Bruce Rauner, Governor
Wayne A. Rosenthal, Illinois Department of Natural Resources Director
160 N. LaSalle St., Suite S-703 • Chicago, Illinois 60601 • 312-814-1405 • www.dnr.illinois.gov/cmp

December 1, 2017

John Perrecone
Areas of Concern Program
US EPA—Great Lakes National Program Office
77 West Jackson Blvd.
Chicago, IL 60604

Subject: Removal of Degradation of Benthos BUI in Waukegan Harbor AOC

Dear Mr. Perrecone,

The purpose of this letter is to request that the U.S. Environmental Protection Agency – Great Lakes National Program Office (USEPA-GLNPO) approve the removal of the Degradation of Benthos Beneficial Use Impairment (BUI) in the Waukegan Harbor Area of Concern (AOC). Benthic populations in Waukegan Harbor are comparable to non-AOC harbors and should no longer be considered impaired in the AOC.

The Illinois Department of Natural Resources (IDNR) has worked closely with the Waukegan Harbor Citizens Advisory Group (CAG) to evaluate the delisting target, which is consistent with the U.S. Policy Committee's Delisting Principles and Guidelines document. The delisting target for Waukegan Harbor AOC states that the benthic macroinvertebrate community can be considered for delisting when "the benthic community is representative of a similar harbor related benthic community in population and species compared to an acceptable harbor control site."

The IDNR has assessed the final data on benthic communities from Waukegan Harbor and from the control site of Burns Harbor, Indiana. Comparisons of pre- and post-dredging data support the conclusion that the benthic community in Waukegan Harbor AOC is not statistically different than the benthic community in Burns Harbor non-AOC. Specifically,

- Benthic invertebrate taxa richness and diversity were found to be significantly higher in Waukegan Harbor AOC than in Burns Harbor non-AOC
- Waukegan Harbor's benthic invertebrate community structure, abundance, and pollution tolerance were comparable to those of Burns Harbor non-AOC
- Overall benthic invertebrate biodiversity in Waukegan Harbor AOC has increased since the completion of environmental dredging

IDNR and the CAG feel that the Waukegan Harbor AOC has met the criterion for removal of the Degradation of Benthos BUI and that the BUI should be removed from the list of impairments in this AOC.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

COASTAL Management Program
IL Dept of Natural Resources

Enclosed, please find the supporting documentation for the removal of the Degradation of Benthos BUI in Waukegan Harbor AOC and a recommendation letter from the Waukegan Harbor CAG.

We look forward to our continuing partnership with the AOC program and working closely with the USEPA-GLNPO to achieve the remaining delisting targets.

Sincerely,

Diane L Tecic

Diane Tecic

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 19 2017

REPLY TO THE ATTENTION OF:

Mr. Wayne Rosenthal
Director
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702-1271

Dear Mr. Rosenthal:

Thank you for your December 7, 2017, request to remove the "Degradation of Benthos" Beneficial Use Impairment (BUI) at the Waukegan Harbor Area of Concern (AOC), Waukegan, Illinois. As you know, we share your desire to restore all of the Great Lakes AOCs and to formally delist them.

Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency hereby approves your BUI removal request at the Waukegan Harbor AOC. In addition, EPA will notify the International Joint Commission of this significant positive environmental change at this AOC.

We congratulate you and your staff, as well as the many federal, state, and local partners who have worked so hard and been instrumental in achieving this important environmental improvement. This progress will benefit not only the people who live and work in the Waukegan Harbor AOC but all the residents of Illinois and the Great Lakes basin as well.

We look forward to the continuation of this important and productive relationship with your agency and the Waukegan Harbor Citizens Advisory Group as we work together to delist this AOC in the years to come. If you have any further questions, please contact me, or your staff may contact John Perrecone, at (312) 353-1149.

Sincerely,

for

Tinka G. Hyde, Director
Great Lakes National Program Office

cc: Diane Tecic, IDNR
Raj Bejankiwar, IJC
Susie Schreiber, Waukegan Harbor Citizens Advisory Group
Wendy Carney, EPA, GLNPO
John Perrecone, EPA, GLNPO

Waukegan Harbor Area of Concern

Proposed Recommendation for Removal of the Degradation of Benthos

Beneficial Use Impairment (Benthos BUI)

Illinois Department of Natural Resources
Coastal Management Program
November 2017

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Abstract

The Waukegan Harbor Area of Concern (AOC), situated in northeastern Illinois on the western shore of Lake Michigan, is a commercial harbor located approximately forty miles north of Chicago. In 1975, polychlorinated biphenyl compounds (PCBs) were found in Waukegan Harbor as a result of manufacturing activities in the heavily industrialized harbor district. In addition to PCBs, other chemical contaminants including heavy metals, nitrogen, volatile solids, polycyclic aromatic hydrocarbons (PAHs), and phenols have been found in and around Waukegan Harbor. These chemical contaminants negatively impact Waukegan Harbor and the surrounding area and as such, in 1981 the International Joint Commission (IJC) identified Waukegan Harbor as an AOC and identified six Beneficial Use Impairments (BUIs) resulting from chemical contamination.

The Degradation of Benthic Invertebrates (Benthos) BUI in Waukegan Harbor AOC is characterized by a lack of macroinvertebrate biodiversity, dominance of pollution tolerant groups such as Oligochaeta (aquatic worms), and low overall numbers of individuals in the benthic community. According to IJC guidelines, the benthic macroinvertebrate community in Waukegan Harbor can be considered for delisting when its community structure does not significantly diverge from the benthic community structure of unimpacted control sites. Burns Harbor, Indiana has been identified as a suitable control site because, like Waukegan Harbor, it is a man-made, deep draft commercial harbor with no tributary in-flow. Burns Harbor also has similar land use, drainage, geology, soils, and climate as Waukegan Harbor.

In 2013, environmental dredging of Waukegan Harbor was completed and PCB concentrations in harbor sediments were reduced below the 0.2 parts per million (ppm) target level established by United States Environmental Protection Agency (USEPA) and the State of Illinois. Comparisons of pre- and post-dredging data support the conclusion that the benthic community in Waukegan Harbor AOC is not statistically different than the benthic community in Burns Harbor non-AOC, thus, IDNR recommends the removal of the Benthos BUI. The following data supports this recommendation:

- Invertebrate taxa richness and diversity were found to be significantly higher in Waukegan Harbor AOC than in Burns Harbor non-AOC
- Invertebrate community structure, abundance, and pollution tolerance were not significantly different between Waukegan Harbor AOC and Burns Harbor non-AOC
- Overall invertebrate biodiversity in Waukegan Harbor AOC has increased since the completion of environmental dredging
- While average PCB concentrations in tree swallow eggs and nestlings from Waukegan Harbor AOC were higher than concentrations found in several Great Lakes AOCs and non-AOCs, they are significantly lower than PCB concentrations known to cause negative reproductive impacts and significantly lower than PCB concentrations found in known-PCB hotspots throughout the United States

Purpose

The purpose of this document is to summarize activities that have been done to evaluate benthic communities in Waukegan Harbor Area of Concern (AOC), and to provide rationale for the removal of the Degradation of Benthic Invertebrates (Benthos) Beneficial Use Impairment (BUI). The document also summarizes activities performed to remove polychlorinated biphenyl compounds (PCBs) and other chemical contaminants including heavy metals, nitrogen, volatile solids, polycyclic aromatic hydrocarbons (PAHs), and phenols that negatively impact the benthic invertebrate community in Waukegan Harbor.

Geographic Extent and Area of Concern Boundary

Waukegan Harbor is located on the west shore of Lake Michigan in Waukegan, Illinois, approximately forty miles north of Chicago, and was built in the 1840s. Waukegan Harbor is a deep-draft commercial harbor ranging in depth from 14 to 21 feet with limited natural water exchange with Lake Michigan. The bottom of the harbor is covered with one to 10.5 feet of organic silt over nine feet of coarse to fine sand (Environmental Consulting & Technology, 2008). With exception of the boat launching area at the Waukegan Port District and the retaining wall near the mouth of the harbor, the entire harbor is surrounded by a steel sheet piling wall that extends into the sand layer, limiting the potential for natural shoreline habitats. The harbor is presently surrounded by industrial, commercial, municipal, recreational, open, and vacant lands. The AOC is bounded on the north by the North Ditch; on the west by Canadian National Railway; and on the south by Government Pier (Figure 1).

USEPA subdivides the Waukegan Harbor AOC into four Operable Units (Figure 1). Operable Unit #1 encompasses Waukegan Harbor and Slip 4, Operable Unit #2 encompasses the former Waukegan Manufactured Gas and Coke Plant, Operable Unit #3 encompasses three PCB Containment Cells (East and West Containment Cells and Former Slip 3), and Operable Unit #4 encompasses the former site of Outboard Marine Corporation (OMC) Plant 2.

The Waukegan Harbor AOC is jointly managed by the Illinois Department of Natural Resources (IDNR), the Illinois Environmental Protection Agency (IEPA), and the Waukegan Harbor Citizens Advisory Group (CAG). Immediately following the formation of the Waukegan Harbor CAG in 1990, IEPA, CAG, and members of the public met and developed what is known as the Waukegan Harbor Extended Area of Concern or Extended Study Area (ESA). The ESA addresses additional known areas of contamination that affect the Waukegan Harbor vicinity and impact the nearshore waters of Lake Michigan. The ESA extends from the Dead River south into the City of North Chicago, ending at 22nd Street and includes all lands to the east of Sheridan Road (Figure 2). While sites within the ESA are critical to the health and sustainability of Waukegan Harbor and nearshore Lake Michigan, the Benthos BUI is focused in the AOC only, and data collection on the health of benthic communities did not extend into the ESA.

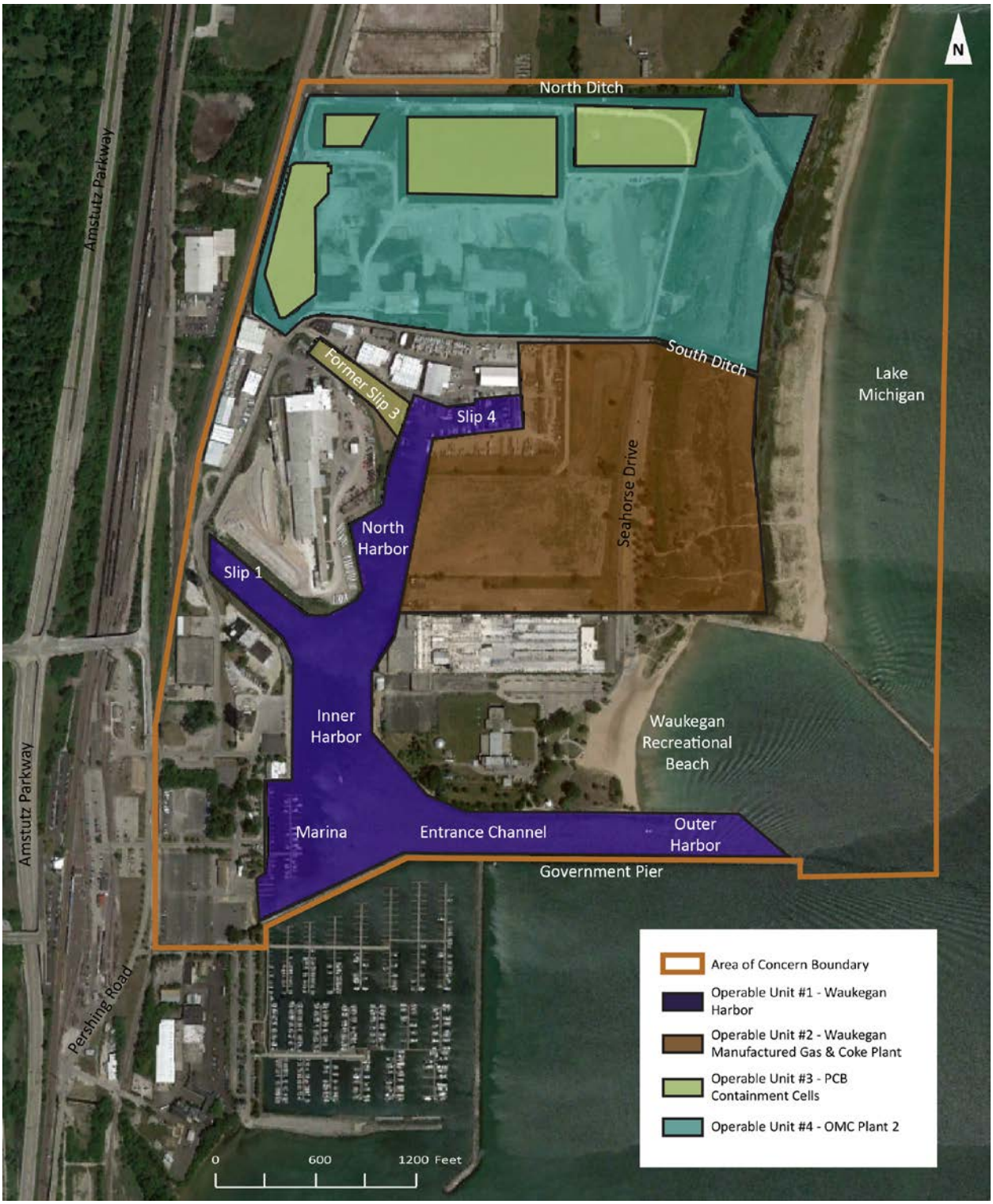


Figure 1. Waukegan Harbor and Area of Concern boundary and USEPA OMC Superfund Site's Operable Units.

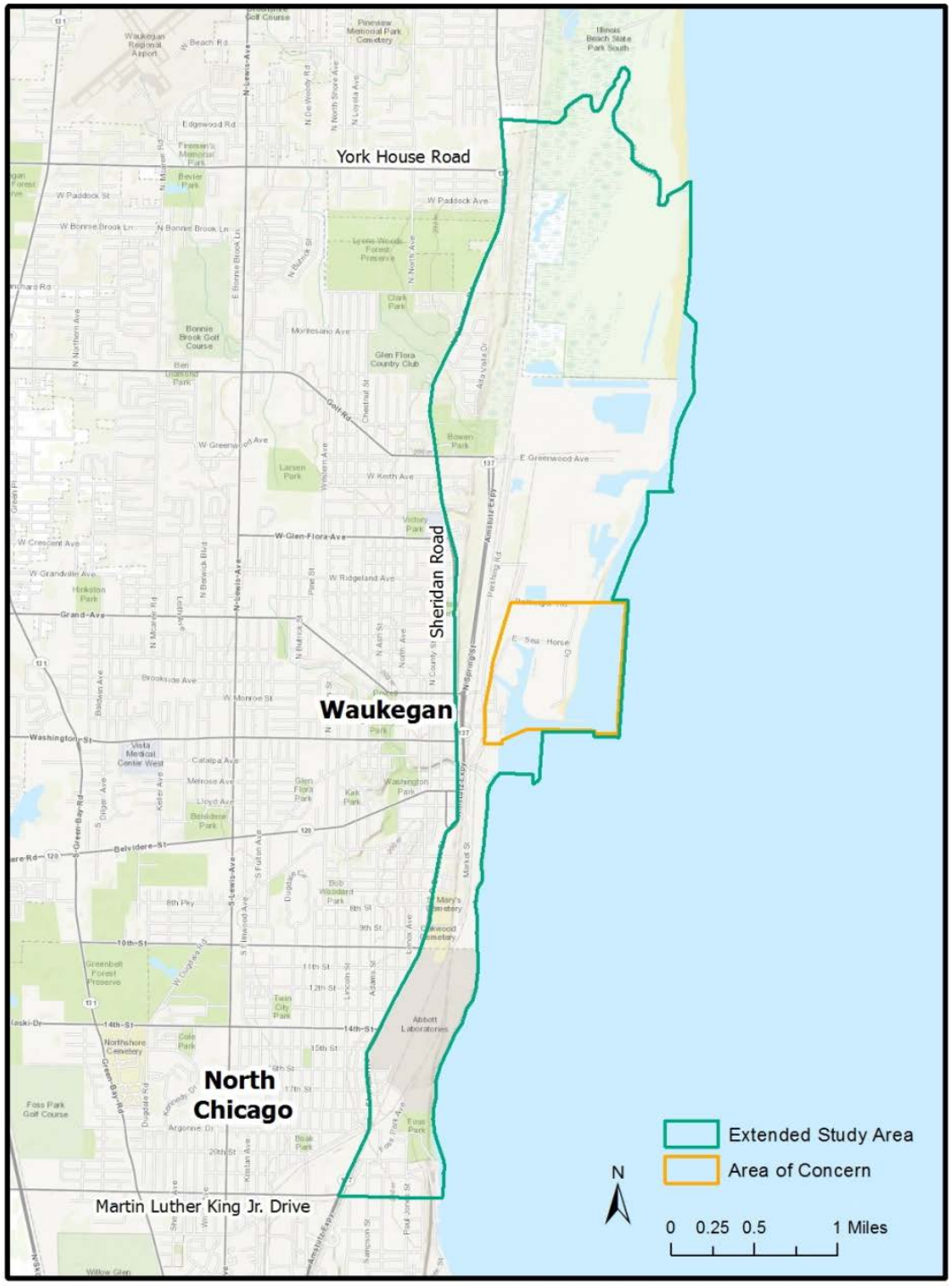


Figure 2. Waukegan Harbor Extended Study Area (Extended Area of Concern).

Overview

In 1975, PCB contamination was discovered in Waukegan Harbor as a result of manufacturing activities at Outboard Marine Corporation (OMC). In 1981, the International Joint Commission (IJC) identified Waukegan Harbor as an AOC and identified six BUIs. The 1987 amendments to the Great Lakes Water Quality Agreement further defined the BUIs. Identified BUIs for the Waukegan Harbor AOC are as follows:

1. Restriction on dredging activities;
2. Degradation of benthos;
3. Degradation of phytoplankton and zooplankton populations;
4. Restrictions on fish and wildlife consumption;
5. Loss of fish and wildlife habitat; and
6. Beach closings

The first four BUIs are the result of industrial contamination from manufacturing activities at OMC where hydraulic fluids containing PCBs were discharged through floor drains at the OMC plant and released directly into Waukegan Harbor via old Slip 3 and the North Ditch. The restriction on dredging BUI was removed in 2014 after dredging by USEPA reduced PCB concentrations in Waukegan Harbor sediments to below the 0.2 parts per million (ppm) target level.

The fifth BUI is a result of the urbanized and industrialized nature of the Waukegan Harbor lakefront and the impacts from resulting legacy contaminants on fish and wildlife. The wildlife habitat that exists is also threatened by several invasive species. A habitat management plan was developed for the AOC and in 2010, Waukegan Harbor CAG received a Great Lakes Restoration Initiative (GLRI) grant to manage invasive species in the AOC and ESA. Under this GLRI grant, from 2010-2016 Waukegan Harbor CAG managed herbaceous and woody invasive species as part of the Illinois Beach State Park Southern Buffer Restoration. Due to successful management actions, the loss of fish and wildlife habitat BUI was removed in 2013. In 2016, supported by a grant from the Illinois Department of Natural Resources (IDNR) Coastal Management Program (CMP), a comprehensive Beach Management Plan was developed for the City of Waukegan. This Beach Management Plan provides the City of Waukegan the necessary guidance to manage its beaches and dunes for both recreation and plant and wildlife habitat. Management of invasive species will continue by the City of Waukegan with support from IDNR.

The sixth BUI, beach closings, is primarily the result of high bacteria levels from fecal contamination and gull activity on the two beaches within the confines of the Waukegan Harbor AOC. These issues have been resolved, and this BUI was removed in 2011.

Degradation of Benthos BUI

The degradation of benthos BUI in Waukegan Harbor is demonstrated by a lack of macroinvertebrate biodiversity, dominance of pollution tolerant groups such as Oligochaeta, and low overall numbers of individuals. While degradation is due in part to high organic contaminant concentrations in harbor sediments, IEPA also partially attributes the degradation to indirect results of navigational traffic such as a lack of adequate benthic habitat and the suspension of harbor sediments by prop wash from

commercial vessels (Illinois Environmental Protection Agency, 1999). Surveys conducted throughout the ESA also found moderate to severe impairment of the benthic communities in the Waukegan River and Lake Michigan nearshore adjacent to the AOC. Impairment in the wider ESA can be mainly attributed to organic and heavy metals pollution, landfill runoff, bottom habitat alteration due to stormwater runoff, and atmospheric deposition of toxics including PCBs, Dichlorodiphenyltrichloroethane (DDT), benzo(a)pyrene, and lead (Environmental Consulting & Technology, 2008; Illinois Environmental Protection Agency, 2016).

Remedial Action Plans and Restoration Targets

The IEPA, in partnership with the Waukegan Harbor CAG, completed the Stage I Remedial Action Plan (RAP) in 1993, the Stage II RAP in 1995, and the Stage III RAP in 1999. The final RAP identified restoration goals for each of the six BUIs, however, these restoration goals were established before USEPA published "Restoring United States Areas of Concern: Delisting Principles and Guidelines" in December of 2001. As a result, USEPA and IEPA funded a project to review, revise, and update the restoration goals listed in the Stage III RAP using the consulting firm Environmental Consulting & Technology, Inc. and a technical team that included CAG and IEPA. The resulting document, "Delisting Targets for the Waukegan Harbor Area of Concern: Final Report," was completed in October 2008. This document, identifying specific delisting targets, was a cooperative effort of expert personnel knowledgeable in the local conditions of the AOC and representing the international, federal, state, regional, and community levels. This report is the current guiding document for RAP and delisting activities for the Waukegan Harbor AOC and provides the definitive guidance to determine at what point the AOC is clean enough that the impaired beneficial uses can be considered for delisting.

Per IJC guidelines, informed and backed by IEPA and the Waukegan Harbor CAG, the benthic macroinvertebrate community in Waukegan Harbor can be considered for delisting when the benthic macroinvertebrate community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. In absence of community structure data, the benthic macroinvertebrate community will be considered restored when the toxicity of sediment-associated contaminants is not significantly higher in Waukegan Harbor than at an un-impacted control site (Environmental Consulting & Technology, 2008).

Summary of Remedial Actions Implemented to Address the Benthos BUI

USEPA initiated cleanup work at Operable Unit #1 (Waukegan Harbor) of the OMC Superfund site in the early 1980s by collecting sediment samples throughout the harbor. Initial sediment cleanup of the harbor was performed in 1992-1993, resulting in the removal of approximately one million pounds of PCBs, 95% of the total estimated PCB contamination released. In 2001, three shipping companies that utilize Waukegan Harbor invested in the dredging of Slip 1 to analyze sediment consistency, demonstrate on-site dewatering, and reinforce corporate buy-in to the harbor clean-up. Through this project, an additional 4,000 cubic yards of sediment were removed.

In 2002, USEPA Region 5 Superfund Division, with assistance from IEPA and Illinois Department of Public Health (IDPH), conducted a 5-Year Review of the site to determine the extent to which the 1992-1993 efforts were successful in protecting human health and the environment. Results of this review showed PCB levels in harbor-caught fish were still too high to be protective of human health and the 50-ppm cleanup level for PCBs was much higher than target remediation levels at other contaminated sediment sites, causing USEPA, IEPA, and area stakeholders to determine a second cleanup action for Waukegan Harbor was needed. In 2003, sediment sampling occurred in Waukegan Harbor to help the USEPA and United States Army Corps of Engineers (USACE) determine the extent of remaining contamination and evaluate remediation options.

In 2002-2003 USEPA removed and properly disposed of large amounts of acids, bases, paints, solvents, hydraulic oil, machining oil, compressed gases, metals, sludge, and transformer fluids containing PCBs from Operable Unit #4 (site of OMC Plant 2). In 2005, soil removal activities at Operable Site #2 (site of Waukegan Manufactured Gas and Coke Plant), located adjacent to the North Harbor and south of Slip 4, were completed. In 2011, active groundwater cleanup at the same site was completed and USEPA continues to apply a monitored natural attenuation approach towards the cleanup of residual groundwater contaminants. These activities have resulted in cleaner groundwater and eliminated potentially contaminated runoff from the site.

Waukegan Harbor CAG was a valuable partner in pre-dredging clean-up activities, raising all in-kind funding required for the above remediation projects.

Record of Decision Amendment

Following the agreement on Delisting Targets in 2008 between USEPA, IEPA, and CAG, a Record of Decision (ROD) Amendment was finalized between USEPA and the State of Illinois in October 2009. The following subset of pertinent tasks were agreed to as part of the Superfund program to clean up Operable Unit #1, which includes Waukegan Harbor:

- Hydraulically dredge sediment from the harbor where PCB concentration exceeds 1 mg/kg (or part per million)
- Dewater the dredged sediment in Geotubes® (or an equivalent geotextile product) and consolidate the dewatered sediment into a cell on the OMC Plant 2 site;
- Filter recovered water and discharge by diffusion back into the harbor;
- Place a cap on sediment next to harbor walls that cannot be safely dredged;
- Place a six-inch sand layer on the dredged harbor areas to achieve a 0.2 ppm PCB surface-weighted average concentration (SWAC) in the sediment; and
- Monitor PCB levels in harbor-caught fish and sediment to track cleanup progress.

In compliance with the 2009 ROD, in 2012-2013 another round of harbor sediment dredging occurred. Environmental dredging was completed on July 8th, 2013. The dredged sediment was pumped out of the harbor to the former OMC Plant 2 site for processing and placement in an 8-acre consolidation

facility located at the north end of the site. The environmental and navigational dredging of 2012-2013 resulted in the removal of 124,244 cubic yards of sediment and successfully reduced PCB concentrations in harbor sediments below the 0.2 ppm target level. Due to the low levels of residual PCBs in the harbor after dredging was completed, planned placement of a clean sand mixing layer was not necessary, except in areas near the harbor walls with residual PCB contamination below 1 ppm where no dredging was performed. With the 2012-2013 dredging and removal of the contaminated sediments, all management actions for the AOC have been completed.

Pre- and Post-Dredging Data

Early Benthic Community Surveys

In 1972 and 1973, IEPA conducted benthic surveys of Waukegan Harbor and Lake Michigan nearshore areas surrounding Waukegan Harbor. These surveys yielded a number of pollutant-tolerant benthic invertebrates, indicating environmental degradation (Environmental Consulting & Technology, 2008). In 1987, the Illinois Natural History Survey (INHS) conducted an additional study and found a correlation between low benthic biomass and known contaminated areas of Waukegan Harbor (Illinois Environmental Protection Agency, 1999).

In 1996, IEPA conducted an initial post-dredging survey of the benthic community in Waukegan Harbor and determined that the macroinvertebrate population continued to be degraded based on high benthic life Biotic Indices for each of the ten sites sampled. Biotic Index scores for Waukegan Harbor varied between 4.07 near the entrance to Slip 4 and 4.96 just north of the OMC Plant 2; scores above 4.0 indicate very poor environmental conditions (Klemm, Lewis, Fulk, & Lazorchak, 1990). The study also found that the benthic community in Waukegan Harbor was characterized by low biodiversity, with only 10 major groups of organisms found across 10 sampling stations. In addition, 88% of the organisms collected were oligochaetes (aquatic worms), a group of species that are known to be pollution-tolerant.

2012 Benthic Community Survey (Pre-Dredging Data)

In 2012, USEPA contracted with Battelle to conduct benthic sampling in the Waukegan Harbor AOC and perform statistical analyses to compare the overall health of the benthic community in the AOC to that of a comparable non-AOC reference site. USEPA and Battelle identified the Port of Indiana at Burns Harbor, Indiana (Burns Harbor) as the reference site for this study. The Port of Indiana, like Waukegan Harbor, is a man-made, deep-draft commercial harbor with no tributary in-flow. Burns Harbor also has similar land use, drainage, geology, soils, and climate as Waukegan Harbor and is not known to have had any major environmental impacts. (Battelle, 2013)

Results of this survey, summarized in Appendix A, showed that the Shannon-Weaver diversity index for Waukegan and Burns Harbors did not differ significantly in either the July or August samples of benthic communities. The Shannon-Weaver diversity index is commonly used to assess community composition and accounts for both abundance and evenness of species found in a community. No significant difference between the samples indicates the benthic communities in the harbors are comparable in community structure.

Battelle also calculated the Trophic Condition Index (Howmiller & Scott, 1977) for Burns and Waukegan Harbors in both July and August 2012. The Trophic Condition Index measures the potential level of organic pollution based on relative abundance of specific species of oligochaetes that have a known level of pollution tolerance based on the degree of enrichment of the environments in which they are commonly found (Battelle, 2013). In August, the Trophic Condition Index indicated the level of pollution in Waukegan Harbor was significantly different than that in Burns Harbor, with Waukegan Harbor falling in the eutrophic range (high in organic pollution) and Burns Harbor falling in the mesotrophic range (low in organic pollution) of the trophic scale. In July, however, the two harbors did not differ significantly, with both harbors falling into the mesotrophic scale. It should be noted that the Trophic Condition Index has some limitations when assessing organic pollution levels. First, the list of oligochaetes used to calculate index values is limited and may not include some species collected at a given site. Second, oligochaetes that cannot be identified down to the species level are excluded from the index calculation. For this study, only about 40% of oligochaetes collected at Burns Harbor were used to calculate the trophic condition indices, while only about 25% of oligochaetes were used from Waukegan Harbor, potentially limiting the accuracy of this method.

As with previous surveys, this 2012 study also found the benthic community in Waukegan Harbor to be characterized by low biodiversity, with an average of 13 species found at each sampling station in July and 16 species found in August. In addition, much like the 1996 IEPA survey, this survey found the benthic community in Waukegan Harbor to be dominated by oligochaetes, making up 93% of organisms collected in July 2012 and 91% in August 2012.

2010 – 2016 Great Lakes Tree Swallow Nestling Survey

From 2012-2016, the United States Geological Survey (USGS) collected data from Waukegan Harbor AOC for a study comparing contaminant exposure of tree swallows nesting in AOCs to that of tree swallows nesting in non-AOCs in the Great Lakes region. Tree swallows feed within one kilometer of their nesting box and feed mainly on the aerial stages of benthic aquatic insects, thus providing a linkage between contaminants in sediments and contaminants in the tissues of tree swallows. Nestlings were collected from nesting boxes installed around Waukegan AOC and contaminant concentrations in nestling tissues and diet were calculated. Results of the study, summarized in Appendix B, showed that while PCB concentrations were elevated in Waukegan Harbor AOC when compared to other Great Lakes AOC samples and non-AOC samples, they were much lower than recorded PCB concentrations in known PCB hotspots in the United States. Mean total PCB concentrations from this study ranged from 0.007 micrograms per gram (µg/g) in nestlings from a non-AOC site in Minnesota to 6.41 µg/g in nestlings from an AOC site in Wisconsin, while total PCB concentrations averaged 5.91µg/g in Waukegan Harbor AOC samples. In an earlier study (Spears, Brown, & Hester, 2008), researchers found mean concentrations of total PCBs from tree swallow tissues harvested near remediated Superfund sites to range from 0.01 µg/g to 16.30 µg/g. Higher pre-remediation PCB concentrations were documented at known PCB hot spots in New York and Massachusetts where mean concentrations were 48.00 µg/g and 44.66 µg/g, respectively. (Custer, Custer, Dummer, Goldberg, Franson, & Erickson, 2016).

A companion study conducted by the same researchers (Custer, Custer, Dummer, Goldberg, & Franson, 2016) found organic contaminants in tree swallow eggs from Waukegan Harbor AOC, while elevated when compared to other Great Lakes AOCs, remained 10 to 20 times below the threshold for negative reproductive impacts due to environmental contamination. In the study, PCB concentrations in tree swallow eggs from Waukegan Harbor AOC averaged 7.30 µg/g; an earlier study found the lower limit for negative hatching effects in tree swallows to be 20.00 µg/g (Custer, Custer, Dummer, & Munney, 2003). In other studies that examined the impacts of PCB contamination on reproductive success in birds, PCB concentrations of 15.00 µg/g were found to cause embryotoxicity, edema, and growth retardation in domestic chicken eggs (Kubiak et al. 1989). Domestic chickens are used in many PCB toxicity studies because chicken embryos are among the most sensitive to PCBs. In a 1983 study in Green Bay, Wisconsin, Forster's terns displayed 14% hatchling deformities and 18% embryo deformities associated with median total PCB concentrations of 23.00 µg/g (Hoffman et al. 1987; Kubiak et al. 1989). Therefore, while PCB concentrations in tree swallow eggs from Waukegan Harbor AOC are significantly higher than background PCB concentrations in the region (reported by Custer et al. 2003 as 0.34 µg/g) they are well below the level at which negative reproductive effects have been observed.

Much of the data collection for this latest study on tree swallow nestling tissues and the companion study on tree swallow eggs occurred at Waukegan Harbor AOC before EPA's completion of dredging in July 2013 and the remediation of harbor sediments to a PCB concentration at or below 0.2 ppm. Therefore, data presented in the above studies may not be indicative of the current post-dredging PCB contamination levels in Waukegan Harbor AOC. However, research on the potential impacts of Waukegan Harbor AOC contamination on tree swallows is ongoing, with data collection and analyses expected through late 2017.

Preliminary analyses of data collected post-dredging (2014-2016) indicates a decline in both the geometric mean total PCBs in eggs and nestlings and a decline in the accumulation rate of PCBs in nestlings (Custer, personal observation). The accumulation rate represents micrograms (µg) of total PCBs assimilated each day by the tree swallow nestlings, and while not a direct measurement of PCBs in harbor sediments, it can be used as an index for the amount of total PCBs that are bioavailable in the diet of tree swallows (Custer, personal communication, September 5, 2017). The geometric means of pre-dredging accumulation rates were 16.50 µg/day in 2012 and 21.65 µg/day in 2013, markedly higher than post-dredging accumulation rates of 1.47 µg/day, 9.36 µg/day, and 1.25 µg/day in 2014, 2015, and 2016, respectively (Custer, personal observation) (Figure 3). The overall downward trend of accumulation rates of PCBs in tree swallow nestlings indicates fewer total PCBs present in their diet, generally dominated by the aerial stages of aquatic benthic invertebrates. In addition to declines in accumulation rates, Custer also noted overall declines in total PCBs in tree swallow nestlings between pre- and post-dredging samples. The geometric means of pre-dredging total PCBs in nestlings were 10.97 µg/g in 2012 and 15.55 µg/g in 2013, notably higher than the post-dredging geometric means of 1.80 µg/g in 2014, 6.78 µg/g in 2015, and 1.08 µg/g in 2016 (Custer, personal observation) (Figure 4). Again, while these data are considered preliminary, the overall negative trend in measured PCBs is notable.

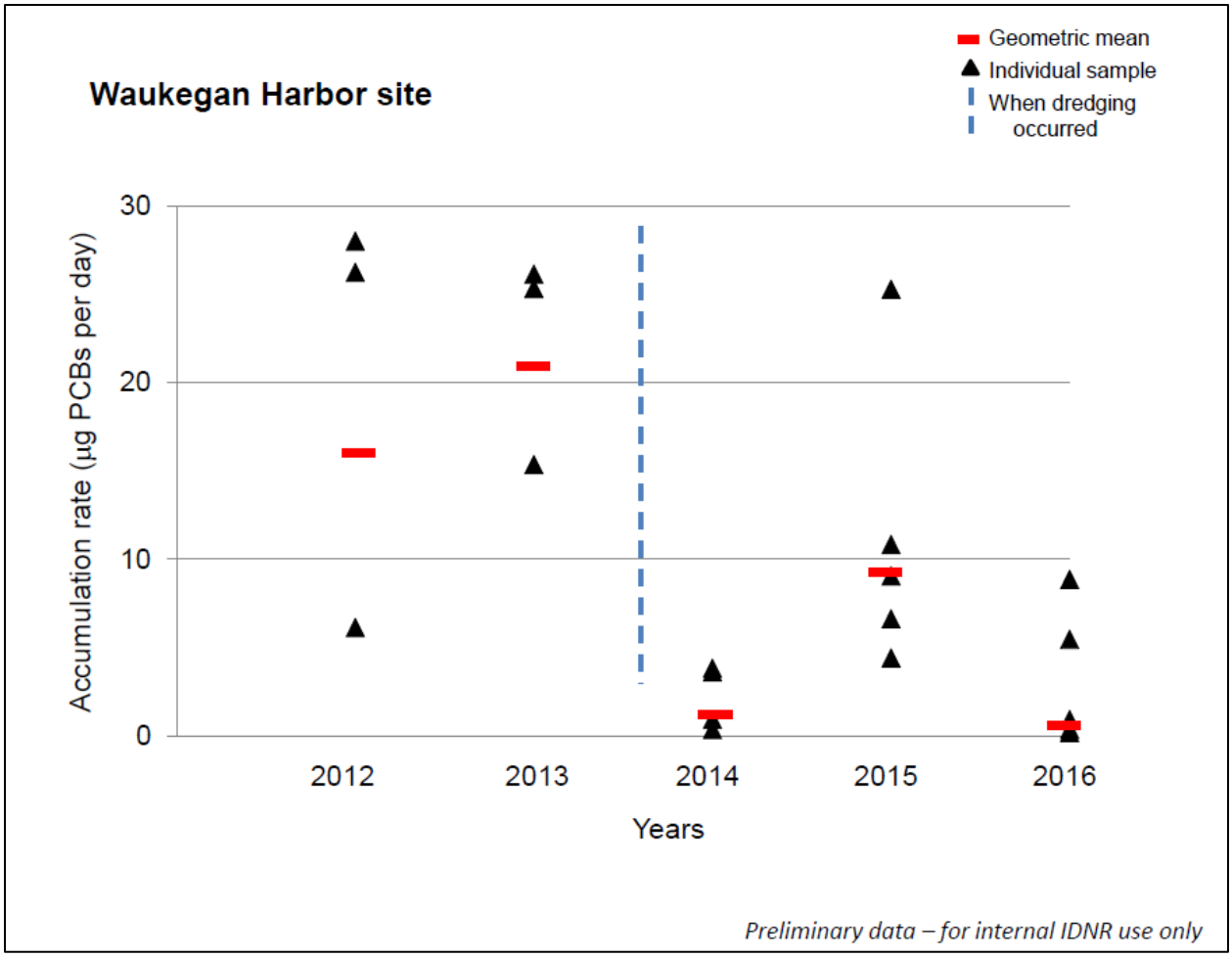


Figure 3. PCB accumulation rate in tree swallow nestlings for the Waukegan Harbor AOC, pre- and post-dredging. Data is preliminary and unpublished at the writing of this document. Custer, personal observation.

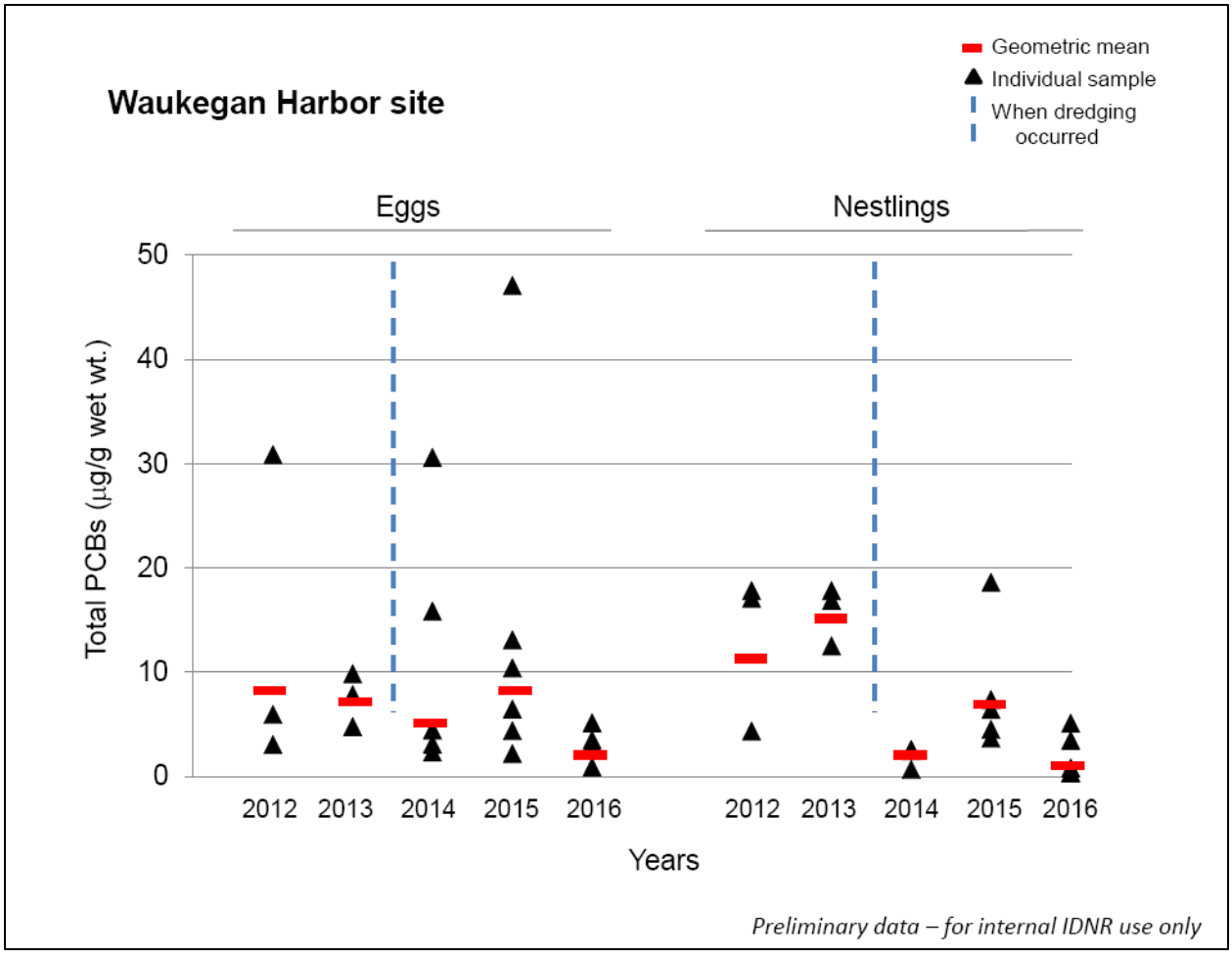


Figure 4. Total PCBs in tree swallow eggs and nestlings for the Waukegan Harbor AOC, pre- and post-dredging. Data is preliminary and unpublished at the writing of this document. Custer, personal observation.

2015 Benthic Community Survey (Post-Dredging Data)

In 2015, USEPA and USGS conducted post-remediation benthic community surveys in both Waukegan Harbor and Burns Harbor in June (spring) and August (fall) to assess whether the benthic community in the Waukegan Harbor AOC was degraded when compared to a non-AOC harbor of similar characteristics (again using Burns Harbor, IN). At both harbors, two different sampling techniques were used to collect benthic samples, a Hester-Dendy artificial substrate sampler (HD samples), and a Ponar® dredge sampler (dredge samples). The dredge sampler targeted sediment-surface benthos living near the sediment surface that naturally occur in the fine harbor sediments, while HD samplers targeted benthos that require a hard substrate on which to colonize and provided a means to standardize substrate differences between the harbors (Scudder Eikenberry, Templar, Burns, Dobrowolski, & Schmude, 2017). Computed metrics were taxa richness (the total number of unique taxa), the Shannon Diversity Index (Shannon, 1948) and, for HD samples, a macroinvertebrate Index of Biotic Integrity (IBI) for large, nonwadable rivers of Wisconsin (Weigel & Dimick, 2011).

Results of this study, summarized in Appendix C, found that across both sampling techniques, taxa richness (the number of unique taxa in a sample) in Waukegan Harbor benthic communities was significantly higher at each sampling station in both spring and fall samples. In Waukegan Harbor, the mean number of species collected across all sites was 22 in the spring and 18 in the fall; in Burns Harbor, the mean number of species collected across all sites was 8 in the spring and 9 in the fall. The calculated Shannon diversity of combined benthos samples across both seasons was significantly higher at Waukegan Harbor sampling stations than at Burns Harbor sampling stations. Mean Index of Biotic Integrity (IBI) values did not differ significantly between Waukegan and Burns Harbors across all seasons and sampling stations. Benthic IBIs combine measures of taxa richness and diversity with measures of pollution tolerance in the species collected, so it can be expected that IBI values would be significantly lower in areas with substantial organic pollution than IBI values from areas unaffected by environmental contamination. IBIs provide a robust, statistically-based characterization of complex benthic communities and their resilience to anthropogenic disturbance and are increasingly used to compare biotic communities that may naturally differ in composition before the introduction of anthropogenic variables such as chemical contamination.

Overall results and data analysis of this post-remediation survey indicate benthos richness and diversity were significantly higher and rated as less degraded at Waukegan Harbor AOC than Burns Harbor non-AOC and benthos IBI values for HD samples were not significantly different between the harbors. Dominant taxa in dredge samples also demonstrated comparable conditions between Waukegan and Burns Harbors. At Waukegan Harbor, the dominant taxa were immature oligochaetes, pollution-tolerant midge larvae, and adult oligochaetes. Dredged samples at Burns harbor were dominated by immature oligochaetes or *Dreissena* mussels, pollution-tolerant midge larvae, and adult oligochaetes.

Conclusions and Recommendations

In consideration of the remediation actions that have been completed and the strength of the supporting data that demonstrates sediment PCB levels are within the required limits and the benthic community in Waukegan Harbor AOC is not statistically different than that in Burns Harbor non-AOC, IDNR recommends the removal of the Benthos BUI. The following data supports this recommendation:

- Invertebrate taxa richness and diversity were significantly higher in Waukegan Harbor AOC than in the non-AOC reference site at Burns Harbor

- Post-dredging benthic IBI measures were not statistically different between Waukegan Harbor and Burns Harbor. Equivalent benthic IBI measures indicate the benthic community in Waukegan Harbor is comparable to that of Burns Harbor in community structure, abundance, and pollution tolerance

- Post-dredging surveys in Waukegan Harbor AOC collected an average of 22 species in July and 18 species in August compared to 13 species collected in July and 18 species collected in August prior to dredging activities, indicating an overall improvement in the biodiversity of the benthic community since the completion of dredging

- PCB concentrations in tree swallow eggs and nestlings from Waukegan Harbor AOC, while higher than those from several AOC and non-AOC sites in the Great Lakes, were significantly lower than PCB concentrations recorded at known PCB hotspots in AOC and Superfund sites across the United States

- Average PCB concentrations in tree swallow eggs from Waukegan Harbor AOC (5.91 µg/g) were significantly lower than PCB concentrations known to cause lethal birth defects in domestic chickens (15.00 µg/g) and lower than PCB concentrations known to cause birth deformities in Forster's terns (23.00 µg/g)

- Recorded PCB concentrations in tree swallow eggs and nestlings from Waukegan Harbor AOC ranged between 10 to 20 times below the threshold for negative reproductive impacts of PCBs on tree swallow nestlings

- Preliminary results from post-dredging tree swallow nestling surveys indicate an overall negative trend in both the total PCBs and the accumulation rate of total PCBs in tree swallow nestlings since environmental dredging of the harbor was completed

Public Involvement

The Waukegan Harbor CAG has been tracking cleanup progress in Waukegan Harbor since August of 1990. This group of concerned citizens, local businesses, municipal representatives, and local, regional, state, and federal environmental and educational organizations meets once a month to discuss environmental issues in the AOC and ESA and support harbor cleanup efforts. CAG is instrumental in coordinating with regional AOC stakeholders, private citizens, and corporations to disseminate information about Waukegan AOC history, cleanup efforts, and current progress of remediation. Waukegan Harbor CAG members engage in public outreach via presentations at on-site meetings, conferences, and in Waukegan-area schools; CAG also brings the W.G. Jackson research vessel to Waukegan Harbor to familiarize the public and local and state representatives with the AOC's history and remediation status, as well as to introduce kids and adults to science on the Great Lakes. Representatives of state and federal agencies attend monthly CAG meetings to report on cleanup and monitoring progress and gather input. IDNR and USGS have presented updates and study results related to the Benthos BUI at previous CAG meetings and IDNR will continue to work with the CAG during the public comment period for this BUI removal document. IDNR staff presented a summary of this document and BUI removal status and provided a summary handout (Appendix D) to CAG members at the July 20, 2017 CAG meeting in Waukegan, Illinois.

IDNR solicited public comments on this Benthos BUI delisting document for 30 days (July 21, 2017 – August 21, 2017) in conjunction with the USEPA review of these recommendations. During this time, this document was posted to the IDNR Coastal Management Program website (Figure 5), https://www.dnr.illinois.gov/cmp/Pages/default.aspx, and a link to view the document and provide comments was included in our August 2017 monthly newsletter (Figure 6) which reaches approximately 500 readers. A survey created using the online survey design site, www.surveymonkey.com was used to

collect and compile public comments (Figure 7). A link to this survey was also included on the CMP website, in the August 2017 newsletter, and shared with stakeholders via email. IDNR also shared this document and solicited comments from the City of Waukegan and Waukegan Port District. This document was also shared with members of the Lake Michigan Lakewide Action and Management Plan (LAMP) Working Group. The Lake Michigan LAMP Working Group is comprised of regional natural resource managers representing USEPA, state Environmental Protection Agencies and Departments of Natural Resources, U.S. Forest Service, USGS, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration (NOAA), and tribal groups.

Public comments were received from the Waukegan Harbor CAG (Appendix E) and addressed in the final draft of this document.

Updated July, 21, 2017:

Now open for public comment:

Waukegan Harbor Area of Concern: Proposed recommendation for Removal of the Degradation of Benthos Beneficial Use Impairment (Benthos BUI)

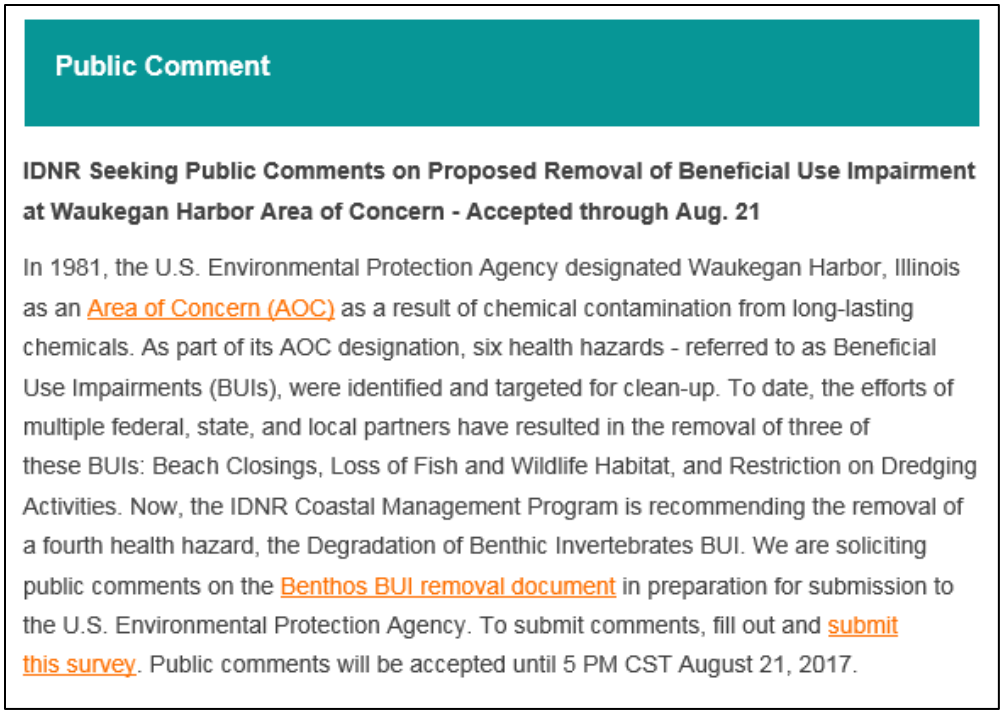
In 1981, the U.S. Environmental Protection Agency designated Waukegan Harbor, Illinois as an Area of Concern (AOC) as a result of chemical contamination from long-lasting chemicals such as polychlorinated biphenyls (PCBs). As part of its AOC designation, six health hazards - referred to as Beneficial Use Impairments (BUIs), were identified and targeted for clean-up. To date, the efforts of multiple federal, state, and local partners have resulted in the removal of three of these BUIs: Beach Closings, Loss of Fish and Wildlife Habitat, and Restriction on Dredging Activities. Now, the IDNR Coastal Management Program is recommending the removal of a fourth health hazard, the Degradation of Benthic Invertebrates BUI.

We are soliciting public comments for the above BUI removal document in preparation for submission to the U.S. Environmental Protection Agency. To provide comments, download and review the document above. To submit comments, fill out and submit the survey below. Public comments will be accepted until **5 PM CST August 21, 2017**.

Thank you for your valuable input!

https://www.surveymonkey.com/r/KRR5HDT

Figure 5. Public comment announcement on the IDNR CMP website. Posted between July 21, 2017 and August 22, 2017.

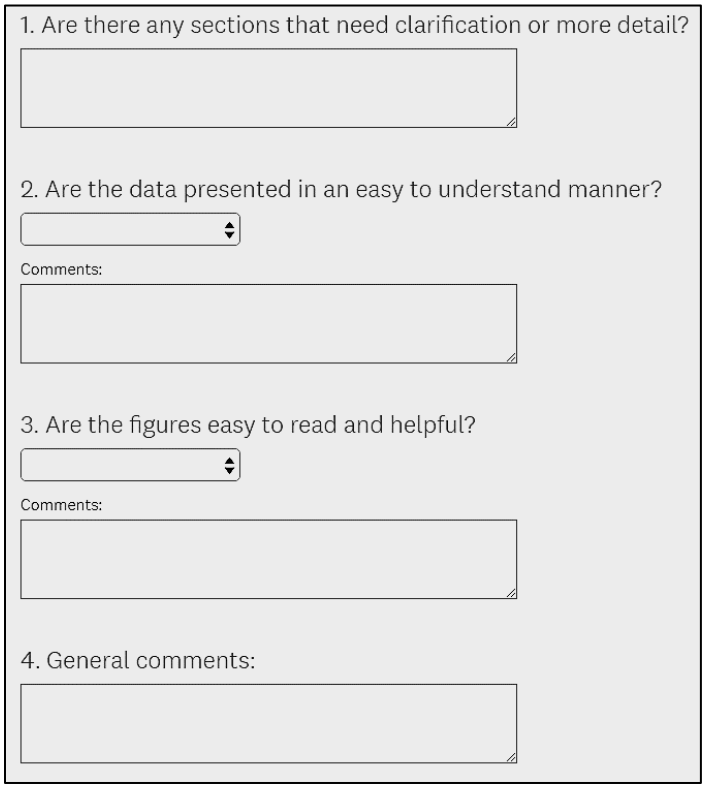


Public Comment

IDNR Seeking Public Comments on Proposed Removal of Beneficial Use Impairment at Waukegan Harbor Area of Concern - Accepted through Aug. 21

In 1981, the U.S. Environmental Protection Agency designated Waukegan Harbor, Illinois as an Area of Concern (AOC) as a result of chemical contamination from long-lasting chemicals. As part of its AOC designation, six health hazards - referred to as Beneficial Use Impairments (BUIs), were identified and targeted for clean-up. To date, the efforts of multiple federal, state, and local partners have resulted in the removal of three of these BUIs: Beach Closings, Loss of Fish and Wildlife Habitat, and Restriction on Dredging Activities. Now, the IDNR Coastal Management Program is recommending the removal of a fourth health hazard, the Degradation of Benthic Invertebrates BUI. We are soliciting public comments on the Benthos BUI removal document in preparation for submission to the U.S. Environmental Protection Agency. To submit comments, fill out and submit this survey. Public comments will be accepted until 5 PM CST August 21, 2017.

Figure 6. Public comment announcement in the August 2017 IDNR CMP newsletter.



1. Are there any sections that need clarification or more detail?

2. Are the data presented in an easy to understand manner?

Comments:

3. Are the figures easy to read and helpful?

Comments:

4. General comments:

Figure 7. Online survey created on surveymonkey.com used to collect public comments for this document.

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APPENDIX A

Summary of 2012 Pre-Dredging Benthos Data

Site	Station	# of Species		# of Individuals	
		July	**August**	**July**	**August**
Burns Harbor, IN (non-AOC)	BH1	8	3	75	6
	BH2	11	3	169	3
	BH3	12	10	253	104
	BH4	10	12	706	172
	BH5	5	2	9	3
	Mean	**9.2**	**6**	**242.4**	**57.6**
Waukegan Harbor, IL (AOC)	Outer Harbor (WH1)	17	9	395	1813
	Entrance Channel (WH2)	13	11	3069	780
	Inner Harbor (WH3)	15	20	194	404
	Marina (WH4)	13	16	1094	1116
	North Harbor (WH5)	9	23	886	864
	Mean	**13.4**	**15.8**	**995.4**	**1127.6**

Table 1. Summary of the abundance of the benthic community at both the Waukegan Harbor Area of Concern and Burns Harbor reference sites. Adapted from Battelle, 2013.

Site	Station	Shannon-Weaver Diversity Index		Trophic Condition Index (Howmiller & Scott, 1977)	
		July	August	July	August
Burns Harbor, IN (non-AOC)	BH1	1.45	0.65	1.54	1.25
	BH2	1.40	1.10	1.53	1.00
	BH3	1.67	1.56	1.52	1.26
	BH4	1.49	1.60	1.47	1.81
	BH5	1.43	0.64	1.00	NA
	Mean	**1.49**	**1.11**	**1.41**	**1.33**
Waukegan Harbor, IL (AOC)	Outer Harbor (WH1)	1.78	1.19	1.92	1.78
	Entrance Channel (WH2)	1.42	1.45	1.68	1.89
	Inner Harbor (WH3)	1.81	2.13	1.36	1.81
	Marina (WH4)	1.17	1.42	1.73	1.82
	North Harbor (WH5)	1.06	2.01	1.64	1.88
	Mean	**1.45**	**1.64**	**1.67**	**1.84**

Table 2. The Shannon-Weaver Diversity Index and Trophic Condition Index for the benthic community for Waukegan Harbor Area of Concern and Burns Harbor reference sites. Adapted from Battelle, 2013.

APPENDIX B

Summary of 2010 – 2016 Tree Swallow Study

AOC Status	Location	Geometric Mean Total PCBs (µg/g)
AOC	Black River, OH	0.2965
	Buffalo River, NY	0.2284
	Clinton River, MI	0.0829
	Cuyahoga River, OH	0.3389
	Deer Lake, MI	0.0773
	Detroit River, MI	0.5912
	Grand Calumet River, IN	0.1366
	Housatonic River, MA	44.66[1]
	Hudson River, NY	48.00[2]
	Kalamazoo River, MI	0.9808
	Lower Green Bay and Fox River, WI	1.8106
	Manistique River, MI	0.2619
	Maumee River, OH	0.4294
	Menominee River, MI/WI	0.1883
	Milwaukee Estuary, WI	0.872
	Muskegon Lake, MI	0.2005
	Niagara River, NY	0.4895
	Presque Isle Bay, PA	0.2961
	River Raisin, MI	1.0774
	Rochester Embayment, NY	0.0740
	Rouge River, MI	0.8329
	Saginaw River and Bay, MI	1.8268
	Sheboygan River, WI	3.6450
	St. Clair River, MI	0.2331
	St. Louis River and Bay, MN/WI	0.0737
	St. Mary's River, MI	0.0372
	Torch Lake, MI	0.1421
	Waukegan Harbor, IL	**5.9084**
	White Lake, MI	0.0876

Table 1. Geometric mean concentrations of polychlorinated biphenyls (PCBs) in tree swallow nestling carcasses from multiple Area of Concern sites in the Great Lakes basin, 2010-2014. Adapted from Custer, Custer, Dummer, Goldberg, Franson, & Erickson, 2016. Note that values containing footnotes are added from additional studies.

[1] Geometric mean PCB concentration in 12-day old nestling carcasses from 1998 study, as reported in Custer, C.M., Custer, T.W., Dummer, P.M., & Munney, K.L. (2003). Exposure and effects of chemical contaminants on tree swallows nesting along the Housatonic River, Berkshire County, Massachusetts, USA, 1998-2000. *Environmental Toxicology and Chemistry, 22*, 1605-1621.

[2] Geometric mean PCB concentration in 10-day old nestling carcasses from 1995 study, as reported in Echols, K.R., Tillitt, D.E., Nichols, J.W., Secord, A.L., & McCarty, J.P. (2004). Accumulations of PCB congeners in nestling tree swallows (*Tachycineta bicolor*) on the Hudson River, New York. *Environmental Science & Technology, 38*, 6240-6246.

AOC Status	Location	Geometric Mean Total PCBs (µg/g)
Non-AOC	Cape Vincent, NY	0.0514
	Chaumont River, NY	0.0372
	Green Mountain, MN	0.0069
	Indian Ridge, IL	0.3395
	Little Tail Point, WI	0.8426
	Midland, MI	0.0852
	Oscoda, MI	0.0483
	Star Lake, WI	0.0140
	Wild Rice Lake, MN	0.0122

Table 2. Geometric mean concentrations of polychlorinated biphenyls (PCBs) in tree swallow nestling carcasses from multiple non-Area of Concern sites in the Great Lakes basin, 2010-2014. Adapted from Custer, Custer, Dummer, Goldberg, Franson, & Erickson, 2016.

APPENDIX C

Summary of 2015 Post-Dredging Benthos Data

Site	Station	Dredge				Hester-Dendy						Combined benthos[4]			
		Richness[1]		Diversity[2]		Richness		Diversity		IBI[3]		Richness		Diversity	
		Spring (July)	Fall (August)	Spring (July)	Fall (August)	Spring (July)	Fall (August)	Spring (July)	Fall (August)	Spring (July)	Fall (August)	Spring (July)	Fall (August)	Spring (July)	Fall (August)
Burns Harbor, IN (non-AOC)	BH1	6	7	0.97	1.36	24	19	2.47	0.63	15	15	28	23	1.34	1.26
	BH3	12	14	0.86	1.16	8	14	1.03	1.77	30	20	19	26	1.03	1.39
	BH5	7	6	1.61	1.41	22	20	2.54	0.16	20	20	26	26	2.74	0.38
Waukegan Harbor, IL (AOC)	Outer Harbor (WH1)	19	19	1.35	0.69	24	23	2.28	1.68	30	20	40	37	1.63	1.47
	Inner Harbor (WH3)	26	17	1.87	1.40	26	25	2.03	2.19	25	20	42	39	2.30	2.33
	North Harbor (WH5)	22	19	1.23	1.69	23	28	2.05	2.66	20	20	38	42	1.86	2.05

Table 1. Richness, diversity, and Index of Biotic Integrity values for benthos samples collected in 2015 by the U.S. Geological Survey at Waukegan Harbor Area of Concern and Burns Harbor-Port of Indiana non-Area of Concern. [1]Richness computed as the number of unique taxa in the sample. [2]Shannon Diversity, calculated as log*e*. [3]Index of Biotic Integrity designed for use with Hester-Dendy artificial substrates in nonwadable rivers, calculated as in Weigel and Dimick (2011). The Index of Biotic Integrity ranges from 0 (worst) to 100 (best): very poor (<19), poor (20–39), fair (40–59), good (60–79), to excellent (>80). [4]Combined benthos represents composites of both dredge and Hester-Dendy samples. Adapted from Scudder Eikenberry, Templar, Burns, Dobrowolski, & Schmude, 2017.

APPENDIX D

Summary Benthos BUI Removal Progress Presented to Waukegan Harbor CAG

Suggested Removal of Benthos BUI at Waukegan Harbor AOC

History

The Waukegan Harbor Area of Concern (AOC), situated in northeastern Illinois on the western shore of Lake Michigan, is a commercial harbor located approximately forty miles north of Chicago. In 1975, polychlorinated biphenyl compounds (PCBs) were found in Waukegan Harbor as a result of manufacturing activities in the heavily industrialized harbor district. In addition to PCBs, other chemical contaminants including heavy metals, nitrogen, volatile solids, polycyclic aromatic hydrocarbons (PAHs), and phenols have been found in and around Waukegan Harbor. These chemical contaminants negatively impact Waukegan Harbor and the surrounding area and as such, in 1981 the International Joint Commission (IJC) identified Waukegan Harbor as an AOC and identified six Beneficial Use Impairments (BUIs) resulting from chemical contamination.

Benthos BUI

The Degradation of Benthic Invertebrates (Benthos) BUI in Waukegan Harbor AOC is characterized by a lack of macroinvertebrate biodiversity, dominance of pollution tolerant groups such as Oligochaeta (aquatic worms), and low overall numbers of individuals in the benthic community. According to IJC guidelines, the benthic macroinvertebrate community in Waukegan Harbor can be considered for delisting when its community structure does not significantly diverge from the benthic community structure of unimpacted control sites. Burns Harbor, Indiana was identified as a suitable control site because, like Waukegan Harbor, it is a man-made, deep draft commercial harbor with no tributary in-flow. Burns Harbor also has similar land use, drainage, geology, soils, and climate as Waukegan Harbor.

Supporting Data

In 2013, environmental dredging of Waukegan Harbor was completed and PCB concentrations in harbor sediments were reduced below the 0.2 parts per million (ppm) target level established by United States Environmental Protection Agency (USEPA) and the State of Illinois. Comparisons of pre- and post-dredging data support the conclusion that the benthic community in Waukegan Harbor AOC is not statistically different than the benthic community in Burns Harbor non-AOC, thus, IDNR recommends the removal of the Benthos BUI. The following data supports this recommendation:

- Invertebrate taxa richness and diversity were found to be significantly higher in Waukegan Harbor AOC than in Burns Harbor non-AOC

- Invertebrate community structure, abundance, and pollution tolerance were not significantly different between Waukegan Harbor AOC and Burns Harbor non-AOC

- Overall invertebrate biodiversity in Waukegan Harbor AOC has increased since the completion of environmental dredging

- While average PCB concentrations in tree swallow eggs and nestlings from Waukegan Harbor AOC were higher than concentrations found in several Great Lakes AOCs and non-AOCs, they are significantly lower than PCB concentrations known to cause negative reproductive impacts and significantly lower than PCB concentrations found in known-PCB hotspots throughout the United States

Next Steps

IDNR CMP will open a 30-day public comment period in conjunction with USEPA review of the Benthos BUI Removal draft document. During this time, CMP will post the draft document on its website, https://www.dnr.illinois.gov/cmp/Pages/default.aspx, include a link to view the draft document and provide comments in the upcoming CMP newsletter, and share the draft document with the Waukegan Harbor CAG, City of Waukegan, and Waukegan Port District for review. After the 30-day public comment period has concluded, CMP will review USEPA and public comments and finalize the Benthos Removal Document for submittal to the USEPA by end of summer 2017.

Questions or comments can be emailed to the project lead at Danielle.M.Nelson@illinois.gov.

APPENDIX E

Public Comments Submitted by the Waukegan Harbor CAG

Location in Draft Document	Comment	IDNR Response
Page 3 – second paragraph – line 3	Please change to reflect that there was an established lighthouse built in the mid 1840's, shipping manifestos listing grain, lumber and other staple commodities are readily available for the 1840's, and by 1853 the USACE had carefully mapped the entire shoreline and were maintaining docks. We suggest you say "…was built in the1840's".	Line was edited to reflect the correct date.
Page 5 – Paragraph 3 – line 4	Please change to reflect that the Waukegan Harbor CAG received the GLRI grant in 2010, (not …2012).	Line was edited to reflect the correct date.
Page 5 – Paragraph 3 – line 6	Please change to reflect the accurate grant period, with extensions to read: "…this GLRI grant, in 2010 – 2016 Waukegan Harbor CAG managed herbaceous and woody invasive species removal as part of...".	Line was edited to reflect the correct date.
Page 5 – Paragraph 3 – line 10	We note that only minimal input from all of the Waukegan Harbor CAG GLRI data was utilized in the development of the Coastal Management Program in developing the Waukegan Beach Management Plan. We strongly urge close coordination with Illinois Department of Natural Resources – Natural Heritage division and their biologists in the implementation of the Waukegan Beach Management Plan	IDNR acknowledges CAG's request for increased coordination among stakeholders.

Page 6 – Paragraph 2 – line 1	Please do change to read: "The IEPA, in partnership with the Waukegan Harbor CAG, completed…". The IEPA most definitely were the main authors of the document and won a SOLEC award in 1998 in Buffalo, N.Y. for their definitive work.	The line was edited to reflect appropriate authors.
Page 6 – Paragraph 3 – line1	Please consider changing to read: "Per IJC guidelines, and with strong input and backing from the IEPA and the Waukegan Harbor CAG, the benthic community…"	The line was edited to reflect all involved parties.
Page 6 – Paragraph 4 – line 2	Please consider changing to read: USEPA began cleanup work at the OMC Superfund "Operating Unit 1 (the actual harbor), taking sediment samples," in the early 1980's.	References to the OMC Superfund site have been edited throughout the document to include specific operating unit references where applicable.
Page 6 – Paragraph 4 – line 5	Please correct to read: invested in the dredging "of Slip One to analyze the consistency of the sand/sediment material, demonstrate dewatering on site, and showing corporate buy in to the harbor cleanup." There was absolutely no dredging of any portion of the Federal Harbor or of the North Channel for navigation purposes.	Line was corrected.
Page 6 – Paragraph 5 – line 1	Please change to read: USEPA Region 5 Superfund Division, "with considerable help from IEPA and IDHP" conducted a 5 Year Review...	Line was updated to reflect all involved parties.
Page 7 – Paragraph 1 – line 7	Please reflect that the Waukegan Harbor CAG raised all of the in-kind funds required for all of the pre-dredging projects.	Paragraph was updated to include efforts of the CAG.

Page 8 – Paragraph 2– line 3	OMC – please change to read PCB's from the OMC "Plant 2 site".	References to the OMC Superfund site have been edited throughout the document to include specific operating unit references where applicable.
Page 8 – Paragraph 2 – line 5	Please change to read "in 201? active treatment" at the Waukegan Manufactured Gas and Coke site was completed.	Year was updated with assistance from USEPA.
Page 10 – Paragraph 2	Re the USGS Swallow studies – we strongly believe that the during dredging and post dredging tree swallow nesting tissues and egg data should be reflected in this report, not just the pre-dredging data. It is available, and both strengthens and validates your agencies benthic studies done by USGS with Barb Eikenberry, biology hydrologist from the USGS Wisconsin Water Science Center.	IDNR has incorporated the post-dredging data obtained from the authors of this study into the final document to be submitted to the USEPA. As the data is preliminary and is yet unpublished, it is deemed for internal use only and will not be included in the public document until published by the authors.
Page 12 – Paragraph 3 – line 5	Please add in: "It is a complex set of dynamics to get all of the stakeholders together throughout this long cleanup and restoration process within the Waukegan Harbor AOC. Numerous meetings on site, in regional offices and at conferences were held, in wide variety of organizations, work in Hyde Park School in the mid 2000's, bringing in the W G. Jackson to familiarize the general public and office holders with the site and its many problems, and presentations off site by requested parties make up just a little of what the Waukegan Harbor CAG accomplishes in public outreach.	Paragraph was updated to include additional efforts of the CAG.