- Streams & Rivers
- KBIC Trust Lands
- KBIC Fee to Trust Lands
- KBIC Fee Lands
- KBIC Allotments

N
W
E
S

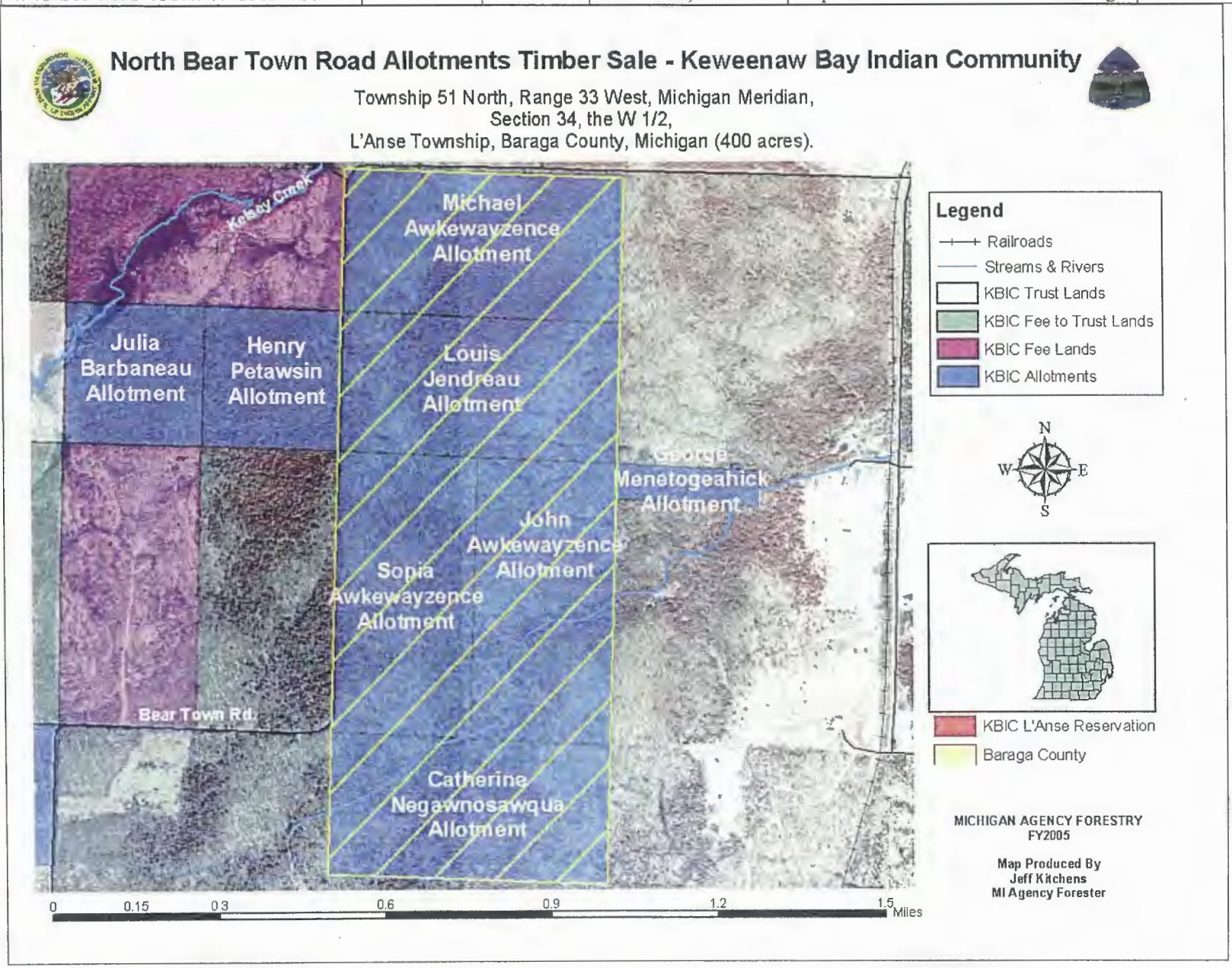
- KBIC L'Anse Reservation
- Baraga County

MICHIGAN AGENCY FORESTRY
FY2005

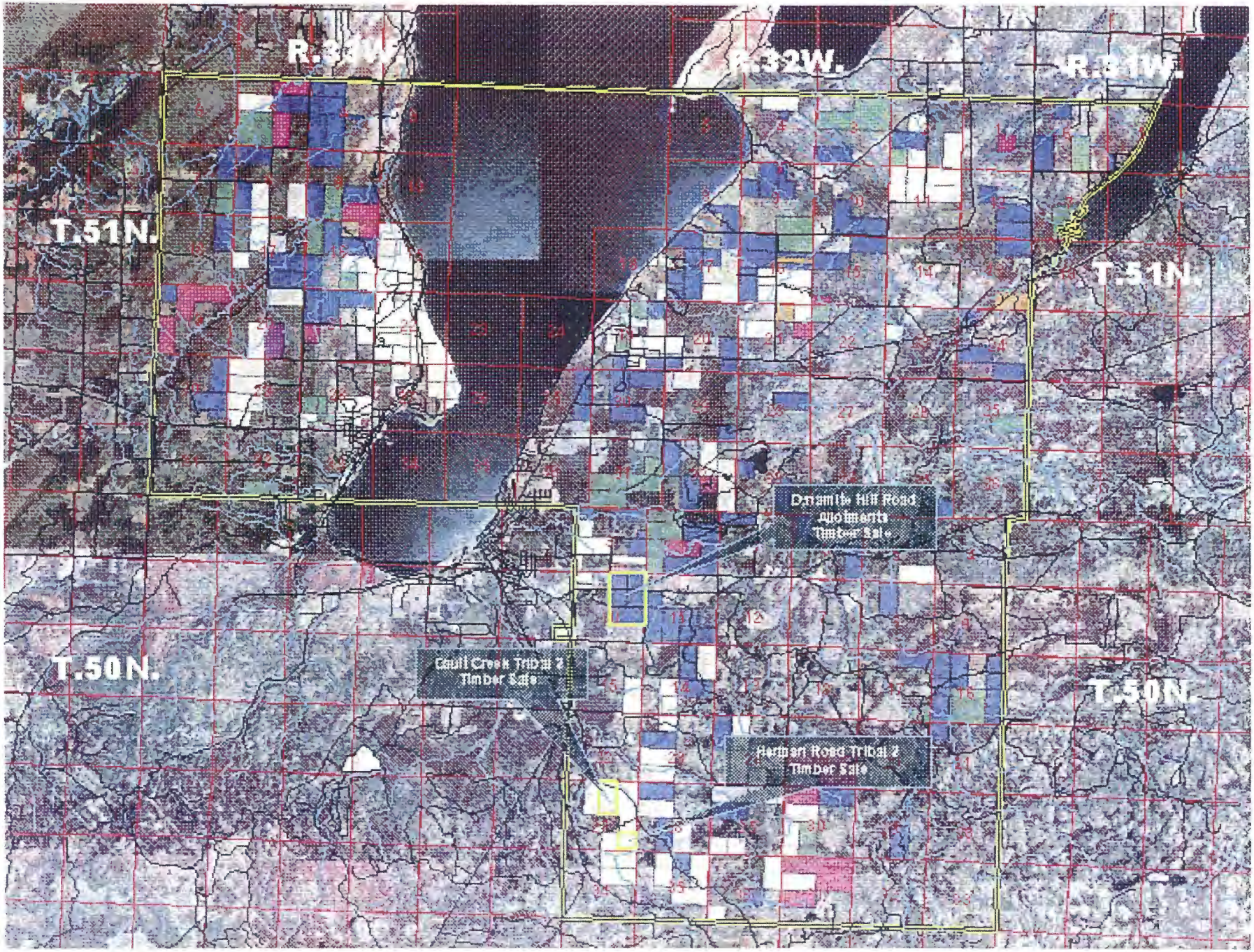
Map Produced By
Jeff Kitchens
MI Agency Forester

North Bear Town Road Allotments

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Allotments	W ½ Sec 4 & N ½ NW ¼ T51N R33W	400	302	801 – 819, omit 814	Aspen Clearcut & Hardwood Thinning	FY05-06	FY06-07

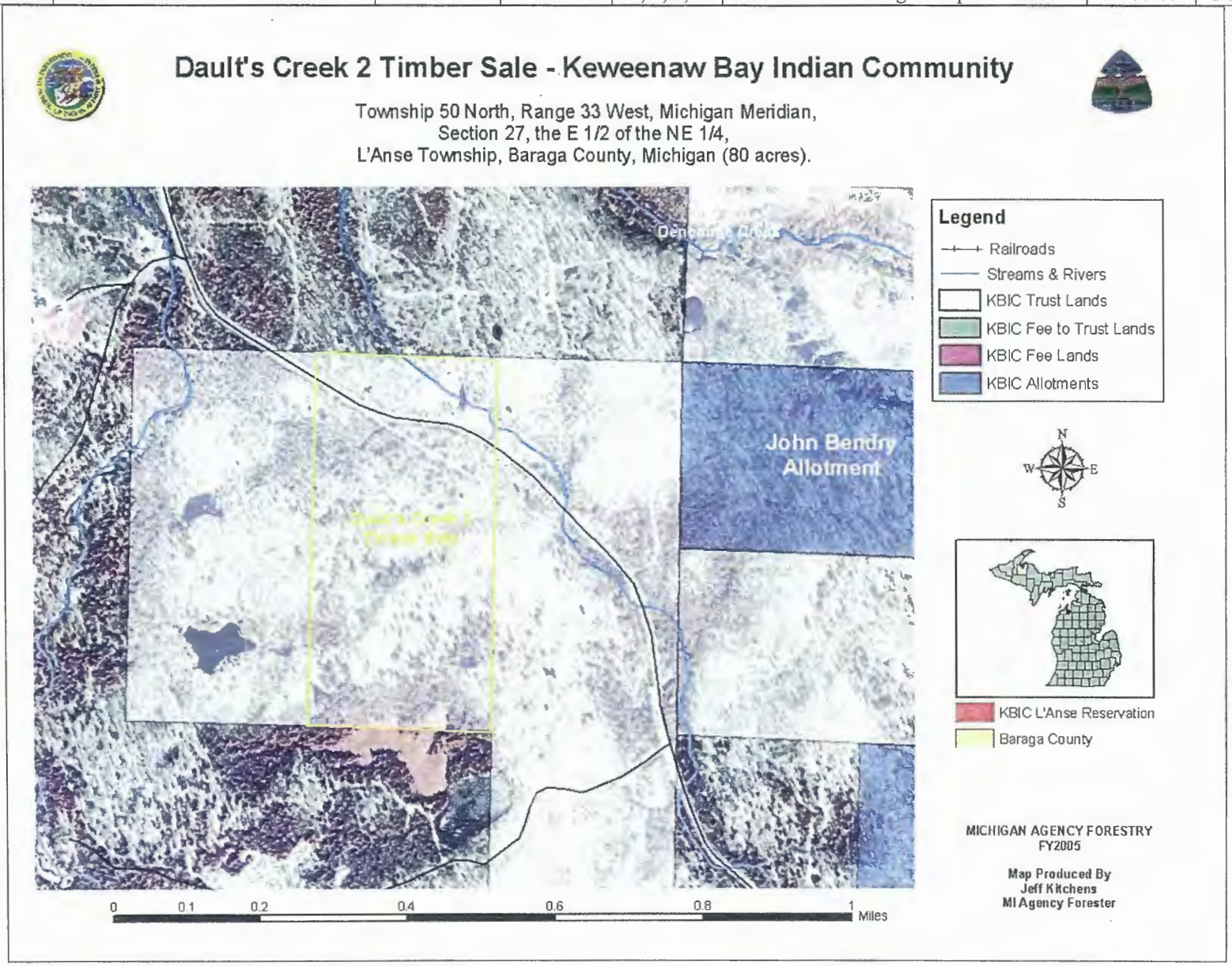


SECTION 3: FY 2007-2008 HARVEST PLAN

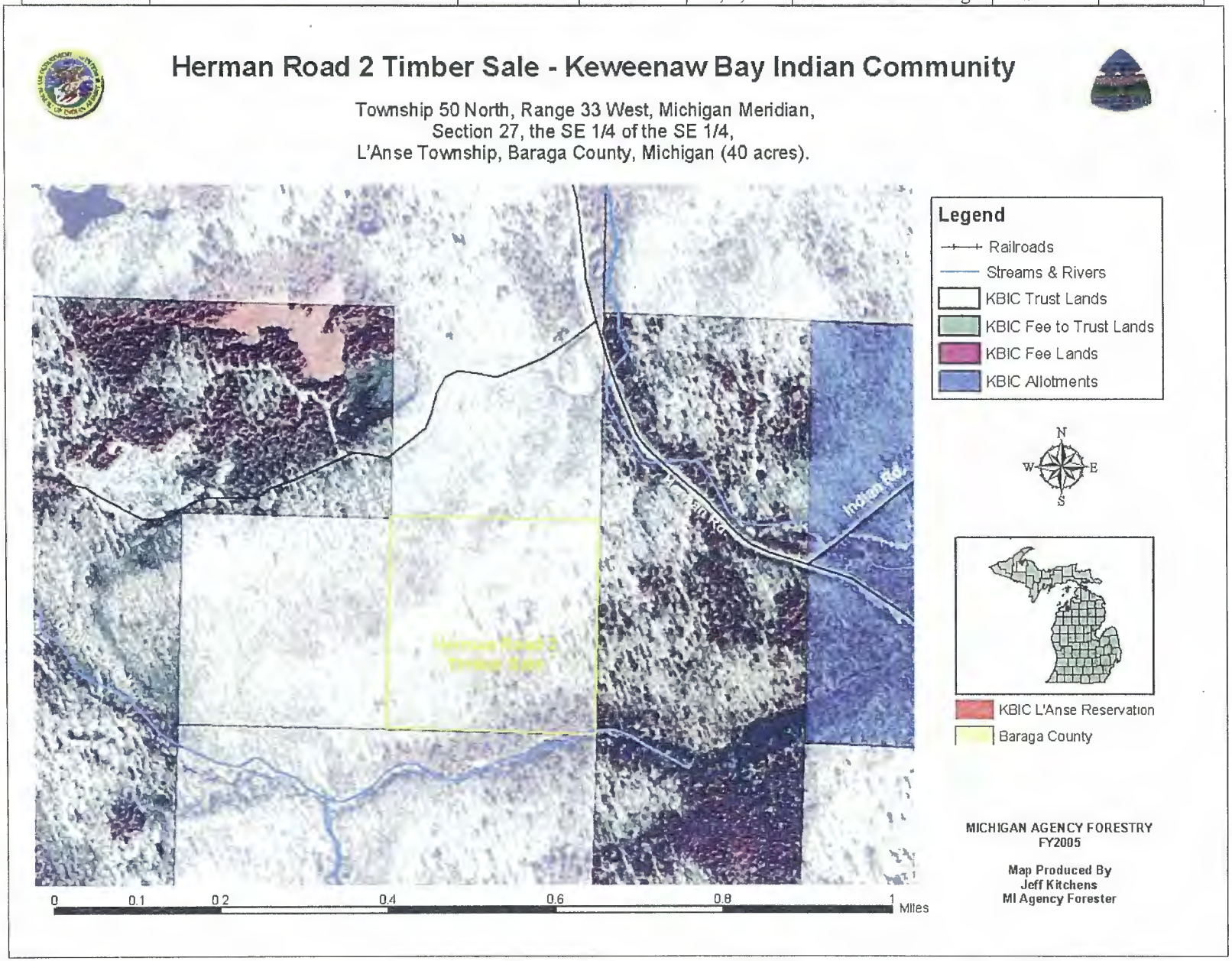


Dault's Creek 2

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	W ½ NE ¼ Sec 27 T50N R33W	80	308	2, 4, 6, 7	Hardwood Thinning & Aspen Clearcut	FY06-07	FY07-08

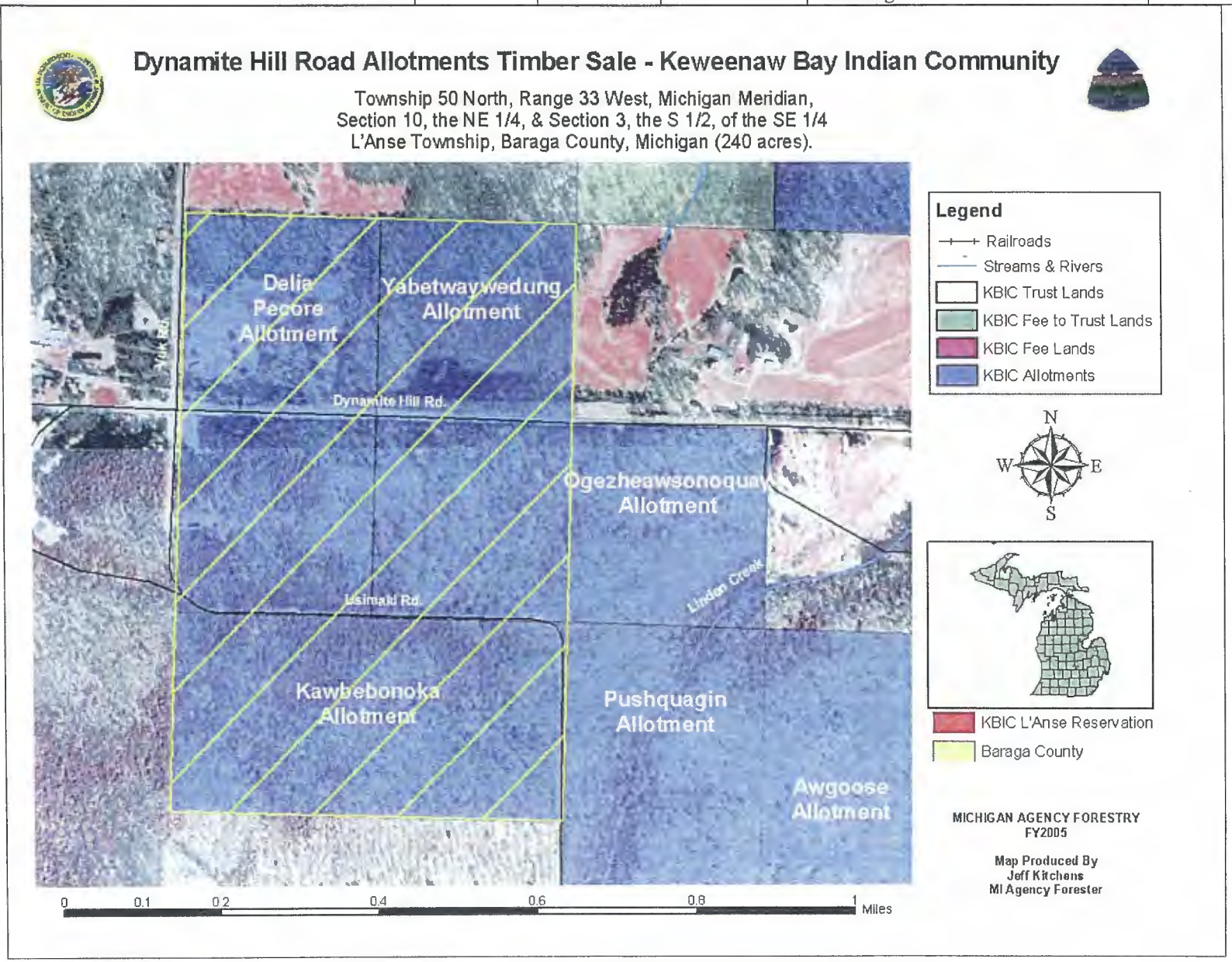


Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	SE ¼ SE ¼ Sec 27 T 50N R33W	40	308	8, 9, 11	Hardwood Thinning	FY06-07	FY07-08

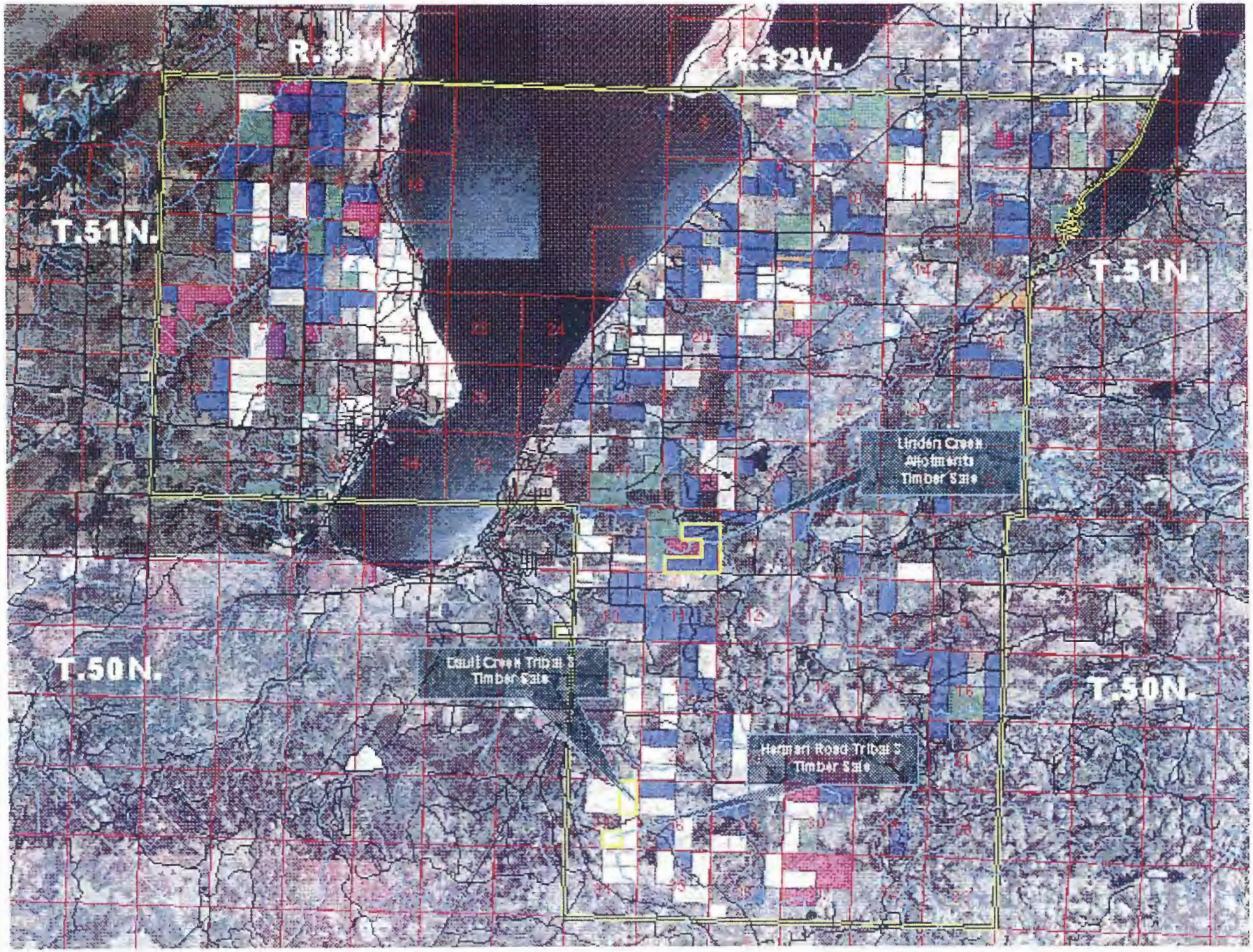


Dynamite Hi[illegible]oad Allotments

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Allotments	NW ¼ Sec 10 & S ½ SE ¼ Sec 3 T50N R33W	240	306 & 307	904, 905, 912 801-807	Aspen Clearcut & Hardwood Thinning	FY06-07	FY07-08



SECTION 4: FY 2008-2009 HARVEST PLAN

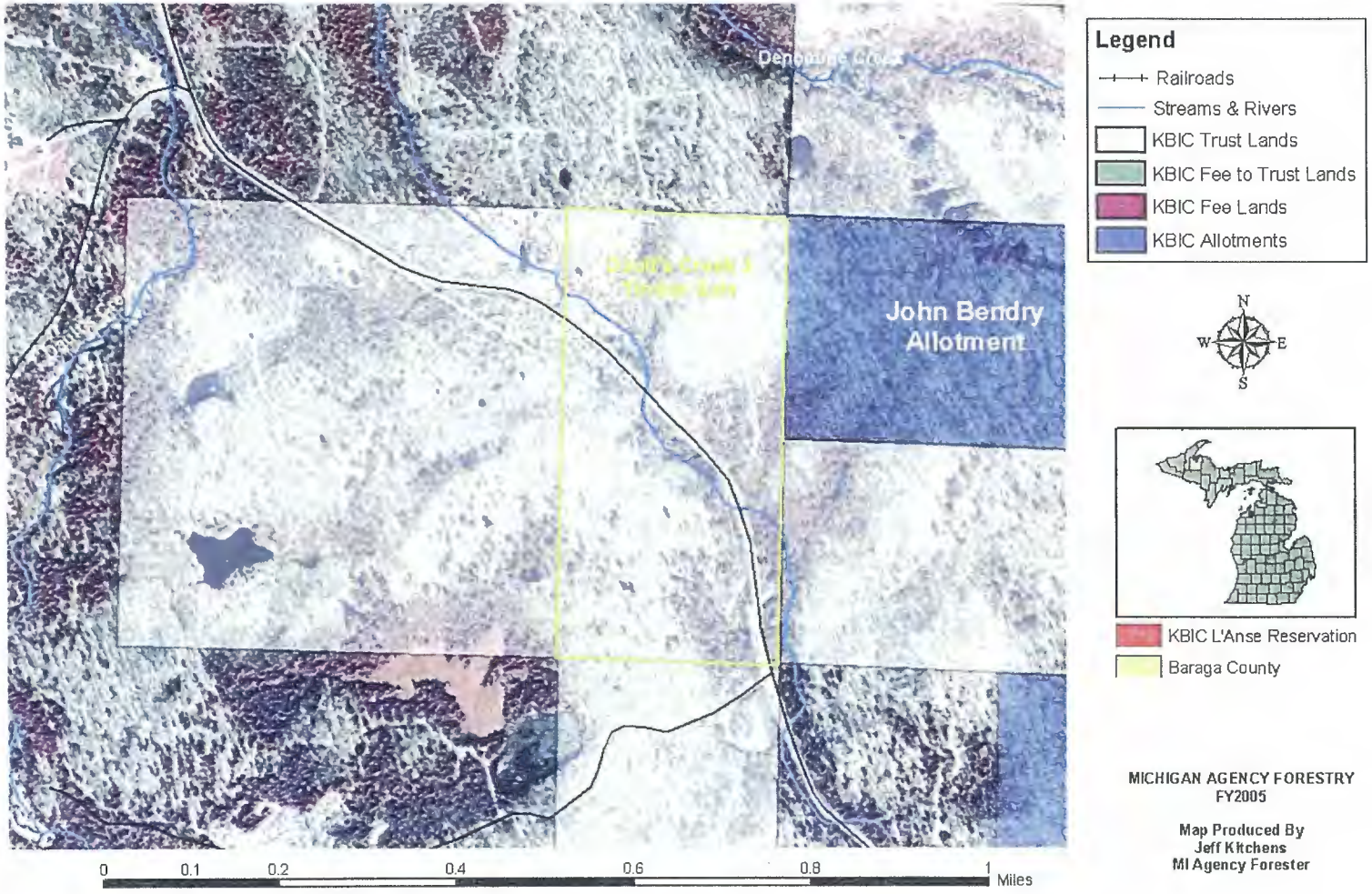


Dault Creek 3

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	E ½ NE ¼ Sec27 T50N R33W	80	308	6, 8, 58	Hardwood Thinning & Aspen Clearcut	FY07-08	FY08-09

Dault's Creek 3 Timber Sale - Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian,
Section 27, the W 1/2 of the NE 1/4,
L'Anse Township, Baraga County, Michigan (80 acres).



Legend

- Railroads
- Streams & Rivers
- KBIC Trust Lands
- KBIC Fee to Trust Lands
- KBIC Fee Lands
- KBIC Allotments

N
W
E
S

- KBIC L'Anse Reservation
- Baraga County

MICHIGAN AGENCY FORESTRY
FY2005

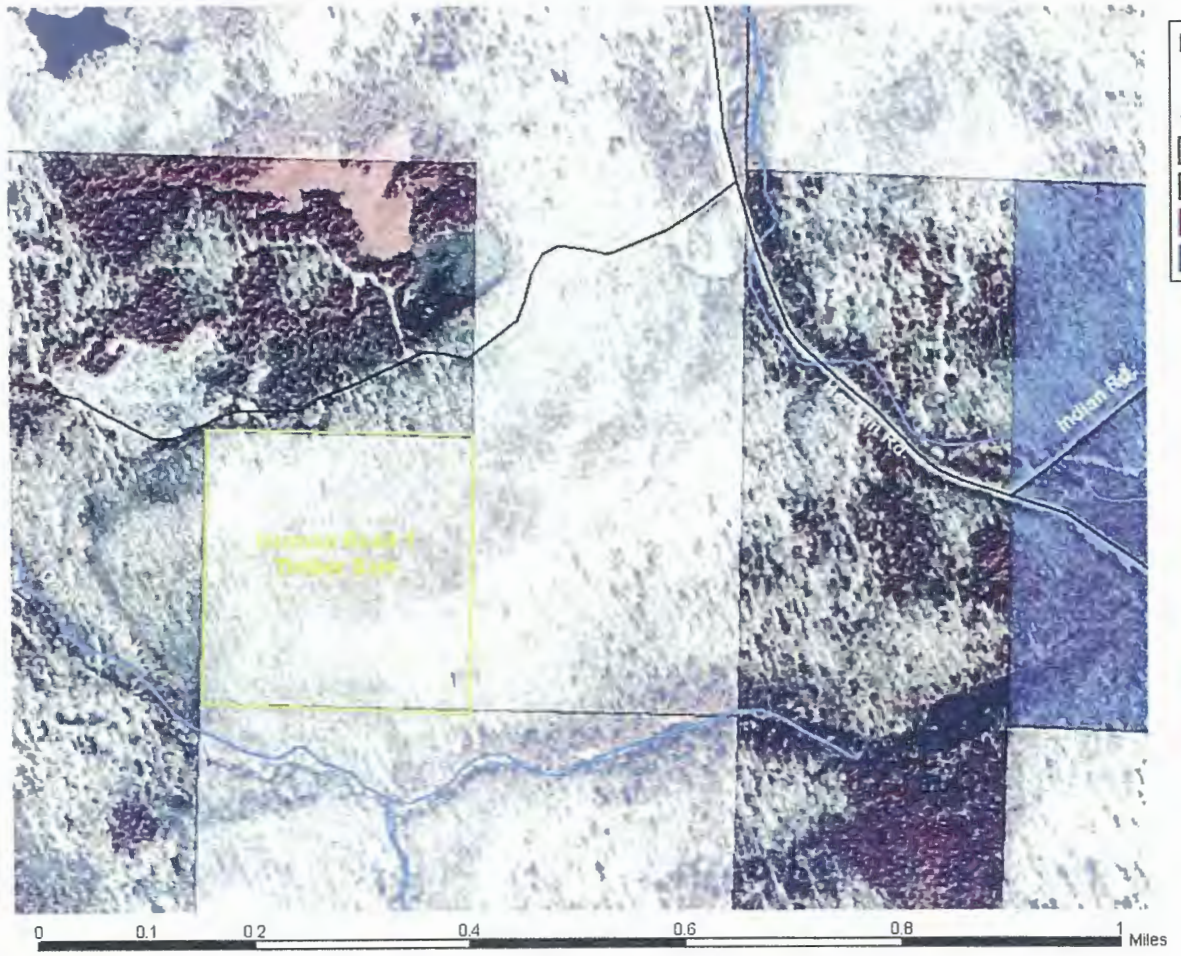
Map Produced By
Jeff Kitchens
MI Agency Forester

Herman Road 3

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	SE ¼ SE ¼ Sec 27 T 50N R33W	40	308	8, 9, 11	Hardwood Thinning	FY07-08	FY08-09

Herman Road 3 Timber Sale - Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian,
Section 27, the SW 1/4 of the SE 1/4,
L'Anse Township, Baraga County, Michigan (40 acres).



Legend

- Railroads
- Streams & Rivers
- KBIC Trust Lands
- KBIC Fee to Trust Lands
- KBIC Fee Lands
- KBIC Allotments

N
W
E
S

- KBIC L'Anse Reservation
- Baraga County

MICHIGAN AGENCY FORESTRY
FY2005

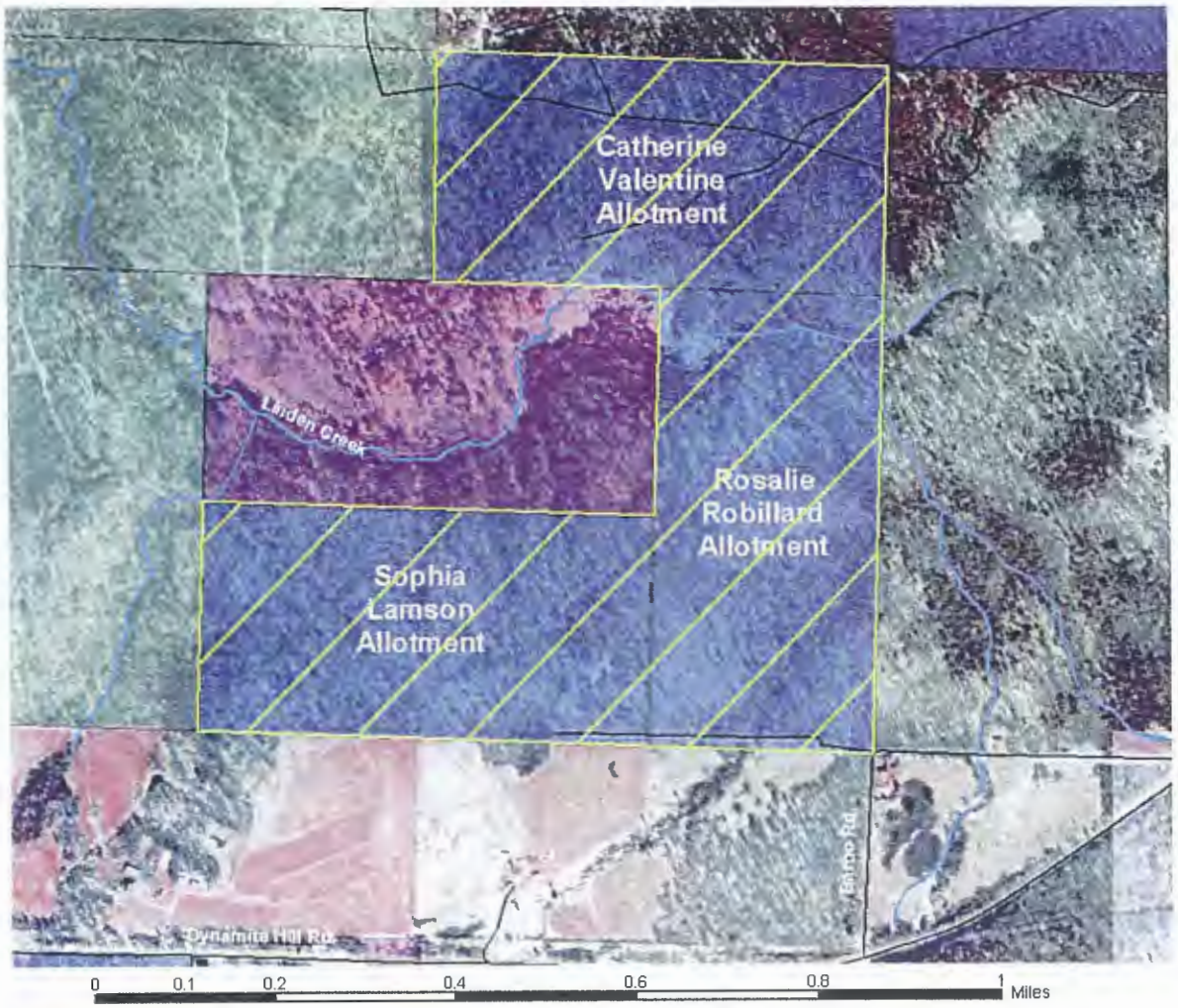
Map Produced By
Jeff Kitchens
MI Agency Forester

Linden Cr[illegible] Allotments

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Allotments	Sec 1& 2 T50N	240	306	865-888	Aspen Clearcut & Hardwood Thinning	FY07-08	FY08-09

Linden Creek Allotments Timber Sale - Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian,
Section 2, the SE 1/4,
L'Anse Township, Baraga County, Michigan (240 acres).



Legend

- Railroads
- Streams & Rivers
- KBIC Trust Lands
- KBIC Fee to Trust Lands
- KBIC Fee Lands
- KBIC Allotments

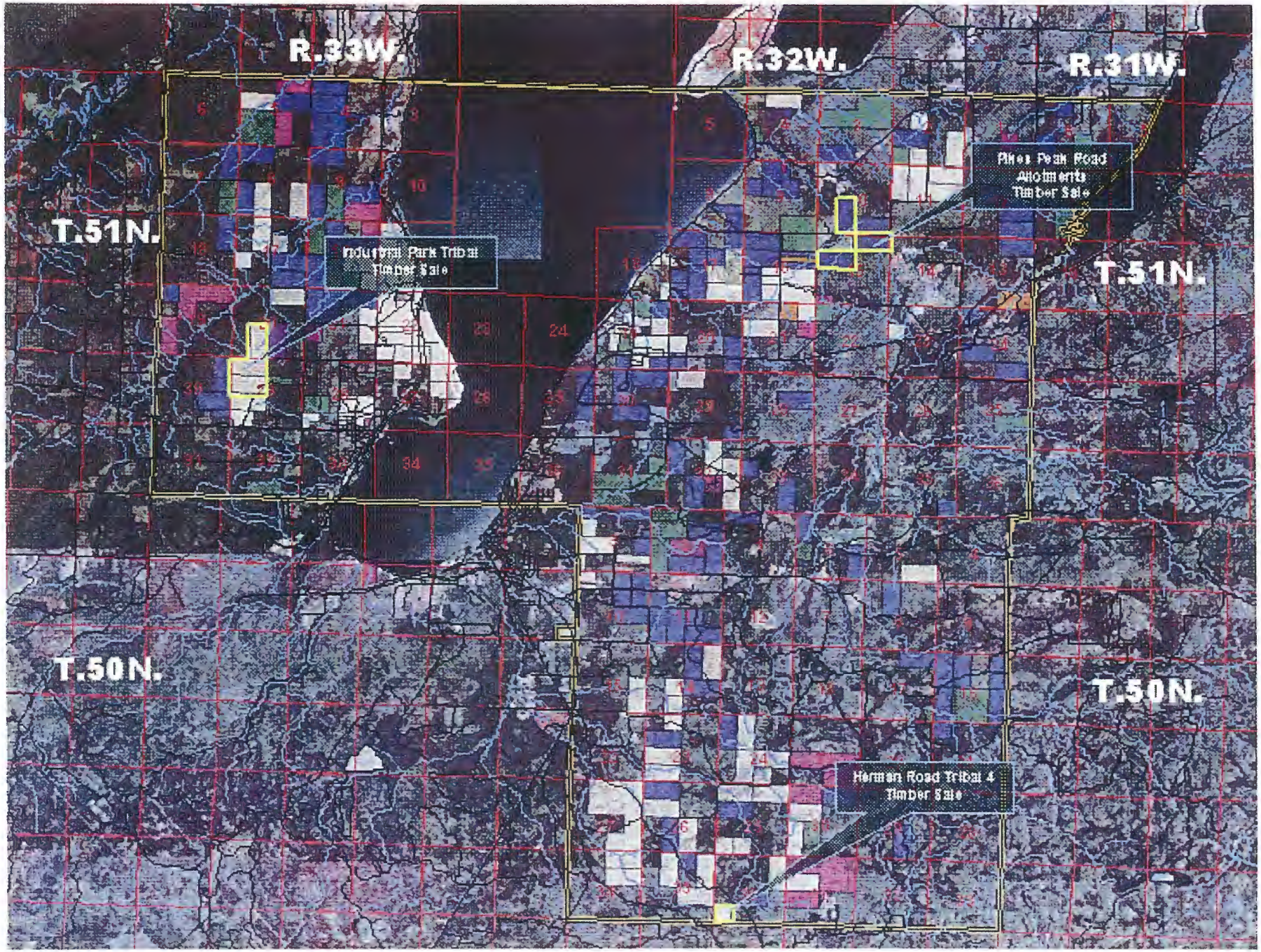
N
W E
S

- KBIC L'Anse Reservation
- Baraga County

MICHIGAN AGENCY FORESTRY
FY2005

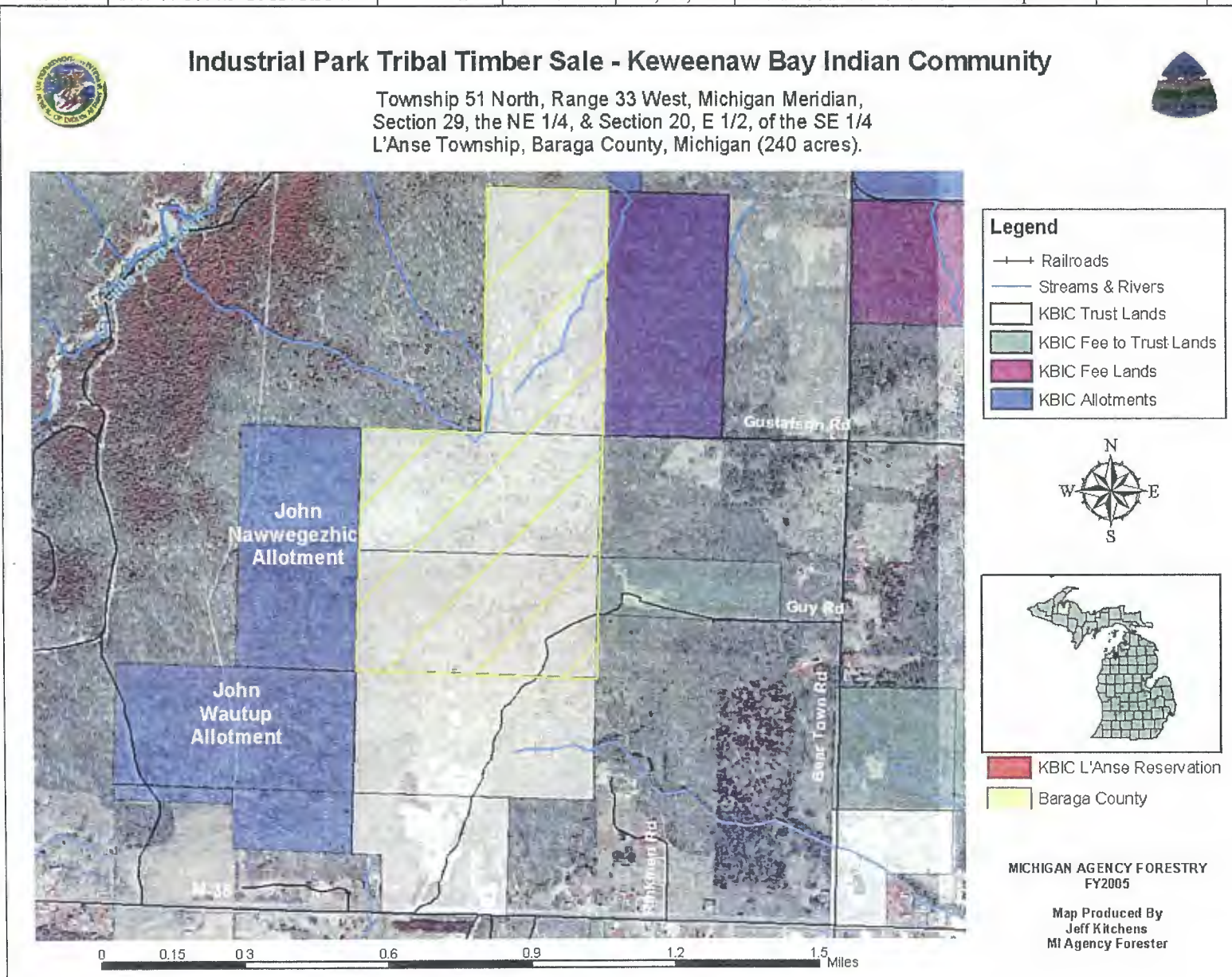
Map Produced By
Jeff Kitchens
MI Agency Forester

SECTION 5: FY 2009-2010 HARVEST PLAN



Industri ark Tribal

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	NW ¼ Sec 29 T51N R33W	240	301	14, 15, 16	Hardwood Removal For Development	FY08-09	FY09-10

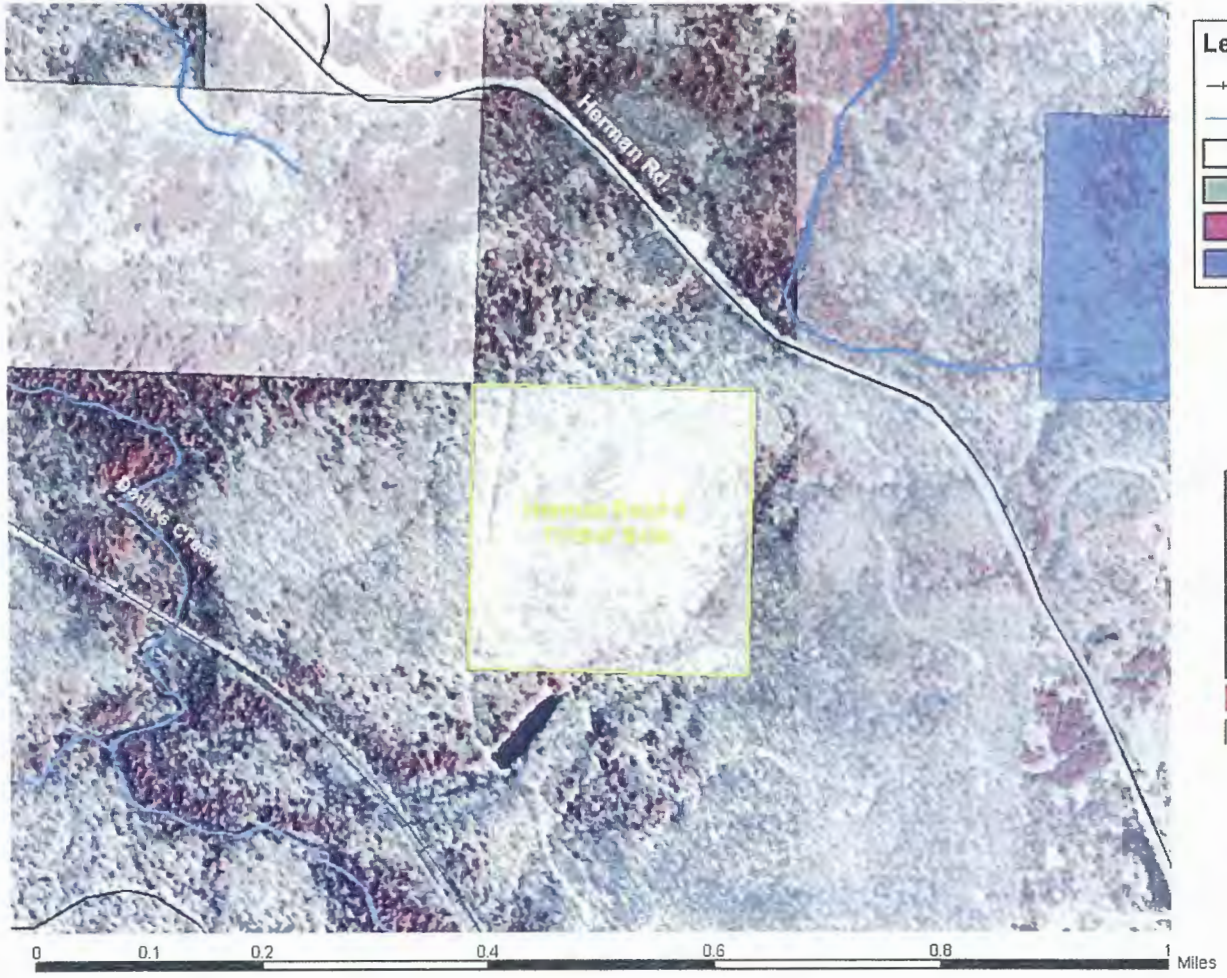


Herman Road 4

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Tribal	SW ¼ SW ¼ Sec 36 T50N R33W	40	308	55, 56	Hardwood Thinning	FY08-09	FY09-10

Herman Road 4 Timber Sale - Keweenaw Bay Indian Community

Township 50 North, Range 33 West, Michigan Meridian,
Section 36, the SW 1/4 of the SW 1/4,
L'Anse Township, Baraga County, Michigan (40 acres).



Legend

- Railroads
- Streams & Rivers
- KBIC Trust Lands
- KBIC Fee to Trust Lands
- KBIC Fee Lands
- KBIC Allotments

N
W
E
S

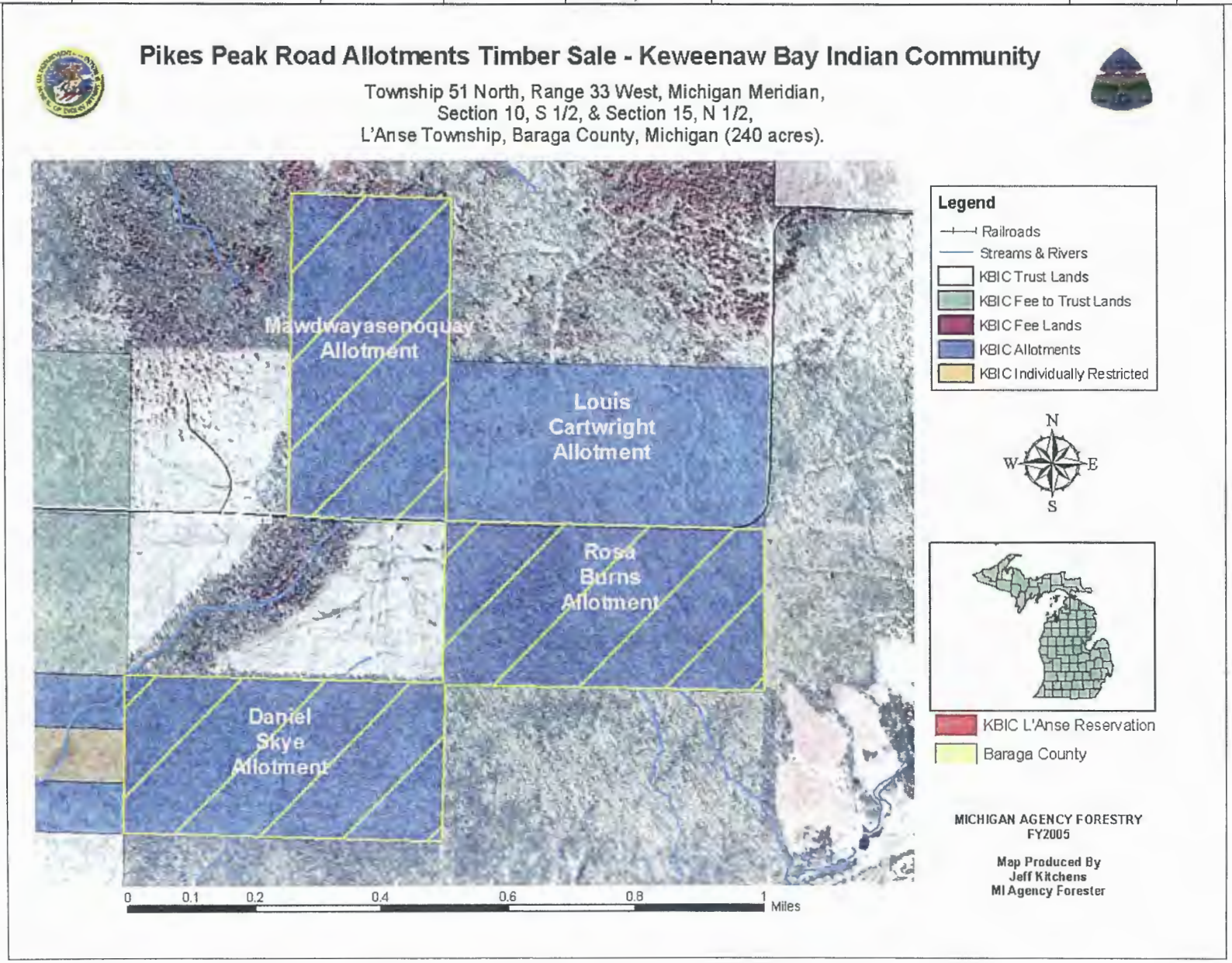
KBIC L'Anse Reservation
Baraga County

MICHIGAN AGENCY FORESTRY
FY2005

Map Produced By
Jeff Kitchens
MI Agency Forester

Pikes Peak ... ad Allotments

Ownership	Legal Description	Est. Acres	Comp(s)	Stand(s)	Prescription	Setup	Harvest
Allotments	Sec 10 & 15 T51N R32W	240	303 & 304	814, 818, 819 820, 830	Aspen Clearcut & Hardwood Thinning	FY08-09	FY09-10



SUMMARY & SUGGESTIONS

Since 1990 the management of KBIC's commercial timberlands in trust has fluctuated from less than 40 acres to more than 440 acres treated in a single year. The total volume of wood harvested has been around 18,000mbf. If the annual allowable cut had been achieved each year since 1990 the total volume of timber would have been 42,000mbf. In terms of dollars, this would have equated to almost $1 million more in revenue for both the Keweenaw Bay Indian Community and its Allotment heirs.

Today almost 70% of KBIC's commercial timberland are overstocked, overmature, or at high risk of decline or disease. This equates to hundreds of thousands of dollars being lost annually in declining and undermanaged timber. The purpose of this plan is to reduce the fluctuation in the commercial timber harvesting program and attempt to capture a good deal of the economic value of KBIC's timber resource. By increasing both the number and size of timber sales each year, KBIC should be able to increase both the health and economic value of their forests. The goal of setting up large multi-unit sales (e.g. Haataja Road Allotments) is to increase acreage and thus the economic potential for the overall sale. This will hopefully increase the number of bids as well as the price/timber product. The goal of small 40acre tribal timber sales is to assist tribal loggers who may need smaller more economically viable operations to maintain or start-up a business. These smaller sales may be broken up into more units of less acreage if needed. The long-term goal of such sales is to give smaller tribal operations the opportunity to build up enough of an economic base that they may be able to increase their overall operation.

As stated previously, this plan does not replace the current KBIC forest management plan. However, in two years the KBIC forest management plan will be outdated (10 years old). In less than five years another harvest plan will need to be created. It would benefit the overall forestry program as well as the health and economic value of timber on the L'Anse reservation if the process of updating the KBIC forest management plan started within the next fiscal year. That way the tribe could have a plan that integrates both a general forest management and a geographically specific timber harvesting plan by 2010.

APPENDIX V:

Reservation Residential Well Head Location Information

Keweenaw Bay Indian Community Wellhead Map

Lake Superior
Keweenaw Bay

Huron Bay

41

38

Village of Baraga

Village of L'Anse

State of Michigan

KBIC

Baraga County

Wellhead Type

- Private
- Public

0 0.5 1 2

Miles

Dec.17, 1936
Keweenaw Bay Indian Community

Source: KBIC, Baraga County
Ctreated by: KBIC GIS Office

APPENDIX W:

Documentation on the Importance of Water

KBIC Water-Related Activities

1. What does water mean to you as a tribal member?

2. In what ways do you interact with the water resources on the reservation and ceded territories? Please list any examples that come to mind, including spiritual and cultural activities. How often?

3. Are you aware of other water-related activities that are unique to Tribal members on our reservation? (yes / no). If so, would you like to mention them?

KBIC Tribal Number_____Date_____

KBIC Tribal Council has adopted a resolution stating their objection to sulfide mining

1. a) Do you practice treaty rights, such as hunting fishing and gathering in the ceded territories?

   b) Do you engage in any other activities in the ceded territories?

2. Are there any areas within the Silver River Watershed and Yellow Dog Plains that are special or unique to you as a tribal member? Why?

3. Are you aware of the proposed sulfide mining within the Silver River Watershed and the ceded terrritories?

4. What is your position on mining on the reservation?

5. What is your position on mining within the ceded territories?

KBIC Tribal Number_____Date_____

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

Friday, April 07, 2006

Micah Petoskey
Water Resources Specialist
Keweenaw Bay Indian Community
Natural Resources Department
HCR01 Box 120 Pequaming Rd.
L'Anse, MI 49946

RE: Nibi (Water) Testimonial

Dear Micah Petoskey,

Water is the life blood of our Mother Earth. The earth's water system is our mother's blood supply. Her lakes, streams, rivers move through the earth to both nourish her and cleanse her. All of life - we are her children which she feeds and sustains. It is our responsibility to watch over our mother as Anishinabeg people. We must preserve and protect her for generations to come. Mother Earth's energy provides a source of life and sustenance. Strength from the earth is the translation for medicine – mashkiki. Mother Earth gives us her medicine, her strength. If she is sick or weak we will become sick and weak people. For the strength of the Anishinabeg we must protect Mother Earth. This is how it is and always will be as recognized in our treaty with the United States. We Anishinabeg live in respect of Mother Earth and her strength we have not forgotten her life giving forces. We honor the Earth our Mother in our ceremonies through our offerings, through our drum songs and in our tobacco offering's when we gather or utilize her resources. Watching over and protecting Mother Earth is our responsibility and our right which has and always will be preserved by Anishinabeg and our Indian tribe.

Respectfully submitted,

Debra Williamson, TERO/EEO Director
Ogima Benasiikwe (Lead Thunderbird Woman)
3rd Degree Midewikwe (Medicine Woman)

In the fall of 2004 the Keweenaw Bay Indian Community Natural Resources Department conducted a survey on the importance of water to the Ojibwa peoples. They were asked what water means to them, what ways they interact with water and examples of such, and whether or not they practice their treaty rights within the ceded territory. The following is a summary of the answers we received.

When asked what water means to them most tribal members responded that water is first and foremost the lifeblood of the earth and all its inhabitants. We also were informed that women are the keepers of the water, that they pray and sing to the water and it becomes medicine.

The participants were then asked how they interact with the water. While many used the water for recreational purposes such as swimming, boating, and hiking many expressed that they used it in ceremonies. The Breaking of the Water ceremony is held each spring to welcome the spring season and to thank the Creator for cleansing the water. It also fulfills basic needs such as bathing, cooking, and drinking. Beyond these things the tribal members surveyed spoke about hunting and fishing in and around the waters. Harvesting wild rice was also expressed as being a very important use of the water in and around the reservation.

To follow up on the surveys that were done the KBNRD Water Quality Department came up with some other areas of concern for the waterways and waterbodies in and around the reservation.

The Villages of L'Anse and Baraga and KBIC each own and operate an individual public water supply system. All three of these systems obtain and treat water from Keweenaw Bay of Lake Superior.

In addition, surface water is also an important economic, recreational and ecological resource. Subsistence, commercial and recreational fishing, recreational boating, and swimming are significant human activities dependent on surface waters in the area. There are also several waterfront camping locations in the area, including Baraga State Park, the Ojibwa Campgrounds and L'Anse Township Park. Area lakes, wetlands, streams and rivers also serve as critical nursery habitat for a number of fish, waterfowl and wildlife species in the region, including trumpeter swans re-introduced by KBIC, brown and white pelicans, bald and golden eagles. The head of Keweenaw Bay is considered to be a critical migratory bird sanctuary and water fowl habitat.

For several years, KBIC has been increasing its wild rice production, including seeking funding and identifying and developing sites. KBIC maintains several wild rice lakes/impoundments both inland and on Keweenaw Bay.

The Ojibwa people give special respect to nibi, water, because it is honored as the most important life-giver. Special ceremonies honor water at certain times of the year, like in the early spring when the ice first breaks, but the Ojibwe teach that we should honor nibi all through the year. They think of Earth as their Mother, and water is like the Earth's lifeblood. It must be kept clean and pure for the Earth and all things that live on Her to be healthy.

As neighbors in a watershed, we must all do our part to keep the water that runs though our watershed clean and pure. As good neighbors, we should not waste water. We want enough clean water for all living things.

Intergovernmental Accord
between
the Federally Recognized Indian Tribes in Michigan
and
the Governor of the State of Michigan
Concerning Protection of Shared Water Resources

Entered into on May 12, 2004
Lansing, Michigan

Whereas the federally recognized Indian Tribes in Michigan and the Governor of the state of Michigan each recognize the essential role of the Great Lakes and of Michigan's inland lakes, rivers, streams, and groundwater (hereinafter termed "water resources") in their past, their present, and their shared destiny;

Whereas the Tribes historically resided in the Great Lakes Region in harmony with the natural environment since well before the arrival of Europeans and have depended upon the water resources of the Great Lakes Region for food, water, and transportation for hundreds of years;

Whereas the Great Lakes and Michigan's inland lakes, rivers, streams, and groundwater remain the cornerstone of the culture and the physical and spiritual well-being of the Tribes and preserving the environmental quality and quantity of those water resources for the present and for the next seven generations is absolutely essential to the Tribes;

Whereas the Great Lakes and inland waters are the state of Michigan's most vital resources and figuratively and literally define the state; the citizens of the state rely on these water resources for their subsistence, health, recreation, and for their aesthetic value; and those water resources also underpin Michigan's economy due to their importance for tourism, agriculture, industry, and transportation;

Whereas the future well-being of all of the residents of the state of Michigan depends on the preservation and enhancement of the quality and quantity of its water resources;

Whereas Michigan's water resources are subject to degradation from numerous sources including toxic substances such as pesticides, mercury and other heavy metals from a variety of agricultural, industrial and municipal sources; and the introduction of exotic species such as lamprey and zebra mussels strain the Great Lakes ecosystem;

Whereas the very presence of the water is imminently threatened by the desire of governments and private companies to divert or export Great Lakes waters outside the Great Lakes basin;

Whereas many activities such as dredging, wetland development, and inadequate wastewater treatment strain the natural recuperative powers of the water resources to maintain diverse ecosystems which depend on water quality and quantity for their very existence;

Whereas past, present and future utilization of water resources by governmental units and private individuals and entities is subject to oversight and regulation under a complex framework of federal, state and tribal law;

Whereas the grandeur and beauty of the Great Lakes create a facade of endless abundance but the Great Lakes and inland waters are in reality delicate and finite;

Whereas protection of these magnificent resources for the present and future generations requires the constant commitment, vigilance, and cooperation of all governments that have jurisdiction over them;

Whereas the undersigned parties wish to enhance and strengthen the government-to-government relationship among the Tribes and between the Tribes and the state of Michigan;

NOW, THEREFORE, the Governor and the undersigned Tribes affirm their joint commitment to the preservation, restoration and enhancement of the Great Lakes ecosystem and pledge to work together to clean-up the pollutants now present, eliminate exotic species, maintain and preserve diverse water resource habitats, and prevent future contaminants, exotics and depletion of these waters. They further commit to sending representatives to meet at least twice a year to review the quantity and quality of our water resources and to develop strategies for protecting those resources including recommendations for state, federal and tribal legislation, and international treaties, coordination of permitting activities, and cooperation on enforcement of water protection laws.

Intergovernmental Accord
between
the Federally Recognized Indian Tribes in Michigan
and
the Governor of the State of Michigan
Concerning Protection of Shared Water Resources

Entered into on May 12, 2004
Lansing, Michigan

Jeffrey D. Parker, President
Bay Mills Indian Community

Kenneth Meshigaud, Chairperson
Hannahville Indian Community

Richard McGeshick, Sr., Tribal Chairman
Lac Vieux Desert Band of Lake Superior
Chippewa Indians

Frank Ettawageshik, Tribal Chairman
Little Traverse Bay Bands of Odawa Indians

Laura Spurr, Tribal Chairman
Nottawaseppi Huron Band of Potawatomi Indians

Audrey Falcon, Tribal Chief
Saginaw Chippewa Indian Tribe of Michigan

Robert Kewaygoshkum, Tribal Chairman
Grand Traverse Band of Ottawa and
Chippewa Indians

William E. Emery, Tribal Council President
Keweenaw Bay Indian Community

Lee Sprague, Ogema
Little River Band of Ottawa Indians

David K. Sprague, Tribal Chairman
Match-E-Be-Nash-She-Wish Band of
Pottawatomi Indians

John Miller, Tribal Chairman
Pokagon Band of Potawatomi Indians

Bernard Bouschor, Tribal Chairman
Sault Ste. Marie Tribe of Chippewa Indians

Jennifer M. Granholm, Governor
State of Michigan

APPENDIX A

Tribal and First Nations Great Lakes Water Accord

November 23, 2004, Page 1

Our ancestors have inhabited the Great Lakes Basin since time immemorial, long before the current political boundaries were drawn. Our spiritual and cultural connections to our Mother Earth are manifest by our willingness to embrace the responsibility of protecting and preserving the land and Waters.

Traditional teachings and modern science combine to strengthen our historical understanding that Water is the life-blood of our Mother Earth. Indigenous women continue their role as protectors of the Water. Ceremonial teachings are reminders of our heritage, they are practices of our current peoples, and they are treasured gifts that we hand to our children.

When considering matters of great importance we are taught to think beyond the current generation. We also are taught that each of us is someone's seventh generation. We must continually ask ourselves what we are leaving for a future seventh generation.

We understand that the whole earth is an interconnected ecosystem. The health of any one part affects the health and well being of the whole. It is our spiritual and cultural responsibility to protect our local lands and Waters in order to help protect the whole of Mother Earth.

Tribes and First Nations have observed with growing interest that the Great Lakes Basin governments of the United States and Canada have begun to share our concerns about the preservation of the quality and quantity of the Great Lakes Waters.

The eight States and two Provinces of the Great Lakes Basin entered into the 1985 Great Lakes Charter, Annex 2001, and have drafted an Interstate Compact and International Agreement to implement the provisions of Annex 2001. These agreements, however, make no provisions for including Tribes and First Nations as governments with rights and responsibilities regarding Great Lakes Waters. These agreements also assert that only the States and Provinces have governmental responsibility within the Great Lakes Basin.

Through International treaties and court actions, however, Tribes and First Nations continue to exercise cultural and spiritual rights of self-determination and property rights within traditional territories for our peoples and nations. Tribal and First Nation governments, like all governments, have the duty to protect the interests and future rights of our peoples. Since we have recognized rights and we are not political subdivisions of the States or Provinces, the assertion that the States and Provinces own and have the sole responsibility to protect the Waters is flawed.

Thus, the efforts of the States and Provinces to protect the Waters of the Great Lakes Basin are flawed because these efforts do not include the direct participation of the governments of Tribes and First Nations. This fundamental flaw endangers the interests of all of the inhabitants of the Great Lakes Basin and, ultimately, because of the interconnectedness of the worldwide ecosystem, endangers the interests of the entire earth.

It is thus our right, our responsibility and our duty to insist that no plan to protect and preserve the Great Lakes Waters moves forward without the equal highest-level participation of Tribal and First Nation governments with the governments of the United States and Canada. Merely consulting with Tribes and First Nations is not adequate, full participation must be achieved.

By this accord signed on November 23, 2004, at Sault Ste. Marie, Michigan, the Tribes and First Nations of the Great Lakes Basin do hereby demand that our rights and sovereignty be respected, that any governmental effort to protect and preserve the Waters of the Great Lakes Basin include full participation by Tribes and First Nations, and we also hereby pledge that we share the interests and concerns about the future of the Great Lakes Waters, further pledging to work together with each other and with the other governments in the Great Lakes Basin to secure a healthy future for the Great Lakes.

Tribal and First Nations Great Lakes Water Accord
November 23, 2004, Page 3

AAMJIWNAANG

By Darren Henry, Councilor

ASSOCIATION OF IROQUOIS AND ALLIED NATIONS

By Chief Chris McCormack

AUDECK OMNI KANING

By Peter Nahwegahbow

BATCHEWANA FIRST NATION

By Chief Vernon Syrette

BEAUSOLEIL FIRST NATION

By Rod Monague, Councilor

BIIJITWAABIK ZAAING ANISHINAABEK

By Chief Mike Esquega

CHIEFS OF ONTARIO

By Regional Chief Charles Fox

CHIPPEWAS OF NAWASH UNCEDED FIRST NATION

By Geewadin Elliott

Tribal and First Nations Great Lakes Water Accord
November 23, 2004, Page 4

DELAWARE (MORAVIAN) NATION

By Denise Stonefish

FIRST NATION OF CREES QUEBEC

By Daisy Costas

FOND DU LAC

By Eugene Reynolds

GARDEN RIVER FIRST NATION

By Chief Lyle Sayers

GRAND TRAVERSE BAY BAND OF OTTAWA AND CHIPPEWA INDIANS

By Robert Kewaygoshkum, Chairperson

HURON POTAWATOMI, INC.

By Laura Spurr, Chairperson

KEWEENAW BAY INDIAN COMMUNITY

By William E. Emery, President

LITTLE RIVER BAND OF OTTAWA INDIANS

By Lee Sprague, Ogemaw

Tribal and First Nations Great Lakes Water Accord
November 23, 2004, Page 5

LITTLE TRAVERSE BAY BANDS OF ODAWA INDIANS

By Frank Ettawageshik, Chairman

MAGNETAWAN FIRST NATION

By Chief Wilmer Noganosh

MATAWA FIRST NATION

By Noah Oshag, First Nation Delegate

M'CHIGEENG FIRST NATION

By Chief Glen Hare

MISSISSAUGA FIRST NATION

By Chief Bryan LaForm

MOHAWKS OF BAY OF QUINTE

Atonaserisio Wolf Clan
By Chief R. Donald Maracle

MOHAWKS OF AKWENSASNE

By Chief A. Francis Boots

NISHNAWBE-ASKI NATION

By Deputy Grand Chief Dan Kooses

Tribal and First Nations Great Lakes Water Accord
November 23, 2004, Page 6

ONEIDA NATION OF THE THAMES
Chief R. Phillips Bi.ne'kwe
By Chief Randall Phillips

POKAGON BAND OF POTAWATOMI INDIANS
Daniel J. Rapp
By Dan Rapp, Tribal Secretary

SAGAMOK ANISHNAWBEK

By Chief Angus Toulouse

SAGINAW CHIPPEWA INDIAN TRIBE OF MICHIGAN
Audrey Falcon
By Chief Audrey Falcon

SAUGEEN FIRST NATION

By Chief Vernon Roote

SAULT STE MARIE TRIBE OF CHIPPEWA INDIANS
Aaron A. Payment
By Aaron Payment, Chairperson

SOKAOGAN CHIPPEWA

By Tina Van Zile, Tribal Delegate

STOCKBRIDGE MUNSEE
Robert Chicks
Robert Chicks, Chairperson

Tribal and First Nations Great Lakes Water Accord
November 23, 2004, Page 7

THESSALON FIRST NATION

Chief James Wabigwan

UNION OF ONTARIO INDIANS

By Grand Council Chief John Beaucage

WALPOLE ISLAND FIRST NATION

By David White, First Nation Delegate

WASAUKSING FIRST NATION

Chief Joel King

WHITEFISH RIVER FIRST NATION

Esther Osche, First Nation Delegate

WIKWEMIKONG FIRST NATION

By Ron Manitowabi, Councilor

ZHIIBAAHAASING FIRST NATION

Chief Irene Kells

Tribal and First Nations Great Lakes Water Accord

By the accord presented on November 23, 2004, at Sault Saint Marie, Michigan, the Tribes and First Nations of the Great Lakes Basin do hereby demand that our rights and sovereignty be respected, that any governmental effort to protect and preserve the Waters of the Great Lakes Basin include full participation by Tribes and First Nations, and we also hereby pledge that we share the interests and concerns about the future of the Great Lakes Waters, further pledging to work together with each other and with the other governments in the Great Lakes Basin to secure a healthy future for the Great Lakes.

WHITEFISH LAKE FIRST NATION

By Ogema Art Petahtegoose — Date: Nov 23 2004

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

RESOLUTION
KB-1301-2004

WHEREAS, the Keweenaw Bay Indian Community is the political successor in interest to the signatories of the 1842 Treaty with the Chippewa, 7 Stat. 591, and the signatories of the 1854 Treaty with the Chippewa, 10 Stat. 1109, from the L'Anse and Ontonagon bands of the Lake Superior Chippewa Indians; and

WHEREAS, the Keweenaw Bay Indian Community is organized pursuant to the provisions of the Indian Reorganization Act of 1934, 48 Stat. 984, 25 U.S.C. §476, and has a Constitution and Bylaws duly approved by the Secretary of the United States Department of the Interior on December 17, 1936; and

WHEREAS, the Keweenaw Bay Indian Community exercises inherent sovereign authority over its members and its territories, on its reservation; and

WHEREAS, Article VI, Section 1(a) of the Keweenaw Bay Indian Community Constitution imposes a duty on the Tribal Council to protect the health, security and general welfare of the Community; and

WHEREAS, the Kennecott Exploration Company (Kennecott) has made its intention to mine for base and other precious metals in the headwaters of the Yellow Dog River and Salmon Trout River known to the Community; and

WHEREAS, the ores sought by Kennecott have been identified by Kennecott and other organizations as containing high levels of sulfide minerals, the mining of which can produce acid mine drainage that can be lethal to the environment to which it is exposed; and

WHEREAS, Kennecott has indicated by its actions that it may engage in these mining operations within the boundaries of the L'Anse Reservation and has in fact already engaged in exploratory drilling on the Reservation; and

WHEREAS, the method of mining currently proposed by Kennecott, deeply offends the traditional and cultural values of the Keweenaw Bay Indian Community; and

WHEREAS, the Tribe recognizes that any temporary gains produced by the proposed activities

of Kennecott are far outweighed by the potential for enduring and severe damage to the area in and around its territory; and

WHEREAS, Kennecott has shown no satisfactory evidence that it can undertake this activity without polluting ground or surface water; and

WHEREAS, Kennecott has made no showing that, after it undertakes such activities, it can protect the ground and surface waters from acid drainage; and

NOW THERFORE BE IT RESOLVED that the Keweenaw Bay Indian Community, through its Tribal Council, hereby prohibits the aforementioned mining activities within the boundaries of the L'Anse Reservation and all activities related thereto unless and until substantial evidence can be produced to satisfy its concerns.

CERTIFICATION

We, William E. Emery, President, and Larry J. Denomie III, Secretary of the Keweenaw Bay Tribal Council, do hereby certify that this Resolution numbered KB-1301-2004 to be a true and exact copy as approved by the Tribal Council of the Keweenaw Bay Indian Community at a duly called meeting held on July 17, 2004 there being a quorum present, by a vote of 10 In Favor, 0 Opposed, and 0 Abstentions, as follows:

Vice President Susan J. LaFernier:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Secretary Larry J. Denomie III:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Asst. Secretary Warren C. Swartz, Jr.:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Treasurer Jennifer Misegan:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Doreen G. Blaker:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Fred Dakota:	AYE	NAY	ABSTAIN	(NOT PRESENT)
Councilperson Michael F. LaFernier, Sr.:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Gary F. Loonsfoot, Sr.:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Elizabeth D. Mayo:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Ann Misegan:	(AYE)	NAY	ABSTAIN	NOT PRESENT
Councilperson Shawanung:	(AYE)	NAY	ABSTAIN	NOT PRESENT

President William E. Emery:

AYE NAY NOT APPLICABLE NOT PRESENT

William E. Emery
William E. Emery, President

Larry J. Denomie III, Secretary

Environmental Program Development & Implementation Agreement

Keweenaw Bay Indian Community and U.S. Environmental Protection Agency Region 5

2010-2012

Table of Contents

ENVIRONMENTAL PROGRAM DEVELOPMENT AND IMPLEMENTATION AGREEMENT

KEWEENAW BAY INDIAN COMMUNITY AND U.S. EPA REGION 5 2010-2012

The United States Environmental Protection Agency Region 5 and the Tribal Government of the Keweenaw Bay Indian Community agree to work together in a government-to-government partnership on the activities identified within this Agreement.

Authorizing Signatures

Warren Swartz, Tribal President
Keweenaw Bay Indian Community

7 May 2010
Date

Susan Hedman, Regional Administrator
U.S. Environmental Protection Agency Region 5

24 June 2010
Date

This Agreement between Region 5 and the Keweenaw Bay Indian Community is for planning purposes only. The document is designed to implement EPA's Indian Policy for working with federally recognized Tribal Governments on a government-to-government basis. The document does not, however, substitute for requirements in federal statutes or regulations, nor is it a requirement itself. This document is not intended to create any right or trust responsibility enforceable in any cause of action by any party against the United States, its agencies, offices or any other person. Thus, it cannot impose legally binding requirements on EPA, and may not apply to a particular situation based upon the circumstances.

Environmental Program Development & Implementation Agreement
Keweenaw Bay Indian Community and U.S. EPA Region 5
2010-2012

Introduction Statement: Purpose, Description, & Use

This document is an Agreement for environmental protection on the Keweenaw Bay Indian Community (KBIC) Reservation. While EPA recognizes KBIC as the primary environmental manager on the Reservation, the Agency retains certain responsibilities for implementing federal environmental authorities. This document will identify the following for the next three years: KBIC environmental program priorities, specific activities related to implementing federal environmental requirements on the Reservation, roles and responsibilities of each party, and Agency support for Tribal program development and implementation activities. This Agreement can be used by each party to forecast work loads for each year, define resource needs, and identify opportunities for partnerships with other federal agencies. EPA and the Tribe will revise this Agreement every three years, or modify as appropriate by mutual agreement.

Section 1: Tribal Background

KBIC is a signatory to the Treaty of 1842 and the Treaty of 1854. The Treaty of 1854 established Reservation land bases which include the L'Anse and Ontonagon Indian Reservations. The primary land base is the L'Anse Indian Reservation, located in the western Upper Peninsula of Michigan along the shores of the Keweenaw Bay of Lake Superior. The L'Anse Indian Reservation consists of approximately 75,000 acres, 54,000 of which are land, and 21,000 of which is Lake Superior. There are approximately 19 miles of Lake Superior shoreline, 3,000 acres of wetlands, and 80 miles of rivers within five watersheds that are either wholly or partially within the L'Anse Reservation boundaries. The Village of Baraga and community of Zeba both lie entirely within the Reservation boundaries. while the Village of L'Anse lies partially within the Reservation. The Ontonagon Indian Reservation is located in Ontonagon County along the Lake Superior shoreline, is approximately 3,000 acres in size, has about 2 miles of Lake Superior shoreline, and includes three watersheds partially within Reservation boundaries. KBIC also administers approximately 200 acres of land holdings and housing in Marquette County. The L'Anse Indian Reservation and the Ontonagon Reservation exterior boundaries are formally recognized by the Bureau of Indian Affairs (BIA).

The KBIC constitution and bylaws were approved on December 17, 1936 and a corporate charter was ratified on July 17, 1937, pursuant to the 1934 Indian Reorganization Act. The legislative body consists of a 12-member Tribal Council with six elected representatives from two voting districts. There are approximately 3,340 enrolled Tribal members, with approximately 960 residing within the L'Anse Reservation boundaries, or in Baraga County. Approximately 35% of land holdings are owned by KBIC, with the remaining 65% owned by individual Tribal and non-Tribal members, local governments, or area businesses.

Ceded territories covering the western Upper Peninsula of Michigan and northern portions of Wisconsin and Minnesota were defined by the Treaties of 1842 and 1854. KBIC retains hunting, fishing, gathering, and other usufructory rights within these ceded territories, and tribal members

and government staff exercise these rights for subsistence, spiritual, cultural, management, and recreational purposes.

KBIC has an established Natural Resources Department (NRD) which includes natural resource, fisheries, wildlife, and environmental programs under the direction of the Natural Resources Director, who in turn takes direction from the Chief Executive Officer and the Tribal Council. The NRD environmental program is staffed by an Environmental Specialist, a Water Resources Specialist, a Water Resources Technician, an Environmental Response Program Specialist, and a Brownfields Assessment Coordinator. Funding for the Natural Resource Department is provided by KBIC, EPA, U.S. Department of Agriculture, Indian Health Service (IHS), Department of Health and Human Services, Bureau of Indian Affairs, and other sources.

The Tribe has a Strategic Plan which is based on community values, identified during an intensive tribal community planning process, that include strong families, sovereignty, tradition/culture, employment/business, health care/good health, education, environment, youth, elders, safety, and government/leadership. Copies are available upon request. Within the Environment Section, the vision for the Keweenaw Bay Indian Community is:

- The waters of Lake Superior, inland lakes and streams are the cleanest in the world
- The Reservation is clean and free of blight and litter
- People from all walks of life come and enjoy the beauty of our Reservation
- The Reservation has a land use plan to assist in development
- Manage our forests for sustainability and profit
- Honor our traditions and culture through the preservation of our homelands

Eight goal statements are provided for in the Environment Section of the Strategic Plan with associated benchmarks and measures to assist the community with meeting the above vision statements. Goals are provided for protection, preservation, mitigation, and enhancement of the natural resources and environment of KBIC through programs, management planning, baseline data collection, ordinance development, forestry program development, alternative energy development and use, water and sewer infrastructure, and active participation and partnerships.

In 2003, an Integrated Resource Management Plan (IRMP) was adopted by the Tribal Council and subsequently approved by the Bureau of Indian Affairs. This IRMP includes goals and benchmarks for the highest priority resources as identified by the Tribal membership. We will continue to use this IRMP as a guidance document for our priorities and activities. The vision of the IRMP is "To live in harmony while enhancing and sustaining the resources of the Keweenaw Bay Indian Community for the Seventh Generation." The IRMP contains an Environment section that includes the following elements:

- Biological control chemicals management
- Air quality management
- Hazardous waste management
- Storage tanks management
- Solid waste management

The IRMP also includes goals and objectives for the following resources or elements:

- Cultural resource management
- Fisheries resource management
- Wild rice and native plants management
- Wildlife management
- Wetlands management
- Forestry and fire management
- Enforcement management
- Recreation management
- Economic development management
- Soils management
- Water quality
- Roads/transportation management
- Land acquisition and use, and GIS
- Partnerships and education

Section 2: Keweenaw Bay Indian Community Environmental Program Priorities

KBIC has identified a number of environmental concerns and/or priorities for the community. These priorities guide the initiation of projects as well as ongoing work and future development of programs. Environmental concerns and priorities include:

1. Providing safe drinking water to tribal members – KBIC would like to expand its existing community water systems to serve more members on the Reservation. Some members are using private residential wells that are poorly constructed and susceptible to contamination from septic systems and surrounding land uses. Some groundwater on-Reservation is of marginal quality.

   EPA Role: The Water Division recommends that KBIC include this need on the IHS Sanitation Deficiency System Priority List. Water Division can assist as needed.

2. Protection of hydrological systems on the Reservation – The Reservation land bases contain an interconnected network of rivers and streams, lakes, and wetlands. All hydrologic systems eventually discharge to Lake Superior. The health and welfare of the community and community resources is dependent upon clean water, both on-Reservation and in Lake Superior. Ongoing or potential threats to water quality include residential, industrial, and commercial development, existing commercial and industrial operations, improper solid waste and hazardous waste disposal and open dumping sites, storm water discharge, wetland filling or dredging, logging and silviculture, agriculture, individual well and septic systems, contaminated properties and Brownfield sites, and transportation industries and corridors. In addition, mineral exploration companies have identified potential mining prospects on the L'Anse Reservation that consist of metallic sulfide ore deposits. Potential mining development and associated acid-mine drainage and release of heavy metals and other contaminants to the environment are a very significant threat to Reservation hydrologic systems, treaty rights, and the health and welfare of the community. Baseline water quality

monitoring has been ongoing since 1996. A program eligibility application for water quality standards is nearing completion.

EPA Role: As appropriate, Water Division will review National Pollutant Discharge Elimination System permits for mining activities that may impact Tribal waters. In addition, Water Division will continue to support the Tribe during the CWA Section 303 program eligibility approval process, and subsequent WQS development and formal submittal. The Great Lakes National Program Office (GLNPO) encourages KBIC to discuss the Tribe's priorities under this subject, as they relate to the Great Lakes Restoration Initiative (GLRI). There may be funding opportunities to pursue and partnerships to join for increased efficiency. For more information, go to http://greatlakesrestoration.us/.

3. Identify and address contaminated or potentially contaminated properties (including open dumps) that are present on lands under the jurisdiction of KBIC – Reservation lands have historically experienced industrial and commercial development activities including logging, scrap yards, railroading, agriculture, industrial, and other similar activity. Off-Reservation mining and ore processing has impacted on-Reservation resources and lands. Currently two industrial parks are located entirely within the Reservation boundaries and one industrial park is partially within Reservation boundaries. These industrial parks currently or at one time did host businesses including scrap recyclers, cement plants, fiberglass manufacturers, auto repair and body shops, construction companies, industrial assembly corporations, and wood processing plants.

   Active and abandoned petroleum facilities are also present within the Reservation. These include gasoline/diesel service stations and fuel oil storage facilities. Unused and abandoned underground storage tanks (USTs) have been found on-Reservation which may present risks to the environment, community resources, and Tribal membership. These USTs need to be located and assessed for the potential presence of surface and/or subsurface contamination.

   An additional problem within the Reservation is open dumping of refuse. We have established a goal of cleaning up and closing existing open dumps on the Reservation. Open dump sites are included in the Brownfields database, and an open dump inventory is being developed for future management and mitigation of these sites. These open dumpsites are unenclosed and accessible to the general public and often contain hazardous materials such as household hazardous wastes, lead-acid batteries, waste oils and other used petroleum and automotive fluid products, rusted metal, broken glass, household cleaning and maintenance solvents, paints, and various other materials potentially hazardous to human health or the environment. The impact of these properties on the community's natural resources and health is largely unknown. The Sand Point Brownfield site requires additional mitigation and we are interested in redevelopment of the property.

   EPA Role: The problems described above can largely be addressed under the Tribe's developing Site Response Program, which Superfund Division supports through annual CERCLA Section128(a) funding. EPA also makes available to Tribes at no cost, technical assistance for site document review or preparation, environmental contractor evaluation, and site assessment planning, among other things, through a grant to Kansas State University. In addition, Superfund Division will continue to provide direct training pertinent to site

assessment and remediation and will provide frequent notices to the Tribe about relevant training offered by others. Costs for the training can be charged to the Section 128(a) grant.

As referenced below under "Resource Conservation and Recovery" section, Land and Chemicals Division (LCD) will consult with the Tribe and conduct enforcement investigations to determine the appropriateness of enforcement action to address specific incidents of illegal dumping on the Reservation. LCD will work with KBIC to update the IHS wSTARS database with the Tribe's open dump inventory information. Upon request and as resources allow, LCD will work with the Tribe to assess open dumps. In addition, LCD will work with the Tribe to review the status of the leaking underground storage tanks located within the Reservation boundaries, identify the LUST inventory, identify any Tribal-specific concerns, gather information on the status of responsible parties, and discuss prioritizing eligible sites for assessment and/or remediation.

4. Provide a solid waste management program that allows for the effective collection, transport, disposal, and diversion of our solid waste and hazardous waste streams – The Tribe would like to improve management of solid waste on the Reservation. Historically there has been a lack of solid waste service which has resulted in the open dumping of waste by members and non-members (see priority number 3 above). There is minimal waste stream diversion, such as recycling and composting, apparently due to cost and lack of potential markets for recycled materials.

   In 2009, we received funding from the Tribal Interagency Solid Waste Workgroup to design and construct a solid waste transfer station in the Ojibwa Industrial Park. We will be working with IHS to complete the project. Completion is expected in 2010. The transfer station will be open to the public. Potential future elements include composting and recycling, household hazardous waste collection, and other special waste collection or recycling services. Over the years, the Tribe has provided an annual bulky waste collection service for enrolled members and hosted or participated in household hazardous waste collection events. We would like to continue offering these services. Our Integrated Solid Waste Management Plan was approved by the EPA in 2005 and is being revised to reflect the current reality and to incorporate EPA recommended elements. We are also interested in reducing or eliminating the use of residential and commercial burning and burn barrels which are used to burn solid waste on the Reservation. Technical assistance is desired to help with our efforts in this area.

   EPA Role: LCD will coordinate with IHS to provide technical assistance to develop the transfer station and corresponding waste collection and recycling services. LCD will assist the Tribe to meet the recommended five elements for an integrated waste management plan. GLNPO encourages KBIC to investigate the possibilities of support for hazardous waste, electronics, and pharmaceutical waste collections under the GLRI. Superfund Division can continue to fund (through the CERCLA Section 128(a) grant) Tribal staff work on household hazardous waste collection events in order to prevent those waste streams from appearing in illegal/open dumps.

5. Protect air quality for Tribal members – The Tribe's goal is to develop an air quality program within the Natural Resource Department and obtain program eligibility. Currently capacity and infrastructure limitations have prevented us from moving forward towards this goal. Our air quality concerns include both ambient and indoor air quality in Tribal residences, offices,

and other Tribal facilities. We currently have a continuous radon monitor which environmental staff are trained to use and is available for conducting testing of area residences and other buildings. Single use radon testing kits are also available for membership use. Elevated radon concentrations are a concern at the NRD offices. Concerns noted in various Tribal residences and government buildings have included mold, asbestos, and lead. A cogeneration power plant recently started operating approximately 2 miles from the L'Anse Reservation which may have adverse impacts on air quality and water quality.

EPA Role: In 2008, the Air and Radiation Division hosted a Tribal Indoor Air Summit in Baraboo, Wisconsin. The majority of Region 5 Tribes participated as well as State and Federal representatives who included Minnesota, Wisconsin, and Michigan asthma leads. As a result, a post summit workgroup was formed as a vehicle for Tribal representatives to join the quarterly calls for input regarding their indoor air concerns. EPA encourages Tribal participation in this call and supports the calls to build indoor air programs capacity, and will work to assist the Tribe to address indoor air quality issues as necessary and appropriate.

6. Impacts from off-Reservation development – Proposals for resource extraction and processing enterprises are increasing on private and public lands within the areas ceded by the Tribe. At least six separate mineral exploration companies have been working in the western Upper Peninsula of Michigan and are targeting both metallic sulfides and uranium ores for potential future development. One exploration firm has announced that it has identified six potential mining development prospects. Another mining company has announced their intention to apply for a permit to mine a copper sulfide deposit located approximately one-half mile from Lake Superior.

   A permit proposal has been submitted to the State of Michigan by a mining company for development of a sulfide ore processing facility at a location about 20 miles from our L'Anse Reservation. A mining trucking haul road has been proposed for construction through an extensive area that was formerly roadless and contains significant clean water resources and healthy fish and wildlife populations and forestry resources. This haul road, if constructed, will require significant wetland filling, and could result in loading of heavy metals and other contaminants to a significant area of streams, wetlands, and forest. Sulfide and uranium mining activities would have significant adverse impacts on the land, water, and biological resources that are used by tribal members. These potential enterprises are primarily regulated by the State of Michigan through authorities delegated by EPA, or through State environmental laws regulations. There are concerns with the State of Michigan regulatory capacity due to lack of State funding and other reasons.

   Additional concerns include potential impacts from area logging, and potential impacts from biomass energy development promoted through renewable energy subsidies. Additional concerns include impact to Tribal resources caused by deposition or migration of contaminants into our environment from outside areas, and impacts caused by persistent contaminants and compounds. Mercury, dioxins, PCB's, toxaphene, and other contaminants impact water quality and our fishery and other resources which tribal members consume.

   EPA Role: Water Division will continue to provide the Tribe with technical assistance as it relates to water resources. Once the Tribe applies for and is approved for program eligibility under CWA Section 303, EPA can assist the Tribe to be more directly involved in activities

that impact Reservation waters. GLNPO encourages KBIC to explore the potential for help in addressing these issues through the Lake Superior Lakewide Management Plan (LaMP) process. Noncompetitive LaMP capacity funding is available from GLNPO. Air and Radiation Division will provide assistance in addressing renewable energy issues, as well as advice on issues associated with aquatic deposition of environmental toxicants. Superfund Division can initiate a site assessment process under CERCLA on formerly used mine sites in response to a petition from the Tribe. That site assessment process is unrelated to proposed future uses of a mine or mining associated site and is unrelated to any permitting process for proposed mines.

7. Reduce the Tribe's environmental impact/climate change – KBIC is interested in reducing our impact to the environment and climate through energy conservation, water conservation, use of renewable and alternative energy sources, recycling, and other resource reduction strategies and potentially sustainable practices. We are also interested in educating ourselves and the Tribal membership about these issues. We recently formed the Committee for Alternative and Renewable Energy which holds monthly meetings and developed a Strategic Energy Plan with assistance from the Council for Energy Resource Tribes. This plan is scheduled to be updated in the near future. Energy baseline assessment data is being collected and compiled. Wind power feasibility studies are being planned and should commence in late 2009 or early 2010 utilizing funding assistance that will be received from the Department of Energy (DOE) and technical assistance from EPA. Additional training and capacity building will commence in the near future using assistance to be received from DOE. Our walleye ponds are aerated using solar power and we are interested in additional development of solar resources. In 2009, the NRD hosted an Environmental Fair to provide education to school-aged children and Tribal members on environmental and sustainability issues and concerns. We hope to expand educational efforts and opportunities and would like to continue hosting an environmental fair each year.

   EPA Role: Land and Chemicals Division will disseminate information on funding and technical resources whenever available to support the Tribe's pollution prevention, source reduction, and recycling strategies. GLNPO encourages KBIC to discuss impacts/adaptation interests within the context of the GLRI as the Initiative develops its priorities for funding in future years. Air and Radiation Division will provide assistance as appropriate in understanding and/or addressing various alternative energy programs and their potential in reducing impacts to the environment. Superfund Division will continue to keep the Tribe informed of funding and technical assistance opportunities for renewable energy offered by EPA nationally and in partnership with DOE.

8. Develop environmental laws and policies – Enforcement mechanisms are needed to ensure the protection, enhancement and restoration of the health, welfare, culture, and the environment and natural resources for current and future generations. These policies and laws need to incorporate a variety of subjects including environmental response and remediation, solid waste management, land use planning, regulation of open dumping and burn barrels, use of environmental management systems, and policies that encourage the use of green building practices, renewable energy, environmental design, energy efficiency and "green" practices. Capacity challenges and limitations are present in this area.

EPA Role: As resources and authorities allow, the Indian Environmental Office will work with the Tribe to identify environmental program capacity building activities related to this priority that may be supported through funding and technical assistance under the Indian General Assistance Program (IGAP). Superfund Division can continue to fund (through the CERCLA Section 128(a) grant) Tribal staff or contractor work on development of Tribal enforcement and oversight authority for environmental response and remediation, and regulation of dumping of solid and hazardous waste and other related laws, regulations, and policies. Technical assistance also can be provided to identify model laws which can be adapted to this Tribe's circumstances.

9. Develop an emergency response program – The KBIC Government would like to take a more active role in emergency response planning and preparation in Baraga County. This role would include either formal involvement in the Local Emergency Planning Commission in Baraga County or the development of a Tribal Emergency Planning Commission. Development of an emergency response program would also include updating or creating an emergency management plan, training appropriate staff, and identifying the role of local, county, and tribal government in a response. Capacity challenges are present in this area.

   EPA Role: Superfund Division supports this work by Tribal staff through CERCLA Section 128(a) grant funding. Superfund Division also provides staff and contractor support to train Tribal staff and is facilitating the ongoing and increasing integration of Tribes into the larger response community. Superfund Division will continue to invite the Tribe to Regional Response Team and Area Planning Committee meetings and will provide more contact between Tribes with the initiation of regular Tribal emergency preparedness conference calls.

10. Obtaining CWA Section 319 funding for non-point source management - Our community is concerned about nonpoint pollution impacts to water resources caused by agriculture, unrestricted livestock grazing, poor siting and design of roads and bridges, poor quality stream crossing construction and maintenance practices, road de-icing in the winter, commercial forestry practices, abandoned mines, fertilizer and pesticide use, construction activities, and other sources. Obtaining Section 319 funding would allow us to quantify, monitor, and potentially remediate some or all of our non-point sources on the Reservation. We are also interested in non-traditional methods of construction and controlling of storm water. Staffing and staffing support services and support infrastructure might need to be increased.

    EPA Role: Water Division will assist the Tribe when they are ready to apply for program eligibility under CWA Section 319. When ready, we suggest the Tribe initiate the process by setting up a conference call with the Water Division, Office of Regional Counsel, and the Indian Environmental Office. In addition to the CWA Section 319 application, the Tribe will need to develop a Management Plan and an Assessment Report outlining their priorities and plans for their Non-point Source Program (funding under CWA Section 106 or IGAP can be used to develop these documents). EPA will provide the Tribe with the revised CWA Section 319 Guidance that will be issued in early 2010 and will provide technical assistance as needed. Please note that the program eligibility application must be approved by mid-October to be eligible for funding the next fiscal year. GLNPO encourages KBIC to discuss their CWA Section 319 interests with GLNPO in light of the potential for complementary non-point source work under the GLRI.

11. Obtaining CWA Section 404 Wetland Management Program funding – The Tribe would like to obtain Section 404 funding to delineate and manage Reservation wetlands, quantify their condition, and identify restoration needs and priorities. An updated wetlands management plan and a wetlands ordinance are goals that have been identified.

    EPA Role: Annually, EPA provides funding under CWA Section 104(b)(3) for wetlands programs through a competitive process. The Water Division will provide technical assistance to the Tribe in the development of wetlands plans. Funding under CWA Section 106 and the IGAP may also be used for these activities. GLNPO encourages the Tribe to discuss its wetlands program goals with the agencies funded for habitat protection/restoration work under the GLRI.

12. Fish Hatchery Aquifer Management – The Tribe has operated a fish hatchery since 1993. Currently, lake trout, brook trout, and coaster brook trout are reared for stocking into Reservation and ceded territory waters for fishery enhancement needs consistent with Great Lakes Fishery Commission restoration objectives for Lake Superior. The hatchery utilizes groundwater as a water supply source. We are in need of additional aquifer characterization studies and water use planning assistance to help ensure the long term sustainability of hatchery operations. We have been requesting funding from the BIA since 2004 for such assistance; however, the BIA water program has been unable to provide any funding for Tribes in this region for many years. Our long term goal is to upgrade and install water recycling and aquifer monitoring systems to improve our water management, use water and other resources more efficiently, and expand our hatchery rearing capacity.

    EPA Role: EPA does not currently have funding available for aquifer characterization studies. Water Division can assist the Tribe if any permits are needed for the hatchery water surface water discharges. GLNPO can help the Tribe to discuss fisheries priorities within the context of the GLRI opportunities across several agencies.

13. Ensure environmental and natural resource elements are considered in land-use planning – Currently, there is no established land-use planning process for Reservation lands. There is no local zoning for surrounding communities. We are currently in the process of conducting land-use planning and would like to ensure that the environment, natural resources, and complex ecosystems are protected and considered when making decisions regarding commercial and residential development. Additional resource inventory databases and database management systems are in need of development.

    EPA Role: Specific activities related to this priority may be eligible for funding under IGAP.

14. Participation and active involvement in regional environmental forums and planning efforts – The Tribe would like to increase its ability to participate in regional environmental planning and management efforts. Specifically we would like more involvement in the LAMP process, Bi-national forum, Fish Habitat Partnerships, Great Lakes Fishery Commission, Intergovernmental Accord process, and other efforts that involve and affect Lake Superior and Lake Superior ecosystems.

EPA Role: Specific activities identified under this priority may be eligible for funding under IGAP and CWA Section 106 programs. Superfund Division will continue to invite the Tribe to Regional Response Team and Area Planning Committee meetings and encourage their participation on those bodies and in area exercises. Tribal staff time to attend these meetings can be funded under the CERCLA Section 128(a) grant. GLNPO can provide noncompetitive capacity funding for the Tribe to participate in LaMP process as well as related networks. In addition, GLNPO encourages KBIC to learn more about the Cooperative Science and Monitoring Initiative (CSMI) and the possible coordination of Great Lakes water quality monitoring activities. The CSMI is a joint effort between Canada and the U.S. which has the goal of providing the environmental managers of each of the Great Lakes with an enhanced science program that addresses their information needs on a 5-year rotating schedule. CSMI began and continues as a program requested by the Binational Executive Committee. Science and monitoring priorities are identified by the Lakewide Management Plan (LaMP) Management Committees, and by management committees for the connecting channels and St. Lawrence River, and coordination through a binational CMSI Steering Committee. For more information, please contact Glenn Warren, U.S. Co-Chair of CSMI Steering Committee, or Liz LaPlante, the Lake Superior LaMP Manager.

15. Establish and Environmental Health Plan for the Tribe – Initial discussions between KBIC's Department of Human Health and Services and NRD have identified a need for development of an Environmental Health Program or an Environmental Health Plan. Topics of the Environmental Health Plan could include contaminant reduction, drinking water quality, indoor air quality, solid waste and household hazardous waste, mercury awareness, consumer product education, lead awareness, asbestos education, mold, ozone, biological agent information, exposure route education that could include fish and wildlife health, water, air, food handling, and consumer product information. Environmental hazards have been linked to such conditions/diseases as asthma, cancer, lung disease, autism, Parkinson's disease, and reproductive health. Environmental Health Planning could also include emergency response actions related to influenza pandemics, environmental disease outbreaks, and natural disasters.

    EPA Role: Specific activities related to this priority may be eligible for funding under IGAP. The Tribe could use a portion of their CWA Section 106 funding to support this activity as it relates to water resources. Air and Radiation Division will support, as appropriate, the Tribe's development of an Environmental Health Program to address various issues including indoor air quality, mercury, radon, and mold. Education of the public about environmental and human health risks of certain actions, such as improper dumping of household hazardous waste, is an appropriate element of a Tribal site response program, and some of this work can be supported by Superfund Division under the Tribe's CERCLA Section 128(a) grant. Much of the environmental health planning also mentioned in this priority is beyond the mission of Superfund Division. However, planning and preparedness work for emergencies related to contaminant releases, which is supportable with the CERCLA Section 128(a) grant, generally will enhance some elements of preparedness for such things as natural disasters or pandemics.

16. Impacts from on-Reservation development – Proposals for resource extraction and potentially for processing enterprises are anticipated on private lands within the L'Anse Reservation boundaries. At least two separate mineral exploration companies have conducted

metallic sulfide mineral exploration within the L'Anse Reservation boundaries. The Ontonagon Reservation is in an area of stated interest by at least one company for metallic mineral exploration. Sulfide and uranium mining, and associated activities, would have significant adverse impacts on the land, water, biological and other treaty resources that are used by Tribal members. Potential mineral development enterprises would be regulated by the EPA through federal statutes and regulatory programs. There are concerns that the Tribe does not have the capacity to fully evaluate potential resource impacts or collect sufficient baseline data to determine likely impacts. Additional concerns include potential impacts to Tribal resources from area logging, biomass energy development promoted through renewable energy subsidies, deposition or migration of contaminants into our environment from outside areas, and persistent contaminants and compounds. Mercury, dioxins, PCB's, toxaphene and other contaminants impact water quality and our fishery and other resources which Tribal members consume.

EPA Role: Activities conducted within the Reservation boundaries are subject to applicable federal environmental requirements. EPA is responsible for ensuring that all regulated activities and facilities are in compliance with these requirements. The Agency recognizes that it has a trust responsibility to protect Tribal resources and consider impacts to Tribal resources as it implements its statutory authorities. As EPA administers the federal environmental programs outlined in this document, it will consult with the Tribe on any actions that may potentially impact Tribal resources. As appropriate under the EPA funding awarded to KBIC, Region 5 will work with the Tribe to identify how specific environmental program capacities can be developed.

17. Protection of traditional/cultural resources and areas on and off-Reservation – Proposals for metallic sulfide mining and processing, uranium exploration and potential mining and processing, biomass development, logging, road construction, housing and other construction, and other land use activities have the potential to negatively impact or destroy Tribal traditional/cultural resources and areas both on and off Reservation lands. Off-Reservation activities are generally regulated by the state of Michigan or local authorities. Consultation with the Tribal Historic Preservation Office is typically not completed by State or local government permitting agencies.

EPA Role: Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effect of their undertakings on properties included or eligible for inclusion on the National Register of Historic Places. NHPA provides that properties of traditional religious and cultural importance to a tribe may be eligible to inclusion in the National Register and federal agencies are directed to consult with tribes when carrying out their responsibilities under Section 106. When implementing the federal environmental requirements, both on and off-Reservation, EPA will consult with KBIC to identify historic properties that meet the National Register criteria, determine potential for adverse effects to historic properties, and attempt to resolve or mitigate adverse effects.

Section 3: Implementation of Federal Environmental Authorities

The purpose of this section is to provide an outline of how EPA and the Keweenaw Bay Indian Community will work in partnership to ensure that federal environmental programs are implemented within the Reservation. For each major environmental statute, the current federally regulated universe is summarized and the corresponding tribal and federal implementation roles/responsibilities are defined for the next three years.

Please note that this section does not attempt to characterize all federal authorities that may be implemented on the Reservation. As new regulated facilities are proposed, additional federal requirements promulgated, or conditions on the Reservation change, EPA may exercise additional regulatory authorities or provide other assistance to the Tribe. Instead, this document defines for a particular time frame a list of specific activities in response to the existing universe of regulated facilities and activities. This Agreement does not preclude EPA's discretion to exercise its authorities to protect human health and the environment.

In accordance with the Agency's policies related to working with Tribal Governments, EPA will promote and facilitate communication with appropriate Tribal leaders and staff as it implements its programs. EPA will use best efforts to ensure that outreach, information exchange, and requests for Tribal input will occur early in any Agency process that may affect the Tribe. Full consideration will be given to the policies, priorities, and concerns of the Tribe. As appropriate under the 1984 EPA Indian Policy and Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, EPA will engage in consultation as requested by the Tribal Government.

Clean Air Act

Federally Regulated Facilities within the Reservation	
Major sources (PSD/Part 71 Permits)	No identified facilities
Minor sources	Inventory under development (see below)
Facilities required to develop a risk management plan under CAA Section 112(r)	No identified facilities

National Ambient Air Quality Standards Attainment Status
Reservation currently in attainment for all promulgated NAAQS

Status of Emissions Inventories Submitted for Reservation		
Inventory Category	Date Submitted	Emissions Inventory System
Major Source - Stationary source that emits or has the potential to emit any pollutant regulated under the CAA at a significant emission rate, as defined by 40 CFR 70.	To be developed	NA
Minor Source - Facility site that does not qualify as a major source.	Under development see below	To be uploaded in 2010
On-road Sources - Vehicles used on roads for transportation of passengers or freight, also called "on-highway."	To be developed	NA
Non-road Sources - Vehicles and equipment that operate off public roadways or highways.	To be developed	NA

Tribal Implementation Activities:

- During 2010-2012, KBIC anticipates continuing to perform radon assessments at tribal facilities and member households using continuous radon monitors.

EPA Implementation Activities:

- Air and Radiation Division (ARD) is working to complete a minor source emissions inventory for the Reservation. A direct implementation tribal cooperative agreement (DITCA) with the Inter-Tribal Council of Michigan (ITCM) has been issued to develop the inventory. ARD is working with the Office of Air Quality Planning and Standards and Office of Management and Budget to secure an updated Information Collection Request to enable ITCM to complete the DITCA inventory project by summer 2011.
- It is anticipated that the Agency will promulgate a Tribal minor new source review rule during the first quarter of fiscal year 2011. After the rule is promulgated, ARD will review with the Tribe the regulated universe on the Reservation and discuss how the minor new source review program will be implemented on the Reservation.
- EPA supports radon testing, as necessary. ARD posts an annual funding announcement to solicit proposals from Region 5 Tribes for TSCA-SIRG radon funding consideration. Funding is based on the strength of the proposal submitted and the applicant's demonstrated need, as well as, the realities of EPA's budget constraints.

Clean Water Act

Federally Regulated Facilities Within Reservation	
NPDES permits	No identified facilities
NPDES storm water construction, industrial, municipal permits	Beartown Housing Road Project [MIR10A551] Walleye Rearing Facility [MIR10A591] Potential facilities/sites on Reservation covered by MDEQ NPDES general permits: All Wood Inc. Connor Forest Industries Des Rochers Bos. Inc. MDOT-M38-McGillian-US41 Michigan Ang-Baraga-OMS 16A Pettibone Corp. Tangen Div. Ralph's Reusables Valmet Logging American Van Sraten & Sons Inc.
Facilities/Sites subject to Section 404 review	No identified facilities
Oil storage facilities regulated under SPCC program (CWA Section 311)	Northern Oil

Tribal Implementation Activities:

- The Tribe has developed a memorandum of agreement (MOA) with EPA to coordinate implementation of the NPDES construction general permit program. Two tribal staff members have been issued federal credentials to conduct inspections at sites regulated under the construction general permit. The Tribe will continue to monitor activity on the reservation that is subject to compliance with the construction general permit, and as authorized by EPA conduct compliance inspections.
- In 2009, KBIC completed a draft application for program eligibility for CWA Sections 303 and 401. Revisions are being made based on discussion with EPA, and the Tribe anticipates a submittal draft will be done in early 2010.
- The surface waters on the Reservation have been inventoried. A wetland inventory is ongoing, but the current focus in on wildlife habitat using Tribal Wildlife Grant support. Additional wetland inventory work will likely be necessary.
- The Tribe completed a Monitoring Strategy in June 2009. KBIC operates a surface water monitoring program. The Tribe would like to add biotic sampling elements to its program. Additional baseline data collection efforts are needed in areas currently targeted for sulfide mineral exploration on the Reservation to ensure we have adequate data with which to predict impact to evaluate any development proposals put forth and to measure any natural resource damage should sulfide mining development occur. The Tribe needs additional funds to complete this work. Recent funding cuts have reduced our ability to collect additional data outside of the core ongoing monitoring program.
- KBIC has had and will continue to have some involvement in the Deer Lake site, an EPA Area of Concern and in general have a high degree of concern with mercury in our environment and fishery resources.

EPA Implementation Activities:

- By September 2010, Water Division will have consulted with the Tribe to determine whether the facilities listed above operating under state permits are located within the Reservation. For any facilities found to be within the Reservation boundaries, Water Division will begin the NPDES permitting process for the permits that are expired and then as permits expire.
- By September 30, 2010, Water Division will identify any facilities on the Reservation that are required to obtain coverage under the Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activity. Facilities that are identified will be sent a notification and Water Division will work with them to obtain permit coverage.
- For the MOA related to the NPDES construction general permit program, Water Division will continue to work with the Tribe to authorize inspections of permitted construction sites; review inspection report checklists and provide compliance assistance or take enforcement actions based on the results of the inspection; continue to ensure required annual training is completed; and, as credentials expire, work with Tribal staff to reissue credentials.
- In 2010, Water Division will work with EPA Headquarters to plan three tribal water quality standards (WQS) training sessions: (1) Introduction to WQS; (2) Clean Water Act Section 303/401 Treatment as State and the EPA Treatment as State Strategy; and (3) 5-day WQS Academy.
- In the event of any spill or incident indicating possible violations at the Northern Oil Facility, Superfund Division will re-inspect this facility for compliance with the Spill Prevention, Control and Countermeasures Rule and take appropriate compliance assistance or enforcement steps.
- EPA will, as resources and authorities allow, support the Tribal implementation activities identified above and within their Monitoring Strategy through targeting funding under the CWA Section 106 funding program.

Safe Drinking Water Act

Federally Regulated Facilities Within the Reservation	
Public Water Supply Systems	Ojibwa II Casino [N-050593303] New Day Treatment Center [T-0505933304] Zeba [C-055293302] Kawbawgam Road [C-055293303] Baraga Water Treatment Facility L'Anse Water Treatment Facility Complete universe on fee lands not known (see below)
Underground Injection Control Wells	Class V wells: 21 (tribal lands) Potential Class V wells: 29 (fee lands)

Tribal Implementation Activities:

- The Tribe completed source water assessments and protection plans for the Kawbawgam Road community system (November 2003) and Zeba community system (February 2004). Under a direct implementation tribal cooperative agreement with the ITCM, the Tribe is currently developing a source water assessment and protection plan for the Ojibwa II Casino.

EPA Implementation Activities:

- A sanitary survey was conducted at the Ojibwa II Casino in June 2007 and at the New Day Treatment Center in April 2007. Sanitary surveys for non-community systems will be conducted every 5 years. The Water Division has entered into an Inter-Agency Agreement with the Indian Health Service to provide support for a Tribal Utility Consultant (formerly called a circuit rider). The Tribal Utility Consultant will conduct annual sanitary surveys at community water systems and provide technical assistance as requested by the Tribes.
- Through a direct implementation tribal cooperative agreement with the ITCM, the Water Division recently completed an inventory of potentially regulated Class V UIC wells located within the Reservation boundaries. By September 2012, the Water Division will complete site visits to verify whether these facilities are regulated under the UIC Program. The Water Division will seek the closure of any active motor vehicle waste disposal wells, floor drains and shop sinks that receive fluids from motor vehicle maintenance and service activities, and drain underground into drywells or septic systems.
- The Water Division has entered into a direct implementation tribal cooperative agreement with the ITCM to provide participating tribes with compliance assistance under the Safe Drinking Water Act. During 2010, the ITCM will provide compliance assistance to KBIC utility operators on source water assessments and protection plans for the Ojibwa II Casino public water supply system.
- By September 2010, the Water Division will complete an inventory and verify the compliance status of the public water supply systems located within the Reservation boundaries that are currently regulated by the state of Michigan.

Resource Conservation and Recovery Act

Federally Regulated Facilities within the Reservation	
RCRA C treatment, storage, disposal facilities	No identified facilities
RCRA C hazardous waste generators – Active	Small Quantity Generators Terex Handlers [MID106634272] Conditionally Exempt Small Quantity Generators AAA Collision [MID985640333] Baraga Armory [MID98207327] Baraga Correctional Facility [MI0000129221] Besse Forest Products, Inc. [MID985619477] Johnson & Berry MFG. [MID048989941] MI Department of Natural Resources Field Office [MID985632595] Native American Tubcraft [MID000009597] Northern Tool & Engineering, Inc. [MID985617596] Pats Baraga Motorsports [MI0000971366] Pettibone Michigan Corp. [MID006129373] Shoeders Auto Center Inc. [MIR000027219]
RCRA D solid waste disposal facilities	KBIC Construction & Demolition Waste Landfill
RCRA I underground storage tanks	Ojibwa BP Lute's Corner Store Northern Oil, Inc. Pines Convenience Center
RCRA I leaking underground storage tanks	Bill's Corner Store, Inc. (Lute's Corner Store) Baraga Mobil Mart/Ojibwa BP (Bay Shore BP) Northern Oil, Inc. (Baraga Muffler) Pines Convenience Center (former)

Open Dumps Currently Inventoried on Reservation	
Reported to wSTARS Operation and Maintenance Data System	38 (tribal lands only)

Tribal Implementation Activities:

- KBIC has an integrated waste management plan (IWMP), and is currently revising to include better waste projection information and meet the EPA recommended elements. The Tribe requests assistance with transfer station and waste stream reduction planning, implementation, and regulatory compliance.
- The Tribe currently has a draft solid waste ordinance that regulates the disposal of solid waste and prohibits open dumping. Ordinance priorities and final development is determined by the Tribal Council and the Tribal Attorney office with relevant input from Government Departments as needed or requested. The process for development and implementation of a new ordinance can be quite lengthy and involved.

- In 2010, KBIC will be designing and constructing a solid waste transfer station to improve solid waste management on the Reservation. Tribal facilities currently contract with private waste haulers for waste disposal.
- Open dump sites are currently included in the Tribal Response Program Brownfields Database. KBIC is also developing an open dump inventory. Open dumps are also listed in the IHS Sanitation Deficiency System list each year.
- KBIC NRD provides compliance assistance to the Pines Convenience Center.

EPA Implementation Activities:

- Land and Chemicals Division (LCD) will ensure that the underground storage tanks are inspected at a minimum of once every three years. This activity will be accomplished through a combination of EPA inspections and a direct implementation tribal cooperative agreement with the Inter-Tribal Council of Michigan.
- During 2010-2012, LCD will work with the Tribe to review the status of the leaking underground storage tanks located within the Reservation boundaries, identify the LUST inventory, identify any Tribal-specific concerns, gather information on the status of responsible parties, and discuss prioritizing eligible sites for assessment and/or remediation.
- By September 2012, LCD will conduct a site visit at the KBIC Construction and Demolition Waste Landfill to verify that the facility is operating according to 40 CFR Part 257.
- During 2010-2012, in consultation with the Tribe, LCD will conduct enforcement investigations to determine the appropriateness of enforcement action to address specific incidents of illegal dumping on the Reservation.
- During 2010, LCD will update the inventory of RCRA Subtitle C facilities located on the Reservation. LCD will work with the Tribe and Indian Environmental Office to verify the location of these facilities and their operating status. Based on their status as a large quantity generator, inspections will be conducted beginning in 2011. Tribal concerns about specific facilities should be forwarded to LCD.
- EPA will, as resources and authorities allow, support the Tribal implementation activities above through targeting funding under IGAP and the CERCLA Section 128(a) Tribal Emergency Response Program.

Comprehensive Environmental Response, Compensation and Liability Act (Including Emergency Planning and Community Right-to-Know Act and Small Business Liability Relief and Brownfields Revitalization Act)

Federally Regulated Sites and/or Facilities	
Facilities that must report to LEPC/TERC	Current universe not known
Facilities that must report under the Toxic Release Inventory (EPRCA Section 313)	Terex Telehandlers Baraga

Contaminated Sites Addressed Under CERCLA	
Emergency Response and Removal Actions	No current activities
NPL Site Remediation	No sites currently on Reservation Torch Lake (located in treaty-ceded area)

Contaminated Sites Addressed Under Non-CERCLA Authorities	
Target Brownfields Assessment Projects	None identified
Number of Brownfields Sites Inventoried and/or Assessed	110 Sites Inventoried

Formal Organization under EPCRA
MOU between KBIC and Baraga County LEPC – status to be verified

Tribal Implementation Activities:

- During 2010-2012, based on direction of the Tribal Council, KBIC expects to formalize its status as a member of the Baraga County LEPC.
- Baraga County Emergency Response Plan includes KBIC Reservation but needs to be updated. The Tribe has had initial discussions with EPA about assistance with EPCRA planning.
- KBIC concerns with the Torch Lake NPL Site and stamp sands in general include potential for continued or an increase in water quality and benthic environment impacts.
- KBIC has received eligibility for funding under CERCLA Section 128(a) to establish a Tribal Emergency Environmental Response Program. During 2010-2012, as part of the development of its site response program under the CERCLA Section 128(a) grant, the Tribe will continue ongoing site assessments (and cleanup if necessary), program development, and community outreach and education.

EPA Implementation Activities:

- Remedies for all operable units (except Quincy Smelter) of the Torch Lake Site are in place. Remedy completion for Quincy Smelter is expected in 2010. The next five-year review of protectiveness of the remedy is not due during the period covered by this Agreement. EPA and the State of Michigan currently are discussing the possibility of assessing additional sites in the vicinity of Torch Lake which may be impacted by mining waste. By September 30, 2010, EPA will meet with the Tribe to provide a comprehensive briefing about the Torch Lake Site and any plans for additional CERCLA assessments in that area. EPA also will discuss with the Tribe any specific areas near the Torch Lake Site about which it is concerned.

- By June 30, 2011, Superfund Division will initiate work with the Tribe to develop a Tribe-specific profile for the Area Contingency Plan describing the Tribe's preparedness status, resources, and capabilities in the event of an incident or spill within the Reservation.
- Superfund Division will review updated draft preparedness plans to help the Tribe to bring the plans into compliance with EPCRA and assure that Tribal resources are covered.
- By September 30 of each year, and based on funding availability, Superfund Division will provide annual Section 128(a) funding to the Tribe for eligible activities to support development of the Tribe's site response program, including emergency preparedness work and addressing open dumps with contamination or potential contamination.
- On an annual basis, Superfund Division will provide Brownfields training for tribal staff.

Federal Insecticide, Fungicide and Rodenticide Act

Federally Regulated Sites and/or Facilities	
Registered pesticide producing establishments	No identified facilities
Retail establishments selling regulated pesticides	No registered pesticide producing establishments Hardware stores Lawn/garden stores Convenience stores
Facilities (i.e., bulk agrichemical establishments) that must comply with the container containment requirements	No identified facilities
Level/type of pesticide use activity on Reservation	Relatively small use of pesticides on the Reservation due to the lack of agricultural lands. Timber/paper companies currently perform occasional pesticide/herbicide spraying. U.S. FWS also performs pesticide sea lamprey control on rivers which drain into Lake Superior near the Reservation. A local power company, UPPCO, may use pesticides/herbicides for line maintenance and the Baraga County Road Commission may use pesticides/herbicides for road maintenance.

Tribal Implementation Activities:

- No Tribal implementation activities have been identified for this planning agreement.

EPA Implementation Activities:

- There are currently no EPA implementation activities specifically identified for this Reservation for 2010-2012. (As new regulated facilities are proposed, additional federal requirements promulgated, or conditions on the Reservation change, EPA may exercise additional regulatory authorities or provide other assistance to the Tribe.)

Toxic Substances Control Act
(Lead-Based Paint and Asbestos)

Federally Regulated Sites and/or Facilities	
Amount of pre-1978 housing and child-occupied facilities (pre-school, daycare, etc.)	Tribe has not completed an inventory. Most Tribal HUD housing is post-1978. IHS staff has completed environmental health surveys of facilities.
K-12 schools	Baraga Area High School Phillip Latendresse School

Tribal Implementation Activities:

- No Tribal implementation activities have been identified for this planning agreement.

EPA Implementation Activities:

- Based on funding availability, Land and Chemicals Division (LCD) will work with the Inter-Tribal Council of Michigan to continue and expand services to the KBIC Reservation through a Lead-Based Paint Program Direct Implementation Tribal Cooperative Agreement.
- By September 2010, LCD and the Indian Environmental Office will work with the Tribe to identify the universe of K-12 schools on the Reservation that were constructed prior to October 12, 1988.
- By September 2012, LCD will provide compliance assistance to support the Local Education Agency (LEA) on the KBIC Reservation to ensure compliance with TSCA Title 2 Asbestos Hazard Emergency Response Act (AHERA).
- During 2010-2012, LCD will conduct 25% of its ACS-committed inspections in Indian country, at K-12 schools that were constructed prior to October 12, 1988, to determine compliance with AHERA.

~ ~ ~ ~ ~

INTERAGENCY OCEAN POLICY TASK FORCE

GREAT LAKES REGIONAL PUBLIC MEETING

OCTOBER 29, 2009 4:00-7:00 P.M.

~ ~ ~ ~ ~

~ ~ ~ ~ ~

BY: Katrina Dearborn

Court Reporter

Dearborn Reporting Services

1375 East Ninth Street

Cleveland, OH 44114

216—298—4888

~ ~ ~ ~ ~

Our first panelist is Susan LaFernier who is the Vice President of the Keweenaw Bay Indian Community who will speak a little bit about tribal interests and the past force charge.

Our second panelist is Peter Johnson, a program director at the Council of Great Lakes Governors who will discuss state governance issues.

Our third panelist is Gildo Tori. Gildo is the Director of Public Policy in the Great Lakes and Atlantic Region for Ducks Unlimited. He'll be speaking on issues related to habitat, conservation, and restoration.

And then the fourth panelist, as far as this group, is David Ulrich, the Director —— the Executive Director of the Great Lakes/St. Lawrence City's Initiative. And he'll be speaking on public and coastal health and recreational issue. With that, I'll turn it over to Susan. Thank you.

MS. LaFERNIER: Thank you very much. ANIN! And good afternoon, everyone. I am honored to be here today, and our Tribe sends greetings to you and our neighbors near and far in this great country. I especially send our Honorable President Obama greetings, and am truly grateful and appreciative of his commitment to us to care for our Great Lakes, and also to all of you.

Our Tribe is the Lake Superior Band of Chippewa Indians. Our total membership is 3,482, of which 2,400 live in the upper peninsula of Michigan. Our reservation was established with our 1854 Treaty. Not all tribes have reservations, and each tribe is unique.

I will be talking briefly about why the Great Lakes are important to our tribe and to all people that the lakes surrounds. Also a brief history of our tribe. And finally, another serious threat to our waters.

I was born at my parents' home on the Keweenaw Bay Indian Community Reservation in the upper peninsula of Michigan. And I am thankful each day for all of the beauty in my backyard. And I am fortunate to be able to live by the shores of Keweenaw Bay and our beautiful Lake Superior. And the moving this morning did tell it all. It was a wonderful, wonderful movie.

The Lake Superior ecosystem and the health of these systems are critical to the health of our community. We are part of the lake, the land, and our survival depends on the lake. We enjoy the lake, swim in the lake, harvest fish. It is part of our ceremonies, and we use it to supply drinking water to our communities. Water is life. We spear walleye and rainbow trout in the spring, and fish for brook trout in our streams. We collect fruits and berries to eat and gather plants for medicines and other purposes. In the fall people travel long distances to harvest wild rice. We also harvest timber to heat our homes in the winter. In our Lake Superior watershed, all of our water flows to our big, fresh lakes and to the other lakes. Do you remember which fish is a survivor in the Lake Superior watershed? And do you know what a watershed is?

We all recognize the essential role that the Great Lakes and the Michigan inland lakes, rivers, streams and groundwater have played in the past, present and future destiny of both the State of Michigan and tribal nations within the state. In a tradition shared with the Ottawa and Potawatomi, the Ojibwa who are nature's people, remember a time when they lived near an ocean, lived along the shores of a great salt sea to the east at the beginning of time. Sometime around 1400 when the climate became colder, these original people started to arrive on the east side of Lake Huron. And so our story begins.

The Ojibwa were the largest and the most powerful Great Lakes Tribe and perhaps the most powerful east of the Mississippi, and quite possibly, the most powerful in North America. To the Chippewa, land was a gift with a Great Spirit; a gift freely given to cherish and protect. In the early 1600s we lived by moving from camp to camp to harvest foods, such a maple syrup, fish, venison, berries, and wild rice, directed by the seasons. According to the government, the Chippewa of Lake Superior had title to the western half of the U.P., and title to the rest of the state had already been purchased by 1840. As settlers came to the U.P. and to the Lake Superior Region in search of timber and minerals, the U.S. Government bought land from the Ojibwa through trees, which are defined as the supreme law of the land in the Constitution of the United States.

In the 1842 Treaty, the tribes were allowed to remain on their ceded territory, and our leaders retained the right to hunt, fish and gather on these lands that were sold, but our rights were not sold, to ensure future generations' survival. We are determined to continue to preserve and protect or homeland and these rights for at least the next seven generations.

I would like to take a moment of your time to discuss a very serious threat to the lands, all the Great Lakes, natural resources, environment, and sacred places of the Lake Superior Bands of the Ojibwa and to the people of Michigan created by proposed sulfide mining operations in the Lake Superior Territory. Sulfide mining is a term for hard rock mining, and is much different than the traditional oxide rock mining that has historically been done in the upper peninsula. Sulfide mining is not the process used to mine the sulfides, but actually the practice of extracting metals, such as copper and nickel from a sulfide ore body.

Acid mine drainage has been described as the most important and widespread source of pollution associated with the mining industry throughout the world. Currently there are a number of mining exploration companies that are conducting mineral exploration operations in dozens of locations in the central and western upper peninsula, and includes uranium exploration. More mines are likely to be proposed and possibly permitted. Keweenaw Bay Indian Community has been very actively opposed to a proposed sulfide metallic mineral mine that will be located on our ceded traditional lands in Marquette County, Michigan. The Tribal Council frown at the proposed mining for nickel, copper, and other minerals at the headwaters of the Yellow Dog River and Salmon Trout River in the U.P., which flows to Lake Superior, deeply offends the traditional and cultural values of Keweenaw Bay Indian Community. The Salmon Trout River is a pristine river located in the wilderness of the Yellow Dog Plains and is one of the few homes to the coaster brook trout.

According to our teachings: to honor all of creation is to have respect. Water is a gift of life and is sacred. The current global state of water already is in grave danger. Many times in the past we have all turned our heads to the damage to the environment that has been caused by previous mining operations over the past 160 years.

Do you know why the Eagle cries on a mountain high? I would like to add my thoughts on the very fundamental concept of the Ojibwa people. Preservation of our land, our culture, and our way of life require that we act now as guardians for the next seven generations.

Sulfide mining will be the single greatest threat to our water and lands in our lifetime, along with all of the other challenges. I pray to our God and creator of all creation to give us vision and determination to

be responsible for all that we have been given before it is too late. Let us share the responsibility and privilege to care for our Earth and not make anymore environmental mistakes so that we will continue to keep our lands, Great Lakes, coasts and oceans the special places they are. Megwetch! Thank you for listening. We honor the greatness of all of you. Thank you.

MR. JOHNSON: Chairwoman Sutley, members of the Interagency Ocean Policy Task Force, thank you for the opportunity to present to you today regarding our shared efforts to protect and restore our water resources. My name is Peter Johnson. I'm the program director of the Council of Great Lakes Governors. The Council is a non—partisan partnership of the governors from the Great Lakes states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin. The premiers of Ontario, Quebec serve as an associate to the Council.

The governors created the Council in 1983. And its mission is to encourage and facilitate environmentally responsible economic growth. More recently, the Council has been coordinating the Governors' shared efforts to protect and restore the Great Lakes. The Governors recognize that this effort is critically important for protecting our environment and promoting our economy, both regionally and nationally. As I think has been said already, and will be said, I'm sure, many more times this evening, the Great Lakes are a treasure of international significance. And as already noted, they differ significantly from our oceans, both hydrologically and in the way they are governed. The Great Lakes contain approximately 20 percent of the world's surface fresh water and 95 percent of North America's. One in 10 U.S. residents depends on the Great Lakes for their water. And more than 35 million U.S. residents live, work, and recreate in, on, or by the waters of the Great Lakes. Eight states and two Canadian provinces border the lakes. Innumerable Tribes and First Nations also have rights and interests related to the lakes. The Great Lakes Regional economy and, indeed, our national economy depend on the Great Lakes. For example, the Great Lakes provide water for 70 percent to the U.S. steel production. The Lakes provide transportation for almost 200 million tons of international and interlake cargo. Water is also used for hydro power on both sides of the international border.

Overall, the region generates nearly 30 percent of our nation's gross domestic product, and about 60 percent of all the U.S. manufacturing. Unfortunately, and despite significant and ongoing investments by all those of government, significant portions of the Great Lakes remain degraded, and all of our waters continue to face a number of different threats.

More broadly, all of our nation's water resources face threats, and many of them promise to increase over time. Therefore, we must work together, if we are to effectively tackle shared threats, and protect and restore our waters. Recent experiences is encouraging based on heightened collaboration both within the federal governments and with governments and other leaders. At the regional level, which Mr. Davis is very familiar with this particular effort, the developments and enactments of the Great Lakes/St. Lawrence River Basin Sustainable Water Resources Agreement, which was signed by the Great Lakes Governors and Premiers. And the corresponding Great Lakes/St. Lawrence River

Basin Water Resources Compact between the states serve as examples of how strong, collaborative efforts can result in agreements and programs that will ensure that water resources are available for the use and benefit of the region's citizens now and in the near future.

KEWEENAW BAY INDIAN COMMUNITY

Keweenaw Bay Tribal Center
107 Beartown Road
Baraga, Michigan 49908
Phone (906) 353-6623
Fax (906) 353-7540

Resolution
KB1296-2004

WHEREAS, Lake Superior is the world's largest freshwater lake and is essential to the quality of life and economic vitality of the cities, villages, towns, and counties along its shores and in the surrounding watershed; and

WHEREAS, Water is life and the quality of water determines the quality of life; and

WHEREAS, Lake Superior supports tribal, cultural and spiritual, recreational, commercial, and tourism activities for its residents and visitors; and

WHEREAS, the responsibility for protecting and restoring the quality of Lake Superior's waters, land, and wildlife lies with all tribes, residents, municipalities, businesses, and visitors; and

WHEREAS, Tribal Officials, Mayors and other municipal leaders throughout the Lake Superior basin desire to protect the water and habitat quality that all life depends on in the basin.

NOW THEREFORE BE IT RESOLVED THAT the Keweenaw Bay Indian Community supports the initiative to permanently establish the third Sunday in July as **Lake Superior Day**, in the Keweenaw Bay Indian Community, which is a day to acknowledge and celebrate the lake's importance in the quality of the lives of its members.

CERTIFICATION

Resolution KB-1296-2004

We, William E. Emery, President, and Larry J. Denomie III, Secretary of the Keweenaw Bay Indian Community, do hereby certify that this resolution No. KB-1296-2004 to be a true and exact copy as approved by the Tribal Council of the Keweenaw Bay Indian Community at a duly called meeting held on the 28th day of June, 2004, there being a quorum present, by a vote of 11 in favor, 0 opposed, and 0 abstentions, as follows:

Vice President Susan J. LaFernier:	AYE	NAY	ABSTAIN	NOT PRESENT
Secretary Larry J. Denomie III:	AYE	NAY	ABSTAIN	NOT PRESENT
Asst. Secretary Warren C. Swartz, Jr.:	AYE	NAY	ABSTAIN	NOT PRESENT
Treasurer Jennifer Misegan:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Doreen G. Blaker:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Fred Dakota:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Michael F. LaFernier, Sr.:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Gary Loonsfoot Sr.:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Elizabeth D. Mayo:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Ann Misegan:	AYE	NAY	ABSTAIN	NOT PRESENT
Councilperson Shawanung (Joseph A. Dowd)	AYE	NAY	ABSTAIN	NOT PRESENT
President William E. Emery (If Required):	AYE	NAY	ABSTAIN	NOT PRESENT

William E. Emery, President

Larry J. Denomie III, Secretary

Keweenaw Bay Indian Community Existing Land Use Map

Lake Superior
Keweenaw Bay

Huron Bay

41

38

Village of Baraga

Village of L'Anse

41

- Agriculture
- Residential
- Residential R2
- Commerical
- Industrial
- Government/Institutional
- Open Space
- Parks & Recreation
- Communication/Utility
- Transportation
- Woodlands/Other Natural Area
- Abandoned Residential
- Abandoned Commercial

0 0.5 1 2
Miles

Dec.17, 1936
Keweenaw Bay Indian Community

APPENDIX X:

Land Use and Census Data and Information

Black-owned firms, percent, 2007	S	8.9%
American Indian and Alaska Native owned firms, percent, 2007	12.6%	0.7%
Asian-owned firms, percent, 2002	F	2.1%
Native Hawaiian and Other Pacific Islander owned firms, percent, 2007	F	0.1%
Hispanic-owned firms, percent, 2007	F	1.3%
Women-owned firms, percent, 2007	S	30.4%
Manufacturers shipments, 2007 ($1000)	0[1]	234,455,768
Merchant wholesaler sales, 2007 ($1000)	4,594	107,109,349
Retail sales, 2007 ($1000)	67,726	109,102,594
Retail sales per capita, 2007	$7,801	$10,855
Accommodation and food services sales, 2007 ($1000)	5,641	14,536,648
Building permits, 2009	11	6,884[2]
Federal spending, 2008	121,460	82,933,158[2]

Geography QuickFacts	**Baraga County**	**Michigan**
Land area, 2000 (square miles)	904.00	56,803.82
Persons per square mile, 2010	9.8	174.0
FIPS Code	013	26
Metropolitan or Micropolitan Statistical Area	None	

1: Counties with 500 employees or less are excluded.
2: Includes data not distributed by county.

Includes persons reporting only one race.
Hispanics may be of any race, so also are included in applicable race categories.

D: Suppressed to avoid disclosure of confidential information
F: Fewer than 100 firms
FN: Footnote on this item for this area in place of data
NA: Not available
S: Suppressed; does not meet publication standards
X: Not applicable
Z: Value greater than zero but less than half unit of measure shown

Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report
Last Revised: Friday, 03-Jun-2011 15:29:17 EDT

1. Annual Estimates of the Resident Population for Counties of Michigan: April 1, 2000 to July 1, 2009

Geographic Area	Population Estimates						
	July 1, 2009	July 1, 2008	July 1, 2007	July 1, 2006	July 1, 2005	July 1, 2004	July 1, 2003
	9,969,727	**10,002,486**	**10,050,847**	**10,082,438**	**10,090,554**	**10,089,305**	**10,066,35**
	11,091	11,299	11,410	11,494	11,513	11,468	11,51
	9,286	9,509	9,650	9,576	9,538	9,611	9,64
y	113,449	113,355	112,920	112,414	111,945	111,153	109,92
	29,289	29,600	29,732	29,807	30,162	30,476	30,63
	23,834	24,013	24,189	24,206	24,199	24,219	24,08
	16,092	16,374	16,622	16,783	16,934	17,002	17,08
y	8,604	8,566	8,682	8,722	8,678	8,749	8,76
	58,434	58,811	59,061	58,826	58,944	58,455	58,27
	107,434	107,597	107,373	107,973	108,513	108,921	109,12
	17,227	17,391	17,535	17,585	17,463	17,242	17,11
y	160,472	160,319	159,886	159,658	160,310	161,274	161,50
	44,737	45,780	46,253	46,326	46,354	46,506	46,45
ty	135,616	136,404	136,689	137,445	138,222	138,882	138,52
	49,925	50,422	50,624	50,544	50,898	51,129	50,90
unty	25,796	26,001	26,219	26,146	26,327	26,441	26,54
ounty	26,106	26,485	26,845	27,024	27,094	27,096	27,15
nty	38,731	38,786	38,805	38,585	38,594	38,499	38,58
	30,104	30,349	30,685	31,016	31,195	31,415	31,39
	69,893	69,818	69,735	69,409	68,816	68,315	67,38
nty	14,203	14,428	14,511	14,690	14,763	14,551	14,61
	36,918	37,243	37,387	37,703	37,813	37,995	38,06
nty	26,691	26,883	27,100	27,125	27,215	27,358	27,03
	106,077	106,816	107,157	107,277	107,142	106,796	106,51
y	33,649	33,570	33,408	33,432	33,278	33,172	32,66
nty	424,043	428,859	434,086	437,395	439,216	439,880	439,54
ty	25,724	25,963	26,264	26,693	26,719	26,947	26,85
ty	15,936	16,072	16,152	16,249	16,558	16,795	17,08
se County	86,333	85,939	85,260	84,397	83,450	82,594	81,75
	41,948	42,339	42,388	42,326	42,149	42,318	42,33
ty	45,650	45,949	46,426	46,689	46,787	46,842	46,92
nty	35,333	35,321	34,945	34,979	35,494	35,616	35,37
	32,236	32,622	33,218	33,630	34,069	34,513	34,92
y	277,633	277,971	278,624	279,261	280,533	281,648	280,69
	62,574	63,899	64,027	64,076	63,849	63,838	63,21
	25,817	26,104	26,341	26,500	26,523	26,609	26,69

U.S. Census Bureau

American FactFinder

FACT SHEET

Baraga County, Michigan

2005-2009 American Community Survey 5-Year Estimates - what's this?
Data Profile Highlights:

Note: The following links are to data from the American Community Survey and the Population Estimates Program.

NOTE: Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the **official estimates of the population for the nation, states, counties, cities and towns** and estimates of housing units for states and counties.

Social Characteristics - show more >>	Estimate	Percent	U.S.	Margin of Error	
Average household size	2.49	(X)	2.60	+/-0.12	map
Average family size	3.07	(X)	3.19	+/-0.17	
Population 25 years and over	6,266			+/-110	
High school graduate or higher	(X)	81.6	84.6%	(X)	map
Bachelor's degree or higher	(X)	12.0	27.5%	(X)	map
Civilian veterans (civilian population 18 years and over)	943	13.6	10.1%	+/-118	map
With a Disability	(X)	(X)	(X)	(X)	
Foreign born	122	1.4	12.4%	+/-64	map
Male, Now married, except separated (population 15 years and over)	1,739	44.0	52.3%	+/-143	
Female, Now married, except separated (population 15 years and over)	1,641	49.0	48.4%	+/-165	
Speak a language other than English at home population 5 years and over)	284	3.4	19.6%	+/-75	map
Household population	7,686			+/-296	
Group quarters population	(X)	(X)	(X)	(X)	

Economic Characteristics - show more >>	Estimate	Percent	U.S.	Margin of Error	
In labor force (population 16 years and over)	3,673	51.0	65.0%	+/-239	map
Mean travel time to work in minutes (workers 16 years and over)	16.2	(X)	25.2	+/-1.8	map
Median household income (in 2009 inflation-adjusted dollars)	40,849	(X)	51,425	+/-2,152	map
Median family income (in 2009 inflation-adjusted dollars)	49,099	(X)	62,363	+/-4,565	map
Per capita income (in 2009 inflation-adjusted dollars)	18,101	(X)	27,041	+/-1,151	
Families below poverty level	(X)	8.5	9.9%	+/-2.5	
Individuals below poverty level	(X)	12.3	13.5%	+/-2.5	map

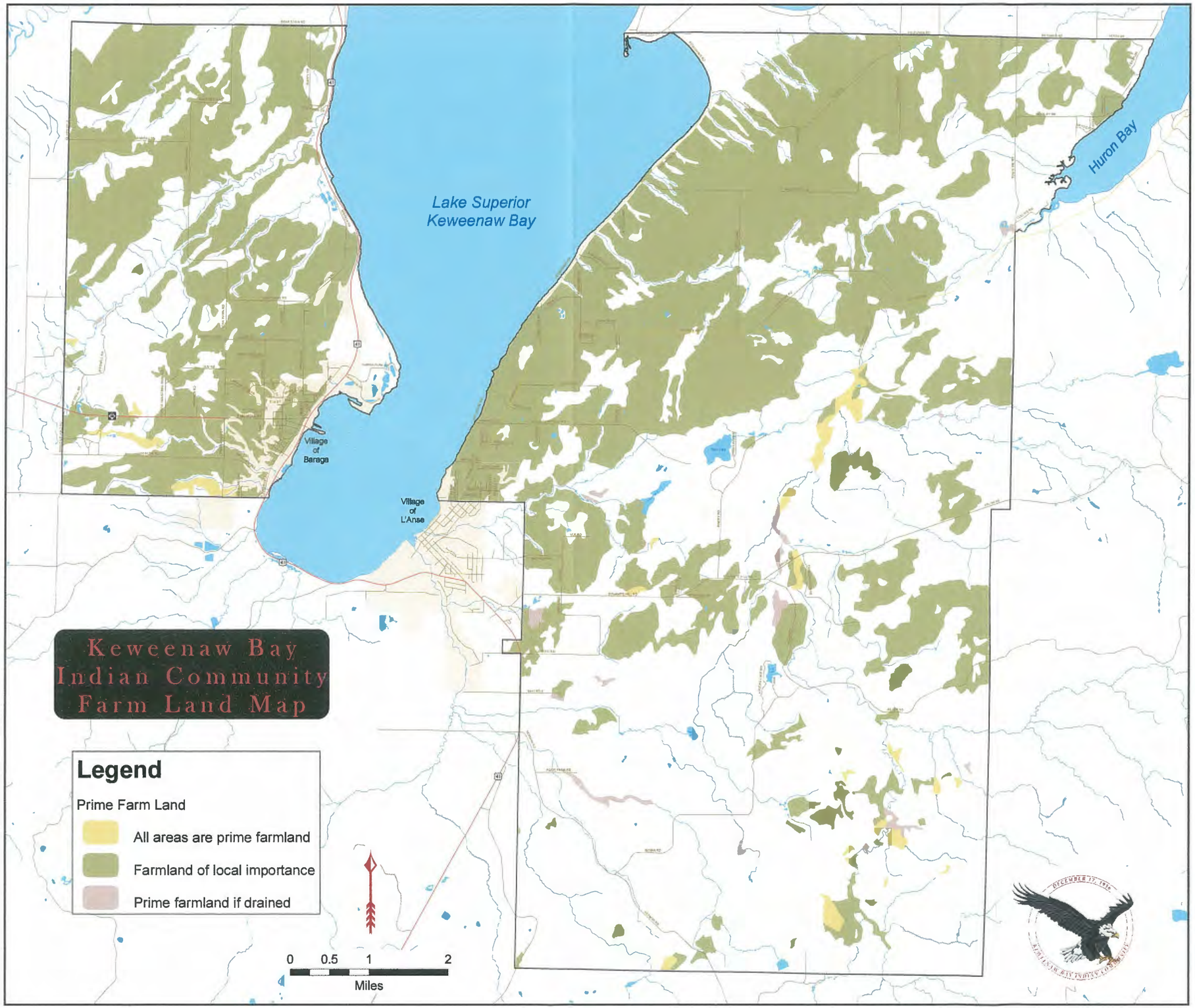
Housing Characteristics - show more >>	Estimate	Percent	U.S.	Margin of Error	
Total housing units	4,952			+/-164	
Occupied housing units	3,081	62.2	88.2%	+/-199	
Owner-occupied housing units	2,304	74.8	66.9%	+/-144	
Renter-occupied housing units	777	25.2	33.1%	+/-140	
Vacant housing units	1,871	37.8	11.8%	+/-135	
Owner-occupied homes	2,304			+/-144	map
Median value (dollars)	86,700	(X)	185,400	+/-4,961	map
Median of selected monthly owner costs					
With a mortgage (dollars)	902	(X)	1,486	+/-50	map
Not mortgaged (dollars)	366	(X)	419	+/-29	

ACS Demographic Estimates - show more >>	Estimate	Percent	U.S.	Margin of Error

Total population	8,650			*****	
Male	4,550	52.6	49.3%	+/-80	
Female	4,100	47.4	50.7%	+/-80	
Median age (years)	41.7	(X)	36.5	+/-1.6	map
Under 5 years	387	4.5	6.9%	+/-39	
18 years and over	6,965	80.5	75.4%	+/-86	
65 years and over	1,384	16.0	12.6%	+/-90	
One race	8,363	96.7	97.8%	+/-79	
White	6,526	75.4	74.5%	+/-63	map
Black or African American	632	7.3	12.4%	+/-219	map
American Indian and Alaska Native	1,146	13.2	0.8%	+/-232	map
Asian	33	0.4	4.4%	+/-109	map
Native Hawaiian and Other Pacific Islander	4	0.0	0.1%	+/-7	map
Some other race	22	0.3	5.6%	+/-14	map
Two or more races	287	3.3	2.2%	+/-79	map
Hispanic or Latino (of any race)	117	1.4	15.1%	+/-13	

Source: U.S. Census Bureau, 2005-2009 American Community Survey

Explanation of Symbols:
'****' - The median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
'*****' - The estimate is controlled. A statistical test for sampling variability is not appropriate.
'N' - Data for this geographic area cannot be displayed because the number of sample cases is too small.
'(X)' - The value is not applicable or not available.


Lake Superior
Keweenaw Bay
Huron Bay
Village of Baraga
Village of L'Anse
Keweenaw Bay Indian Community Farm Land Map
Legend
Prime Farm Land
All areas are prime farmland
Farmland of local importance
Prime farmland if drained
0 0.5 1 2
Miles

APPENDIX Y:

Commercial Forestry Information

Plum Creek Herbicide spraying in KBIC tribal boundaries

	Herbicide(s)	Rates	Plantation Name	Plantation number	Acres	Town	Range	Sec.	Sub.
2005									
	Razor Pro/Garlon/oust	2/1/.5	N. Arvon Rd.	N197	31	51	32	36	NE1/4SE1/4
			Poor Farm	N173	22	50	33	22	NE1/4SE1/4
			N. Robillard	N204	71	50	33	14	S1/2
2006									
	Accord Conc.	1.1 qts.	N. Conley	N182	22	50	33	27	W1/2SW1/4
			Poor Farm	N173	22	50	33	22	NE1/4SE1/4
			Laws Lake West	N163	55	50	33	13	NE1/4
			N. Robillard	N204	71	50	33	14	S1/2
2007									
	Velpar/Oust	4 qts/.5 oz.	N. Arvon Rd.	N197	31	51	32	36	NE1/4SE1/4
			Snowmobile trail	N186	37.5	51	31	31	center of sec.
	Chopper/Glyphosate/oust	30 0z./3 qts./1 oz.	Indian Road	WPC004	42.5	50	33	13	SE1/4
			South Pages	WPC005	42.5	51	32	25	SE1/4SE1/4
2008									
	Accord/Oust	1.1 qts/.5oz.	Laws Lake West	N163	55	50	33	13	NE1/4
			Poor Farm	N173	22	50	33	22	NE1/4SE1/4
2009									
	Accord/Oust	1.1 qts/.5oz.	N. Robillard	N204	71	50	33	14	S1/2
2010									
	Velpar/Oust	4 qts/.5 oz.	South Pages	WPC005	42.5	51	32	25	SE1/4SE1/4
	Accord/Oust	1.1 qts/.5oz.	Laws Lake West	N163	10	50	33	12	S1/2SE1/4
			N. Robillard	N204	71	50	33	14	S1/2

MATERIAL SAFETY DATA SHEET

Dow AgroSciences

Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

GARLON* 3A HERBICIDE

Effective Date: 17-Nov-06
Product Code: 38321
MSDS: 004422

1. PRODUCT AND COMPANY IDENTIFICATION:

PRODUCT: Garlon* 3A Herbicide

COMPANY IDENTIFICATION:
Dow AgroSciences LLC
9330 Zionsville Road
Indianapolis, IN 46268-1189

2. HAZARDOUS IDENTIFICATIONS:

EMERGENCY OVERVIEW

Light purple-pink liquid, ammonia-like odor. May cause eye irritation with corneal injury. May cause skin irritation. Toxic to aquatic organisms.

EMERGENCY PHONE NUMBER: 800-992-5994

3. COMPOSITION/INFORMATION ON INGREDIENTS:

COMPONENT	CAS NUMBER	W/W%
Triclopyr TEA Salt	057213-69-1	44.4
Triethylamine	000121-44-8	3.0
Ethanol	000064-17-5	2.1
Balance		50.5

4. FIRST AID:

EYES: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist.

SKIN: Wash skin with plenty of water.

INGESTION: Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth to an unconscious person.

INHALATION: No emergency medical treatment necessary.

NOTE TO PHYSICIAN: Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach & lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done. If burn is present, treat as any thermal burn, after decontamination. Exposure to amine vapors may cause minor transient edema of the corneal epithelium (glaucopsia) with blurred vision, blue haze & halos around bright objects. Effects disappear in a few hours and temporarily reduce ability to drive vehicles. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIRE FIGHTING MEASURES:

FLASH POINT: 110°F (43°C)
METHOD USED: TCC
FLAMMABLE LIMITS
LFL: Not determined
UFL: Not determined

EXTINGUISHING MEDIA: Alcohol foam and CO_2.

FIRE & EXPLOSION HAZARDS: Toxic, irritating vapors may be formed or given off if product is involved in fire. Although product is water-based, it has a flash point due to the presence of small amounts of ethanol and triethylamine.

FIRE-FIGHTING EQUIPMENT: Use positive-pressure, self-contained breathing apparatus and full protective clothing.

6. ACCIDENTAL RELEASE MEASURES:

ACTION TO TAKE FOR SPILLS/LEAKS: Contain small spills and absorb with an inert material such as clay or dry sand. Report large spills to Dow AgroSciences at 800-992-5994.

7. HANDLING AND STORAGE:

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: HANDLING: Keep out of reach of children. Causes irreversible eye damage. Harmful if inhaled or absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic skin reaction in some individuals. Avoid contact with eyes, skin, clothing, breathing vapor, or spray mist. Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

STORAGE: Store above 28°F or agitate before use. Store in original container. See product label for handling/storage precautions relative to the end use of this product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

These precautions are suggested for conditions where the potential for exposure exists. Emergency conditions may require additional precautions.

EXPOSURE GUIDELINE(S):
Ethanol (ethyl alcohol): ACGIH TLV and OSHA PEL are 1000 ppm. ACGIH classification is A4.
Triclopyr TEA Salt: Dow AgroSciences Industrial Hygiene Guideline is 2 mg/M^3 as acid equivalent; Skin.
Triethylamine: ACGIH TLV is 1 ppm TWA, 3 ppm STEL, Skin. OSHA PEL is 10 ppm TWA, 15 ppm STEL.

A "skin" notation following the exposure guideline refers to the potential for dermal absorption of the material including mucous membranes and the eyes either by contact with vapors or by direct skin contact. It is intended to alert the reader that inhalation may not be the only route of exposure and that measures to minimize dermal exposures should be considered.

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

EYE PROTECTION: Use chemical goggles. Eye wash fountain should be located in immediate work area. If exposure causes eye discomfort, use a full-face respirator.

SKIN PROTECTION: When prolonged or frequently repeated contact could occur, use chemically protective clothing resistant to this material. Selection of specific items such as face shield, gloves, boots, and apron or full-body suit will depend on operation.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use a NIOSH approved air-purifying respirator.

APPLICATORS AND ALL OTHER HANDLERS: Refer to the product label for personal protective clothing and equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES:

BOILING POINT: Not determined
VAPOR PRESSURE: Not determined
VAPOR DENSITY: Not applicable
SOLUBILITY IN WATER: Miscible
SPECIFIC GRAVITY: 1.135 (68/68°F)
APPEARANCE: Light purple/pink liquid
ODOR: Ammonia-like odor

10. STABILITY AND REACTIVITY:

STABILITY: (CONDITIONS TO AVOID) Avoid sources of ignition if temperature is near or above flash point.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Any oxidizing agent. Consult manufacturer for specific cases.

HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen oxides and hydrogen chloride may be formed under fire conditions.

HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION:

POTENTIAL HEALTH EFFECTS: This section includes possible adverse effects, which could occur if this material is not handled in the recommended manner.

EYE: May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur. Vapor of amines may cause swelling of the cornea resulting in visual disturbances such as blurred or hazy vision. Bright lights may appear to be surrounded by halos. Effects may be delayed and typically disappear spontaneously.

SKIN: Prolonged contact may cause skin irritation with local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals. With the dilute mix, no allergic skin reaction is expected. Prolonged skin contact is unlikely to result in absorption of harmful amounts. The LD_{50} for skin absorption in rabbits is >5,000 mg/kg.

INGESTION: Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Swallowing may result in gastrointestinal irritation or ulceration. The oral LD_{50} for rats is 2,574 mg/kg (male) and 1,847 mg/kg (female).

INHALATION: Brief exposure (minutes) is not likely to cause adverse effects.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Effects have been reported on the following organs: liver and kidney.

CANCER INFORMATION: Triclopyr did not cause cancer in laboratory animal studies.

TERATOLOGY (BIRTH DEFECTS): Triclopyr did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother. Ethanol has been shown to cause birth defects and toxicity to the fetus in laboratory animal tests. It has also been shown to cause human fetotoxicity and/or birth defects when ingested during pregnancy.

REPRODUCTIVE EFFECTS: For triclopyr, in laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

MUTAGENICITY: For triclopyr and ethanol: in-vitro genetic toxicity studies were negative. For triclopyr: animal genetic toxicity studies were negative. For ethanol: animal genetic toxicity studies were negative in some cases and positive in other cases.

12. ECOLOGICAL INFORMATION:

ENVIRONMENTAL FATE:

MOVEMENT & PARTITIONING:
Based largely or completely on information for triclopyr.
Bioconcentration potential is low (BCF <100 or Log Pow <3).

DEGRADATION & PERSISTENCE:
Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD >40%).
The 20-Day biochemical oxygen demand (BOD20) is 0.30 p/p.
Theoretical oxygen demand (ThOD) is calculated to be 0.75 p/p.

ECOTOXICOLOGY:
Material is slightly toxic to aquatic organisms on an acute basis (LC_{50} or EC_{50} is between 10 and 100 mg/L in most sensitive species).

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHOD: If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws and regulations.

MATERIAL SAFETY DATA SHEET

Dow AgroSciences

Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

GARLON* 3A HERBICIDE

Effective Date: 17-Nov-06
Product Code: 38321
MSDS: 004422

14. TRANSPORT INFORMATION:

U.S. DEPARTMENT OF TRANSPORTATION (DOT) INFORMATION:

For non-bulk shipments by land:
This material is not regulated for transport.

For bulk shipments by land:
COMBUSTIBLE LIQUID, N.O.S. (TRIETHYLAMINE, ETHANOL)/COMBUSTIBLE LIQUID/NA1993/PGIII

For shipments by air or vessel:
FLAMMABLE LIQUIDS, N.O.S. (TRIETHYLAMINE, ETHANOL)/3/UN1993/PGIII

15. REGULATORY INFORMATION:

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

U.S. REGULATIONS

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
Triethylamine	000121-44-8	3.0%

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard
A delayed health hazard
A fire hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
Ethanol	000064-17-5	NJ1 NJ3 PA1
Triethylamine	000121-44-8	NJ1 NJ3 PA1 PA3

NJ1=New Jersey Special Health Hazard Substance (present at > or = to 0.1%).
NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).
PA1=Pennsylvania Hazardous Substance (present at > or = to 1.0%).
PA3=Pennsylvania Environmental Hazardous Substance (present at > or = to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

CATEGORY	RATING
Health	3
Flammability	2
Reactivity	0

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND): This product contains the following substance(s) listed as "Hazardous Substances" under CERCLA which may require reporting of releases:

Chemical Name	CAS Number	RQ	% in Product
Triethylamine	000121-44-8	5000	3.0%

RCRA Categorization Hazardous Code:
Triethylamine = U404

16. OTHER INFORMATION:

MSDS STATUS: Revised Section: 2, 3, 11, 12, 13, 15
Reference: DR-0121-6064
Replaces MSDS dated: 11/24/03
Document Code: D03-101-004
Replaces Document Code: D03-101-003

The Information Herein Is Given In Good Faith, But No Warranty, Express or Implied, Is Made. Consult Dow AgroSciences for Further Information.

"DuPont" "Velpar" L Herbicide
M0000056 Revised 4-NOV-2010

Substance ID :130000000166

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"Velpar" is a registered trademark of DuPont.

"DuPont" is a trademark of DuPont.

Corporate MSDS Number : DU003032

Tradenames and Synonyms

"VELPAR" L
"VELPAR"
DPX-A3674 250SL
B10048626

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
*HEXAZINONE (3-Cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione)	51235-04-2	25
INERT INGREDIENTS		75
(Includes Percentages of the Following):		
ETHANOL	64-17-5	40-45

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Emergency Overview

DANGER! CAUSES EYE DAMAGE. Corrosive, causes irreversible eye damage. Harmful if swallowed. Do not get in eyes or on clothing. Wash thoroughly with soap and water after handling.

Potential Health Effects

Based on animal data, eye contact with Velpar L may cause corneal opacity or clouding of the eye.

Based on animal data, skin contact with Hexazinone may cause skin irritation with discomfort or rash.

Based on data from animal testing, ingestion of large amounts of Hexazinone may cause effects on the liver.

Significant skin permeation and systemic toxicity after contact appears unlikely.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

INHALATION: No specific intervention is indicated, as the compound is not likely to be hazardous by inhalation.

Consult a physician if necessary.

Notes to Physicians

Probable mucosal damage may contraindicate the use of gastric lavage.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for emergency medical treatment information.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	: 23-25 C (73-77 F)
Method	: Closed Cup

Flammable liquid. Vapor forms explosive mixture with air. Heating can release vapors which can be ignited.

Extinguishing Media

Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Wear self-contained breathing apparatus. Use water spray. Cool tank/container with water spray.

If area is exposed to fire and conditions permit, let fire burn itself out. Burning chemicals may produce by-products more toxic than the original material. If product is on fire, wear self-contained breathing apparatus and full protective equipment. Use water spray. Control runoff.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Emergency Response - Chemical resistant coveralls, waterproof gloves, waterproof boots and face/eye protection. If dusting occurs, use NIOSH approved respirator protection.

Initial Containment

Dike spill. Prevent material from entering sewers, waterways, or

low areas.

Spill Clean Up

Soak up with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up.

HANDLING AND STORAGE

Handling (Personnel)

Do not get on clothing. Do not get in eyes. Avoid breathing vapors or mist. Avoid contact with skin. Wash thoroughly after handling. Wash clothing after use. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material.

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Handling (Physical Aspects)

Keep away from heat, sparks and flames. Keep container tightly closed.

Storage

Store product in original container only. Do not contaminate water, other pesticides, fertilizer, food or feed in storage. Store in a cool, dry place.

Do not subject product to temperatures below 32 deg F.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment

Always follow label instructions when using this product.

Applicators and other handlers must wear:
Long-sleeved shirt and long pants.
Shoes plus socks.
Protective eyewear.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such

instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:
- Chemical resistant gloves made of any waterproof material.
- Coveralls.
- Shoes plus socks.
- Protective eyewear.

Exposure Guidelines

Applicable Exposure Limits

HEXAZINONE

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: None Established
AEL *	(DuPont)	: 10 mg/m3, 8 & 12 Hr. TWA, total dust 5 mg/m3, 8 & 12 Hr. TWA, respirable dust

ETHANOL

PEL	(OSHA)	: 1,000 ppm, 1,900 mg/m3, 8 Hr. TWA
AEL *	(DuPont)	: STEL 1000 ppm, A3, 1000 ppm, 8 & 12 Hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Vapor Pressure	: 33 mm Hg @ 25 C (77 F)
Solubility in Water	: Dispersible
Odor	: Alcoholic
Form	: Liquid
Color	: Light yellow
Specific Gravity	: 0.9776

Physical Hazards

FLAMMABLE. Keep away from heat, sparks, and open flames. Keep container closed.

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

Incompatible with strong acids or bases (slowly hydrolyzes).

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

VELPAR L

Oral LD50:	4120 mg/kg in rats
Dermal LD50:	> 5000 mg/kg in rabbits
Inhalation 4 hour LC50:	> 5.0 mg/L in rats

VELPAR L is corrosive to the eye. It was slightly irritating to the skin, but is not a skin sensitizer in animals.

HEXAZINONE
Repeated skin applications indicated no irritation or systemic activity.

Repeated dosing by ingestion of excessive dietary levels of Hexazinone resulted in weight loss, alterations in liver weights alterations in blood chemical measurements, and alterations in enzyme activities. No evidence of pathological organ damage was observed. Long-term dosing produced decreased weight gain, alterations in hematology, clinical chemistry, and blood enzyme levels, increased liver weights in some species, and pathological liver changes.

Animal data showed that chronic, excessive dietary exposure to Hexazinone produced a slight, equivocal increase in liver tumors in female mice.

Animal data show developmental effects only at exposure levels producing other toxic effects in the adult animal. Animal testing indicates Hexazinone does not have reproductive effects. The weight of evidence from a battery of cell culture and laboratory animal tests indicates Hexazinone does not cause genetic toxicity.

ECOLOGICAL INFORMATION

Ecotoxicological Information

AQUATIC TOXICITY:
96-Hour LC50 - Fathead minnows: 274 mg/L

96-Hour LC50 - Bluegill sunfish: > 370 mg/L
96-Hour LC50 - Rainbow trout: > 320 mg/L

AVIAN TOXICITY:
LD50 - Bobwhite quail: 2258 mg/kg

DISPOSAL CONSIDERATIONS

Waste Disposal

Do not contaminate water, food or feed by disposal. Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

ENVIRONMENTAL HAZARDS
Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

See product label for additional application instructions relating to environmental precautions.

Container Disposal

CONTAINER REFILLING AND DISPOSAL: Refer to the product label for instructions. Do not transport if container is damaged or leaking.

In the event of a major spill, fire or other emergency, call 1-800-441-3637 day or night.

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO

Proper Shipping Name	: Ethanol Solution
Hazard Class	: 3
UN No.	: UN 1170
Special Information	: Flashpoint: 23 deg C (74 deg F)
Packing Group	: III
Marine Pollutant	: Yes (Hexazinone)

REGULATORY INFORMATION

U.S. Federal Regulations

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes

Chronic : No
Fire : Yes
Reactivity : No
Pressure : No

In the United States this product is regulated by the US Environmental Protection Agency under the Federal Insecticide, Fungicide and Rodenticide Act. It is a violation of federal law to use this product in a manner inconsistent with its labeling.

EPA Reg. No. 352-392

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating
Health : 2
Flammability : 3
Reactivity : 0

NPCA-HMIS Rating
Health : 2
Flammability : 3
Reactivity : 0

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : DuPont Crop Protection
Wilmington DE 19898
Telephone : 1-888-638-7668

# Indicates updated section.

Material Safety Data Sheet

DuPont™ Oust® XP Herbicide

Version 2.1

Revision Date 01/04/2011 Ref. 130000029167

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ Oust® XP Herbicide
Tradename/Synonym	:	DPX-T5648 B11159747 SULFOMETURON METHYL: {Methyl 2-[[[[(4,6-dimethyl-2-pyrimidinyl)amino]-carbonyl]amino]sulfonyl]benzoate}
MSDS Number	:	130000029167
Product Use	:	Herbicide
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Caution

Causes moderate eye irritation. Avoid contact with skin, eyes and clothing.

Potential Health Effects

This section includes potential acute adverse effects which could occur if this material is not used according to the label.

Skin	:	May cause: Irritation with discomfort or rash.
Eyes	:	May cause: Irritation with discomfort, pain, redness, or visual impairment.

Ingestion

Sulfometuron methyl : Effects due to ingestion may include: Red blood cell destruction which could produce tiredness, rapid heartbeat, dizziness, pale skin, leg cramps, shortness of breath, jaundice (yellow tinge to skin and eyes)

Carcinogenicity

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Sulfometuron methyl	74222-97-2	75 %
Other Ingredients		25 %

SECTION 4. FIRST AID MEASURES

Skin contact : The material is not likely to be hazardous by skin contact, but cleansing the skin after use is advisable. Consult a physician if necessary.

Eye contact : Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Inhalation : No specific intervention is indicated as the compound is not likely to be hazardous. Consult a physician if necessary.

Ingestion : No specific intervention is indicated as the compound is not likely to be hazardous. Consult a physician if necessary.

General advice	:	Have the product container or label with you when calling a poison control center or doctor, or going for treatment. For medical emergencies involving this product, call toll free 1-800-441-3637. See Label for Additional Precautions and Directions for Use.

SECTION 5. FIRE-FIGHTING MEASURES

Flammable Properties Flash point	:	not applicable
Lower explosion limit	:	0.092 g/l
Suitable extinguishing media	:	Water spray, Dry chemical, Foam, Carbon dioxide (CO2)
Unsuitable extinguishing media	:	High volume water jet, (contamination risk)
Firefighting Instructions	:	Wear full protective clothing and self-contained breathing apparatus. (on small fires) If area is heavily exposed to fire and if conditions permit, let fire burn itself out since water may increase the area contaminated. Cool containers / tanks with water spray. Control Runoff.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel)	:	Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus. Use personal protective equipment.
Spill Cleanup	:	Sweep up and shovel into suitable containers for disposal.
Accidental Release Measures	:	Prevent material from entering sewers, waterways, or low areas. Never return spills in original containers for re-use. Dispose of in accordance with local regulations.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Wash hands thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove clothing/PPE immediately if material gets inside. Wash thoroughly and put on clean clothing. Remove personal protective equipment immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing.
Handling (Physical Aspects)	:	Keep away from heat and sources of ignition. Under severe dusting conditions, this material may form explosive mixtures in air.
Storage	:	Do not contaminate water, other pesticides, fertilizer, food or feed in storage. Store in original container. Keep tightly closed in a dry, cool and well-ventilated place. Keep out of the reach of children.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls	:	Use only with adequate ventilation. When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.
Personal protective equipment Skin and body protection	:	Applicators and other handlers must wear: Long sleeved shirt and long pants Shoes plus socks PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is: Coveralls Chemical resistant gloves made of any waterproof material Shoes plus socks
Protective measures	:	Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Exposure Guidelines

DuPont™ Oust® XP Herbicide

Version 2.1

Revision Date 01/04/2011 Ref. 130000029167

Exposure Limit Values				
Sulfometuron methyl				
TLV	(ACGIH)	5 mg/m3	TWA	
AEL *	(DUPONT)	10 mg/m3	8 & 12 hr. TWA	Total dust.

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	solid, dry, free flowing granules
Color	:	off-white
Odor	:	none
pH	:	no data available
Bulk density	:	39 lb/ft³ packed
Bulk density	:	33 lb/ft³ loose
Water solubility	:	dispersible

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Incompatibility	:	None reasonably foreseeable.
Hazardous decomposition products	:	Decomposition will not occur.
Hazardous reactions	:	Hazardous polymerization will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

DuPont™ Oust® XP Herbicide

Inhalation 4 h LC50	:	> 5.3 mg/l , rat
Dermal LD50	:	> 5,000 mg/kg , rabbit
Oral LD50	:	> 5,000 mg/kg , rat
Skin irritation	:	slight irritation, rabbit
Eye irritation	:	slight irritation, rabbit
Sensitisation	:	Animal test did not cause sensitization by skin contact., guinea pig

Sulfometuron methyl

Repeated dose toxicity	:	The following effects occurred at levels of exposure that significantly exceed those expected under labeled usage conditions. Oral multiple species Reduced body weight gain, Liver effects, Red blood cell destruction causing abnormal decrease in number of red blood cells (anaemia), altered blood chemistry
Carcinogenicity	:	Animal testing did not show any carcinogenic effects.
Mutagenicity	:	Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity	:	Animal testing showed effects on reproduction at levels equal to or above those causing parental toxicity.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Sulfometuron methyl

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 148 mg/l
96 h LC50	:	Lepomis macrochirus (Bluegill sunfish) > 150 mg/l

120 h EC50	:	Pseudokirchneriella subcapitata (green algae) 0.0046 mg/l
48 h EC50	:	Daphnia magna (Water flea) > 150 mg/l

Toxicity to other organisms
Sulfometuron methyl

LC50	:	Anas platyrhynchos (Mallard duck) > 5,000 ppm Dietary
LC50	:	Colinus virginianus (Bobwhite quail) > 5,620 ppm Dietary
Additional ecological information	:	Environmental Hazards: Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters or rinsate.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal	:	Do not contaminate water, food or feed by disposal. Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.
Container Disposal	:	Container Refilling and Disposal: Refer to the product label for instructions. Do not transport if this container is damaged or leaking. In the event of a major spill, fire or other emergency, call 1-800-441-3637 day or night.

SECTION 14. TRANSPORT INFORMATION

IATA_C	UN number	:	3077
	Proper shipping name	:	Environmentally hazardous substance, solid, n.o.s. (Sulfometuron methyl)
	Class	:	9
	Packing group	:	III

DuPont™ Oust® XP Herbicide

Version 2.1

Revision Date 01/04/2011 Ref. 130000029167

	Labelling No.	: 9MI
IMDG	UN number	: 3077
	Proper shipping name	: Environmentally hazardous substance, solid, n.o.s. (Sulfometuron methyl)
	Class	: 9
	Packing group	: III
	Labelling No.	: 9
	Marine pollutant	: yes (Sulfometuron methyl)

Not regulated as a hazardous material by DOT.

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s)	: SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
Title III hazard classification	: Acute Health Hazard: Yes Chronic Health Hazard: No Fire: No Reactivity/Physical hazard: No Pressure: No
EPA Reg. No.	: 352-601 In the United States this product is regulated by the US Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read and follow all label directions. This product is excluded from listing requirements under EPA/TSCA.
PA Right to Know Regulated Chemical(s)	: Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Sucrose , Trisodium phosphate dodecahydrate , 1,2-Benzisothiazol-3(2H)-one 1,1-dioxide
NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances

identified as carcinogens, mutagens or teratogens): 1,2-Benzisothiazol-3(2H)-one 1,1-dioxide

SECTION 16. OTHER INFORMATION

		NFPA	HMIS
Health	:	1	1
Flammability	:	1	1
Reactivity/Physical hazard	:	0	0

Contact person : DuPont Crop Protection, Wilmington, DE, 19898, Phone: 1-888-638-7668

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

MATERIAL SAFETY DATA SHEET

Dow AgroSciences

Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

ACCORD* CONCENTRATE HERBICIDE

Effective Date: 3/23/04
Product Code: 84820
MSDS: 006694

1. PRODUCT AND COMPANY IDENTIFICATION:

PRODUCT: Accord* Concentrate Herbicide

COMPANY IDENTIFICATION:
Dow AgroSciences LLC
9330 Zionsville Road
Indianapolis, IN 46268-1189

2. COMPOSITION/INFORMATION ON INGREDIENTS:

Glyphosate IPA: N-(phosphono-methyl) glycine, Isopropylamine Salt	CAS # 038641-94-0	53.8%
Balance, Total		46.2%

3. HAZARDOUS IDENTIFICATIONS:

EMERGENCY OVERVIEW

Clear, pale yellow liquid. May cause eye irritation. Slightly toxic to aquatic organisms.
EMERGENCY PHONE NUMBER: 800-992-5994

4. FIRST AID:

EYE: Flush eyes thoroughly with water for several minutes. Remove contact lenses after initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

SKIN: Wash skin with plenty of water.

INGESTION: No emergency medical treatment necessary.

INHALATION: Remove person to fresh air; if effects occur, consult a physician.

NOTE TO PHYSICIAN: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIRE FIGHTING MEASURES:

FLASH POINT: >214°F (>101°C)
METHOD USED: Setaflash

FLAMMABLE LIMITS:
LFL: Not applicable
UFL: Not applicable

EXTINGUISHING MEDIA: Foam, CO_2, Dry Chemical

FIRE AND EXPLOSION HAZARDS: Foam fire extinguishing system is preferred because uncontrolled water can spread possible contamination. Toxic irritating gases may be formed under fire conditions.

FIRE-FIGHTING EQUIPMENT: Use positive-pressure, self-contained breathing apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES:

ACTION TO TAKE FOR SPILLS: Absorb small spills with an inert absorbent material such as Hazorb, Zorball, sand, or dirt. Report large spills to Dow AgroSciences on 800-992-5994.

7. HANDLING AND STORAGE:

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep out of reach of children. Do not swallow. Avoid contact with eyes, skin, and clothing. Avoid breathing vapors and spray mist. Handle concentrate in ventilated area. Wash thoroughly with soap and water after handling and before eating, chewing gum, using tobacco, using the toilet or smoking. Keep away from food, feedstuffs, and water supplies. Store in original container with the lid tightly closed. Store above 10°F (-12°C) to keep from crystallizing.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

These precautions are suggested for conditions where the potential for exposure exists. Emergency conditions may require additional precautions.

EXPOSURE GUIDELINES: None established

ENGINEERING CONTROLS: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

EYE/FACE PROTECTION: Use safety glasses.

SKIN PROTECTION: No precautions other than clean body-covering clothing should be needed.

RESPIRATORY PROTECTION: For most conditions, no respiratory protection should be needed; however, if discomfort is experienced, use a NIOSH approved air-purifying respirator.

APPLICATIONS AND ALL OTHER HANDLERS: Please refer to the product label for personal protective clothing and equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES:

APPEARANCE: Clear, pale yellow liquid
DENSITY: 10.0 - 10.5 lbs/gal
pH: 4.8 – 5.0
ODOR: None
SOLUBILITY IN WATER: Miscible
SPECIFIC GRAVITY: 1.21 gm/L
FREEZING POINT: -7°F - -10°F (-21°C - -25°C)

10. STABILITY AND REACTIVITY:

STABILITY: (CONDITIONS TO AVOID) Stable under normal storage conditions.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Galvanized or unlined steel (except stainless steel) containers or spray tanks may produce hydrogen gas which may form a highly combustible gas mixture.

HAZARDOUS DECOMPOSITION PRODUCTS: None known.

HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION:

EYE: May cause slight temporary eye irritation. Corneal injury is unlikely.

SKIN: Essentially non-irritating to skin. Prolonged skin contact is unlikely to result in absorption of harmful amounts. The LD_{50} for skin absorption in rabbits is >5000 mg/kg. Did not cause allergic skin reactions when tested in guinea pigs.

INGESTION: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts. The oral LD_{50} for rats is >5000 mg/kg.

INHALATION: Brief exposure (minutes) is not likely to cause adverse effects. The aerosol LC_{50} for rats is >6.37 mg/L for 4 hours.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: For a similar material, glyphosate, in animals, effects have been reported on the following organ: liver.

CANCER INFORMATION: A similar material, glyphosate, did not cause cancer in laboratory animals.

TERATOLOGY (BIRTH DEFECTS): For glyphosate IPA, available data are inadequate for evaluation of potential to cause birth defects.

REPRODUCTIVE EFFECTS: For glyphosate IPA, available data are inadequate to determine effects on reproduction.

MUTAGENICITY: For a similar material, glyphosate, in-vitro and animal genetic toxicity studies were negative.

12. ECOLOGICAL INFORMATION:

ENVIRONMENTAL DATA:

ECOTOXICOLOGY:
Material is practically non-toxic to aquatic organisms on an acute basis (LC_{50} or EC_{50} is >100 mg/L in most sensitive species tested).
Acute LC_{50} for rainbow trout *(Oncorhynchus mykiss)* is >2500 mg/L.
Acute immobilization EC_{50} in water flea *(Daphnia magna)* is 918 mg/L.
Material is practically non-toxic to birds on an acute basis (LD_{50} is >2000 mg/kg).
Acute oral LD_{50} in bobwhite *(Colinus virginianus)* is >2000 mg/kg.
The LC_{50} in earthworm Eisenia foetida is >1000 mg/kg.
Acute contact LD_{50} in honey bee *(Apis mellifera)* is >100 µg/bee.
Acute oral LD_{50} in honey bee *(Apis mellifera)* is >100 µg/bee.
Growth inhibition EC_{50} in green alga *(Selenastrum capricornutum)* is 127 mg/L.
Growth inhibition EC_{50} in duckweed *(Lemna sp.)* is 24.4 mg/L.

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHOD: If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities.

MATERIAL SAFETY DATA SHEET

Dow AgroSciences

Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

ACCORD* CONCENTRATE HERBICIDE

Effective Date: 3/23/04
Product Code: 84820
MSDS: 006694

This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

If the material as supplied becomes a waste, follow all applicable regional, national and local laws and regulations.

14. TRANSPORT INFORMATION:

U.S. DEPARTMENT OF TRANSPORTATION (DOT) INFORMATION:

For all package sizes and modes of transportation:
This material is not regulated for transport.

15. REGULATORY INFORMATION:

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

U.S. REGULATIONS

SARA 313 INFORMATION: To the best of our knowledge, this product contains no chemical subject to SARA Title III Section 313 supplier notification requirements.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: This product is not known to contain any substances subject to the disclosure requirements of

New Jersey
Pennsylvania

OSHA HAZARD COMMUNICATION STANDARD: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND): To the best of our knowledge, this product contains no chemical subject to reporting under CERCLA.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

CATEGORY	RATING
Health	1
Flammability	1
Reactivity	0

16. OTHER INFORMATION:

MSDS STATUS: Revised Sections: 3,4,11,12,13,14 & 15
Reference: DR-0361-8028
Replaces MSDS Dated: 1/12/00
Document Code: D03-145-002
Replaces Document Code: D03-145-001

The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult Dow AgroSciences For Further Information.

BASF
The Chemical Company

Safety Data Sheet
CHOPPER GEN 2

1. Product and Company Identification

Company
BASF CORPORATION
100 Campus Drive
Florham Park, NJ 07932, USA

24 Hour Emergency Response Information
CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP

Substance number:	000000234359
Molecular formula:	C(13) H(15) N(3) O(3). C(3) H(9) N
Chemical family:	imidazole derivative
Synonyms:	Isopropylamine salt of imazapyr

2. Hazards Identification

Emergency overview

CAUTION:
May cause moderate but temporary irritation to the eyes.
Prolonged or repeated skin contact may cause sensitization or allergic reactions.
HARMFUL IF SWALLOWED.
KEEP OUT OF REACH OF CHILDREN.
KEEP OUT OF REACH OF DOMESTIC ANIMALS.
Avoid contact with the skin, eyes and clothing.
Avoid inhalation of mists/vapours.

See Product Label for additional precautionary statements.

State of matter: liquid
Colour: transparent
Colour: light yellow
Odour: odourless

Potential health effects

Primary routes of exposure:
Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquified gases.

Acute toxicity:
Slightly toxic after single ingestion. Relatively nontoxic after short-term skin contact. Relatively nontoxic after short-term inhalation.

Irritation / corrosion:
May cause slight but temporary irritation to the eyes. May cause slight irritation to the skin.

Sensitization:
Caused skin sensitization in animal studies.

Medical conditions aggravated by overexposure:
Individuals with pre-existing diseases of the respiratory system, skin or eyes may have increased susceptibility to excessive exposures.

Potential environmental effects

Aquatic toxicity:
There is a high probability that the product is not acutely harmful to fish. There is a high probability that the product is not acutely harmful to aquatic invertebrates. Acutely harmful for aquatic plants.

Terrestrial toxicity:
With high probability not acutely harmful to terrestrial organisms.

3. Composition / Information on Ingredients

CAS Number	Content (W/W)	Chemical name
81510-83-0	26.7 %	imazapyr isopropylamine salt
	73.3 %	Proprietary ingredients

4. First-Aid Measures

General advice:
First aid providers should wear personal protective equipment to prevent exposure. Remove contaminated clothing. Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or physician for treatment advice. Have the product container or label with you when calling a poison control center or doctor or going for treatment.

If inhaled:
Remove the affected individual into fresh air and keep the person calm.

If on skin:
Rinse skin immediately with plenty of water for 15 - 20 minutes.

If in eyes:
Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing.

If swallowed:
Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions.

Note to physician

Antidote:	No known specific antidote.
Treatment:	Treat symptomatically.

5. Fire-Fighting Measures

Flash point:	Based of the high water content the determination of the flash point seems not to be necessary.
Autoignition:	Based on the water content the product does not ignite.

Suitable extinguishing media:
foam, dry extinguishing media, carbon dioxide, water spray

Hazards during fire-fighting:
carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons,
If product is heated above decomposition temperature, toxic vapours will be released. The substances/groups of substances mentioned can be released if the product is involved in a fire.

Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
Evacuate area of all unnecessary personnel. Contain contaminated water/firefighting water. Do not allow to enter drains or waterways.

6. Accidental release measures

Personal precautions:
Take appropriate protective measures. Clear area. Shut off source of leak only under safe conditions. Extinguish sources of ignition nearby and downwind. Ensure adequate ventilation. Wear suitable personal protective clothing and equipment.

Environmental precautions:
Do not discharge into the subsoil/soil. Do not discharge into drains/surface waters/groundwater. Contain contaminated water/firefighting water.

Cleanup:
Dike spillage. Pick up with suitable absorbent material. Place into suitable containers for reuse or disposal in a licensed facility. Spilled substance/product should be recovered and applied according to label rates whenever possible. If application of spilled substance/product is not possible, then spills should be contained, solidified, and placed in suitable containers for disposal. After decontamination, spill area can be washed with water. Collect wash water for approved disposal.

7. Handling and Storage

Handling

General advice:
RECOMMENDATIONS ARE FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS. PESTICIDE APPLICATORS & WORKERS must refer to the Product Label and Directions for Use attached to the product for Agricultural Use Requirements in accordance with the EPA Worker Protection Standard 40 CFR part 170. Ensure adequate ventilation. Provide good ventilation of working area (local exhaust ventilation if necessary). Keep away from sources of ignition - No smoking. Keep container tightly sealed. Protect contents from the effects of light. Protect against heat. Protect from air. Handle and open container with care. Do not open until ready to use. Once container is opened, content should be used as soon as possible. Avoid aerosol formation. Avoid dust formation. Provide means for controlling leaks and spills. Do not return residues to the storage containers. Follow label warnings even after container is emptied. The substance/ product may be handled only by appropriately trained personnel. Avoid all direct contact with the substance/product. Avoid contact with the skin, eyes and clothing. Avoid inhalation of dusts/mists/vapours. Wear suitable personal protective clothing and equipment.

Protection against fire and explosion:
The relevant fire protection measures should be noted. Fire extinguishers should be kept handy. Avoid all sources of ignition: heat, sparks, open flame. Sources of ignition should be kept well clear. Avoid extreme heat. Keep away from oxidizable substances. Electrical equipment should conform to national electric code. Ground all transfer equipment properly to prevent electrostatic discharge. Electrostatic discharge may cause ignition.

Storage

General advice:
Keep only in the original container in a cool, dry, well-ventilated place away from ignition sources, heat or flame. Protect containers from physical damage. Protect against contamination. The authority permits and storage regulations must be observed.

Storage incompatibility:
General advice: Segregate from incompatible substances. Segregate from foods and animal feeds. Segregate from textiles and similar materials.

Temperature tolerance
Protect from temperatures below: 0 °C
Changes in the properties of the product may occur if substance/product is stored below indicated temperature for extended periods of time.
Protect from temperatures above: 40 °C
Changes in the properties of the product may occur if substance/product is stored above indicated temperature for extended periods of time.

8. Exposure Controls and Personal Protection

Users of a pesticidal product should refer to the product label for personal protective equipment requirements.

Advice on system design:
Whenever possible, engineering controls should be used to minimize the need for personal protective equipment.

Personal protective equipment

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Wear a NIOSH-certified (or equivalent) TC23C Chemical/Mechanical type filter system to remove a combination of particles, gas and vapours. For situations where the airborne concentrations may exceed the level for which an air purifying respirator is effective, or where the levels are unknown or Immediately Dangerous to Life or Health (IDLH), use NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

Hand protection:
Chemical resistant protective gloves, Protective glove selection must be based on the user's assessment of the workplace hazards.

Eye protection:
Safety glasses with side-shields. Tightly fitting safety goggles (chemical goggles). Wear face shield if splashing hazard exists.

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.

General safety and hygiene measures:
Wear long sleeved work shirt and long work pants in addition to other stated personal protective equipment. Work place should be equipped with a shower and an eye wash. Handle in accordance with good industrial hygiene and safety practice. Personal protective equipment should be decontaminated prior to reuse. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. No eating, drinking, smoking or tobacco use at the place of work. Keep away from food, drink and animal feeding stuffs.

9. Physical and Chemical Properties

Form:	liquid
Odour:	odourless
Colour:	transparent

	light yellow	
pH value:	6.8	(25 °C)
Freezing point:	approx. 0 °C	(1,013.3 hPa) Information applies to the solvent.
Boiling point:	approx. 100 °C	(1,013.3 hPa) Information applies to the solvent.
Vapour pressure:	approx. 23.3 hPa	(20 °C) Information applies to the solvent.
Density:	1.10 g/cm3	(20 °C)
Relative density:	1.10	(20 °C)
Bulk density:		not applicable
Viscosity, dynamic:	163.2 mPa.s	(20 °C)
	56.59 mPa.s	(40 °C)
Solubility in water:		miscible
Molar mass:	320.4 g/mol	

10. Stability and Reactivity

Conditions to avoid:
Avoid all sources of ignition: heat, sparks, open flame. Avoid extreme temperatures. Avoid prolonged exposure to extreme heat. Avoid contamination. Avoid electro-static discharge. Avoid prolonged storage.

Substances to avoid:
oxidizing agents, reducing agents

Hazardous reactions:
The product is chemically stable.

Decomposition products:
No hazardous decomposition products if stored and handled as prescribed/indicated., Prolonged thermal loading can result in products of degradation being given off.

Thermal decomposition:
Possible thermal decomposition products:
carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons
Stable at ambient temperature. If product is heated above decomposition temperature toxic vapours may be released.

Corrosion to metals:
Corrosive effect on: mild steel brass

Oxidizing properties:
Not an oxidizer.

11. Toxicological information

Acute toxicity

Oral:
Type of value: LD50
Species: rat (male/female)
Value: > 2,000 mg/kg

Inhalation:
Type of value: LC50
Species: rat
Value: > 5.5 mg/l
Exposition time: 4 h

Dermal:
Type of value: LD50

Species: rabbit (male/female)
Value: > 5,000 mg/kg

Irritation / corrosion

Skin:
Species: rabbit
Result: non-irritant
Method: Primary skin irritation test

Eye:
Species: rabbit
Result: non-irritant

Sensitization:
Skin sensitization test
Species: guinea pig
Result: Caused skin sensitization in animal studies.

Genetic toxicity

Information on: imazapyr
No mutagenic effect was found in various tests with microorganisms and mammals.

Carcinogenicity

Information on: imazapyr
In long-term studies in rats and mice in which the substance was given by feed, a carcinogenic effect was not observed.

Reproductive toxicity

Information on: imazapyr
The results of animal studies gave no indication of a fertility impairing effect.

Development:

Information on: imazapyr
No indications of a developmental toxic / teratogenic effect were seen in animal studies.
---

12. Ecological Information

Fish

Information on: imazapyr
Acute:
Oncorhynchus mykiss/LC50 (96 h): > 100 mg/l

Aquatic invertebrates

Information on: imazapyr
Acute:
Daphnia magna/EC50 (48 h): > 100 mg/l

Aquatic plants

Information on: imazapyr
Toxicity to aquatic plants:
green algae/EC50: 71 mg/l

Non-Mammals

Information on: imazapyr
Other terrestrial non-mammals:
mallard duck/LC50: > 5,000 ppm
With high probability not acutely harmful to terrestrial organisms.
Honey bee/LD50: > 100 ug/bee
With high probability not acutely harmful to terrestrial organisms.

Degradability / Persistence
Biological / Abiological Degradation

Evaluation: Not readily biodegradable (by OECD criteria).

Other adverse effects:

The ecological data given are those of the active ingredient. Do not release untreated into natural waters.

13. Disposal considerations

Waste disposal of substance:
Pesticide wastes are regulated. Improper disposal of excess pesticide, spray mix or rinsate is a violation of federal law. If pesticide wastes cannot be disposed of according to label instructions, contact the State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container disposal:
Rinse thoroughly at least three times (triple rinse) in accordance with EPA recommendations. Consult state or local disposal authorities for approved alternative procedures such as container recycling. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

RCRA:
This product is not regulated by RCRA.

14. Transport Information

Reference Bill of Lading

15. Regulatory Information

Federal Regulations

Registration status:

Chemical	TSCA, US	blocked / not listed
Crop Protection	TSCA, US	released / exempt

OSHA hazard category: Chronic target organ effects reported; ACGIH TLV established

EPCRA 311/312 (Hazard categories): Acute; Chronic

State regulations

CA Prop. 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

16. Other Information

Refer to product label for EPA registration number.

Recommended use: herbicide

BASF supports worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

Local Contact Information
Product Stewardship
919 547-2000

IMPORTANT: WHILE THE DESCRIPTIONS, DESIGNS, DATA AND INFORMATION CONTAINED HEREIN ARE PRESENTED IN GOOD FAITH AND BELIEVED TO BE ACCURATE , IT IS PROVIDED FOR YOUR GUIDANCE ONLY. BECAUSE MANY FACTORS MAY AFFECT PROCESSING OR APPLICATION/USE, WE RECOMMEND THAT YOU MAKE TESTS TO DETERMINE THE SUITABILITY OF A PRODUCT FOR YOUR PARTICULAR PURPOSE PRIOR TO USE. NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH, OR THAT THE PRODUCTS, DESIGNS, DATA OR INFORMATION MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS. IN NO CASE SHALL THE DESCRIPTIONS, INFORMATION, DATA OR DESIGNS PROVIDED BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE. FURTHER, YOU EXPRESSLY UNDERSTAND AND AGREE THAT THE DESCRIPTIONS, DESIGNS, DATA, AND INFORMATION FURNISHED BY BASF HEREUNDER ARE GIVEN GRATIS AND BASF ASSUMES NO OBLIGATION OR LIABILITY FOR THE DESCRIPTION, DESIGNS, DATA AND INFORMATION GIVEN OR RESULTS OBTAINED, ALL SUCH BEING GIVEN AND ACCEPTED AT YOUR RISK.
END OF DATA SHEET

BARAGA COUNTY FOREST INDUSTRY

LARGER INDUSTRIES	PUBLIC AGENCIES
Besse Forest Products	Craig Lake State Park
Celotex Corporation	Michigan DNR
Champion International Corporation	Michigan Technological University
Mead Corporation	Ottawa National Forest
Shelter Bay Forests	
Erickson Lumber	

Area of special note is the L'Anse and Keweenaw Bay Indian Reservations and Communities.
Listing indicates land ownership and/or an office location.

SMALLER INDUSTRIES, LOGGERs, TRUCKERS, BROKERS, DEALERS, CONSULTANTS

Greg Alessandroni	Mayes & Stenvig Timber Harvesting
All-Wood	Michigan State Industries
B & B Logging	Cliff Nankervis
Baraga Land & Timber	Newland Logging
BorgenTrucking (Dale)	Dave Newman
Richard Brouchoud Logging	Ollila Trucking (Clyde)
Robert Cadeau Logging	Pequaming Logging (R.Heikkinen)
CDC Logging	Perrow Trucking (Dale)
Paul Clisch	Ward Perrow
Tom Clisch Logging	Quality First Forest Products
Collins Forest Products	Rice Trucking (Lee)
D & L Logging	Risku Trucking (Ron)
E & M Contracting	Risku Brothers Forest Products
Four C's Logging	R.D. Kent Trucking
Wilbert Franti	Ruona (Bucky)
GDE Logging	S.K. Wood Products
Gerou Forest Products	Santti Brothers
Ted Gearu	Pioneer Logging & Trucking
Geroux Logging	Silver River Logging & Trucking
Rodney Haanpaa Logging	Specialty Wood Products
Ray Hansen	Adrian Stein
Jack Hornick	Charles Takalo
Huron Bay Forest Industries	The End Sawmill
David & Robert Janda	Tolonen Contracting
Stan Johns	Robert Tolonen Logging
Kayramo Trucking (William, Sr.)	John Trenier Logging
William Kayramo, Jr.	Turpeinen Brothers
Tom Kelley	John Vuk & Son
Ketola & Sons Trucking	Wedin Sawmill
Krueger Trucking (Carl)	Westman Forest Products
L & D Perry Logging	Gary Willis
Le Claire (Paul) Logging	Witz Trucking
Lehto Loggin	Younggren Farm & Forest (Francis)
M & S Logging	Robert Younggren Logging

Assembled by Michigan State University Extension, Upper Peninsula Regional Forestry office for use by County Commissioners, planners, and others interested in the forest industry. While considerable effort was made to prepare this list, it is not represented as complete, entirely accurate, or an endorsement by MSU of any particular individual or company. The intent is to demonstrate the importance of forestry and forest industry in each county of the Upper Peninsula. Sources of data are MSU Sustainable Forestry Education program and Michigan DNR publications: Burcham, Vi (editor). 1996. "Wood Products in Michigan: A Directory of Mills & Manufacturers" and Burcham, Vi (editor). 1992. "Michigan Forest Products: Producers, Truckers, Brokers, and Dealers". DNR directory information is also available on the Internet at(http://www.dnr.state.mi.us/dnr/main.htm). There have most likely been additions and deletions to these lists since the data sources were last updated.

Plum Creek's
Upper Peninsula Forest

Plum Creek is the largest and most geographically diverse private landowner in the nation, with more than 8 million acres in major timber producing regions of the United States. Plum Creek owns 650,000 acres of timberland in Michigan's Upper Peninsula. These lands are managed under the rigorous guidelines of the Sustainable Forestry Initiative (SFI). The comprehensive system of principles and objectives that integrate the perpetual growing and harvesting of trees with the protection of wildlife, plants, soil, water and air quality.

Most of Plum Creek's forestland in the Upper Peninsula are listed under the Commercial Forest Reserve Act and are open to the public for hunting and fishing. As you travel through and enjoy these lands, please observe the following rules:

1. Littering and dumping are prohibited. Please carry out what you carry in.
2. The use of nails, screw-in steps, or any device which penetrates the bark of trees to secure a hunting blind or tree stand is prohibited.
3. All hunting blinds and tree stands must be removed from Plum Creek property no later than the day following the close of the last deer season.
4. Cutting trees to create shooting lanes, ORV trails or camping sites is not permitted.
5. ORV's are allowed on existing roads except where specifically prohibited. However, construction of new ORV trails is not permitted.

Please feel free to contact one of Plum Creek's foresters at either of our administrative offices if you have any questions.

Escanaba Office
2831 N. Lincoln Rd
Escanaba, MI 49829
(906) 789-9076

L'Anse Office
15800 Mead Road
L'Anse, MI 49946
(906) 524-2040

Mead

Publishing Paper Division

Route 2 Box 672
L'Anse, Michigan 49946
906-524-6513
Fax: 906-524-6899

June 9, 1999

Tricia Beaver
Keweenaw Bay Indian Community
Baraga, MI 49908

Dear Tricia:

Sometime during the time period between June 14 and June 25, Mead will be doing a release spray on three of our plantations within the tribal boundaries. Enclosed are copies of plat book pages and of Mead type maps describing the areas to be sprayed. I have also enclosed the MSDS for the release chemical, which is Velpar L, and Garlon 4.

Velpar L releases the plantation from grass, raspberry, cherry, and aspen competition. There is a slight odor at initial application, but this odor does not linger. As soon as this herbicide dries on the plants it is safe to enter the area. All landowners within one quarter mile of the affected area have been notified. There are six different parts of this plantation, and all these areas have been sprayed before. This will be sprayed by a helicopter.

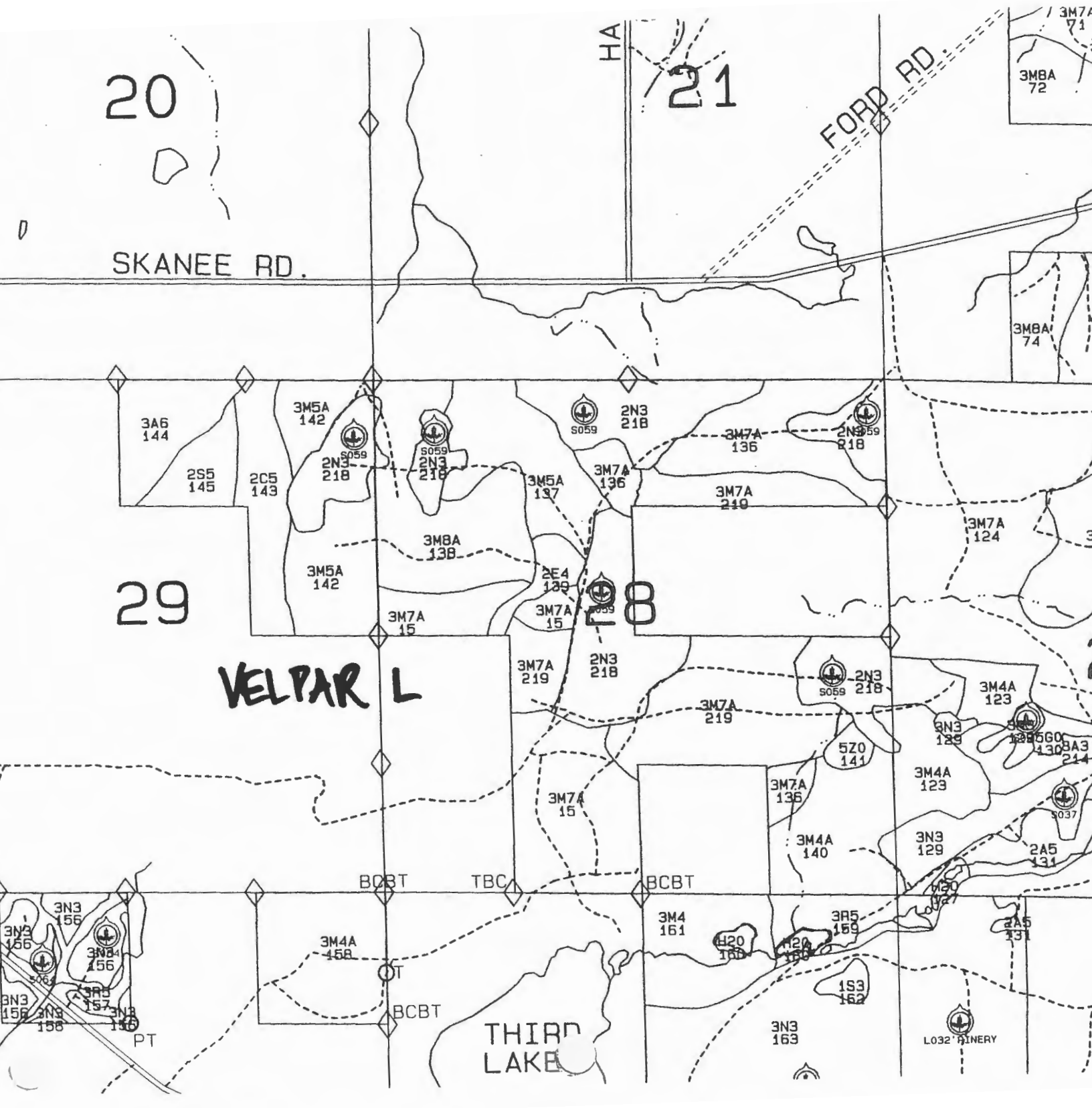
Garlon 4 will be sprayed by a contractor using backpack spray units. Individual stems are sprayed, with the main target being the stump sprout competition.

If you have any questions, please give me a call. Please refer to plantation # N059 (Velpar L), N037 (Garlon 4), and N048 (Garlon 4).

Sincerely,

Stephen R. Nelson

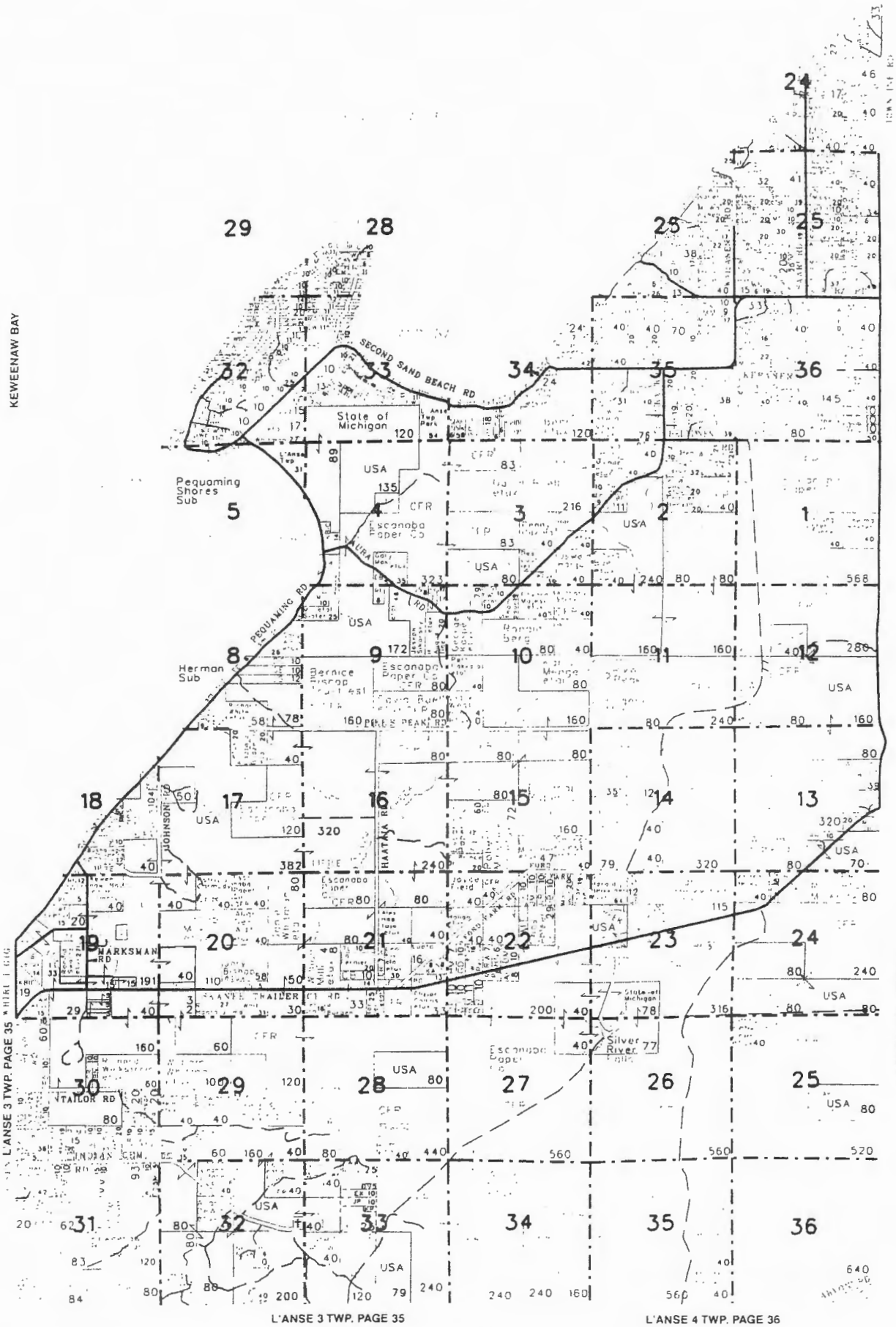
Stephen R. Nelson
District Regeneration Forester
Mead Paper


20
21
29
28
SKANEE RD.
FORD RD.
VELPAR L
THIRD LAKE
BCBT
TBC
BCBT
BCBT
PT
OT
3M8A 72
3M8A 74
3M5A 142
3A6 144
2S5 145
2C5 143
2N3 218
S059
3M8A 138
3M5A 137
3M7A 136
3M7A 219
3M7A 124
2E4 139
3M7A 15
2N3 218
3M4A 123
3N3 129
5Z0 141
3M4A 140
2A5 131
3M4 161
3R5 159
1S3 162
3N3 163
3M4A 158
3N3 156
3N3 157
3N3 158
L032 WINERY

T-51-52-N L'ANSE 7 PLAT R-32-W

(Landowners)

KEWEENAW BAY



#101

DU PONT

Du Pont Agricultural Products

MSDS MATERIAL SAFETY DATA SHEET

M0000056 Revised 16-DEC-1993 Printed 15-FEB-1995

"Velpar" L Herbicide

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification
"Velpar" is a registered trademark of DuPont.

Corporate MSDS Number DU003032

Company Identification
MANUFACTURER/DISTRIBUTOR
DuPont
1007 MARKET STREET
WILMINGTON, DE 19898

PHONE NUMBERS
Product Information 1-800-441-7515
Transport Emergency CHEMTREC 1-800-424-9300
Medical Emergency 1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
*HEXAZINONE	51235-04-2	25
(3-CYCLOHEXYL-6-(DIMETHYLAMINO)-1-METHYL-		
1,3,5-TRIAZINE-2,4(1H,3H)-DIONE)		
INERT INGREDIENTS		75
(INCLUDES PERCENTAGES OF THE FOLLOWING:)		
ETHANOL	64-17-5	40-45

* Regulated as a Toxic Chemical under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

(Continued)

HAZARDS IDENTIFICATION

Potential Health Effects

DANGER! Causes eye damage. Corrosive, causes irreversible eye damage. Harmful if swallowed.

ANIMAL DATA:

ORAL LD50 - (rat) 6,887 mg/kg or > 5,000 mg/kg. Very low toxicity by ingestion.

DERMAL LD50 - >7,500 mg/kg (rabbit). Slightly toxic by contact.

Not classified as a primary skin irritant in tests on rabbits. Produced no sensitization and only mild transient irritation in the guinea pig.

EYE - Direct contact with the liquid concentrate produced persistent mild to severe corneal cloudiness with moderate to severe conjunctivitis and moderate iritis in unwashed rabbit eyes. Considered a severe eye irritant.

CHRONIC STUDIES - HEXAZINONE

Oral (rat): In a 2-year feeding study with the 90% powder, the no-observable-effect level was 200 ppm a.i.; nutritional and body weight effects were seen in females at 1,000 ppm a.i. and in both sexes at 2,500 ppm a.i. Biochemical effects were noted in both sexes at 2,500 ppm a.i.

Oral (mouse): In a 2-year feeding study with technical material, the no-observable-effect level (NOEL) was 200 ppm; Decreased body weight gain was observed in both sexes at 2,500 ppm and 10,000 ppm. This effect was severe at 10,000 ppm, the highest dose tested. Non-neoplastic liver effects were noted in males at 2,500 ppm and in both sexes at 10,000 ppm. Based on a recent pathology review, hyperplastic liver nodules diagnosed at 10,000 ppm when this study was initially conducted have been reclassified as liver adenomas. This effect was only significant among female mice in this dose group. This change reflects the current scientific consensus regarding the classification of this benign lesion in the mouse liver.

Oral (dog): In a 1-year feeding study with technical material, the NOEL was 200 ppm. Reduced food consumption and body weight gains were significant at the high dose, 6,000 ppm. These nutritional effects were associated with mild but reversible changes in hematological parameters at the high dose. Increased liver weights and other non-neoplastic liver effects as indicated by histopathology and changes in clinical chemical parameters were observed at

(Continued)

1,500 and/or 6,000 ppm.

Dermal (rabbit): A 21-day dermal study was conducted in rabbits with technical hexazinone. There were no compound-related effects observed. This included the high-dose group in which 1,000 mg/kg was dermally applied for 6 hours/day throughout the study.

OTHER STUDIES:

REPRODUCTION (Rat) - In a 3-generation, 3-litter study with 90% powder, no adverse reproduction or lactation effects were seen at any level; slightly depressed average weanling weights were noted in the second and third litters at the high dose, 2,500 ppm. A second rat reproduction study (2-generation, 3-litter study) was conducted at dietary doses from 200 to 5,000 ppm. There were no adverse effects on fertility. The NOEL was 200 ppm. Decreased food consumption, parental body weight gain and decreased offspring weights were observed at the higher doses.

TERATOGENICITY - Not teratogenic or embryo-fetal toxic to rats by dietary administration at levels as high as 5,000 ppm, the highest dose tested. Administration to rats by oral intubation resulted in a NOEL for maternal and fetal effects of 100 mg/kg body wt./day. Maternal toxicity (reduced food consumption and lower body weights) was observed at 400 and 900 mg/kg. Lower fetal weights and indications of general delayed development associated with maternal toxicity were also observed at these doses. When hexazinone was administered to rabbits via oral intubation, there were no teratogenic or embryo-fetal toxic effects at the highest dose tested, 125 mg/kg/day. Only a transient reduction in maternal food consumption was observed at the high dose. The maternal and fetal NOELs are considered to be 125 mg/kg.

MUTAGENICITY - Not mutagenic in Ames bacterial assay, Chinese hamster ovary cell point mutation assay, or rat liver DNA repair assay; positive in the in vitro Chinese hamster ovary cell cytogenetic assay but negative in the in vivo rat bone marrow cytogenetic assay.

HUMAN HEALTH EFFECTS OF OVEREXPOSURE TO HEXAZINONE:
Overexposure to hexazinone by eye contact may initially include eye irritation with discomfort, tearing, or blurring of vision.

Ingestion may include abnormal liver function as detected by laboratory tests.

Significant skin permeation, and systemic toxicity after contact appears unlikely. Indiviuals with preexisting diseases of the liver may have increased susceptibility to

(Continued)

HAZARDS IDENTIFICATION(Continued)

the toxicity of excessive exposures.

HUMAN HEALTH EFFECTS OF OVEREXPOSURE TO ETHANOL:
The principal manifestation of ethanol poisoning is central nervous system depression.

Skin contact may initially include defatting of the skin resulting in irritation with discomfort or rash; or allergic skin rashes.

Eye contact may initially include eye irritation with discomfort, tearing, or blurring of vision.

Inhalation may initially include irritation of the upper respiratory passages, with coughing and discomfort.

Ingestion may initially include temporary nervous system depression with anaesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness; reproductive effects with risk to the unborn child; temporary nervous system effects such as muscular weakness and incoordination; gastrointestinal tract irritation; or nonspecific discomfort, such as nausea, headache, or weakness.

Higher exposures may lead to reduced white blood cell production; temporarily reduced fertility in females and males; temporary elevation of blood pressure; degeneration of the heart muscles; abnormal liver function as detected by laboratory tests; or abnormal liver function with nausea or vomiting, reduced appetite, or abnormal pain.

Individuals with preexisting diseases of the liver, central nervous system, gastrointestinal tract, or reproductive organs may have increased susceptibility to the toxicity of excessive exposures.

Carcinogenicity Information
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid
INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

(Continued)

FIRST AID MEASURES(Continued)

In case of contact, immediately wash skin with soap and water. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

No specific intervention is indicated as compound is not likely to be hazardous by ingestion. Consult a physician if necessary.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	23-25 C (73-77 F)
Method	Closed Cup

Flammable liquid. Vapor forms explosive mixture with air. Heating can release vapors which can be ignited.

Extinguishing Media

Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Wear self-contained breathing apparatus. Use water spray. Cool tank/container with water spray.

If area is heavily exposed to fire and if conditions permit, let fire burn itself out since water may increase the contamination hazard.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill. Prevent material from entering sewers, waterways, or low areas.

Spill Clean Up

Soak up with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up.

(Continued)

HANDLING AND STORAGE

Handling (Personnel)
Do not get on clothing. Do not get in eyes. Avoid breathing vapors or mist. Avoid contact with skin. Wash thoroughly after handling. Wash clothing after use. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material.

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Handling (Physical Aspects)
Keep away from heat, sparks and flames.

Storage
Store in a well ventilated place. Keep container tightly closed.

Do not subject product to temperatures below 32 deg F.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls
Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment
Always follow label instructions when using this product.

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants
- Shoes plus socks
- Protective eyewear

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:
- Coveralls
- Waterproof gloves
- Shoes plus socks
- Protective eyewear

Exposure Guidelines
Applicable Exposure Limits
HEXAZINONE

PEL	(OSHA)	None Established
TLV	(ACGIH)	None Established

(Continued)

EXPOSURE CONTROLS/PERSONAL PROTECTION(Continued)

AEL * (Du Pont)	10 mg/m3, 8 Hr. TWA

ETHANOL

PEL (OSHA)	1,000 ppm, 1,900 mg/m3, 8 Hr. TWA
TLV (ACGIH)	1,000 ppm, 1,880 mg/m3, 8 Hr. TWA
AEL * (Du Pont)	1000 ppm, 8 & 12 Hr. TWA

* AEL is Du Pont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Vapor Pressure	33 mm Hg @ 25 C (77 F)
Solubility in Water	Dispersible
Odor	Alcoholic
Form	Liquid
Color	Light yellow
Specific Gravity	0.9776

STABILITY AND REACTIVITY

Chemical Stability
Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials
Incompatible with strong acids or bases (slowly hydrolyzes).

Polymerization
Polymerization will not occur.

ECOLOGICAL INFORMATION

Ecotoxicological Information
Aquatic Toxicity

This formulation is considered slightly toxic.

96 hour LC50, bluegill sunfish: > 1,000 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal
Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

Do not contaminate water, food or feed by storage or disposal. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA regional office for guidance.

(Continued)

TRANSPORTATION INFORMATION

 # Shipping Information

DOT/IMO

Proper Shipping Name	ETHANOL SOLUTION
Hazard Class	3
UN No.	UN 1170
Special Information	FLASH POINT: 23 deg C (74 deg F)
Packing Group	III

REGULATORY INFORMATION

U.S. Federal Regulations

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute	: Yes
Chronic	: No
Fire	: Yes
Reactivity	: No
Pressure	: No

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating

Health	2
Flammability	3
Reactivity	0

NPCA-HMIS Rating

Health	2
Flammability	3
Reactivity	0

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

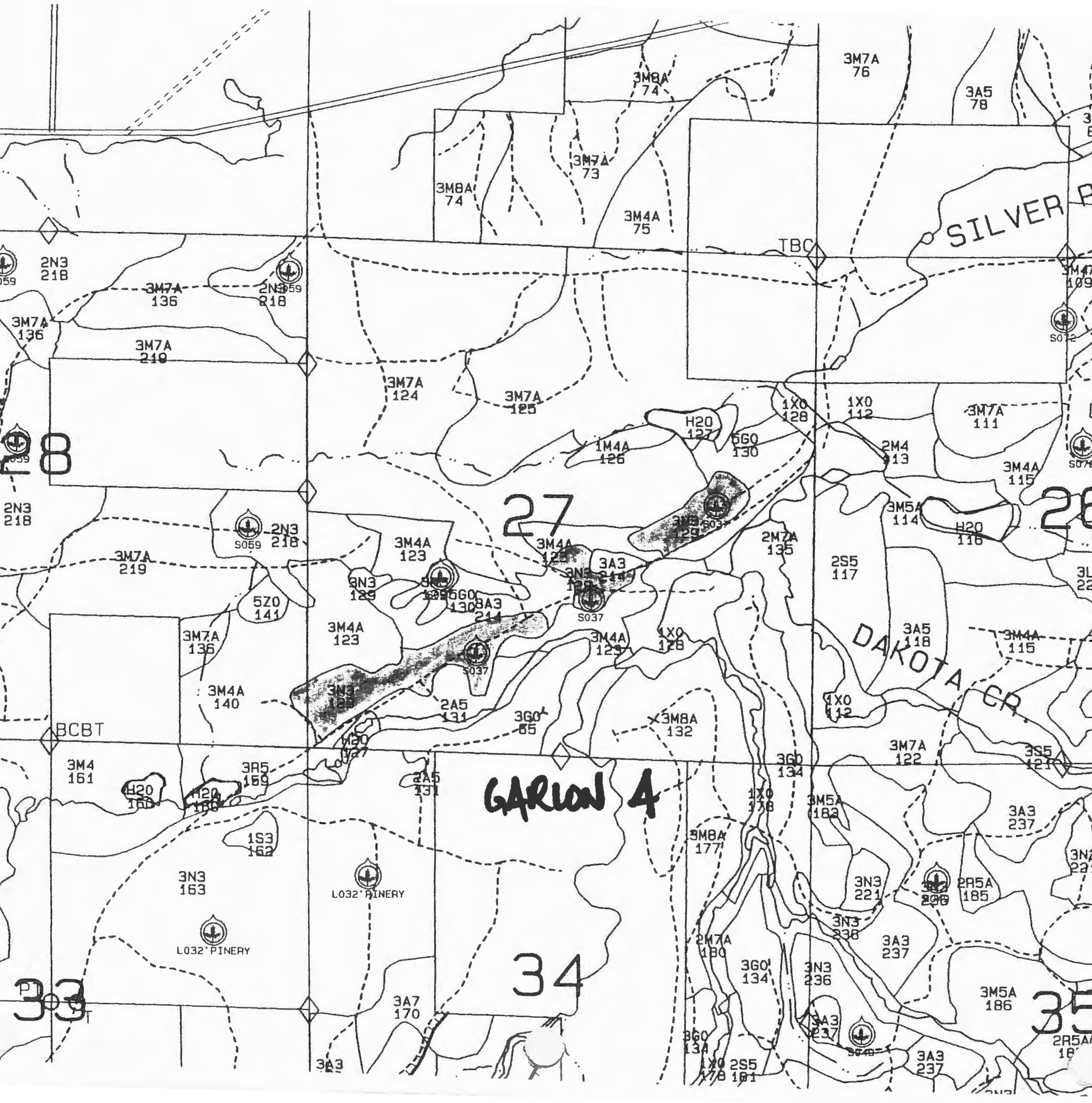
This product is registered under EPA/FIFRA Regulations.
The EPA Reg. No. is 352-392.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

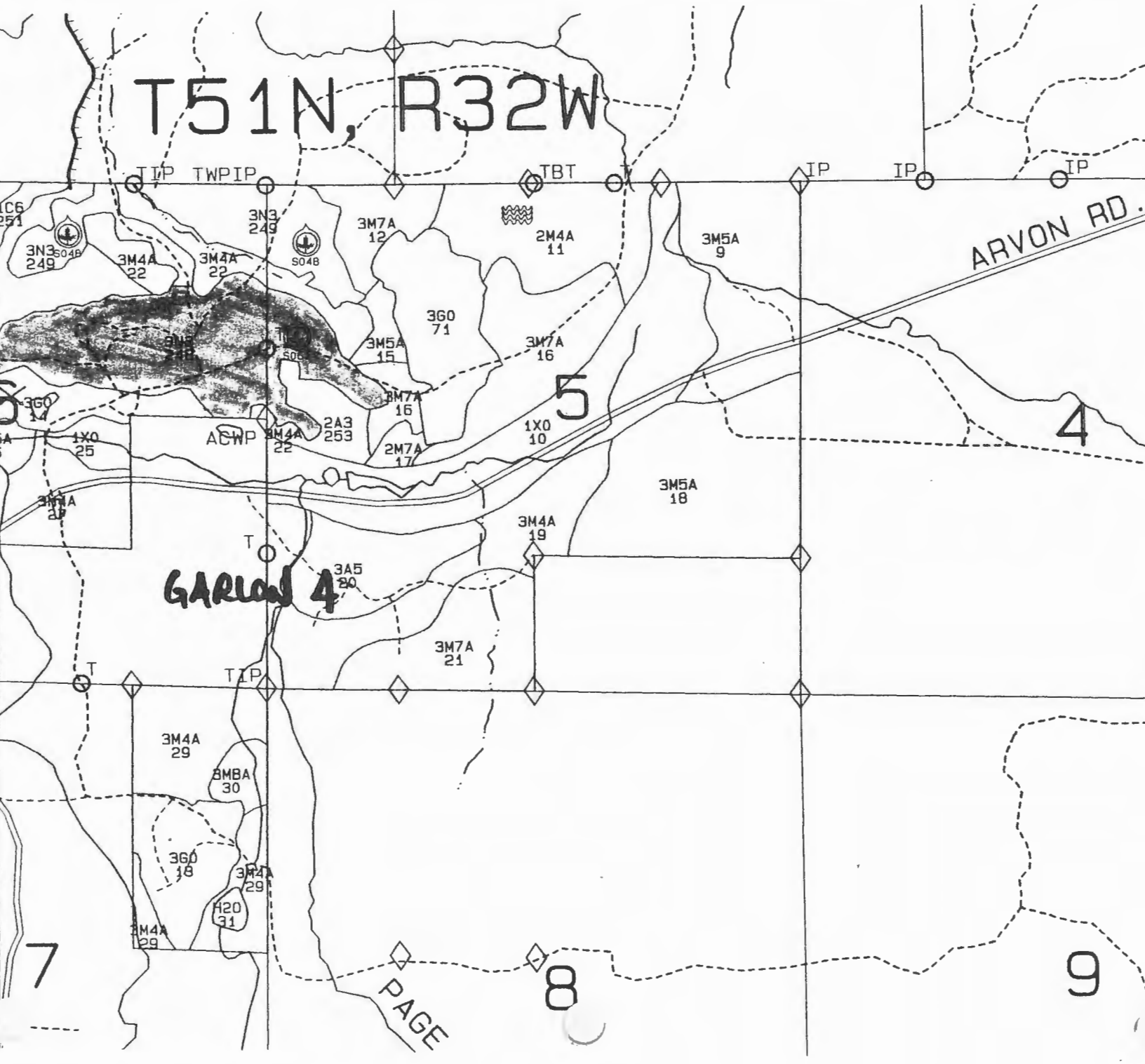
Responsibility for MSDS	Du Pont
Address	Agricultural Products Wilmington DE 19898
Telephone	800-441-7515

# Indicates updated section.

End of MSDS

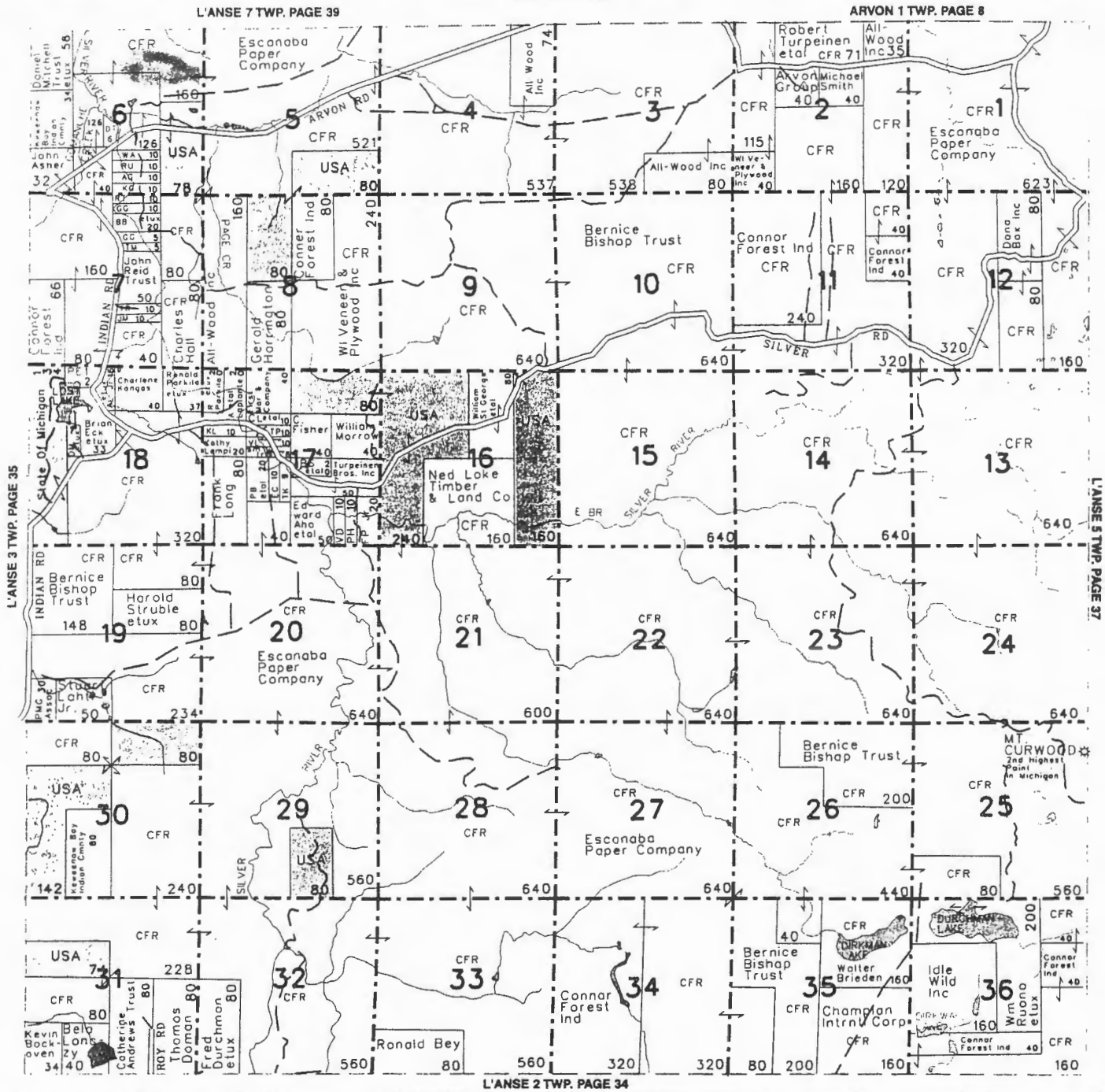


SILVER
TBC
28
27
DAKOTA CR.
BCBT
GARLON 4
33
34
L032 PINERY
3M7A 76
3A5 78
3M8A 74
3M7A 73
3M4A 75
2N3 218
3M7A 136
3M7A 219
3M7A 124
3M7A 125
1X0 128
1X0 112
3M7A 111
H20 127
5G0 130
1M4A 126
2M4 113
3M4A 115
3M5A 114
H20 116
2M7A 135
2S5 117
3M4A 123
3A3 214
5Z0 141
3N3 129
3A5 118
3M4A 140
2A5 131
3G0 65
3M8A 132
3M7A 122
3M4 161
3R5 159
3G0 134
3M5A 183
3A3 237
1S3 162
3N3 163
3M8A 177
3N3 221
2R5A 185
3N3 236
3N3 238
3M5A 186
3A7 170
S037
S059


T51N, R32W
TIP
TWPIP
TBT
IP
IP
IP
ARVON RD.
3N3 249
S048
3M4A 22
3M7A 12
2M4A 11
3M5A 9
3G0 71
3M5A 15
3M7A 16
3M7A 16
5
4
3G0 14
1X0 25
ACWP
3M4A 22
2A3 253
2M7A 17
1X0 10
3M5A 18
3M4A 19
T
GARLOW 4
3A5 20
3M7A 21
TIP
3M4A 29
8MBA 30
3G0 18
3M4A 29
H20 31
3M4A 29
7
8
9
PAGE

T-50-N L'ANSE 4 PLAT R-32-W

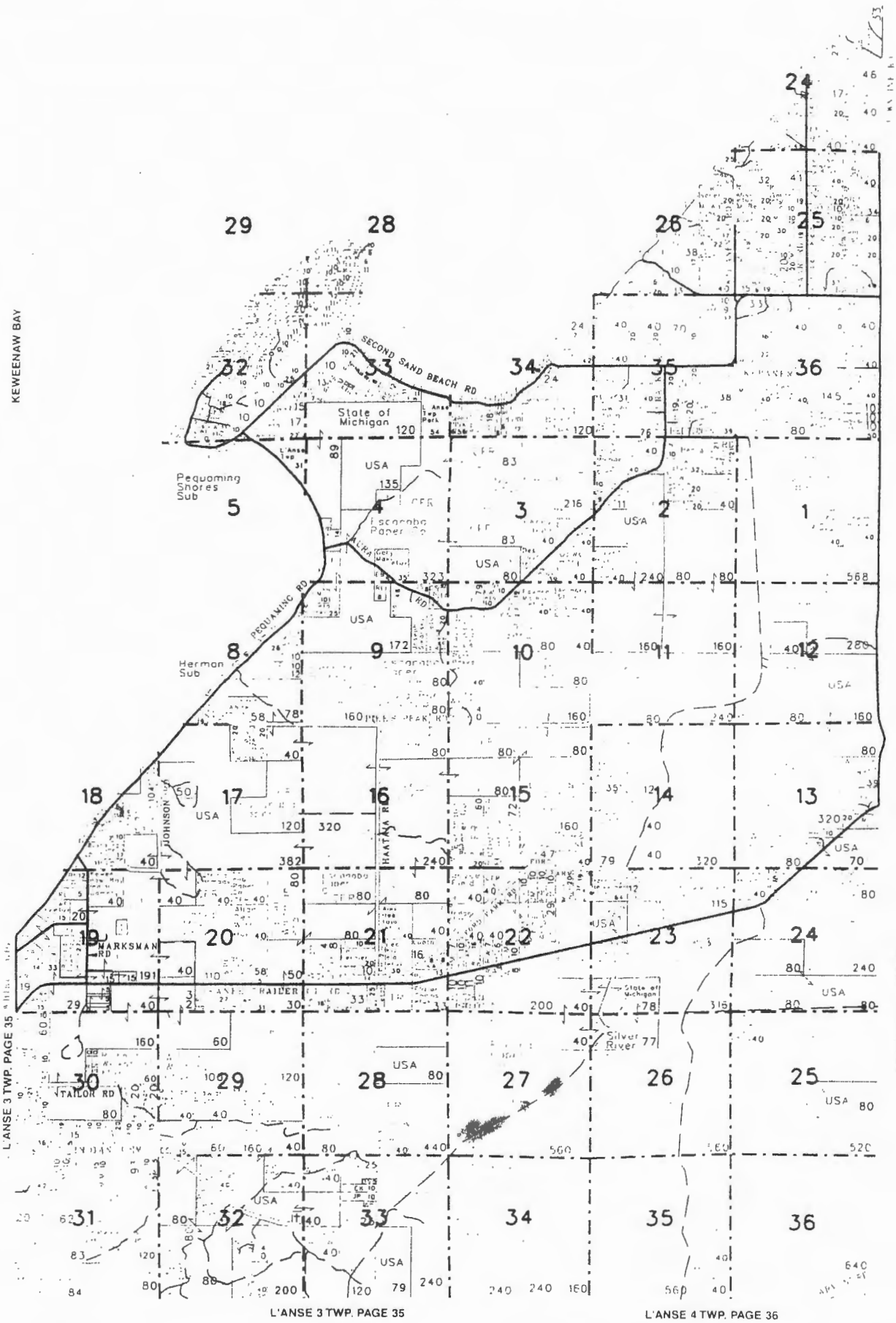
(Landowners)



See Page 56 For Additional Names.

T-51-52-N L'ANSE 7 PLAT R-32-W

(Landowners)



NHD551

Material Safety Data Sheet

DowElanco

Emergency Phone: 517-636-4400
General Phone: 1-800-352-6776

EPA Reg. Number: 62719-40
Effective Date: July 16, 1992
Product Code: 38322
MSDS Number: 001314
DowElanco • Indianapolis, IN 46268

GARLON* 4 Herbicide

1. INGREDIENTS: (% w/w, unless otherwise noted)

Triclopyr ((3,5,6-trichloro-2-pyridinyl) oxy) acetic acid, butoxy ethyl ester
CAS# 064700-56-7 .....61.6%

Other ingredients: 38.4%
Kerosene . . . CAS# 008008-20-6
Proprietary ingredients

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: >302°F, 150°C initial

VAP. PRESS: 0.1 mm @ 37.8°C (kerosene)

VAP. DENSITY: >1

SOL. IN WATER: Emulsifies

SP. GRAVITY: 1.08

APPEARANCE: Amber liquid.

ODOR: Not available.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: 147°F, 64°C

METHOD USED: TCC

FLAMMABLE LIMITS:
LFL: Not determined
UFL: Not determined

EXTINGUISHING MEDIA: Water fog, foam, CO2, and dry chemical.

FIRE & EXPLOSION HAZARDS: Combustible.

FIRE-FIGHTING EQUIPMENT: Use positive pressure self-contained breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Combustible. Avoid sources of ignition if temperature is near or above flash point.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Acid, base, and oxidizing material.

HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen oxides, hydrogen chloride, and phosgene may result under fire conditions.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Dike large spills. Keep out of streams and domestic water supplies. Absorb small spills in inert material such as sand.

DISPOSAL METHOD: In case of large spills, contact The Dow Chemical Company. Bury clean-up material from small spills in an approved landfill in accordance with applicable local, state, and federal regulations.

6. HEALTH HAZARD DATA:

EYE: May cause slight transient (temporary) eye irritation.

SKIN CONTACT: Prolonged or repeated exposure may cause skin irritation. Prolonged or frequently-repeated skin contact may cause allergic reactions in some individuals. With the dilute mix, no allergic skin reaction is expected.

SKIN ABSORPTION: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The LD50 for skin absorption in rabbits is >2000 mg/kg. Repeated skin exposure may result in absorption of harmful amounts.

INGESTION: Single dose oral toxicity is low. The oral LD50 for male rats is 1581 mg/kg and for females 1338 mg/kg. Small amounts swallowed incidental to mormal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury. If aspirated(liquid enters the lung), may cause lung damage or even death due to chemical pneumonia.

INHALATION: Excessive exposure may cause irritation to upper respiratory tract. Signs and symptoms of excessive exposure may be central nervous system effects (due to kerosene).

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Repeated excessive exposures may cause liver, kidney or blood effects.

CANCER INFORMATION: Did not cause cancer in long-term animal studies.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth

*Trademark of DowElanco

DowElanco

GARLON* 4 Herbicide

Emergency Phone: 517-636-4400
General Phone: 1-800-352-6776

EPA Reg. Number: 62719-40
Effective Date: July 16, 1992
Product Code: 38322
MSDS Number: 001314
DowElanco • Indianapolis, IN 46268

defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother.

REPRODUCTIVE EFFECTS: The active ingredient in this formulation has been shown in animals not to interfere with reproduction.

MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): Results of in-vitro ("test tube") mutagenicity tests have been negative. Results of mutagenicity tests in animals have been negative.

7. FIRST AID:

EYES: Flush eyes with plenty of water.

SKIN: Wash off in flowing water or shower. Get medical attention if irritation persists.

INGESTION: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: The decision of whether to induce vomiting or not should be made by an attending physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient. Repeated excessive exposure may aggravate preexisting liver and kidney disease.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): For 3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester{triclopyr, butoxyethyl ester}, the Dow Industrial Hygiene Guide is 2 mg/m3 as the acid equivalent, Skin. Dow Industrial Hygiene Guide is 10 mg/m3 for kerosene.

VENTILATION: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator.

SKIN PROTECTION: For brief contact, no precautions other than clean body-covering clothing should be needed. Use impervious gloves when prolonged or frequently repeated contact could occur.

EYE PROTECTION: Use safety glasses.

9. ADDITIONAL INFORMATION:

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep out of reach of children. Do not use near heat or open flame. Avoid contact with eyes, skin or clothing. Do not ship or store with food, feeds, drugs, or clothing. Do not contaminate water, food, or feed by storage or disposal.

MSDS STATUS: Sections 6,7 and regsheet Revised 7/92.

REGULATORY INFORMATION:

(Not meant to be all-inclusive—selected regulations represented).

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See MSD Sheet for health and safety information.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard
A delayed health hazard
A fire hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in Section 1 of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
KEROSENE	008008-20-6	NJ3 PA1

NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).
PA1=Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Mead

Publishing Paper Division

Route 2 Box 672
L'Anse, Michigan 49946
906-524-6513
Fax: 906-524-6899

July 15, 1999

Tricia Beaver
Keweenaw Bay Indian Community
Baraga, MI 49908

Dear Tricia:

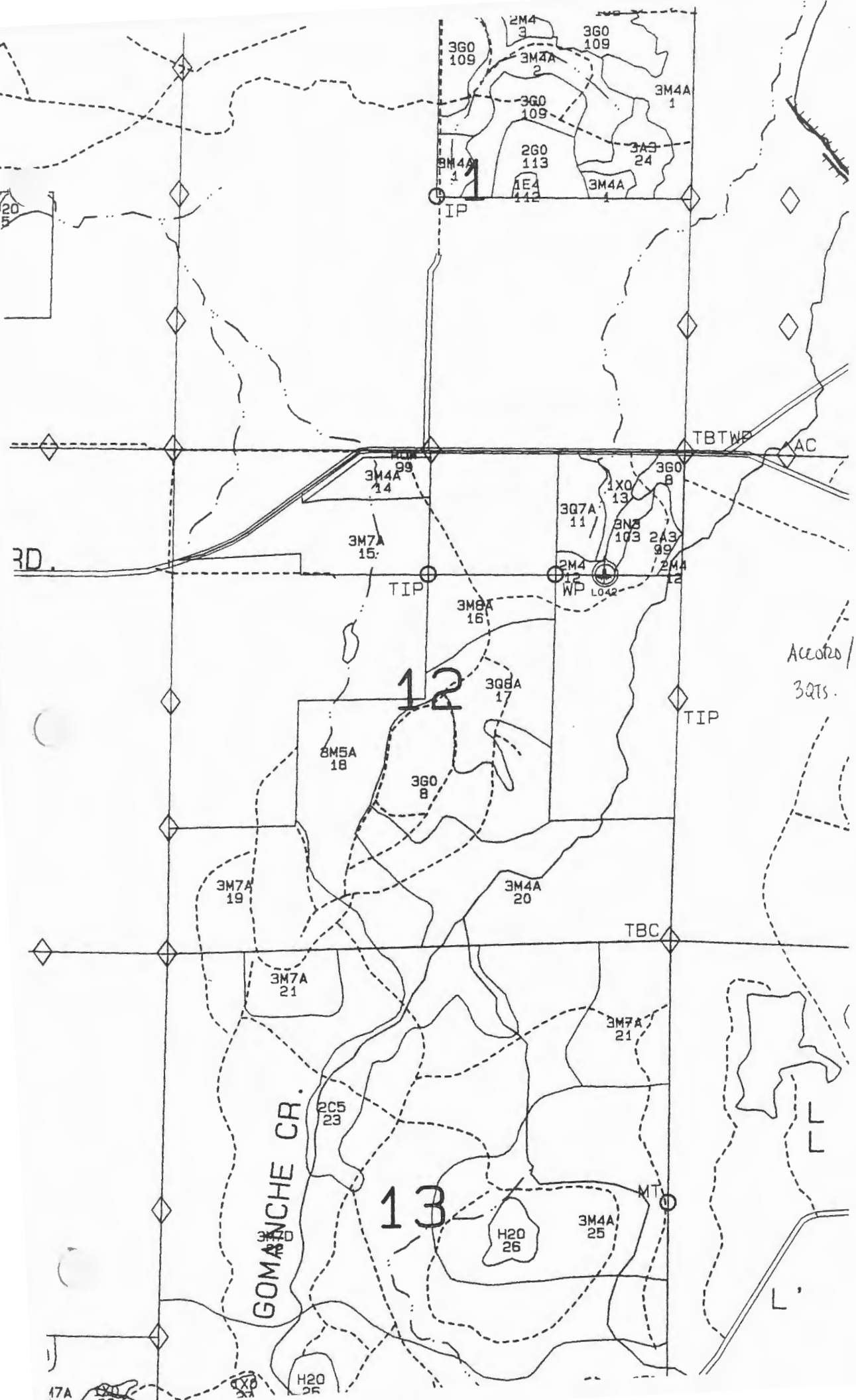
Sometime during the time period between July 19 and July 28, Mead will be doing a site preparation spray on seven of our future plantations within the tribal boundaries. Enclosed are copies of plat book pages and of Mead type maps describing the areas to be sprayed. I have also enclosed the MSDS for the site prep. chemicals, which are Accord, Arsenal, Oust, and Tordon 101.

These herbicides eliminate woody brush, raspberry, and grasses from the future plantations. All of these herbicides have a slight odor at initial application but will not linger, except for Tordon 101 which can linger for a couple of weeks depending on the weather. The plantation which is being sprayed with Tordon 101 is not near anyone's dwelling. All landowners within one quarter mile of the affected area have been notified. This will be sprayed by a helicopter.

If you have any questions, please give me a call. Please refer to plantation # N076, N083, N090, N091, N101, N102 (Accord, Arsenal, Oust) and N084 (Tordon 101, Oust).

Sincerely,

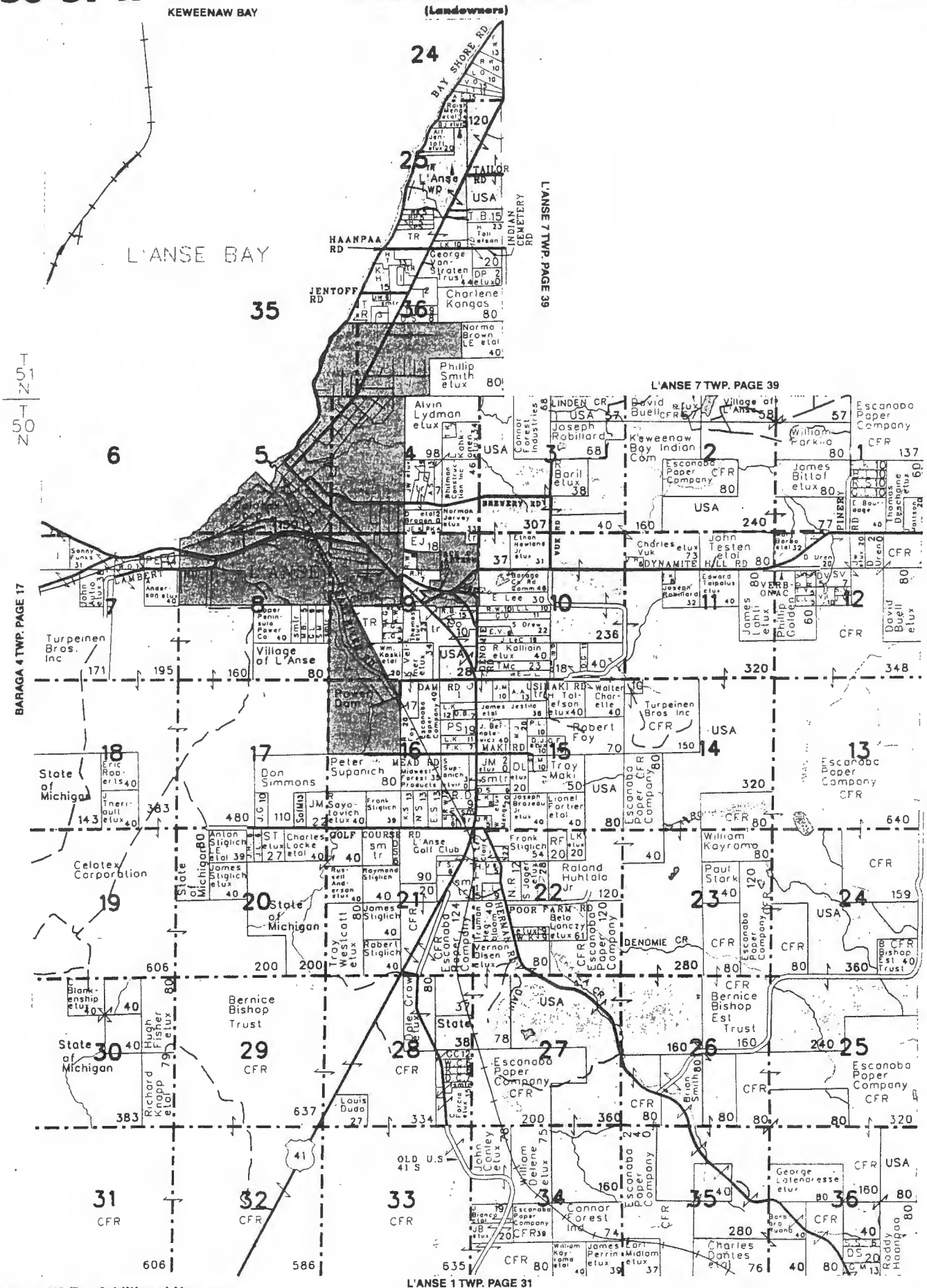
Stephen R. Nelson
District Regeneration Forester
Mead Paper

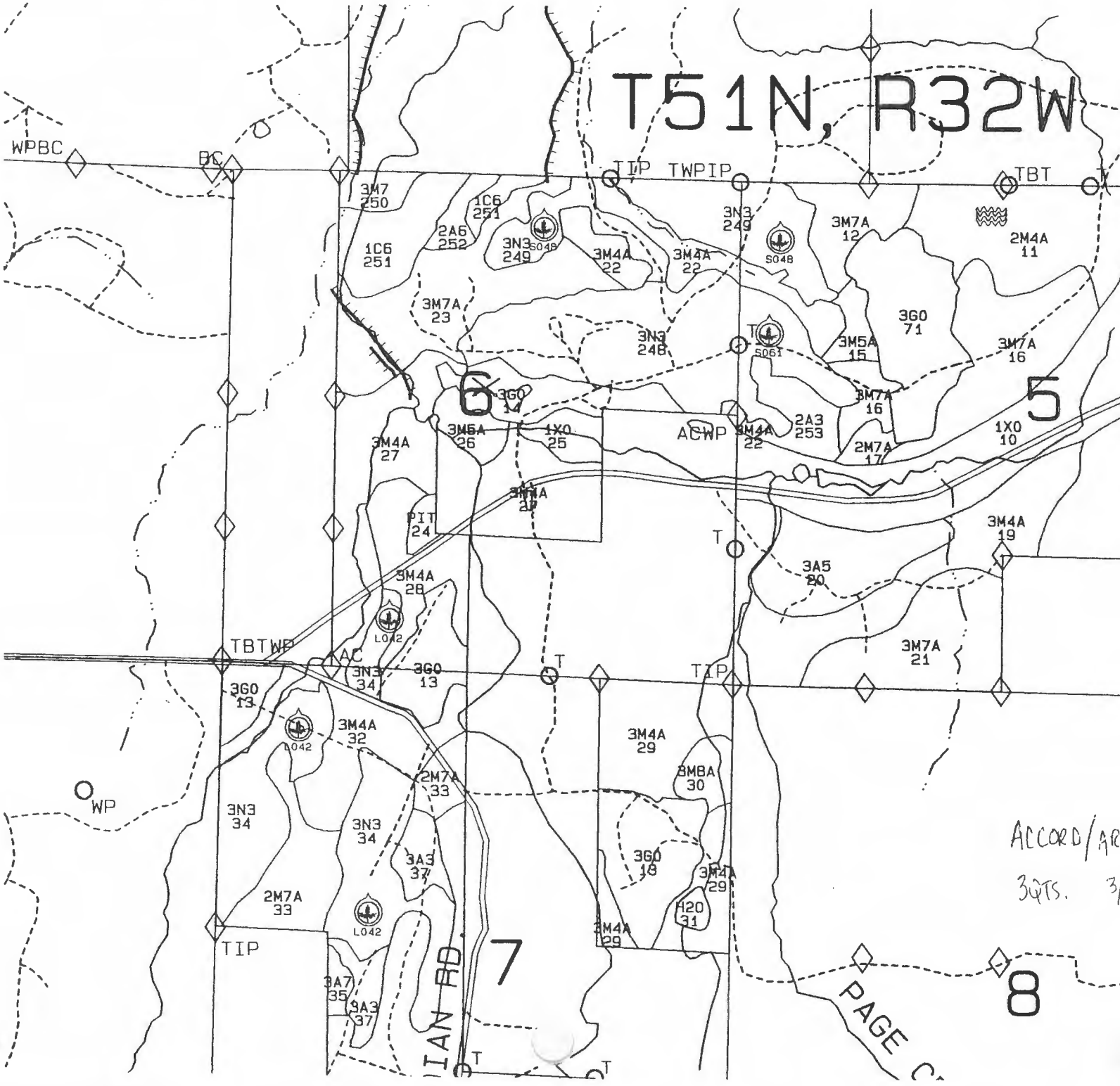


ACCORD / ARSENAL / OUST
3QTS. 3/81b 15 OZ

T-50-51-N L'ANSE 3 PLAT R-33-W

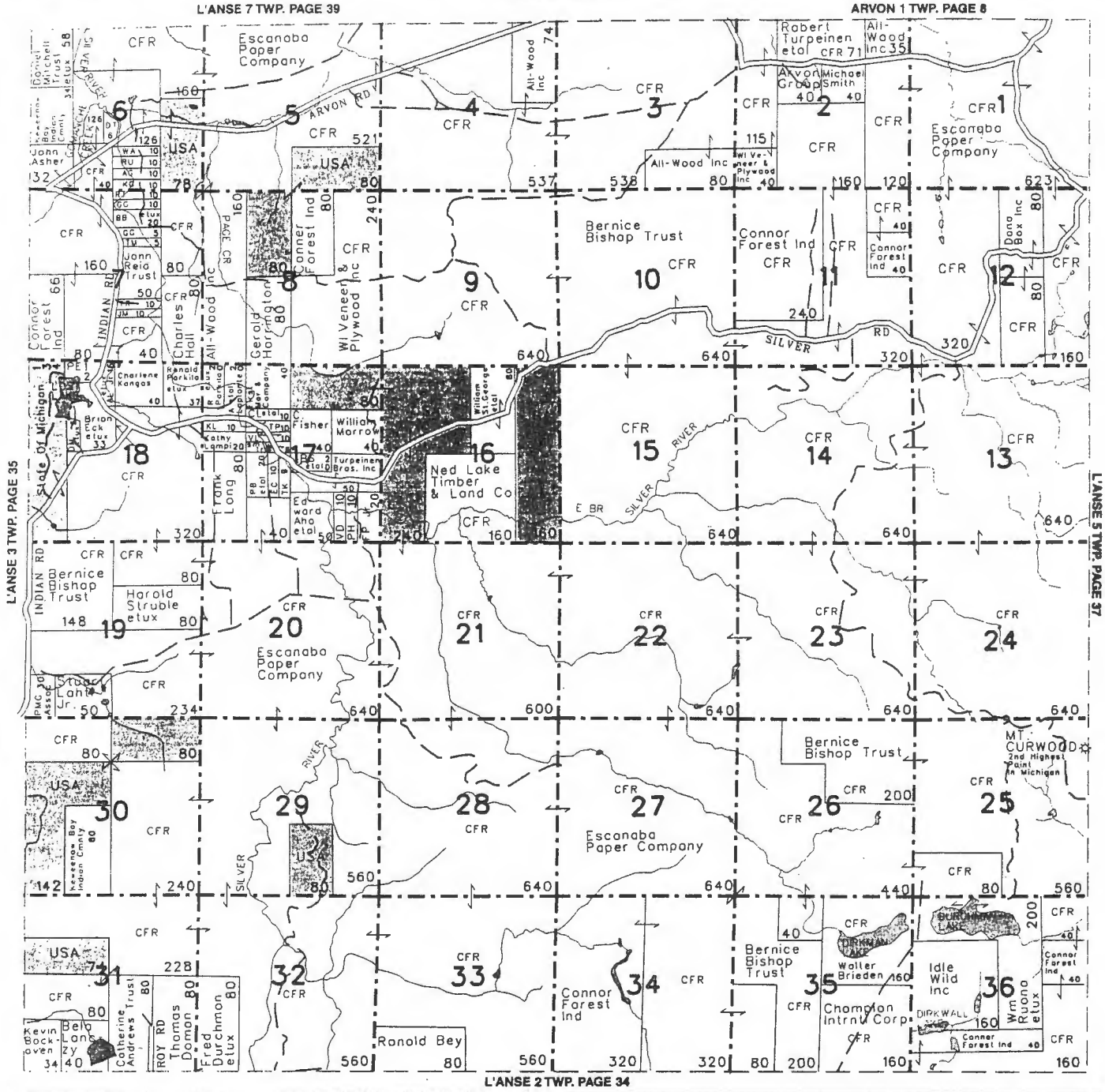
(Landowners)



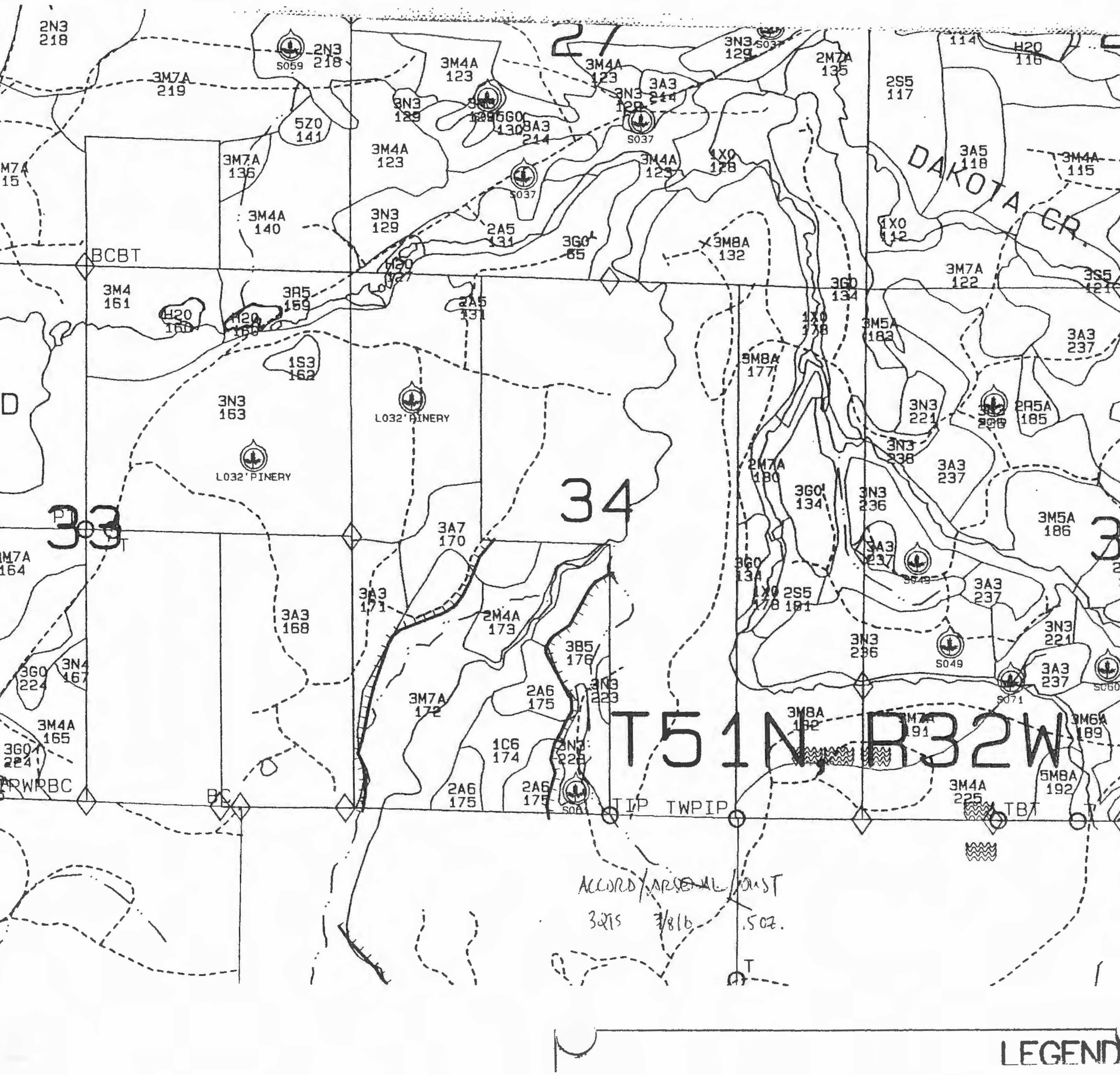

T51N, R32W
WPBC
BC
TIP TWPIP
TBT
3M7 250
1C6 251
2A6 252
3N3 249
S048
3M4A 22
3M7A 23
3N3 248
S061
3M5A 15
3M7A 16
3G0 71
3M7A 12
2M4A 11
6
5
3G0 17
3M5A 26
1X0 25
ACWP
2A3 253
2M7A 17
1X0 10
3M4A 27
PIT 24
3M4A 19
3A5 20
3M4A 28
L042
TBTWP
AC
3N3 34
3G0 13
TIP
3M7A 21
3M4A 32
3M4A 29
3M8A 30
2M7A 33
WP
3A3 37
H20 31
2M7A 33
3A7 35
9A3 37
7
8
PAGE
ACCORD/AR
3QTS. 3

T-50-N L'ANSE 4 PLAT R-32-W

(Landowners)

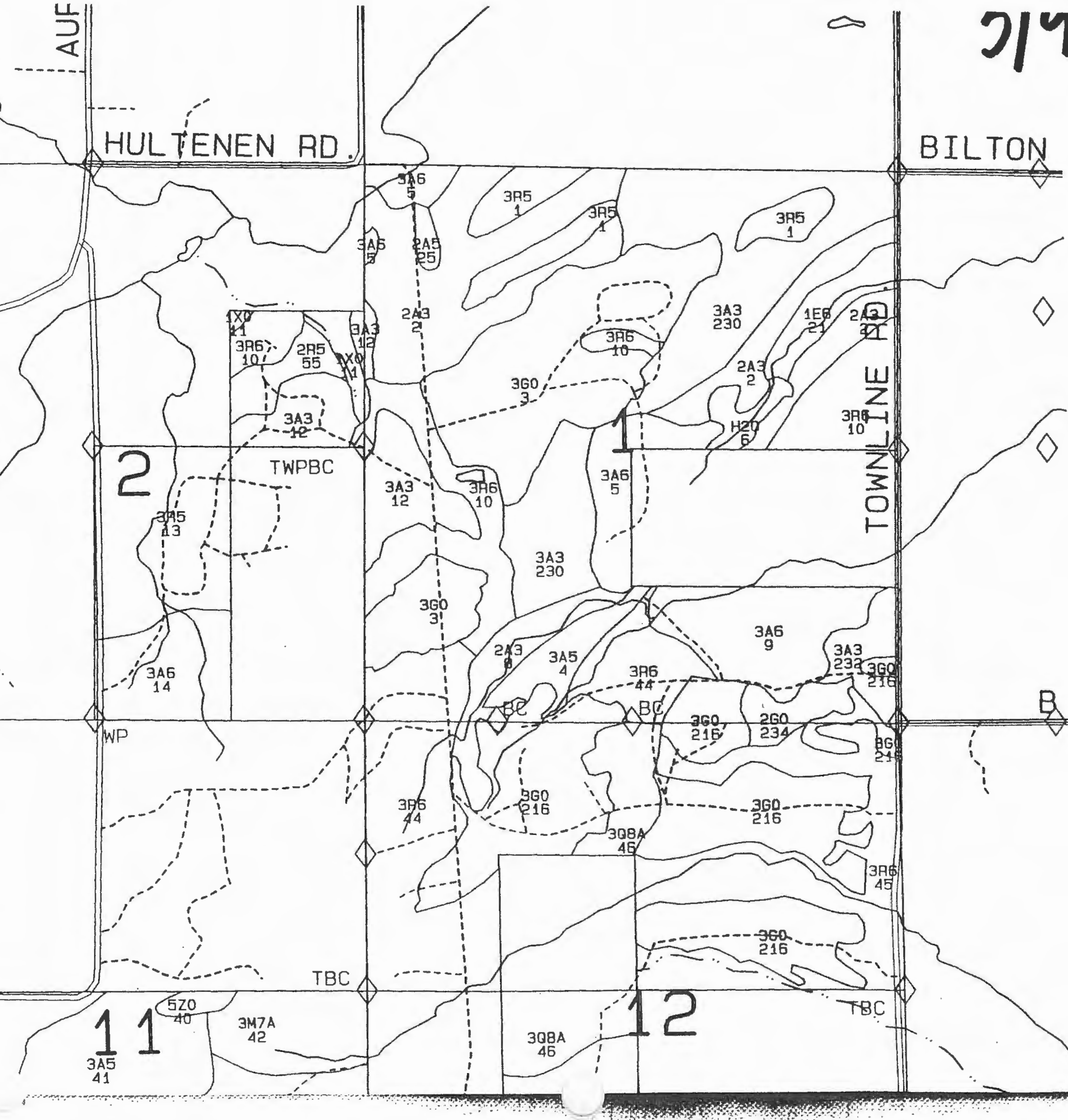


See Page 56 For Additional Names.



T51N, R32W
27
33
34
DAKOTA CR.
L032' PINERY
L032' PINERY
BCBT
TIP
TWPIP
TBT
ACCORD/ARSENAL/JOUST
3QTS 7/8/16 .5OZ.
LEGEND

7/44

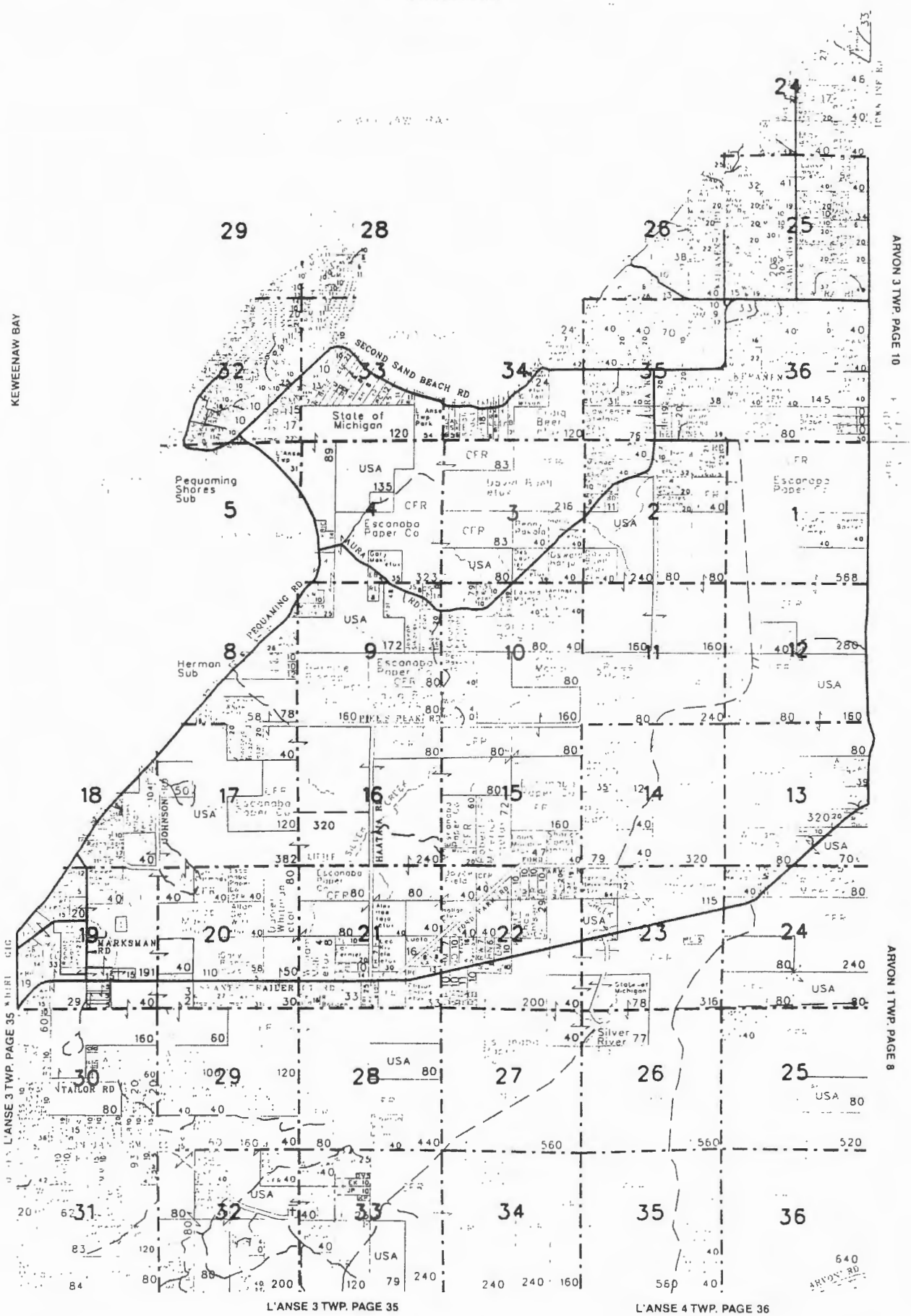


TURDON/
7QTS

ACCORD/
3QTS

T-51-52-N L'ANSE 7 PLAT R-32-W

(Landowners)



NHU554

MONSANTO MATERIAL SAFETY DATA

MONSANTO PRODUCT NAME
ACCORD® Herbicide

MONSANTO COMPANY
800 N. LINDBERGH
ST. LOUIS, MO 63167
Date Prepared: November, 1992
Emergency Ph. No. (Call Collect) (314) 694-4000

PRODUCT IDENTIFICATION

EPA Registration Number:	524-326
Synonyms:	None
Chemical Name:	Not Applicable, Formulated Product
Active Ingredient:	*Glyphosate, N-phosphonomethyl glycine, in the form of its isopropylamine salt 41.5%
Inert Ingredients:	..... 58.5%
	100.0%

*Contains 480 grams per liter or 4.0 pounds per U.S. gallon of the active ingredient glyphosate, N-(phosphonomethyl) glycine in the form of its isopropylamine salt. Equivalent to 356 grams per liter or 3 pounds per U.S. gallon of the acid, glyphosate.

CAS Reg. No.:	Not Applicable, Formulated Product
CAS Reg. No. Active Ingredient:	1071-83-6
DOT Proper Shipping Name:	Not Applicable
DOT Hazard Class/I.D. No.:	Not Applicable
DOT Label:	Not Applicable
Reportable Quantity (RQ) Under Clean Water Act:	Not Applicable
U.S. Surface Freight Classification:	Weed killing compound, N.O.I.B.N.

SARA Hazard Notification/Reporting

Section 302/304 - Emergency Planning and Release Notification: This product does NOT contain a listed extremely hazardous substance.

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370): Not Applicable

Section 313 Toxic Chemical(s): Not Applicable

Hazardous Chemical(s) Under OSHA Hazard Communication Standard: Not Applicable

---

WARNING STATEMENTS

Keep out of reach of children.
CAUTION!
MAY CAUSE EYE IRRITATION
REFORMULATION IS PROHIBITED
SEE CONTAINER LABEL FOR REPACKAGING LIMITATIONS

PRECAUTIONARY MEASURES

- Avoid contact with eyes, skin or clothing
- Wash thoroughly with soap and water after handling.
- Do not contaminate water when disposing of equipment washwaters. Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss can cause fish suffocation.

EMERGENCY AND FIRST AID PROCEDURES

First Aid:

If in Eyes: Flush with plenty of water for at least 15 minutes. Get medical attention.

If on Skin: Flush with plenty of water. Wash clothing before reuse.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Accord® herbicide does not present significant eye irritation or eye toxicity requiring special protection. Avoid eye contact as good industrial practice.

Skin Protection: Accord® herbicide does not present significant skin concern requiring special protection.

Respiratory Protection: Undiluted Product: Respiratory protection should not be required during the normal handling of undiluted product. However, if abnormal exposure to heavy sprays or mists of undiluted product is likely, the use of NIOSH/MSHA approved equipment for pesticide vapor/mist is recommended. The respiratory use limitations specified by NIOSH/MSHA or the manufacturer should be observed.

Diluted Product: Under typical application conditions with normal use dilutions (as specified in the label instructions) no respiratory protection should be required.

Ventilation: No special precautions are recommended.

Airborne Exposure Limits:

Product: **Accord® herbicide - 100% by weight:**

OSHA PEL/TWA: None established ACGIH TLV/TWA/STEL: None established

FIRE PROTECTION INFORMATION

Flash Point: >200°F **Method:** Tag Closed Cup

Extinguishing Media: Water spray, foam, dry chemical, CO_2, or other class B extinguishing agent.

Special Firefighting Procedures: Firefighters or others who may be exposed to mists or products of combustion should wear a self-contained breathing apparatus. Equipment should be thoroughly cleaned after use.

Unusual Fire and Explosion Hazards: None

REACTIVITY DATA

Stability: Stable for at least 5 years under normal conditions of warehouse storage. Heated facilities are not required. (See Storage, Spill/Leak & Disposal Information)

Incompatibility: Spray solutions of this product should be mixed, stored and applied only using stainless steel, aluminum, fiberglass, plastic and plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT USING GALVANIZED OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Hazardous Decomposition Products: None known.

Hazardous Polymerization: Does not occur. This product can react with caustic (basic) materials to liberate heat. This is not a polymerization but rather a chemical neutralization in an acid-base reaction.

HEALTH EFFECTS SUMMARY

The following information summarizes human experience and results of scientific investigations reviewed by health professionals for hazard evaluation of Accord® herbicide and development of Precautionary Statements and Occupational Control Procedures recommended in this document.

EFFECTS OF EXPOSURE

Inhalation and skin contact are expected to be the primary routes of occupational exposure to Accord® herbicide. Occupational exposure to this material has not been reported to cause significant adverse health effects. On the basis of available information, exposure to Accord® herbicide is not expected to produce significant adverse human effects when recommended safety precautions are followed.

TOXICOLOGICAL DATA

Data from laboratory studies conducted by Monsanto with Accord® herbicide or a product of similar composition are summarized below.

Oral -	Practically Non-toxic, (Rat LD_{50} - >5,000 mg/kg)
Dermal -	Practically Non-toxic, (Rabbit LD_{50} - >5000 mg/kg)
Inhalation -	No More Than Slightly Toxic (Rat 4-hr LC_{50} - >1.3 mg/L, the highest atmospheric concentration achievable in this study.)
Eye Irritation -	Nonirritating, (Rabbit, 0.0/110.0)
Skin Irritation -	Practically Nonirritating (Rabbit, 24-hr exposure, 0.1/8.0)

Additional toxicity information is available on glyphosate, the active herbicidal ingredient of ACCORD® herbicide. Following repeated exposures (90-days) to glyphosate in their feed, decreased weight gains were noted in mice, while no treatment-related effects occurred in rats. Following repeated skin exposure (3-weeks) to glyphosate, slight skin irritation was the primary effect observed in rabbits. No skin allergy was observed in guinea pigs following repeated skin exposure. There was not evidence of effects on the nervous system, including delayed effects in chickens (repeat oral doses) or cholinesterase inhibition in rats (single oral doses). Reduced body weight gain and effects on liver tissues were observed with long-term (2-year) feeding of glyphosate to mice. No adverse effects were observed in long-term feeding studies with rats (2-year) and dogs (1-year). Glyphosate did not produce tumors in any of these studies. **Based on the results from the chronic studies, EPA has classified glyphosate in Category E (evidence of non-carcinogenicity for humans).** No birth defects were noted in rats and rabbits given glyphosate orally during pregnancy, even at amounts which produced adverse effects on the mothers. No effects were seen on the ability of male or female rats to reproduce when fed glyphosate for three successive generations. Glyphosate has produced no genetic changes in a variety of standard tests using animals and animal or bacterial cells.

PHYSICAL DATA

Appearance:	Colorless solution
Odor:	Essentially odorless
pH:	4.6 - 4.8
Specific Gravity:	1.158 (Water = 1)

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specification items.

SPILL, LEAK & DISPOSAL INFORMATION

SPILL/LEAK:

Observe all protection and safety precautions when cleaning up spills -- see Occupational Control Procedures.

Liquid spills on floor or other impervious surfaces should be contained or diked, and should be absorbed with attapulgite, bentonite or other absorbent clays. Collect contaminated absorbent, place in plastic-lined metal drum and dispose of in accordance with instructions provided under DISPOSAL. Thoroughly scrub floor or other impervious surfaces with a strong industrial type detergent solution and rinse with water.

Liquid spills that soak into the ground should be dug up, placed in plastic-lined metal drums and disposed of in accordance with instructions provided under DISPOSAL.

Leaking containers should be separated from non-leakers and either the container or its contents transferred to a drum or other non-leaking container and disposed of in accordance with instructions provided under DISPOSAL. Any recovered spilled liquid should be similarly collected and disposed of.

Do not contaminate water, foodstuffs, seed or feed by storage or disposal.

DISPOSAL:

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, State or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

Do not reuse container. Triple rinse container, then puncture and dispose of in a sanitary landfill or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

STORAGE:

Store above 10°F (-12°C) to keep from crystallizing.

Crystals will settle to the bottom. If allowed to crystallize, place in a warm room 68°F (20°C) for several days to redissolve, and roll or shake container or recirculate in mini-bulk containers to mix well before using. For bulk containers, see container label.

ENVIRONMENTAL EFFECTS

96-hr LC_{50} Bluegill:	>1,000 mg/L, Practically Nontoxic
96-hr LC_{50} Trout:	>1,000 mg/L, Practically Nontoxic
96-hr TL_{50} Carp:	>1,000 mg/L, Practically Nontoxic
48-hr EC_{50} *Daphnia*:	930 mg/L, Practically Nontoxic

DATE: November, 1992 **SUPERSEDES:** March, 1992 **MSDS NO.:** S00011151

FOR ADDITIONAL NON-EMERGENCY INFORMATION, CALL: 1-800-323-1421

ARSENAL® herbicide

Applicators Concentrate

AMERICAN CYANAMID CO.
WAYNE, NJ 07470

MSDS NO. AG09021-5
CAS NO. 081510-83-0

MATERIAL SAFETY DATA SHEET

DATE: JAN 14, 1992

EMERGENCY TELEPHONE: (201)-835-3100 (U.S.A.)

PRODUCT IDENTIFICATION

TRADE NAME:	ARSENAL® Herbicide Applicators Concentrate
SYNONYMS:	2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl) nicotinic acid, salt with isopropylamine (1:1), 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid, salt with 2-propanamine (1:1); AC252,925; Imazapyr; Isopropylamine Salt; CL252,925
CHEMICAL FAMILY:	Imidazolinone
MOLECULAR FORMULA:	$C_{13}H_{15}N_3O_3.C_3H_9N$
MOLECULAR WEIGHT:	320.400
USAGE:	Herbicide

WARNING STATEMENTS

CAUTION. KEEP OUT OF REACH OF CHILDREN.
AVOID CONTACT WITH SKIN, EYES, AND CLOTHING.
AVOID BREATHING SPRAY MIST.

INGREDIENTS

COMPONENT	CAS. NO.	%	PEL/TLV
Inerts		46.90	None Establishe
Isopropylamine Salt of Imazapyr	081510-83-0	53.10	None Establishe

REFERENCE:		
	Inerts	None
	Isopropylamine Salt of Imazapyr	None

PHYSICAL PROPERTIES

APPEARANCE AND ODOR:	Clear green liquid with an ammonia/amine-like odor
BOILING POINT:	100°C (212°F)
MELTING POINT:	Not Applicable
VAPOR PRESSURE:	Similar to water
SPECIFIC GRAVITY:	1.11 - 1.12
VAPOR DENSITY:	Similar to water
% VOLATILITY (BY VOL.):	~45 by weight
OCTANOL / H_2O PARTITION COEF.:	1.3 [ai at 22°C]
PH:	5.5 - 7.5

(cont from pg. 1)

SATURATION IN AIR (BY VOL.):	Not Available
EVAPORATION RATE:	Not Available
SOLUBILITY IN WATER:	Miscible

FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT:	>210°F, >98.9°C (SETA closed cup)
FLAMMABLE LIMITS (% BY VOL.):	Not Applicable
AUTOIGNITION TEMP:	> 93°C (200°F)
DECOMPOSITION TEMP:	Not Available

FIRE EXTINGUISHING MEDIA:
Use water, alcohol foam, dry chemical or carbon dioxide to extinguish fires.

FIRE CONTROL TACTICS:
Wear self-contained, positive pressure breathing apparatus and full fire fighting protective clothing.

Keep unnecessary people away. Use as little water as possible. Dike area of fire to prevent pesticide run-off. Use spray or fog - solid stream may cause spreading.

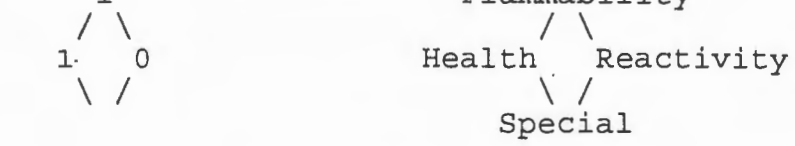
Do not decontaminate personnel or equipment, or handle broken packages or containers without protective equipment as specified in the Exposure Control Section. Decontaminate emergency personnel with soap and water before leaving the fire area.

Avoid breathing dusts, vapors and fumes from burning materials. Control run-off water - if water enters a drainage system, advise the authorities downstream.

NFPA HAZARD RATING

(As Recommended by American Cyanamid Co.)

0 Least
1 Slight
2 Moderate
3 High
4 Severe



REACTIVITY DATA

STABILITY:	Stable
CONDITIONS TO AVOID:	Strong oxidizing agents and alkalies.
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Strong oxidizing agents and alkalies. Corrosive to mild steel and brass.
HAZARDOUS DECOMPOSITION PRODUCTS:	Combustion may produce oxides of carbon and nitrogen.

HEALTH HAZARD INFORMATION

TOXICITY DATA AND
EFFECTS OF OVEREXPOSURE:

ACUTE TOXICITY DATA:
The oral LD_{50} for both male and female albino rats is greater than 5000 mg/kg indicating that this product is practically non-toxic by ingestion in single doses.

The dermal LD_{50} for both male and female albino rabbits is greater than 2000 mg/kg indicating that this product is no more than slightly toxic by single skin applications.

The product is not irritating to the rabbit eye but it is mildly irritating to the rabbit skin.

CHRONIC TOXICITY DATA:
Mutagenicity:

No mutagenic activity was observed in ARSENAL Technical (Imazapyr) by all test methods used. These included unscheduled DNA Synthesis Rat Hepatocyte Assay, in vitro Chinese Hamster Ovary (CHO)/Hypoxanthine Guanine Phoshporiboxyl Transferase (HGPRT) Mutation Assay, Bacterial/Microsome Reverse Mutation (Ames) Test and in vitro Chromosomal Aberrations in Chinese Hamster Ovary Cells.

Teratogenicity:

No teratogenic or fetotoxic effects were found at all dose levels tested in both rats and rabbits.

Carcinogenicity:

No oncogenic effects were observed at all dose levels tested in mice, rats and purebred beagle dogs.

Imazapyr is not listed as a human carcinogen by the IARC, OSHA or NTP.

Isopropylamine salt of Imazapyr present in this formulation is not listed as a human carcinogen by the IARC, OSHA or NTP.

EMERGENCY AND FIRST AID PROCEDURES:

IF ON SKIN: Wash with plenty of soap and water. Get medical attention if irritation persists.

IF IN EYES: Flush with plenty of water. Get medical attention if irritation persists.

IF SWALLOWED: Drink two glasses of water, induce

(cont from pg. 3) vomiting if the person is conscious. Obtain medical attention promptly.

IF INHALED: Remove to fresh air.

NOTES TO PHYSICIAN:
There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

MEDICAL CONDITION AGGRAVATED BY OVEREXPOSURE:
A knowledge of the available toxicology information and of the physical and chemical properties of the material suggest that overexposure is unlikely to aggravate existing medical conditions.

EXPOSURE CONTROL METHODS

During formulation of this product, use the following recommended industrial hygiene practices:

Wear chemical splash goggles to prevent contact with the eyes. If face-shield is used for protection, chemical splash goggles are still needed to protect the eyes.

Wear rubber gloves and apron to prevent contact with the skin. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

For end-users, refer to product label for personal protective clothing/equipment.

SPILL OR LEAK PROCEDURES

Absorb with an inert material such as clay or sawdust. Shovel into a metal container which can be sealed.

WASTE DISPOSAL: Dispose in accord with local, state, and federal regulations.

SPECIAL PRECAUTIONS

HANDLING AND STORAGE:
Because of this material's flash point, areas containing this material should conform to the codes, such as NFPA 30 and NFPA 70, governing Class III combustible liquids.

Do not contaminate water, food, or feed by storage or disposal. Store in a secure, dry, well-ventilated separate room, building or covered area.

Not for use or storage in or around the home.

Keep away from sources of ignition and protect from exposure to fire and heat.

Segregate from oxidizers and incompatible materials listed in the Reactivity Data Section.

ADDITIONAL REGULATORY INFORMATION

SARA Title III Data

Section 311 and 312 Hazard Categories

Immediate Health Hazard	- Y	Reactive Hazard	- N
Delayed Health Hazard	- N	Sudden Pressure Release Hazard	- N
Fire Hazard	- N		

Section 302 Extremely Hazardous Substances - None

Section 313 Toxic Chemicals - None

CERCLA Reportable Quantity

None

APPENDIX

ARSENAL® is a registered trademark of the American Cyanamid Company.

The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of ar information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE.

Last Revision Date: 3/26/90

SOURCE AND DATE INFORMATION SHEET NO.: AG09021-5
DATE: JAN 14, 1992

NHD540

Material Safety Data Sheet

DowElanco

TORDON* 101 Mixture

Weed And Brush Killer (Private Label)

Emergency Phone: 517-636-4400
General Phone: 1-800-352-6776

EPA Reg. Phone: 62719-5
Effective Date: May 5, 1994
Product Code: 87229
MSDS Number: 000381
DowElanco • Indianapolis, IN 46268

1. INGREDIENTS: (% w/w, unless otherwise noted)

4-Amino-3,5,6-trichloropicolinic acid, (picloram) triisopropanolamine salt
CAS# 006753-47-5 .....10.2%

2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt
CAS# 032341-80-3 .....39.6%

Other ingredients, total, including: 50.2%
Water . . . CAS# 007732-18-5
Isopropanol . . . CAS# 000067-63-0
Proprietary surfactant
Triisopropanolamine . . . CAS# 000122-20-3

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: IBP >180°F, 82°C

VAPOR PRESSURE: Approx. 32 mmHg @ 20°C

VAPOR DENSITY: Not determ.

SOLUBILITY IN WATER: Infinite

SPECIFIC GRAVITY: 1.143 68/68°F, 20°C

APPEARANCE: Dark brown liquid.

ODOR: Not available.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: 114°F, 46°C

METHOD USED: TCC

FLAMMABLE LIMITS:
LFL: Not determined
UFL: Not determined

EXTINGUISHING MEDIA: Water fog, alcohol foam, CO2, dry chemical.

FIRE & EXPLOSION HAZARDS: Autoignition temperature 698F, 370C. Toxic, irritating vapors may be formed if product is involved in fire.

FIRE-FIGHTING EQUIPMENT: Wear positive-pressure, self-contained breathing apparatus and full protective clothing. Do not allow water from fire fighting to enter domestic or irrigation water supplies.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Combustible. Keep away from heat, open flames and sparks.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) None under normal use conditions. Under abnormal conditions avoid oxidizing materials and strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen chloride and nitrogen oxides may be formed if product is involved in fire.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ENVIRONMENTAL DATA: Drift or runoff may adversely affect nontarget plants. For terrestrial uses, do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters. Read the product label for additional Environmental Hazards.

ACTION TO TAKE FOR SPILLS/LEAKS: Absorb small spills with inert material such as dry sand. In case of large spills, dike area to contain. Consult manufacturer for clean-up.

DISPOSAL METHOD: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of federal law and may contaminate groundwater. If these wastes cannot be used according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA regional office for guidance.

6. HEALTH HAZARD DATA:

EYE: May cause moderate eye irritation which may be slow to heal. May cause slight transient(temporary) corneal injury.

SKIN CONTACT: Prolonged or repeated exposure may cause skin irritation, even a burn. May cause allergic skin reaction in susceptible individuals.

SKIN ABSORPTION: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The LD50 for skin absorption in rabbits is greater than 2000 mg/kg.

*Trademark of DowElanco

DowElanco

TORDON* 101 Mixture

Weed And Brush Killer (Private Label)

Emergency Phone: 517-636-4400
General Phone: 1-800-352-6776

EPA Reg. Phone: 62719-5
Effective Date: May 5, 1994
Product Code: 87229
MSDS Number: 000381
DowElanco • Indianapolis, IN 46268

INGESTION: Single dose oral toxicity is low. The LD50 for male rats and female rats is 2598 mg/kg. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury. Ingestion may cause gastrointestinal irritation or ulceration.

INHALATION: Excessive exposure to isopropyl alcohol (a minor component) may cause eye, nose and throat irritation at around 400 ppm (the TLV concentration), and with prolonged (hours)and progressively higher levels, incoordination, confusion, hypotension, hypothermia, circulatory collapse, respiratory arrest and even death may occur.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Excessive exposure may cause liver, kidney, gastrointestinal, central nervous system and muscular effects. Signs and symptoms of excessive exposure may be nausea, vomiting, abdominal cramps, and/or diarrhea. Central nervous system (CNS) effects would not be likely unless there is excessive exposure to the most volatile (but minor) component of this formulation—isopropanol. Observations in animals include middle ear lining damage upon exposure to vapors of isopropanol.

CANCER INFORMATION: Various animal cancer tests have shown no reliably positive association between 2,4-D exposure and cancer. Epidemiology studies on herbicide use have been both positive and negative, with the majority being negative. Picloram did not cause cancer in long-term animal studies.

TERATOLOGY (BIRTH DEFECTS): 2,4-D has caused birth defects in laboratory animals only at doses toxic to the mother (severe maternal toxicity). For picloram TIPA, birth defects are unlikely. Even exposures having an adverse effect on the mother should have no effect on the fetus. Isopropyl alcohol at extremely high concentrations (17 times the TLV) has been reported to cause birth defects and fetal toxicity in rats. At lower concentrations there were no effects on the fetus.

REPRODUCTIVE EFFECTS: In animal studies, picloram has been shown not to interfere with reproduction. Excessive dietary levels of 2,4-D caused decreased weight and survival in offspring in a rat reproduction study.

MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): Results of in vitro (test tube) mutagenicity tests have been inconclusive. (various components). Results of mutagenicity tests in animals have been inconclusive (various components).

7. FIRST AID:

EYES: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention promptly.

SKIN: Flush skin with plenty of water. Get medical attention if irritation persists.

INGESTION: Induce vomiting immediatley by giving two glasses of water and sticking finger down throat. Call physician. Do not induce vomiting or give anything by mouth to an unconcious person.

INHALATION: Remove individual to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: If burn is present, treat as any thermal burn, after decontamination.
No specific antidote.
Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINES: None established for 2,4-D triisopropanolamine salt. The ACGIH TLV and OSHA PEL are 10 mg/m3 for 2,4-D acid.
None established for picloram triisopropanolamine salt; for picloram as the acid, the ACGIH TLV is 10 mg/m3 and the OSHA PEL is 10 mg/m3 total dust, 5 mg/m3 respirable.
The ACGIH TLV and OSHA PEL are 400 ppm TWA, 500 ppm STEL for isopropanol.
The Dow Industrial Hygiene Guide is 2 mg/m3 for the proprietary surfactant.
PEL's are in accord with those recommended by OSHA, as in the 1989 revision of PEL's.

VENTILATION: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator.

SKIN PROTECTION: SKIN PROTECTION: For handling prior to end-use of this product, no precautions other than clean body-covering clothing should be needed for brief contact. When prolonged or frequently-repeated contact could occur, use protective clothing impervious to this product. Selection of specific items such as faceshield, boots, gloves, apron, or full-body suit will depend on operation.
For handling relative to end-use of this product, the Worker Protection Standard of 1993 requires that applicators and other handlers, including persons repairing or cleaning equipment, must wear long-sleeved shirt and

DowElanco

TORDON* 101 Mixture

Weed And Brush Killer (Private Label)

Emergency Phone: 517-636-4400
General Phone: 1-800-352-6776

EPA Reg. Phone: 62719-5
Effective Date: May 5, 1994
Product Code: 87229
MSDS Number: 000381
DowElanco • Indianapolis, IN 46268

long pants; chemical-resistant gloves such as Barrier Laminate, Butyl Rubber, Neoprene Rubber, Natural Rubber, Polyvinyl Chloride (PVC), or Viton; and shoes and socks.
For containers of over 1 gallon but less than 5 gallons, persons engaged in pouring this product must also wear coveralls or chemical-resistant apron.
Users should remove personal protective equipment (PPE) immediately after handling this product. Wash the outside of gloves before removing. After work, remove all clothing, shower using soap and water, and change into clean clothing. Launder clothing worn during mixing, loading, application, or cleaning and repairing equipment before reuse.
Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.
Follow manufacturer's instructions for cleaning/maintaining PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

EYE PROTECTION: For handling prior to end-use, such as during manufacturing, wear chemical goggles. If vapor exposure causes eye discomfort, use a full-face respirator.
For handling relative to end-use, applicators and other handlers must wear protective eyewear, such as face shield or safety glasses (brow or temple protection is recommended). Eye protection is not required for ground or aerial applicators in completely enclosed cabs or cockpits.

9. ADDITIONAL INFORMATION:

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep out of reach of children.
Causes substantial but temporary eye injury.
Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals.
Harmful if swallowed or absorbed through the skin. Do not get in eyes, on skin, or on clothing.
Users should wash hands, face, and arms with soap and water as soon as possible after mixing, loading, or applying this product and before eating, smoking, or drinking. Wash hands and arms before using the toilet.
For handling relative to end-use of this product, read the product label for further information concerning the use of personal protective equipment (PPE) under the Worker Protection Standard of 1993.
Combustible. Do not use or store near heat or open flame. Do not contaminate water, food, or feed by storage or disposal.

MSDS STATUS: Revised sections 3,4,5,8,9, and regsheet.

REGULATORY INFORMATION:

(Not meant to be all-inclusive—selected regulations represented).

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See MSD Sheet for health and safety information.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:
An immediate health hazard
A delayed health hazard
A fire hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in Section 1 of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
Isopropyl alcohol	000067-63-0	NJ1 , NJ3, PA1 , PA3
Triisopropanolamine	000122-20-3	PA1

NJ1=New Jersey Special Health Hazard Substance (present at greater than or equal to 0.1%).
NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).
PA1=Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).
PA3=Pennsylvania Environmental Hazardous Substance (present at greater than or equal to 1.0%).

(continued on next page)

DowElanco

TORDON* 101 Mixture

Weed And Brush Killer (Private Label)

Emergency Phone: 517-636-4400
General Phone: 1-800-352-6776

EPA Reg. Phone: 62719-5
Effective Date: May 5, 1994
Product Code: 87229
MSDS Number: 000381
DowElanco • Indianapolis, IN 46268

OSHA HAZARD COMMUNICATION STANDARD:
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

Category	**Rating**
Health	2
Flammability	2
Reactivity	0

NHD 338 # 71

DU PONT

MSDS MATERIAL SAFETY DATA SHEET

Du Pont Agricultural Products

M0000028 Revised 19-NOV-1994 Printed 15-FEB-1995

"Oust" Herbicide

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification
"Oust" is a registered trademark of DuPont.

Corporate MSDS Number DU003048

Company Identification
MANUFACTURER/DISTRIBUTOR
DuPont
1007 MARKET STREET
WILMINGTON, DE 19898

PHONE NUMBERS
Product Information 1-800-441-7515
Transport Emergency CHEMTREC 1-800-424-9300
Medical Emergency 1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
SULFOMETURON METHYL	74222-97-2	75
(METHYL 2-[[[[(4,6-DIMETHYL-2-PYRIMIDINYL)- AMINO]CARBONYL]AMINO]SULFONYL]BENZOATE)		
INERT INGREDIENTS		25

HAZARDS IDENTIFICATION

Potential Health Effects

CAUTION! May irritate eyes, nose, throat and skin.

ROUTES OF EXPOSURE AND EFFECTS

Acute Oral LD50: >5,000 mg/kg (rat)

(Continued)

#338

Oust

HAZARDS IDENTIFICATION (Continued)

Very low order of toxicity.

Acute Dermal LD50: > 8,000 mg/kg (rabbit) males
> 2,000 mg/kg (rabbit) females
Slight to moderate order of toxicity.

SKIN IRRITATION AND SENSITIZATION

Not a primary skin irritant; not a sensitizer

EYE IRRITATION

Mild transient conjunctival irritation with slight corneal cloudiness and no irritic effects. Eyes were normal within 3-4 days.

INHALATION

4 hour LC50 (rat): 5mg/L
Moderate order of toxicity.

CHRONIC STUDIES - SULFOMETURON METHYL

The effects in animals from single exposure by ingestion include nonspecific clinical changes. Repeated exposures of high doses resulted in decreased body weight gain, liver changes, and red blood cell hemolysis. Long term exposure caused mild hemolytic anemia, decreased body weight, alteration of clinical chemical parameters, and changes in the bile duct.

Animal testing indicates that this compound does not have carcinogenic effects. Developmental toxicity was observed but only at maternally toxic dose levels. In a two generation rat reproduction study, decreased numbers of pups were observed at the 5,000 ppm level, a dose that was also maternally toxic. There were no effects on fertility and no reproductive effects were observed at 500 ppm.

The compound does not produce genetic damage in any of four tests conducted in bacterial and mammalian cell cultures.

HUMAN HEALTH EFFECTS

Overexposure by skin contact may initially include: skin irritation with discomfort or rash. Eye contact may initially include: eye irritation with discomfort, tearing, or blurring of vision.

Based on data from animal studies higher exposures may lead to these effects: red blood cell destruction.

Significant skin permeation, and systemic toxicity, after contact appears unlikely. There are no reports of human

(Continued)

HAZARDS IDENTIFICATION(Continued)

sensitization.

Carcinogenicity Information
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid
INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Flush skin with water after excessive contact.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

No specific intervention is indicated as compound is not likely to be hazardous by ingestion. Consult a physician if necessary.

FIRE FIGHTING MEASURES

Flammable Properties
Flammable limits in Air, % by Volume
LEL 0.092 g/L

Not a fire or explosion hazard.

Like most organic powders or crystals, under severe dusting conditions, this material may form explosive mixtures in air.

Extinguishing Media
Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions
Wear self-contained breathing apparatus. Wear full protective equipment. Use water spray. Runoff from fire control may be a pollution hazard.

If area is heavily exposed to fire and if conditions permit, let fire burn itself out since water may increase the contamination hazard.

(Continued)

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)
NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment
Dike spill. Prevent material from entering sewers, waterways, or low areas.

Spill Clean Up
Shovel or sweep up.

Accidental Release Measures
If spill area is on ground used to produce crops or other valuble vegetation, or if area is adjacent to water used for irrigation, remove soil to depth of spill wetting.

HANDLING AND STORAGE

Handling (Personnel)
Avoid breathing vapors or mist. Avoid breathing dust. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material.

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Handling (Physical Aspects)
Keep away from heat, sparks and flames.

Storage
Store in a well ventilated place.

Do not contaminate water, other pesticides, fertilizers, food or feed in storage.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls
Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment
Always follow label instructions when using this product.

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants
- Waterproof gloves
- Shoes plus socks

Follow manufacturer's instructions for cleaning. maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other

(Continued)

EXPOSURE CONTROLS/PERSONAL PROTECTION(Continued)

laundry.

PPE required for early entry into treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:
Coveralls
Waterproof gloves
Shoes plus socks

 # Exposure Guidelines

Applicable Exposure Limits

SULFOMETURON METHYL

PEL	(OSHA)	None Established
TLV	(ACGIH)	5 mg/m3, 8 Hr. TWA, A4
AEL *	(Du Pont)	10 mg/m3, 8 & 12 Hr. TWA total dust

* AEL is Du Pont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Solubility in Water	Dispersible
Odor	None
Form	Solid, dry flowable
Color	Off-white
Bulk Density (Loose)	33 lb/cu ft
Bulk Density (Packed)	39 lb/cu ft

STABILITY AND REACTIVITY

Chemical Stability
Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials
None reasonably foreseeable.

Decomposition
Decomposition will not occur.

Polymerization
Polymerization will not occur.

(Continued)

ECOLOGICAL INFORMATION

Ecotoxicological Information
Aquatic Toxicity

Sulfometuron Methyl

96 hour LC50, rainbow trout: >12.5 ppm

Environmental Toxicity

Oral LC50, mallard ducks: >5,000 ppm
Oral LC50, bobwhite quail: >5,620 ppm

DISPOSAL CONSIDERATIONS

Waste Disposal
Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

Do not contaminate water, food or feed by disposal. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal
Triple rinse (or equivalent) the container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

TRANSPORTATION INFORMATION

Shipping Information
DOT/IMO
Proper Shipping Name NOT REGULATED

REGULATORY INFORMATION

U.S. Federal Regulations
TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
Fire : No
Reactivity : No
Pressure : No

(Continued)

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating	
Health	1
Flammability	1
Reactivity	0

NPCA-HMIS Rating	
Health	1
Flammability	1
Reactivity	0

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

This product is registered under EPA/FIFRA regulations.
The EPA Reg. No. is 352-401

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS	Du Pont
Address	Agricultural Products Wilmington, DE 19898
Telephone	800-441-7515

# Indicates updated section.

End of MSDS

MeadWestvaco Corporation
Post Office Box 100
Champion, MI 49814

Forestry Division
tel 906 339 2281
fax 906 339 4126

MeadWestvaco

Eric Oliphant
BIA Forestry
P.O. Box 637
Baraga, MI 49908

September 4, 2002

Dear Eric:

Next week, MeadWestvaco will be involved in a herbicide spray operation within the Keweenaw Bay Indian Community's reservation boundaries. Enclosed you will find copies of MeadWestvaco type maps of the spray areas as well as copies of plat book pages showing the general areas we will spray. These areas will be sprayed with a helicopter unit. Our helipad will be in the Dynamite Hill pit.

During this spray session, we will spray Dupont GLYPHOSATE VMF. This is a release herbicide which will rid the site of raspberry, cherry, grasses, and will slow the growth of stump sprout maple. When sprayed after the red pine dormancy, it will not hurt red pine. We spray this at a rate of 1.5 quarts per acre. Enclosed is an MSDS for Glyphosate vmf, and a label copy of the "Directions for use" pamphlet. If you have any questions regarding this spray operation, please call me.

It looks like we may be spraying these sites the week of September 9 – 13, 2002. When I find out a more exact time, I'll call you in case you would like to observe the operation. If you have any questions, my office number is (906)-339-2281 ext. 14, or my truck phone number is 630-2749.

If anyone else needs this information, could you make sure they either see this copy, or if need be, I'll send them copies of this also. Please just let me know if you need me to send other copies.

Thank you very much.

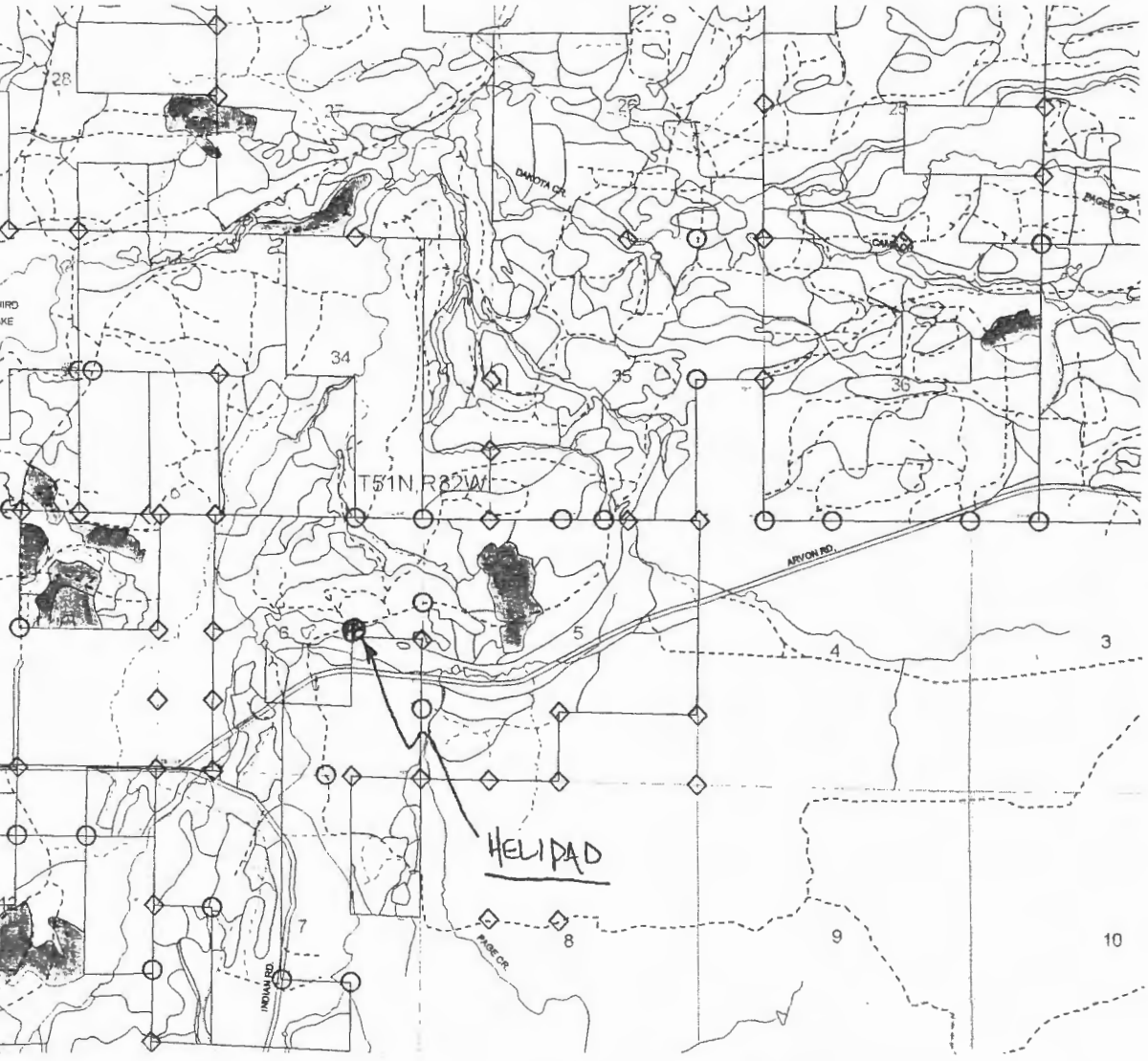
Sincerely,

Stephen R. Nelson

Stephen R. Nelson
West Area Regeneration Forester

Enc.

MEADWESTVACO FALL GLYPHOSATE SPRAY WITHIN TRIBAL BOUDARIES



Painted Lines
- Cutting Line
- Property Line
- Stream/Lake Buffer

Roads and Streams
- Class A Roads
- Rail Roads
- Piplines and Powerl
- County Roads
- Summer Woods Rds
- Winter Woods Rds
- Intermittent Streams
- Perrenial Streams
- QuickMap Buffers

QuickMap Stands
- Clear Cut
- Shelterwood
- Select Cut
- No Cut
- Unclassified

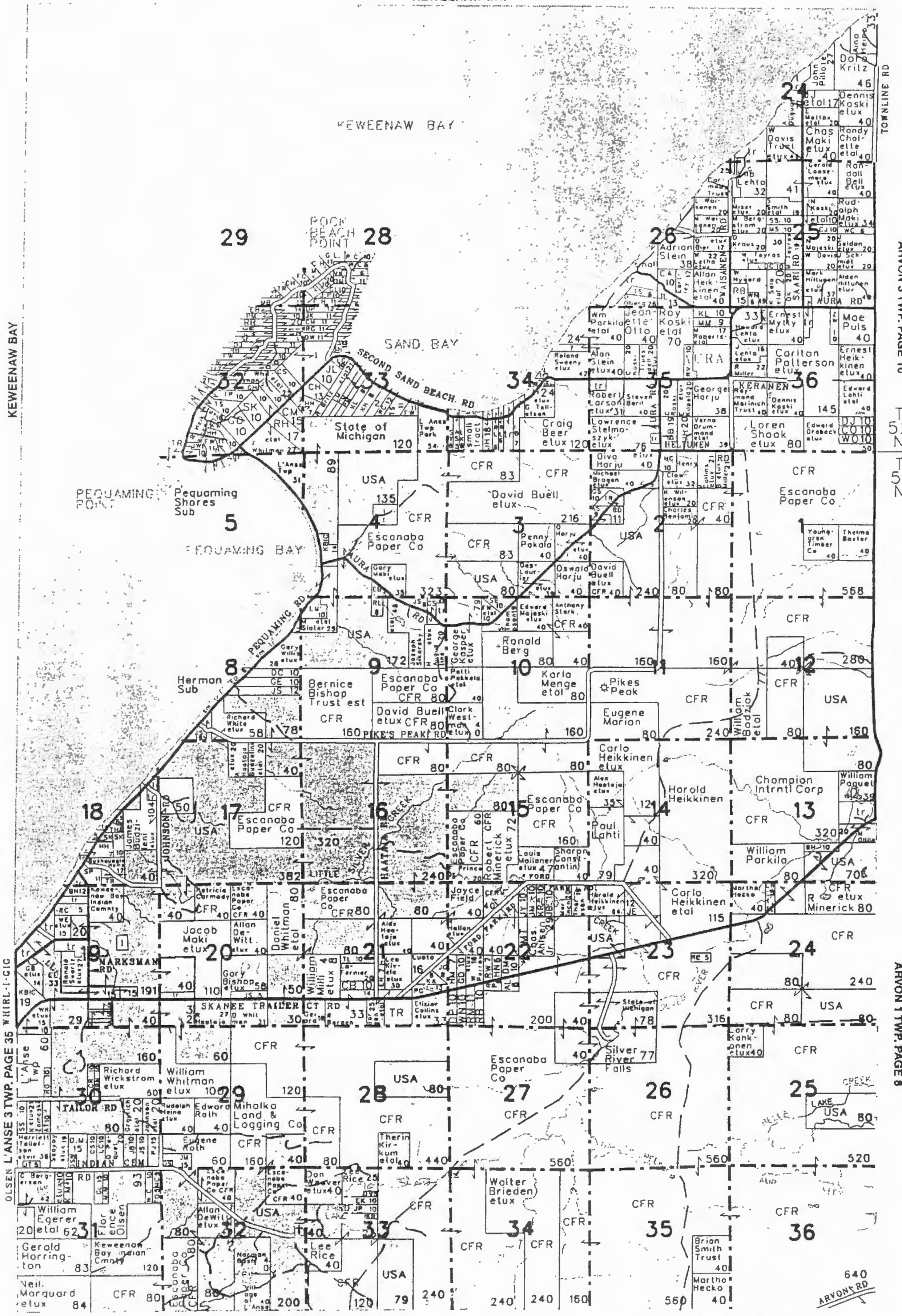
N
W E
S

0 1 2 Miles

PLANTATIONS TO BE SPRAYED W/ GLYPHOSATE VMF

L'ANSE 7 PLAT

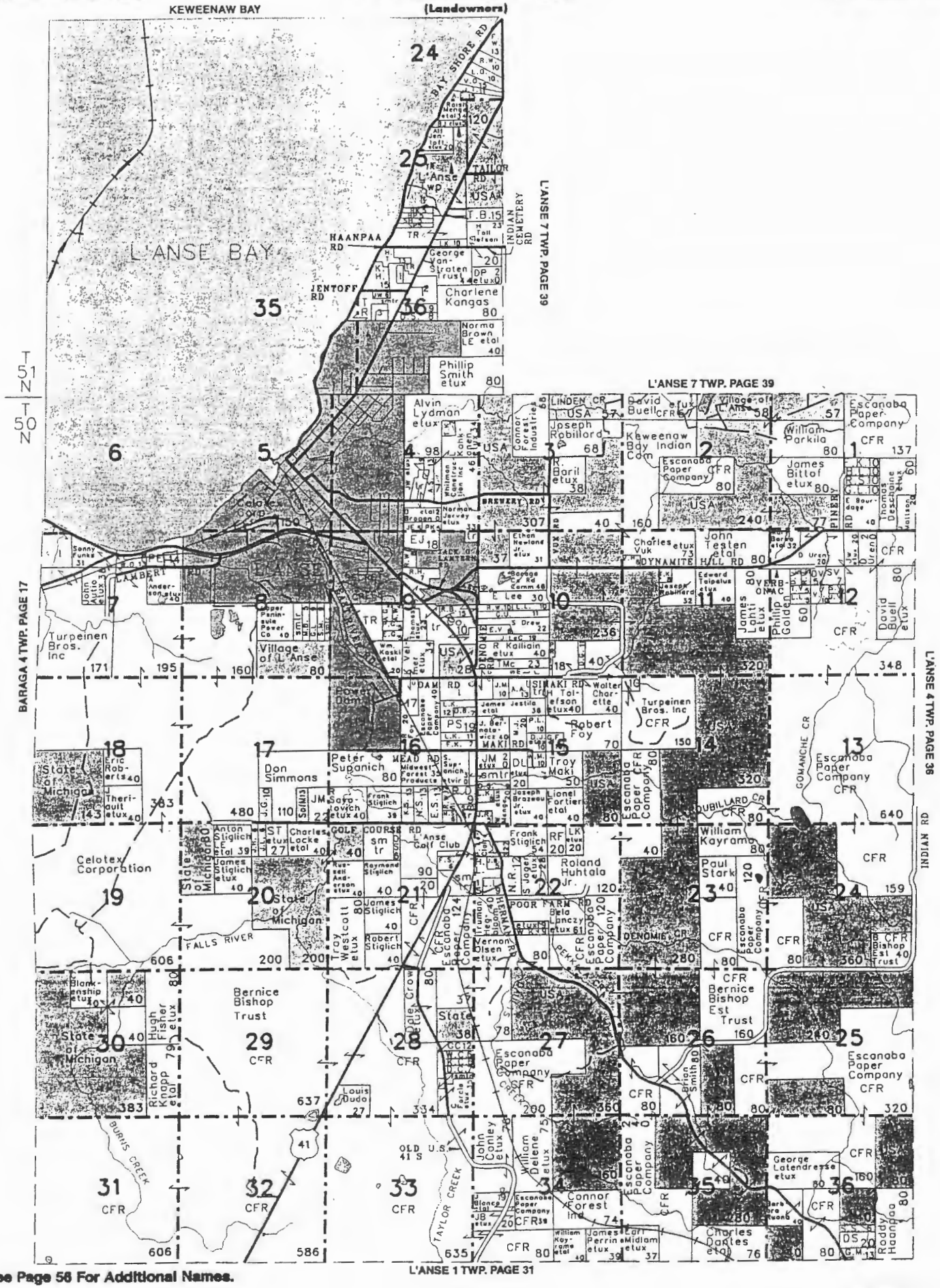
(Landowners)



L'ANSE 3 TWP. PAGE 35 L'ANSE 4 TWP. PAGE 36

T-50-51-N L'ANSE 3 PLAT R-33-W

(Landowners)

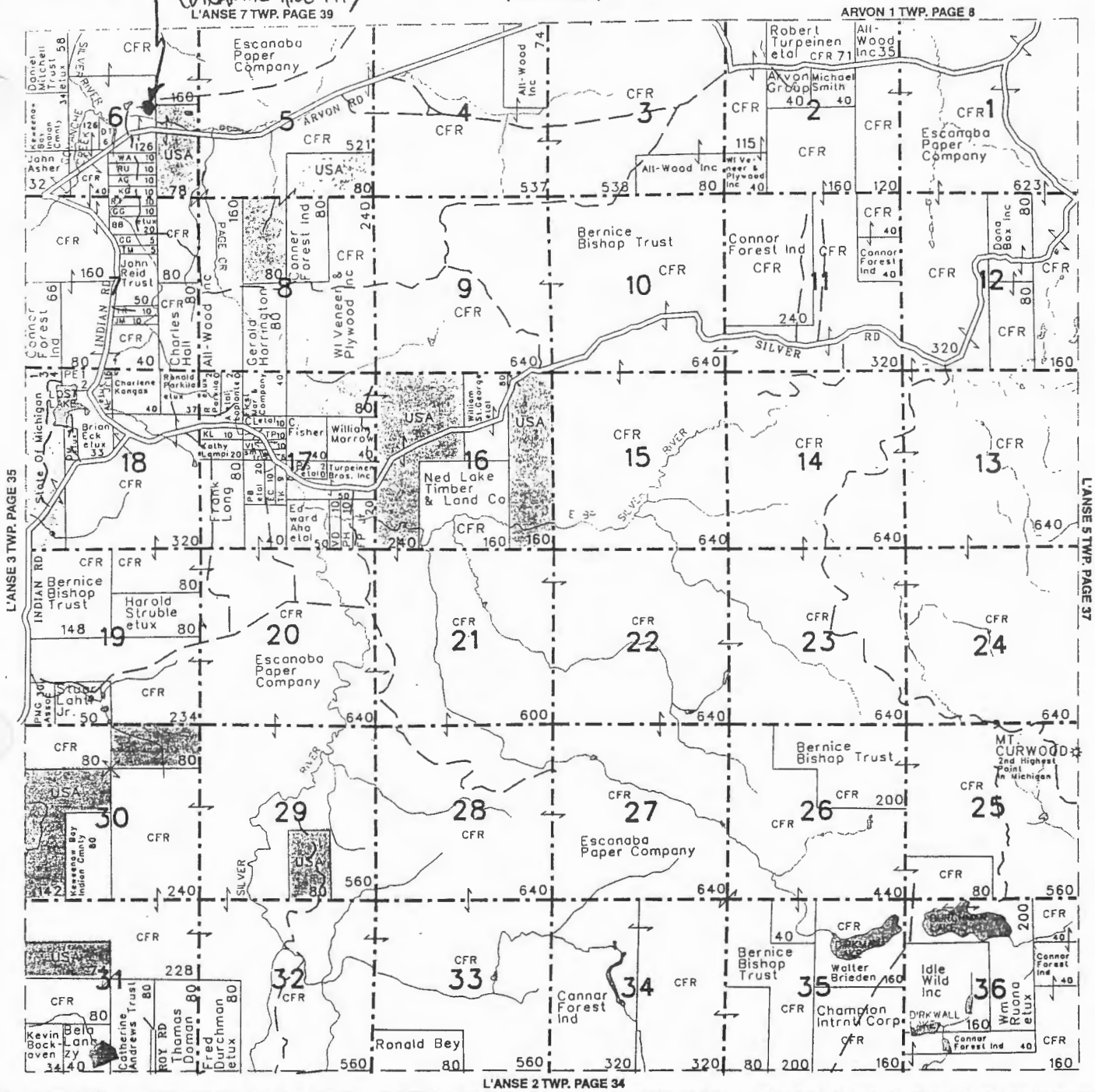


See Page 58 For Additional Names.

T-50-N L'ANSE 4 PLAT R-32-W

(Landowners)

HELIPAD (DYNAMITE HILL PIT)



See Page 56 For Additional Names.

The MSDS format adheres to U.S. standards and regulatory requirements and may not meet regulatory requirements in other countries.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience are gained.

" DuPont " GLYPHOSATE VMF HERBICIDE

M0000453 Revised 1-FEB-2001 Printed 8-FEB-2001

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515
Transport Emergency : CHEMTREC 1-800-424-9300
Medical Emergency : 1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
GLYPHOSATE Glyphosate, N-(phosphonomethyl)glycine, in the forms of its isopropylamine salt	1071-83-6	53.8
Inert Ingredients		46.2

HAZARDS IDENTIFICATION

Emergency Overview

APPEARANCE AND ODOR: Clear, viscous amber-colored solution

CAUTION STATEMENTS:
Keep out of the reach of children.

CAUTION!
CAUSES SUBSTANTIAL BUT TEMPORARY EYE INJURY.
HARMFUL IF SWALLOWED OR INHALED.
Do not get in eyes or on clothing.
Avoid breathing vapor or spray mist.

Potential Health Effects

EYE

May cause pain, redness and tearing based on toxicity studies.

SKIN

No more than slightly toxic and no more than slightly irritating based on toxicity studies.

INGESTION

No more than slightly toxic based on toxicity studies. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed. Ingestion of similar formulations has been reported to produce gastrointestinal discomfort with irritation of the mouth, nausea, vomiting and diarrhea. Oral ingestion of large quantities of one similar product has been reported to result in hypotension and lung edema.

INHALATION

No more than slightly toxic if inhaled based on toxicity studies.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Flush skin with water after contact. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point

This material is not combustable as tested by the Tag Cup Test.

Extinguishing Media

Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Wear self-contained breathing apparatus. Wear full protective equipment.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Spill Clean Up

Small Spills - For a spill less than one gallon on floor or other impervious surface, soak up with towels or other absorbent material and discard in the trash. Clean the spill area with soap and water and rinse the area thoroughly.

Large liquid spills - on the floor or other impervious surface should be contained or diked and then absorbed with attapulgite, bentonite or other absorbent clays. Collect the contaiminated absorbent, place in a metal drum and dipsose of in accordance with the instructions provided under Disposal. Thoroughly scrub floor or other impervious surface with a strong industrial detergent and rinse with water.

Large spills that soak into the ground should be dug up, placed in metal drums and disposed of in accordance with instructions provided under Disposal. Contact appropriate state agency when considering a land spreading disposal option.

Leaking containers should be separated from non-leakers and either the container or its contents transferred to a drum or other non-leaking container and disposed of in accordance with instructions provided under Disposal. Any recovered spilled liquid should be similarly collected and disposed of.

HANDLING AND STORAGE

Handling (Personnel)

Do not get in eyes, on skin or clothing. Avoid breathing vapors or mist. Wash thoroughly after handling. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material. Wash clothing after use.

Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss can cause fish suffocation.

Handling (Physical Aspects)

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark.

Do not contaminate water when disposing of equipment washwaters.

Storage

Store above 10 degrees F(-12 degrees C) to keep from crystallizing. Crystals will settle to the bottom. If allowed to crystallize, place in a warm room at 68 degrees F(20 degrees C) for several days to redissolve and mix well before using. Do not contaminate water, foodstuff, feed or seed by storage or disposal.
[EOB]

EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment

EYE/FACE PROTECTION: Wear safety glasses or coverall chemical splash goggles.

RESPIRATORS: Where there is potential for airborne exposures in excess of applicable limits, wear NIOSH approved respiratory protection.

PROTECTIVE CLOTHING: Where there is potential for skin contact have available and wear as appropriate impervious gloves, apron, pants, and jacket.

RESPIRATORS: Wear a NIOSH approved respirator if there is potential for exposure to airborne dusts, mists or vapors.

Ventilation: No special precautions are recommended.

Exposure Guidelines

Exposure Limits

" DuPont " GLYPHOSATE VMF HERBICIDE

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: None Established

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Color	: Colorless.
Form	: Liquid.
Odor	: Odorless.
pH	: 4.6-4.8
Specific Gravity	: 1.22-1.25 (water=1)

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Conditions to Avoid

Store above 10 degrees F (-12 degrees C) to keep from crystallizing.

Incompatibility with Other Materials

Spray solutions of this product should be mixed, stored, or applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined containers.

Do not mix, store or apply this product or spray solutions of the product in galvanized or unlined steel (except stainless steel) containers or spray tanks. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Polymerization

Does not occur. This product can react with caustic (basic_ materials to liberate heat. This is not a polymerization but rather a chemial neutralization in an acid base reaction.

TOXICOLOGICAL INFORMATION

Animal Data

TOXICOLOGICAL DATA:
Data from laboratory studies conducted by Monsanto with Rodeo(R) Emerged Aquatic Weed and Brush Herbicide are summarized below.

Oral - Practically Non-toxic, (Rat LD50 - >5,000 mg/kg)

Dermal - Practically Non-toxic, (Rabbit LD50 - >5000 mg/kg)

Inhalation - Slightly Toxic, (Rat 4-hr LC50 - >1.3 mg/l, the highest atmospheric concentration achievable in this study); FIFRA Category III, Not DOT poisonous

Eye Irritation - Non irritation, - Rabbits (6 animals); 24-hr exp.; Draize Average: : 0.0/110; EU: Corneal Opacity - 0.0, Iris - 0.0,Erythema - 0.0, Chemosis -

0.0

Skin Irritation - Practically Nonirritating - Rabbits (6 animals); 24-hr exp.; Draize Average: 0.1/8.0; EU: Erythema - 0.1, Edema - 0.0

In repeat dosing studies (6 months), dogs fed DuPont Glyphosate VMF Herbicide exhibted slight body weight changes. Following repeated skin exposure (3 weeks) to Dupont Glyphosate VMF Herbicide, skin irritation was the only effects in rabbits. No skin allergy was observed in guinea pigs following repeated skin exposure.

Additional toxicity information is available on glyphosate, the active ingredient of DuPont Glyphosate VMF Herbicide. Following repeated exposures (90-days) to glyphosate in their feed, decreased weight gains were noted at the highest levels in mice, while no treatment-related effects occured in rats. Following repeated skin exposure (3 weeks)to glyphosate, slight skin irritation was the primary effect observed in rabbits. No skin allergy was observed in guinea pigs following repeated skin exposure. There was no evidence of effects on the nervous systems, including delayed effects in chickens (repeated oral doses) or cholinesterase inhibiti in rats (single oral doses). Reduced body weight gain and effects on liver tissue were observed with long term (2-year) feeding of glyphosate to mice at high-dose levels. Reduced body weight gain and eye changes were observed at the high dose levels in one long term (2 year)feeding study in rats, while no treatment-related effects occured in a second study. No adverse effects were observed in feeding studies with dogs. Glyphosate did not produce tumors in any of these studies. Based on the results from the chronic studies, EPA has classified glyphosate in category E (evidence of non-carcinogenicity for humans). No birth defects were noted in rats and rabbits given glyphosate orally during pregnancy, even at amounts which produced adverse effects on the mothers. Glyphosate was fed continuously to rats at very high dose levels for 2 successi generations. Toxicity was reported in offspring from the high dose, a level whichalso produced adverse effects on mothers. In a 3 generation study conducted at lower dose levels, no effects were seen on the ability of male or female rats to produce. Glyphosate has produced no genetic changes in a variety of standard tests using animals and animals or bacteria cells.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicological Information

96-hr LC50 Bluegill: >1,000 mg/l, Practically Nontoxic
96-hr LC50 Trout: >1,000 mg/l, Practically Nontoxic
48-hr LC50 Daphnia: 930 mg/l, Practically Nontoxic
Oral LD50 Goat: 5/700 mg/kg, Practicially Nontoxic

Brahman-cross heifers were given Rodeo(R) Emerged Aquatic Weed and Brush herbicide, by gavage, at daily dosages of 0, 540, 830, 1290 and 2000 mg/kg for 7 consecutive days. Clinical signs of toxicity, including loss of appetite, diarrhea and death (1290 and 2000 mg/kg) were observed at 830 mg/kg or above. The no-effect level was considered to be 540 mg/kg day.

DISPOSAL CONSIDERATIONS

Waste Disposal

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures.

Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed. Do not cut or weld on or near this container.

Metal Drums - Triple rinse container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Plastic Drums - Do not reuse container. Return container per the Monsanto container return program. If not returned, triple rinse container, then puncture and dispose of in a sanitary landfill, or by incineration, or if allowed, by state and local authorities, by burning. If burned, stay out of smoke.

TRANSPORTATION INFORMATION

Shipping Information

DOT
Not Regulated.

U.S Surface Freight Classification: Weed killing compound, N.O.I.B.N.

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : All components in compliance with TSCA Inventory requirements.

EPA Reg. No. 352-609

OTHER INFORMATION

Additional Information

Technical data, based on Monsanto Company MSDS dated January 1998.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS: DuPont Agricultural Products
Address : Wilmington, DE 19898
Telephone : 800-441-7515

End of MSDS

APPENDIX Z:

Septic System Waste Dumping Incident Documentation

SEPTAGE PROGRAM
ADMINISTRATIVE ENFORCEMENT ACTIONS

Name/Business	Type of Violation	Outcome
Mr. Fredrick M. Maki J.F.K. Maki P.O. Box 63 Watton, MI 49970 DEQ Septage Lic. No. 07-01 (suspended) Baraga County	August 8, 2007 – Keweenaw Indian Res. Police Officer took photos showing unscreened septage waste dumped down a steep hill into a wetland on Maki property & reported finding to DEQ. September 18, 2007 – transporting septage without a current Federal Motor Carrier safety inspection. September 19, 2007 – Email and photos from Western Upper Peninsula District Health Department confirming that J.F.K. Maki was dumping down steep slopes, no tilling, no crops, and not at agronomic application rates (AAR). July 9, 2009 – DEQ held informal conf. w/ Maki.	April 11, 2008 - DEQ issues Notice of License Suspension. Notice of Hearings set for April 18 and 21, 2008, to appear before an Administrative Law Judge. Mr. Maki does not show. December 4, 2009 – Mr. Maki signs Administrative Consent Order. **December 18, 2009** – ACO is entered into record. Mr. Maki agrees to: - voluntarily terminate, revoke and surrender all septage waste licenses and permit; - not engage in the practice of septage waste hauling or land application until he obtains all DEQ required licenses and permits; - pay $300 in civil fines.
Ms. Collen St. Louis Lester Septic Cleaning Service 2803 Superior Trail St. Ignace, MI 49781 DNRE Septage Lic. No. 49-04	October 14, 2009 – DEQ is contacted by LMAS DHD staff that Lester Septic Cleaning Service (Lester) is servicing portable toilets with unlicensed pump truck. DEQ confirms Lester has been operating its portable toilet business without the required vehicle and septage waste servicing licenses since March 2006.	October 22, 2009 – DEQ issues Notice of Violation (NOV) to Lester concerning the violation of Sec. 11702(1) "A person shall not engage in servicing or contract to engage in servicing except as authorized by a septage waste servicing license and a septage waste vehicle license…" Lester is ordered to cease all operations until the business is licensed and to provide a written response by November 14, 2009. November 2009 - Invoice issued to Lester with license and late fees to be paid dating back to 2006. Total invoiced is $2,665.19. **December 12, 2009** – All fees paid in full. Business is licensed.