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PROCEEDINGS

WATER QUALITY CRITERIA AND STANDARDS FOR THE 21ST CENTURY

4TH NATIONAL CONFERENCE
September 13-15, 1994
Arlington, VA

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PROGRAM AGENDA

WATER QUALITY CRITERIA AND STANDARDS FOR THE 21ST CENTURY
FOURTH NATIONAL CONFERENCE
ARLINGTON, VIRGINIA

SEPTEMBER 13-15, 1994

TUESDAY, SEPTEMBER 13

9:00 WELCOME — PLAZA BALLROOM AND WASHINGTON

Tudor T. Davies, Director, Office of Science and Technology (OST), U.S. EPA

KEY NOTE — PLAZA BALLROOM AND WASHINGTON

Carol Browner, Administrator, U.S. EPA

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Margaret Stasikowski, Director, Health and Ecological Criteria Division, OST, U.S. EPA

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PLAZA BALLROOM AND WASHINGTON

Amy Leaberry, OST, U.S. EPA - Session Moderator

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James J. Reisa, Ph.D., National Research Council

CRITERIA DEVELOPMENT PAST, PRESENT, AND FUTURE

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Edward B. Swain, Minnesota Pollution Control Agency

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Amy Leaberry, OST, U.S. EPA - Panel Moderator

Panel

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Philip G. Watanabe, Ph.D., Dow Chemical Company
Tim A. Eder, National Wildlife Federation

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PLAZA BALLROOM AND WASHINGTON

Susan Jackson, OST, U.S. EPA - Session Moderator

ADDRESSING NUTRIENT OVERENRICHMENT AND HABITAT DEGRADATION

Richard Batiuk, Chesapeake Bay Program Office, U.S. EPA, Region 3

Panel

Chris O. Yoder, Ohio Environmental Protection Agency
Geoffrey W. Harvey, Idaho Department of Health and Welfare
Tom Fontaine, South Florida Water Management District

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Max H. Dodson, U.S. EPA, Region 8
Jerry Johns, California State Water Resources Control Board

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Patrick Wright, U.S. EPA, Region 9
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David P. Braun, The Nature Conservancy

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6:30 - 8:30 **RECEPTION**
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Robert Perciasepe, Assistant Administrator, Office of Water, U.S. EPA

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Brian D. Richter, The Nature Conservancy
William S. Whitney, Prairie Plains Resource Institute
Donna F. Sefton, Office of Wetlands, Oceans, and Watersheds, U.S. EPA
Kevin J. Beaton, Idaho Office of Attorney General

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John E. Miller, Office of Solid Waste and Emergency Response (OSWER), U.S. EPA - Panel Moderator

Panel

Bill Kittrell, The Nature Conservancy
Jack Edmundson, U.S. Department of Agriculture
Ren Lohoefener, Ph.D., U.S. Fish and Wildlife Service
Janet McKegg, Maryland Department of Natural Resources

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Susan M. Cormier, Ph.D., Office of Research and Development (ORD), U.S. EPA - Panel Co-moderator
Marc A. Smith, Ohio Environmental Protection Agency - Panel Co-moderator

Panel

Chris O. Yoder, Ohio Environmental Protection Agency
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Alan Randall, Ph.D., Ohio State University

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  Richard Anderbery, Tri-Basin Natural Resources District
  Jeremiah (Jay) Maher, Central Nebraska Public Power & Irrigation District
  John Bender, Nebraska Department of Environmental Quality
  William S. Whitney, Prairie Plains Resource Institute
  Paul J. Currier, Ph.D., Platte River Whooping Crane Trust

- **MANAGING OVER-ENRICHMENT FROM AIR, LAND, AND WATER** WILSON-HARRISON

  Maggie Geist, Waquoit Bay National Estuarine Research Reserve - Panel Co-moderator
  Joseph E. Costa, Buzzards Bay Project - Panel Co-moderator

  Panel

  Jennie Myers, Consultant to The Nature Conservancy Latin America - Caribbean Division
  Richard Batiuk, Chesapeake Bay Program Office, U.S. EPA, Region 3

- **CONFLICTING USES AND THEIR IMPACTS - HOW TO MANAGE THEM** COMMONWEALTH AUDITORIUM

  Pat Cirone, U.S. EPA, Region 10 - Panel Moderator

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  Peter Bowler, University of California
  Bob Muffley, Gooding County
  Larry R. Wimer, Idaho Power Company
  Kevin J. Beaton, Idaho Office of Attorney General
  Don Brady, OWOW, U.S. EPA

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Margarete Heber, OST, U.S. EPA - Session Moderator

Panel

Cynthia Dougherty, Director, Permits Division, Office of Wastewater Management (OWM), U.S. EPA
Steve W. Tedder, North Carolina Department of Environment, Health and Natural Resources
Michael A. Ruszczyk, Eastman Kodak Company
Jessica C. Landman, Natural Resources Defense Council

2:30 **Break**

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  Russ Kinerson, OST, U.S. EPA - Co-moderator
  Don Brady, OWOW, U.S. EPA - Co-moderator

  Panel

  Dale Bryson, U.S. EPA, Region 5
  Geoffrey H. Grubbs, OWOW, U.S. EPA

- **IMPLEMENTING THE ENDANGERED SPECIES ACT**

  WILSON-HARRISON

  David Sabock, OST, U.S. EPA - Moderator

  Panel

  John Christian, U.S. Fish and Wildlife Service
  Robert F. (Mike) McGhee, U.S. EPA, Region 4
  Robert J. Smith, Competitive Enterprise Institute

- **ASSESSING AND REPORTING TOXICS IN SEDIMENT AND FISH**

  WASHINGTON

  Thomas M. Armitage, OST, U.S. EPA - Moderator

  Panel

  Catherine A. Fox, OST, U.S. EPA
  Jeffrey D. Bigler, OST, U.S. EPA
  William F. (Rick) Hoffmann, OST, U.S. EPA

- **MONITORING TO SUPPORT THE WATERSHED PROTECTION APPROACH**

  COMMONWEALTH AUDITORIUM

  Elizabeth Fellows, OWOW, U.S. EPA - Moderator

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  James G. Horne, OWM, U.S. EPA
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  Chris O Yoder, Ohio Environmental Protection Agency

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THURSDAY, SEPTEMBER 15

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Chris Zarba, OST, U.S. EPA - Session Moderator
Robert Paulson, Wisconsin Department of Natural Resources
Julie DalSoglio, U.S. EPA, Region 8
Ed Stigall, Chesapeake Bay Program Office, U.S. EPA, Region 3
W. William Weeks, The Nature Conservancy

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Group 2 - Julie DalSoglio - Group moderator	WASHINGTON
Group 3 - Ed Stigall - Group moderator	COMMONWEALTH AUDITORIUM
Group 4 - W. William Weeks - Group moderator	WILSON-HARRISON

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1:00 **SUMMARY AND CONCLUSIONS** PLAZA BALLROOM AND WASHINGTON

Betsy Southerland, Director, Standards and Applied Science Division, OST, U.S. EPA - Moderator

Amy Leaberry, OST, U.S. EPA
Susan Jackson, OST, U.S. EPA
Suzanne Marcy, OST, U.S. EPA
Margarete Heber, OST, U.S. EPA
Chris Zorba, OST, U.S. EPA

2:15 **Break**

THURSDAY, SEPTEMBER 15 (Continued)

2:30 STAKEHOLDER OBSERVATIONS — PLAZA BALLROOM AND WASHINGTON

Betsy Southerland, Director, Standards and Applied Science Division, OST, U.S. EPA - Moderator

Darren Olsen, Nez Perce Tribe
Joel Cross, Illinois Environmental Protection Agency
Robert Berger, East Bay Municipal Utility District
Mary Buzby, Merck & Company, Inc.
Jessica Landman, National Resources Defense Council

3:30 CLOSING REMARKS — PLAZA BALLROOM AND WASHINGTON

Tudor T. Davies, Director, OST, U.S. EPA

4:00 Break

4:15 AD HOC SESSIONS - TO BE ANNOUNCED — ROOMS TO BE ANNOUNCED*

5:00 End of Conference

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Opening Session

WELCOME

Tudor T. Davies
Director, Office of Science and Technology
U.S. EPA

Good Morning, We have a very tight agenda for the next couple of days. I am real pleased to see you all here. As you know, a great deal of work goes into a conference like this, and we had a lot of people preregistered. We had no cash on the barrel and we were not sure how many of you would turn up. I am thrilled to see how many of you have come, and how diverse the audience is.

We are very excited because the topic of the conversation that we will have with you over the next three days is future directions on criteria and standards, particularly as we move towards a watershed approach. And, we have here today a great variety of people who represent many thoughts and many ideas. We have people here from EPA, from industry, private companies, from States, municipalities, other federal agencies, environmental groups, academic people here who will help us think about the academic functions. And we also have an international audience that I would like you to get to know as you walk around the corridors over the next couple of days. We have people here from Indonesia, Malasia, the Phillipines, Singpore and Thailand who are attending the conference as part of a cooperative activity with Canada. They are developing criteria and standards for the marine environment and for human health for their nations. I hope that as they ask questions and as we have a dialogue here, you will give them the benefits of your experience.

It's sort of difficult starting off cold on a morning like this. My staff know that I tell a joke very poorly and so they have given up on providing me stories to tell. Dave Sabock did a great job at the last standards conference we had almost two years ago in Las Vegas and I totally blew his joke, so he gave up on me.

We are looking forward to the conference. We have a wide variety of speakers and we really do want you to participate in the dialogue. We are looking forward to having some guidance out of this conference. We are looking forward to an evolution of our program based upon the things that you are going to tell us over the next few days.

I am really pleased, in fact delighted that our Administrator, Carol Browner could come to welcome you this morning and give you some of her insights. Carol has been in EPA now getting on for two years. And, we are really thrilled with the things that she has been involved with and the strong support that she has given to the water program. She and Bob Perciasepe have worked very hard on reauthorization issues and in looking at where our program is evolving. She brings, as Bob does, experience from State government and from the national program. Her perspective as a mother with a young child also influences where she wants to see the Environmental Protection Agency go and where the environmental movement in this country should progress. She has been refreshing, interesting and delightful for us. We are thrilled with her energy and her enthusiasm, which as I am sure she will convey to you this morning.

KEYNOTE ADDRESS

Carol Browner
Administrator
U.S. Environmental Protection Agency
Washington, DC

Thank you Tudor, and thank all of you for the opportunity to be with you this morning. I understand that we have had such a strong interest in this conference that there are actually a number of individuals viewing this conference from another room and I give a special welcome to those people who are not in here with us.

It is a pleasure to welcome you all to this very, very important conference. We hope and we believe that this conference will assist and help us in charting a course in water quality criteria and standards in the future. And so we are very excited about the prospects of the work that you will do over the next several days of the conference.

I am particularly interested and glad to be here to talk to you about the special emphasis that this Administration, the Clinton-Gore, Administration is placing on the importance of clean water. We believe that water, clean water protection of our water resources is one of the most important tasks, very important responsibilities that we have. Water is essential to our health, our economy and to our natural world. It is the first line of defense, the most fundamental line against environmental threats to human health. Clean water, and I think this is relatively simple but is worth restating, keeps our communities healthy and thriving, it creates jobs and tax revenues across this our country. It nourishes our farmlands. It sustains the animals for which we share our world. If you look at what we have been able to accomplish in the EPA and the state and local agencies that share in this work with us, over the last 25 years, we have been very successful in many ways. We have accomplished a lot. But if you look at the challenges that lie ahead, they are great. So despite our progress much remains to be done. Forty percent of the rivers, lakes and streams in this country today do not meet standards, and are still too polluted for fishing and swimming. Now you all know that in some ways far better than I. Last year the states issued 1000 fish consumption advisories, warning people not to eat the fish in specific rivers, lakes and streams. In the city of Milwaukee 100 people died from their tap water that came from the lake. The lake that provided the drinking water for the people of Milwaukee was contaminated. Hundreds of thousands became ill and 100 people died. And today, a year and half later there are still people suffering in Milwaukee because of that contamination.

New York and Washington, DC in the last year experienced problems, crises in their drinking water supplies, associated with contamination of their source water. In addition to the pollution problems, the contamination problems that we are facing and that our water faces, there is another threat and that is a political threat. Now while many citizens, businesses, public officials across the country are working harder than ever before to solve environmental problems, there are a few but a vocal few who call for a rollback in the progress we have made, who seek to challenge the safeguards that we have worked so hard to put in place.

Unfortunately, they are very good at using stories, horror stories to advance their argument on why environmental standards have become too rigid, ridiculous in their words.

Now some of you may have heard the story about drinking water, that is commonly told these days, how EPA requires all of the states to test for the pineapple pesticide. Now isn't this ridiculous. We are requiring people to test for pesticides, the pineapple pesticide that was only used on pineapples. And since pineapples are not grown in most of our states, why are we doing this? The truth is that this particular pesticide was used in most all of our states. It was used on broccoli, peas, carrots, and lots of crops. And unfortunately, it continues to be found in drinking water supplies 13 years after EPA banned the use of this pesticide.

We banned the use of it because it was found to have significant health effects, including male sterility. So I don't think what we are doing is silly, or ridiculous, but that is how this one standard, this one requirement has been portrayed to the people of this country. And because of that story, there are now people is Congress who think we should weaken the drinking water standards, rather than strengthen the drinking water standards.

If we are going to be able to address the very real environmental problems we have in this country, and the political arguments that we are encountering far too frequently, then we believe, this administration, the Clinton-Gore Administration, believe that we must launch a new generation of environmental protection. One that is based on a firm commitment to the goal of environmental protection to tough standards. Standards designed to protect those most at risk--children in many instances. But standards that are combined with flexibility, innovation and common sense and how they are implemented. Goals that are combined with common sense, innovation and flexibility and how they are achieved.

This new generation of environmental protection should be based on three simple principles. First, we must recognize that nature is a system. Too often the past approach has been a piece- meal approach and the result of this piece-meal approach has been to shift pollution to move it from our air to our water to our land rather than reducing and preventing pollution. Instead of continuing to simply shift pollution, we must take a comprehensive approach. Now in the case of water this means a watershed approach. It means looking at an entire system. At the tributaries, at all of the pieces that make up a functioning ecosystem, a watershed. It means dealing with the non-point sources, as well as the point sources. It means dealing in a holistic manner instead of simply focusing on an individual segment one after the other.

The second principle is pollution prevention, instead of waiting to clean up the pollution, we must prevent pollution. Instead of waiting to filter the water that becomes our drinking water, treat the contamination. Why not prevent the contamination from entering the source water. Why not protect the sources of our drinking water. When I go out and talk to the public about this concept, they are shocked that anyone would oppose it, that anyone would oppose the source water protection in the drinking water program. And yet in the debate in

Congress over reauthorization of the drinking water law, this has been one of the hardest issues for us to secure the votes necessary to change the law.

The third principle is we must seek to involve those who must live with the decisions that we make. Those people include the business community, citizens, states and local government. They must have every opportunity to work with us in making our decisions. In place of a one-size-fits-all approach, we must recognize that there are local differences.

Now I come from Florida. I grew up there. I spent a lot of time working on environmental issues in that state. While there are similarities in the environmental problems that Florida faces with California, even Maine, maybe Alaska, there are very real differences, and we must able and willing to recognize those differences and find solutions that speak to those differences. I'm sure that each and every one of you coming from your community, your state, is familiar with the differences in your state that need to be addressed that can allow for the kind of change, for the kind of solutions that we all want, and that we all know are so necessary.

In my experience of working with local communities and informing and involving them in making environmental decisions, I have always found that a local community once informed and involved will be willing to make far more difficult, far more stringent decisions than a distant bureaucracy, than a governmental agency can make. We are forced to look at everyone simultaneously. A local community can look at itself and make appropriate decisions. And yes, they will be different from a decision that another community will make. A decision about how to protect one watershed will be different than a decision to protect another watershed, because they are fundamentally different systems. We must allow for and create the mechanisms to recognize those differences and to build our solutions around those differences.

So what we are doing in this Administration is taking these three principles and fighting to change the programs, to change the laws on Capitol Hill. We are asking Congress in effect to write these principles into the Clean Water Act, the Safe Drinking Water Act, and Superfund. To change the laws so that they embody a fundamentally new approach to water protection that will work for all people in all communities.

Now I spoke briefly about the Safe Drinking Water Act. We believe that it is very important to strengthen the Safe Drinking Water Act. We believe that it is important to allow EPA and the states to work together to decide what are the most dangerous contaminates around which we should be setting standards for.
We believe the enforcement provisions of the Safe Drinking Water Act should be strengthened so that the bureaucratic hoops that we must now jump through before we can take an action, are removed and when there is a problem we can act expeditiously to ensure safe drinking water. We believe that we should provide money to the states in the same way that the states have received money for clean water implementation over the last two decades. We believe there should be federal money to the states to assist them in their work of providing safe drinking water. And finally, and I think in many ways most importantly for the long term, is we must achieve source protection.

We need to see the law changed so that communities who are willing to invest in protecting the source water have that flexibility. So that if they are willing to take dollars that would go towards treatment and put those dollars upstream to prevent the pollution, that they can make that long-term decision for their citizens, for their community.

Now we are hopeful that this will pass. It has passed in the Senate, and the House is literally working around the clock to achieve a strong reauthorized Safe Drinking Water Act. As many of you are aware we also asked Congress to reauthorize the Clean Water Act. We thought that there were important changes if we were to do the job that we know must be done to protect the rivers, lakes and streams of this country. We asked that a new Clean Water Act include incentives for watershed planning so that states could look on a watershed basis, could work on a watershed basis. We asked Congress to give us the tools and the states the tools to address polluted runoff, to improve our approach to stormwater problems, combined sewer overflow and again to provide federal dollars to the states.

Now I don't think anyone believes that it is possible that we will see a reauthorized Clean Water Act this year. And obviously we are disappointed. As of last night the money will be available to the states despite the fact that there will not be a reauthorization. But we believe that even without a reauthorization there is an awful lot that we can do within the existing law. And so in the coming months we will be looking at what tools are available to us to address the problems of non-point source pollution, to encourage watershed protection, to address storm water runoff and combine sewer overflow. We will be looking at how we in conjunction with states and local governments can move forward to achieve real watershed protection.

We also have several initiatives within the agency that will change how we do this job of protecting our environment in this new generation of environmental protection. Let me briefly mention one of them to you and that is our common sense initiative. We have selected six industries that we will be working with on an industry-by-industry basis rather than a pollutant-by-pollutant basis. As we look at the history of our work over the last two and half decades, what we see is that the strides we have been made on a pollutant-by-pollutant basis while significant, are not ever going to be fast enough and of the magnitude necessary to address the kind of problems that we are seeing. And so, instead, we need to work on an industry-by-industry basis to achieve pollution prevention for example, to discover how the printers could best implement pollution prevention. And the answer to the printer will be different than for the people who paint automobiles, or for the people who make electronic equipment.

So we will be working with the six industries, environmentalists, and state regulators to design a blueprint for environmental protection, pollution prevention, and compliance. It is our hope that as we move forward in these industries we will be able to add other industries in the coming months and years.

We are also moving ahead with a fundamentally new approach to water quality standards. The public, industry, and environmentalists I think are all demanding, and you know this far better than I that we must develop new tools that will more accurately measure the health of our rivers, our lakes and streams. I think there is a growing recognition that the old tools are not enough, that the chemical-by-chemical approach is not enough. The old tools don't do a good enough job of measuring the combined effect of a variety of chemicals.

In some ways it is as if when we look at a specific chemical we have blinders to the other problems. And then we look at another chemical and we have blinders to what we saw previously. The current tools, the old tools aren't enough to deal with sediment in the water. They aren't enough to really measure whether our water bodies are suitable for fishing, swimming, supporting wildlife, and the balance, the diversity so important to maintaining a healthy ecosystem. The old tools are not enough to ensure that we are dealing with all sources of water pollution. They are pretty good in terms of the industrial pipe discharges, but I don't think that any of us believe they are adequate or what they should be for dealing with the other sources of contaminants.

So for all of these reasons we need new tools. And we are working today at EPA to develop new tools that will serve the communities of this country, that will serve you all as we work together to implement Clean Water Act criteria and standards program, as we seek to fully develop and implement that program.

We are working to develop biological criteria, sediment quality criteria, wildlife criteria, and new methods for evaluating risks as it effects both human health, and the health of our environment. We must be looking at both. If we are successful in the efforts to develop these tools, these approaches, then we will be successful in our efforts to move beyond the chemical-by-chemical approach of the past.

So if there is one thing I would like to leave you with as you begin this conference, it is quite simply this. We need to hear from you. We need to know what are the tools you need in the work that you do. What are the tools that you have developed that perhaps can be used in other parts of the country. And we need to all continue our efforts to work together, at the federal level, the state level, local level, environmental level, and industry community so that we can make the new generation of environmental protection a reality. So that we can recognize that our natural world functions as a system. So that we can prevent pollution, rather than continue to clean up pollution and so that we can allow those who must live with our decisions, who must implement our decisions to be a part of making those decisions.

I have no doubt that the discussions that you will engage in over the next several days will help to advance these goals, and most importantly will help all of us in our efforts to leave a legacy of clean water for our children and our children's children.

Tudor T. Davies
Director, Office of Science and Technology
U.S. EPA

Introduction of Margaret Stasikowski

What we are going to do now is have Margaret Stasikowski, who is the Director of the Office of Health and Ecological Criteria Division in OST give you a little background to the conference and an overview of the topics and the themes we would like to cover over the next couple of days.

As I said in my welcoming remarks, we expect you to be strong participants. We are trying to get a variety of view points and perspectives for each of the topics we've chosen to cover, and we would like dialogue. If you don't get an opportunity to speak, I think that if you have some biding concern please put them in writing and send it to us. And, we will try to incorporate those ideas if they don't get incorporated.

And then on the last day my staff and I will get together and I will try and to summarize what we think we have heard and what we will try to do as a result of the conference.

At this point I would like to introduce Margaret Stasikowski who will give you the overview. When she is finished we will take a break and then we'll get directly into the proceedings of the conference.

Thank you.

CONFERENCE INTRODUCTION

Margaret Stasikowski
Director, Health and Ecological Criteria Division, OST
U.S. EPA

Good morning. I would like to add my welcome to that of Administrator Browner and Dr. Davies. We have a very full program for you over the next three days and I think you will find the program both interesting and challenging. The administrator has talked about the need for a comprehensive approach in dealing with environmental problems. She has described the environment as a system that requires an integrated approach to pollution prevention and control. This conference focuses on these needs and will attempt to point the way to the development of new concepts and tools for addressing ecosystem issues in watersheds. I will give you a brief summary of my presentation. We will talk about the purpose of the conference, provide you with some historical context for where we are in the clean water programs, talk about specific objectives of the conference, and give you an agenda for the next three days, emphasizing the critical points of each of the technical sessions.

Over the last few years at EPA and perhaps longer in the states, we realized that to continue to make progress in cleaning up our nation's waters, we need to emphasize watersheds as entities to be assessed and managed. Many of our scientific, technical and implementation tools, however, have been built for a program that placed emphasis on control of industrial discharges. The purpose of our conference is to describe the programs that we need to support the watershed based management of ecosystems. At the conference we will discuss with you the scientific tools that are needed to assess and manage the quality of ecosystems in watersheds. We will provide examples of how watershed based assessment and management can be done. I am sure these examples will be a forum for lively debates. The new science has no value unless it is used. Perhaps most importantly we want to talk with you about how to implement the new approaches and how to integrate them with our existing programs. We want your thoughts on how to include you the stakeholders when we develop guidance for assessment and management of ecosystems in watersheds.

Whenever I think about where the water quality programs, or for that matter any environmental program is, I find it useful to put it in its historical context. We can argue how far we need to go back, let's just say go back about 40 years to the time when environmental concerns rarely made the first page of the newspaper.

Appropriately, the focus of our early programs was to reduce the point source industrial discharges. These programs, as the Administrator has said, were largely successful. Together we have accomplished a lot. You cannot set rivers on fire anymore. Fish have come back to many of our water bodies. I understand that the Potomac River, for example, is one of the best places for bass fishing on the East Coast. Certainly that was not true 30-40 years ago. There are many stories of progress that we have made with technology-based and water quality-based programs. As we collect information about the environmental releases of chemicals, data sources like the Toxics Releases Inventory, show us that mass loadings of individual chemicals have been drastically reduced. And, as I have already mentioned, there are many signs of improvement. Each of you I am sure knows of successes that have occurred over the last 30 years. So far I talked about point source discharges of chemical pollutants, yet when you look at the objectives of the Clean Water Act they include chemical, biological and physical integrity and protection of human and ecological resources. We have not stopped ecological degradation of the watersheds. But that's not surprising because watershed quality depends on many influences beyond point source discharges of chemical pollutants.

Some of those influences are nutrients/over-enrichment, habitat degradation, alteration of water quantity and flow, and sedimentation. Non-point sources of pollutants are very important. How all of these influences interact and which one may be a key to degradation of an ecosystem is an important reason for us to move into watershed based assessment and management. To accomplish the objectives of the Clean Water Act, we must solve problems on the watershed level. Some of the assessment tools that we've developed in the past 20 years will need to be modified when we apply them to make assessment and management decisions in specific watersheds. There is a need for new tools that we do not have, and there is a need for implementation programs that may be somewhat different from what we have today.

So before we go to the agenda of the conference what are the objectives for the conference? We want to share with you the methods that we have under development to measure effects, and distribution of chemical, physical, and biological stressors on a watershed. We are going to discuss with you how these methods can be used in assessment of watersheds to examine impacts from multiple stressors to identify the relative importance of various stressors and how to identify key stressors for a specific watershed. We will discuss and seek your input on how watershed level assessment can be applied within our current laws, and how to implement effective watershed management.

CONFERENCE AGENDA

In the <u>first session</u> we will cover chemical pollutants commonly referred to as toxics, and how the program has and will continue to change in this area. For many reasons we have in the past concentrated on development of chemical criteria to protect human health and aquatic life in the water column. We're making a shift to develop criteria based on the transport and fate of pollutants. Even though past criteria have been specific numerical values, the science that supports them is not that precise. We want to and we will discuss with you some innovative approaches under development to deal with that imprecision. We will prioritize development of criteria to address the chemicals that pose the greatest risk to an ecosystem. We'll discuss development of criteria for those parts of the ecosystem most at risk. But we must move beyond chemical toxicity to address ecosystems in watersheds. You'll have an opportunity to explore that in our <u>second session.</u> Some of the key issues that we will cover during that session are:

Biological information can be an indicator of the condition of an aquatic ecosystem. This is the session where we will talk about the tools that are needed to address nutrients/over enrichment, habitat degradation, sedimentation, alteration of water quantity and flow. We will discuss how these tools differ from our traditional water quality criteria.

The third session is a link between development of tools to address individual problems and solving the right problems in the watershed. Most likely when addressing issues in the watershed one is looking at the complex situation. In this session we will describe what watershed ecological risk assessments are and we will have some examples of those. We will discuss the value of ecological risk assessments in understanding watershed problems. We will be addressing some complex issues, for example, endangered species. Ecological risk assessment methods can promote better watershed management. We will describe how that can be true.

Session four will be very interesting for many of you, it is where the rubber meets the road. How can these ideas be implemented by states? What will the state programs of the future look like? Well, we will discuss what a comprehensive state water management program may look like in the future. We know that to accomplish the many different objectives of a watershed management program, the definition of what a state program is may need to be broadened. We will also discuss whether and how much flexibility we already have in interpretation of current laws and policies.

But of course we have been conducting watershed assessment and management for some time already. It's actually through the use of those assessments that we learn what additional tools we need, and how critical it is to address ecosystem problems based on the watershed basis.

In our last technical session, session five, we will discuss how a watershed approach to risk management has been and is being used currently. We will describe how to use the tools we have and how future guidance will help to continue watershed protection. There will be a discussion of how important site-specific planning is to a successful watershed management activity.

At the end of our conference we will have a summary session with Dr. Davies. We will have a stakeholders session chaired by Dr. Southerland where we are looking forward to summaries of the sessions and your recommendations to us.

Session 1

New Ways To Evaluate Risk:

Moving Beyond Chemical Toxicity in the Water Column

NEW WAYS TO EVALUATE RISK: MOVING BEYOND CHEMICAL TOXICITY IN THE WATER COLUMN

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Abstract: This session covers background on the traditional Criteria—Standards—TMDL—Permits—Enforcement approach to water quality protection and how it is evolving to address the dispersion of contaminants through different media: water, sediments, air, and tissue. The session provides information on how criteria can be used to address effects from pollutants in media other than the water column and provides approaches on how to use criteria to solve environmental problems. The session will include a review of the environmental gains and benefits of chemical water quality criteria achieved to date and gives insight on how chemical water quality criteria may be developed and applied in the future.

SUMMARY

Introduction

This session explains the background of traditional water quality criteria and how the criteria are evolving to address multi-media stresses

Criteria that are used to assess water quality now or will be used in the future include:

- human health criteria
- aquatic health criteria
- sediment criteria
- wildlife health criteria

The panel for Session 1 will discuss EPA's long term water quality goals. The panel includes representatives from the following:

- state agencies
- industry
- environmental groups

The panel will give recommendations on EPA's future direction on water quality criteria.

Session I

Discussion

EPA's long-term goals and future directions
Toxics criteria and assessment tools
move beyond water column toxicity

Historical criteria

mainly concerned with water column toxicity
limited to two criteria - human health and aquatic life criteria

New direction - branch off to other areas where pollutants occur and cause effects

Improve existing Aquatic Life assessment methods
Improve existing Human Health assessment methods

New assessment methods:

sediment
wildlife
bioaccumulation
nutrient criteria

Goals of EPA

Maximize protection of aquatic dependent resources
Develop and apply most appropriate tools to implement an integrated watershed approach
Emphasize areas that will allow us to achieve greatest environment benefit

Toxics Strategy

determine areas of impairment
known impacts and effects
integrate effects information
use tools to evaluate

Pollutant analysis
mode of action + route of exposure --> fate and effects
must be conducted across media
must identify all risks and effects
adapt tools to address risk
define adverse impact based on exposure to populations

ex. Great Lakes - didn't pay enough attention to biological effects focused on reducing chemicals rather than achieving a desired goal.

may be better for EPA to specify ranges or procedures instead of hard/fast criteria.

Need to be innovative in methods development. Lab methods do not necessarily predict Field conditions or deliver exact effect information.

Integration and development:

Study interrelationships between water, sediments, food chains

This will allow EPA to avoid setting standards that overlap and avoid gaps in criteria

Look for potential for greatest environmental benefit
Consider resources needed to develop criteria to provide economically effective standards
Environmental gains can be made without all the information, so proceed forward with the information that is available, considering the uncertainties associated with the (amount or type) of data collected.

EPA Future Direction

Disinvestment:
mass production of criteria - instead, focus on key (those posing greatest risk) pollutants
non-integrated criteria (i.e. studying effects on aquatic health in absence of consideration of human health, wildlife, etc.

Investment:
Integrated assessments/approach
Methodology development
Leverage resources to impact major environment problems in order to gain the greatest impact with available resources

Are current resources being used in the most effective way?
Should methods being developed be more simplified?
What role do states, tribes, etc. play?

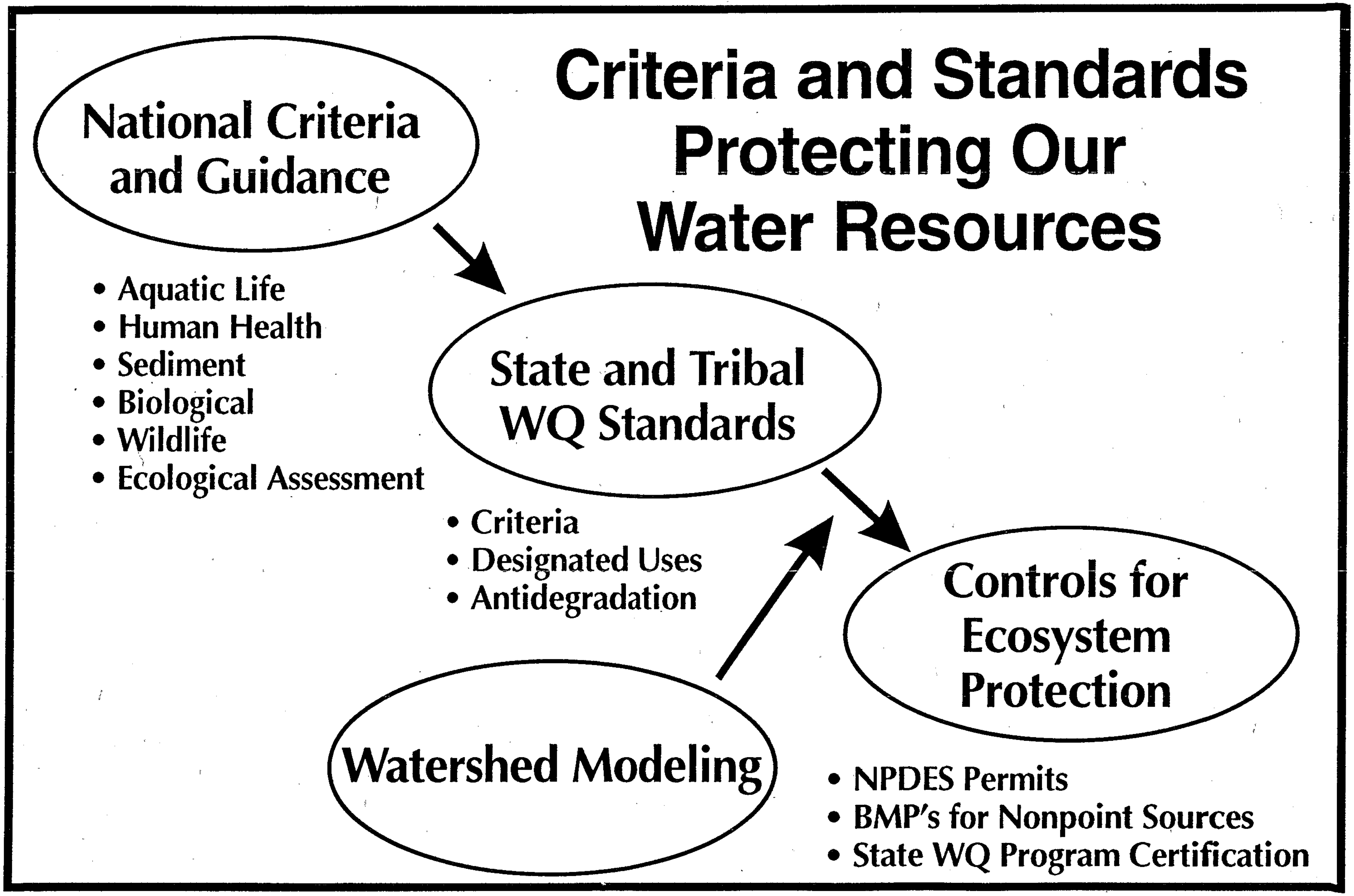
Current methodology may be too resource intensive for states/tribes to use without EPA assistance
Consider simplifying current methods if to be utilized by States alone.

Methodology development

future areas of emphasis:
chemical exposure analysis - across media
plant toxicity
bioaccumulation models/predictions
nutrients - beyond chemical aspects

Session I

New Ways to Evaluate Risk
- assess true fate and effects of pollutants
- innovative application of data to create tools
- integration to increase utility of toxics criteria
- More stakeholder participation


Criteria and Standards Protecting Our Water Resources
National Criteria and Guidance
• Aquatic Life
• Human Health
• Sediment
• Biological
• Wildlife
• Ecological Assessment
State and Tribal WQ Standards
• Criteria
• Designated Uses
• Antidegradation
Watershed Modeling
Controls for Ecosystem Protection
• NPDES Permits
• BMP's for Nonpoint Sources
• State WQ Program Certification

A DIFFERENT FOCUS FOR THE SCIENCE BEHIND CRITERIA

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Environmental Studies and Toxicology
National Research Council
Washington, DC

Abstract: New concepts and methods for assessing the risks that environmental toxicants pose to human health and ecological resources are needed, inevitable, and rapidly evolving. Although toxicological risk assessment is still an immature field of applied scientific practice, the enormous demand for such information brings impatient scrutiny and pressure for improvement, ready or not. Only a decade since the "red book" paradigm for risk assessment was proposed, revolutionary changes are underway on several fronts. Deficiencies in current risk assessment practices concerning default assumptions, uncertainty, and variability have been identified and are beginning to be addressed by EPA, Congress, and risk assessment practitioners. Efforts are also underway to remedy past overemphasis of human cancer risks; more robust and more effective approaches are being pursued in reproductive and developmental toxicology, neurotoxicology, immunotoxicology, and ecotoxicology. Within this context, some of the most important challenges and opportunities in risk assessment today are being posed by the group of phenomena associated with xenoestrogens and other hormone-related toxicants—sometimes called "endocrine disruptors"—in the environment. Various pesticides and industrial chemicals-especially certain persistent, bioaccumulating organohalogens—have been reported or suggested to produce reproductive impairment and developmental abnormalities in wildlife and a variety of developmental and other adverse health effects in humans through alterations of hormonal homeostasis. The need to understand and address these phenomena is likely to force development of new and more sophisticated risk assessment approaches with respect to elucidating toxicological and pharmacokinetic mechanisms, defining adverse effect "end points", integrating human health and ecological risk assessments, assessing multiple chemical exposures, and assessing environmental loading, transport, fate, ecological comparmentalization, and exposure pathways for environmental toxicants. These challenges potentially represent great opportunities for improving both risk assessment and regulatory practices.

Summary

EPA Office of Water is currently funding research in human and environmental effects of xenobiotics

NRC looking at new ways to evaluate risk

30 years ago there was no risk assessment

Session I

Only 11 years since development of Red book

Applied science struggles to attain creditability

Concerns expressed about risk assessment methods developed by EPA

Criticisms of EPA Risk Assessments:

Anti-regulatory: EPA is overregulating with overprotective results.

Multiple overprotective assumptions lead to over simplified results

Inflexible: resists scientific evidence unresponsive to additional scientific evidence

believe that uncertainty leads to excessive regulation of trivial risks.

Pro-regulatory:

insufficient attention to non-cancer health effects

risk assessment looks at one chemical at a time
should look at multiple effects

population variability
sensitivity of people tested should be looked at
less susceptive animals being looked at instead

ploys to delay regulations

scientific priesthood vs. public opinion

Risk assessment is still young, incorporated in many of the statutes

There is a strong movement to use risk assessment to comparatively rank regulatory initiatives

Last three EPA administrators moved forward to use risk assessment

National Research Council - not a government agency
serves as an advisor to government in scientific matters
strategically seeks to help advance scientific methods that help to assist public decision-making
NRC looking at:
biological markers
exposure assessment reports
variability of toxic effects - pesticides if diet of babies and children who are not

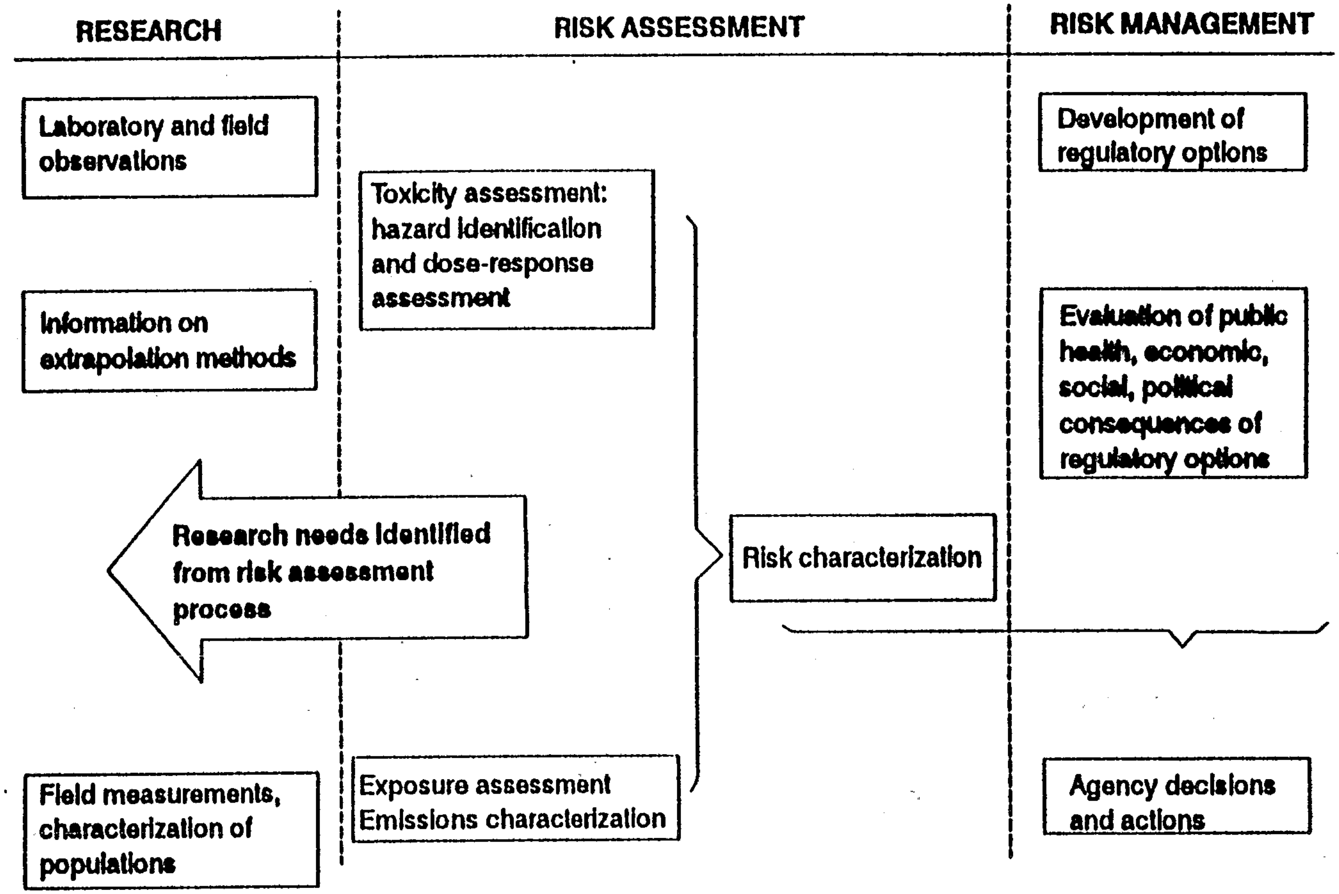
little adults, (physiology is different)
issues in risk assessment
paradigm for ecological risk assessments
applicability of carcinogenic risk assessment to ecological risk assessment
most important research to date was to evaluate EPA Red book risk assessment
Report: "Science and Judgment in Risk Assessment"
Looked at Red book paradigm
Risk assessment assumptions should be standardized

Recommended to EPA:
Document default options and assumptions
Document basis for arriving at an assumption and basis for departing from default
Continue using them
Need to stop cookie cutter assessment
process needs to be iterative to increase confidence - feedback to research to decrease uncertainty
Conduct formal uncertainty analyses

Science Policy Council presented plans for Agency to adopt recommendations of report

Xenobiotic Chemicals
mimic hormones and have important effects on developing organisms
affect all animals
masculinization
feminization
cancers, ectopic pregnancies
literature mostly anecdotal and speculative
no exposure assessment of endocrine disrupters
NRC will do a critical literature review
NRC will develop conceptual framework for looking at Xenobiotics
Beyond importance of toxic effects they see study of Xenobiotic toxicants as a challenge to:
advance risk assessment methods
look at toxicologic/pharmokenetic mechanisms
study adverse effect end-points
address human/ecological risk assessment
study multiple chemical exposures
study transport/fate/ecological compartmentalization

Move away from traditional water quality column criteria


RESEARCH
RISK ASSESSMENT
RISK MANAGEMENT
Laboratory and field observations
Information on extrapolation methods
Research needs identified from risk assessment process
Field measurements, characterization of populations
Toxicity assessment: hazard identification and dose-response assessment
Exposure assessment
Emissions characterization
Risk characterization
Development of regulatory options
Evaluation of public health, economic, social, political consequences of regulatory options
Agency decisions and actions

PAST RISK ASSESSMENTS DOMINATED BY USE OF DEFAULT OPTIONS

- Generic approaches, based on general knowledge, that are applied to various elements of the risk assessment process when specific knowledge is not available.

- Most common

  - Humans are as sensitive as the most sensitive animal species, strain or sex.

  - The biology, including the rate of metabolism of chemicals, in humans and laboratory animals is related to the body surface area.

  - Chemicals act like radiation at low exposures (doses) in inducing cancer, i.e., even intake of one molecule of a chemical has an associated probability for cancer induction that can be calculated.

DEFAULT OPTION DEPARTURES

- ALPHA-2μ-GLOBULIN FORMATION IN MALE RAT LIVER FOR UNLEADED GASOLINE, D-LIMONENE, AND OTHERS.

- METHYLENE CHLORIDE METABOLISM IN HUMANS. USE OF PHARMACOKINETIC (PB-PK) MODELS IN ESTIMATING UNIT RISK.

- FORMALDEHYDE MECHANISMS OF TOXICITY. DNA-PROTEIN CROSS-LINKS IN TARGET CELLS.

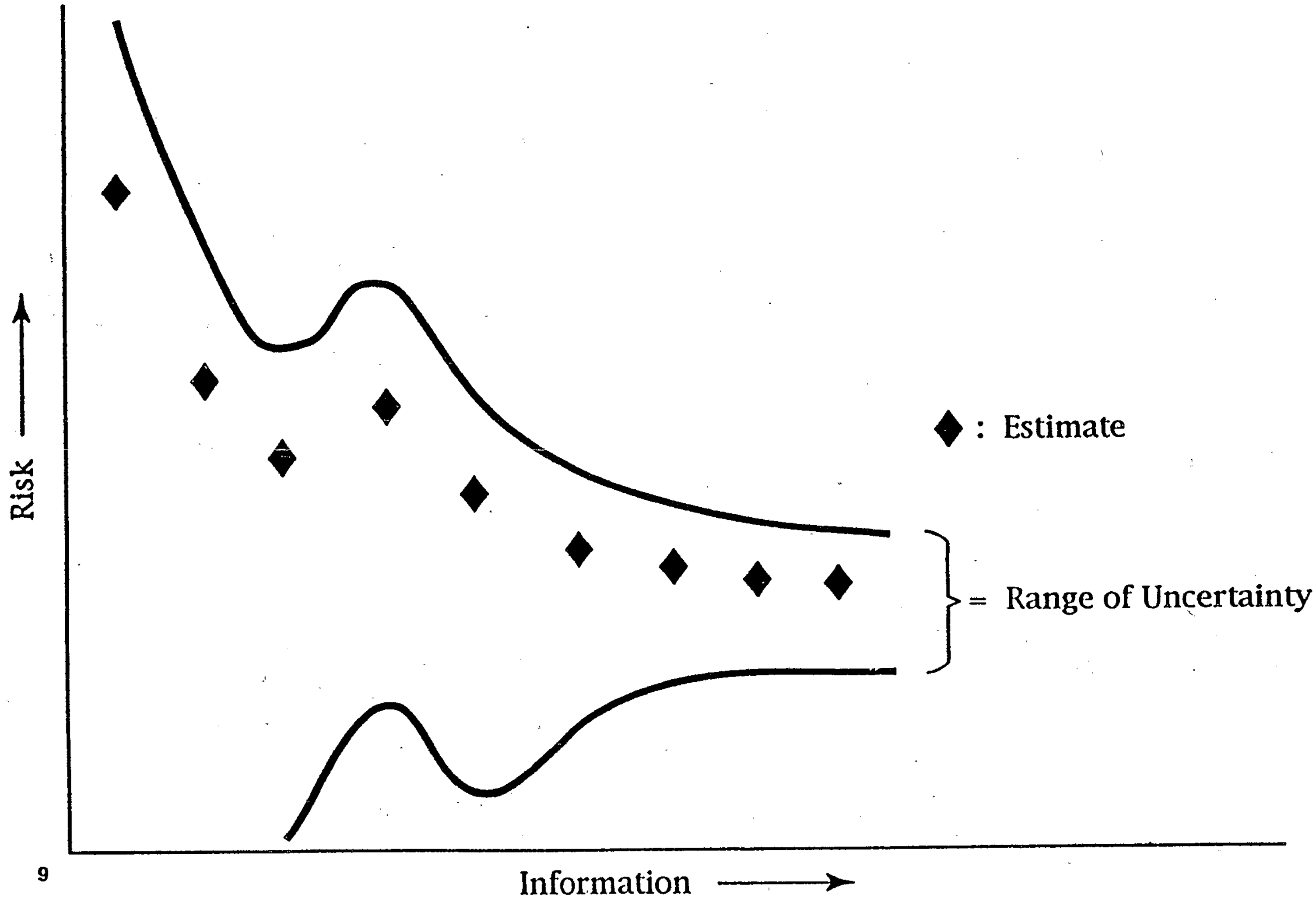
- CADMIUM BIOAVAILABILITY IN AIR, WATER, SOIL, AND FOOD.

DEFAULT OPTION RECOMMENDATIONS

EPA should:

- Continue to use default options as a reasonable way to deal with uncertainty about underlying mechanisms in selecting methods and models for use in risk assessment
- Should explicitly identify each use of default options in risk assessment
- Should clearly state the scientific and policy basis for each default option
- Should attempt to give greater formality to its criteria for departure from default options
- Should continue to use the Scientific Advisory Board and other expert bodies to provide peer review

THE ITERATIVE APPROACH



UNCERTAINTY

EPA should:

- conduct formal uncertainty analyses, which can show where additional research might resolve major uncertainties and where it might not

- consider the limits of scientific knowledge

- develop guidelines for quantifying and communicating uncertainty (e.g., for models and data sets) as it occurs in each step in the risk assessment process

- when ranking risks, consider the uncertainties in each estimate, rather than ranking solely on the basis of point estimate values

Summary: Central Themes (Chapter 12, p. 18-19)

- EPA should retain its conservative, default-based approach to risk assessment for screening analysis; however, corrective actions are needed.
- EPA should rely more on scientific judgment and less on rigid procedures by taking an iterative approach.
- EPA should provide justification for its current defaults and should set up a procedure that permits departures from the default options.
- When reporting estimates of risk to decision-makers and the public, EPA should report not only point estimates of risk but also the sources and magnitudes of uncertainty associated with these estimates.

Report of the EPA Science Policy Council on the National Research Council Report "Science & Judgment in Risk Assessment" May 31, 1994

"The NRC report contains a comprehensive analysis of the state of the science of cancer-risk assessment and its uses in relation to decision-making at EPA."

"The SPC agrees with the general course of action that the NRC advocates. In particular, we view the 70 recommendations, taken together, as providing a sound conceptual framework for our continuing efforts to upgrade health-risk assessments (ie, both cancer and non-cancer hazards), strengthen the linkages between risk assessment and risk management, and improve the ways EPA communicates about risk with all interested parties."

"The recommendations cover a wide variety of objectives from near-term methodological refinements to long-term research. Although some of the recommendations can be implemented in the short term, a comprehensive response will require a sustained resource-intensive effort for the forseeable future."

"The SPC believes that the combination of the NRC report and our proposed response constitute a realistic, multifaceted approach to improving both our capability for health-risk assessment and its applications in support of environmental protection."

Herbicides

2,4-D
2,4,5-T
Alachlor
Amitrole
Atrazine
Metribuzin
Nitrofen
Trifluralin

Fungicides

Benomyl
Hexachlorobenzene
Mancozeb
Maneb
Metiram-complex
Tributyl tin
Zineb
Ziram

Insecticides

Beta-HCH
Carbaryl
Chlordane
Dicofol
Dieldrin
DDT and metabolites
Endosulfan
Heptachlor & epoxide
Lindane
Methomyl
Methoxychlor
Mirex
Oxychlordane
Parathion
Pyrethroids
Toxaphene
Transnonachlor

Industrial chemicals

Cadmium
Dioxin (2,3,7,8-TCDD)
Lead
Mercury
PBBs
PCBs
Pentachlorophenol
Penta- to nonylphenols
Phthalates
Styrenes

Nematocides

Aldicarb
DBCP

Toxicologic/Pharmacokinetic Mechanisms

Adverse Effect "End Points"

Human/Ecological Risk Assessment

Multiple Chemical Exposures

Transport/Fate/Compartmentalization

CRITERIA DEVELOPMENT PAST, PRESENT, AND FUTURE

New Ways to Evaluate Risk: Moving Beyond Chemical Toxicity in the Water Column

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The Water Quality-Based Approach in EPA Region 4: Environmental Gains, Barriers and Recommendations

> *"It is the mark of an instructed mind to rest easy with the degree of precision which the nature of the subject permits and not to seek an exactness where only an approximation of the truth is possible."*
>
> *- Aristotle -*

Background

During the past two decades, we have succeeded in reducing some forms of serious water pollution, especially from point sources (e.g., factories and sewage treatment plants)**[Adler, 1993]**. The Clean Water Act (CWA) was an appropriate law for responding to disasters like the burning of the Cuyahoga River in the summer of 1969. However, separate laws for water, air and land often shuffle pollution from air to water and from water to land instead of preventing it**[Browner, 1994]**.

Also during the last two decades, the EPA has developed water quality aquatic life and human health criteria for nearly 200 chemical entities and substances. The specific value for each substance adopted by EPA was based upon exhaustive examination of the existing scientific literature and knowledge of the particular chemical entity **[EPA, 1992]**. These criteria are the foundation for water quality-based control in NPDES permits.

Despite the progress that has been made in the area of criteria development for chemical toxicity in ambient waters and point source pollution control, there are over 65,000 chemicals registered for current use in the United States, with new ones added continuously. Many of these chemicals are released into the environment by discharges into air, water, sewer systems, land or subsurface. More than 1000 of these chemicals have been identified in the waters of the Great Lakes **[EPA, 1992]**.

Although the number of registered chemicals and types of chemicals found in surface waters continue to increase each year, the number of water quality criteria published by EPA over the last fifteen years have remained virtually unchanged. For example, the number of aquatic life chronic criteria for priority and non-priority pollutants with published criteria documents has only increased from 28 criteria in 1980 to 36 criteria in 1994 **[EPA, 1982; Wagener, personal communication, 1994]**. While the number of aquatic life criteria has remained relatively constant, the number of aquatic species used in data bases to support the criteria derivations has almost doubled from 99 in 1980 to 188 in 1994 **[EPA, 1982; Wagener, personal communication, 1994]**. Thus, the criteria that are in use today have been thoroughly researched but their development cannot keep pace with the growth of the chemical industry and when applied alone may not adequately protect aquatic and human health resources. If we are ever to achieve the CWA goal of restoring, protecting and maintaining the chemical, physical and biological integrity of the nation's waters, we must look beyond chemical toxicity in the water column alone to other appropriate water quality and ecosystem health measures.

Environmental Gains

Many of the gains in point source pollution control can be attributed to the water quality criteria and NPDES programs. At the regional level, we can examine progress that has been made through the implementation of aquatic life and human health criteria to control the potent carcinogen, dioxin. The adoption of water quality criteria for dioxin (2,3,7,8-TCDD) is an example of environmental gains that have resulted in Region IV at least partly from the implementation of these criteria. To date, 97% (37/38) of the bleach kraft mills in Region IV comply with State water quality standards for dioxin. In 1990, 30 mills in the Region discharged detectable levels of dioxin. Today, only 12 mills (30 %) discharge detectable levels of dioxin.

Correspondingly, fish consumption advisories for dioxin in Region IV have also decreased. In 1990 there were 13 advisories for dioxin in six of the Region IV States [AL(3), FL(2), MS(1), NC(5), SC(1), & TN(1)]. Today there are only 5 advisories for dioxin in four Region IV States [FL (1) MS (1), NC (2) and TN (1)]. Nationally, 22 States have fish advisories for dioxin. Despite this apparent progress, questions remain about endocrine, immunologic and reproductive effects that may be occurring at dioxin levels below analytical detection.

Other factors to consider when comparing fish consumption advisory information within a region or across the country include: 1) the procedures that States use to remove a fish consumption advisory can vary from State to State (some require several years worth of data to lift a ban whereas others may remove a ban after a single season of data collection), and 2) the source of the pollution responsible for the advisory may come wholly or in-part from an adjoining State.

Barriers to Meeting Clean Water Act Goals

In many respects we are actually losing ground in our efforts to restore aquatic ecosystem health. This problem is primarily due to massive pollution running off of farms, city streets and other intensive land uses (known as nonpoint source pollution or polluted runoff) coupled with large-scale destruction of wetlands, floodplains, stream channels, and other important aquatic habitat**[Adler, 1993]**. Without additional tools and resources, controlling runoff pollution will remain one of the nation's most formidable water quality challenges. Barriers to achieving results have included inadequate or incorrectly installed BMPs, the lack of biological criteria habitat criteria, nutrient criteria (including chl *a* criteria for lakes), wildlife criteria, sediment quality criteria, and endangered/threatened species criteria.

To overcome these barriers, we must release the shackles of single-media, pollutant-by-pollutant "tunnel vision," and embrace existing multi-media and pollution prevention alternatives. As a step in this direction, Region IV developed a multi-media screening inspection checklist for inspections in April, 1993. This checklist is required for at least 25% of the Region's inspections. Yet, coordinated inspections are only a first step because water quality problems are often complex and many require detailed assessments that go beyond the examination of chemical toxicity in the water column and extend into our air and land.

For example, in the 1992 EPA Great Waters Program Report mean concentrations of PCBs, dieldrin, dioxin (all isomers), DDT, chlordane, and mercury in rainfall were reported at levels above EPA water quality criteria. For PCBs, DDT and dioxin respectively, the mean concentrations in rain were 2-3 orders of magnitude greater than the human health criteria**[Eisenreich and Strachan, 1992; refer to table in the attached handouts]**. This information clearly indicates the need for multi-media approaches to environmental problem solving. We need to preserve and strengthen the principles of environmental protection while changing the means by which we achieve this protection.

Further, the recent development of statewide fish consumption advisories for mercury in Florida (1993) and South Carolina (1994) demonstrates the role chemical and biological processes play in adding complexity to a water resources problem**[Murphy, 1994 Draft Report; refer to map in the attached handouts]**. To date, at least 30 States are seeing elevated levels of mercury in fish. Agencies in Florida are currently working with EPA Region 4 on a regional environmental monitoring and assessment program (REMAP) project to characterize the existing sources of mercury. This information will be distributed to the States and Tribes as soon as it is available for release.

Other barriers include the overwhelming number of agencies and regulations that we must engage to address water quality issues. According to a report issued last year by Water Quality 2000, water quality issues are handled by 18 agencies in seven departments plus seven independent agencies with 25 separate water programs **[Newman, 1993]**. By necessity, environmental regulations have cropped up on an emergency basis, crisis by crisis, pollutant by pollutant. Today we have 16 major national environmental laws overseen by some 74 Congressional committees and subcommittees **[Browner, 1994]**. Too often, our environmental activities have been compartmentalized, law by law, pollutant by pollutant.

Recommendations for Overcoming Barriers and Implementing Change

We must recognize the integration of our air, water and land. The old way of regulating on a pollutant-by-pollutant basis is not enough to adequately protect watersheds and ecosystems.

In Chris Yoder's presentation on biological criteria-based experiences in Ohio at the 2nd National Water Quality Standards Conference held here in Arlington in December 1991, he provided a flow chart that illustrates in more detail the five major classes of variables influenced by human actions that impact biology and result in the degradation of water resources[**Yoder, 1991; Karr, 1986**]. One of the major findings of Ohio EPA's biological criteria analysis was the ability of the biota to detect impairment in the absence of chemical criteria exceedances. In the past, the NPDES program has focused heavily on chemical variables and flow regime and the related components in Yoder's flow chart. The other variables, however, biotic factors, energy source, and habitat structure have either wholly or somehow in-part been ignored.

To focus needed attention on these other variables, Karr more recently asked the rhetorical question, "What is the appropriate balance of monitoring approaches?[**Karr, 1993**]." To answer that question, EPA's 1990 National Program Guidance for Biological Criteria for Surface Waters, its 1991 Policy for Integration of Biological Assessments and Criteria in the Water Quality Program, and rapid bioassessment protocols recommend the three-legged stool analogy in which the three legs of the stool are the water monitoring approaches (e.g., the physical/chemical parameters of traditional water chemistry, toxicity testing, and ambient biomonitoring). In the stool analogy, equal weight is given to each of the criteria. This policy is often referred to as that of independent application:

> Since each type of criteria (biological criteria, chemical-specific criteria, or whole effluent toxicity evaluations) has different sensitivities and purposes, a criterion may fail to detect real impairments when used alone. As a result, these methods should be used together in an integrated water quality assessment, each providing an independent evaluation of nonattainment of a designated use.

According to Karr, the stool analogy is inadequate. Karr argues his case for a balanced approach and compares this situation to a tripod supporting a spotting scope. In his words, "to see a distant bird (or focus on a water resource problem), one must adjust the lengths of the three legs to accommodate the terrain (or the nature of the water resource problem)[**Karr, 1993**].

When we consider the additional tools and resources that must be developed by the 21st century to adequately protect human and ecosystem health, we can imagine the advances that Karr's spotting scope or tripod analogy will have made. We hopefully will have added supporting sections to each leg of the tripod so that we can successfully record resource degradation as it occurs and successfully measure environmental improvements after the appropriate restoration techniques have been employed. By the 21st century, the water chemistry leg of the tripod could include sediment, nutrient and wildlife criteria in addition to aquatic life and human health criteria. The toxicity testing leg of the tripod could include other methods for deriving site-specific criteria, including the water-effects ratio (WER). And finally, the ambient biological monitoring leg of the tripod could and hopefully will include habitat criteria in addition to the existing narrative and numeric biological criteria for all aquatic resource types: streams, lakes, large rivers, estuaries, and wetlands. Each section of the tripod's three legs would be available to describe the nature of the water resource problem and also measure the degrees of success in attempting to restore the water resource to a pristine or least-impacted reference condition.

Looking ahead, a watershed protection approach (WPA) that includes basin planning and permitting, improved effluent guidelines like those proposed for the pulp and paper industry and those being developed as part of the Administrator's "Common Sense Initiative", and a strengthened whole effluent toxicity (WET) program coupled with the water quality standards described above should improve our ability to define problems and evaluate ecosystem health. For example, EPA's pulp and paper industry proposed effluent guidelines should virtually eliminate (to detectable levels) all dioxin discharges from industry to water**[FR 66078-66216FR, 1993]**. The American Forest and Paper Association has noted the industry's pledge to cut dioxin emissions to non-detect levels at all US bleach kraft pulp mills by 1996. These guidelines expect to significantly reduce the discharge of toxic pollutants by 3,000 metric tons/year and conventional pollutants by 200,000 metric tons/year. The guidelines further hope to decrease toxic air emissions by 70% of current levels.

This approach will hopefully move us closer to one of the goals of the CWA: zero discharge of pollutants by 1985. By jointly providing air and water requirements, EPA is promoting pollution prevention while allowing industry to more effectively plan compliance strategies. This integrated approach focuses on the multi-media nature of pollution control and allows each facility to determine the pollution control approaches that should be implemented.

Several States in Region IV have embarked on geographic or "place-based" approaches to address both point source and nonpoint source inputs into a watershed or river basin. As one example in Georgia and South Carolina, a comprehensive assessment of water quality conditions in the Savannah River watershed has been underway since 1990. Recent discussions with stakeholders in the basin have yielded a comprehensive list of environmental issues, including:

- Fisheries impacts due to poor water quality
- Low dissolved oxygen (D.O.) in Savannah River and Estuary
- Nonpoint source (NPS) impacts from forestry, agriculture, and urban land use
- Sedimentation impacts in estuary yielding navigation problems and increased dredging
- Modification and physical changes in estuary
- Point source (PS) discharge impacts
- Habitat alteration/destruction
- Sediment quality
- Urban stormwater impacts on river and estuary systems

A multi-agency/organization effort with stakeholders in the basin is underway to plan and organize a comprehensive and integrated watershed project that is consistent with the WPA. Actions are underway to develop a Watershed Management Plan that includes input on priority actions from all basin stakeholders. There is a great deal of interest in coordinated management of the natural resources of the Savannah River basin, and the many stakeholders in the basin are committed to participation in project management, planning and implementation.
This effort includes the coordination of analyses in the basin by both States, a Regional EMAP Study evaluating the biological integrity of streams and lakes in the basin, and a use

attainability analysis (UAA) for the Savannah Harbor. The UAA hopes to 1) develop harbor criteria for protection of the endangered shortnose sturgeon and other estuarine species and 2) develop a dynamic flow, water quality and sediment model to evaluate the effects of existing stressors, and to also predict the effects of and allocate future pollutant loadings for Total Maximum Daily Loads (TMDLs).

Section 303(d) of the CWA has resulted in the initiation of over 40 TMDLs in Region 4 (to be completed by FY 1996), in which the wasteload allocation for point sources and the load allocation for nonpoint sources for specific stream reaches has been or is being determined. The TMDL process affords a more holistic, multi-source approach to basinwide permitting. In the coming years, we must look at how the changes in the way we derive criteria (including biological and habitat criteria) factor into the TMDL process.

Another approach to addressing the presence of toxic chemicals in toxic amounts that has gained favor in recent years is the implementation of WET limits in NPDES permits. WET tests have the advantages of measuring the combined effects of many potentially toxic substances in an effluent and provide an integrated assessment of the potential toxic effects of effluent discharges on receiving waters. Some of the other advantages of WET tests are that they address unknown toxicants through toxicity identification and toxicity reduction evaluations (TIE/TREs), provide a measure of bioavailability, and can accurately predict impacts to biota. We need to investigate the application of WET into the criteria and standards programs.

Through 1992, Region 4 States had issued over 1000 NPDES permits with WET limits **[Hyatt, personal communication, 1994]**. In 1992 there were about 2500 NPDES permits with WET limits nationally with about 290 labs conducting the tests **[Peltier, personal communication, 1994]**. North Carolina WET program compliance for industrial facilities and POTWs is currently about 89% and 91%, respectively **[Ausley, personal communication, 1994]**. An important component of any WET program is the proper implementation of a quality assurance/quality control (QA/QC) program in which an unknown toxicant is sent to laboratories for testing with each species used in their toxicity program. Companion to QA/QC procedures is a commercial laboratory certification process. EPA currently has no commercial laboratory certification process. However, some States do have lab certifications and a fee is charged.

Finally, despite attempts to meet the goals of the CWA for over 20 years, we still have a long way to go. Although the failures of the CWA outweigh the handful of successes, we must "never give up" and remain committed to restoring the chemical, physical and biological integrity of the nations waters with improved water quality tools and approaches that we must continue to refine into the 21st century.

Acknowledgements

The author acknowledges the following folks, without whose help and support this presentation and paper would not have been possible: The Region 4 Water Quality Standards Section (Lydia Dow, Joel Hansel, Jim Harrison, Keeva Lloyd, Edyth McClusky, Fritz Wagener, and Eve Zimmerman), Meredith Anderson, Jim Greenfield, Marshall Hyatt, Amy Leaberry, Bill

Peltier, Larry Ausley, Dan Scheidt, Karrie-Jo Shell, Dee Stewart, Allan Antley, and last but not least, Mike McGhee.

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The Water Quality-Based Approach in EPA Region 4: Environmental Gains, Barriers and Recommendations

Water Quality Criteria and Standards for the 21st Century

4th National Conference

Morris C. Flexner

Water Management Division

EPA's Water Quality Criteria Development

In the past 20 years:
Criteria developed for nearly 200 chemicals.

Basis: exhaustive examination of the scientific literature and knowledge of the properties of each chemical.

Resulting in EPA's water quality criteria calculator...

From Chapter 2.2, Exposure and Effects of Airborne Contamination for the Great Waters Program Report, USEPA, December 1992.

Comparison of Aquatic Life Criteria 1980 vs. 1994

Number of Aquatic Life Chronic Criteria for Priority and Non-Priority Pollutants (with Published Criteria Documents)*

	1980	1994
Priority Pollutants	28	29
Non-Priority Pollutants	0	7
Total	28	36

* (does not include 1976 Red Book criteria)

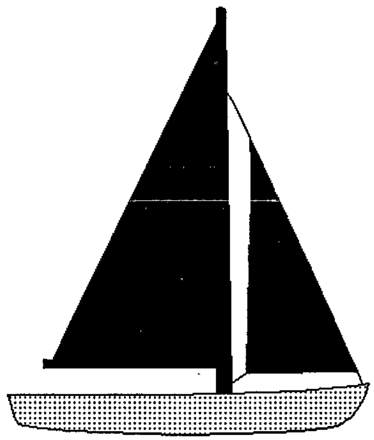
Comparison of Aquatic Species Used in Acute Criteria Derivations 1980 vs. 1994

Number of Individual Aquatic Species Used in Data Bases (Table 3) for Criteria Derivations

1980	1994
99*	188

*** From Recalculation of State Toxic Criteria, USEPA, October 1992**

Environmental Gains



Region 4 Water Quality Criteria for Dioxin

- Implementing State criteria for dioxin reduced the number of paper mills in the Region discharging detectable levels of dioxin by 60% (from 30 mills in 1990 to 12 mills in 1994).

- 97% (37/38) of the bleach kraft mills in Region 4 currently comply with their State water quality standards for dioxin.

- Despite this apparent progress, questions remain about endocrine, immunologic and reproductive effects that may be occurring at dioxin levels below analytical detection.

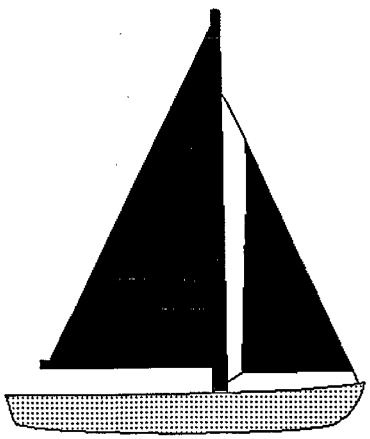
Fish Consumption Advisories for Dioxin in Region 4

13 advisories in 1990 to 5 in 1994.

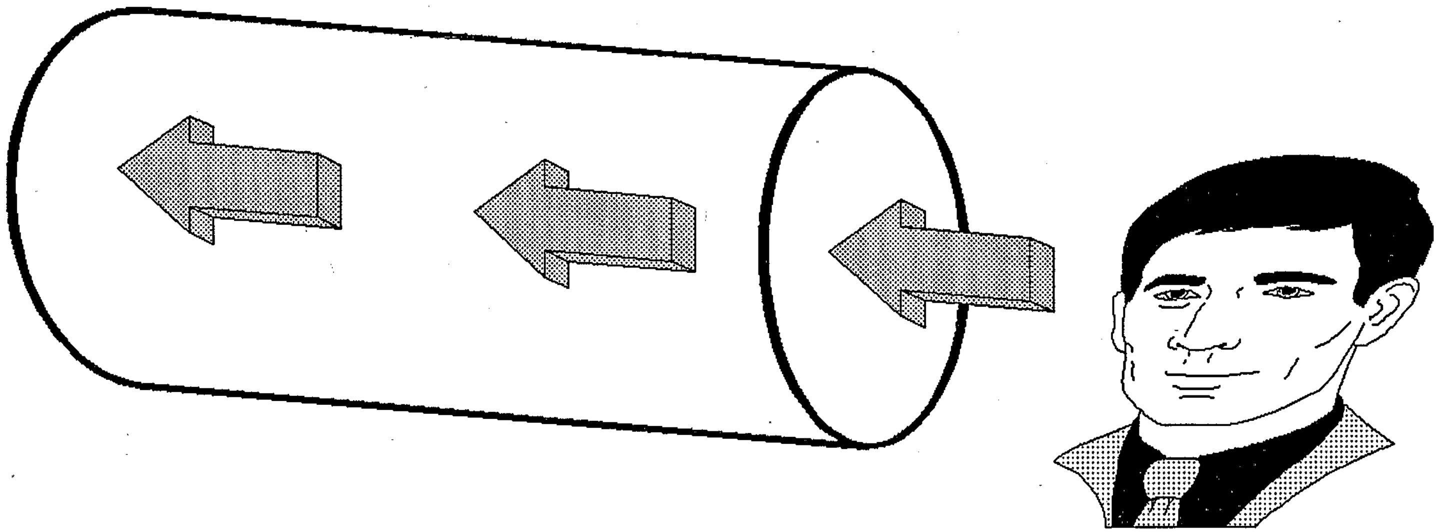
# of Advisories

State	1990	1994
Alabama	3	0
Florida	2	1
Mississippi	1	1
North Carolina	5	2
South Carolina	1	0
Tennessee	1	1
Total	13	5

Barriers to Implementation



Tunnel Vision



Separate laws for water, air and land shuffle pollution from air to water and from water to land instead of preventing it.

Compounds Measured in Rainfall Exceeded Water Quality Criteria in the Great Lakes Region

- Regulating point sources on a pollutant-by-pollutant basis may not adequately protect watersheds and ecosystems. We need to recognize the integration of our air, water and land.

- Example 1992 EPA Great Waters Program Report: mean concentrations of PCBs, dieldrin, dioxin (all isomers), DDT, toxaphene, and mercury in rain were reported at levels above EPA water quality criteria.*

*From Eisenreich and Strachan 1992, as reported in Chapter 2.2, Exposure and Effects of Airborne Contamination for the Great Waters Program Report, USEPA, December 1992.

Rainfall Concentrations vs. Water Quality Criteria (All Values μg/l)

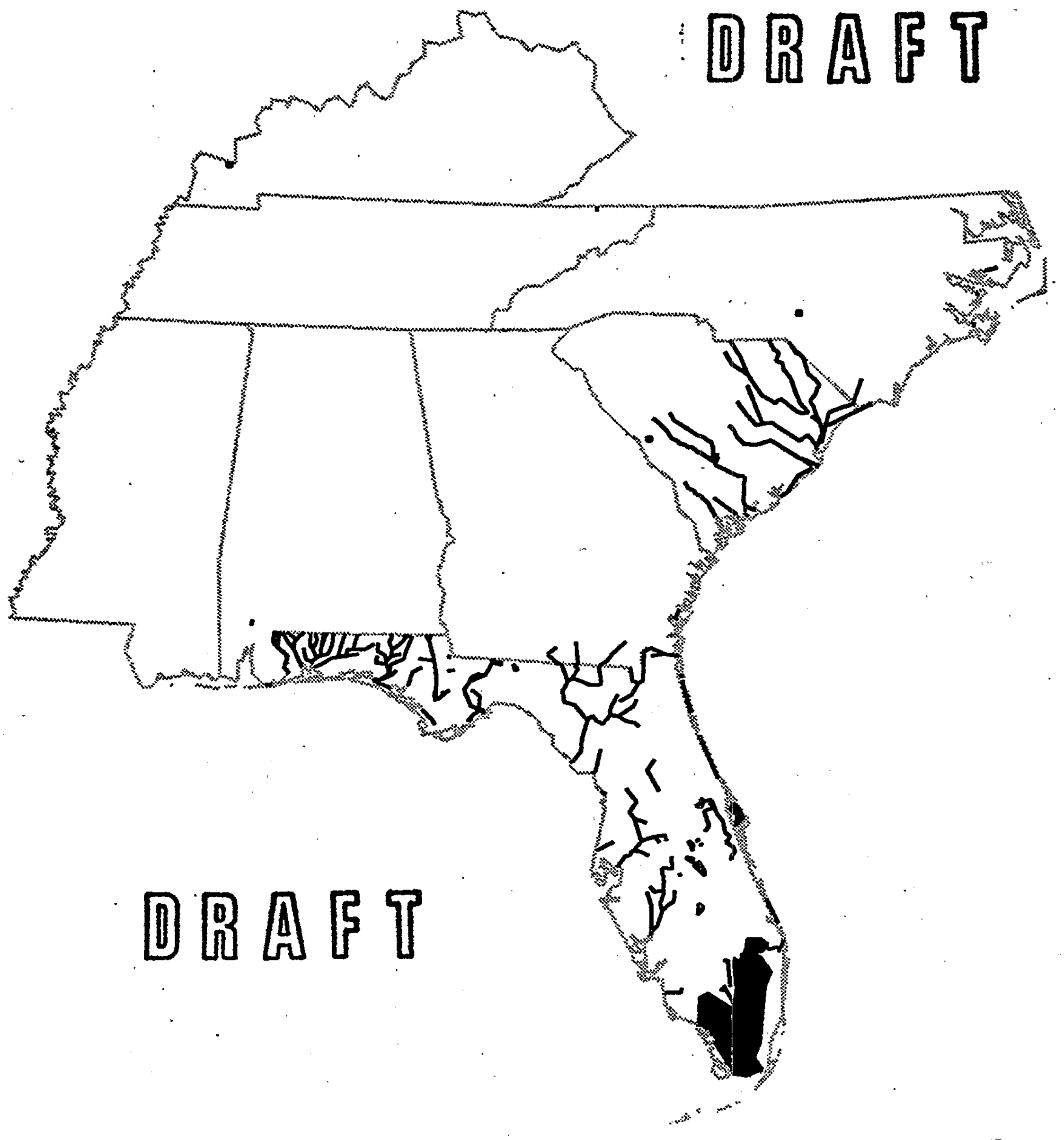
C M P D.	Aquatic Life Criteria				Human Health 10^{-6}				Estimated Mean Conc. in Rainfall
					Published		IRIS		
	Acute Fresh	Chron Fresh	Acute MAR	Chron MAR	W&O	O/O	W&O	O/O	
PCBs TOT.	2.0	0.014	10.0	0.03	$7.9E^{-5}$	$7.9E^{-5}$	——	——	0.003
Diel-drin	2.5	0.0019	0.71	0.0019	$7.1E^{-5}$	$7.6E^{-5}$	$1.4E^{-4}$	$1.4E^{-4}$	0.0006
2378-TCDD	<0.01	$<1.0E^{-5}$	——	——	$1.3E^{-8}$	$1.4E^{-8}$	——	——	$4.0E^{-5}$
DDT	1.1	0.001	0.13	0.001	$2.4E^{-5}$	$2.4E^{-5}$	$5.9E^{-4}$	$5.9E^{-4}$	0.001
Toxa-phene	0.73	0.0002	0.21	0.0002	$7.1E^{-4}$	$7.3E^{-4}$	$7.3E^{-4}$	$7.5E^{-4}$	0.0006
Hg	2.4	0.012	2.1	0.025	0.144	0.146	0.14	0.15	0.025

Complex Environmental Problems Require Detailed Assessments

Water quality problems are often complex.

Many require detailed assessments going beyond examination of chemical toxicity in the water column.

MERCURY IN FISH ADVISORIES
REGION IV



Restoration of Aquatic Ecosystem Health Continues to be Impeded by Runoff Pollution, Wetlands and Habitat Loss

- Additional tools and resources are needed to control runoff pollution and mitigate the destruction of wetlands.

- Barriers to achieving and measuring results have included the lack of:
  - -Adequate and correctly installed BMPs
  - -Biological criteria (narrative and numeric)
  - -Habitat criteria (riparian and in-stream)
  - -Nutrient criteria (including chl a criteria for lakes)
  - -Wildlife criteria (Great Lakes model)
  - -Sediment quality criteria (National Inventory)
  - -Endangered/threatened species criteria (MOA)

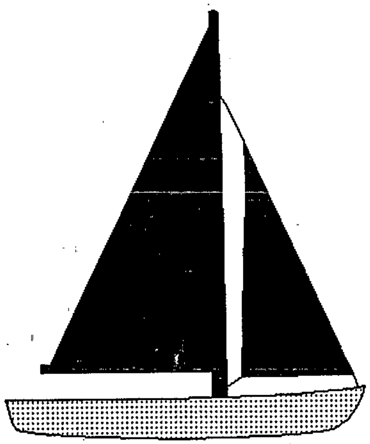
Too Many Agencies and Regulations!

- Water quality issues are handled by 18 federal agencies in seven departments plus seven independent agencies with 25 separate water programs.[1]
- Today we have 16 major national environmental laws overseen by some 74 Congressional committees and subcomittees.[2]
- Number of water-related lawsuits nationally and within Region 4?

[1] From *A National Water Agenda for the 21st Century*, Water Quality 2000, November 1993.
[2] From *The Common Sense Initiative*, Newsmaker Luncheon, July 1994.


THESE ARE THE COMMANDMENTS .....
THOSE OVER THERE ARE THE GOVERNMENT REGULATIONS THAT GO WITH THEM

Recommendations



PULP AND PAPER INDUSTRY PROPOSED RULE

- **For the first time, EPA is proposing an integrated regulation that includes guidelines and standards to control the release of pollutants to the water <u>and air</u> from one industry.**

- **By jointly providing air and water requirements, EPA is promoting pollution prevention while allowing industry to more effectively plan compliance strategies.**

- **This integrated approach focuses on the multi-media nature of pollution control and allows each facility to determine the pollution control approaches that should be implemented.**

PULP AND PAPER INDUSTRY PROPOSED RULE

Estimated Costs (Rough) and Expectations

- EPA's estimates a $4 billion capital investment cost and $600 million in annual operating expenditures for industry.
  - -70% (2.8 billion) of this cost will be due to the water related part of the rule.
  - -30% (1.2 billion) of this cost will be due to the air related part of the rule.
- EPA expects the rule to:
  - -Virtually eliminate (to non-detectable levels) all dioxin discharges from industry to water.
  - -Significantly reduce the discharge of toxic pollutants (3,000 metric tons/year) and conventional pollutants (200,000 metric tons/year).
  - -Decrease toxic air emissions by 70% of current levels.

Savannah River Watershed Project

Effort includes: the coordination, since 1990, of analyses in the basin by Georgia and South Carolina; Regional EMAP Study focusing on ecological condition and a use attainability analysis (UAA) for the Savannah Harbor.

Savannah Harbor UAA

The UAA plans to develop: harbor D.O. criteria to protect the shortnosed sturgeon and other estuarine species; a dynamic flow, water quality and sediment model to evaluate the effects of the existing stressors, and allocate future loadings for TMDLs.

Whole Effluent Toxicity (WET) Program

Wet tests measure aggregate toxicity, address unknown toxicants through TIE/TRE procedures, provide a measure of bioavailability and they can accurately predict impacts.

In North Carolina in 1992, WET program compliance for industrial facilities and POTWs was 80% and 89%, respectively.

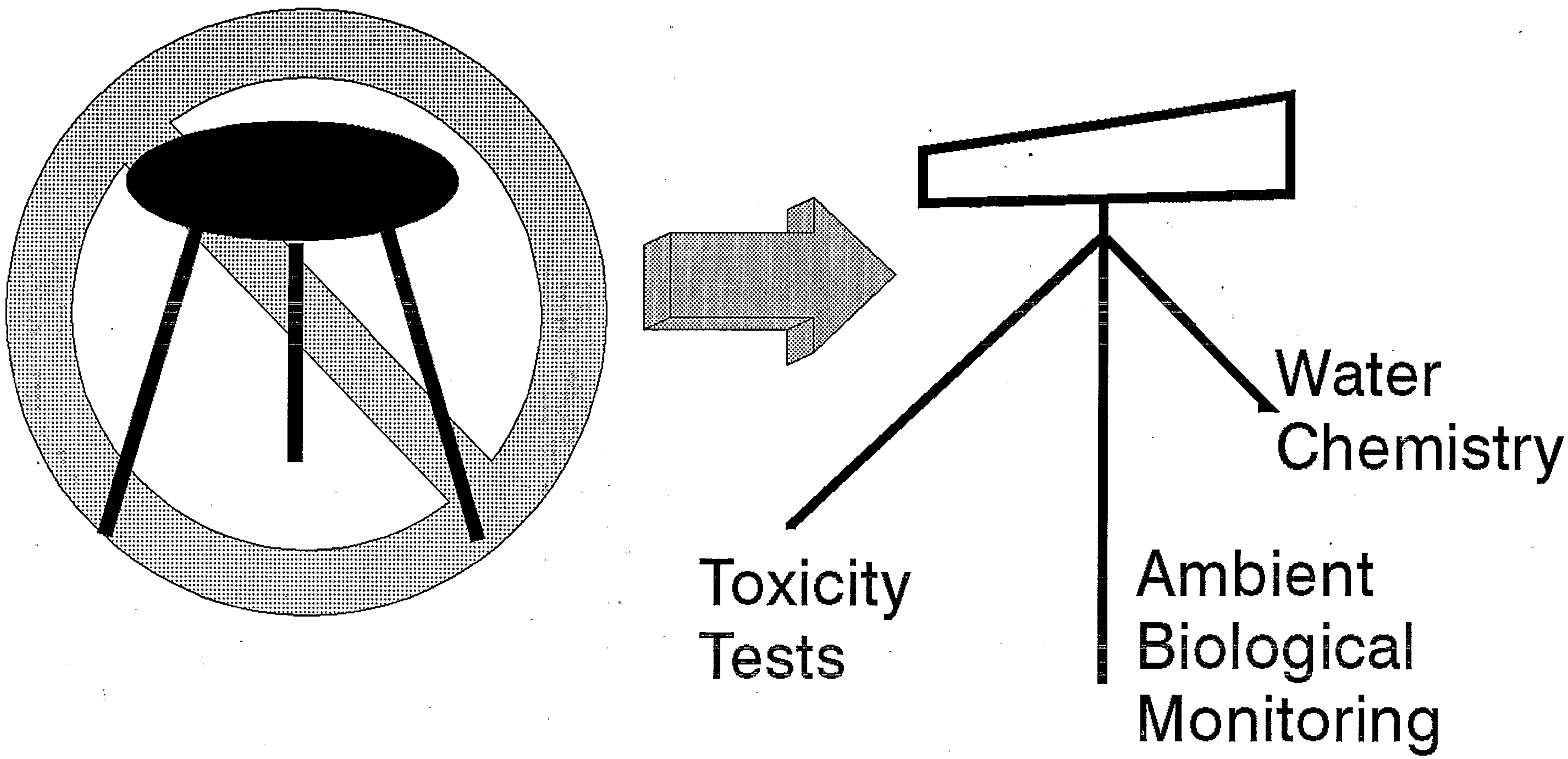
WET DMR-QA Program

An unknown toxicant is sent to laboratories for testing with each species used in their toxicity program. In 1992 there were about 2500 NPDES Permits with WET Limits with about 290 labs conducting tests.

Commercial Laboratory Certification

EPA currently has no commercial laboratory certification process. However, some States do have lab certifications and a fee is charged.

*What is the Appropriate Balance of Monitoring Approaches?**



* **From Karr, J.R., Defining and Assessing Ecological Integrity: Beyond Water Quality, Env. Toxic. and Chem., Vol. 12, 1993**


Don't ever give up

FROM SOURCES TO FATE AND EFFECTS: AN INTEGRATED APPROACH TO MERCURY CONTROL

Edward B. Swain
Research Scientist
Minnesota Pollution Control Agency
St. Paul, MN

Abstract: It is entirely possible for all point discharges to meet the EPA criterion for mercury but for the water body to yield fish that exceed fish consumption advisories. The EPA mercury criterion is outdated in light of recent data and is too high at 12 ng/L. The current national criterion does not account for food chain sources of mercury, which are now thought to be the main source of mercury to fish. Certainly some lakes that have ambient levels of only 1 to 2 ng/L produce fish that have high mercury concentrations. On the other hand, the bioaccumulation factor (BAF) varies a great deal from lake to lake and is difficult to predict because background chemistry affects the BAF to a great degree. Some of this variability is doubtless from differences in the efficiency of methylation of mercury in a given lake, because only methyl mercury bioaccumulates in the food chain.

Even if water quality managers reduced mercury to zero in point discharges, fish may still exceed the FDA action level of 1.0 ppm. Nonpoint sources of mercury have been shown to be the origin of mercury contamination of a broad range of lakes, ranging from small seepage lakes in Wisconsin to Lake Superior. Although geological sources may be significant in a few parts of the world, most of the nonpoint mercury is deposited from the atmosphere to soils, where a portion (about 20 percent) is transported to lakes and streams. Once in water, a small but variable proportion (about ten percent) is methylated and can be bioaccumulated. Some of the mercury evades back to the atmosphere, but the majority falls to the bottom of the lake. It is likely that little of the sedimentary mercury is available to the food chain. The connection between air emissions and fish mercury is highly complicated and subject to mechanisms that would require considerable research for a full understanding. For instance, it is unclear how mercury vapor is removed from the atmosphere. Mercury vapor needs to be converted to a water soluble form to be washed out, but dry deposition may be a significant mechanism. Some mercury is emitted in a water-soluble form, so that deposition around some sources may be enhanced.

It would be possible to research the mercury path between air and fish for years and not be able to construct a useful mechanistic model. We do know, however, that most of the mercury in the atmosphere is human-generated, and that reducing emissions will reduce fish contamination. Air emissions are split between energy production and product manufacturing/disposal. Water managers need to work with air and solid waste managers in their pursuit of mercury control. Point source control, while necessary, is not sufficient to reduce mercury to acceptable levels.

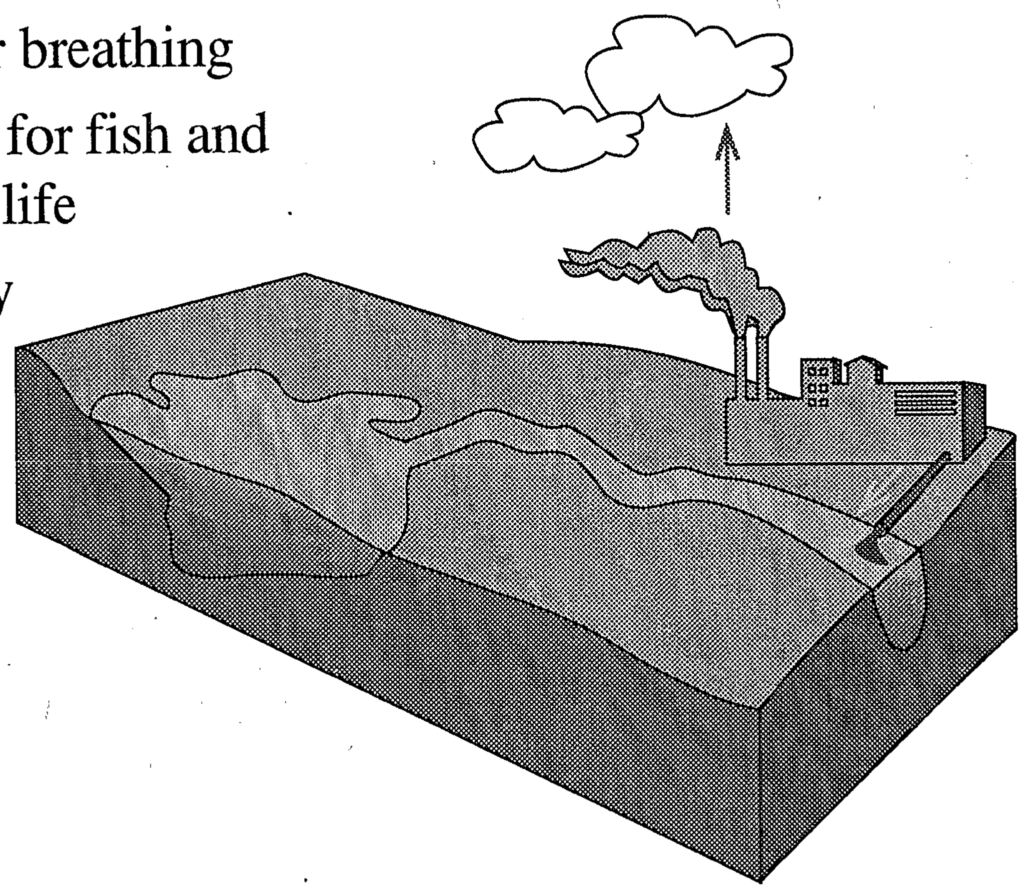
Session I

The EPA should provide leadership for integrated approaches to airborne pollutants such as mercury. Communication among EPA's water, air, and solid waste offices should be fostered. A mechanism to coordinate guidance and rules should be established.

MPCA

Old Mercury Paradigms

- Protect air for breathing
- Protect water for fish and other aquatic life
- Treat mercury at point sources



MPCA

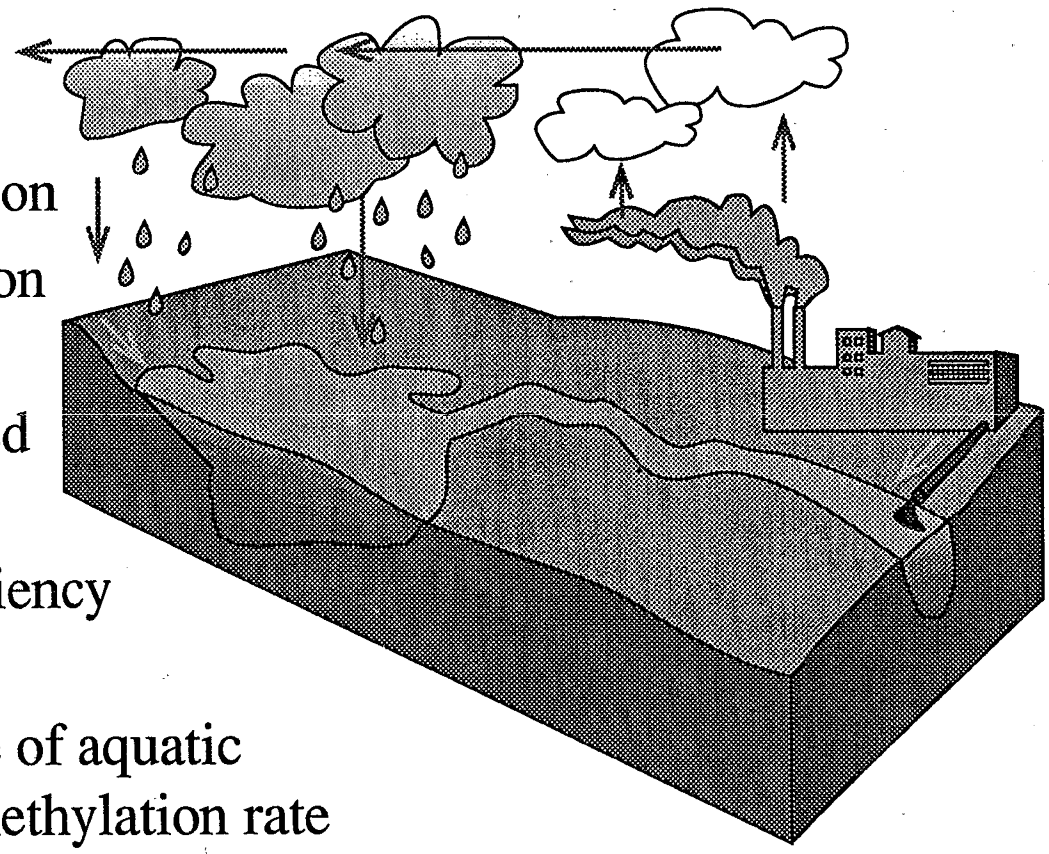
Old Mercury Paradigms Result

- Treatment just moves mercury around
- Bioaccumulation concentrates mercury to toxic levels
- Too much mercury remains in the environment

MPCA

New Mercury Paradigms

- Control mass released as well as concentration
  (Dilution does not solve this pollution problem)
- Reduce mercury release through pollution prevention
- Non-point pollution is a major source
- Air emissions need to be reduced
- Methylation efficiency is variable
- Physical structure of aquatic systems affects methylation rate



MPCA

Physical Structure of Aquatic Systems Affects Methylation Rate

- Methylation occurs at anoxic/oxic boundary
- Methyl mercury can accumulate in the hypolimnion
- Methylation rate much higher in wetlands
- Watersheds deliver about 20% of atmospheric loading

MPCA

Factors negatively correlated with mercury contamination in fish

- Alkalinity
- pH
- Phosphorus

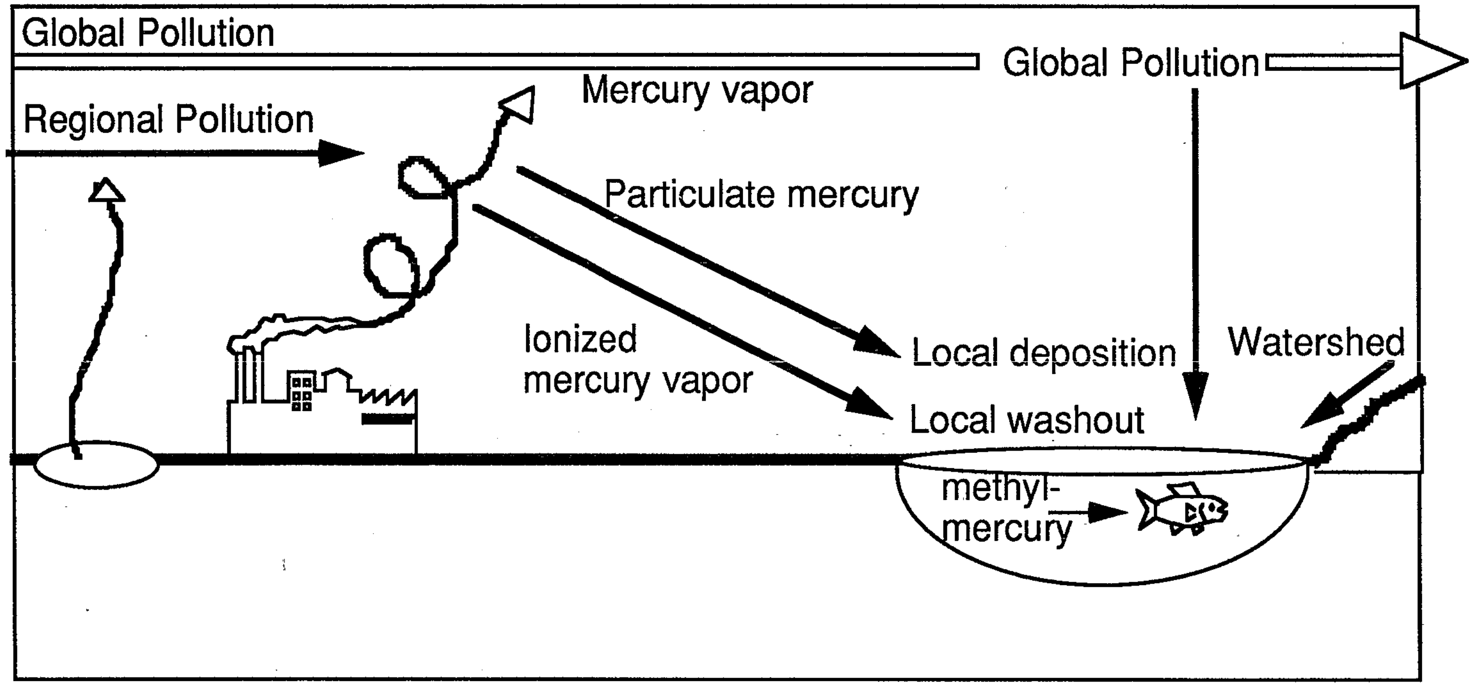
MPCA

Factors correlated with mercury contamination in fish

- Mercury in water
- mercury in zooplankton
- water color
- sulfate in water

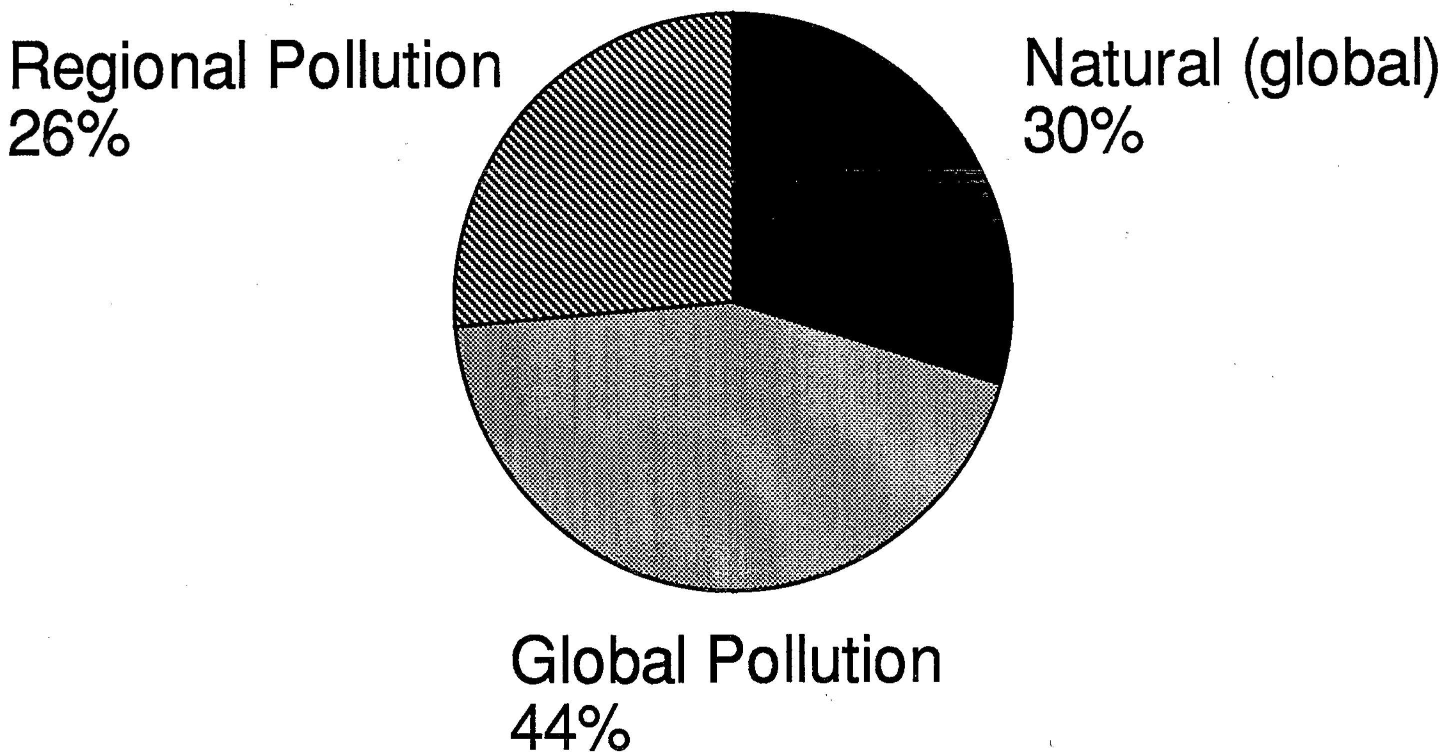
MPCA

Mercury Contamination in Minnesota Lakes



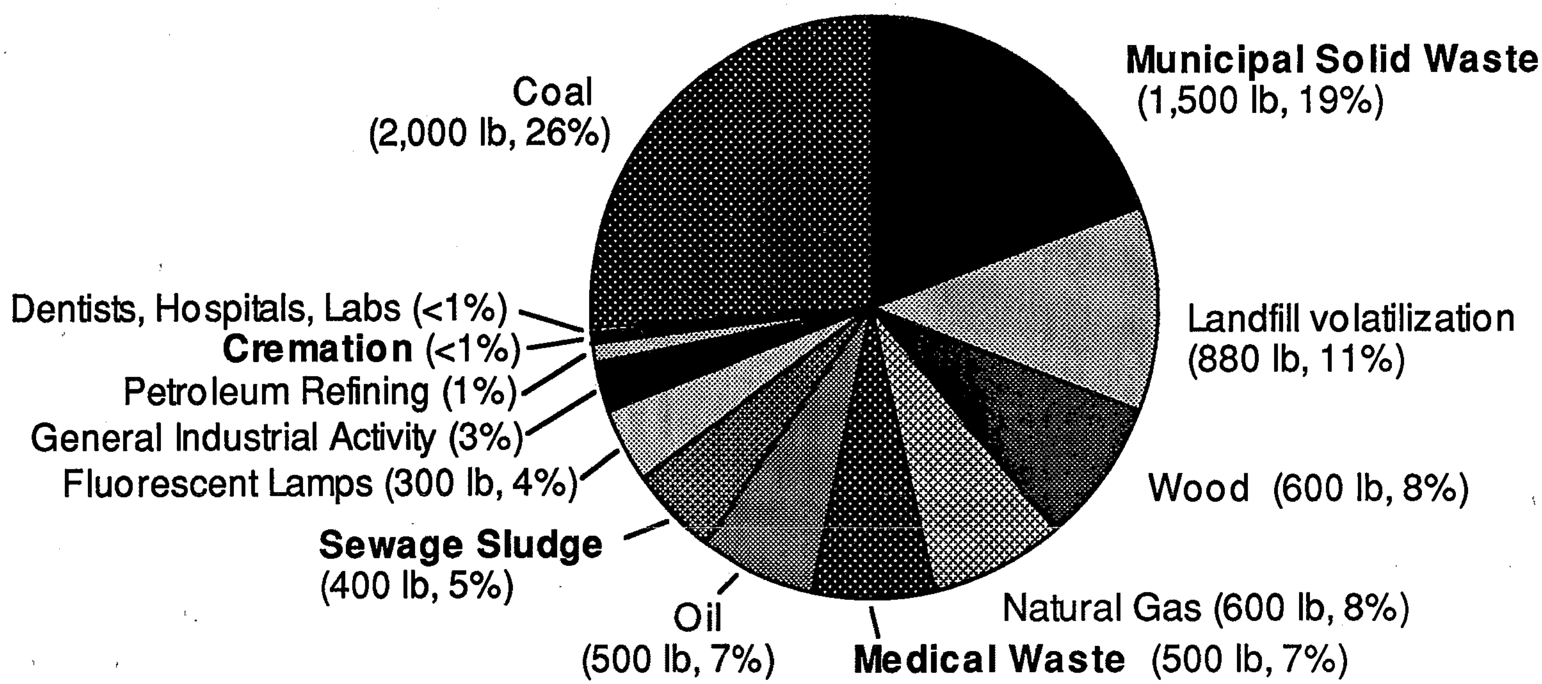
Sources of Atmospheric Mercury Deposition in Minnesota, 1988

Annual Total = 12.5 micrograms per square meter



Estimated Atmospheric Mercury Emissions in Minnesota, 1990

Annual Total about 7,700 pounds per year

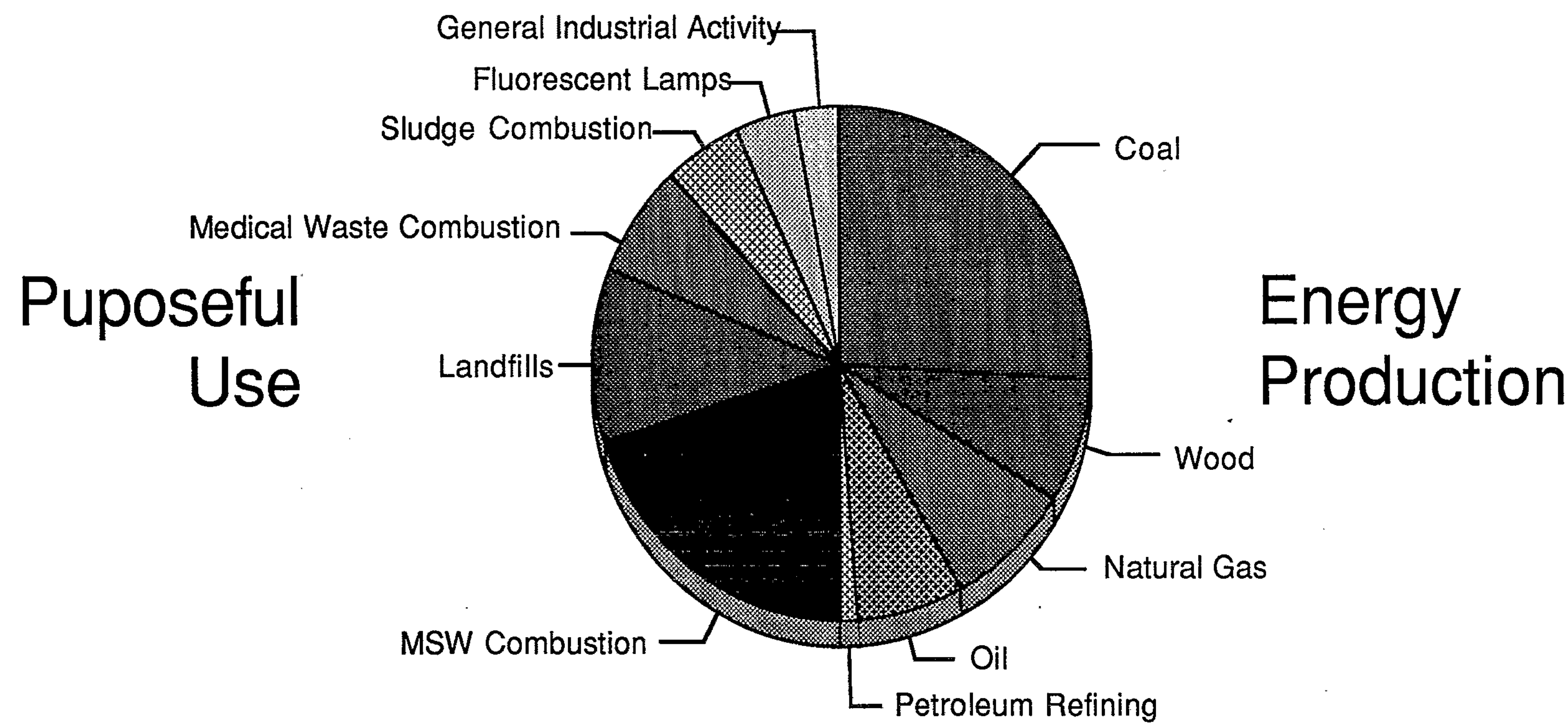


Categories in **Bold** have the highest degree of confidence; additional data are needed for the other categories.

MPCA 12/92

MPCA

Estimated Mercury Emissions by Source



MPCA

Overall Strategy for Reducing Mercury Contamination of Lakes & Streams

- Conventional pollution control regulations
- Pollution prevention
- Incentive-based controls

MPCA

Conventional Pollution Control Regulations

- Not sufficient to reduce mercury to acceptable levels
- Moves mercury from one medium to another
- Should only be used when pollution prevention is not sufficient

MPCA

Sources of Air Emissions	Pollution Prevention Strategies
Energy Production (fossil fuel, biomass)	Conservation, Efficiency, Non-Combustion
Purposeful Use (Manufacturing, products)	Reduction, Elimination, Alternative Products
Incidental (cement, asphalt, mining)	Recycling

MPCA

Incentive-based Controls

- Tax on mercury in products
- Emission allowances
- Offsets
- Emission taxes
- Deposit/Refund

MPCA

National Strategy to Reduce Mercury Emissions

- Individual states have little incentive to control emissions
- Recognize mercury as national & international problem similar to acid rain
- Use Virtual Elimination Project in Great Lakes region as model

MPCA

National Strategy to Reduce Mercury Emissions

- Foster communication among EPA offices of water, air, & solid waste
- Establish mechanism to coordinate guidance & rules

MPCA

What Federal Action is Needed?

- Lower detection limits
- Support more research on transport, fate, & wildlife toxicity for modeling
- Support research on immobilizing mercury in landfills

MPCA

Data Gaps

- Effects on fish and wildlife, especially reproductive effects
- Environmental monitoring
  - Fish contamination: trends
  - Surface water: trends

MPCA

Data Gaps

- Fate of mercury in waste water
  - How much is volatilized?
  - How much ends up in sludge?
  - How much is methylated?

MPCA

Data Gaps

- Volatilization rate from soil
- Soil erosion as a carrier for mercury
  - Water erosion
  - Wind erosion

MPCA

Mercury Health Concerns

- Direct inhalation is rarely a problem
- Methyl mercury biomagnifies in food chain
- Fish are the top of the aquatic food chain
- Fish-eating animals are at risk
  - Loon
  - Mink
  - Otter
  - Eagle
  - Humans

CRITERIA DEVELOPMENT PAST, PRESENT, AND FUTURE

Robert T. Angelo, Ph.D.
Chief, Science and Standard Section
Kansas Department of Health and Environment
Topeka, KS

SUMMARY

Speaking on role of specific water quality criteria for pollutants

Kansas is 49th in overall water quality conditions in US
- fewer than 10% of waters support all designated uses
- biggest problem is non-point source pollution
  - TSS, TDS, sediments, fecal coliform, agricultural chemicals
- 90% of surface area has been converted to farm land
- 2.5 cows and swine per person
- some problems related to historical mining of coal and zinc and lead ores

Water related impacts
- Have numerous dams resulting in habitat loss
- Have lost a number of aquatic species - several mussels and fish
- Widespread dewatering of streams and springs in western Kansas
- Ground water depletion
- Loss of riparian and wetlands

About 95% of streams in Kansas are not in full compliance with WQS

Kansas making major investment in anti-degradation
- designation of 35 streams and 12 wetlands as outstanding Natural Resource waters

Economic impact is felt most by wastewater treatment facilities although make up small percentage of problem
- shallow water tables have led to contamination from livestock opertions, fertilizer application, ammonia, etc.
- show increase in nitrates in drinking water wells

Standards recently revised - included in National Toxics Rules
- Over 200 parameters with numeric criteria
- Included WET provisions
- Narrative provision for protection of wildlife
- Criteria don't address multi-media

Don't address habitat impacts

Chemical-specific Standards are:
Resource intensive
Assumptions are too simplistic (mixing zones, etc.)
Do not address synergistic effects
Do not adequately address non-point sources
Media to media transfer not considered
State lines are not considered

However, ease of application
familiarity with process, easy to understand
can be easily and directly measured

. Do numeric criteria still play a part in WQS?
Yes, states have invested too much time and money.

Kansas will invest in chemical specific as backbone of program and will supplement with BMPs, WET testing, and pollution prevention.

Need greater research by EPA in areas of BMP, mutagens, teratogens, pollution prevention, etc.

Recognize that states will not be able to implement these new initiatives overnight but they will keep trying.

CRITERIA DEVELOPMENT PAST, PRESENT, AND FUTURE

Philip G. Watanabe, Ph.D.
Director
Health and Environmental Sciences
Dow Chemical Company
Midland, MI

SUMMARY

Would like to contribute to conference on scientific issues by adding discussion of sociological issues

We are all in the same boat
- desire clean water
- recognize it is not acceptable to release persistent chemicals to environment
- industry has changed its modes of operation
- all stackholders should be involved

Decision factors - how/what to do to protect human and environmental health while maintaining standards of living and protection of future generations
- scientific factors - facts, uncertainty -
  - caution not to oversell value of science
  - reach stages where we can make sound decisions
- sociological factors - values, economics
  - decisions are driven as much by sociological factors as they are by scientific information. (Previous conference discussion on what causes tort litigation is more sociological - perception of effect rather than scientific established cause and effect)
- technology factors - pollution prevention hierarchy
  - transfer of scientific information to engineering solutions

Complex issues require integrated solutions - base decisions on
- rigorous science - evaluation of health and environment
- better exposure data/global fate and distribution
- environmental equity
- economics
- evaluation of alternatives

Current Activities
- Committee on Social Environment
  - Life Cycle analysis

fate/distribution
impact analysis

Evaluation of various Decision Models for selecting target chemicals
George Washington University - Dr. Furan
University of Tennessee

Needs
- Good economic analysis
  - jobless people aren't healthy people
- Global approach
- Incentives to plan best for long range
- Professionals to solve technological problems

CRITERIA DEVELOPMENT PAST, PRESENT, AND FUTURE

Tim A. Eder
National Wildlife Federation
Ann Arbor, MI

SUMMARY

Manager of Water Quality Program
worked on CWA last four years
Great Lakes Initiative five years
currently working on Virtual Elimination Task Force to eliminate persistent chemicals from the Great Lakes Basin

Background on GLI
Ecosystem based approach to protecting a unique system
EPA should consider similar approach for other areas
Program will be a set of regulations with water quality criteria to protect human health, aquatic and wildlife
new anti-degradation proceeds
National Wildlife Federation (NWF) has been involved since start of program.

Great Lakes Initiative (GLI) was developed by committee (including citizen, industry, and government groups)

Characteristics of Great Lakes
Great Lakes don't flush out. Only about 1% volume is discharged, therefore, pollutants bioaccumulate.
Politically unique. For example, US made commitment to eliminate discharges of persistent chemicals to Canada.

Recommendations regarding current program:

NWF is concerned about effects of toxic chemicals on endocrine system
NWF recommends EPA ban/phaseout chemicals which bioaccumulate
Put a screening assay in place
Agree that we must take action prior to having all the answers, we'll never have all the answers
Environmental Equity
assumptions of fish consumption are unacceptable. Executive order sites EPA directive to update this.
Example: creating standards assuming people only eat fish one meal every six

weeks (limited amount)

Everyone should be able to eat fish as much as they want (cultural, religious, etc. reasons)

Many communities in Great Lakes depend on fish

EPA needs better methods and must use a multi-media approach, should address all sources (example: air sources), single media focus will not be enough

EPA should reassess risk program.

Several chemical control strategies are based on safe levels

shouldn't abandon criteria approach, but should ban some uses of certain chemicals

Example: Chlorine - studied uses of chlorine of 4 industries and called to eliminate several uses

New approach: work with industries to study particular pollutant and potentially eliminate certain uses.

SESSION 1: QUESTIONS AND ANSWERS

Q: Given new EPA policy of watershed protection and innovative criteria, how will EPA deal with state and local agencies that try to implement creative approaches when they don't have flexibility to ignore criteria? Will we get sued if we do not meet these criteria?

A: EPA needs to work together with the states and localities to find out what is important to each entity and to identify alternatives and negotiate implementation strategies and changes to program.

Q: EPA wants to emphasize "Greatest Environmental Benefit." How is this defined?

A: EPA needs to work with all affected parties to determine which advances are the most advantageous for environmental benefit.

Q: For Ed Swain: Perhaps water column measurement is not the best for measuring effects of mercury.

Official detection limit for mercury is 200 nanograms/l
Criteria is 12 nanograms/l
Ambient conc. are 1 nanograms/l
Consultants have developed methods to .5

EPA has not followed up and approved this method.

A: Until recently could not measure to the water quality criteria. Therefore EPA should revise the methods required to meet mercury limits. There are available methods to measure small quantities. Measuring the concentration of mercury in the water column may not show the real problem and impacts. Methyl mercury is the form which has the impacts because it is rapidly taken up in tissues. Therefore the water quality criteria will not protect the environment. You must use both measurement of the water column and measurement of mercury in fish tissue to determine the whole problem.

C: To Morris: Three legged approach

1. Water chemistry leg should add to aquatic life and health including:
   - sediment
   - nutrient
   - wildlife
2. Develop ambient monitoring programs
   - strides in biological criteria
   - have rivers and streams; need lakes, wetlands, estuaries
   - also need habitat criteria

3. Toxicity testing
   now have Wetlands
   need site specific alternatives or adjustments like water effects
   to use in addition to WET

Q: (Teresa, API) Common Sense Initiative, how does future direction affect GLI?

A: GLI is EPA's state of the art and may be the best that we can do at this time. However because of time constraints, there is a lot more EPA would like to do and will do in the future.

Q: (Dick Schover, Dupont) Three legged analysis is another example of independent applicability. EPA has chemical criteria, WET criteria, biological criteria. If any of these sources shows a problem we must do something about it. How will this policy fit in with the future?

A: We are currently looking at the policy. There are areas where if a state has enough info to make decisions with one or two pieces of information, EPA will allow the decisions to be made. EPA is looking at watershed-based permitting

EPA is reviewing policy; has circulated paper for comment.

Q: What approach is EPA taking to involve industry in water quality regulation development?

A: EPA has opened up workgroups to industry members. There is an upcoming meeting for Aquatic Life Guidelines at EPA Lab in Duluth. On human health there was a national meeting held recently.

Q: Does EPA plan to monitor actual impacts to determine if additional measures are needed?

A: There is an ad hoc session on monitoring tomorrow. A work group is currently trying to standardize questions asked under 305(B) program to allow for consistency.

SESSION 1: Questions from cards (Not anwered at the Conference)

Q. What is EPA's position and/or recommendation on using a low stream flow value of 1Q10 versus 7Q10 in the modelling for chronic and acute toxicity criteria?

A. EPA continues to recommend 1Q10 for acute and 7Q10 for chronic criteria, as these flows will generally provide a very high degree of protection. The recommended frequency is under review as part of the revision to the Aquatic Life Guidelines. EPA may approve a State's use of less stringent design flows if the State provides a sound scientific rationale.

Q. Session I advocated flexibility and innovation in addressing pollution control and water quality criteria. Yet state water quality standards and implementation procedures are judged against other state programs, often without regard to the individual state's ability to carry out the innovative approaches and protect water quality. Is this comparison of programs going to stop? How are you (EPA) going to address this?

A. See Ed. Note

Q. When performing risk assessments in the face of uncertainty, there is a tendency to specify criteria in the most conservative manner. Significant resources may be spent by dischargers to meet resulting standards. When uncertainty is reduced and if criteria are changed to reflect this change, dischargers are still backed into meeting the initial criteria due to anti-backsliding and anti-degradation concerns. Wouldn't it be more reasonable to use a less conservative starting point and move down if necessary?

A. See Ed. Note

Q. Virtually every speaker said non-point sources are more significant than the already-compliant point sources. However, every strategy or plan seems to consider point sources as the cure or control point, i.e., more stringent end-of-pipe WQS. What innovations does EPA envision to address this discrepancy?

A. EPA is moving on two fronts to address NPS problems: (1) the implementation of NPS controls, and (2) the developmnt of better NPS science. The following examples illustate efforts in these two areas.

Implementing NPS Controls: EPA awards grants to States, Territories, and Tribes under Section 319 of the Clean Water Act (CWA) for the purpose of implementing programs that reduce NPS impacts to surface and ground waters that are impaired or threatened by nonpoint sources. Section 319 funding was $80 million in FY 1994, and is increasing to $100 million in FY 1995. EPA is also working with NOAA to implement the Coastal Nonpoint Pollution Control Program under Section 6217 of the Coastal Zone Management Act Reauthorization Amendments of 1990 (CZARA).

CZARA requires that 29 coastal States and Teritories develop and implement "management measures" to control nonpoint sources of pollution to coastal waters. States and territories that fail to implement programs under CZARA are subject to loss of funds under both Section 319 of the CWA and Section 306 of the Coastal Zone Management Act of 1972.

Developing Better NPS Science: Excess nutrients are a major problem in U.S. waters. The failure to implement an effective nutrient control program stems in part from a lack of scientifically defensible endpoints for ambint waters, and the inability to translate endpoints, where available, into a comprehensive nutrient control strategy. EPA is in the preliminary stages of developing a national nutrient control strategy. The oveall goal is to identify and implement a focused effort to address the nutrient problems in U.S. waters.

Q. How does a water quality based approach replace numerical limits on existing NPDES Permits? Indicator parameters. At what point will The Clean Water Act interface with the drinking water act in a water quality based approach?

A. As part of the Water Quality-Based Approach numerical effluent limits are calculated to meet water quality standards. EPA doees not anticipate the removal or replacement of the requirements of numerical NPDES effluent limits at this time. An obvious area where the Clean Water Act and Safe Drinking Water Act will interface is in the protection of source waters for drinking.

Q. Why develop new methods to evaluate risks, when you still don't know whether current methods are any good?

A. The methods under development by EPA (sediment criteria, wildlife criteria, bioaccumulation methods, etc.) are areas where EPA has not focused atttention in the past. EPEA is also reevaluating existing methods, piolicies and protocols and revising these methods as needed (e.g., aquatic life tuidelines, human health guidelines, and metals criteria policies are some being reevaluated.)

Q. What does EPA mean by "innovative application of criteria?" Please define and give some concrete examples.

A. EPA encourages the use of criteria in a non-regulatory context where appropriate. A concrete example is the Chesapeake Bay Program Office who has developed dissolved oxygen goals and is using these as a spearhead in the reduction of nutrient loadings into the Chesapeake Bay. Criteria may alo be used as assessment tools in the problem formulation phase of an ecological risk assessment.

Q. Does EPA view the Great Lakes Initiative Tier II procedure as a prototype of simplified methodology development requiring less data? How should the greater uncertainty and inaccuracy of these values be recognized in implementation (i.e., NPDES permitting)?

A. The Great Lakes Initiative (GLI) Tier II methodology was developed for the express purpose of deriving criteria for regulatory purposes where the data do not exist to derive a Tier I criteria. EPA believes at this time the Tier II methodology is a good prototype. However, EPA would have some reservations of utilizing this methodology exclusively (i.e., in place of the Tier I methodology). The final Great Lakes Water Quality Guidance should anwer the question of how to implement values based on limited data, such as the GLI Tier II values.

Q. How soon can we expect to see new criteria as ranges? Will there be a methodology that can be retrospectively to existing criteria to make them more flexible? What does EPA headquarters plan to do to assure that the EPA regions will allow states or local governments to be innovative and flexible to discourage regional cookie cutter approach?

A. If EPA decides to produce national criteria recommendations as ranges it is unlikely to be released prior to 1996. EPA is considering deriving a methodology that can be retrospectively applied to existing criteria.

Q. Presently EPA seems to have limited staffing and resources to direct to criteria development and implementation. The agenda for the future is impressive, but will EPA be given the resources to carry it out? Do you have completion date goals for any of these?

A. This conference is to solicit comment on this agenda. Overall resources for EPA, States, Tribes, and the regulated community are shrinking. This makes it imperative that EPA and the other parties learn how to leverage the resources available to acquire the necessities of ecosystem protection.

C. I would like to see <u>environmental</u> basis for EPA second guessing state programs and decisions. (from John Hensel, Minnesota Pollution Control Agency)

[Ed. Note: The purpose of these proceedings is to provide a written compendium of the presentations and discussions as soon after the conference as possible. It is being published even though answers to some of the questions are not available. Persons interested in the answer to this question are encouraged to continue discussions with the appropriate sources.]

Session 2

Addressing Ecological Integrity:

Moving Beyond Chemical Toxicity

ADDRESSING ECOLOGICAL INTEGRITY: MOVING BEYOND CHEMICAL TOXICITY

Susan Jackson **Session Moderator**
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U.S. Environmental Protection Agency
Washington, DC

Abstract: This session covers approaches for managing environmental stressors that are adversely affecting water quality and aquatic ecosystems but are not part of EPA's regulatory program. These stressors include habitat degradation, nutrient enrichment, and hydrologic modification. At this session, participants are presented information on how to estimate the cumulative impacts of all stressors in a watershed, available tools for addressing them, and ways to build close working partnerships with other federal, state and tribal agencies in developing and implementing water quality and resource management. Technical, legal, and implementation issues will be a part of the discussions.

SUMMARY

Conference purpose:
- focus of science needed to achieve ecosystem protection
- seeking your input

Session 2 focus:
- Scientific tools to address aquatic problem such as nutrient over enrichment, habitat degradation, sedimentation, alteration of water quality and flow
- Discuss how these tools differ from traditional water quality criteria

- Organized to showcase how criteria are developed to address problems highlighted above

Organization of session:

1st part: nutrient/over enrichment, modification, sediments
(R. Batiuk, C. Yoder, G. Harvey, T. Fontaine)

2nd part: hydrologic modification habitat loss
(M. Dodson, J. Johns, P. Wright, E. Mead, D. Braun)

Session 2

NUTRIENT ENRICHMENT, HABITAT, AND RESOURCES RESTORATION GOAL SETTING IN THE CHESAPEAKE BAY PROGRAM

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Chesapeake Bay Program Office
U.S. Environmental Protection Agency
Region III
Annapolis, MD

Abstract: Building from the 1987 Chesapeake Bay Agreement's goal for the "restoration and protection of the Bay's living resources, their habitats, the ecological relationships", there has been a consensus-based evolution within the Chesapeake Bay Program towards developing and adopting increasingly quantitative habitat and resource restoration goals. This presentation will highlight five sets of goals, methods used in their development, implementation within habitat restoration and pollution abatement programs, and resultant recommendations to the national program.

- Dissolved oxygen restoration goals
- Nutrient and light attenuation habitat requirements
- Submerged aquatic vegetation restoration goals
- Benthic community restoration goals
- Living resource restoration goals under development.

These goal setting efforts will be presented in the context of a larger effort to institutionalize links between resource management, habitat restoration and pollution reduction/prevention.

SUMMARY

Chesapeake Bay Program includes State/Federal, Academic and local agencies, (e.g., Chesapeake Bay Foundation it is a collective consortium.) States include PA, MD, DC, and VA.

Chesapeake Bay Program goals:

> Find issues that we can effect and then improve these
> Ask public what does a healthy watershed mean to you?

Key in Chesapeake Bay is identify what we are there for
> Resource, example: Bay grasses
> Outcome, example: Sustained Harvests

Idea is to link habitat to resources.

Conceptual model
- compiled info on bay grasses
- knew in what areas grasses were effected by nutrients etc.
- Predicted effects of varying factors.
- started with studying light as limiting factor

Numerical requirements by ranges:
- lists assumptions and says within a particular range grasses would grow.
  - this allows us to look at nutriential requirements in Bay
- allows to put together a habitat requirement map and show where grasses may be returned if certain changes in nutrient levels, etc. are achieved.

Dissolved Oxygen Restoration Goals
- Find existing data showing dissolved oxygen levels needed for certain species.
- This showed us what we need to strive to achieve and helped develop a basin wide restoration goal.

spawning river habitat	5 mg/l at all times
upper water column	5 mg/l monthly average
lower water column	1-3 mg/l
sediment	1 mg/l

Benthic Community Restoration goals
- Study inspected benthic community in non-degraded habitat based on seven different habitat classes by salinity, sediment type, different matrixes
- This allows us to compare Chesapeake Bay benthic community conditions to expected communities in non-degraded systems. This will help identify potential problems and problem areas.

Recommendations for EPA to consider:

Nutrient Criteria:
- Set threshold requirements for body of science supporting nutrient criteria
- Establish national policy linkages
  Support technical transfers necessary for implementation modeling

Estuarine/Marine Dissolved Oxygen criteria:
- Support/promote water body based criterion development
- Address implementation within criterion development
- Recognize need for estuarine criteria (there are several sensitive estuarine species)

Biological criteria:
- Connect habitat degradation to watershed based activities, ex. harvest, watershed

Summary
- Hold ourselves accountable to the public by setting meaningful goals that can be measured
- Link problems to sources the people can understand.

ADDRESSING NUTRIENT OVERENRICHMENT AND HABITAT DEGRADATION

Chris O. Yoder
Manager
Ecological Assessment Section
Division of Surface Water
Ohio Environmental Protection Agency
Columbus, OH

Abstract: Current methods to develop biological criteria and habitat assessment, with emphasis on addressing impacts of nutrient enrichment and habitat degradation on aquatic communities.

Habitat assessment as an integral component of biological assessments.

Recommendations to EPA National Program for developing future/needed methods for biological and habitat assessment.

SUMMARY

Five factors determine integrity of water resource:
chemical variables
flow restrictions

Biological criteria are narrative or numerical expressions based on reference condition of least impacted aquatic community inhabiting waters of a region.

-- can't establish national numbers,
-- can create framework to use in different regions
-- In Ohio biocriteria define fish and macrovertebrates community structure and they vary with ecoregions across the State.

Monitoring design is critical first step
Aquatic life impairment causes:
organic/DO
siltation
metals
flows
nitrates
habitat mod

Habitat Assessment is conducted by applying Qualitative Habitat Evaluation Indices (QHEI)
- substrate
- instream cover
- channel quality
- riparian/bank stability
- pool/riffle river

Area of degradation value based on - how far from the biological criteria goal is the water body degraded.

Plot IBI versus ratio of modified water attributes/warm water attributes

Headwater sewage problem - Phosphorus in headwater streams
- higher phosphorus in the water column, lower the habitat quality
- in healthy headwaters the phosphorus is in the plants and animals
- in unhealthy it is in the water column causing habitat degradation

Consequences of using stream beds to run sewer interceptors
- created larger problem

Stream miles impaired due to combination of point source and nonpoint source pollution
- at present, reducing point source faster than NPS
- to achieve use restoration must address NPS

WATER QUALITY CRITERIA FOR UNCONTAMINATED SEDIMENTS

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Northern Idaho Regional Office
Idaho Department of Health and Welfare
Coeur d'Alene, ID

Abstract- Key Points:

- In many western states uncontaminated sediment is the most prevalent contaminant of water.
- Uncontaminated sediment occurs as a natural product of erosion, but erosion rates and sedimentation are accelerated by nonpoint source activities making sediment a contaminant.
- Any criteria or standards promulgated to protect beneficial uses from accelerated sedimentation must consider sediment impacts on the water column and the stream bed load to adequately protect the beneficial uses, especially freshwater biota habitat as related to these uses.
- Criteria and standards must be chosen which are directly related to the protection of the beneficial use's habitat.
- Since sediment is primarily generated from nonpoint source activities (irrigation, logging, grazing etc.) sediment criteria are often used to assess the effectiveness of best management practices.

Impacts of Uncontaminated Sediment on Freshwater Biota Beneficial Uses

- Interference with sight feeding fish species (e.g., salmonids).
- Loss of juvenile and over-wintering habitat; cobble interstitial space.
- Loss of adult holding habitat; pool filling.
- Loss of spawning habitat: oxygen transport interference and sediment retardation of fry escape from the redd.

EXAMPLE: Water Column Based Sediment Criteria

Salmonid Sight Feeding Criterion

In surface waters supporting or capable of supporting salmonid fisheries, turbidity, as the result of nonpoint source activities, shall not exceed background turbidity measured at comparable discharge by 50 NTU instantaneously or 25 NTU for 10 days.

EXAMPLE: Stream Bed Based Criteria

Salmonid Holding Habitat Criterion

Residual pool volume of a representative stream reach may not be significantly (95% confidence interval) altered by bedload sedimentation.

Salmonid Rearing Habitat Criterion

Natural baseline interstitial space index of the cobble and boulder substrate of a representative stream reach shall not exhibit a statistically demonstratable decrease at the ninety-five percent (95%) confidence interval. Impacts of sedimentation on the interstitial space habitats important to salmonid rearing and refuge will be assessed by measurement of the cobble and boulder interstitial space index. Baseline interstitial space index will be determined by a quantitative technique in stream reaches with similar geomorphology and stream power which are unaffected by human induced (i.e., nonpoint source) sedimentation. An interstitial space index value will consist of a mean at the ninety-five percent (95%) precision level of the t statistic.

Salmonid Spawning Criterion

Nonpoint source activities shall not cause intergravel dissolved oxygen in spawning gravels to decline, below a weekly average of 6 milligrams per liter.

ADDRESSING NUTRIENT OVERENRICHMENT AND HABITAT DEGRADATION

Tom Fontaine
South Florida Water Management District
West Palm Beach, FL

SUMMARY

Integrated system approach to Everglades restoration
  Facing competing demands for water - First: define hydrologic needs of ecosystem, then agriculture, urban uses get what is left over
  Phosphorus is key problem (mostly from agricultural runoff).

Florida has developed 50 stormwater treatment areas
  Consisting of 40,000 acres of wetlands used to intercept agricultural runoff before it reaches the Everglades.
  System is set up to reduce phosphorous to 50 parts per billion
  Florida standard is "no imbalance."
  What level of nutrient causes switch from saw grass to cattails?
  - Cattails tend to grow at higher nutrients this is not desired because cattails take over the natural vegetation when phosphorus levels increase.
  - State experiments with tubs of grasses to get defensible statistically significant data.

Florida is using natural systems model to predict what impacts moving water from one area to another has on the vegetation.
  Use this to set restoration goals
  Hydrology under managed and natural
  Set hydroperiod restoration goals for Everglades

Landscape model
  Measures only vegetation response to nutrients.
  It will be several years before the model is complete.
  Natural park - wildlife data will be added to the model.

Recommendations to EPA:
- Adaptive approaches
  - Don't wait for perfect information to get started.
  - Need specific criteria for wetlands.

SESSION II: QUESTIONS AND ANSWERS

Q: Do you see a role for EPA on a national level in attacking clean sediment problem? (Bob April)

A: Clean sediment criteria will be a more regional issue. What Idaho has done so far is applicable to other mountain neighboring states, but criteria needs to be homegrown criteria. At national level role should be in communication between difference areas, information transfer. (Harvey)

A: Issues Idaho are addressing are very applicable to our streams, the clean sediment information from Idaho are appropriate to warm water streams. Needs to be linked to biological criteria to measure the end product. (Yoder)

A: Habitat criteria must be further explored. Large part of problem is cows walking through stream which are not controlled by NPDES permit. Part of the continuum to protect the streams.(Batiuk)

A: In Florida we have problems with humic acids. This is a bioavailable issue (Fontaine)

Q: How do you apply criteria in permits and enforce them? How do you apply criteria to nonpoint sources and determine they are being met? (Mary Jo Garreis)

A: For the most part we do not. The farmer or logger is required by law to implement BMPs. If farmer/logger is performing the BMP, the law has been met. We use in-stream criteria to determine if BMP is working and if its not, the State must develop new BMPs. Lack of funding is a serious problem. (Harvey)

Q: Are loggers required to have permits?

A: Yes, loggers have a notice (a type of permit) that requires implementation of BMPs, but are not required to do monitoring to prove BMP works.

Q: If you are basing criteria on reference of natural condition, how do you decide what reference is? Is the decision hard? How do you draw line between what meets criteria or not? (Jerome G., Tetratech, Corp.)

A: For SAV, In Chesapeake Bay, we used historical data such as the amount of grasses in the past and studies that indicated in what conditions grasses should grow. We looked at 20 years of aerial survey records. We then looked at the grasses in the Chesapeake Bay in areas that are not impacted. For benthic ecosystem, there were no pristine areas, but identified low impact systems. For dissolved oxygen, looked at gradation in stream achievable and what aquatic life needed. (Batiuk)

A: In the Everglades, we used cores (dating cores) to determine historical flow and past water conditions to set baseline. We also looked at plant materials to get an idea of what system use to be, to describe prior conditions. (Fontaine)

A: There are steps in setting numeric criteria, as described in proceedings on the 1991 biocriteria symposium (Yoder) (EPA-440/5-91-005).

A: Idaho is in the position of having low impact areas that can be used for references. (Geoffrey)

Q: What kind of wetlands do you have, how do you collect and dispose of phosphorous?

A: Cattail marshes are used to collect phosphorous; nothing is being done to remove it, it stays in the cattails and sediments in the marshes. (Fontaine)

Q: What changes are necessary in the future to further reduce phosphorous, further reduce runoff?

A: Farms implementing BMPs, farm BMPs have achieved 40% reduction in total runoff, other options are water treatment plants. (Fontaine)

ADDRESSING HYDROLOGIC MODIFICATION AND HABITAT LOSS

WATER QUALITY IN THE ARID WEST: IS THERE A ROLE FOR EPA IN ADVANCING SOLUTIONS TO THE CONFLICTS BETWEEN INSTREAM FLOW AND HYDROLOGIC MODIFICATION?

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Abstract: The objective of the Clean Water Act establishes a broad ecological goal aimed at restoration and maintenance of the chemical, physical and biological integrity of the Nation's waters. However, the substantive part of the Act, implementing that objective, is principally constructed to address the discharge of pollutants, and it is this control of pollutant discharges which has appropriately occupied EPA's attention over the last twenty years. There is now, however, a growing awareness within the Agency of the need to address impacts to the water resource as a whole and refocus attention on the Act's ecological integrity objective. This new focus is evident in the Agency's growing interest in landscape level approaches to water resource protection such as watershed protection and ecosystem management. Clearly, the *presence* of water will be a key component in satisfying an objective aimed at maintaining the ecological integrity of aquatic ecosystems. As a result, the Agency's interest in watershed protection and ecosystem management, necessarily, will force a somewhat more active Agency role in water quantity issues. In the arid west, there is a somewhat more active Agency role in water quantity issues. In the arid west, there is a continuing conflict between maintenance of instream flows for the protection of aquatic ecosystems and hydrologic modifications which dewater streams to meet offstream demands. This conflict is compounded by western water laws which view water as a property right. The right to allocate water is acknowledged in the Clean Water Act in Section 101(g); however, the courts and EPA have interpreted this provision as requiring an accommodation of quantity and quality demands. Furthermore, the recent U.S. Supreme Court ruling, in a case addressing instream flow requirements in the State of Washington, appears to strengthen the standing of the ecological integrity objective of the Act. Is there a role, then, for EPA in negotiating an accommodation between instream flows needed to meet the Act's ecological objective and hydrologic modifications designed to satisfy legitimate offstream demands also recognized by the Act? Three case studies in Region VIII will be used to illustrate the conflicts and a potential role for EPA in negotiating accommodation.

Session 2

SUMMARY

Water Quality in West is very controversial

need accommodation of both quantity and quality demands

working toward resolution of water quality conflicts will require

-- sound technical tools to identify threshold flow regimes needed to meet CWA ecological integrity objective.

-- implementation process to accommodate other competing uses of water

the very presence of water shows need for ecological system protection

aquatic organisms require water 365 days a year

issues compounded by Western Water Law

-- water is viewed as a "property" right.

-- the highest use must be maintained or it can be taken from you -- this complicates the conflict issue

Two Supreme Court statements which strengthen the EPA's and States' position:

(1) There is a link between water quality and quantity.

(2) There is a recognition in the CWA that the diversion of water (diminishment of flow) can be considered a pollutant.

Kingsley Dam - example of relationship between flow and temperature

-- contentions issue

-- impacts Big Bend of Plat River

Key Question: how much water can be used for agriculture and other uses until it impacts flow and thus the temperature and therefore the critical habitats for the wildlife.

-- Required minimum flow on 3 communities in county with dams

Key to solving conflicts in West is to reach a decision that will not drop quantity below safe annual yield - the minimum amount of water that can be expected even in a drought year.

Summary - We are all consumers of water

historically focus has been on our needs for water (drinking, recreation, fishing)

Often those uses are in conflict with each other; ex., in August drinkers want high volume, fishers want low flow

Bottom line is ecological integrity vs. our needs for the water

ESTABLISHING STANDARDS FOR CALIFORNIA'S SAN FRANCISCO BAY/SACRAMENTO - SAN JOAQUIN DELTA ESTUARY

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Division of Water Rights
California State Water Resources Control Board
Sacramento, CA

Abstract: California's San Francisco Bay / Sacramento - San Joaquin Delta Estuary (Bay/Delta Estuary) is not only the largest estuary on the west coast of the United States but is also the critical water supply link between the water surplus areas in the northern part of California and the water deficient areas in the southern and coastal regions of the State. The factors influencing the biological resources in the Bay/Delta Estuary will be discussed. Also, State and Federal approaches to stop the current decline of the biological resources and improve estuarine habitat will be presented.

One factor affecting the biological resources in the Bay/Delta Estuary is the reduction in flow out of the freshwater Delta portion of the estuary into the saline bay portion of the estuary. Numerous studies show a positive relationship between freshwater flow out of the Delta and the populations of various trophic levels of organisms that live in or depend on the estuary for a portion of their life cycle. As is typical for estuaries, flows and salinities are closely correlated. Decreases in flows result in increases in salinity. The relationships between flows and biological production have been reformulated to show similar relationships between salinity and tropic response. The pros and cons of setting standards on either flows or salinity will be discussed from a scientific, regulatory and political viewpoint.

Another large factor affecting the biological resources in the Delta portion of the Bay Delta Estuary is water diversions from the Delta. These diversions occur to satisfy both the 550,000 acres of agricultural land within the Delta and the approximately six million acre-feet of water exported from the Estuary for use in areas to the south and west. Controls on the timing and amount of these exports have been placed on the operators of these export facilities as requirements under the Endangered Species Act to protect winter run salmon and Delta Smelt. Additional controls are likely needed to protect other species. Factors other than flow (salinity) and diversions have also affected the biological resources of the Bay Delta Estuary, but these two factors are the most controllable factors which have the largest effect on these resources.

All of the standards for Bay Delta Estuary affect the available water supply for much of the State's agricultural land and most of it's people. The establishment and enforcement of these standards must strike a reasonable balance between the legitimate needs of both in stream and out of stream uses of water. They must also be sensitive to the State's long guarded

desire to have control over water allocation decisions and the Clean Water Act's structural inability to allow the kind of balancing needed when two beneficial uses of water compete for the same resources.

SUMMARY

Water quality standards - Need to look at effect response curve

For developing flow criteria, laboratory data is useless,
must be developed in the field

Basic problems in California
80% of water use is in Southern 2/3 of state
70% of precipitation falls in North 1/3

San Francisco Bay-Delta Watershed
2/3 of water consumed
700 reservoirs
1/2 water rights in watershed

In California have looked at factors affecting use
As flow increases, abundance increases proportionately
No abundance flows - fish could use it all
none to allocate

Factors affecting San Joaquin Watershed
EPA has proposed salinity standards
Pumps in watershed can reverse flows
Diverts fish out of the system trying to exit to ocean -
fish are collected and trucked to estuary
Inflows, screening factors - fish screening at pumping stations
Water qualities set by EPA are deficient for use in flow standards
because set up for polluters to protect use from industrial discharges
If have competing uses, can't protect most stringent uses
Existing regulations say protect uses, but can't protect both, must balance

CWA is not an appropriate legal mechanism - cannot allow for balance

At issue:
deciding flow between two beneficial uses that are competing - flow vs drinking water

Need EPA to help with development of tools to develop the criteria
States should develop and implement those standards

ADDRESSING HYDROLOGIC MODIFICATION AND HABITAT LOSS

Patrick Wright
Chief, Bay/Delta Section
U.S. Environmental Protection Agency
Region 9
San Francisco, CA

Abstract: Collaboration with other Federal agencies to develop and apply methods to address the impacts of water withdrawal on aquatic communities, development and application of methods within context of watershed approach to comprehensive ecosystem protection.

SUMMARY

EPA's role should be to work closely with state, however, if water uses are not being met EPA will act more formally.

1987 - EPA found state standards inadequate.

December 1993 - EPA proposed federal criteria for the Bay Delta
EPA is now working with the state to develop standards the state can adopt.

EPA is open to options other than just salinity criteria, which is being developed.
- Salinity criteria is to protect mixing zone. EPA used historical information in trying to model what the conditions of the bay should be.

Why use salinity standards?
- Scientific information
- Legal reasons
- Management reasons

Fish screening (salmon)
- Key is to keep fish in main channel for them to avoid getting stuck in the pumps.
- EPA left this to state and is focusing on restoration goal.
  - Settled on goal and are allowing state to find methods to meet this goal
  - EPA will focus on outcomes instead of specific criteria, thus giving the state flexibility in how to meet goals.

Flow standards serve as measures to provide feedback on management plans

Endangered Species Act
- Important lessons have arisen from Bay

CWA provides flexibility to act before the ESA acts
CWA may be used to help promote habitat

There is a need to include provisions in the reauthorization of the Clean water Act to allow EPA to make policy on flow matters so EPA can work with states to solve water management issues. This will assure States that EPA will work with them in solving these issues.

ADDRESSING HYDROLOGIC MODIFICATION AND HABITAT LOSS

TOOLS TO ASSESS THE IMPACTS OF HYDROLOGIC MODIFICATION ON AQUATIC COMMUNITIES

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Abstract.--The Fish and Wildlife Service has used a variety of methods to assess the effects of stream flow regulation on aquatic biota and to provide instream flow recommendations. Instream flow analysts have divided these methodologies into two categories, standard-setting and incremental, depending on the objectives and complexity of the decision process involved. Standard-setting methodologies refer to those measurements and interpretative techniques designed to generate a flow value or values which are intended to maintain aquatic biota, usually recreationally and commercially importance fish species, at some acceptable level. Incremental methodologies refer to a collection of procedures and techniques designed to predict changes in aquatic habitat due to incremental changes in stream flow and allow the systematic evaluation of different water management options. Two examples of standard-setting methodologies are provided. The incremental methodology most relied upon by the Service is the Instream Flow Incremental Methodology, or IFIM. For small hydroelectric projects, we have found that standard-setting techniques can be used effectively to set instream flows in situations where there is little controversy or competition between instream and out-of-stream uses of water. They are often helpful for long range planning tasks and evaluating the preliminary feasibility of an applicant's proposal. However, where there is controversy and competition for water, these techniques do not provide the information necessary to reach a balance between the need to protect instream resources and the needs of development. Incremental techniques like the IFIM have helped the Service reach equitable solutions that minimize the conflicts between these two uses of water and continue to meet the flow needs of instream resources.

The moderator has asked me to speak today about some of the tools used by the Fish and Wildlife Service to assess the impacts of hydrological modifications on aquatic communities and relate to you some of the Service's experiences regarding the formulation of instream flow recommendations.

My background and experience with hydrological modifications and their impacts on aquatic resources are related to the development of small hydroelectric power projects in the

Northeast and the Pacific Northwest. A major environmental issue for most small hydropower developments is the amount and timing of alterations of downstream water flow caused by power generation. To evaluate these flow-related impacts, the Service conducts and/or recommends instream flow studies of the affected stream reaches and, based on those studies, recommends instream flow reservations for the protection of downstream fish and wildlife. As a rule, our instream flow studies focus on the protection and maintenance of habitat for anadromous and other recreationally important fish species with the assumption that if flows are reserved that provide for the life history requirements of these fish species, then other aquatic biota will be protected as well.

Over the years, the Service has used a variety of methods to assess the effects of stream flow regulation on aquatic biota and to provide instream flow recommendations (Bayha 1980; Stalnaker and Arnette 1976; Stalnaker et al. 1994). These methods differ in their use of hydrologic records, hydraulic simulation techniques, and habitat rating criteria, and in their capability to provide seasonal or species-specific recommendations (Loar and Sale 1981). Research biologists at the Service's National Ecology Research Center in Fort Collins, Colorado, have divided these methodologies into two categories depending on the objectives and complexity of the decision process involved (Trihey and Stalnaker 1985).

Standard-setting methodologies refer to those measurements and interpretative techniques designed to generate a flow value or values which are intended to maintain aquatic biota, usually recreationally and commercially importance fish species, at some acceptable level. Incremental methodologies refer to a collection of procedures and techniques designed to predict changes in aquatic habitat due to incremental changes in stream flow and allow the systematic evaluation of different water management options.

Standard setting methodologies are most appropriate for protecting existing instream uses, state water plans, state water allocation permits or reservations, and identifying target flows for use during project feasibility studies (Trihey and Stalnaker 1985). Standard-setting methodologies are usually based on historical water supply records and are relatively easy and inexpensive to perform.

Incremental methodologies tend to be more complex, time consuming and expensive to perform. They are organized and repeatable processes by which a aquatic habitat/streamflow relationship and the hydrology of the stream are transformed into a baseline habitat time series, proposed water management alternatives are quantified and compared with the baseline, and project operating rules are negotiated to protect instream resources (Trihey and Stalnaker 1985). Incremental methodologies are most appropriate for time series analysis to identify limiting flow conditions, fine tuning resource maintenance objectives, avoiding or minimizing flow-related impacts, and comparing mitigation or water management alternatives (Trihey and Stalnaker 1985). Incremental methodologies provide decision makers with information necessary to facilitate negotiated solutions to complex, controversial water management problems (Stalnaker et al. 1994).

Two examples of standard-setting techniques that have been widely used by the Service to recommend instream flows are the Tennant Method (Tennant 1976) and the Aquatic Base

Flow, or New England Flow Policy (Larson 1981; Kulik 1990). The incremental methodology most relied upon by the Service is the Instream Flow Incremental Methodology, or IFIM (Bovee 1982; Milhous et al. 1981).

Tennant used over 10 years of personal observations of streams and stream flows in Montana and the mid-west to categorize streams into varying degrees of habitat quality for fish and other aquatic biota based on recorded flow data. His method assigns minimum flows needed to maintain different levels of habitat quality at different times of the year based on percentages of mean annual flow. Ten percent of the average annual flow is assigned as the minimum necessary to sustain short-term survival habitat for most aquatic life forms. Thirty percent of the average annual flow is set as the base flow adequate to sustain good survival habitat for most aquatic life forms. A base flow standard equal to 60% of the average annual flow is recommended to provide excellent to outstanding habitat for most aquatic life forms during their primary periods of growth. This flow level also provided excellent conditions for most recreational uses.

Tennant's method also sets a standard for periodic high flows to remove silt, sediment, and other bedload material from the stream channel. A flushing flow equal to 200% of the average annual flow is recommended as sufficient to produce effective depths and velocities for moving silt, sediment, and other bedload material without doing extensive damage to streambanks and riparian vegetation.

The Aquatic Base Flow is a standard-setting technique widely used in the Northeast to recommend instream flows and is receiving considerable attention by several New England states as they develop their own biological criteria and standards programs (R. Abele, USFWS, Personal communication). This method was originally developed by the Service in response to the "gold rush" of hydropower development activity that occurred in New England in the early 1980's (Larson 1981). This technique is also based on historical stream flow records and selects the median flow for the lowest flow month, typically August or September, as adequate through out the year, unless additional flow releases are required to meet the needs for spawning and incubation. Where hydrological records are unavailable, instream flows are recommended on the basis of drainage area. A minimum instream flow value, or base flow, of 0.5 cubic feet per second per square mile of drainage area (cfsm) is recommended for the summer months. Flow releases of 1.0 cfsm in the fall/winter and 4.0 cfsm in the spring are recommended for the entire applicable spawning and incubation periods.

For both of these techniques, the use of stream gage records assumes that those measured flows support the needs of fish, aquatic insects, riparian vegetation and other aquatic resources at acceptable levels. This assumption only applies where streams are essentially undeveloped or where the pattern of development has been stable for a long period (Stalnaker et al. 1994; Wesche and Rechard 1980).

Where it is necessary to know and understand the response of habitat variables to changes in flow as a means to support balanced decision making between the need to protect instream resources and the needs of development, the Service generally recommends that the Instream Flow Incremental Methodology, or IFIM, (Bovee 1982; Milhous et al. 1981) be applied to determine instream flow needs. The IFIM is not a single technique but rather a suite of methodologies designed to evaluate and integrate the dynamic nature of riverine habitat into water management practices (Trihey and Stalnaker 1985). IFIM is specifically designed for simulating and quantifying impacts of changes in flow, channel morphology, or water quality, resulting from water management or stream channelization activities, on aquatic biota and instream recreational activities (Armour et al. 1984). It combines measures of habitat quality and quantity to obtain an index to the amount of habitat available for different life stages at different flow levels, provides information about habitat changes over time, and provides a means of comparing the impact of alternative management practices on aquatic habitat (Stalnaker et al. 1994).

The decision variable generated in the IFIM is total habitat area for the life stages of fish or other aquatic organisms that are of special concern for management, or that are thought to be most sensitive to change. Habitat, as computed by IFIM, incorporates longitudinal changes in channel characteristics, streamflow, water quality, and temperature. These factors are termed macrohabitat variables, and determine the longitudinal distribution of various aquatic species downstream. Habitat also includes the distribution of hydraulic and structural features comprising the actual living space of the aquatic resources selected for evaluation. These physical features are termed microhabitat variables. Standard microhabitat variables are depth, velocity, substrate, and cover. The total habitat available to a species at any streamflow is the area of overlap between available microhabitat and suitable macrohabitat characteristics.

IFIM uses computer software to integrate these two measures of habitat into habitat units that are then related to flow over time (Milhous et al. 1990). Displaying the availability of suitable habitat over time, such as a known period of hydrological record, makes it possible to analyze the effects of changes in flow on each life stage of every species for which habitat suitability data are available.

IFIM is not intended to be an ecosystem model (Bovee 1982). However, it is designed to have environmental and ecological applications. And, unlike traditional standard-setting techniques, IFIM does not generate a single solution to a flow allocation problem. Rather it has been specifically designed to provide multiple solutions. However, where habitat protection and maintenance is a primary consideration, solutions that deviate the least from the baseline habitat condition can and have been formulated into instream flow standards.

Every instream flow needs assessment that includes instream flow protection offers a unique challenge (Stalnaker et al. 1994). This is because every assessment presents its owns set of political, environmental, and institutional problems that directly affect the decision making process and the ability to defend the decisions that are made. Therefore, there is no single methodology that can be applied unilaterally to all situations. Rather, the method of choice should be the technique that provides the most assurance that the recommended flows will be supportable , sustainable, and capable of protecting a streams biological integrity over a range of environmental perturbations.

For small hydroelectric projects, we have found that standard-setting techniques can be used effectively to set instream flows in situations where there is little controversy or competition between instream and out-of-stream uses of water. They are often helpful for long range planning tasks and evaluating the preliminary feasibility of an applicant's proposal. However, where there is controversy and competition for water, these techniques do not provide the information necessary to reach a balance between the need to protect instream resources and the needs of development. In the case of small hydropower projects, there is always competition because the water needed to maintain instream resources is often unavailable for power production. Incremental techniques like the IFIM have helped the Service reach equitable solutions that minimize the conflicts between these two uses of water and continue to meet the flow needs of instream resources.

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ADDRESSING HYDROLOGIC MODIFICATION AND HABITAT LOSS

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Abstract: Methodologies and approaches to assess the impacts of hydrologic modification on aquatic biota and their habitat—Eastern perspective. Wetlands hydrology—gw/sw interaction. Monitoring for ecological significance (on limited resources)—how set monitoring objectives and endpoints.

Panel Comments:

My comments will necessarily be brief and general given our time limits but will touch on several issues raised by the speakers and other discussants. Other speakers from The Nature Conservancy will discuss some of the specific experiences and views of our organization later in this conference.

The Nature Conservancy is in the business of protecting biological diversity in our increasingly human-dominated ecosystems, and is widely involved in the conservation of riparian, aquatic, and wetland ecosystems. These overarching concerns drive our interest in the ways that water quality criteria and standards address issues of hydrologic modification and habitat loss. My comments here will cover the general philosophy that informs our concerns and conservation efforts.

We recognize that protecting biological diversity in the face of hydrologic modification and habitat loss is not possible to the same degree everywhere. We often must make <u>choices</u> about the biological values we seek to protect. Wherever possible, though, protecting biological diversity--as opposed to protecting only a few select species--must involve protecting ecosystem structure and function. This in turn, necessarily involves protecting the integrity of the <u>physical</u> <u>processes</u> that shape this structure and function.

The key physical processes shaping riparian, aquatic, and wetland ecosystems are hydrologic and hydrogeologic processes. These processes involve atmospheric, surface, and ground water; and also can involve the <u>exchange</u> of water and water-borne substances among these three environments. That is, the movement of ground water into streams and wetlands, and the leakage of water from streams and wetlands into the ground water can be important components of the hydrologic system in many ecosystems. Ecological conditions at individual sites are shaped by these key hydrologic and hydrogeologic processes operating at several spatial scales -- at the immediate sites, within their local drainage areas, across their entire surrounding watersheds, and across entire ecological regions.

The key physical processes combine to produce the hydrologic "regime" of any given site. This regime consists of the patterns of water availability, velocity, turbulence, temperature, and concentrations of dissolved and suspended constituents, these conditions vary over time. Further, in order to fully characterize it, we must describe the hydrologic regime in terms of the timing, duration, and frequency with which different conditions occur -- both their averages and their ranges of variability. Hydrologic regimes thus include much more than simply the average annual or monthly water depth, stream flow, sediment load, or salinity at a given site.

Hydrologic regimes also include variability on many time scales, and include not only the "normal" range of conditions at a site but also the "extremes" of floods, droughts, other infrequent conditions. However, from an ecological standpoint there is nothing "abnormal" or undesirable about these extremes. They are a natural and indeed often a crucial part of ecosystem dynamics, especially long-term historical dynamics. Indeed, we must bear in mind that ecosystems are naturally dynamic; they have evolutionary histories and capabilities, and are never static in either structure or function.

Ecologists have increasingly come to the realization that species survival, reproduction, and interactions in water-dominated ecosystems often depend intimately on specific and even unique features of the hydrologic regime. These relationships often can be very subtle and different from one species and ecosystem to the next. As a result, when you seek to protect biological diversity, it is very difficult to segregate any single feature of the hydrologic regime as more important to ecosystem function than any other. These features can include aspects of both the normal and extreme ranges of variation in the hydrologic regime at each site; and can involve threshold effects, in which a slight change in a single feature of the regime can cause large changes in ecosystem structure and function.

For example, even slight changes in the timing of high or low turbidity in a stream can make a great difference in the ability of some fish to mate, or the ability of many fish and shellfish to feed. Slight changes in the pH or temperature of stream water can have similar effects. Changes in the frequency, timing, or duration of flooding can cause changes in streambed habitat and in floodplain vegetation, as well as in the movement of nutrients between the floodplain and the stream. A stream that has lost its ability to flood or to scour its banks can become a biologically very different place indeed. And even small changes in the chemistry of waters entering many kinds of wetlands can cause enormous changes in vegetation, as can changes in the timing and duration of wetland flooding and drawdown.

Given this intimate relationship between hydrologic regime and ecosystem processes, water quality criteria and standards that address biological diversity and ecosystem integrity need to be developed with the following considerations:

First, we need to recognize that human activities can alter hydrologic regimes in many ways:

- Stream, lake, and ground water withdrawals, and hydropower and flood control systems are only the most obvious examples of hydrologic alterations. These usually are monitored routinely only for their effects on water availability, however, leaving their impacts on other features of the hydrologic regime less often examined by and large.

- Other examples of activities that affect both surface and ground water availability include alterations of surface runoff rates and patterns by pavement, buildings, and agricultural practices; alterations of vegetation by land use practices and fire suppression; and the drainage of wetlands.

- Water chemistry and temperature regimes can be altered not only by the well-recognized impacts of point and nonpoint discharges, but by changes in the capacity of watersheds to exchange natural nutrient materials between streams and riparian zones; in the rate and timing of ground water discharges to streams and wetlands; and in the contributions to stream flow from geologically different tributary watersheds.

Thus, we need extensive knowledge of entire watersheds and an ability to <u>model</u> watershed processes, in order to know how, and to what extent, any given human activity has affected or will affect a site's hydrologic regime.

Second, we need scientific tools that allow us to measure the extent of alteration to hydrologic regimes that has or will result from our activities, and will allow us to distinguish human-caused alterations from natural variation. Given the subtleties of ecosystem interactions with hydrologic regimes, measurements of such gross parameters as average flows, temperatures, or salinities will often be no more useful than measurements of only average pollutant or sediment concentrations and loads. Similarly, given the subtleties of ecosystem interactions with hydrologic regimes, management tools such as the IFIM fall far short of providing the information needed for effective ecosystem management. Indeed, we need scientific tools in combination with better ecological knowledge, so that the features of the hydrologic regime that we do monitor are the ones most ecologically significant rather the ones easiest to measure.

The Nature Conservancy has developed and begun testing and improving a method called the "Index of Hydrologic Alteration," that provides a means to assess the impacts of human activities (and climatic change) on hydrologic regimes. The method captures information on alterations to several of the most commonly ecologically significant features of water availability regimes. It requires reference data on pre-impact conditions, or surrogate pre-impact data, for comparison. We feel strongly that such tools have an important role and fill an important need in our efforts to protect biological diversity.

Third, we need legal tools that allow us to recognize and deal with ways that our activities in any one part of a watershed can affect the hydrologic regime in other parts of the watershed. These tools should allow us to recognize and deal with the ways by which impacts on ground water conditions can affect surface water conditions and *vice versa*, often over considerable distances. Legal doctrines that do not readily recognize the interconnections between surface and ground water systems, or that work against regional-scale hydrologic planning efforts, for example, can pose unique challenges to our efforts to protect riparian and aquatic resources.

Finally, we need a framework that recognizes the sometimes subtle but crucial relationships that can exist between many features of the hydrologic regime and ecosystem structure and function. These relationships often can be unique to particular sites or ecosystems, and can pivot on subtle aspects of the hydrologic regime. Managing an ecosystem for hydrologic conditions that support a limited suite of species may leave other aspects of the hydrologic regime vulnerable to alteration and so allow the ecosystem to degrade despite our best intentions.

In sum, we need planning tools and assessment methods that include but also focus on much more than the health of small numbers of species as indicators of overall ecosystem health. That is, we also need planning tools and assessment methods that include evaluations of the physical processes -- especially the hydrologic regimes -- necessary for ecosystem integrity. We need legal tools that recognize the relationships that can exist among surface and ground water processes across entire watersheds. And we need management tools that recognize the often subtle and crucial importance of hydrologic regimes in ecosystem function.

SESSION 2: QUESTIONS AND ANSWERS

Q: Will innovative approach eclipse or conflict with existing WQC&S?

A: No, the innovative approach is to add to EPA's tool box (Susan Jackson)
A: We do not see this as a competition (Estyn Mead)

Q: Is FWS's philosophy to give EPA the lead?

A: No, work as partnership. (Mead)

Q: How do we deal with artificial ecosystems that arise from water use (e.g. irrigation return flow and WWTP discharges) in terms of WQS? (Mark P, Colorado Springs)

A: Artificially induced systems are one of our most difficult issues. Some of the systems developed may be worth saving (e.g. artificial wetland may be valuable habitat) and we may need to make a decision that it is beneficial and must be protected. It is a very site-specific issue. Currently under wetlands there is no distinction between natural and artificial wetlands. This may change in the future. (Max Dodson)

Goal of EPA is to get the State to do the right thing. It is the State's prerogative with EPA there to provide funds and support.

Q: Have there been other stakeholders involved in San Joaquin watershed issues debate? What are the sociological values being dealt with? (John Jackson, Oregon)

A: State held public meetings (water rights meetings), 174 interested parties, agriculture, urban, 84 attorneys involved. An average of 50 representative attend each of these meetings. State tries to have a workgroup and get the stakeholders to develop a negotiated solution and bring it to the State. Historically, most progress in setting standards has been achieved when stakeholders are present and the workgroups develop a negotiated solution plan which the State adopts. (John)

Opening Comments

INTRODUCTION OF ROBERT PERCIASEPE

Tudor T. Davies
Director, Office of Science and Technology, OST
U.S. EPA

We have to get back into the energy level that we had yesterday. A couple of comments on the day. I have asked our session moderators to make sure that the presenters stay within their time limit. One of the things that we need to do better today than we did yesterday is embark upon a dialogue among ourselves. Many of the things that we are talking about, particularly from an EPA, a city, and a state standpoint, are things we want to hear some response to. What I would like you to do today is comment. Yesterday a number of people that came to the microphone asked pointed questions to EPA. I think you can do that individually to many of us that will be here right through the conference to get EPA's answers to those questions. What we'd like to know is what your answer to that question would be. You have a particular perspective, I talked to Bob Berger who asked a question about anti-backsliding and anti-degradation. What I would have liked Bob to do is say "This is what I think about those two issues, what do you think?", so we can have a dialogue. We need your input. I would like to see a line of people at the microphones who want to talk, and share their ideas, that's the benefit to us. We want your input, if you don't get a chance and there are too many lines, perhaps when we go into these breakout sessions today there may be more opportunity for dialogue. We ask the presenters to be provocative, to be short, to be to the point, and then we can have dialogue so that we can get the feedback from you about these ideas that we are investigating and talking about.

If you remember at the last conference that we had in Las Vegas we talked about ideas, we talked about alternative positions, we are moving toward some ad Hoc positions that came out of that meeting, we'd like some response to those positions. So please talk. At the breakout sessions we will have staff in each one, we want to know what you think, what your problems are, what your ideas are, I would prefer you do that rather than ask EPA pointed questions that may be of relevance to you particularly, but perhaps not to the total audience. If you do have a question like that, tell us what you think the answer should be, so we can get your perspective as well. Anyway that's a heavy way to start. Please do communicate with us, I do think that is the whole purpose of the meeting.

Today I have the great pleasure to introduce Bob Perciasepe, who is the Assistant Administrator for Water. Bob has been with us for just about one year in his formal position. He brings extensive experience from a state environmental program. And, perhaps for the Office of Water, he brings a broader experience than we have had in a number of years, in that he ran the whole set of environmental programs for the State of Maryland and came to that program with experience in working in city government at various levels. He was also a prime mover in the Chesapeake Bay program, that you heard Rich Batiuk talking about yesterday. So he brings to the Office of Water a perspective on how the Federal government works from a state and city perspective, how we respond to the public, how we should change. And he also has been a major mover in the ecosystem program from the state level and from the national level.

His perspectives have been very useful to us. He has made us stop and think about the way we do business. He has been a strong arm for the Administrator and you heard yesterday how much she thinks of the Drinking Water and Clean Water Act programs. And so I think we'll all enjoy hearing some of his perspectives this morning on where he sees the water programs going.

WATER QUALITY CRITERIA AND STANDARDS FOR THE 21ST CENTURY

OPENING COMMENTS

Robert Perciasepe
Assistant Administrator, Office of Water
U.S. EPA

Good morning everyone, I hope you all weren't up too late last night, and that my talk at least gets you going a little bit. Yesterday you heard the Administrator and her vision on some of these issues, some of the challenges she is facing. I think these are challenges in the environmental field that we all face. And, I think during yesterday's sessions you heard a little bit about the tools that are needed for ecosystems management and how the water quality standards and criteria program is evolving into the 21st century. I couldn't think of a better title for the conference than that because it is an evolutionary process that is taking place.

Most of you here today are on the front lines of environmental management, and I think you look to EPA to provide some leadership, some guidance, and above all some tools for you to do your job. And that is what we hope we can do and that is what we want to do. One of the purposes of this conference is to share ideas, so we can be in a better position to do that. I won't read much into Tudor's comments about pointed questions. I imagine that there were some.

Tudor also mentioned that in my past life I worked on the Chesapeake Bay. I wouldn't say that I was a prime mover, but I certainly had the honor to participate in that rather extensive program that in many respects is a model for looking at how environmental programs work on a place, as opposed to as a program perspective. I think there was an interesting lesson that I learned. Probably the best lesson I learned was that the public by in large does not look to how many milligrams per liter of some chemical or some compound in the water column as the indicator of whether the program is successful or not.

What they want to know is, can they can go fishing for striped bass, or rock fish? Will there be crabs for the 4th of July? And, when they're out there in their boats, can they jump in the water. These are the environmental indicators that the public use, and to a certain extent the ones the media use.

Our job is to translate our technical needs in science into those kinds of measurements that the public understands, the public can rise to the challenge of, and the public can buy into so they can make the hard choices, to make it happen when they decide that this is what they want.

Another key message that Carol had and one I would like to bring to you is that moving towards an ecosystem or watershed management approach means involving the stakeholders. Stakeholders are primarily the public and entities that are involved in decisions that effect the work and the way life is conducted in a watershed. But those stakeholders have to have some common view of where they want to go, or what they want to do. For example, if, they want to be able to fish for rockfish, then that's one of the things that has to be factored in as to how we do our business in the water quality management world.

Now these are not unusual thoughts, nor are they foreign to most of you. But they are challenging and it's these challenges that we need to adapt to and change the way we think in terms of implementation.

We proposed improvements to the Clean Water Act earlier this year. And I guess the Administrator told you that the Clean Water Act is not going to be passed by Congress this year given that they have about three weeks left, maybe four weeks left in the session. There is actually no debate going on about it right now so I don't think we're going to be seeing a revised Clean Water Act this year. We had a number of issues that we were pressing for in the Clean Water Act. Some had to do with shoring up some of our existing programs, like the non-point source program, wet weather flows with CSO's, expanded enforcement provisions, as well as increasing and reauthorizing the state revolving fund that provides some financial tools.

Some of the issues that we also were looking at include some of the subjects of this conference. For example, we proposed new approaches for how to do water quality standards, whether we should be looking at the bioaccumulative and persistant toxics, how we deal with watershed approaches to water quality management and tying that together with the different programs.

These are new directions that we have been working on, that are going on around the country and that we wanted to get a statutory framework in which to work under. That's not going to happen this year. So we are going to have to work harder yet with our existing tools to make some of these transitions, because I suspect the debate on the Clean Water Act is going to go on for many years, based on my personal knowledge of the state of the debate at this particular time. There is really no convergence of opinion on the more critical issues.

We can't abandon the base that got us where we are. We can't abandon the good-point source programs that have gotten us where we are, but we do need to start looking about where we are going.

Last week I spoke to an environmental finance conference at the University of Maryland. Interestingly enough the same kind of sea change thought process is going on there as is going on with a lot of the water management programs in the country. Now that we know more about non-point sources and wet-weather flows, problems and factors like habitat considerations and harvesting are key in defining a healthy ecosystem; the vehicles for financing programs to solve these new problems hasn't kept up with our improved understandings of what the environmental programs should include. Financing techniques are still imbedded in point-source programs. Fees, user charges, none of those systems work very well to solve some of the more intractable problems.

Likewise, our criteria and standards, our under pinnings of science, have to also flow into an implementation tool development mode that follows what we understand the problems to be. That is a very difficult challenge, one that we have to continue to focus on, and one that I know is a focus of this conference.

Getting all of our programs at EPA together a little more harmoniously is something that we are working very hard on. There are two major areas that the Administrator and the rest of the leadership at the Agency is pushing very hard on. I think she mentioned both of them yesterday but I will try to talk a little bit about both of them today.

First, what we call the Common Sense Initiative. This is an initiative that is looking at the regulated community. How do we deal with the regulated community holistically across the board and up and down through levels of government. If we are dealing with the iron and steel industry, it's not just the air program, it's not just the water program, it's not RCRA. It's all of them together. It's not just the federal government. It's also the state government who probably have more inspectors visiting the steel mills than the federal government does. If they are using water or discharging to a sewer system they are probably actually involved with the local government.

It's a whole host of regulatory environments that a steel mill is subjected to that transcends level of government, transcends programs. In addition, there are a lot of stakeholders that have an interest in what happens at steel mills. Labor unions, environmentalists, the levels of government I mentioned, the suppliers and the customers; all of these people have a stake in what happens at steel mills. What we have found, and I'm using steel mills as an example, that as soon as we try to regulate any particular sector we find out very quickly what all those other stakeholders think about what we are doing. The supplier says, "well I won't be able to get my product the way I want it any more because they won't go all the way to make it bright," (as you used to hear with the phosphate debate). Remember those? Those were the good old days, before anything could bioaccumulate. Then it was biodegradable. The whole issue of how do we deal with a regulated community holistically is one we are struggling with and why we've kicked off this initiative. We are looking at six industrial sectors--auto assembly, electronics and computers, iron and steel, metal plating and finishing, petroleum refining (that's an easy one), and printing. That runs a gamut from your high tech to your traditional smokestack industry. It also runs a gamut of small businesses to big large integrated steel mills. So you've got a real spectrum of what we're doing there. We're putting together teams of those stakeholders that I mentioned on each one, and they are going to examine six specific areas, and take a fresh perspective of the regulations that we currently have in place, prospectively and retrospectively. They are going to take a look at how these things are working together. This is going to provide a context for our regulatory review, which we are required to do by Executive Order--look at our regulations and see how they are working. You just can't wheel them into a room and say, "hey O.K. lawyers, lets have at it." Unless you have a context. What is the context? What isn't working and what is working and are they working together? Should they work together? We're going to look at pollution prevention. We're going to look at information collection. There's RCRA and NPDES; and the new clean air protection systems--they all are going to provide the same information. Can it be integrated? Can it be modified? Can it work better?

I don't know what the answers to the questions are but we're going to ask them. Strong enforcement and compliance assistance is also a part of this initiative. How do we factor that in? How do we improve the permitting process? We have a permitting improvement team in place. These sector teams are also going to look at the permits in the context of the different sectors. How can the permit process be made more efficient? We're also going to look at the barriers to new environmental technology and, again, we will have teams made up of the stakeholders involved. Each team will be chaired by an assistant administrator and a regional administrator, with a state environmental commissioner as a lead for the states. We've already started these meetings. In fact, I chaired the first iron and steel meeting yesterday. We had people from all over the country. So this approach as we develop it, will be a way to integrate our programs up and down the government structure and across the EPA media structure, and one that we hope will bear fruit.

At a minimum if the EPA, state, and local regulators understand more about the people we regulate and they understand more about what we have to do and that's all that happens, I think we will have made progress. But I hope that, and we expect that there will be a lot more coming out of this initiative than that.

The second area that we are pushing and pushing very hard at the management level in EPA to integrate our programs, is something we call ecosystems management. Although we are struggling for a better term than that because the term "ecosystem management" doesn't mean much to the general public. Another thing that we've been talking about is place-based environmental management. The key here is how do our programs work up and down the government structure, across the media to deal with a place in the real world that needs to be clean. Just as we have a process for looking at those we regulate holistically, we also are starting a process that looks at the places we want to protect or clean, or restore holistically.

I'll use ecosystems management today as a way to describe that process. It's a process that recognizes that one-size-doesn't-fit- all. You've heard some of the examples of place-based environmental management that are already in place, where there is a lot of watershed activity going on. Source protection for drinking water or groundwater protection programs are looking at places, and there are others I'm sure that we can think of.

The idea here is to link our programs to fundamental strategic choices. To look at what the place needs in terms of its goals, keeping in mind the base of our existing statutory responsibility. We have to look at ways that we can do this creatively and flexibly. We have to look in each place to find the problems, set priorities and help with solutions. That is what the stakeholders can do if they buy into the solutions. This is another example of getting folks to the table--the different levels of government and the different people who have an interest in an area--into the solution.

We'll be turning more and more to this type of an approach in the agency. And we'll be looking at more places and involving more people in what we do. This still has to be based on sound science, and this is where you come in. The tools that we are going to need to do this can be presented and can be dealt with in a digestible way, but they have to be based on sound underpinnings. We can't be making up the goals, but we have to be figuring out if they are achievable, how they get achieved and what's the science behind them. I think the EPA is in the unique position to provide that kind of leadership and those kinds of tools and I think that that's what we should be doing.

We're looking at our regional offices to be what we call our place rangers. We have 10 regional offices around the country. We want them to be facilitating and creating the environment for these activities to take place. To be engaging. To be pulling people literally out of the woodwork to participate in various place-based environmental management activities. And we will have, or we hope we will have, because we still haven't gone through the full budget process, a major initiative for our 96 budget that we'll be shifting resources to regional place-based environmental activities.

One of the foundations for doing this, obviously, is going to be some new tools, and adjusting the tools we currently have to meet the needs that I was just talking about. I'm still talking about ecosystems management.

Here are some of the things that I hope you'll be thinking about during and after this conference. Some of the tools that I want to say something about are:

Environmental Indicators, Habitat Assessment and Sediment Criteria, Biological Assessments and Nutrients Methodology, to just name a few.

Environmental Indicators. How many of you have heard the term "you can't get there from here?" Right, I actually saw a cartoon that said the same kind of thing. One of those little cartoons, probably Larson or something, where there was a guy standing on the side of the road and a guy sitting in a car. There was a big sign next to the guy that said "Point B', and way off in the distance across the desert that you could hardly see was another sign that said "Point A." The caption at the bottom said "I don't know mister, no one ever asked that question before." You know, "how do you get from Point B to Point A?" We always say "how do you get from Point A to Point B" and the question is, "what are these indicators?" How do we tell when we get there in environmental improvement, what's the answer? Is it the milligrams per liter, or is it the rockfish? Is it acres of aquatic vegetation for habitat? Is it a number of obstructions to spawning? Is it swimmable beaches? Obviously it's all those things. The kinds of measures we use these days are significant non-compliance, average monthly whatever. I don't want to say something that will technically be wrong with you people here, but you know what I mean, and these are important and we have to have them. But how do we take that next step to engage the public, engage the stakeholders into figuring out what they want.

Perciasepe

I can take you places within driving distance from here, where everything is in compliance with everything. There are no NPDES permits out of compliance. All of the construction sites have the proper sediment control. You name it, everything is in compliance. Yet the ecology of the stream is degrading. How do I know that the ecology of the stream is degrading? Because I go out there and I can tell that the species diversity is down, the abundance is down, the temperature is up, there's no habitat, there are no amphibians. Whatever measure you want to use, something's wrong in that stream. But yet everything's in compliance.

There's another problem we have to deal with. What are we missing and is it in the purview of EPA, this thing we're missing? And if it's not in the purview of the EPA then whose purvey is it in? And how do we factor it into ecosystems management? It is very important, is how do we get those measures, how do we find those indicators and what are they and that they be based on science. I think that the question on how do we get from Point B to Point A, or alternately create a Point C, and we'll all go over there.

Public participation is important in this process because you have to be able to communicate back and forth and get an understanding of what the public wants. We have to be able to translate to them what it is we're talking about, because ultimately whatever we're talking about in environmental improvements is going to mean spending money or resources. It could be time, it could be flexibility, it could be money, but there are going to be resource expenditures.

People are going to have to make decisions, and choices. Elected officials are going to have to make decisions, and choices. The more they understand what those choices are buying and where they want to go with them and what the indicators of success are going to be, the more willing they are going to be to make the investment.

When you do public opinion surveys, 70 to 80% of the people still say we're not going far enough, because they have some indicator in their mind. Whatever it is, they've got it in their mind that we haven't gone far enough. Yet when you go to congress or to state legislators, and I've been to both of them, we're spending to much money on this stuff; we don't know what we're getting etc., etc., etc. So there's a disconnect; there's something in the public's mind we're not going far enough, wherever that is.

Where is Point C? In the elected officials mind they're making these tough decisions about money and they got these conflicting interests coming to them. It's easy for the public to say, I want no crime; I want all this health care; I want everything in the environment to be fine and I want to be able to drive my car where ever I go. That's what they'll say, so you take that with a grain of salt perhaps in terms of public opinion. But clearly the public has some vision that hasn't been satisfied. We see this time and time again in the polls. Yet, the congressional, state legislature, the executive branch decision-makers are making allocations of resources as well as the boardrooms of this country are making allocations about corporate investment. All are saying, well, wait a minute, what are we getting, where are we going? Why are we going there? And so tough decisions have to be made, buying has to occur, and that's where translating some of the things we do for a living into these indicators is important.

Habitat Assessment. How do you, I just went through something, species abundance, species diversity, does that mean anything? Is it different in a stream in Arizona from a stream in Virginia? Probably yes. So how do we do that? How do we determine whether or not the habitat is there for the needs we have? Do we spend another billion dollars cleaning up the Chesapeake Bay so that we can have shad? Or do we simply remove the barriers so they can spawn? You know, so they can have spawning habitat. What a concept. You know that may be a hell-of-a-lot cheaper than spending another billion dollars thinking that it's pollution we are dealing with, so we have to link these things together in a way that we haven't been successful at in the past.

Nutrients. This has been a struggle for many years. People have looked at all kinds of approaches in dealing with nutrients, classifying lakes as eutrophic levels. We need a place-specific way to do this that is linked to some of these indicators. Maybe it's submerged aquatic vegetation. Maybe it's light penetration. Maybe its chlorophyll-A or the amount of algae. Whatever. What's a good nutrient environment in terms of photosynthesis in one area may be different than another area. And, part of the answer to what the nutrient criteria ought to be, I think, probably ought to have a place-based component to it. Obviously it's different in a stream than it is in a lake. And in an estuary than in an ocean. We have to consider all that and figure out ways to apply it.

Sediment Assessments. How do we look at whole sediment toxicity? How do we deal with that in terms of the benthic community?

Risk Assessments. How do we integrate these tools into ecosystems management and communication devices to the public? That's something that we have to do. That is something that you can help on. How do we create a package, a toolbox so that we do know how to get to Point C? And again, case studies are being developed. There are case studies that you are going over in this conference, there is a lot of activity and a lot of energy in many of these areas. I think to get to the next level of water pollution control in this country we need to figure out how to take the science and the new understanding of what the water quality problems are, put those together, develop the tool box and the indicators and how to get there, develop better tools on communicating with the public as to what their expectations are. It is no longer simple; it is no longer secondary treatment at every plant. That was good; it was great; it got us a long way; it is easy to digest; and everybody understands it. I won't get into the ways though, but we did it.

The next part isn't that easy, fifteen percent submerged aquatic vegetation in every estuary. How about that? Nobody knows, so it is going to be different in different places and we again have to link it to science. If I can leave you with this thought, the leadership at EPA, I think that the leadership in state government where I come from, leadership in corporate America, leadership in community activists, leadership in tribes, they all want to figure out ways to integrate our program to get to that next level. I haven't heard anybody say "no, Bob that is a bad idea." I don't want to go to Point B; been there; saw that; did that. I've heard people say we need to get to the next level, but we need to be a little better at answering the questions of what we're getting, how we're getting there, and what's the indicator of success when we get there. It can't just be we spent 50 billion dollars and now everybody's got secondary treatment. It's much more complicated than that and there has to have a scientific basis to it. The challenge we face in the Agency is dealing holistically with the regulated community to get the most we can get out of that relationship, dealing holistically with the places we want to clean, and getting the most out of stakeholder involvement and getting a scientific understanding of what needs to be done in that place. That is the challenge we face in environmental management, and you all are in a unique position to help develop and move us forward in meeting these challenges.

QUESTIONS & ANSWERS: OPENING COMMENTS (Perciasepe)

Q. What do you do at EPA if you find, you mentioned that if it's not in the purview of EPA, or looking at if its in the purview of EPA, what do you do if the stressor that you are looking at is not in the purview of EPA, what do you do? For example: Let's say you find out that you find out that over fishing is really the cause of the decline of fisheries, and EPA doesn't regulate fisheries.

A. I think that was the point I was trying to make with place-based or ecosystems management that the stakeholders have to be involved, including the Department of the Interior, local fisheries commission or whoever who have some stake in that, as well as the public, the commercial and recreational fisherman or fisherpersons or whatever and they all have to understand what the problem is. What we had in the past, and I observed this, and I said it during my talk, sometimes it's convenient to say, "well there's still environmental problems and we need more in pollution control." And sometimes it's stabilization on the pollution side and management of the living resources both from a habitat and harvest standpoint. I think that the only way you are going to get that is when you look at a place. There is no one federal agency, no one state agency, no one local agency, or tribe that has the total absolute purview over all the factors involved. There may be things outside the reservation; there may be things upstream in another state; there may be air deposition, and there could be harvesting as regulated by different agencies. So the idea is to get everybody to agree on what the plan is and what the approach is and then you get the cooperation that you need. That's sort of the beauty of doing ecosystem or place-based environmental management. That's also the challenge because I don't think anybody wants all this authority to be vested in one entity.

Comment: Now, my comment. I agree with you 100%, you see the problem with EPA in the past has been, they see their charge as doing everything. And I think what you are saying is you should facilitate everything; you don't have to do it all yourself, and you should try to get it done, and I think that's where this idea of getting the states involved and helping. For example, the use where EPA could facilitate that, but they don't have to do it all. That's my comment.

A. Yeah, well I hope we're facilitating that in California. In very interesting ways.

Q. Jon Monson: City of Hollywood, Florida. I will make a comment rather than a pointed question. You really hit a cord with us, especially your comment on everything's in compliance but the ecosystem seems to be degrading. Let's look at the flip side. What if everything's in compliance; you see no degradation but you are being asked to do more. Quite frankly, what we have here is the need to define the problem. And I'm really impressed to hear EPA's approach to this. I am really concerned in how we define those problems. I'll make a comparison here. We're being asked in South

Florida to remove silver from our wastewater. Now silver is a problem, but when you look in the environment we don't see where the problem is occurring yet we're being asked to do more and more. So when we come up with something as simple as silver, and when I say simple, that's with a grain of salt, because I've gotten lab results that tell me the ocean has got about a part per-million in it of silver. And I go back to them and I say come on, and they say oh-yeah we forgot to account for the chlorides in the ocean and they come back with real silver numbers. Now I compare that with something as simple as silver to something as complex as, "how do we measure habitat," and the criteria that are going to be established for habitat are going to be much more complicated than an EPA method for measuring silver. Yet the people are going to be required in meeting that goal or criteria. I would like to commend EPA for bringing the regulated community into this entire process. I am also very pleased that the environmental groups are going to be involved in this because they seem to be our primary focus for getting the message out. What are the important problems? If we can focus them on what consensus is of what the important problems are, I think we are going to go a long way.

A. I appreciate the comment. I know we continue to work on silver and other chemical-specific and pollutant-specific issues. They are not going to go away, keep in mind that whenever I was talking we need a base on which to hop off on maybe that base can be adjusted as we are working with our common sense initiative, but the base has to based on science. Another example of the bioaccumulative toxics where there may not be an immediate habitat or living resource problem yet there is a systemic ecological problem that has to be dealt with so decisions have to be made on a broader sense. You can point to the DDT decisions of the past that were affecting a whole host of organisms on the earth and continued to in some places in the world. And there are probably more problems like that, but there are always exceptions to the rule. and there is always a reason that you need to focus on one thing or another. But as a general rule, the framework that I laid out is where we need to go in the next decade as the transition that is logical based on science and based on sound public policy and involvement. So it is a challenge and there will be back and forth. So I do appreciate those comments.

Session 3

Assessing Risk At The Watershed Level:

Integrating Assessments to Solve Complex Problems

ECOLOGICAL RISKS AT THE WATERSHED LEVEL: INTEGRATING ASSESSMENTS TO SOLVE COMPLEX PROBLEMS

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The U.S. Environmental Protection Agency and the Office of Water have identified watershed ecosystem protection as a top priority. To meet this challenge, we need to use available assessment tools in more integrated and innovative ways. We need to develop a new process that allows us to evaluate and predict ecosystem vulnerability to diverse human activities impacting watersheds and placing them at risk.

Assessment of ecosystem level risk can be based on current ecological risk assessment methodology as described in the *Framework for Ecological Risk Assessment* (USEPA 1992). Ecological risk assessments contain three primary components: problem formulation, analysis (encompassing characterization of exposure and ecological effects) and risk characterization. These basic principles are now being modified and expanded to develop a scientific process for assessing risk at the watershed ecosystem level. Principal differences identified in the process include the high level of manager involvement required, and a primary focus on the ecological resources to be protected.

To develop the process, a multi-agency Technical Panel, co-sponsored by the USEPA Office of Water and Risk Assessment Forum, was established in 1993 to develop case study examples of watershed level ecological risk assessments. These case studies are featured in Session 3. Although each case study watershed is subject to complex interactive problems from many sources of stress, the five case studies will be used here to target some of the more difficult issues facing watershed managers today. For example, endangered mussels in the Clinch River Valley, VA, are already being carefully managed but they continue to decline. Big Darby Creek, OH, is a relatively unimpaired ecosystem subject to increasing land development. In the Middle Platte River, NE, farmers working in America's agricultural bread basket compete with the birds of the Central Migratory Flyway for a limited supply of water and wet meadows in a complex hydrologic system. Waquoit Bay Estuary, MA, is suffering the effects of over-enrichment from air, land and water. Finally, the Snake River, ID, beset by a cycling interaction of sediments, nutrients and low flows has many conflicting stressors and human demands. The purpose for the following panel discussions is to explore how ecological risk assessments help to evaluate and increase our understanding of the complexities of these problems and provide the basis for better watershed management.

The U.S. Environmental Protection Agency (EPA) is placing increased emphasis on achieving integrated ecosystem protection. The Office of Water is working to meet Agency goals through the development of watershed protection programs. This shift in emphasis is based on a recognition that despite major advancements in environmental protection, and significant observable improvements, degradation of ecological resources continues. More integrated assessments of ecological resources at risk in watersheds are needed to solve remaining problems.

Background

Under the Clean Water Act and Clear Air Act, implementation of best available technology and establishment of criteria and permit limits continues to reduce direct discharge of pollutants into surface waters and air. Implementation of regulations under FIFRA, TSCA and CERCLA controlling land application and clean up of toxics is reducing soil, ground water and surface water pollution. The outcome of these and other programs has been a resurgence of aquatic life in surface waters, increased productivity of wildlife, and a significant increase in human quality of life. However, despite decreasing pollution and improved environmental protection, ecological degradation continues. Surface waters supporting aquatic life contain communities with lowered diversity, non-native species and in many cases advisories restricting human consumption of resident fish. Reproductive success of many birds and mammals is decreasing and extinction of species within all classes of organisms, except humans, is increasing. This degradation can be attributed to many factors including physical loss of habitat, reproductive defects from bioaccumulative chemicals, human misuse of surface and ground water, and the introduction of non-native species. Such human induced changes are some of the stressors recognized as degrading ecosystems. Often the cause of degradation is not known. Past program success in reducing pollutants in water, land and air through media specific programs has served to highlight the diversity of continuing environmental problems.

To meet the challenge of a changing environmental focus, a process to understand and predict ecosystem vulnerability to many stressors is needed. This process must take into account the combined and cumulative effects of chemical, physical and biological stressors, the dynamic relationships of biotic communities interacting with each other and their physical environment, and the need to evaluate risk within a definable ecosystem, where stressors from one medium, such as air, can transfer to others like water or soil. Assessment tools are now available, and others are under development to evaluate the effects of specific stressors. However, we need to use these tools in more integrated and innovative ways.

Developing a New Process

To incorporate multiple assessment tools and evaluate risk at an ecosystem level, an approach may be derived from current ecological risk assessment methodology. Ecological risk assessments have been used extensively by the Agency in a variety of applications (e.g., aquatic life water quality criteria, pesticide registrations, Superfund clean up levels). In 1992 the Risk Assessment Forum published the *Framework for Ecological Risk Assessment* (USEPA, 1992) to promote consistency in Agency use when addressing single chemical or physical stressors. Ecological risk assessments contain three primary components: problem formulation, analysis (both characteristics of exposure and ecological effects) and risk characterization. These three components are being expanded into a scientific process, based on experimental design, to assess risk from multiple stressors impacting watershed ecosystems. The process will directly support watershed management initiatives.

To develop the process, a multi-agency Technical Panel, co-sponsored by the Office of Water and Risk Assessment Forum, was established in 1993 to develop case study examples of how to conduct ecological risk assessments for watershed ecosystems. Watershed ecosystems were selected to represent a landscape scale because watersheds are natural geographic and hydrologic boundaries where the effects of diverse stressors in water, on land and in the air combine in surface and ground water as it flows through the watershed. In addition, federal, state and local organizations are already working to manage regulatory and non-regulatory activities within watersheds to meet environmental goals. The case studies will provide examples of the process and complexity of geographic risk assessments and form the basis for guidance on how to conduct risk assessments for watershed ecosystems. Two principal objectives were identified for this program: develop guidance on conducting watershed level ecological risk assessments based on the scientific method, and using risk assessment results to improve watershed management.

Based on initial objectives, coupled with what has been learned during case study development, several significant conclusions have been reached. First, although watershed management activities are well under way by many states and local organizations, the current process used to define what human activities are responsible for observed degradation, what degradation is actually occurring, and how best to reduce the risk from ongoing or planned human induced changes is as varied as the number of projects. Dependence on best professional judgement is central to the development of these efforts. Yet, best professional judgement is difficult to evaluate because much of the information processing and decision-making is in the mind of the professional making the judgement and less subject to review or understanding by others. Best professional judgement will continue to be a key and essential element of any watershed assessment. However, ecological risk assessments founded on the principles of the scientific method require a search for alternative hypotheses and predictions, add analytical rigor, and focus the principles of experimental design on evaluating the combined and cumulative effects of multiple stressors on ecological resources of concern. Application of the traditional scientific method is essential for development of watershed ecological risk assessments.

A second important difference in watershed risk assessments is the primary focus on assessment endpoints, and the degree of involvement of local, state and federal managers in selecting them. Management input about watershed ecological goals and the translation of these goals into assessment endpoints by risk assessors, provide the driving force for the risk assessment. Instead of asking what organisms are likely to be impacted by a particular stressor, more typical of traditional risk assessments, the question becomes which stressors are likely to impact the ecological resource of concern. This shift in emphasis results in significant changes in how the risk assessment team evaluates information and structures the risk assessment. It also promotes an evaluation of the combined and cumulative risk of exposure to multiple stressors based on a rigorous analytical design.

Case Study Examples

The watershed ecological risk assessment case studies each provide an opportunity to evaluate the value added when choosing to conduct an ecological risk assessment. Each of these watersheds is already managed, and has been for some time. Each is subject to a significant variety of human induced stressors that range from chemical contamination (e.g., Superfund sites, agricultural run-off or point-source dischargers), and physical alterations (wetlands loss, dredging, sedimentation and erosion), to biological impacts (e.g., algal growth, domesticated animals, introduced non-native species). Each watershed was selected in part because significant information was already available on the watershed. In each case the risk assessment has provided new ways of evaluating available information and new ways of looking at the problems. A few of these are briefly described below; for additional discussion refer to summaries of the break-out sessions in Session 3.

Endangered species are protected under the Endangered Species Act and of significant concern to resource managers. The Clinch River Valley in Virginia contains among the most diverse endemic communities of mussels in the country. Many of these mussel species are now endangered. Local managers are working hard to protect mussel habitat to save these species, but the effort has not achieved what was hoped for. In some areas, older mussels are still alive but no young are being successfully reproduced. One of the significant outcomes of the ongoing risk assessment of the Clinch River is the increasing consideration of other possible causes for the decline, including the simultaneous change in the fish community in the river. Since many endangered mussel species young must attach to a particular species of host fish during a critical life stage, the loss of the fish host in the community will result in the continued failure of mussels to recruit young. To save the mussels it may be necessary to develop more effective management of the fish.

The Big Darby Creek in Ohio is a relatively unimpaired ecosystem based on aquatic community measures and habitat structure. However areas of impairment can be identified along different reaches of the stream. The purpose of the first phase of this risk assessment is to evaluate the relationships among different land use activities, their proximity to the stream and the observed differences in the biotic communities. In the second phase, a more detailed evaluation of land use stressors will be conducted to evaluate what kinds of changes are most likely to be causing adverse effects. Each land use is a complex of stressors that must be evaluated. The Big Darby Partners, a local management organization, want to use the results of the risk assessment to refine their current planning efforts.

The Middle Platte River in Nebraska is a exceptionally valuable natural resource that supports major agricultural production, serves as the primary feeding and resting area for the internationally important migratory bird central flyway, and supports a significant diversity of resident birds, amphibians and fish. Historically described as a mile wide and an inch deep, the river's character has changed significantly over the years because of increasing demands for water, both within and upriver of the Middle Platte. Although highly managed, the hydrology of the system is unique and not easily understood. The risk assessment process, which included going to the watershed to talk with local managers and the public, has helped identify conflicting interpretations of the river's hydrology. This, and the importance of the river's diminishing wetlands, prompted the risk assessment team to focus one aspect of the risk assessment on more systematically evaluating the natural and human managed hydrology of the river and its relationship to habitat needs for selected biota. This information will hopefully aid resource managers in achieving consensus on an effective management plan for the river to protect ecological resources and sustain agriculture and industry.

Waquoit Bay Estuary on Cape Cod in Massachusetts has been the focus of intensive research on nutrient cycling for several years because of observed problems caused by over-enrichment. Despite this effort relatively little data are yet available on the actual ecological effects that over-enrichment is having on the bay. Nor is much known about the condition of the freshwater component of the watershed. Researchers are still grappling with the relative contribution of different sources of nutrients to the system. The risk assessment in this case will more closely associate the nutrient inputs from the three primary sources (septic systems, fertilizers, air deposition) to observable ecological effects on the eel grass community most at risk in the estuary. In addition, the risk assessment will include evaluations of the freshwater component. Finally, the risk assessment will recommend further research in the bay, freshwater ponds and streams to more fully characterize the ecology of the system and risk from stressors.

The Middle Snake River in Idaho is highly degraded from agricultural return flows, fish hatcheries and dams. Sedimentation, over-enrichment, impoundment and water withdrawals are taking their toll on native species, river flow and human enjoyment of the river. The risk assessment in this case is focused on understanding the inter-relationships among water flow, nutrients and sediments. They each impact the other and managing one without managing all is problematic. The risk assessment will help to clarify these relationships, information of value to managers trying to determine how best to meet human needs and aquatic life goals.

These brief descriptions highlight a few of the issues being addressed in the watersheds, and a few of the approaches being used by the risk management and assessment teams developing the case studies. Our first steps in developing these case studies have been difficult. Traditional approaches to ecological risk assessment were not as effective for watersheds. The risk assessors had to refocus on management goals and assessment endpoints to make progress. As we develop analysis plans, more rigorous experimental design must be applied. Throughout, the learning process has been rich and characterized by new understanding of the power of applying the scientific method to problems of understanding and managing risk.

U.S. Environmental Protection Agency (1992) *Framework for Ecological Risk Assessment* EPA/630/R-92/001.

ECOSYSTEM ANALYSIS FOR BIODIVERSITY CONSERVATION: SOME PERSPECTIVES FROM THE NATURE CONSERVANCY

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Background

During the past few years, The Nature Conservancy (TNC) has taken a headlong plunge into the morass of "ecosystem management." As with many other land managing organizations, the Conservancy had come to understand that the management of isolated, fragmented preserve areas for conservation purposes simply could not succeed when our management influence was constrained within our own property boundaries. Through our experience in managing a network of more than 1500 preserves across the U.S., we could well appreciate the challenges of conserving biodiversity within a landscape matrix of diverse land uses, watershed processes, species migrations and gene flows. While senior managers within the organization were boasting of being a quiet, "science-driven" conservation organization, our scientists were quietly driving the organization into ecosystem management.

Fortunately, we had a history of critical thinking about applied conservation biology, a lot of biological management success and failure, and even a few scientists familiar with the concepts of risk assessment to guide our early forays into ecosystem management. So when the Conservancy decided four years ago to launch a fundraising campaign to fuel the initiation of more than 70 individual ecosystem management projects (called "bioreserves"), Conservancy scientists felt reasonably confident that they could "walk the talk." As more than 70 Conservancy planning teams simultaneously dove into strategic planning for their respective ecosystem projects, they all worked within a planning and analysis structure we call "The Six S's: Systems, Stresses, Sources, Situation (e.g., economic, social factors), Strategies, and Success."

The first three of these S's represent an analytical process quite similar to the "problem formulation phase" of the ecological risk assessment framework, as articulated by EPA (1992). Using the Six S's, Conservancy planning teams first identify the ecological systems of interest or concern, then evaluate the leading stresses and sources of stress to those systems. As in ecological risk assessment, these analyses are based upon conceptual ecological models of the systems to be protected.

The Six S's framework has had an immeasurably beneficial influence on the Conservancy. For the first time, Conservancy managers and scientists are being recognized and rewarded for sharing their knowledge about how ecosystems work, and for investing resources in planning their conservation activities *strategically* (based upon ecosystem knowledge). Bioreserve strategic plans are based upon current, local, interdisciplinary knowledge of current and past human activities within targeted watershed areas. This knowledge is used to assess what is stressing the system and the biological implications of those stresses. Although this planning process is quite time-consuming, few of the Conservancy's planning teams dispute the merits (and necessity) of adding this level of rigor to decisions involving considerable investment of organizational resources. The ability of such conceptual discussion and analysis to improve our conservation effectiveness is now well established within our organization.

What Else Can Ecological Risk Assessment Do For Us?

While the Six S's planning framework has elevated the Conservancy's strategic planning standards, these analyses of ecosystem stresses are generally based upon qualitative information and intuitive reasoning. A common realization derived from these planning exercises is that large holes exist in our understanding of present and historical conditions and functions in our targeted ecosystems. For many of us, the idea of committing millions of dollars and years of our time to conservation actions founded upon a weak knowledge base and tentative hypotheses about the causes of ecosystem stress is terribly unsettling. At the same time, many others within the organization are openly nervous about investing resources in research activities that hold no guarantee of substantially influencing our decisions about how to conserve biodiversity.

The scientific rigor embodied in the "analysis phase" of EPA's ecological risk assessment process (EPA 1992) holds great promise for minimizing these conflicts between science and applied management concerns within our organization. The ecological risk assessment framework outlines a methodology for strategically engaging scientific methods in the resolution of real world, applied ecosystem conservation issues. If the application of ecological risk assessment principles can reduce the risk of investing in poorly designed and directed research and lead us to better identification of the causes of ecosystem stress, we expect that it will be quickly adopted within our organizational culture.

Challenges for Watershed Analysis

During the past couple of years, the Conservancy has begun to make some careful but increasing investments in applied ecosystem research. The purposes of this applied research closely parallel the intentions of the analysis phase of ecological risk assessment, as outlined in the EPA framework document (EPA 1992): i) to characterize ecosystem stresses in time and space; and ii) to characterize biological responses to these stresses (ecological effects). While this analytical strategy appears conceptually sound, its application to watersheds and hydrologic stresses is proving to be quite challenging. We would like to briefly summarize some of the challenges we have identified in some of our early investigations of watershed stresses.

Hydrologic regimes clearly play a preeminent role in structuring ecosystem conditions, processes and functions within watersheds. The rates and timing of water flows over the land surface, through ground water systems, and within channels directly shapes aquatic habitat conditions such as water depths and velocities, and indirectly influences water temperatures and chemistry. Hydrologic regimes dictate the degree of connectivity between floodplain habitats (such as backwater lakes and sloughs) and primary river channels, thus influencing exchanges of nutrients and other materials between these habitats and controlling access to floodplain habitats for feeding, resting, and reproduction by aquatic organisms. Hydrologic regimes structure wetland or riparian environments by affecting flood inundation, drought stress, and other critical environmental conditions that affect the distributions of plants and animals in these ecosystems.

Although many of these hydrologically-driven ecosystem processes and functions are intuitively understood by ecologists, four constraints are substantially limiting our abilities to adequately characterize hydrologic stresses in time and space:

1. Existing hydrologic data collection networks and technologies are grossly inadequate. The data needed to adequately assess hydrologic changes over time are available for only a finite number of monitoring stations. Watershed analysts are commonly constrained by the limited transferability of these data to their study areas, and the limited utility of these data for calibrating simulation models. Stated simply, we need more data.

2. Statistical summaries of hydrologic data (prepared by data collection agencies) are generally limited to a handful of summary statistics such as monthly means. These statistics are quite useful to planners and engineers concerned with human water supply and flood protection, but most of the commonly published statistics are meaningless to ecologists trying to evaluate ecosystem relationships. New computational tools capable of more fully characterizing such hydrologic phenomena as the magnitude and duration of flood and drought pulses, the timing of extreme water conditions, and the rate of change in hydrologic conditions are needed to support ecosystem analysis.

3. Hydrologic data generally needs to be translated into associated habitat characteristics (such as flow velocities or depths, or duration of inundation) before it can be used in ecosystem analyses. Few scientists are familiar with the tools hydrologists use (such as hydraulics models) to perform such translations. Therefore, ecologists need to be able to ask hydrologists for assistance in characterizing hydrologic stresses in the language of ecologists.

4. Hydrologic processes alter physical habitats over time. The hydrologic variation (such as water table or river fluctuations) that influences ecosystem functions and biotic distributions operates within the physical structure of the environment (i.e., the river channel, floodplain, wetland pond, etc). When the physical structure of the environment changes, the distribution of habitat characteristics such as flow velocities and depths may change substantially as well.

   The degree of physical habitat change important to ecological components such as fish (e.g., changes in the relative abundance of riffles and pools) may be relatively inconsequential to other components such as a riparian forest. Therefore, we need to understand the nature and rates of geomorphic change occurring within the ecosystems we are studying, we need to assess its significance to the ecological components we are analyzing, and we need models capable of simulating these effects over time.

Beyond these challenges in characterizing hydrologically influenced habitats and stresses in space and time, we are also challenged in our attempts to link such stresses to changes in ecosystem biota. Within the Conservancy, we have assembled a team of hydrologists and ecologists to advance our understanding of the role of hydrologic regimes in biological systems (which we call "biohydrology"). Through involvement in research efforts across the country, the biohydrology team is beginning to recognize some common pitfalls in our attempts to link hydrologic regimes to biotic changes over time.

Many of the problems just described for characterizing hydrologic stresses are equally pertinent to biohydrologic analysis. We seldom have adequate data on historical distributions and abundances of native species and communities. It's difficult to identify the specific hydrologic characteristics that might best explain changes in the ecological component of interest, due to the limited availability of information about life history strategies and hydrologic dependencies. Changes in ecological patterns have to be characterized at spatial and temporal scales compatible with hydrologic characterization.

If all the hurdles mentioned previously in this paper could be overcome, we will still be hindered by the absence of a general theoretical framework for linking hydrologic and biotic change at various spatial and temporal scales, and the lack of successful research designs for other researchers to emulate. To build such a general framework for biohydrologic analysis, an extensive review of currently available data collection technologies and networks for monitoring both current and past hydrologic and ecologic conditions needs to be undertaken. Ecologists specializing in research design at different levels of biological organization (e.g., populations, communities, ecosystems) need to collaborate with hydrologists and fluvial geomorphologists to seek common intersections between data, processes, and life histories. Opportunities for making substantial contributions to the emerging field of biohydrology are clearly abundant.

SELECTING WHAT TO PROTECT IN THE WATERSHED ECOSYSTEM: USING MULTIPLE ASSESSMENT ENDPOINTS FOR THE MIDDLE PLATTE RIVER SYSTEM

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and

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The Middle Platte River watershed is situated at the crossroads of North America, where a major east-west human transportation route intersects the north-south Central Flyway avian migration corridor. The watershed is an internationally important system that supports rich agricultural production, provides habitat for over 300 species of migratory birds (including six threatened or endangered species), and supports a wide variety of multiple uses, including recreation, irrigation, agricultural and industrial water supply, hydropower generation, fish and wildlife habitat, and groundwater recharge. The Middle Platte and its alluvial aquifer also provide drinking water, support irrigated agriculture and other industries, serve as a focal point for community and economic development and sustain remaining fish and wildlife habitat within the basin.

The watershed covers approximately 5,130 square miles in south-central Nebraska. It includes broad, braided river channels and associated wetlands and uplands. Most water flow in the watershed comes from snow melt and runoff from precipitation. The flows in the Platte River are naturally highly dynamic with intermittent high and low flows and flooding. Diversions of surface water for irrigation and power generation have a major effect on the natural rhythm of Platte River flows in the sub-basin.

To successfully manage these diverse resources and uses in a complex system like the Middle Platte, education of stakeholders, from children to adults, is essential. An understanding of the important resources such as the storehouse of biodiversity in wet meadows, native prairie and backwaters is needed. Key ecological relationships must be studied. These values must be balanced with the multiple uses of associated resources.

To develop the watershed ecological risk assessment for the Middle Platte, a cooperative team of local, state and federal professionals initiated the development of a watershed ecological risk assessment based on three cornerstones: problem identification, stakeholder involvement and comprehensive integrated action. Learning about the watershed and getting stakeholders involved has been central to the process. Activities included tours of the watershed, a Platte Basin Ecosystem Symposium and public meetings to obtain feedback on what is of value to people living in the watershed which support quality of life, diversity and economic stability. These were followed by focus group meetings with commercial groups (farmers, irrigators, utilities), environmental interests, and state and local governments. Based on feedback from stakeholders, and current scientific understanding of local resources, a general management goal was identified by the group that focuses on maintaining a functioning and sustainable watershed ecosystem that includes habitat components, landscape patterns and valued species, while maintaining economic stability.

These general goals provided the basis for the work group to select a diverse set of assessment endpoints to consider for the risk assessment. Assessment endpoints should be characterized by three things: ecological significance, susceptibility to a stressor, and societal value. Based on background work, the group selected sets of assessment endpoints. These include a habitat component with three habitats: wet meadows, sandbars, and backwater. Biota selected included representatives from migratory birds, nesting birds, amphibians and native fish. Potential interactions of these endpoints will also be considered.

MANAGING CONFLICTING USES IN THE MIDDLE SNAKE RIVER

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The Snake River is a major river in Idaho that serves as the life blood of the agricultural economy. The Snake begins in the Tetons. By the time water reaches the Middle Snake, it has been impounded many times. The Middle Snake is considered a separate river because at Milner Dam, water from the river is completely appropriated for agriculture where it enters irrigation canals. Sometimes there is no flow below the dam. Water re-enters the river channel by natural springs.

These changes make the Middle Snake the most degraded portion of the river. Degradation is caused by a combination of excess sediments and nutrients, and hydrological modification. Flow restrictions caused by impoundments from hydroelectric facilities, and withdrawal of water for irrigation are major contributors to problems associated with nutrients and sediments. The Middle Snake provides ample evidence of what is wrong with the Clean Water Act. The Act does not address hydrological modification, non-point sources discharges, habitat destruction, or nutrients.

Sources of stress include nutrient loading from irrigation run-off. Numerous aquaculture and fish hatcheries divert water from natural springs. Outflowing water is regulated under NPDES permits for control of solids but not nutrients. Five hydroelectric facilities are in operation below Milner Dam that provide Idaho regions with some of the cheapest electricity in the country. These facilities contribute to sediment build-up, changes in water temperature and habitat modification. These changes, coupled with several drought years have resulted in low flows, high plant growth, rooted aquatic plants and algae, low dissolved oxygen, lowered biotic diversity, and replacement of native species with stress tolerant species. Five molluscs are now listed under the Endangered Species Act.

Public concern over changes in the river has resulted in the emergence of stakeholder groups who are addressing the restoration of the river. A Nutrient Management State Planning Group, composed of members from local governments, industries, citizen groups and state and federal resource agencies are working toward better management of the river. The first phase of the plan focuses on reduced loading of sediments and nutrients from best management practices and point source controls. However, it is recognized that reducing sediment and nutrient discharges is unlikely to meet management goals, and that more water will be needed to scour and flush the river.

Water rights, however, have been in litigation for over 10 years and 150,000 claims have been made during reviews of river water appropriations. Human induced changes to the hydrology of the river through efficient irrigation and ground water use have resulted in decreasing natural spring flows over the last 30 years. The Endangered Species Act has, and will continue to impact water flow issues and water quality. There are four endangered species in the U.S. Fish and Wildlife reclamation plan. The Bureau of Reclamation has released water from reservoirs at times to ease pressure on salmon populations. Thus, conflicting uses in this watershed are more than a local issue. They result from national policies as well. Settlers were encouraged to settle in the arid west and establish and maintain agricultural production. Hydroelectric power development has been strongly encouraged. These earlier goals and policies now conflict with current goals to protect biological integrity of our nation's waters, including the protection of endangered and threatened species.

The key to solving problems relating to these conflicting uses in the Middle Snake River is quality science. Only through good science, that is accurate and accepted by the community, can we restore state waters and move forward. The ecological risk assessment and nutrient management plan are essential to this process.

GENERAL CONCLUSIONS FROM PARTICIPANT FEEDBACK:

- Watershed ecological risk assessments can be an effective process for using quality science in a systematic way to reach consensus on, and prioritize environmental problems.
- As a cooperative and educational process, risk assessment is valuable for managers, industry, scientists and the public (stakeholders).
- Good communication, coordination and interest in achieving environmental goals among stakeholders is essential for success. All must participate.
- When watershed stakeholders use quality science to agree on how to address environmental problems, problems are more likely to be solved through voluntary actions.
- Guidance on the development and use of watershed ecological risk assessments is needed. Use of that guidance will depend on the availability of a facilitator to initiate and promote the watershed ecological risk assessment.
- Watershed ecological risk assessment is an integrated and cooperative process to evaluate environmental problems using quality science. The purpose is to promote understanding among stakeholders so that better watershed management plans can be devised using available tools. More information is needed concerning how risk assessment will affect standards implementation.

SESSION 3 - PANEL DISCUSSIONS

PROTECTING ENDANGERED SPECIES

Endangered species are sentinels of the larger problem of ecosystem degradation. Protection of a single species is not possible without protecting the ecosystem upon which it depends. Participants in this session discussed how the goal of protecting endangered species may improve through the use of watershed management based on ecological risk assessments. The session was based in part on evaluating problems related to protecting endangered mussels in the Clinch River, Virginia.

John E. Miller **Panel Moderator**
Environmental Scientist
Office of Emergency and Remedial Response
Office of Solid Waste and Emergency Response
U.S. Environmental Protection Agency
Washington, DC

This panel was convened to discuss current problems and successes in protecting endangered species and highlight the value of ecological risk assessment for improving management decisions. The Clinch River watershed ecological risk assessment case study is featured as an illustration. Each panelist provided an overview of their program and highlighted the value of science and risk assessment in improving endangered species management.

Bill Kittrell
Clinch Valley Bioreserve Manager
The Nature Conservancy
Abington, VA

The purpose of management by The Nature Conservancy is to protect species before impacts occur so that impacts can be avoided, and to protect resources at risk. The Clinch Valley Project began in 1985 when the Nature Conservancy purchased Pendleton Island in the Clinch River and jumped into watershed level protection, focusing on a richly diverse but threatened aquatic community. Watershed management focused on protecting mussel habitat because habitat degradation and loss was considered the greatest threat to this group. Participation in the watershed ecological risk assessment led to a better recognition of the need to integrate management of the fish and mussel communities because these mussels are obligate parasites on fish for a short period during their life cycle.

Jack Edmundson
Branch Chief, Environmental Analysis and Documentation
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Hyattsville, MD

The USDA does not have an environmental mission, but recognizes that they have a role in protecting endangered species. USDA is working to increase awareness of environmental issues and is dedicated to complying with the Endangered Species Act and other environmental laws. The USDA follows an ecological risk assessment process that includes a biological assessment where hazard characterization, exposure assessment and risk characterization are completed. These biological assessments are used in the consultation process with the U.S. Fish and Wildlife Service. Greatest success occurs when USFWS and USDA work one on one together, the biggest problems come from difficulties in coordination between the Agencies and having the necessary diversity of experts. To improve the process, we need better information transfer including a central database.

THE FISH AND WILDLIFE SERVICE'S ROLL IN PROTECTING ENDANGERED SPECIES

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The purpose of the Endangered Species Act (ESA) is to provide a means to conserve and protect threatened and endangered species. Currently there are 875 species listed nationally, 60% are endangered, 40% threatened. Of these 53% are plants and 47% are animals. Twenty-five percent are freshwater dependent. In the 1992 Report to Congress, 40% are listed as stable and improving, 60% are listed as declining or unknown. There are 200 additional species considered candidates for listing and another 3700 species are potential candidates but there is insufficient information. ESA Sections 4, 5, 6, 9 and 10 provide authority to USFWS to list and recover species, acquire land, cooperate with states and local governments, enforce the law and provide permits for taking of species. Section 7 specifically requires interagency cooperation and an evaluation of the impacts of federal action. Determination of impact and effects on endangered species functions as an assessment of risk for specific species.

The U.S. Fish and Wildlife Service (Service), along with the National Marine Fisheries Service, is responsible for implementing the Endangered Species Act of 1973, as amended. The Service's role in recovery of threatened and endangered species has many facets.

- The Service initiates, participates in, and supports programs designed to "recover" species before they decline to a point that federal listing as a threatened of endangered species is necessary. Examples of programs include the Partners in Flight and Partners in Wildlife initiate. Also, the Fish and Wildlife Refuge system includes over 470 nits and 91 million acres. About 25% of federally protected species are known to occur on refuge lands.

- Section 4 of the Endangered Species Act (Act), gives the Service the authority to list species as threatened or endangered. currently, nearly 900 species of plants and animals in the United States and territories have been listed.

- Cooperation between and among the states, territories, and the Service is authorized by Section 6 of the Act. All states and territories have cooperative agreements for animal species and all but a few have cooperative agreements for plants.

- Interagency cooperation is the subject of Section 7. All federal agencies are mandated to use their authorities to carry out programs for the conservation of threatened and endangered species [Section 7(a)(1)]. Section 7(a)(2) requires Federal agencies to insure that any action they fund, authorize, or carry out has a "is not likely to jeopardize" effect on federally listed species and does not destroy or adversely modify critical habitat for listed species. For action that "may affect" listed species or critical habitat, Federal agencies are required to consult with the Service or the National Marine Fisheries Service, depending on which agency has lead for the listed species.

- The prohibitions on "take" of listed plant and animal species are specified in Section 9. The Act defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The Service's Division of Law Enforcement has authority to protect federally listed species.

- Through the procedures outlined in Section 10, private individuals and non-federal agencies can acquire permits that allow the take of federally listed species and their habitats as long as that take is incidental to otherwise lawful activities. The procedure is often referred to as Habitat Conservation Planning.

- Finally, the Service is responsible for monitoring species for five years after they have been recovered to ensure their status does not begin to decline.

PROTECTING ENDANGERED SPECIES

Janet McKegg -
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Maryland's Nongame and Endangered Species Conservation Act establishes the Department of Natural Resources as the agency responsible for the identification and protection of threatened and endangered species in Maryland. The Maryland Natural Heritage Program is the Department's lead for implementation of the Act. As with the Federal Endangered Species Act, Maryland's Act authorizes the listing of species that are threatened with extinction within the State and sets out prohibitions to prevent their extinction. One of these prohibitions allows the Department to include conditions for the protection of listed species in State-issued permits, projects that use State funds, and projects that are proposed by State departments and agencies.

The Maryland Endangered Species Act provides some fundamental tools for the protection of listed species, such as a mandate to conserve listed species. Without this authority, the State could take no action to identify or protect these species. However, the prohibitions and restrictions contained in the Act can be considered as primarily stopgap actions, such as inserting conditions in permits, until recovery plans can be developed for a particular species. Because few funds are available for developing of comprehensive recovery plans for listed species, this type of temporary protection, gained through environmental review, may be the only type of protection that many listed species receive. Over the long term, the cost of providing protection through environmental review can be high, but the results can often be poor.

The Program's most successful approach to maintaining endangered species is to conduct research into the distribution, life history and habitat needs of the species and then develop a protection and management strategy based on the needs of the species. Although the initial costs of this approach can be high, the results are long-lasting.

EPA *Framework for Ecological Risk Assessment* (February 1992) defines ecological risk assessment (ERA) as a "a process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors." The process described in the above paragraph as the Program's most successful approach to maintaining endangered species is essentially an informal, intuitive, simplified seat-of-the pants ERA where threats identified are used to guide protection and management actions. When the maintenance of an endangered species population is among the assessment endpoints for an ERA, then the risk characterization would identify threats to that population and lead to the development of options to maintain the population. Therefore, ERA appears to have a great potential to contribute to the protection of endangered species. EPA could adopt a policy that one of the sets of data to be obtained for any ERA is the presence of known locations of listed species in the project area. This would be a major step towards making ERA a significant tool for endangered species protection.

MAJOR ISSUES AND RECOMMENDATIONS FROM DISCUSSION:

- Communication and coordination among multiple agencies are essential for successful implementation of the Endangered Species Act. This must include working to understand the mission and responsibilities of each of the agencies and their role in protecting species.

- To really protect endangered species an ecosystem approach is necessary. Individual species cannot be managed and protected without protecting the ecosystem upon which the species depends. Conducting careful scientific evaluations of life history characteristics, community structure, habitat requirements of species, and evaluating potential stressors impacting ecological resources within watershed to determine risk, provides a mechanism to meet this need.

- A process for protecting endangered species should be accessible to all levels of government, especially the local level where management is normally implemented. Local organizations expressed interest in investment by state and federal agencies in providing support for implementation.

SESSION 3 - Questions and Answers

Q: Wants to discuss water quality standards program and how it relates to protection of Endangered Species (ES). (OK Resource Board)

A: Working with EPA and State to look at WQC and standards and whether they protect ES, in conjunction with Section 7 process. Working on MOU with EPA and consultations. (Lohoefener)

A: Do not have good criteria on listed species. Need to develop surrogate species that will measure the impacts for these species that cannot be measured. (Miller)

Q: When will MOU be signed? What will be role of the states? (Virginia)

A: Working hard on MOU and is close to signing. FWS intends to work closely with states. Policy statement coming down from Secretary of Interior. (FWS)

Q: What can be done legislatively other than ESA USDA does not know of any farm bills? (Inside EPA)

A: See Ed. Note

Q: How can local government get involved in protection of ES? Local governments need more information. (MD local government)

A: Incorporate into five year plans and other planning documents where endangered species are located. Avoid these areas and develop guidance to help local government. (NC)

A: Heritage Foundation is getting GIS system to help local governments determine where species are to help in planning and zoning decisions

A: FWS has developed work group for getting outreach during development of recovery plans.

A: Need bilateral feedback during watershed protection projects from local government, states up to Feds and feds back to local governments. (Miller)

Q: Doesn't think we can develop criteria that will guarantee protection - cautions against jeopardizing threatened and endangered species. Only...a certain level of proof that we should be held to. Implementation of ESA on states that we not jeopardize the species (EPA Region 4)

A: Thinks its a good goal but will be hard to do.

Q: As program grows up, where will resources come from to solve the problems? Is there a coherent strategy on how to implement (watershed-based)? How will we implement to see actual accomplishments? (MA)

A: Recommend recovery plans to consider all species in the area. There are ways to allocate resources so higher efficiency where areas with many species may be prioritized. Develop guidance to encourage concentrating on areas where the species have similar life histories. (NC)

A: Work with best scientific data available, failing that, err on side of the species. We are going toward watershed/ecosystem approach and will not be looking at just single species but many in the same area. (FWS)

Q: Doesn't see why we are considering endangered species more sensitive than other species that are protected by criteria. Thinks we should assume that standards we are developing are protective of endangered species. If not, then they should be considered during standards development process. Any comments by FWS or EPA on whether the criteria are protective, have they been considered? (NC)

A: We don't have a vehicle to address endangered species separately from other species. (FWS)

A: Criteria documentation says they are 95% protective of all species. Is it a gamble, do the endangered species fall into that 5%? Doesn't think it is necessarily so. (EPA)

A: Afternoon sessions will address these issues (Dave Sabock)

Q: What I am hearing is that ESA is not as powerful a tool as I thought. If a species is listed in the area will a criteria be reviewed to see if it is protective of the endangered species?

A: Most likely outcome from discussions between EPA and FWS are recommendations from the parties involved to reassess uses and criteria when endangered species are involved in a particular area. Development of a site-specific criteria. Not authority of FWS to determine if the criteria are protective or not of an endangered species. However, FWS may make recommendations to change uses or standards of an area. (Dave Sabock)

Q: Dam halted in Tennessee due in part to endangered species in area. Group of people have been relocating the mussels. Is relocation a good idea to protect species? (TN)

A: Not FWS's first choice to relocate, but sometimes it may be a reasonable and prudent choice. (FWS)

A: Doesn't think it is a viable alternative because of survival problems (Nature Conversancy)

A: Jeopardy opinion was that if they could, would support efforts to recover these mollusks (J. Christian)

A: We don't know enough about species to relocate these species. Has not worked in many instances. Must have unoccupied habitat. (Jan)

Q: Important to look at whole, don't often recognize what the problems are without looking at whole. How do you see evaluation of ecosystem as a mechanism to better protect species? (Marcy)

A: FWS approach is not a new one, but gets big and resource intensive. Good philosophy, but may be hard to measure results in short time frames.

A: For first time, we are taking conservation seriously by using this approach. Critical that information be disseminated at the local level. (Nature Convervancy)

[Ed. Note: The purpose of these proceedings is to provide a written compendium of the presentations and discussions as soon after the conference as possible. It is being published even though answers to some of the questions are not available. Persons interested in the answer to this question are encouraged to continue discussions with the appropriate sources.]

PROTECTION THROUGH IMPROVED LAND USE PLANNING

Human land use directly changes the characteristics of the landscape and effects ecological resources within watersheds where changes are occurring. Participants in this session discussed issues surrounding the management of land use, the types of measures needed to understand ecological processes affected by different land use, and how ecological risk assessments can help provide direction for land use planners. Land use planning in the Big Darby Creek, Ohio was featured.

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In order to learn better ways to scientifically predict environmental risk, an ecological risk assessment was undertaken in the Big Darby Creek watershed. The Big Darby Creek watershed is a freshwater, stream ecosystem in central Ohio. The watershed is a high quality ecosystem which is still relatively free of pollution problems. However, this exceptional stream is threatened by an assortment of stresses originating with day-to-day activities of people in the watershed. Some of the key stressors include sedimentation, nutrient enrichment, changes in hydrology and geomorphology, loss of a riparian zone and chemical contamination. Approximately 90% of land use is agricultural, but there is increased residential development in the eastern portion of the watershed near Columbus, Ohio.

The ecological risk assessment has identified land use as a critical element for relating watershed scale processes to ecological effects. The case study has elected to characterize the system by correlating land use with biological effects at the ecoregional scale for agricultural, forested, residential and industrial land uses. These data will then be used to forecast changes to the biological communities in the mainstem and tributaries of the Big Darby Creek Watershed. Some specific management concerns will be examined including presence of riparian zones, residential density and storm water control. The risk assessment will then become a tool to generate the information needed for sound decision-making by county commissioners and engineers, by township trustees and other local officials, and by voters. The processes and analytical methods used to develop the risk assessment will provide a concrete example of how an ecological risk assessment might be done in other ecosystems.

INCORPORATING ECOLOGICAL CONCEPTS AND BIOLOGICAL CRITERIA IN ECOLOGICAL RISK AND WATERSHED MANAGEMENT

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Current strategies for the assessment and management of ecological risk, while allowing for the incorporation of ecological information, are largely dependent on non-ecological measures and principles. Water quality program managers, being hampered by a lack of adequate funding and mandates to produce evidence of environmental improvements quickly, have historically relied on surrogate indicators such as administrative actions (e.g., permits issued, funding awards, legal actions) and relatively simple physical/chemical indicators of aquatic ecosystem integrity. Recent developments and refinements of reliable biological measures have enhanced our ability to produce comprehensive and ecologically relevant expressions of aquatic ecosystem integrity. The availability of these measures and tools close an important gap in our ability to successfully manage water resources both locally and on a watershed scale.

The condition and well-being of aquatic resources is the combined result of chemical, physical, and biological processes as reflected in Clean Water Act goal statements (e.g., maintenance and restoration of biological integrity). To be truly successful in meeting these goals via an ecological risk approach to watershed management, monitoring and assessment tools which portray and integrate the interacting chemical, physical, and biological processes and the integrated result of those processes are needed. This condition is reflected directly by biological criteria which are numerical and narrative expressions that describe the reference condition of a waterbody of a given use classification (i.e., designated use). This is especially relevant to watershed level assessments because many of the effects at this level are a direct result of the interaction of multiple chemical, physical, and biological factors. Impaired aquatic ecosystems lack integrity and thus show evidence of departures from the reference condition which is embodied by the biological criteria.

Many logic ecosystems are seriously impaired nationwide, an indication that existing frameworks for water resource protection and watershed management have achieved only partial success. Aquatic faunas, particularly those impacted by watershed level such as land use changes, wetlands degradation, habitat degradation, riparian encroachment, excessive sedimentation, and nutrient enrichment, continue to decline despite our current national efforts in pollution control. Biological criteria offer the type of evaluation framework that is needed to more effectively target ecological risk and watershed management efforts, better define management goals, and more accurately measure program effectiveness. A landscape partitioning framework such as ecoregions is also required to account for natural landscape variability. This variability can frustrate uniform and overly simplified approaches to watershed management.

There are a number of areas of watershed management in which biological criteria and assessment methods can and do play a key role. As a criterion for determining use impairments biocriteria have played a central role in the Ohio Water Resource Inventory (305b report), Nonpoint Source Assessment, and watershed specific assessments. As an environmental end-point, biological criteria represent a goal for watershed management efforts. However, biological assessments must also be accompanied by appropriate chemical/physical measures, land use, and source information necessary to establish linkages between the watershed use activities and instream responses. Utilizing this type of environmental feedback loop makes sense given the spatial and temporal uncertainties involved with assessing and controlling varied point and nonpoint source impacts on a watershed scale.

CHALLENGES IN DEVELOPING ENVIRONMENTAL INDICATORS TO ASSESS THE CUMULATIVE IMPACT OF WATERSHED DEVELOPMENT

Thomas R. Schueler
Executive Director
Center For Watershed Protection
Silver Spring, MD

Many communities across the country have become interested in the use of environmental indicators to assess the individual and/or cumulative impact of watershed development on streams. Environmental indicators are a broad series of biological measures and responses that can often integrate the numerous impacts produced by urban storm water. Although they have yet to be systematically applied to urban watersheds, the results so far indicate that stream biodiversity sharply declines even with modest increments of development. Several case studies on the application of environmental indicators will be presented from around the U.S.

Environmental indicators are a more attractive alternative to traditional regulatory tools, such as end-of-pipe discharge limits. Since they integrate the effects of land use, they have the potential to become a credible and defensible planning and zoning tool. To achieve this potential, however, several technical and programmatic challenges must be surmounted. These include the problems of scale, resolution, standardization, benchmarks and confounding sources. Each of these methodological problems will be critically analyzed, and some uggested watershed protocols for the use of environmental indicators will be presented.

LAND USE PLANNING AT WATERSHED SCALE TO REDUCE ECOLOGICAL RISK: CONFLICTS BETWEEN NATIONAL AND LOCAL CONTROLS

Steven I. Gordon, Ph.D.
Department of City and Regional Planning
Ohio State University
Columbus, OH

Ecological risk assessment at the watershed scale seeks to establish the relationships between changes in land use and the potential increases in risk for the survival of our valuable aquatic resources. Recent studies in the Big Darby Creek Basin near Columbus, Ohio demonstrate that local planning and zoning approaches will not reduce the overall risk of environmental degradation and may in fact exacerbate the level of damage. Coordinated regional strategies aimed at controlling land use, providing for regional storm water control facility construction and maintenance, and continuing monitoring of the impacts on stream quality and flow appear to be the preferred method for avoiding these problems. Yet, the control over land use decisions, storm water drainage, and related facilities management lies mainly with local municipalities that have strong political incentives to maintain that local control.

Past attempts at regional planning have met with strong resistance and have mostly resulted in failure. If the current focus on ecological risk assessment is to be successful, new, compromise approaches to coordinated local and regional land use management that are acceptable to local communities will need to be found.

SALAMANDERS IN SUBURBIA: MEETING THE CHALLENGES OF CRITICAL RESOURCE PRESERVATION WHILE MAINTAINING PRIVATE PROPERTY RIGHTS

Christine R. Furr
Land Use Planner
Christine Furr Consulting
Dublin, Ohio

Critical resource preservation goals are often made at the macro-level, while implementation is most likely to be effective at the micro-level whereby individual properties are affected. The connection between the goals and the avenues for implementation are often incomplete.

Land use decisions are influenced by market forces, given shape to some extent by local land use plans, then ultimately modified by locally-applicable subdivision and zoning regulations. Land with a variety of aesthetically attractive features (such as rolling meadows, waterways and woods) is often sought by residential developers and home buyers; however, the same features are already home to functioning, sensitive ecosystems which are of significant value as local, regional and national resources.

Land use planning is a first vital step toward translation of critical resource preservation goals into policies in a given jurisdiction. Land use plans must be supported with appropriate subdivision and zoning regulations for implementation of the higher critical resource preservation goals (upon which plans are based). And, further, the role of strong private property rights in a given jurisdiction does not necessarily serve to weaken or invalidate critical resource goals as implemented through subdivision and zoning.

A PRACTICAL MORALITY FOR CONSERVATION AT THE WATERSHED LEVEL

Alan Randall, Ph.D.
Professor
Department of Agricultural Economics
Ohio State University
Columbus, Ohio

The moral foundations are surprisingly robust of a conservation policy decision rule based on benefits and costs, but subject to a safe minimum standard (SMS) of conservation. The benefit cost rule provides an account of the net contribution of policy to the satisfaction of human preferences. The SMS constraint provides direct protection of ecosystems for their own sakes, or humans seek prudently to avoid the risks entailed in ecosystem destruction.

Nevertheless, commitment to a SMS policy is unlikely to be iron-clad. Moral reasoning might find circumstances in which the sacrifice that would ensure conservation is too much to ask of particular groups of people. Practical reasoning suggests that people asked to bear an enormous cost in order to keep a conservation commitment may well defect. These considerations suggest some general principles for designing a workable conservation policy. First, the objective should focus on the sustainability of ecosystems rather than the preservation of particular species. Second, in order to maintain the commitment to conservation, the costs imposed on any particular group of people must be kept tolerably low. Costs tend to be high, for last-ditch preservation efforts made in a crisis atmosphere: so, early warning and early implementation of conservation strategies makes sense. Local conservation efforts sometimes impose high costs within a watershed in order to provide benefits for society at large; in such case, compensation mechanisms are both equitable and effective in facilitating local cooperation.

A PRACTICAL MORALITY FOR CONSERVATION

Alan Randall
The Ohio State University

1. Maximize (Benefits-Costs), but subject to a Safe Minimum Standard of conservation

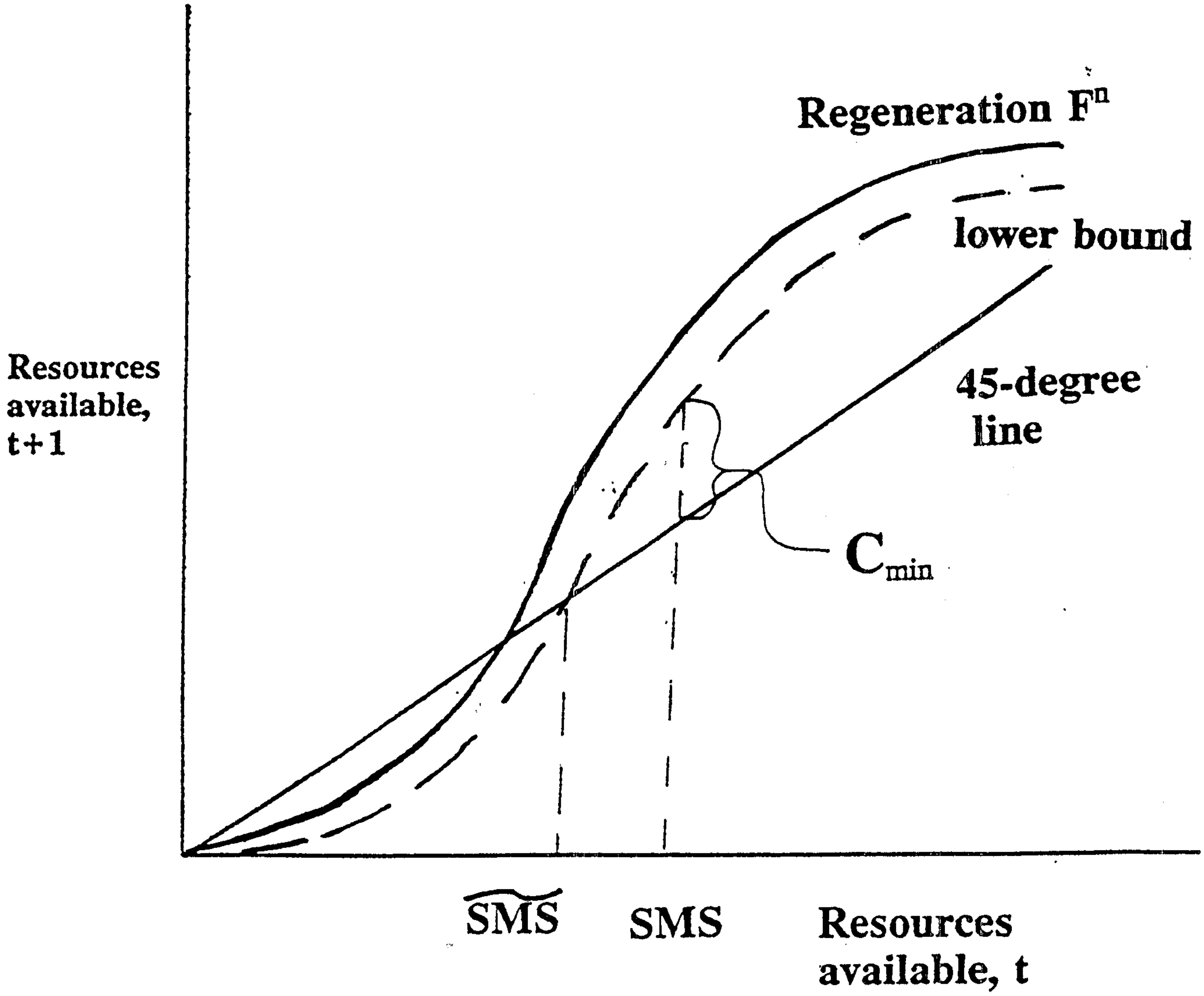
   - Why B-C?

   - Why SMS?

2. But commitment to SMS is less than iron-clad.

   - Moral reasons

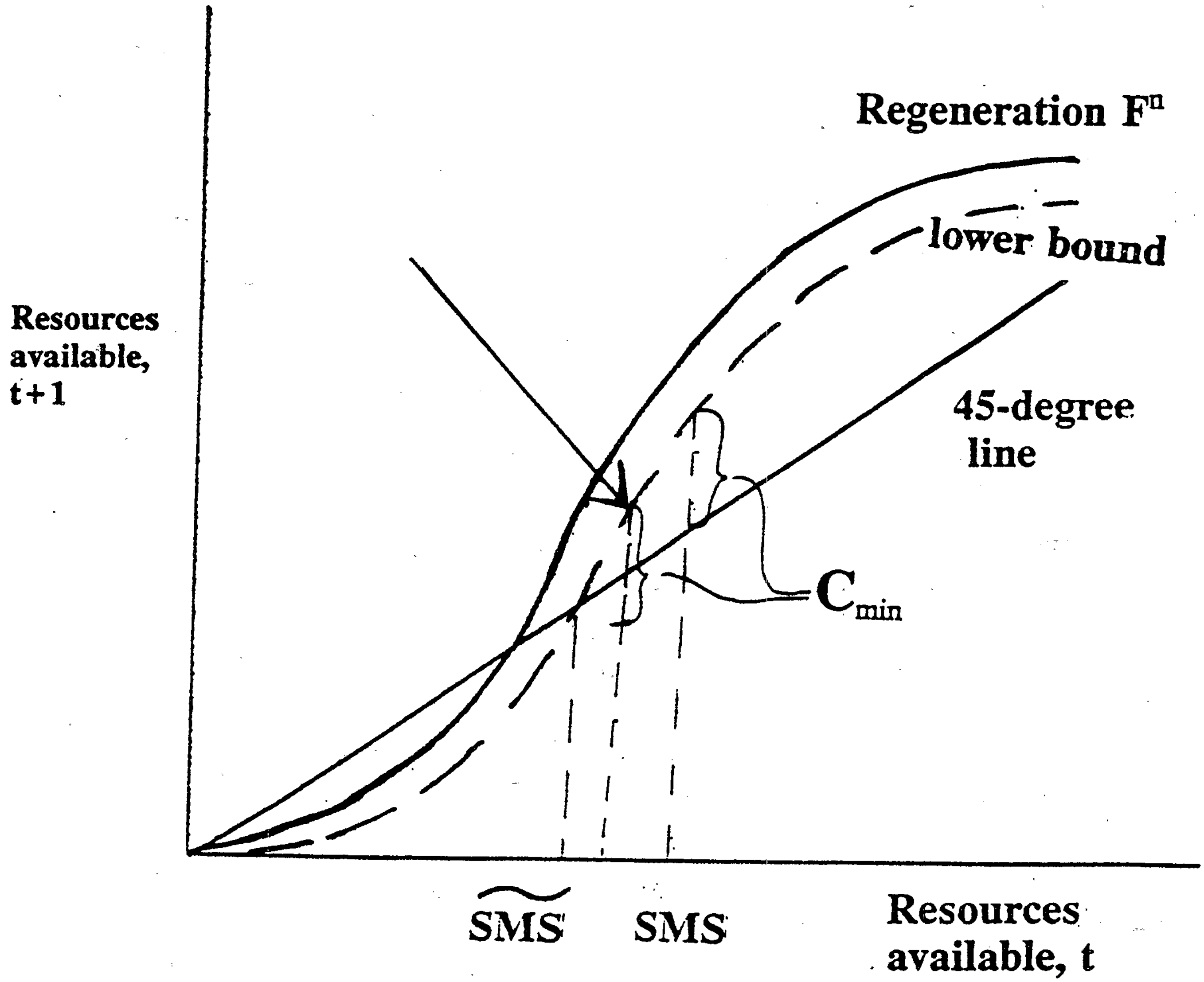
   - Practical reasons



3. $\widetilde{SMS}$: the SMS of Preservation

C_{min}: Mimimum Necessary Consumption

SMS: the SMS of Conservation



4. The Conservation Dilemma

- The best hope is to avoid it by maintaining SMS.

5. Policy Conclusions

- Sustain Ecosystems

- Early Warning

- Compensation, Cost-sharing

Those who seek conservation have a strong interest in keeping its costs tolerably low.

MAJOR ISSUES AND RECOMMENDATIONS FROM DISCUSSION:

- Land use planning is a political process and reflects how a community wants to change over time. Little consideration is given to impacts outside of the local community. How can watershed planning take place when most planning is local? There is a major communication disconnect among local planning groups and state and federal environmental programs. Data from governmental entities is under used by planners.

- Recommend encouraging community officials to identify critical resources such as wetlands, stream buffers and others and to work toward sustaining an ecosystem. Ecosystem protection is more cost effective and ecologically viable than focusing on preserving an individual endangered species.

- The question was raised about the level of controls that are acceptable before society will be begin to reject further work to protect the environment.

- States cannot meet restoration goals with current regulations. Alternative approaches for controlling nutrients, habitat alteration, sediment, and non-point source degradation are needed at the state level.

- To improve land use planning incentives are needed such as: cost sharing for land use planning and data collection, pooling resources for land use planning, and allow flexibility in reporting on other programs when using a comprehensive planning and implementation system. Efforts are needed to counteract the tendency to use private property rights as a basis for degrading resources.

- Better science is needed to help define environmental conditions, the effects of multiples stressors, evaluating exposure and identifying and evaluating response indicators.

- When dealing with environmental management it is important to avoid the lose of gains made in environmental restoration because of an abrupt change in management to address other stressors. Good integrated planning is necessary based on an understanding of the ecological resources of concern.

SESSION 3 - Questions and Answers

Q: How do you define Regions in Ohio?

A: They are ecoregions.

Q: What is role of biocriteria to address land use problems?

A: Identify impaired areas.
Identify sources of impairment.

Q: Can audience recommend how land use planning can be incorporated into EPA's initiative?

A: One example where failure to plan has thwarted ESA habitat conservation, failure of land use planning to address habitat of species. FWS tries to encourage planning for habitat protection, provides list compiled from various state sources to the states of species under pressure.

Q: Most planners don't know about list data. Planners at local level who are not getting information from state.

A: An example of a success story involves a Michigan condominium developer plan. The Nature Conservancy provided developer with information of species which developer incorporated into project to protect species.

Q: How do you prioritize sources of stress? Do you rank value of resources?

A: Use GIS - layer topography to identify sensitive areas under greatest pressure by mapping
critical resources (rivers and floodplains)
roads and other structures
areas under development pressure (areas purchased by developer)

Develop special policies for critical areas that are under development pressure

Q: How well do communities adhere to zoning rules? Historically zoning exists until developer shows up with a proposal.

A: Ground swell of public pressure to stick to zoning plans.

COMPETING DEMANDS FOR WATER

Donna F. Sefton **Moderator**
U.S. EPA
Region 7
Kansas City, MO

Water is an essential resource for all living things. It is also essential for agriculture, industry and other human endeavors. The removal of water from natural watersheds to support increasing human populations and economic development is changing watershed ecosystems. This panel explored how competing demands for water simultaneously impacts natural ecosystems and human interests in sometimes unexpected ways. Participants discussed water management problems in the Middle Platte River watershed and evaluated the value of ecological risk assessment may have in developing management plans for more balanced and effective water use.

The Middle Platte River watershed in Nebraska is part of the larger Platte River watershed that extends into Colorado and Wyoming. There are controversial issues surrounding water use in the watershed. Questions addressed by the panel included: what are the water issues in the Platte, and how might we use a systematic scientific approach to better solve theses issues? Panelists also provided background on their role in the watershed.

RECOGNIZING LOCAL CONCERNS WHILE DOING RISK ASSESSMENT AT WATERSHED LEVEL

Richard Anderbery
Water Quality Coordinator
Tri-basin Natural Resources District
Holdrege, NE

The boundaries for Natural Resource Districts in Nebraska are based on watersheds. As a result, the state has been using a watershed approach to manage their natural resources since 1969. Primary concerns in the watershed involve establishing an effective balance between irrigation demands and sufficient water for wildlife. Water quality issues focus on ground water nutrient levels. Activities by the NRD include working with farmers to increase irrigation efficiency.

Abstract: I have been involved in the Risk Assessment Study of the Middle Platte river since the study began in September of 1993. Having lived in the Platte Valley all my life, I am very much aware of the changes that have taken place on the Platte River. The river is an extremely complex system. The result of this study could have a positive effect on the Platte

River providing that the proper information is provided in doing this study. The river has a direct effect on the economy of the area because of its many uses and needs. Some factors involved in this Risk Assessment are Upland Game Habitat, Central Flyway for migrating birds, HydroElectricity, Surface Water Irrigation, Groundwater Irrigation, Recreation, and Agriculture to name just a few.

The Middle Platte River is unique in that it is a very wide flat river with intermittent flows feeding it. This is the reason for the changes that have taken place on the Platte and one reason for the need for local input in doing a Risk Assessment. The hydrology of the river is very complex as a result of storage facilities, surface and groundwater irrigation, migrating birds, flows, and wetlands all having a direct effect on each other. It is very difficult to understand or do a Risk Assessment Study if you have not seen the river.

Local districts have adopted and enforced many new management practices that have created a positive effect on river water quality and quantity.

The results of a Risk Assessment Study on the Platte River could have a positive effect on future management provided proper and complete information is used in doing this study. The river is a very complex system and management decisions will have a direct effect on the economy of the area because of its many uses and needs. Factors involved in doing this study are Upland Game Habitat, Habitat for Migrating Birds, Hydro Electricity, Surfacewater Irrigation, Groundwater Irrigation, Recreation and Agriculture to name just a few.

The Platte River is unique in that it is a wide flat river and does not have definite banks along most of the river. Because its basic source of water is from mountain snow melt, historically the river had high flows in the spring of the year and was often dry in the summer. Storage structures and return flows have evened the flows, however, they are still intermittent in portions of the river. Hydrologic changes in the river have a direct effect on all aspects of the ecology and economy of the river. Excessive changes in management practices could create a negative result rather than a positive result because all aspects of the ecology are dependent on each other. For example some proposed minimum flows in the river could deplete water available for crop irrigation, thus reducing a source of food for migrating waterfowl and upland game.

Forestation along tie Platte River has increased since storage facilities have been installed creating more even flows and less flood flows. This has improved habitat for upland game such as eagles, deer, pheasants, rabbits, and songbirds; however, this is not considered ideal habitat for migrating birds which are increasing in numbers in the Central Flyway. We must develop a balance in this area.

Quality of groundwater and surfacewater is an important factor in the ecology of the river basin. Natural Resource Districts are the governmental agencies responsible for water quality in Nebraska. They are addressing this through local regulations that are adopted according to the level of contamination. This is important as the problem is usually localized and it is not necessary or practical to develop regulations on a state or federal level. Pollution can vary even within a county and therefore regulations should be developed according to need. The education process should be used to eliminate further contamination. Local people are very receptive to this because their livelihood depends on the quality of this water and they are willing to protect it.

Irrigation water use efficiency has taken tremendous strides over the past years as irrigators and irrigation districts became aware of the need to better utilize the water that is available. Improved compacted canal systems, underground delivery pipe, and modern automatic controls are just a few of the irrigation district's improvements. Irrigators have changed from open ditches to gated pipe and from surfacewater to pivot irrigation. They have also adopted the use of flow meters and surge valves and are using irrigation scheduling. These practices not only reduce water usage, but in return could have a negative effect on return flows to the river, groundwater recharge and wetlands.

To do a risk assessment study of the Platte River that can be used by managers we must study the watershed as a whole and strive to create a balance in management recommendations. The work group must be acquainted with the structure, hydrology, and complexity of the river. This is the reason that local input and involvement is critical in developing a balanced risk assessment study. The socioeconomic impact could be tremendous if it is weighted too far in either direction.

Jeremiah Maher
Relicensing Coordiator
Central Nebraska Public Power & Irrigation District
Holdrege, NE

The Central Nebraska Public Power and Irrigation District operates a multi-use project that handles irrigation, and storage water in Lake McConihay for additional irrigation. There are four hydroelectric plants. In addition the District is responsible for addressing ground water recharge, and protection of wildlife habitat and recreational opportunities. Objective information is central to successful balancing of these potentially competing needs for limited water supplies. Work has been ongoing since 1984; primary focus has been on possible effects to endangered species. Work on the ecological risk assessment will augment this effort. However it is essential that the risk assessment process be an objective assessment of scientific data and provide an effective means of educating the public. The assessment should not focus on values that are not based on science. In addition the sciences of economics and sociology should be included. This will help avoid the creation of a "designer" watershed which is a conception about what the watershed should be.

John Bender
Water Quality Coordinator
Nebraska Department of Environmental Quality
Lincoln, NE

The Nebraska Department of Environmental Quality administers all aspects of the Clean Water Act except Section 404. Most recent 319 programs and point source programs are evolving toward watershed management. The NPDES permitting process is being modified for watershed planning where permits are issued within a watershed at the same time. The main role of DEQ is to formalize procedures to get data on the table for management decisions. However the DEQ does not make decisions concerning water quantity.

SELECTING WHAT TO PROTECT IN THE WATERSHED ECOSYSTEM: USING MULTIPLE ASSESSMENT ENDPOINTS IN THE MIDDLE PLATTE RIVER SYSTEM

William Whitney
Prairie Plains Resource Institute
Aurora, NE

The Objective of the Middle Platte ERA is to provide decision-makers, i.e., people involved with various watershed resource aspects and regulatoy procedures, with a tool to assist them in seeing beyond parochial concerns to a basin-wide prspective. With information on ecological risks associated with potential land and aater management o ptions within a basin, it is our hope that decisions can achieve more balance among varied objectives. It is vital to realize that ecological risk assessment is a fluid process relying on communication among many people with many perspectives and an ever-changing body of iinformation. The process, however, can reveal a concrete framework of ecological relationships and factual information acceptable to all stakeholders. Subsequently, on this framework can grow a broad-based understanding of what alternate management strategies might do or what kinds of research information is needed.

The Middle Platte is an extremely complex system. The challenge in developing a risk analysis for the basin is to: 1) Identify ecosystem components along with assessment and measurement endpoints, 2) rate assessment endpoints as to susceptibility, societal value, and ecological relevance, and 3) correlate changes in land use and hydrology (the Platte may be unique i regard to the ecological and economic importance of both surface and underground water) with changes in species and ecological community structure. Historic trends in stressors and effects have been developed to serve as the basis for predicting the effects of a range of potential management alternatives within the basin.

A focus on the landscape habitat mosaic derives from a general hypothesis that there is a critical mix of habitat to support both the natural biodiversity and the economy of the basin. The task is to identify the optimum structure and then evaluate management strategies in light of their ability to establish that structure. Risks associated with a particular strategy are measures of how far its endpoints deviate from the optimum structure.

Paul J. Currier
Deputy Director, Platte River
Whooping Crane Trust
Grand Island, NE

The primary emphasis of the Platte River Whooping Crane Trust is managing critical habitats on the Middle Platte River. Management plans focus on maintaining the system as an integrated unit that will support habitats for insects, clams, and invertebrates as well as migratory birds. Wet meadows, woodlands, brush areas and the main river channel are managed. Management techniques include grazing, controlled fire, restoration and creation of wetlands, cutting trees to provide resting places for cranes, restoration of sand islands and elevated points on the islands used for nesting, and grassland restoration. We are trying to manage resources in a highly developed watershed system with only a small natural area remaining. Water is the basis of the system we are trying to restore. Understanding the dynamics of the system are central to our efforts.

ISSUES AND RECOMMENDATIONS FROM DISCUSSION:

- Public involvement is essential for successful management of limited water supplies. The strength of the watershed ecological risk assessment is the opportunity for group synergism and dialogue among organizations that are often at opposite ends of the issue. The group process helps to diffuse polarization.

- Risk assessment is a scientific process that provides a forum for focusing on issues and ideas in a systematic way and allows diverse groups to reach a common understanding. It also promotes education.

- Ecological risk assessment provides a scientific basis for targeting management options.

- The risk assessment provides a framework for looking at the landscape mosaic as a large scale and dynamic system. This will help to identify a range of quality management options.

- EPA can serve as a facilitator in the risk assessment process. The ecological risk assessment will bring a scientifically based approach to issues to reduce political and emotional discord.

SESSION 3 - Questions and Answers

Q: How would more systematic scientific evaluation help resolve competing water demand issues? (Sefton)

A: There have been a lot of overflow problems. Mistakes were made in terms of habitat protection at the start of the project. Further information may not help, but people must get together and use risk assessment process to solve problems. (Richard Anderberry)

A: Most of the information from our watershed management experiences in management end up in scientific documents, etc. Risk assessment will involve a lot of people that otherwise would not be involved and expose them to this information. We provide a lot of public education. (Paul Currier)

Q: About $45 million will be available for irrigation. How will risk assessment be used to allocate these resources?

$45 million was the figure used in the revised EIS. Is it economically feasible for hydroelectric producer, who is a wholesaler, to provide this amount of money? This process will bring to light what the priorities are, and the amount of money needed to address the problems. (Jay Maher)

Q: How will the $45 million be used?

A: As it is planned new, about $39 million will be used for habitat restoration and $6 million for loss power revenue. (Jay Maher)

FWS has identified certain areas they want to see restored and that is what the majority of the $39 million will be used for. (Paul Currier)

Q: Is the $45 million from the state of Nebraska?

A: No 80% is from Central Public Power, 20% from Nebraska Public Power (Jay Maher)

Q: In earlier Sessions, one work group identified 3 or 4 biota that should be focused on. Was this helpful or have we left out endpoints that should be included?

A: All issues identified are important but several key ones were left out - such as economic and other human issues. (Jay Maher)

A: Process may focus too much on the science, even though the science is important. Conceptualizing the system as a whole and deciding what areas to focus the scientific studies on is an enormous task. (William Whitney)

Q: Increasing Flow regimes is discussed in the EIS, are we going to see ecological benefits from the extra flow?

A: If the $45 million is appropriated amount used the individual rate would only be $3/year. We don't think the proposed goes far enough. Modification in our proposal would maintain recreation uses, irrigation uses and provide some increase flow during low flow seasons. We are not talking about a dramatic effect on the flow of the river, however. (Paul Currier)

A: Let me point out that Central Power can not pass on rate to individuals. Companies we sell our electricity may, and if this is acceptable to the State of Nebraska, then we'll agree, but $45 million is too much for our company to deal with. We will see, however, an incremental increase in flow from our management practices (Jay Maher)

Q: How much of an issue of water quality is involved here?

A: Hasn't been much of an issue to date. A recent issue has been a concern over temperature increases caused by the plant, but it only affects a very short distance of the stream (Jay Maher)

A: Overall the Central Platte River gives partial support for aquatic life. When this study was made the focus was on aquatic life and not other wildlife. There are problems in the on overall watershed ecology. Ecological response assessment can help us set goals and prioritize issues. (John Bender)

A: We do have high pesticide discharges that we don't yet understand; however, USGS is beginning studies (Paul Currier)

Q: Please elaborate on the Districts' Nutrient Management Plan.

A: This is to address groundwater problems. Our ground water management plans require:

farmers must take deep soil samples (3 feet)
check water for nitrogen
consider nitrogen levels when applying nitrogen

This has been in effect 3 years. Central Platte ground water management has been active for 5 years and has seen a decrease in nitrogen. (Richard)

Q: Given new emphasis on ecological assessment, how are we going to resolve the Federal/State stakeholder friction?

A: EPA is coming down on the state trying to say that 401 certification should include flow regime. We can't because we have state laws that don't let us. (John)

A: Ecological risk assessment will bring a scientific based approach to issues and hopefully cut down on some of the political and emotional heat. (Sefton, EPA)

Q: What is the role of Department of Water Resources? (Susan, EPA)

A: They are the water accountants for the State of Nebraska. They track how much water each person has a right to. (John)

Q: Is the Department of Water Resources on the risk team?

A: They have been asked but have not been actively participating on the team. They have, however, attended some public meetings. (Sefton, EPA)

Summary: Risk assessment is tool to connect stakeholders, provide scientific analysis of data, and identify data gaps. (Sefton, EPA)

MANAGING OVER-ENRICHMENT FROM AIR, LAND, AND WATER

Over-enrichment of the nation's waters from point source discharges, septic systems, air deposition, agricultural practices, gardening and other sources presents a difficult problem for those trying to manage watersheds. Nutrients present scientific as well as management challenges. Participants in this panel discussed how scientific advancements can be used in the context of ecological risk assessment to help risk managers develop better plans to control over-enrichment.

NUTRIENT ENRICHMENT OF WAQUOIT BAY, MASSACHUSETTS

Maggie A. Geist **Co-Moderator**
Research Translator
Waquoit Bay National Estuarine Research Reserve
Waquoit, MA

Waquoit Bay is a shallow, poorly flushed embayment on the south coast of Cape Cod. Its watershed covers 23-square miles of diverse habitats including barrier beaches, dunes, marshes, and uplands. In the Waquoit Bay watershed, valued resources are at risk from a suite of biological, physical, and chemical stressors that have accompanied the approximately fifteen-fold increase in population in the past 50 years.

The waters of Waquoit Bay show signs of degradation primarily due to nutrient loading. Ecological effects include loss of eelgrass habitat, a valued resource, and their replacement with mats of opportunistic macroalgal species, and concomitant changes in the vertebrate and invertebrate communities that utilize eelgrass beds. A proliferation of docks and excessive boating use are other human activities that may add suspended solids and toxics to the Bay, compounding the effects of other stressors. Additional chemical impacts in the watershed are connected with the Massachusetts Military Reservation (MMR) which has been declared a Superfund site by the EPA. MMR activities contribute phosphorus and possibly other contaminants to nearby freshwater ponds. In addition, herring runs and trout streams that feed into the Bay are under potential stress from development which will add nutrients and may alter flow rates.

The Waquoit Bay National Estuarine Research Reserve is cooperating with the U.S. Environmental Protection Agency in an ecological risk assessment case study. This study will aid the Reserve in examining and evaluating multiple ecological effects from anthropogenic stressors in the watershed, with the goal of helping risk managers make informed coastal policy decisions.

Among the stressors, a most pervasive agent of change is the increased nutrient loading to the Bay, associated with changing land use patterns. Research has identified subwatersheds of Waquoit Bay that have experienced different rates of development and have different rates of nitrogen-loading. Studies show that the primary producers in the receiving waters of the subwatersheds reflect these differences. Several models, which differ in assumptions and parameters, have been developed to calculate nitrogen loads to receiving waters in coastal watersheds underlain by glacial soils. Some model parameters are sources of nitrogen (septic systems, fertilizers, atmospheric deposition, run-off), transport of nitrogen through the terrestrial and aquatic components of the system, losses of nitrogen through dispersion, dilution, denitrification, the size of the watershed, the number of residents and residences, the distance to the receiving water body, the size of the receiving body of water, and the flushing rate of the receiving body.

As part of the ecological risk assessment, model outputs will be compared and analyzed and attempts made to establish minimum and maximum contributions from major nitrogen sources. The models will be used in conjunction with land use data to calculate past, present and future loading of nitrogen and to relate that nutrient load to changes in the abundance and distribution of eelgrass, an indicator of estuarine health. This information may help coastal planners target a nitrogen loading limit for Waquoit Bay.

NITROGEN TMALs FOR BUZZARDS BAY EMBAYMENTS

Joseph E. Costa **Co-Moderator**
Director
Buzzards Bay Project
Marion, MA

The Buzzards Bay Project, a participant in the U.S. Environmental Protection Agency's National Estuarine Program, developed a strategy to manage anthropogenic nitrogen sources to protect and restore water quality and living resources in Buzzards Bay. The recommended nitrogen management strategy focuses on implementation on land use and sewage management controls which are based on annual nitrogen mass loads estimated from land use evaluations. The mass loading approach (as opposed to a water quality standard) was deemed the most defensible management strategy based on existing scientific knowledge, and was also the strategy most likely to be successfully implemented.

In the recommended approach, Total Maximum Annual Loads (TMALs) for nitrogen impacted embayments are established based on historical trends in water quality and estimates of historic inputs of nitrogen based on land use. For unimpacted embayments, or impacted areas where historical data is lacking, a tiered system of TMAL limits was established that could be applied to any embayment of known size and hydraulic flushing. This tiered system was based on the best available scientific information from experimental mesocosm manipulations and ecosystem studies where nitrogen loadings were estimated and ecosystem response documented. Since it is meaningful to characterize nitrogen loading rates as either annual loadings per unit area or loadings per unit volume during the water turnover time, both methods were used to establish nitrogen loading limits. Turnover time, using a "Vollenweider model" flushing coefficient like that used for setting phosphorus limits to lakes, is used to establish the nitrogen loading limits.

Recommended nitrogen TMAL limits are tiered to reflect existing water quality management classifications as well as bathymetric and hydrographic features of the embayment. The tiered system enables different ecosystem endpoints to be targeted based on existing embayment conditions and uses. Managers and local officials can choose a water quality goal for an embayment by changing its water quality designation (i.e., by defining what degree of environmental degradation is acceptable in that embayment). Once the essential data about embayment hydrology, and existing and potential future watershed loadings are evaluated, this approach establishes an objective process for federal, state and local authorities to manage nitrogen inputs from both point and non-point sources in coastal embayments.

The response of coastal ecosystems to nitrogen loading is complex and poses a challenge to the ecological risk assessment approach. To evaluate the appropriateness of its recommended limits, the Buzzards Bay Project is currently evaluating the relationship between nitrogen loading and embayment water quality and living resources through its Citizen's Water Quality Monitoring Program.

VALUE OF WETLAND TRANSITION ZONES IN PROTECTING THE NUTRIENT BALANCE OF COASTAL WATERSHED ECOSYSTEMS: TALAMANCA-CARIBBEAN BIOLOGICAL CORRIDOR, COSTA RICA

Jennie Myers
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Latin America-Caribbean Division
Cambridge, MA

Background

The coral reefs, lagoons, and wetlands of Costa Rica's Talamanca region link the Gandoca/Manzanillo National Wildlife Refuge with Cahuita National Park to the north, and form the lowland and marine component of the bi-national La Amistad Biosphere Reserve, a World Heritage Site included in the Nature Conservancy's Last Great Places initiative. Together, these areas contain more than 60 percent of Costa Rica's biodiversity, and are further linked ecologically with Panama's San San N.W.R. to the south and to critical coastal habitats along the Nicaraguan border to the north.

Along the rapidly-developing Talamanca coast, important aquatic habitats considered vulnerable to eutrophication are currently subject to a variety of transition zone disturbances—artificial drainage of flood plain soils, land clearing and sedimentation—that both enhance nutrient inputs and affect crucial nutrient transformation (buffering) processes in the soil. Soils of wetlands, floodplains, and similarly affected areas have been shown to intercept nutrients in groundwater and surface flows, affecting ecosystem nutrient availability and exerting significant control over aquatic plant community structure and secondary productivity. On a landscape scale, these functions dampen ecosystem shifts that have been shown to occur in nutrient-limited systems at very low thresholds of watershed development.

Of the highly-ranked elements of biodiversity tracked in The Nature Conservancy's databanks, approximately one third are found in wetland, riparian and aquatic environments, many of which are nutrient-limited. This project seeks to characterize nutrient flows, to examine how key buffering processes are affected by land use alteration, and to develop simple soil-based indices and bio-monitoring measures that integrate several elements of ecological risk in both pristine and degraded systems.

While the research and management effort underway in Talamanca was not structured as an ecological risk assessment, it may serve to illustrate some opportunities for adapting aspects of a risk assessment paradigm to nutrient management in tropical watersheds. Because landscape functions are known to exhibit spatial and temporal patterns that are distinct from those of temperature zones, principles of ecological risk assessment may prove valuable in ordering future assumptions to develop a timely, if qualitative understanding of ecosystem relationships, focusing education and planning efforts, refining rapid ecological assessments, capitalizing upon strengths of spatial analysis, designing cost-effective monitoring regimes, etc.

Objectives:

a) Characterize nutrient transformation processes that occur in soils of representative transition zones between terrestrial environments and water bodies;

b) Examine the effects of current deforestation, drainage, and other hydrologic alterations on accepted indicators of transformation functions;

c) Recommend suitable bio-indicators and monitoring strategies to identify nutrient enrichment trends and related turbidity shifts in receiving waters; and

d) Work with local partners to develop practical methods and predictive tools for evaluating cumulative nutrient management needs, planning sound development patterns, and setting management priorities that are effective in preserving and restoring important transition zone functions.

Expected Products and Results

Part 1

1) Characterization of nutrient flow pathways affecting transition zone functions of case study lagoons, fringe wetlands and streams

2) Data on the nutrient transformation potential of representative transition zone soil classes under natural and disturbed conditions, with mappable factors prepared in a format suitable for entry into GIS systems

Part 2

1) Tested bio-monitoring methods suitable for anticipating trends in nutrient enrichment and evaluating ecosystem protection needs

2) Identification of easily recognizable patterns in macro-invertebrate behavior which can be related to increased turbidity or nutrient availability associated with basin land use change

3) Recommendations for the use of bio-indicators in ecological assessment protocols for tropical streams and aquatic systems which can reveal shifts in nutrient availability and/or turbidity.

Session 3

Part 3

1) Nutrient loading assessment for representative coastal floodplain settings

2) Recommendations for protecting and restoring nutrient transformation functions in study area transition zones

3) Basis for a standardized "rapid assessment method" to be used in predicting the potential of different ecosystem components to function as buffer zones for nutrients, and in evaluating the effects of alteration upon buffering functions

4) Recommendations for development patterns, densities and land management practices needed to preserve and restore transition zone functions

5) Tested nutrient loading spreadsheets suitable for local use in objectively quantifying development capacity and focusing land planning and management efforts.

Collaborating Institutions

The Nature Conservancy; Univ. of Costa Rica/CIMAR; Institute of Ecosystem Studies; Woods Hole Oceanographics Inst.; Univ. of New Hampshire Dept. of Water Resources; Univ. of Georgia Inst. of Ecology; Watershed Management Institute; Local NGO staff.

Richard Batiuk
Chesapeake Bay Program
U.S. EPA

The Chesapeake Bay is a large complex watershed encompassing 64,000 square miles. Two key parameters were used to assess the condition of this large watershed: the decline of dissolved oxygen since the 1950's, and the decline of bay grasses. These changes were evaluated relative to levels of suspended solids and nutrient loadings. Monitoring data and models were used including a watershed model that connects land base and nitrogen deposition to a hydrodynamic model and eutrophication model. Work is ongoing to include feedbacks within the biological system to determine what will change as nutrients are removed from the system. To develop the management plan, loads delivered by the Potomac River were considered along with the Susquahanna, James, Rap/York, West Shore, East Shore watersheds. Comparing loads from these subwatersheds helped determine the best nutrient management decisions. The combined models provided the information needed to allocate loadings and led to decisions that are cost effective.

ISSUES AND RECOMMENDATIONS FROM DISCUSSION:

- It is important to consider the relative significance of difference sources of nutrients to determine how to manage watersheds most effectively. Sources include wet and dry deposition as well as point and non-point discharges to water.

- There is a trade-off on different management options that must be considered. Management options that replace septic systems with sewers help to reduce non-point discharge of nutrients. At the same time, sewer systems support a much more developed community that adds nutrients to the system in many ways.

- A eutrophic state index for estuaries is needed.

- More research on the contribution of nutrients from air deposition is needed. Agencies need to address the interactions of different media when assessing risk.

SESSION 3 - Questions and Answers

Q: Suzanne Marcy - Commented that risk assessment discussion good. How do we use risk assessment to account for significant amount of load from air?

A: Richard Batiuk - Trend was from point source thinking to nonpoint source thinking and now the trend is to wet fall and dry fall sources. Need to recognize all sources, how they get there. Then what is most cost effective way to deal with issue. Is it easier and more cost effective to get it out of air or get it out of other sources. First get information, then back it up to source, then look at cost effectiveness and feasibility.

A: Joseph Costa - For Buzzards Bay load is 10-15% of total load from atmospheric deposition. Total amount has not changed much over time. Makes sense to look at significance of sources.

Q: Jeff Harvey - Idaho State Environmental Quality Agency. Has found dense development on lake fronts overtime. As they go to ranchettes there are large changes in phosphorus loading with minor changes in vegetation. If they sewer the areas to get rid of septic load, then there is greater development

Q: Joel Salter - EPA HQ Recreational boating as a nutrient input?

A: Joe Costa - fecal coliform does increase but believes sediment resuspension most significant source of nutrients as a result of recreational boating.

A: Maggie Geist - More concerned with boat props churning up sediment in shallow embayment. Already a no-wake zone, but keels and props from boats go to sediments.

Q: Suzanne Marcy - Want recommendation to EPA on needs in handling overenrichment.

A: Tom Brayman, NYC - Would like eutrophic state index for estuaries. Also want to know where high nutrients go. When energy transfer goes to sediments then system not functioning properly. Want scientific studies in this area to use for management decisions.

A: Need more science for air component of evaluation. Need to bring agencies together on interaction of media.

CONFLICTING USES AND THEIR IMPACTS - HOW TO MANAGE THEM

Managers of many river watersheds must address diverse and seemingly conflicting uses of the river, each of which has at least one and possibly many impacts. How do we determine which, among the bewildering array of problems, are most important? How can private, local, state and federal interests agree on a course of action? The Snake River watershed is a textbook example of multiple, conflicting uses that have resulted in nutrient enrichment, sedimentation, reduced flow, and loss of indigenous species. The panel used the Snake River as a starting point for discussing how ecological risk assessments may provided the needed interpretation for stakeholders to reconcile conflicting demands and protect their resource.

Pat Cirone **Moderator**
Environmental Services Division
U.S. EPA Region 10
Seattle, WA

The Snake River ecological risk assessment is focusing on only a limited stretch of the river defined by hydroelectric dams. Primary problems in the Snake are linked to water use and associated limits of available water. Multiple impoundments and heavy sediment and nutrient loadings combine with low flows resulting in significant degradation.

THE MIDDLE SNAKE RIVER: ECOLOGICAL RISK ASSESSMENT AND STRATEGIES FOR RECOVERY

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Abstract. Prior to disturbance, the Middle Snake River had a natural biology that was extraordinary, including elements which were endemic, relict, anadromous, and more widespread in distribution. Above Shoshone Falls there was a distinctive "Upper Snake River" fish fauna, which overlapped in only a few taxa with the "Middle Snake River" fauna of over two dozen species below the natural barrier of Shoshone Falls. The fish fauna above the barrier falls is now poorly represented between Milner Dam and Shoshone Falls, and only one population of cutthroat trout has survived, and it is hybridized. Below the falls, the anadromous taxa are eliminated and included the famous fall chinook salmon stock for which a tributary creek and river falls are named, a late spring or summer chinook stock, steelhead, Pacific lamprey, and white sturgeon (the resident population is endangered). The mollusc

fauna was also remarkable, and was characterized by a guild of coldwater, lotic taxa. These coldwater taxa are now either extinct, endangered, or rapidly declining The present mollusc fauna has shifted in species composition from that of a coldwater, free-flowing habitat to one characteristic of warm, shallow, eutrophic lakes, with taxa being tolerant of moderately eutrophic conditions gaining in presence. The exotic New Zealand mudsnail which was first noted in the area in the mid-1980s is now the dominant mollusc, and there are five listed and three candidate threatened or endangered species.

A history of unmitigated human impacts is responsible for this faunal transformation. Complete dewatering of the river at the Milner Dam diversion during irrigation season and upstream water storage eliminated spring runoff and natural annual flushing; at the same time sediment from agricultural runoff and aquaculture outfalls which was rich in nutrients accumulated, blanketing the benthos and thalweg. Dairies and feedlots, as well as local towns, contributed waste to the system. Nearly all of the aquifer tributaries were developed for aquaculture or diverted for agricultural or domestic use; rather than contributors of high quality water, most are point source polluters from aquaculture and agricultural runoff. A sequence of dams inundated riparian and lotic habitat, interrupted natural sediment regimes an the natural hydroperiod, and also operated in a manner to track electric need (peak-loading) which caused diurnal fluctuations in water levels, with severe impacts on the invertebrate fauna in zone of daily wetting and drying. The benthos accumulated muddy, nutrient rich, anoxic sediments while the littoral zone experienced sediment stripping or streambed armoring. The reduction in the magnitude of peak-load operation recently has reduced all scouring since spring runoff no longer occurs, and has resulted in colonization of shallow riffles and rocky point-bars by riparian vegetation. There has been a shift from a diatom sheath community in the shallow shoreline rocky habitats to one dominated by green algae and macrophytes.

Potential contributors to the challenge of raising the ecologic condition of the area include suction dredging of selected reaches to remove sediment and macrophytes, implementation of Total Maximum Daily Loads (TMDLs) on a reach by reach basis, better control of sediment in agricultural runoff, and a dovetailing of needed river operation measures with Federal Energy Regulatory Commission (FERC) license requirements for hydroelectric facilities. There have been many vertebrate and many invertebrate extinctions in this cultural sacrifice area, but better stewardship and an improved quality of life for the environment and humans can be hoped for if ecological risk assessment is taken seriously. Success should be measured not only by meeting TMDL budgets or macrophyte and algal growth which inhibits human recreational use of the river, put also by the survival and expansion of healthy, viable populations of the lotic mollusk fauna, particularly those listed s Threatened or Endangered.

"Destroying or damaging a natural system is a reprehensible act. A badly damaged ecosystem is highly visible evidence of misplaced values. It proclaims not only ethical insensitivity of the society in which it occurs, but also poor management. After all, pollutants are merely misplaced resources. Nutrients added to lakes, rivers, and oceans are badly needed on our agriculture."

John Cairns, Jr. (1982)

The Natural Resources: An Historical Perspective

The Middle Snake River ecosystem, the reach between Milner Dam (River Km 1030.4) and King Hill (River Km 880.7), comprises one of the most remarkable biologies of the state, including the "Upper Snake River" fish fauna of fourteen native taxa above the 212 foot (64.6 m) Shoshone Falls and the "Middle Snake River" fauna below it, consisting of approximately twenty four species though some of these are headwater species not occurring in this river (Smith, 1978; Simpson and Wallace, 1978; Bowler, et al, 1992). There is little overlap in species between these two discrete faunas, and the assemblage below Shoshone Falls represents the maximum interior penetration of anadromous fishes and the Columbia River elements. Among the over two dozen species native to Middle Snake River sub-basin are many now extinct or endangered, including the fall chinook salmon, a late spring or summer chinook stock, steelhead, white sturgeon, and Pacific lamprey. The Shoshone sculpin (*Cottus greenei)*is restricted primarily to springs along the river and is one of Idaho's few endemic fishes. Today it is a Candidate Endangered Species due to habitat loss. The red band trout is now found a pure strain only in King Hill Creek, a tiny, isolated tributary. This area was famous for its salmon fishery (Gilbert and Evermann, 1894; Murphey, Freeman and Bowler, 1993), as attested by names such as Lower Salmon Falls, Upper Salmon Falls, and Salmon Falls Creek, and it was heavily used by native Americans for thousands of years.

The mollusc fauna is also unique, and includes 17 native and one exotic clam taxa, and 30 native and two introduced snail species, half a dozen of which are endemic relict species from the later Pliocene (Blancan) Lake Idaho or subsequent Pleistocene Lakes (Frest and Bowler, 1992). Five snail species are listed as Threatened (*Valvata utahensis,* Bliss Rapids Snail [*Taylorconcha serpenticola,* see Hershler, et al, 1994]) or Endangered *(Pyrgulopsis idahoensis,* Banbury *Lanx, Physa natricola)* in the Middle Snake River, there are three candidate endangered species *Fluminicola columbiana, Fisherola nuttalli, Anodonta californiensis,* and several of the declining lotic taxa are also becoming increasingly rare and should be candidates *Stagnicola hinkleyi*, for example. Prior to disturbance the reach was characterized by a suite of several dozen lotic, cold water, species. The largest mussel *(Margaritifera falcata)* which formerly inhabited the river as evidenced in native American middens throughout the area is now locally extirpated. This species exists for a portion of its development on the gills of salmonids, and it apparently was unable to make th transition from chinook salmon when thy were blocked by Swan Falls Dam. There may have been a few extinctions in the modern fauna prior to disturbance, as I found two new (undescribed taxa which were not previously known from the Pliocene or modern faunas) hydrobiid snail species in a Holocene deposit in August, 1994. However, the dramatic collapse of the fauna has been very marked and has happened within the last twenty years.

In recent years pollution, seasonal diversion of water, sedimentation, impoundment, and other disturbances have transformed the fauna to one more characteristic of warm, shallow lakes, and nearly all of the fast, cold water requiring taxa are either endangered or are rapidly becoming so (Frest and Bowler, 1992). Even in tailwater segments which are free flowing, occurrence of the old fastwater fauna today is patchy and depauperate. Old, dead shells indicate that the former species richness is disappearing very rapidly (for data on specific reaches see: Frest, 1992; Frest and Johannes, 1991; 1992; 1993a; 1993b; Neitzel an Frest, 1993; Bowler, 1991; Frest and Bowler, 1992).

The free-flowing reaches exhibit the consequences of long term lack of seasonal flushing and the natural hydrologic regime, as well as the impacts of hydroelectric peak-loading,, or diurnal fluctuations of water level in the tailwaters. Lack of flushing has resulted in a fine mud many meters in depth blanketing the benthos and the thalweg, as well as a lack of seasonal scouring of the riparian and littoral zones. Anoxic conditions develop in the benthos early in the spring, often by april. Because of the lack of flushing and scouring, riparian vegetation along the shoreline does not exhibit the formations. The free-flowing, lotic segments do, however, sustain a unique and rare deciduous riparian forest formation comprised primarily of hackberry and river birch. The riffle and littoral zones of the lotic sites caused by interruption of sediment flow due to the dams and altered hydrologic regime, and also due to historic peak loading (fluctuating the water level on a daily basis to track electrical need).

Exotic Organisms

Exotic plants which are problematic in the riparian zone include trees such as Russian olive, teasel, and watercress, though there are many, many others as there are in most wetland settings. Wetland in general appear to support more species of exotic plants than upland habitats (Bowler an Wolf, in press). Watercress, am Old World annual species, has dramatically altered spring habitat in the area, as well as many shallow areas in the mainstem Snake River by blanketing the shallows with a closed canopy of growth. During the past several years purple loosestrife, a pernicious invasive species, has become increasingly abundant along various reaches in the Middle Snake River, and it can be expected to expand its presence. Overgrazing has reduced riparian vegetation along many reaches, particularly those in the public domain, and, for example, there is little riparian vegetation along in the reach below Bliss Dam.

There are three exotic molluscs present in the mainstem river, including the Old World aquarium snail *Radix auricularia,* the New Zealand mudsnail *Potamopyrgus antipodarum)*Bowler, 1991, and the Asian clam *Corbicula fluminea. Radix* has low population levels and is not an ecologic problem, but the New Zealand mudsnail has become the dominant mollusc in the river and many of its tributaries (Bowler and Frest, 1991). It covers the undersides of rocks, macrophytes, and algae, and has astonishingly high population densities ranging into the hundreds of thousands per square meter. *Corbicula* is a problem mollusc in other parts of the country, however, has not developed large populations in the Middle Snake River and appears to be restricted at present to the area above the Indian cove Bridge. It has the potential to develop enormous populations, however, and could become a serious concern if it is spread to other reaches. There are a number of exotic snails present in the thermal plumes associated with tropical fish farms, however, they appear to be largely restricted to these sites though some may extend their presence into the river during the summer when the water becomes warmer (Bowler and Frest, 1992).

The introduction of exotic fishes has a long history in the Middle Snake River. Carp were present in the river by the 1890s and a sequence of plantings by individuals such as Ridenbaugh and the Idaho Department of Fish and Game led to the establishment of a wide range of non-native fishes (Bowler and Frest, 1992). Tropical fishes have escaped from warm-water hatcheries, and recently (August, 1994) a piranha was caught by hook and line. Non-native game fishes range from rainbow trout of non-Snake River origin to yellow perch, crappie, largemouth and smallmouth bass, catfish and others (Bowler and Frest, 19922). There is concern that the walleyed pike, which has been caught in the pool below the Twin Falls power plant and exists in Salmon Falls reservoir, could enter the system. Were this to occur, significant impacts might follow due to its carnivorous and predatory habits.

A History of Degradation, Extinction, and Habitat Loss

The Middle Snake River has a history of ecologic degradation and habitat loss which is both a lesson in reckless development and an embarrassment in lack of foresight - as well as a natural resource tragedy. Early dams eliminated the salmon and sturgeon runs, though steelhead reinvaded the Middle Snake River after the installation of a poorly sited and marginally operable fish ladder at Swan Falls Dam. Similar inadequate fishways were installed at the rebuilt Lower and Upper Salmon Dams. Subsequent dams (Bliss Dam, C.J. Stirke Dam) lacked ladders and blocked steelhead, but all anadromous access was ended by the Hells Canyon projects. Early diversion for irrigation dismantled the natural hydroperiod and flushing from runoff, and the tributary springs from the Snake River Plain Aquifer were nearly completely developed for aquaculture, hydroelectricity, or were diverted for irrigation or domestic purposes. Cities such as Twin Falls contributed waste streams, and a seemingly endless list of non-point contributions paid their toll (Bowler, et al, 1992). At present there are over 560,000 acres irrigated with water diverted from the Snake River, another 370,000 acres are irrigated with aquifer water; there are approximately 140 fish hatcheries; there are five existing mainstem hydroelectric projects and seven more have been proposed; two municipal sewage treatment plants; and over 600 dairies along the river - all of which contribute to the declining conditions in the aquatic ecosystem (Bowler, et al, 1992). Impacts have further been exacerbated by a pattern of decline in aquifer-fed tributaries in recent years.

The result of nearly a century of ecologic disruption has produced a river which is rapidly changing from its original biology, now only present in remnant species and patches of marginal habitat, from a coldwater lotic environment to that of a eutrophic lake. This pattern is not uncommon in rivers with heavy nutrient loads, seasonal diversions, and sequential dams. In both the impoundments and the free-flowing tailwaters macrophytes (mostly several species of *Potamogeton*) and green algae dominate the shallow littoral zone. Carp are the most common fish in many areas, the non-native New Zealand mudsnail has replaced the native lotic fauna, and the benthos are altered from a rock, cobble, and sand (heterogeneous) substrate to a uniform deposit of black, anoxic mud meters deep.

The Promise of Ecological Risk Assessment and TMDLs

"In the past, ecosystem risk has not been of much concern. Society believed that the supply of some resources was infinite, that ecosystem destruction was a necessary component of progress, that ecosystems not being harvested were of no benefit to society, that any use was harmless until evidence of harm became direct and dramatic, and that technological advances would continue to correct any problems resulting from destruction of natural

resources. These beliefs have been challenged in the last part of this century, and public attitudes in developed countries have undergone a remarkable transformation. Public priorities have shifted to embrace environmental values."

John Cairns, Jr. and B.R. Niederlehner (1992)

Ecological risk assessment in its current state can be viewed as being comprised of three primary components: problem definition; "a scientific risk assessment compares a prediction of the level of stress that will occur in the environment after some human activity to a prediction of likely biological effects at that level of stress; this comparison is used to estimate the probability of adverse effect" (Cairns and Niederlehner, 1992); and then predictions of risk are compared to "observed effects in natural systems for the purposes of quality control and validation of methods for risk prediction" (see Cairns and Niederlehner, 1992, for further discussion). Ecologic consequences of arrays of pollution loads, for example, are predicted usually employing biomonitoring of individual indicator organisms or on multispecies evidence (see, for example, Cairns, et al, 1994; Cairns, 1988; 1990). The resilience of a heavily perturbed system such as the Middle Snake River in which large elements of the fauna are extinct, the natural hydrology irreversibly altered, heavy pollution loads both in solution and in sediments, and the physical benthic habitat simplified to a homogeneous frequently anoxic substrate, is not easy to predictively model, however, species richness of the lotic mollusc community does provide one means of assessing predictive success. The mollusc diversity within the Middle Snake River has been well studied on a reach by reach basis, and has been declining even within the past few years (Frest and Johannes, 1992; 1993a; 1993b). Species richness and the robustness of populations of lotic taxa, including the Candidate, Threatened, and listed Endangered species, would be one means of determining river health. Macrophyte abundance, another measure,, is challenging because of absorption of nutrients from both the water column and the sedimentary substrate; nonetheless, macrophyte response to varying pollution loads can be predictively modelled based on TMDL concepts and load budgets. Polluting industries which have in a sense become dependent upon the "natural resource welfare" of continuing to degrade the aquatic environment without adequate mitigation for the pollution they generate should be expected to support a budget concept as opposed to more hardcore regulatory action such as directly limiting production. Thus, the TMDL model would reduce nutrients in the water column with predicted ecologic outcomes. Ongoing monitoring and adjustment of the model will be critical as the concept is implemented.

Suction dredging key reaches such as macrophyte colonized areas of Upper Salmon Impoundment would be one means of reducing macrophyte dominance. The concept of "flushing" sediment out of any river section places the reaches and impoundments below at ecologic risk as a re-suspension of nutrients would likely exacerbate algal and macrophyte problems downgradient. And, of course, sediment would simply fill lentic areas downstream be they in impoundments or the already loaded naturally deep holes in sturgeon. It is unlikely that the "salmon flushing flows" will move significant quantities of sediment from the Middle Snake River.

Among the actions proposed by the Idaho Department of Health and Welfare, Department of Environment (IDHW-DEQ) are the implementation of industry self-policing plans and goals within 5 years, achieving cold water biota state (Idaho) dissolved oxygen standards within 5 years, reducing aquatic vegetation (primarily macrophytes) below "nuisance" levels within 5 years, including a reduction of plant biomass by 30% and a reduction in sediment input of 30% (IDHW-DEQ, July 11, 1994). These goals are not a TMDL approach per se and ignore species richness or population indicators among sensitive taxa such as the molluscs, but could reinforce early TMDL endeavors. Beyond five years, if implemented, TMDLs would clearly be required to continue to better water quality so that the crash in the lotic ecosystem can be arrested.

TMDLs based on modelling for individual reaches are one means of escaping the conspicuous pitfalls of instantaneous measurements of pollution load to a daily budget concept, which allows more even handed regulatory consideration and a better overall prediction of ecologic outcomes of regulated pollution loads. There is presently an excellent opportunity to involve ecosystem restoration actions with FERC re-licensing conditions, and this should be vigorously explored by both state and federal regulators. It is critical to involve the FERC, as it is still processing new hydroelectric project license applications despite state and Northwest Power Planning Council "protected area" designations for the Middle Snake River. Instream flow and other concerns will be central to the success of the TMDL approach, and new license condition opportunity can be a strong asset. This could be further strengthened by the Northwest Power Planning Council's wildlife enhancement plan.

Despite our best intents, there will be surprises - which perhaps modelling can anticipate. For example, peak loading water fluctuation has been known to have a severely deleterious impact on littoral river invertebrates since its initiation in the early 1950s. A reduction of substantive peak loading in recent years has worked to the benefit of sensitive invertebrate taxa by not forcing them to endure daily wetting and drying (or eliminating them from the littoral zone entirely), yet because of the nitrate and phosphate load borne by the water it has allowed macrophytes to expand their presence and for green algae to completely cover rocky littoral habitat. Riparian vegetation, no longer scoured by seasonal runoff, has also expanded on partially submerged point bars. In other words the benefit of terminating diurnal water fluctuation which damaged snail populations has been reduced because of an encroachment of algae and macrophytes on the environment protected by a stable water level. Thus, the TMDL budget is needed to work with and allow protective water management operations to succeed in assisting ecosystem recovery. This example also shows why prediction is needed, as the consequence was not anticipated yet is obvious in retrospect. In conclusion, dovetailing physical remediations with TMDLs and FERC license conditioning, ecological risk assessment is our best hope for arresting the present ecological decline and transformation presently underway in the Middle Snake River.

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CONFLICTING USES AND THEIR IMPACTS

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The Middle Snake River provides multiple important uses including recreational opportunities, hydroelectric power, irrigation for agriculture, aquaculture and support for fish and wildlife. By 1988 it became clear to the people in surrounding counties that the Middle Snake River was dying. By 1989, county groups began working with state and federal agencies to help facilitate problem solving by forming the Middle Snake River Study Group. The Study Group worked closely with these agencies and hydroelectric, agriculture and aquaculture stakeholders. Several problems were recognized. Sources of water entering the river were return flows from irrigated land. In addition eight years of drought resulted in the mining of underground water and natural springs were being depleted. Recharge of the underground aquifer had been altered. After several years of effort by the Study Group that included significant public involvement, a management plan was adopted by the three counties that was tough but fair. The objective was to maintain the economic viability of the region. It is important to recognize that multiple uses of the river may or may not be conflicting. They were out of balance.

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The conflicting uses in the Middle Snake River include aquaculture, agriculture, POTW's (both river discharge and land application), and confined animal feeding operations. There are also five hydroelectric projects on this stretch of the river. Along 90 river miles there are approximately 25 miles of impounded reservoirs. Concerns associated with these uses include reduced flow velocity, temperature change, nutrient loads and the need for water to flush the system. To manage these uses and the ecological resources in the watershed, appropriate and responsible actions and management decisions should be based on scientific work. Idaho Power has conducted 27 studies as part of relicensing. Several years ago, Idaho Power had only three environmental staff; now there are 51. They have also worked hard to include the public in the relicensing process.

MANAGING CONFLICTING USES IN THE MIDDLE SNAKE RIVER

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Abstract: Water rights issues are a problem in the Middle Snake River. For example, the Idaho Supreme Court recently made a decision which involved the application of fresh water springs (a 1905 water right). Over the last two years water could not be delivered to a farmer because water was being extracted from ground water many miles away. The decision requires the Idaho Water Resources Board to manage surface water and ground water together and therefore provide water to the farmer. To resolve the problem the Board purchased water for the farmer. Other issues relate to requirements under the Clean Water Act Section 303(d) listing and TMDL requirements, and Section 404 issues in water quantity and flows in relicensing. These difficulties highlight the central point, people in the watershed want water conditions to improve. They are interested in developing effective management options.

I. INTRODUCTION

The Snake River is known as Idaho's working river since it is the essential natural resource supporting the successful agricultural economy in southen Idaho. Water quality conditions in the middle Snake River have significantly deteriorated for the past decade. The causal factors are relatively simple to identify. There is too much sediment and nutrient discharged to the river. Addressing water quality problems in the middle Snake River while maintaining the agriculturally-based economy that depends upon the river, is a much more difficult problem.

Public concern about water quality conditions on the middle Snake River has culminated in industries, citizens, and local governments coming together with state and federal resource agencies for the purpose of developing plans to address long term water quality improvements.

In developing a plan to restore the river, the state has been and will continue to be utilizing watershed ecological risk assessment models as tools to predict the risks and results of proposed regulatory and non-regulatory pollution controls. Public acceptance of the validity of the watershed ecological risk assessment approach is essential to implementing the necessary changes in state laws, regulations, politics, and the way people conduct their lives to clean up the river.

II. DESCRIPTION OF THE RIVER

The Snake River begins in the high mountains within Teton and Yellowstone National Parks and flows for hundreds of miles through southeastern Idaho along the arid Snake River Plain, supplying water and electricity to the agriculturally-based economy. The Snake River is the major waterway in southern Idaho. Flows in the upper Snake River are dictated by winter snow pack and spring melt in the mountains, and operation of numerous Bureau of Reclamation storage reservoirs. By the time the river reaches southcentral Idaho, where the middle Snake River begins, water in the river has been impounded and diverted numerous times.

The upstream boundary of the middle Snake River is Milner Dam. From below Milner Dam, the middle Snake River flows over ninety miles, descending 1,600 feet through spectacular basalt canyons. Although flows in the river are low or nonexistent below Milner Dam during certain times of the year, the river is recharged by fresh water springs throughout this reach. One popular area along the river is known as the "Thousand Springs" area where numerous springs issue forth from the canyon walls and drop hundreds of feet to the river below. During low flow periods, fresh water springs account for over 2/3 of the flow on the river. The source of the fresh water springs is the Snake River Plain Aquifer, one of the largest aquifers in the United States which extends hundreds of miles north and east of the middle Snake River watershed.

Idaho's water plan recognizes that the Snake River is fully appropriated at Milner Dam. In the past, it has not been unusual for the river to be dry below the dam during irrigation season. Hardly an auspicious beginning for a large river with significant water quality problems. Water that is impounded and stored above Milner Dam and other upstream storage reservoirs supplies water to irrigate over half a million acres in the middle Snake River watershed for agricultural production through a series of large canals that extend for hundreds of miles.

III. LOCAL INDUSTRY

The land along both sides of the middle Snake River is known as the Magic Valley. The economy in the Magic Valley is largely dependent upon agriculture. At the turn of the century, the terrain in the Magic Valley was largely arid high plains steppes. The construction and operation of dams and canals along the river significantly transformed changed the landscape. Today, the Magic Valley consists of tracts of farms and rangeland, and is one of the most productive agricultural areas of the state. Return flows from irrigated agriculture in the summer and early fall account for a significant amount of the flow in the river. Not unexpectedly, irrigation return flows to the river contain sediment and nutrients which contribute to water quality problems in the river. Dairies or confined animal feeding operations (CAFOs) are a high growth industry in the Magic Valley. Nutrients and bacteria generated during dairy operations may be discharged to surface and ground water, thereby contributing to the enrichment of the river.

The cold, well oxygenated and clean fresh water springs that recharge flows in the middle Snake River provide the aquaculture industry with an essential natural resource. Over one hundred commercial fish hatcheries in the Magic Valley utilize the fresh water springs to grow Idaho rainbow trout. It has been estimated that over 70% of the commercial trout produced in the United States are produced in Magic Valley fish hatcheries. The total production from Magic Valley fish hatcheries is approximately 40 million pounds of fish annually. Fish hatcheries are subject to EPA NPDES permits which set forth limits for the discharge of solids to the river. Nevertheless, fish hatcheries contribute substantial amounts of dissolved nutrients to the middle Snake River annually which also contributes to enrichment of the river.

Numerous publicly owned sewer treatment plants along the river also discharge substantial amounts of dissolved nutrients, to the river which serve the growing population and food processing industries. On the middle Snake River below Milner Dam, there are presently five dams which are used to generate electricity. These hydroelectric facilities help supply Idaho's citizens with some of the most inexpensive electrical rates in the United States. The hydroelectric facilities also change the hydrology of the river through peaking flows and impoundment of water. These changes result in an increase in water temperatures, encouragement of sediment deposition, increased algae blooms and modification to aquatic species in the river.

A final ecologic stressor is mother nature. Flows in the upper Snake River are largely dependent upon snow melt in the spring to fill the large storage reservoirs. Since 1987, Idaho has been in a severe drought condition, similar to conditions documented in the 1930s. The resulting low flows in the middle Snake River have exacerbated poor water quality conditions.

IV. WATER QUALITY CONDITIONS

As a result of sediment runoff from irrigated agriculture, nutrient discharge from fish hatcheries and sewage treatment plants, and other agricultural operations, low flows from upstream impoundments, drought, and the operation of hydroelectric facilities, water quality conditions on the river are poor.

For the past ten years, water quality on the middle Snake River has been a noticeable problem. Rooted aquatic plants, filomentous algae alternating with plankton blooms seemingly take over the river from late spring through fall. In some areas, the surface of the 1/4 mile-wide river is entirely covered by macrophytes and algae. During most of the summer, it is difficult or impossible to boat or water ski in the river.

Beginning in 1990 through today, the state of Idaho along with EPA and local governments began studying the river to determine the sources and levels of pollutants going into the river and the extent of water quality problems. The results of those studies have confirmed initial suspicions that the river is overloaded with nutrients, organic solids, sediment and aquatic plants. The native aquatic species, particularly salmonids and the macroinvertebrates they feed upon, are being displaced by pollution-tolerant species such as carp, suckers and an exotic snail known as the New Zealand Mud Snail. In some areas these snails cover submerged surfaces at densities up to 8,000 snails per square meter. Degraded conditions on the river have also led to the listing of a number of native mollusk species as endangered under the Endangered Species Act. The original cobble substrate of the river has become entirely covered in some areas with sediment and organic materials from two to twelve feet in depth. Dissolved oxygen concentrations often have been recorded near zero on the bottom of the river or in deep weed beds. As a result of the excessive plant growth and sediment deposition, most designated uses for the river established under the Clean Water Act and state water quality standards are impaired and narrative and numerical criteria are frequently exceeded.

WHAT IS BEING DONE TO ADDRESS WATER QUALITY PROBLEMS

As a result of the documented water quality conditions on the river, the middle Snake River was designated as "water quality limited" under § 303 of the Clean Water Act. In lieu of proceeding with a traditional total maximum daily load approach, the state, in partnership with the EPA and local governments has been actively pursuing the development of a nutrient management plan under state authorities. Since 1991, local governments, industries, citizen groups, and state and federal resource agencies have come together as the middle Snake River Nutrient Planning Group to reduce nutrient and sediment discharges to the river. The first phase of the plan will establish target goals for each industry to reduce their pollutant loadings by significant percentages through best management plans and other modification to industry practices. It is hoped that a reduction in pollutant loading from all industries will eventually result in a reduction in plant growth. In developing the goals of the plan, the planning group has relied upon ecologic risk assessment in helping to establish the goals of the plan and the expected results.

As the plan has developed, it is becoming increasingly clear, through the use of watershed ecological risk assessment, that the reduction of pollutant loading alone will not restore the river. More water is needed in the river to scour and flush sediment in the river substrate which has accumulated for decades. The volume of nutrient-rich sediments in the river combined with shallow water depths will continue to support nuisance plant growth. Studies are ongoing to determine the water velocities necessary to flush sediment down the river. Whatever the final result of those studies are, significantly increased water flows through the middle Snake River during certain times of the year will be necessary to wholly restore the river and maintain habitat. It is not known where that water will come from. The Snake River is fully appropriated before it reaches the middle Snake River.

Almost all of the storage space in upstream Bureau of Reclamation reservoirs has been contracted or is otherwise committed. Fresh water spring flows into the middle Snake River from the Snake River Plain Aquifer have been declining for the past thirty years due to more efficient irrigation practices which has reduced ground water recharge combined with ground water diversions hundreds of miles away. There is also concern that the ground water may become contaminated.

Because the Snake River is fully appropriated, the state has been going through a comprehensive water rights adjudication since 1986 to determine over 150,000 claims to the Snake River basin water. By all accounts, it appears that the litigation may last well into the 21st Century. Whatever the final resolution of the Snake River adjudication may be, it will likely not result in any increased flows in the middle Snake River for water quality purposes.

The underlying doctrines in western water law of "first-in-time, first-in-right" and "use it or lose it" are firmly established in Idaho water law. Consequently, any newly established instream flows as a water right for instream beneficial use will continue to have too late of a priority date to have any meaningful benefit to water quality on the middle Snake River.

The Endangered Species Act has and will continue to impact upon water flows and water quality issues in the middle Snake River. In an effort to provide additional water to ease northwest salmon downriver, the Bureau of Reclamation has released committed water from upstream reservoirs in 1994. However, this amount of water was not sufficient to flush the sediment in the middle Snake River however. It is expected that there will be increasing demands upon the Bureau of Reclamation to release more water in the coming years for salmon. The state, through the middle Snake River planning group, is working with the Bureau of Reclamation to time the increased flows to ensure the most benefit to water quality. Recovery plans for endangered snails found in the middle Snake River are currently being prepared. It is expected that the plans will propose require improved water quality and increased and stable flows in the river. Again, it is not known where the additional water will come from.

The present conflicting uses in the middle Snake River are also a product of conflicting national policies and goals established throughout the Twentieth Century. The well-intentioned national goals of settling the arid west, establishing and maintaining agriculture production, and encouraging hydroelectric development to provide inexpensive power seemingly conflict with later goals of protecting the biological integrity of our nation's water and protecting endangered species.

In light of these conflicting uses, it is clear that there are no easy solutions. Economical modifications to industry practices affecting water quality in the river may not be enough to restore the river and protect native aquatic species. Significant changes in state law and the way people conduct their businesses may be necessary to restore the river. The much heralded and often illusory confrontation between the economy and the environment seems a reality in the middle Snake River.

The middle Snake River offers a good example of why it is essential to expand the analysis of water quality issues beyond point source controls and water column chemistry as we assess ecological stressors from throughout the watershed. Water diversions and reservoir operation decisions hundreds of miles away have impacts on water quality in the middle Snake River. Likewise, land management practices throughout the middle Snake River watershed have impacts on what pollutants reach the river and ultimately affect water quality.

In retrospect, the use of watershed ecological risk assessment models when the Clean Water Act was first passed in 1972, might have predicted current water quality conditions on the middle Snake River and other western rivers. It is now clear that water quantity issues and nonpoint source controls, not addressed in the Clean Water Act, are essential components to achieving the goals of the Clean Water Act. Appropriation of state water and the regulation of land management practices should increasingly recognize water quality issues. It is essential that policymakers have a clear understanding of the consequences of their actions.

The use of watershed ecological risk assessment can assist policymakers and especially the general public understand the consequences of their actions and the risks involved in choosing a course of action and the benefits to be obtained. To be effective, ecological risk assessments must not only identify environmental stressors, establish priorities, and provide a scientific basis for regulatory actions, but the general public and policymakers must believe assessments can do all these things and be willing to act according to risk assessment projections.

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The watershed protection approach focuses on the resources to be protected. This involves geographic targeting (e.g., a certain reach of a water body) and the identification of threats to human health and aquatic resources. The approach depends on the involvement of stakeholders and focuses on developing integrated management actions. Data sharing is essential to ensure that all quality information is used in the evaluation. The culture and customs of the stakeholders must also be addressed; the process is not only scientific and technical. The Middle Snake River management efforts provide a perfect example of this process.

ISSUES AND RECOMMENDATIONS FROM DISCUSSION:

- We need to understand the ecosystem and need data to develop a logically derived problem statement. An ecological risk assessment is a process for collecting, compiling, sorting and evaluating information.

- The processing of information in a risk assessment helps educate everyone in the watershed and places them on the same level playing field so they can discuss issues.

- Peer pressure can be an effective tool for obtaining environmental protection. When members of the public understand the problems, they pressure their neighbors to meet agreed upon actions.

- Data sharing is critical to success. USEPA could play a role as "data bankers."

- Effective legal actions depend on good science. This helps to determine workable options for management. These options should be based on what can be regulated and enforced.

- Private industry needs to know the rules and have them consistent. These rules need to be "black and white" not gray when it comes to implementing laws.

SESSION 3 - Questions and Answers

Q: With respect to the Australian snails, if the water were clean, would they increase in population?

A: No, if water were colder and cleaner, there would hardly be any.

Q: Was there any discussion about retiring agricultural use of the river?

A: Idaho is revising their plan - not to eliminate the above ground irrigation, but irrigation done through pumping from the underground aquifer (about 300,000 acres). If you want a good spring level, then the above ground irrigation (which recharges the aquifer) is needed.

Q: What types of crops are grown in the area?

A: You can grow anything. Main crops include potatoes, beans, hay, and corn. With respect to hay, there are about 600 dairies with about 2000-5000 cows each.

Q: Pat Cirone: Is there anyone here from west of the Mississippi? (Some participants raised their hands.)

Q: Do you understand water law? Some participants raised their hands.

Q: Is agriculture contributing nutrients to the river?

A: There are two sides of the river. On the north side, there is lava. They have to use pivotal circular sprinklers to water. On the south side, there is no ability to sprinkle. The south side contributes 80% of the loading.

Q: What about tail water recovery?

A: Yes. One company put in a wetlands area. Other places are looking at it, but this is not the whole answer. We need to clean up the water.

C: On the north side is volcanic soil. On the south side, these are old lake beds. It is very rich fine soil. (Peter Bowler)

Q: Could you highlight the components of the plan?

A: The plan addressed every major use on the waterway and involved the public. It addressed hydroelectric power, industries, local government uses, individual septic systems, agriculture, aquaculture, recreation and tourism - on a BMP basis.

The counties have no ability to create laws, but mechanisms to coordinate with State and Federal agencies. For example, all new development on the Middle Snake River was stopped.

Canal companies started to work based on the plan. It is important to note that the entire commission is made up of farmers.

Q: When people reached consensus, was economics considered?

A: Some components are quite easy to implement. For BMPs proposed by the farmers, the economic impact is minimal. A problem with Federal plans is that they don't always address the culture of the region. You need local people to work with you on the plan.

Q: It was stated that 6,000 cfs would be needed for the flushing over several months. Did you consult with an expert regarding that number? Possibly a higher number such as 30,000 cfs for a shorter period of time would be sufficient.

A: It's not our number. Peak flows really flush out. It may be something you could do with the natural morphology.

Q: How does environmental mitigation fit into your relicensing?

A: In the relicensing process, you should know how the river functions and what the impacts are. In our study, we looked at 27 different areas. We are now undertaking our mitigation planning.

Q: To audience: How many local government representatives are in the audience? How many State government representatives? How many Federal government representatives? How many private representatives? Generally equal number of various parties in the audience.

Q: In New Mexico, Indian tribes stream water quality are an issue. Is that an issue in this area?

A: Yes. About 100 miles upstream from beginning of Middle Snake River, there is a tribe. Also, there are a number of tribes downstream. They have an influence on adjudication and relicensing.

C: If water law applied in the Everglades, there would be no Everglades. The Everglades Act is that water would be available forever for the Everglades. (Fontaine)

A: Idaho has adopted a public trust doctrine in that the public interest should be taken into account in issuing new water rights. However, this does not affect the shuffling of water rights.

C: Some suggestions for what Idaho might do are to construct mass balance models, buy the farms, and use land application of wastes for existing farms. (Fontaine)

A: In Idaho, you can buy the farm, but you don't get the water right. Also, there are problems with land application.

Q: Regarding an issue with respect to TMDLs, there are only two sources with limits in NPDES permits. These have a clout of clout. Then there are the agricultural BMPs with no clout. Is there any incentive to ensure that the BMPs happen?

A: There is some concern that non-point source controls aren't working and that you may have to set up some mandatory requirements. The Federal government may have some control on Federal land. However, they are looking at possibly changing State law.

Q: If the State identified a stream as being impaired because of upstream diversion, could the Federal government do something?

A: There would have to be changes to Federal/State laws.

C: Oregon has the same problem regarding with respect to water rights. However, they have a State law that when a new application for appropriation of water comes to the State Commission, it must be compared against the public interest. The results are that a lot of appropriation applications have gone by the wayside.

A: Idaho has the same law.

C: (API): Industry can agree with the watershed approach, but let's look at a problem. In the watershed approach, there may be an existing requirement that doesn't make sense (e.g., technology-based standard) that would require a statutory or regulatory amendment. How would you respond to amending statutes?

A: It's pretty clear that in a comprehensive approach you may find these situations. Stakeholders should make these situations known and make a case. It doesn't mean that the watershed approach is meant to replace EPA's total regulatory structure. There may be other reasons for the requirements.

C: (API): Maybe EPA should keep this in mind during CWA reauthorization.

C: County has hammer - peer pressure. It has the right to subpoena and hold hearings. It has used this in one situation successfully to bring in various agencies and the press. This can be more powerful than regulations. (Muffley)

Q: Will BMPs solve the problem?

A: I think it will, but we must stay on top of it. We must keep it in front of the public. (Muffley)

Q: In one case, we routed an entire creek through settling ponds. The ditch company sued PRP for taking the water. This was a problem involving water rights and water quality.

A: We had a situation which used a collaborative process; we routed water through old hatcheries and then into wetlands areas. The irrigation company, Power Co., etc. worked together to make it work without the federal government. (Wimer)

Session 4

Comprehensive Environmental Programs Of The Future:

Where Are We Now And Where Are We Going?

COMPREHENSIVE ENVIRONMENTAL PROGRAMS OF THE FUTURE: WHERE ARE WE NOW AND WHERE ARE WE GOING?

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SUMMARY

The conference's previous sessions introduced:
the tools available to regulators; and
the risk assessment process

Why is this session important?
Too much time is spent trying to catch up to the regulations and laws.
We can use this session to think about where we want to be in 5 years and the steps we need to get there, using the tools discussed in the previous sessions.

Historically the Environmental Protection Agency's (EPA) water quality-based permitting program has focused on controlling individual chemicals from specific point sources through chemical specific criteria. Chemical specific water quality criteria are allowable concentrations of a chemical pollutant which, if not exceeded in the receiving water, are protective of aquatic life for an individual chemical. More recently, whole effluent toxicity (WET) testing was developed to protect aquatic life from the effects of complex mixtures of chemicals, with known and unknown toxicity, being discharged from point sources.

In addition, other types of chemical specific criteria/methodologies are being developed in an attempt to protect other parts of the aquatic ecosystem which are not currently protected by aquatic life criteria. These include sediment criteria for the protection of benthic organisms, wildlife criteria, and a methodology to more consistently address highly lipophilic compounds in all of the above types of criteria.

All of the criteria and or methodologies serve as both yard sticks to measure pollution and as assessment tools for monitoring the health of a waterbody or watershed. Another type of assessment tool which has been developed, which directly measures the health of the ecosystem, as opposed to measuring stressor levels, are biological assessments or biological criteria.

Environmental stressors to an aquatic ecosystem can be chemical, physical or biological in nature, and likewise can impact the chemical, physical, and biological characteristics of an

aquatic ecosystem. As our focus shifts to overall watershed protection, biological criteria and assessments are important tools to add to detect the cumulative effect of stressors to aquatic ecosystems.

EPA's Office of Water 1991 "Independent Applicability" (IA) policy builds on all these water quality-based programmatic pieces (chemical specific aquatic life criteria, whole effluent toxicity tests and biological assessments and criteria). The policy stresses the integration of all of the three types of criteria/assessment tools and states that "each of these three methods can provide a valid assessment of designated aquatic life use impairment. Thus, if any of the three assessment methods demonstrate that water quality standards are not attained, it is EPA's policy that appropriate action should be taken to achieve attainment, including use of regulatory authority." The policy gives equal weight to all three tools and their complementary abilities to detect impairment in a waterbody. Critics of the IA policy have argued that if one type of measurement indicates attainment, it should override the two that indicate nonattainment. An example of this is when either or both chemical criteria and effluent toxicity are exceeded but biological surveys in the receiving water indicate no impact. This has led to a heated controversy between the states and EPA over the last several years.

Since the promulgation of the National Toxics Rule (1993), all the states now have adequate chemical specific water quality criteria in their standards so that the overall baseline of information on chemical pollution in watersheds will increase nationally. Those states which have had chemical specific water quality criteria in their standards and have utilized WET in their NPDES permitting programs have established strong databases and continue to move their water quality programs ahead.

A good example of a state that has moved ahead with their water quality-based programs is North Carolina. They have implemented the watershed permitting program which in turn allows them to use TMDLs as they were intended. They also have an active Pretreatment program and an extensive and strong enforcement record with WET. The State believes that they have a very good monitoring database composed of WET, chemical specific data and biological criteria/assessments for most of their dischargers and waterbodies gathered over a number of years. They are also making strides to assess and control non-point source problems in those same waterbodies. Based on this extensive database they have recently chosen to propose not re-adopting some chemical specific criteria in some waterbodies.

As attention is focused on implementation programs in watersheds, shouldn't the definition of a <u>good</u> state water quality-based program be broadened to include all the water programs (criteria, standards, non-point source programs, National Pollutant Discharge Elimination System permits, enforcement, TMDLs, monitoring, or groundwater protection etc.), instead of the narrow programmatic focus we've taken in the past? Shouldn't the definition of a good state water quality program be comprehensive and flexible using all the tools available to provide a balance in our decision making in watersheds? Won't this result in overall environmental benefit to the watersheds we are trying to protect, support the state's environmental programs and improve our overall ecosystem management by providing states with flexibility based on good supporting data which has been gathered over many years?

The participants of this session will be representatives from EPA, states, industry, and an environmental group. They will be looking into their crystal balls to try and address these issues, as well as the implications this type of approach might have for Clean Water Act reauthorization, the Endangered Species Act, and current EPA Office of Water policies.

COMPREHENSIVE ENVIRONMENTAL PROGRAMS OF THE FUTURE: WHERE ARE WE NOW AND WHERE ARE WE GOING?

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SUMMARY

Review previous points:
- Do we have common view of comprehensive water resource management?
- How do we balance need to continue to aggressively implement existing program while recognizing what comprehensive approach may require?
- How do we make environmental laws to achieve goals?

Approach for future pollution prevention

Informed community does better job than distant bureaucracy

Ecosystem management is top priority in administration

Edgewater consensus
- fundamental reorganization in how we address remaining environmental problems
- Existing problems all have to do with how we live.

Previous efforts have been fragmented

EPA has not paid sufficient attention to whole problem
- place-based environmental management driven by problems

Watershed approach
- Consider all water resource concerns
  - surface water and groundwater
  - apply tools to solve problems of greatest concern
- Actions are driven by environmental objectives and strong science
  - high quality data
- Stakeholder involvement
  - willingness to pay attention
- Cross program coordination is an efficient allocation of resources

Office of Water Activities
- Watershed policy committee
  - Interagency coordination
  - Comprehensive state programs
  - Remove impediments to integration of water programs
- Improve coordination and collection of data
  - Task force
  - Natural strategies, plans for environmental data collection
- National goals project
  - Identify goals
  - Develop ways to measure progress

- Office of Water Strategic goals
  - Protect water supply
  - Enhance public health
  - Enhance ambient water quality
  - Reduce loading
- Diagnostic tools development for watersheds
- Integrated watershed grants
  - EPA grant programs structure make it difficult for states to take watershed approach. EPA is changing.
- NPDES watershed strategy - March 1994
  - Use old program to provide tools to move to watershed approach
    - synchronize permit decisions
    - develop a watershed basis for NPDES permitting

Issues
- What do we do in the meantime as we develop approach to watershed
  - focus on stressors in watershed
  - work with other programs that have effects on watershed

Office of Water is committed to goal of comprehensive water resource management.

COMPREHENSIVE ENVIRONMENTAL PROGRAMS OF THE FUTURE: WHERE ARE WE NOW AND WHERE ARE WE GOING?

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SUMMARY

A balanced state program
What is a balanced program?
- comprehensive
- innovative
- constantly look at resources and prioritize
- dynamic
- good political timing

Look at cash flow
- appropriations
- fee base

Look at staffing

North Carolina State Program
- Monitoring program must be strong
    - Must have good biological component to the program, not just chemical
    - Also oxygen demand and sediment programs
    - Get into innovative monitoring
    - Monitoring is how to show successes and failure of the entire environmental program
    - Design program so that information collected fills in information gaps

- Non-point source program
    - Public can see non-point source problems, therefore very visible
    - Target agricultural issues to public resources to prioritize
    - Stormwater programs and controls (NC mandates land use controls)
    - Use more innovative approaches to enhance program and make it more attractive to regulated community
- WET Program - Most successful program in NC
    - NC has 90% NPDES compliance
    - Anything except purely domestic discharges have a WET limit
    - Biological state laboratory certification program to ensure quality of data

- Wetlands Program
  - Developing Program
- Criteria and Standards Program
  - Nutrient sensitive waters have been identified and have standards on nutrients
- Water Supply Protection Programs
  - mandatory land use planning
  - risk based approach - predictive
- Pretreatment Program
- Compliance Program
  - Other programs are only as good as enforcement and compliance
  - have increased compliance effort in state
- Operator Training and Certification Program
  - NC requires for every treatment plant in state
- NC Basin wide planning initiative
  - NC - 17 river basins
  - Evolutionary process - keep building on information you have - will develop way to bring point source and non-point source programs together will give the efficiency and effectiveness, consistency and predictability have put this program in without additional staffing monitoring program in basin - designed a nutrient trading mechanism can protect and enhance resource in the states if have balanced programs.

COMPREHENSIVE ENVIRONMENTAL PROGRAMS OF THE FUTURE: WHERE ARE WE NOW AND WHERE ARE WE GOING?

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Abstract: Many in the regulated community believe that a well-crafted program for comprehensive watershed planning can be the best approach to water quality protection. A successful program must: (1) prioritize watersheds in order to focus resources on the more significant problems; (2) allow for a cooperative effort among stakeholders; (3) clearly identify the problems causing impairments; (4) ensure a long-term phased approach based on sound scientific and technical information; (5) ensure equability in terms of funding sources; (6) be implementable through an appropriate balance of incentives and enforcement.

A watershed approach should be a program which supplants existing programs to some degree rather than overlying an additional burden on regulatory authoriies and the regulated community. Watershed planning decisions should be allowed to supersede certain existing restrictions, such as the NPDES antibacksliding provisions.

Lakewide Management Plans (LaMPs) being developed for the Great Lakes may provide an attractive model. Properly developed LaMPs offer great potential as an integrating mechanism for Federal, State and local programs, watershed management plans, Remedial Action Plans and other voluntary and regulatory programs. This holistic and integrated approach offers a better process to achieve water quality standards.

SUMMARY

Intent is to provide an industrial perspective of watershed approach

GLI is inappropriately considered a model for watershed planning and management.
    The initiative views the Great Lakes watershed as one ecosystem, and uses a one size fits all approach

Problems: management and funding
obtaining adequate data

Uniform protection should be the goal - we need to assure nationwide consistency

Prioritize watersheds

focus on specific impacts
allow for education and involvement of stakeholders
ensure equitability in terms of funding sources
use of positive incentives - market based incentives or pollution trading

Lakewide Management Plans such as the Lake Michigan approach can provide a better watershed planning model than the Great Lakes Initiative.

Identify impairment: e.g., overharvesting and introduction of exotic species
Process
Causes and sources of water quality impairment must be identified
Goals must be well defined
Funding must be equitable - it's not right to require the currently regulated community to carry the cost burden of the program

Groundwater impacts on watersheds must be considered on a case-by-case basis.
Restrictive federal programs are not appropriate for this task.
Local agencies are in the best position to address these issues.

COMPREHENSIVE ENVIRONMENTAL PROGRAMS OF THE FUTURE: A 21st CENTURY VISION OF EFFECTIVE STATE WATERSHED PROTECTION PROGRAMS

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A truly respectable State watershed protection program does the following:

A. Clearly and publicly defines goals for protection and restoration

1. Water quality standards are comprehensive (chemical, physical, biological; cover all appropriate endpoints, including endocrine); new ones judiciously selected and financed. (Example: pesticide manufacturers finance development of Atrazine WQC.)

2. Water quality data are efficiently collected and answer critical questions with minimum wasted energy, resources.

3. Use classifications have been carefully rethought and ambitiously established to encourage restoration.

4. Outstanding waters have been identified through a process that builds massive citizen support.

5. All key stakeholders know what to strive for, on what timeline -- and know they will be held accountable. Performance-based measures. Baseline protection for everyone -- i.e., cancer risk levels.

6. Is not necessarily limited to a single State's program -- i.e., it adheres to natural watershed boundaries. Exploits true potential of, e.g., National Estuary Program. Signals new era of cross-boundary cooperation. Taps potential of multi-state arrangements like the Great Lakes Initiative.

7. Builds on technology-based programs, using those programs effectively:

   a. Don't fight them, join them: Fully implements the effluent guidelines, pretreatment and CZARA baseline technology (these programs also must evolve to include, for example, pollution prevention in effluent guidelines).

1. Lets the Federal government do the work and take the heat.
2. Levels the playing field.
3. Concentrates State political muscle on the areas where it is truly needed by not re-fighting each battle.

8. Fully engages the community in service of a shared goal

   a. Citizens and affected industry engaged in triennial review and feel they have a stake in achieving water quality goals.

   b. Volunteer monitors are integrated into State/regional plans.

   c. State/local planning agencies are part of water quality program process, not an afterthought.

   d. Waterbodies are posted for fishing and swimming safety, to help build public momentum for cleanup as well as to help protect public health.

9. Takes integrated approach to environmental protection, beyond traditional in-stream (or even water body-based) water quality considerations.

   - 401 Certification process is fully exploited (flow, runoff sources, etc.)
   - Coastal Zone Management Act/environmental agencies work hand-in-hand
   - Endangered Species Act considerations routinely included
   - State pollution prevention office called for every major permit renewal/issuance
   - Clean air permits, mobile source programs cognizant of water quality impacts
   - Decisions on open space protection are based on knowledge of critical ecosystems, Outstanding National Resource Waters (ONWR), source water protection areas; tax and other incentives coordinated
   - Database allows for special consideration for highly-impacted communities, such as subsistence fishing communities

10. Flexibility: You Want It? You Gotta Earn It!

    a. Best example: Requests for relaxing technology-based standards for wet weather flows. These can't be expected to be accepted without making a case. This means:

1) data on water quality impacts -- who, what, where

2) best efforts on finding enough resources

3) full implementation of other program components

4) sensitivity to current and future community needs (example: combined sewer overflow policy focuses on urban recreational waterways)

b. Enforcement -- prove you mean business and the public will be on your side when you use enforcement discretion.

c. Total Maximum Daily Loads (TMDL's): do not expect miracles unless and until the polluted runoff program gets some teeth. Environmentalists won't buy a pig in a poke, but will buy one with a fully operational manure management system that has an NPDES permit.

d. Treat water quality standards with respect. Independent applicability makes sense. Why not make it work?

- Fix, do not belittle, chemical-specific standards. Use site specific criteria where appropriate.

- Do biocriteria right the first time. Make them regional, if necessary.

- WET is here to stay -- support it. But should it be expanded to ensure that estrogenicity is adequately addressed?

e. ITFM -- example of how to earn flexibility. Support for fewer reports, once it is clear reports will serve us better.

Conclusion: Same tax base, same goals: citizens, local, State and Federal governments are all in this together.

SESSION 4 - Questions and Answers

Q: Have talked about what is to happen in future, but what about implementation now? What about enforcement and compliance of nonpoint source problems? They have had BMPs for a long time but see no changes in water quality problems? (John Jackson, Oregon POTW)

A: Congress did not reauthorize CWA this year. A part of this should be enforceable programs for runoff control. Enforceable runoff programs are highest priority to environmental groups. (Landman)

A: Several states have enforceable programs. NC has turbidity standard with caveat that if industry (animal husbandry, logging, etc.) had BMPs in place it would not be a violation. NC would like to see site-specific controls as opposed to across the board controls. Trying to remove legislative barriers to go after nonpoint source problems. (Tedder)

C: Perhaps move beyond CWA, possible Food and Drug. (Jackson, Oregon POTW)

Q: In using watershed approach, is there any problem you are experiencing from regulated community and citizen groups in the way you have prioritized basins as far as a delay in getting to the watershed? (Garreis, MD)

A: NC established schedules based on sensitivity of the basins and the amount of information on a particular basin. We still keep all controls under other programs in place so no basin is without controls. It is a way of managing resources and controls. We haven't received any complaints. (Tedder)

Q: Need flexibility in grants to do watershed work. Look at analytical methods to keep them current. EPA should go on the road with these tools once they are developed. Bring them to stakeholders, not just in a national meeting. Independent applicability, where is it going? (Bob O. NJDEP)

A: Next step is to take another look at policy, not necessarily to do away with policy but to improve upon it. EPA is going through a process to develop a report to give to regions documenting the steps for implementation. We are collecting information, looking at technical side of it and input from state programs. For immediate future we see no change in independent applicability policy. (Margaret Stasikowski, EPA)

C: Report, in draft stage, is a comprehensive technical document seen as first step in independent applicability policy. Evaluation of biological, chemical and WET approaches - strengths and weaknesses, changes will proceed slowly and will be science driven, only a technical document that describes where we are now. (Susan Jackson, EPA)

Q: What has been presented is great, but from a manager's point of view we are having a problem just implementing chemical-specific toxics program. Sounds as if future direction will be labor and resource intensive. Many states don't have the money. (Bob O., NJDEP)

A: Look at resources. Basin-wide program does not have to be statewide; focus resources on a few priority basins, as the program advances and achieves good results hopefully more state funds will be applied to what seems worthwhile.

Q: How do you allocate responsibility or liability for nonpoint sources? How do you handle the multiple natural stressors? How should we treat artificial ecosystems?

A: The approach allows us to put into perspective what the stressors are. If the primary stressors are nonpoint sources, state it in the report and don't increase controls on point sources. Be as specific as you can as to who is causing problems. NC does not currently allow treatment in natural systems, but there are a lot of possibilities there. (Tedder)

A: Identify pollution runoff source. Establish BMP program and define exactly what land owner would be required to do. Take enforcement if they do not implement the specified BMPs. (Landman)

C: EPA is standing in the cart backwards, sending a mixed message. Telling us that it is time to move on, develop new tools and step toward basin specific management without providing flexibility in current requirements, like holding on to policy of independent applicability Recommend that EPA delete policy of independent applicability. (Peter Ruffier, City of Eugene)

Q: Wouldn't it be most efficient to identify problems on a national basis and then focus state and national resources?

A: Can't take problems faced out there and boil them down to a national program. (Tedder)

A: We would be usurping state authority if we look at a problem on a national basis. (Cynthia Dougherty)

Q: Based on experience, should EPA continue with independent applicability policy? Should changes be recommended to independent applicability? Should changes be limited to watershed or ecosystem? How do you deal with questions of national consistency on the state level if changes take place? (Fritz Wagener, EPA Region 4)

A: There is more to national consistency than adopting standards. National consistency doesn't have to be in standards. (Tedder)

A: Independent applicability should be changed. Regulated community should not be penalized if state chooses not to implement watershed approach or held hostage to independent applicability until watershed approach is implemented. Implementation of watershed approach is Federal and state decision, regulated community can't do this. (Michael R.)

A: Not prepared to see a change in independent applicability. Need to examine the legs of the stool to see if they are scientifically sound. Time to look at national standards and make decisions on mixing zones and other parts of the process to make truly consistent standards. (Landman)

Q: EPA is raising a lot of expectations with common sense initiative and watershed approach that they will have a lot of say on what goes on in the watershed. There are other EPA programs that will be affected, 106(b), 319 funding will need to be revisited. Need strategy to define where the flexibility will be.

A: There is no guidance; these programs are just getting off the ground. Have put on the table the common sense initiative.

Q: Who are the stakeholders and what are their exact roles? Stakeholders should be in the room when decisions are made and plan is developed. All stakeholders should be involved in a watershed decision. (DuPont)

A: NC wants stakeholders involvement but will base decisions on sound science. Doesn't want emotions or the stakeholders to be able to sway the decision in a bad way. Important to have citizen involvement to get additional information but citizens will not have veto power over the plans, the management agency will still have ultimate say. (Tedder)

A: Stakeholders should not just have to watch the process, they should be able to participate. Science should drive the process but stakeholders' ideas should be included. (Michael Ruszcyk, Kodak)

A: There must be a bottom line at which point a baseline of protection is met. Local stakeholders should not be able to set just any level of protection. Enlist a community in investing in water protection by allowing them to participate. It is a delicate balance. (Landman)

A: May not be able to have all stakeholders represented, may not be able to have a representative group. In order to get balanced stakeholder involvement we try to get them to provide suggestions as to what policy decisions to make. (Cynthia Dougherty)

Q: Since we are looking at watershed approach, shouldn't we be looking at regional standards or site-specific standards and not national standards?

A: In great lakes area we have seen regional standards do not work because the areas are so diverse, different ecosystems within the region. We may need watershed basin standards. (Tedder)

Q: When is a watershed too large?

A: We already had a hierarchy in NC that divided the watersheds. They may not be too big, may break up the watershed into smaller groups with different management practices. (Tedder)

A: EPA may have answered this by developing ecoregions. These regions were developed based on ecological conditions including aquatic and land biota. Hierarchy within watershed, can't look at regions, can make observation and group together some regions that are similar. (Tetratech)

A: Arkansas has had regional based standards for 10 years. Ecoregions are based on soil. type, land use, and topography. This made a difference in the dissolved oxygen standards. (Martin May)

A: For human health criteria, don't see an alternative to national criteria. For nutrients and aquatic life criteria may be appropriate on a watershed basis. Right now we are adjusting these criteria based on species sensitivity and hardness of water, etc. (Margaret Stasikowski, EPA)

Q: Some people have suggested that we should delete policy of independent applicability. Yet NC has flourished with a basin approach with independent applicability. How have you dealt with independent applicability, multiple grant authorities? Identify what are some of the hurdles to your development of a program. (Rob Wood, EPA)

A: Have never said that independent applicability is in our way. Trying to get away from tunnel vision on where the funds are coming from. Want to put together some of the grants like 305(b) and 319 and get rid of 305(b) reporting every 2 years. Can't evaluate trends on a two year basis. How about a report every 5 years? Consolidate reporting requirements so that more resources can be put toward program. (Tedder)

Q: Can you see any changes to the program that should be used?

A: Lack of trust among one another. Improvement - National Estuary Programs. Stakeholders have been brought together. Bringing together stakeholders all over the government on water quality. Need better database to make decisions on, like national toxics database. (Landman)

Q: Watersheds do not obey state boundaries. How does NC deal with this issue?

A: NC management strategies are only implementable in our state. Working with Tennessee and other states to develop plans together. At least share information. (Tedder)

C: Watershed approach is a good way to coordinate water quality standards programs amongst tribes and adjoining states. We need to have the information upfront in order to make decisions that are not in conflict. (Marsha H., EPA Region 10)

Q: Does NRDC support common sense initiative? (Bob Weaver)

A: Who could be against smarter, cheaper water protection? Participating, but do not know what to expect. (Landman)

Ad Hoc Session

TMDLS And The Watershed Protection Approach

TMDLS AND THE WATERSHED PROTECTION APPROACH

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SUMMARY

What is a TMDL - sum of allowable WLAs (point sources) + LAs (nonpoint sources) + Margin of Safety (MOS)

Why are TMDLs important?
- quantifies loading capacity of a waterbody for a stressor
- allocates allowable loadings among contributors

Primary characteristics
- address unattained water quality standard on specific waterbodies
- can be developed to address a significant stressor or multi-stressors
- are quantitative
- contain a margin of safety
- are supported by the best available scientific information

TMDLS AND THE WATERSHED PROTECTION APPROACH

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SUMMARY

History of TMDLs
- started focusing on point sources

nonpoint sources were next
other factors to be addressed today

What is problem with approach of Federal/state programs
- TMDLs think too narrowly
- we focus on point sources
- we don't understand nonpoint sources

Problems emerging
- sediment
- agricultural runoff
- Superfund sites
- RCRA sites
- air deposition
- bioaccumulative problems

Two planes to TMDLs
- look at waste load from point source (this is usually easy)
- looking at complex situation as tied to watershed approach (more difficult)

In planning for sink situations (ex. GLI, Chesapeake, Mississippi River) we must use the complex TMDL approach

- look at problems and where they originate
- look at all nonpoint sources
- look at entire watershed, not just 2 or 3 miles downstream of industries
- force other people to come to table, e.g., Superfund, RCRA, Air
  - all sources end up in water therefore they must be involved
- develop management plan for basin

Management plan vision

- Use TMDL in process as base but must include several things:
  - sequence of events as we clean up water bodies
  - role of other media - Superfund, Air, RCRA
  - must have accountability
  - time-frame to revisit and assess progress

Phased approach to TMDLs needed when:

- nonpoint sources
- cross-media sources are involved
- financial limitations exist

Phased TMDL does not mean point sources now and nonpoint sources later

Phased TMDL does mean:

look at what is expected to meet standards
monitoring
revisiting problems
schedule for progression

Summary

Convince Congress that reasonable and steady progress is acceptable

Get help from other media programs

Focus on bioaccumulative compounds as a special category that doesn't need TMDL process but that we have to get out of the environment now. The bioaccumulative compounds are there and we need to deal with them now.

What is a complete water program? Watershed approach must focus on basics - monitoring, permits, etc.

TMDLS AND THE WATERSHED PROTECTION APPROACH

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SUMMARY

First lawsuit against EPA over TMDLs was in Michigan in 1987.

TMDLs has progressed a long way.

TMDLs can be a link between what the watershed is and what we can do.

TMDLs are the technical backbone of watershed protection

Four key aspects of TMDL process
geographic focus (place-based)
integrated action for all sources and stressors
stakeholder involvement
evaluate success

Geographic focus of TMDL process
- identifies impaired or threatened watersheds or bodies
- forces clear focus on specific area
- lends focus on priority problems, e.g., specific stressors

Interpreted action
- identify significant sources and contributors
- analyze combined impacts/effects of sources
- consider broad array of social, economic and legal factors; this is a step that EPA can help states with
- recommends appropriate reductions

Stakeholder involvement
- identifies stakeholders
- provides a forum for discussion and analysis
- provides content for agreement
- implementation and continuing discussion

Evaluate success
- long-term focus on established endpoints
- phased approach is important due to technology limits, economics and other factors

Future and current directions for TMDL program
- Don't see TMDL as a required step for every stressor in every waterbody, not enough funding

- Growing interest in non-chemical stressors - Oregon studies on temperature and forest canopy

- Will increasingly rely on nonpoint source control - USDA is a valuable source for information on problems with nonpoint source pollution

- Increased public involvement

- Watch legal issues - TMDLs are open to lawsuits

- Hierarchy on types of TMDLs

- Watershed approach is here to stay, must keep focus on real measurable goals

Questions to audience:

How do you list impaired waters?
What do we really do about unsolved problems, e.g., PCBs in sediments?
How do we take stigma away from naming names? How do we get people to recognize problems and solve them?

SESSION 4: Ad Hoc (TMDLs) - Questions and Answers

Q: How does anti-backsliding affect this watershed approach? Basin has high natural phosphorous but how high was not known until after TMDLs were set. Now the POTW is stuck with these limits. TMDLs should not be set until all factors are considered. (John Jackson)

A: Can't generalize on site-specific conditions (Dale Bryson)

Q: Regarding identifying impaired water body, as EPA develops new criteria (e.g. sediment) what does this mean for the process? (Sharon Green)

A: In states where standards are already in place we'll be going with what the states say.

Q: How can the process address areas where growth is occurring?

A: We will have to maintain standards and build in certain play for potential growth. This is also an area where schedules can be implemented to allow compliance with standards. Must look at the site specific conditions. TMDLs are normally targets about how much loadings can be placed into a water body without exceeding the standards. Many times TMDLs are then placed into permits. (Geoffrey Grubbs)

Q: Could you comment on working with soil conservation in TMDL process?

A: Through TMDLs we are giving people credit for what they are already doing and possibly requiring additional steps. Soil Conservation Districts can play an important role in this TMDL process. (Geoffrey Grubbs)

A: We need reauthorization of CWA to give us some strength to deal with agricultural runoff and other nonpoint source issues. (Dale Bryson)

Ad Hoc Session

Implementing The Endangered Species Act

IMPLEMENTING THE ENDANGERED SPECIES ACT

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AQUATIC ECOSYSTEM PROTECTION THROUGH THE ENDANGERED SPECIES ACT

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Abstract: This presentation will summarize the requirements of the Endangered Species Act and outline water quality factors which lead to the endangerment of aquatic species. The author will explain why current water quality standards and criteria may not be adequate to protect some endangered species and why additional compliance with the Endangered Species Act may be necessary. The principal recommendations and conclusions of the author are: 1) to conclude that listed and threatened and endangered species are still being impacted by water quality concerns; 2) to conclude that for the most part existing water quality criteria and standards are beneficial for Endangered Species; 3) to recommend that additional analysis is needed to identify any unique or specific water quality requirements for endangered species; 4) to recommend a collaborative and cooperative process between EPA, the States, and the Service to develop water quality criteria and standards that are fully protective of listed species; 5) to recommend that specific procedures be adopted to ensure appropriate compliance with the Endangered Species Act and; 6) to recommend that an ecosystem approach is the preferred method to avoid or minimize the application of any of the regulatory provisions of the Endangered Species Act.

The best way to start this presentation is to read an excerpt from a recent New York Times article entitled: "Water-based Animals are Becoming Extinct Faster than Others".

"Fish and other animals that live in North American waterways are disappearing much faster than land-based fauna, survey data indicate. And without broad measures to protect water-dependent creatures from such threats as pollution,...the rate of aquatic extinctions is likely to accelerate...Indeed, while few were looking, many aquatic species recently disappeared, sometimes leaving gaping holes in the food chain and always diminishing forever the biological diversity that keeps the earth genetically healthy..."

Lets take a look at the trends of aquatic species versus birds and mammals. According to the Nature Conservancy, 7% of US mammals and birds are extinct or imperiled compared to 20% of fishes, 55% of freshwater mussels and 36% of crayfish being-extinct or imperiled.

Also note that only 4%of listed aquatic species have shown signs of recovery.

Lets look at fish specifically. This status report was compiled by the American Fisheries Society for all of North America. The data include State and Foreign sources as well species listed under the US Endangered Species Act. Of 1,061 species of native freshwater fishes in north America, 364 species are listed as endangered, threatened or are of special concern and 40 species are extinct; 16 since 1964.

The primary documented cause for these declines is the widespread degradation of aquatic habitats.

Not all of this dismal picture is due to pollution, but a significant portion is. This slide is based on American Fisheries Society data and it shows the factors behind the extinction of 40 species of North American fishes in the last century. The percentages for all the categories add up to more than 100% because its believed that more than one factor is responsible for each extinction.

But water pollution is identified as a factor in 38% of the extinctions.

Based on the documented declines of species and loss of biodiversity the Congress passed the Endangered Species Act of 1973. It has been amended numerous times since then but it remain substantially the same. The Act embodies a fairly comprehensive approach to maintaining species diversity in the United States.

You might be asking yourself at this point : Okay, so we are losing species, so what!! The dinosaurs went extinct and we're doing great without them!!!

Right. And the people in the movie Jurassic Park would no doubt agree!!

But endangered species do have values to society which led to our elected representatives passing the Endangered Species Act. What are those values?

Here's 10 to think about:

1. Endangered species are an integral part of our nation's heritage. Their very existence is part of our country's history and should be preserved.

2. Endangered species are our environmental barometers -"or canaries in the coal mine"-- warning us of environmental situations that could affect us.

3. Endangered species have utilitarian value for a range of human enterprises such as agriculture, medicine, hunting, fishing, and wildlife watching.

4. Endangered species have scientific value. We can learn much about the life that sustains us by studying endangered species in their habitats.

5. Endangered species have spiritual and aesthetic value for some . They are, for many people, a source of personal and emotional fulfillment, appreciated for their beauty or complexity or rarity.

6. Endangered species have intrinsic value for some people. Meaning that the simple right to exist is respected.

7. Endangered species have value for the survival of other species with which they are interconnected (including humans). They have evolutionary value, in the contribution they make to the global gene pool.

8. Endangered species have educational value. The plight of these organisms can raise public awareness about the nature of environmental problems. And success in saving one species can serve as a model for strategies that would save others.

9. Endangered species have value by virtue of their legal status. They are a legal force for conservation and protection of our natural environment.

10. Endangered species are the "bottom line" reminder that the continued health of the planet depends on the wisdom of our stewardship and that we have an ethical responsibility to protect and conserve nature of which we are a part.

Maybe just as important as the above reasons is that your children care about endangered species. Go home tonight and ask them if you don't believe me!!

Does everyone believe that the benefits of preventing the extinction of a species are worth the cost to society? No. Hardly. Look at the Spotted Owl controversy. This situation and others like it have lead to a great National debate as the U.S. Congress considers the reauthorization of the Endangered Species Act.

Now for the quick review of the Act. If you want a lot of detail, I'll disappoint you. My objective here is to give you a quick overview of the structure of the Act and the tools that it contains to accomplish its purposes so you can put the other panel presentations in perspective. If you want the details---you will need to read the Act.

I will focus my summary on the primary sections of the Act that relate to Purpose, Listing, Recovery, Consultation and Protection.

Section 2 -- Findings, Purposes, and Policy

The Act finds that human activities have caused the extinction of some species and put the survival of other species at risk, that these species are of value, that the United States has committed itself through several treaties to the conservation of species, and then states its purpose very clearly:--- the maintenance of endangered and threatened species and the ecosystems upon which they depend.

Section 4 -- Listing and Recovery

Basic to the conservation of species at risk of extinction is a process for determining those species in need of attention. Changes to the threatened and endangered species list are accomplished through a rulemaking process involving proposal, public comment, and adoption of a final rule.

There are 5 criteria for determining whether a species qualifies for listing. The criteria are: 1) habitat loss, 2) direct taking, 3) disease, 4) inadequacy of existing regulatory mechanisms and 5) other natural or manmade factors.

The Act provides that the Secretary shall make listing decisions "solely on the basis of the best scientific and commercial data available . . ." In other words, no economic or social impact data may be used in making a listing decision.

When a species is placed on the list, section 4 requires that the agency specify, "to the maximum extent prudent and determinable", the species' critical habitat. A designation of critical habitat adds additional regulatory review requirements----but does not mean that human activities are outlawed--which is a common fallacy!
Once a species is listed, a variety of protective measures become available, including the requirement that a recovery plan be prepared for any listed species likely to benefit from the effort.

A recovery plan establishes recovery goals and objectives, as well as an implementation schedule and estimate of costs. Plans are also required to be subjected to public review before being adopted or revised.

Obviously, once a species is recovered and removed from the list then the regulatory provisions of the Act no longer apply.

Section 7 -- Consultation

One of the most important and controversial provisions of the Act is section 7,

Section 7(a)(1) directs agencies to carry out programs for the conservation of endangered and threatened species and Section 7(a)(2) requires them to ensure that the actions they authorize, fund, or implement are not likely to jeopardize the continued existence of listed species or to destroy or adversely modify critical habitat.

To comply with these provisions, agencies must consult with the Fish and Wildlife Service or National Marine Fisheries Service on actions that may affect listed species or critical habitat.

To be more to the point in terms of the focus of this conference, we believe that EPA must consult on water quality criteria, water quality standards and NPDES programs and permits.

In most cases consultation results in a no adverse affect determination with some beneficial conservation recommendations. However, in a few cases consultation leads to a written biological opinion as to whether the action is likely to jeopardize listed species or adversely modify critical habitat. If the conclusion is "jeopardy" then reasonable and prudent alternatives are provided that would avoid jeopardy if implemented.

The opinion must also document any expected taking of a species incidental to the action and prescribe means to minimize impacts. An incidental take statement in the opinion defines allowable take levels that remain after appropriate mitigation and in that regard protects agencies against application of the take provisions of the Act under Section 9..
Section 7 also contains an elaborate but little-used process that allows a Cabinet-level committee to exempt an agency's action from the duty to avoid jeopardy to a species or adverse modification of critical habitat. This is the only part of the Act that provides for explicit balancing between the survival of a species and the economic and social cost of its conservation. It has been rarely used and most decisions have favored the species.

Section 9 -- Prohibitions

Section 9 of the Act prohibits "taking" of endangered animals. Taking is broadly defined to include not only killing or wounding, but "harming and harassing." Taking of endangered plant species is prohibited in some circumstances and not in others.

Section 10 -- Permits

Permits can be issued that allow taking to carry out research or recovery activities.

Permits can also be issued to allow taking to occur on private lands provided there is replacement. This "habitat conservation plan" permit mechanism has been useful in a number of cases for easing the conflict between endangered species conservation and private development activities.

Section 11 -- Penalties and enforcement

This section sets the penalties for violations of the Act, including civil fines up to $25,000 and criminal penalties that may include fines up to $50,000, and imprisonment for up to 1 year. Vehicles, vessels, and other equipment involved in a violation may also be subject to seizure.

That's the end of my summary. The overall structure of the Act is relatively simple---provisions to list species in trouble, recover them and protect them from further threats to extinction in the interim.

But as someone once said: "the devil is in the details"!!! If you want to examine the details I would urge you to read the Act and its implementing regulations.

There are some that believe the Act stops progress in a significant way.

I will not agree with that.

In the vast majority of circumstances projects or other Federal actions are found to have no adverse affect on species or only minor modifications needed. But the few major conflicts end up on the front page of the newspapers and help form the public perceptions of the Act.

Heres the facts:

During the 6-year period from 1987 to 1992 there were over 94,000 informal consultations. Only 2,700 (or 2.9%) resulted in the need for a formal consultation. Of the 2700 formals, only 356 resulted in a jeopardy opinion (or 13%). Of the 356 jeopardy opinions only 54 (or 2%) ultimately blocked, cancelled, or terminated a Federal action. Over the 6 year period, that represents an average of 9 per year. In a number of those cases the Federal agency willingly withdraws the action realizing the project will lead to the extinction of a species.

So 99.94% of the projects reviewed under Section 7 of the Act went forward.

I therefore argue strongly that the Endangered Species Act is not the major impediment to progress that some would like us to believe. Does it create additional workloads for agencies? Yes. Does it increase project costs? In some cases, yes. Are the costs worth the benefits of maintaining unique forms of life on this planet and the environmental underpinnings for us humans?

The Congress has continued to say yes.

Is our administration of the Act perfect in every way? No. Hardly. But we are constantly looking for ways to improve and are developing initiatives aimed at streamlining the requirements of the Act and reducing economic impact while increasing species protection.

A number of these improvements have recently been announced by the White House and cover such areas as increased peer review of Service proposals, avoiding crisis management through cooperative approaches that focus on groups of species dependent on the same ecosystem and increased participation of State agencies in Endangered Species Act activities.

These and other internal efforts will lead to improved administration of the Endangered Species Act.

But what about EPA's programs and specifically, water quality criteria and standards in relation to the provisions of the Endangered Species Act?

There has been a long standing presumption that EPA's programs only benefit and never harm threatened and endangered species and that they contribute substantially to the recovery of them. While we agree that this is generally the case, in a number of circumstances we believe that EPA criteria, State water quality standards and NPDES permits either could result in harm to species by not being sufficiently protective or are not contributing to their recovery.

I know those are fighting words to some---and we have been engaging in some of that over the past few years with EPA and the States over compliance with Endangered Species Act provisions. But all are realizing that there is some truth to this and that incremental actions by EPA, the State water quality agencies and dischargers can both protect the survival of listed species and lead to their recovery.

But I want to say for the record that the Fish and Wildlife Service recognizes the tremendous progress made to date in pollution control by the EPA,. States and dischargers. And I want to say that the vast majority of these regulated activities, do indeed, benefit species and their ecosystems. But some fine tuning is necessary. The consultation provisions under Section 7 and the recovery provisions provide the mechanism for the fine tuning.

Water quality criteria and standards have been developed using, for the most part, a traditional approach based on water column impacts of a chronic or acute nature to test organisms, primarily fish.

In general, criteria and standards may not adequately protect some listed species in the following circumstances: 1) migratory species blocked by mixing zones or other chemical or physical blocks, 2) sedimentation that covers up fish eggs and smothers native mollusks, 3) contamination of such sediments, 4) secondary impacts of bioaccumulation of toxics in aquatic species that affect listed terrestrial wildlife that feed on them, 5) unfavorable flow conditions for aquatic species either from water withdrawals, irrigation return flow or industrial or municipal sources, 6) unique sensitivities of certain species that are lower than EPA's standard test species or 7) some other unique site specific life history requirements of a species.

I offer two simple approaches to modify State water quality standards where aquatic listed species are present in a waterbody and have unique requirements that are not covered by the existing standards or criteria.

One approach is to designate a beneficial use of threatened and endangered species protection and then define any site specific criteria necessary to cover any unique needs. I have seen this used in a few State standards. A second approach is to designate such segments as Outstanding National Resource Waters and apply the more stringent prohibitions that go with this designation.

How do we get consideration of endangered species in EPA and State water quality management programs? I offer three recommendations.

First, we need to begin to talk to each other. That's essential. The ideal approach is to develop collaborative efforts that are ecosystem based to protect species---in advance of the need for listing, if possible. The regulated community also needs to be involved and can contribute much to the dialog.

The Fish and Wildlife Service is actively implementing a new way of doing business based on an ecosystem approach. EPA is also actively pursing a watershed approach with its partners. These efforts need to be better integrated and coordinated.

Second, we believe that the recovery and consultation provisions of the Endangered Species Act need to be applied to all Clean Water Act activities to create a framework for the consideration of the unique needs of some listed species,.

And third, when Endangered Species Act conflicts do occur, the parties need to commit to collaborative, interest based negotiation----and move from WIN/LOSE or LOSE/LOSE interaction models to WIN/WIN models. Yes---- that comment includes all involved parties----- the Fish and Wildlife Service, EPA, the States and the regulated community!!!

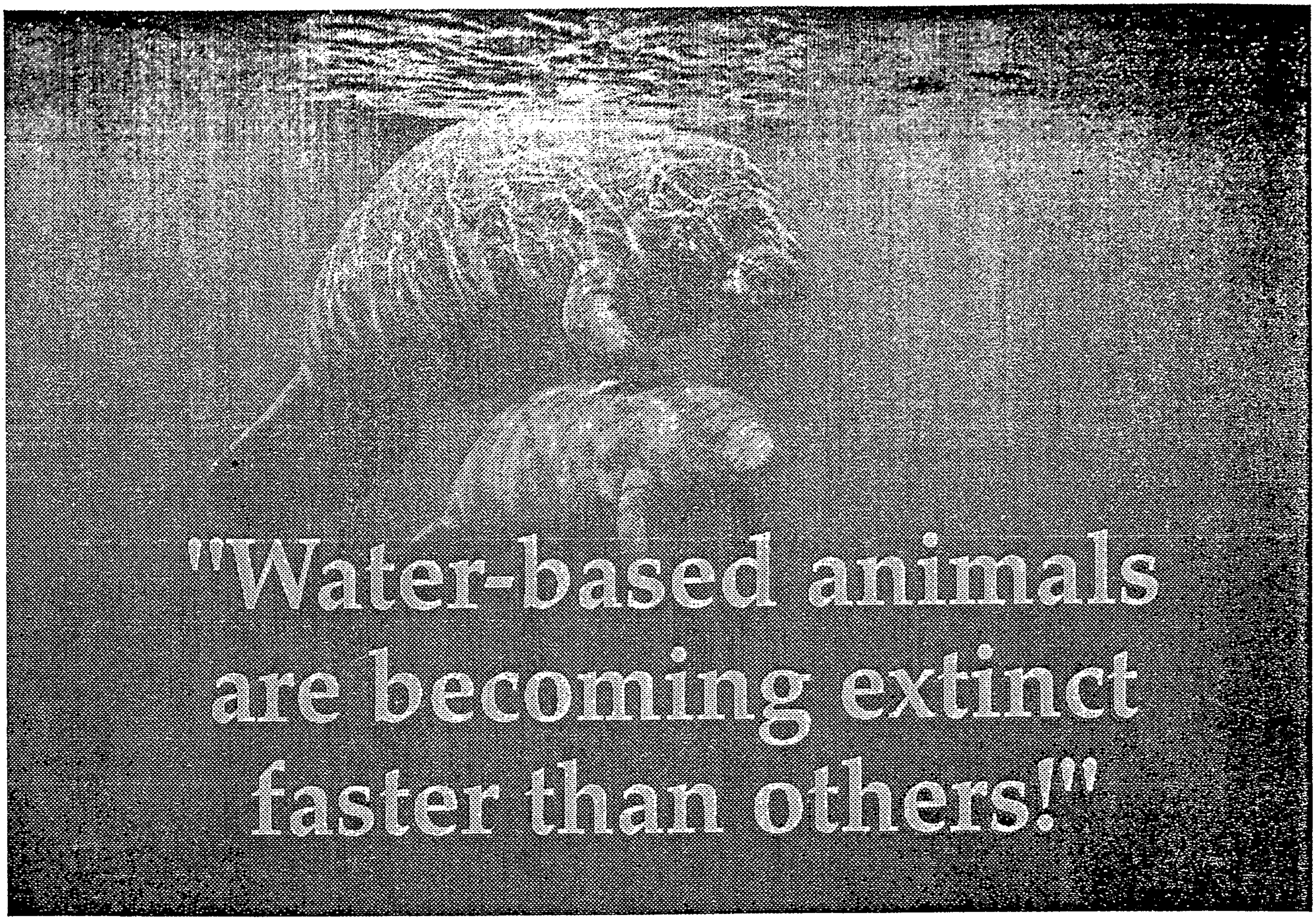
Will there be problems?

Yes, particularly in the beginning as we try to understand each others authorities and integrate our regulatory cultures and work out the details of interacting. And that has been true in the development of a Memorandum of Agreement that Mike McGee will now be talking about.

However, if we stay focused on the goals of incrementally providing species protection while keeping paperwork to a minimum, streamlining the process and seeking to minimize economic impacts, we can succeed.

I think the ultimate result will be worth it. But it will require the commitment of all parties, and liberal doses of common sense, trust and mutual respect.


Aquatic Ecosystem
Protection
through the
Endangered
Species Act


"Water-based animals
are becoming extinct
faster than others!"

Aquatic Species Status

Extinct or Imperiled
(According to the Nature Conservancy)

- 7% of U.S. Mammals and Birds
- 20% of Fishes
- 55% of Freshwater Mussels
- 36% of Crayfish

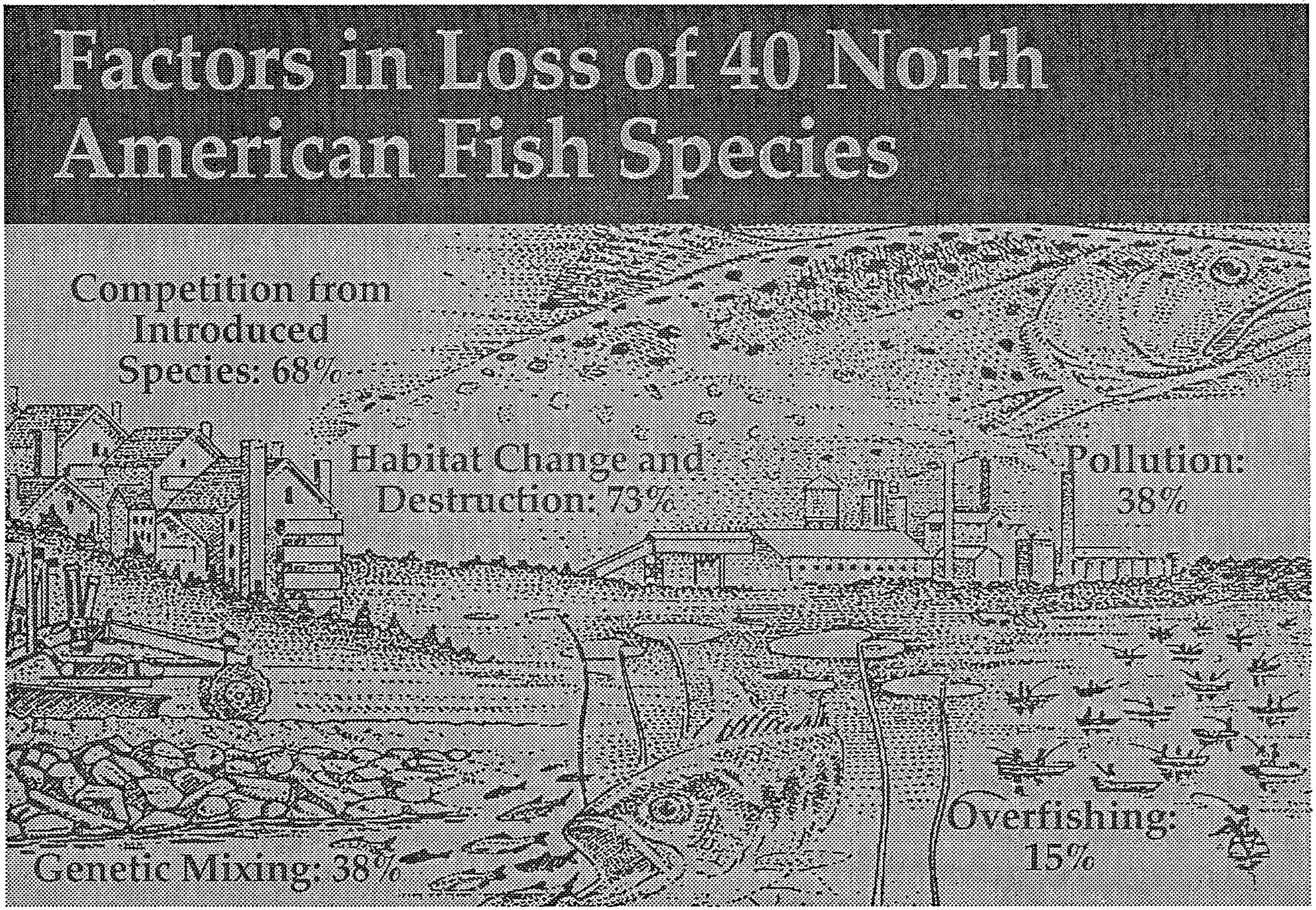
Only 4% of Listed Aquatic Species Have Shown Signs of Recovery!

Fish Status

Out of 1,061 Species of Native North American Freshwater Fish

- 364 Listed as *Endangered*, *Threatened* or of *Special Concern*
- 40 Species Extinct (16 since 1964)

CAUSE: Widespread Degradation of Aquatic Habitats


Factors in Loss of 40 North American Fish Species
Competition from Introduced Species: 68%
Habitat Change and Destruction: 73%
Pollution: 38%
Genetic Mixing: 38%
Overfishing: 15%

Endangered Species Values

- National Heritage
- Environmental Barometers
- Utilitarian
- Scientific
- Spiritual and Aesthetic

Endangered Species Values

- Intrinsic
- Other Species Survival
- Educational
- Legal
- Remind us of our Ethical Responsibility to Preserve Nature

Summary

- Purpose
- Listing
- Recovery
- Consultation
- Protection

Section 2: Findings, Purpose and Policy

- Human Activities Have Caused Extinction
- Species are of Value
- Species and Ecosystems are to be Maintained

ENDANGERED SPECIES ACT

Section 4: Listing and Recovery

- Rulemaking Process
- 5 Criteria to List
- No Consideration of Economic/Social Impact
- Critical Habitat
- Recovery Plans

Section 7: Consultation

- Directs Agencies to Carry Out Programs to Conserve
- Requires Agencies to Ensure Their Actions will not:
  - jeopardize existence of species
  - destroy or adversely modify critical habitat
- Biological Opinion
- Incidental Take Provisions

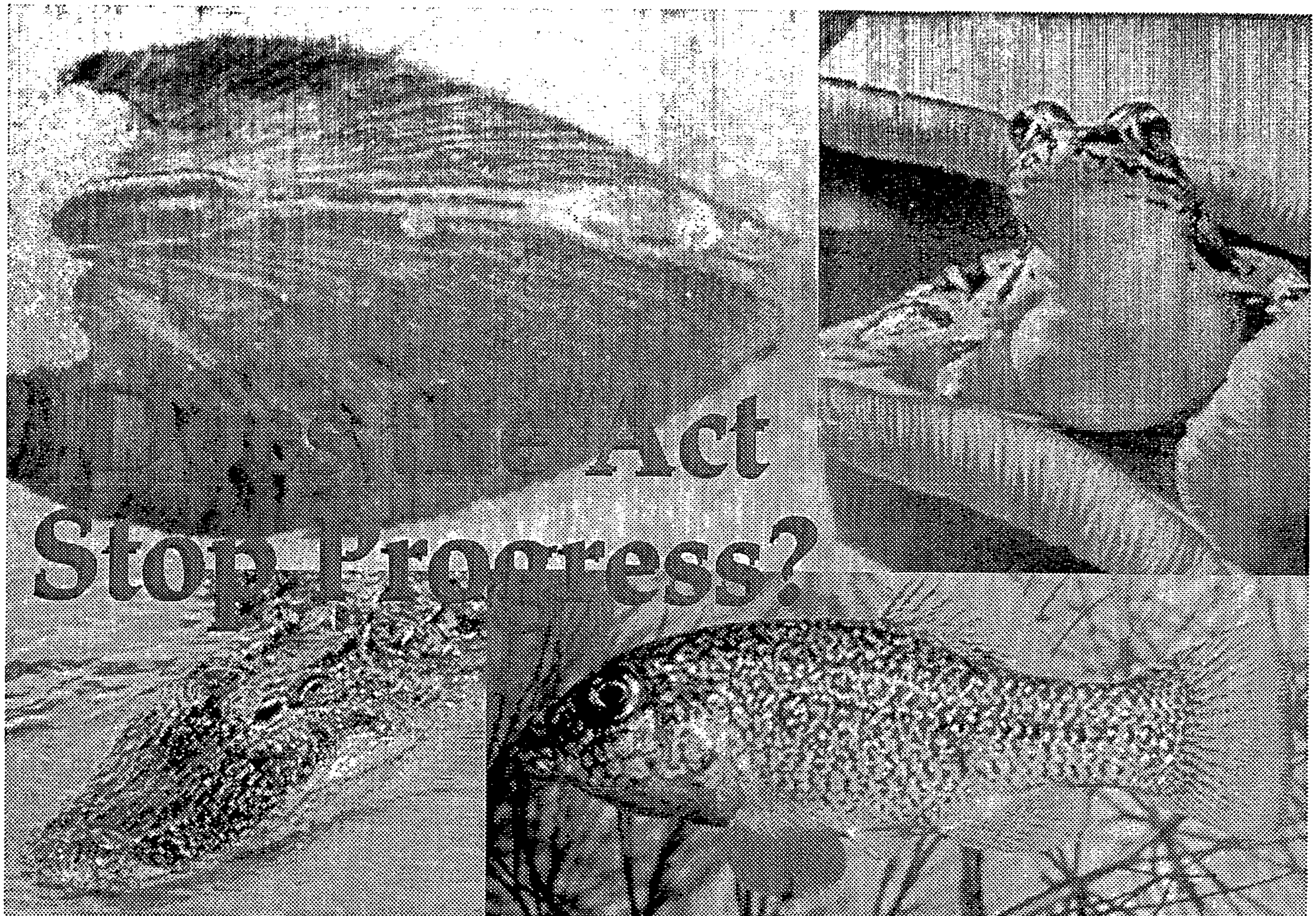
ENDANGERED SPECIES ACT

Section 10: Permits

- Permits Taking of Species for Research or Recovery
- Permits Taking on Private Lands with *"Habitat Conservation Plans"*

Section 11: Penalties & Enforcement

- Civil - Up to $25,000
- Criminal - Up to $50,000 and 1 Year in Jail


Act
Stop Progress?

Reality (1986 - 1992)

- 94,000 Informal Consultations
- 2,700 Formal Consultations
- 356 Jeopardy Opinions
- 54 Blocked, Stopped or Terminated

- 99.94% of Projects Went Forward

What About EPA's *Water Quality Programs?*

- Some Circumstances - Not Protective
- Tremendous Progress Overall
- Fine Tuning is Necessary

Why Aren't Criteria and Standards Protective?

- Blocks to Migratory Species
- Sedimentation
- Toxic Sedimentation
- Bioaccumulation of Toxics in Wildlife
- Greater Toxic Sensitivities
- Flow Conditions
- Other - Life History

Two Approaches

- Designate a beneficial use of threatened and endangered species protection with site specific or statewide criteria.

- Designate *Outstanding National (or State) Resource Waters Status*

Three Recommendations

- Collaborate on ecosystem approach to recover species and avoid listings
- Consult under Section 7 on CWA Programs
- Resolve conflicts through collaborative, interest-based negotiation

AN ALTERNATE VIEW ON THE ENDANGERED SPECIES ACT AND EPA'S WATER QUALITY CRITERIA DEVELOPMENT AND STANDARDS APPROVAL

Robert F. (Mike) McGhee
Acting Director
Water Management Division
U.S. EPA, Region 4
Atlanta, GA

Duncan M. Powell
Endangered Species Act Coordinator
Water Management Division
U.S. EPA, Region 4
Atlanta, GA

Abstract: An integrated national committee, with representatives from the Department of Interior's Fish and Wildlife Service, Department of Commerce's National Marine Fisheries Service and the U.S. Environmental Protection Agency/Office of Water staff, investigated development of procedures which would streamline and make more efficient use of inter-agency relationships for EPA's federal actions, involving development of water quality criteria and approval of state water quality standards. A draft Memorandum of Agreement was developed by this committee. Three unique ideas were conceptually developed to meet the requirements of the ESA for these two federal actions. These ideas included: (1) EPA's development of draft biological evaluations for national water quality guidance values of two chemicals, (2) the Services' development of draft biological opinions on these two chemicals, and (3) procedures for the Services' review of state water quality standards.

AN ALTERNATIVE VIEW ON THE ESA & EPA'S WQC & S APPROVAL

Robert F. McGhee
Director, Water Management Division
U.S. EPA Region IV
Atlanta, GA

Interagency Task Force
EPA, FWS & NMFS

BASED ON JULY 24, 1992 MOA
Task Force Draft, Principle Agency Review, Agency Legal Review, Agency Staff Review, Agency Review of Staff Comments, Signature Level Review
****

Endangered Species Act
as amended, Section 7(2)

"Each Federal Agency shall, in consultation with and with the assistance of the Secretary, insure that any action **authorized, funded or carried out** by such agency (an "agency action") is not likely to jeopardize the continued existence of any endangered or threatened species of result in the destruction or adverse modification of critical habitat..."
****

Draft MOA regarding the ESA and CWA
Sections 303(c), 304)a), 402, and 405
EPA Agency Actions:
♦WATER QUALITY CRITERIA♦
♦WATER QUALITY STANDARDS♦
♦NPDES PERMITS PROGRAMS♦
****

BENEFITS
+++Agency Resources+++
*Reduces Process Conflicts
*Focus Efforts for Maximum Coverage
*Provide National Consistency
*Reduces Litigation Activities
****

BENEFITS
+++Natural Resources+++
*Identifies Resources at Greatest Risk
*Protection From Impacts
*Provides for Species Recovery
****

♦ WATER QUALITY CRITERIA ♦

☼

Development of New Water Quality Criteria
Methodological Guidelines

☼

Consultation on Existing Criteria
Guidance Values

☼

Development of New Section 304(a)
Criteria Guidance Values

☼

EPA Headquarters Lead

****

♦ WATER QUALITY STANDARDS ♦

☼

Development of New or Revised State
Water Quality Standards

☼

EPA Regional Offices Lead

****

♦ NPDES PERMITS PROGRAMS ♦

☼

Approval and Modification of State Programs

1. Rulemaking
2. New State NPDES Program Applications
3. Existing NPDES State Programs

☼

Issuance of State NPDES Permits

☼

Issuance of EPA NPDES Permits
(Including Sludge Provisions)

☼

EPA Regional Offices Lead

IMPLEMENTING THE ENDANGERED SPECIES ACT

Robert J. Smith
Competitive Enterprise Institute
Washington, DC

SUMMARY

ESA is a complete failure
    has done more to jeopardize species than any other initiative
    introduce you to adverse reaction against the ESA around the country
        mostly in the pacific northwest
What is the act doing for incentives for private land owners?

Act is single most powerful act that has been promulgated to date
Directs all federal activities
Private landowner cannot do anything on his land that will "take" an endangered species
    $100,000 for each taking and up to one year in jail
Nobody pays you for the loss of the use of your land
No just compensation
Creating a solid backlash against the protection of animals
Several unforeseeable court decisions on taking of bears have caused land owners to implement the 3S syndrome-shoot, shovel and shut up
In southeastern US, timber owner, famous in conservation circles, turned land into wildlife management. Managed part of the land to hunt bobwhite quail as well as protect endangered redcocaked woodpecker. Now he cannot cut trees. He is losing money.
The act, by harming land owners and not providing compensation has driven these people to destroy habitat. FWS needs to change to the Act to allow for the protection of landowners rights

John Christian's Response:

Anecdote is a powerful tool. He has laid out the worst case to prove his point. Admits he has seen some instances where the act implemented unjustly for individuals. Will not admit that ESA is detrimental to wildlife and harms land owners. There are provisions in the act for landowners. Section 10a - private landowners can develop habitat conservation plan. If activity will result in loss of habitat can replace with habitat elsewhere.

Is there room for improvement in the Act? Yes. How do we integrate and resolve these practices? There are positive examples and successful accommodations when dealing with landowners.

Robert Smith Rebuttal:

Before ESA, had long tradition of voluntary conservation. These worked well even without compensation. There is a lack of mutual respect between FWS and private land owners.

SESSION 4: Ad Hoc (ESA) - Questions and Answers

Q: Mary Joe Garreis owns land on lower eastern shore. Was going to put up stands to promote nesting of eagles. They were approached by two hunting clubs who asked her not to do it because it might affect their hunting. If habitat owner puts in a conservation plan and the species flourishes, would land owner eventually have to revisit plan or would they need to move out?

A: Region 4 - Bruce Babbitt announced that a deal is a deal. If conservation plan is implemented would not be revisited. However, most plans allow for some taking

A: Robert: What happens with a new species come in after implementation of a well thought out plan. Babbitt says well then you're in trouble.

Q: What is trigger for state issued permits?
What about in standards process?
What is federal action requiring need for Section 7 consultation?

A: Reg 4 - Consultation has been done for a standard, if standard, reissued or No change there is no consultation needed. If new information may revisit and then a consultation would be required.

EPA feels state-issued permits not covered under ESA because it is not a federal activity because if going to wipe out species, probably protected under the CWA anyway.

A: Sabock: EPA approval of standards may be considered EPA criteria - published on Then when applied on state standards and in permits consultation may be limited

Q: Riverside County EA: People are better there. People are doing.
Important to remember that these people are not against the environment.
Need to address this in the reauthorization of ESA
Incentives are real important and just compensation.

A: Sabock: ESA up for reauthorization.

Q: If non-delegated state do they have to consult on Section 7?

A: If EPA issued permit, will consult.

Q: Is consulting at FWS Field Office?

A: Sabock: This is a reflection of the fact that the activities are occurring in the regional office and information on species and effects to species are in the FWS field office.

A: John: See potential for conflict. Therefore regional review and implementation provision. There is some degree of oversight built into MOU.

Q: Beth McGee - N.C. - Wildlife Resource Agency
What have you done on the National level for protection of species?

A: Region 4: Haven't addressed ESA on a national level.

A: John: In the case of non-point source pollution, incentive approach can be applied to program that would be somewhat satisfactory to private land owners. Now need to apply this type of approach to ESA.

A: On 319 grants one of selective factors is whether or not these activities will be effective.

A: Dave Sabock:

EPA: 17 informal consultations underway
1 formal consultation underway

Ad Hoc Session

Assessing Toxicity in Sediment and Fish

ASSESSING AND REPORTING TOXICS IN SEDIMENT AND FISH

TOOLS FOR ENVIRONMENTAL MANAGERS AND DECISION-MAKERS

Thomas M. Armitage **Moderator**
Acting Chief
Risk Assessment and Management Branch
Standards and Applied Science Division, OST
U.S. Environmental Protection Agency
Washington, DC

Abstract: EPA has developed national guidance for assessing the risks of consuming chemically contaminated fish. The Agency is also developing national databases describing the extent and severity of sediment and fish tissue contamination. These databases are now being evaluated to produce the first biennial report to Congress on sediment quality in the United States. This session will provide an overview of the new risk assessment guidance, the national databases, and how they will be used by managers and decision-makers.

SUMMARY

Contaminated sediments
- impact aquatic life
- contribute to bioaccumulation
- ecological effects

1980's EPA began to survey contaminated sediment toxicity
- ecological impacts
- health impacts

Findings indicated
- important factors influence toxicity
  - grain size
  - organic carbon
- Lack of information on these factors in previous studies indicates a need for new data

EPA recently proposed an Agency-wide contaminated sediment strategy
- Published in the Federal Register on August 31, 1994

EPA is developing national guidance for risk assessment on fish consumption advisory
- State responsibility

No consistent approach

EPA is compiling a national fish tissue data repository

EPA is working on an inventory of contaminated sediment sites to target
- source control
- remediation
- prevention

THE NATIONAL SEDIMENT INVENTORY: A TOOL FOR ENVIRONMENTAL MANAGERS AND DECISION-MAKERS

Catherine A. Fox
Environmental Scientist
Office of Science and Technology
U.S. Environmental Protection Agency
Washington, DC

Abstract: EPA is nearing completion of a four-year national study to assess the nature, extent, and causes of sediment contamination in the United States. Data collected during the study are being compiled in EPA's National Sediment Inventory. EPA program offices will use the information in the National Sediment Inventory database to target sites for management action including: monitoring, pollution prevention, source control, and dredged material management. As a requirement of the Water Resource Development Act of 1992, EPA will also continue to update and use the National Sediment Inventory to prepare a biennial Report to Congress on sediment quality in the United States. This presentation provides an overview of the types of information contained in the National Sediment Inventory, and a discussion of the methodology used to evaluate the data. The presentation also describes the results of a preliminary evaluation of the sediment chemistry and point-source release data contained in the database to identify areas, chemicals, and industries of concern for the nation's aquatic ecosystems.

SUMMARY

Purpose of National Sediment Inventory is:

To support development of National Sediment Strategy, Programs and Regions have already provided OST with over 25 commitments on uses of data

Also through the Water Resources Development Act, Congress directed EPA to:
- Develop a Report to Congress on sediment quality
- Provide 2 year updates

The report will include
- Site inventory
- Point source analysis - report due out soon
- Compilation and Analysis of non-point source pollution
  - beginning with pesticide use and
  - atmospheric deposition data to be carried out FY95

EPA began with a pilot inventory

Limitations of data in inventory
- little TOC & AVS
- detection limits are sometimes higher than threshold value
- limited biological data
- Limited QA/QC data
- lat/long. not verified
- variations in objectives of studies collected
- multiple sampling and analysis methodologies used

Results of preliminary evaluation
- evaluate data on water body segments/reach level
- identify areas with elevated concentrations of sediment contaminants
- threshold values used were
- allow regions to verify targeted sites and provide additional data
  - NOAA ER-M - metals
  - EPA EQP for nonionic organics
  - Washington State lowest AET for ionic organics

Problem chemicals were defined as those for which the 50th percentile of each contaminant within each watershed exceeded the threshold

Chemicals of concern included
- PCB
- Chlordane
- DDT
- Along with others

Areas of concern were identified throughout the country

NATIONAL SEDIMENT INVENTORY: DATA OVERVIEW

Catherine Fox
U.S. Environmental Protection Agency
Office of Science and Technology
Standards and Applied Science Division

NATIONAL SEDIMENT INVENTORY: DATA OVERVIEW

Topics of Discussion

- Project Overview
- Sources of NSI Data
- Description of NSI Data
- Limitations of NSI Data
- Preliminary Evaluation of Sediment Chemistry Data

SOURCES OF NSI DATA

Timeline: 1980 to present

Sources of data

- Select Data Sets from STORET (COE, USGS, EPA, States, BIOACC, etc.)
- EPA Region IV's Sediment Quality Inventory
- EPA Gulf of Mexico Program's Contaminated Sediment Inventory
- EPA's Ocean Data Evaluation System
- EPA's Environmental Monitoring and Assessment Program's Sediment Quality Data
- EPA Region X/COE Seattle District's Sediment Inventory
- USGS Mass. Bay data (metals only)
- NOAA's Coastal Sediment Data Base (includes NS&T)
- EPA Great Lakes Data Base
- EPA Region IX's DMATS Data Base
- EPA's National Sediment Contaminant Source Inventory (TRI & PCS)

Additional data sets to be added following Regional review of Preliminary Evaluation

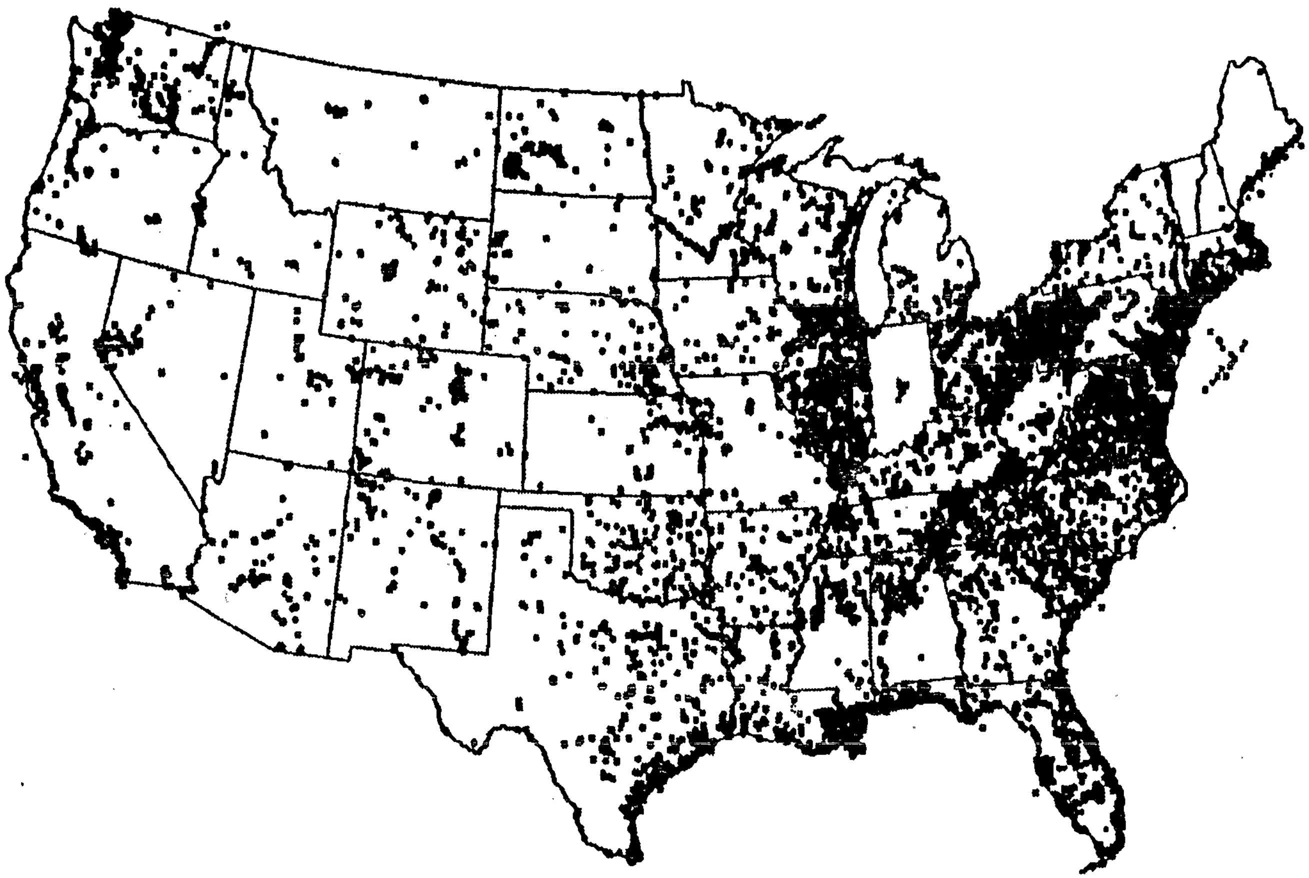
DATA INCLUDED IN NSI: Type of Data

Data Set	Data Type					
	Sed Chem	Tissue	Toxicity	Abund	Histopath	Effluent
STORET	x	x				
Reg. IV	x					
GOMP	x		x			
ODES	x	x	x	x		
EMAP	x	x	x	x	x	
Reg. X/Seattle COE	x		x	x		
USGS Mass Bay	x					
COSED/NS&T	x					
Great Lakes	x	x	x	x		
Reg. IX DMATS	x	x	x			
Source Inv.						x

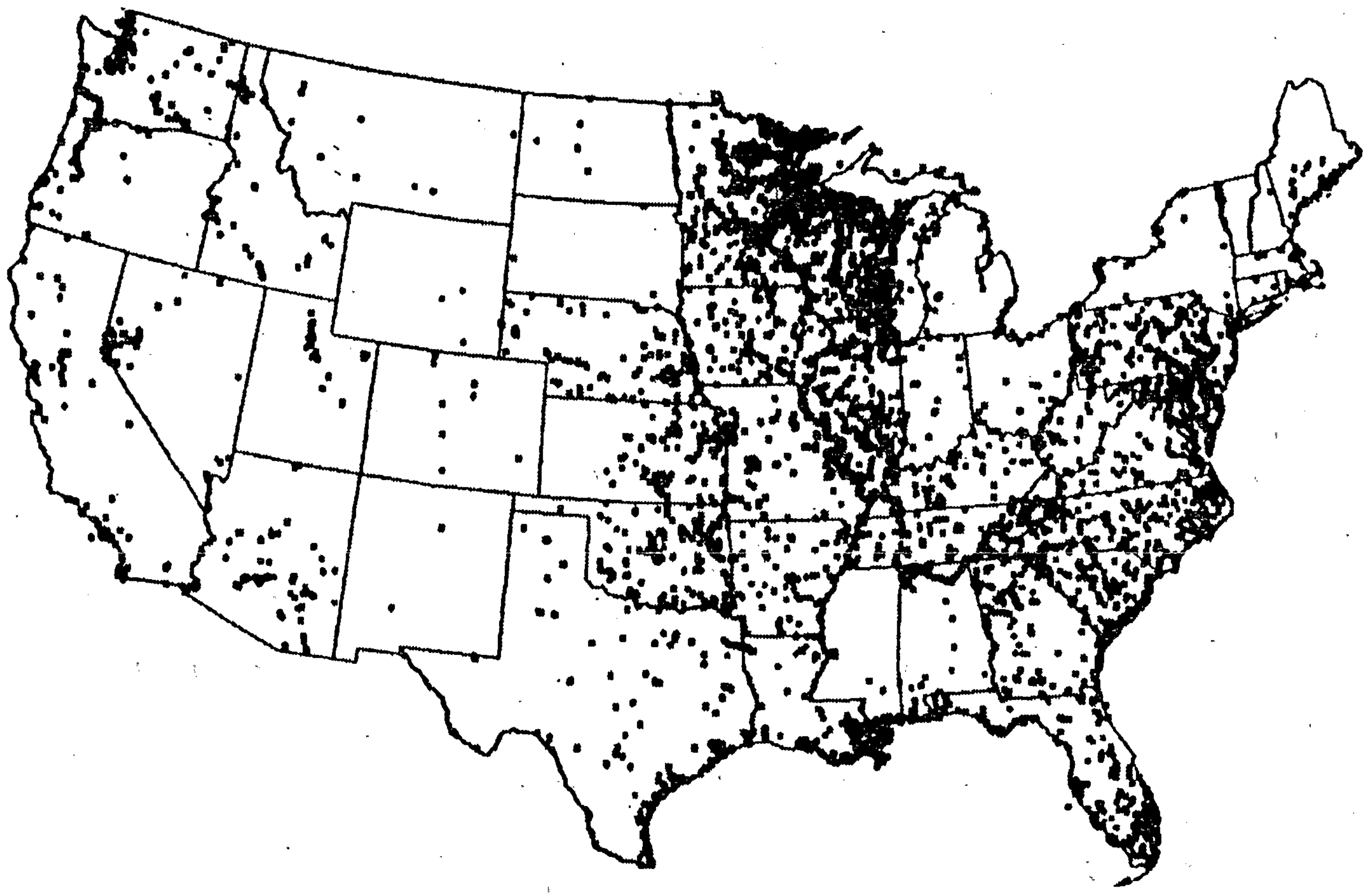
SUMMARY OF QA/QC INFORMATION

Database	Are There QA/QC Reports	Was the Data Peer Reviewed	Are the Sampling and Analytical Methods Available	Are the Detection Limits for the Analytes Available	Comments
ODES	Yes	Yes (301(h))	Yes	Yes	Data Qualifiers
EMAP	Yes	Yes	Yes	Yes	Data Qualifiers
Reg. X/ Seattle COE	Yes	Yes	Yes	Yes	Data Qualifiers
Reg. IV	Some	No	Some	Yes	Data Qualifiers
GOMP	Some	No	Some	Yes	Data Qualifiers
COSED	Yes	Yes	Yes	Some	
Great Lakes	Yes	Yes	Yes	Yes	
DMATS	Some	Yes	Yes	Yes	Data Qualifiers
STORET	Unknown	Unknown	No	Yes	Data Qualifiers
USGS	Some	Yes	Yes	Yes	

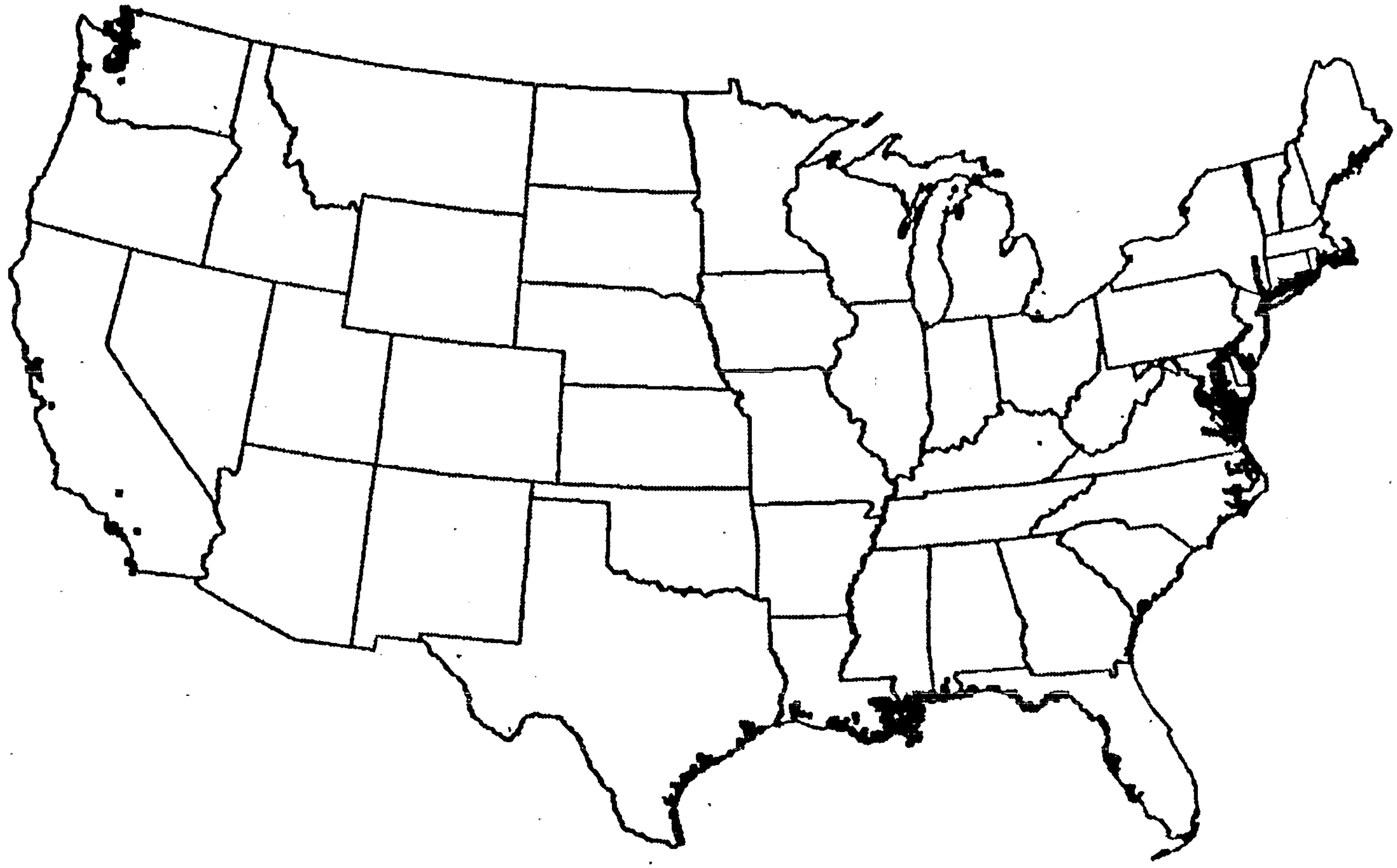
DESCRIPTION OF NSI DATA:
Location of Sediment Chemistry Stations



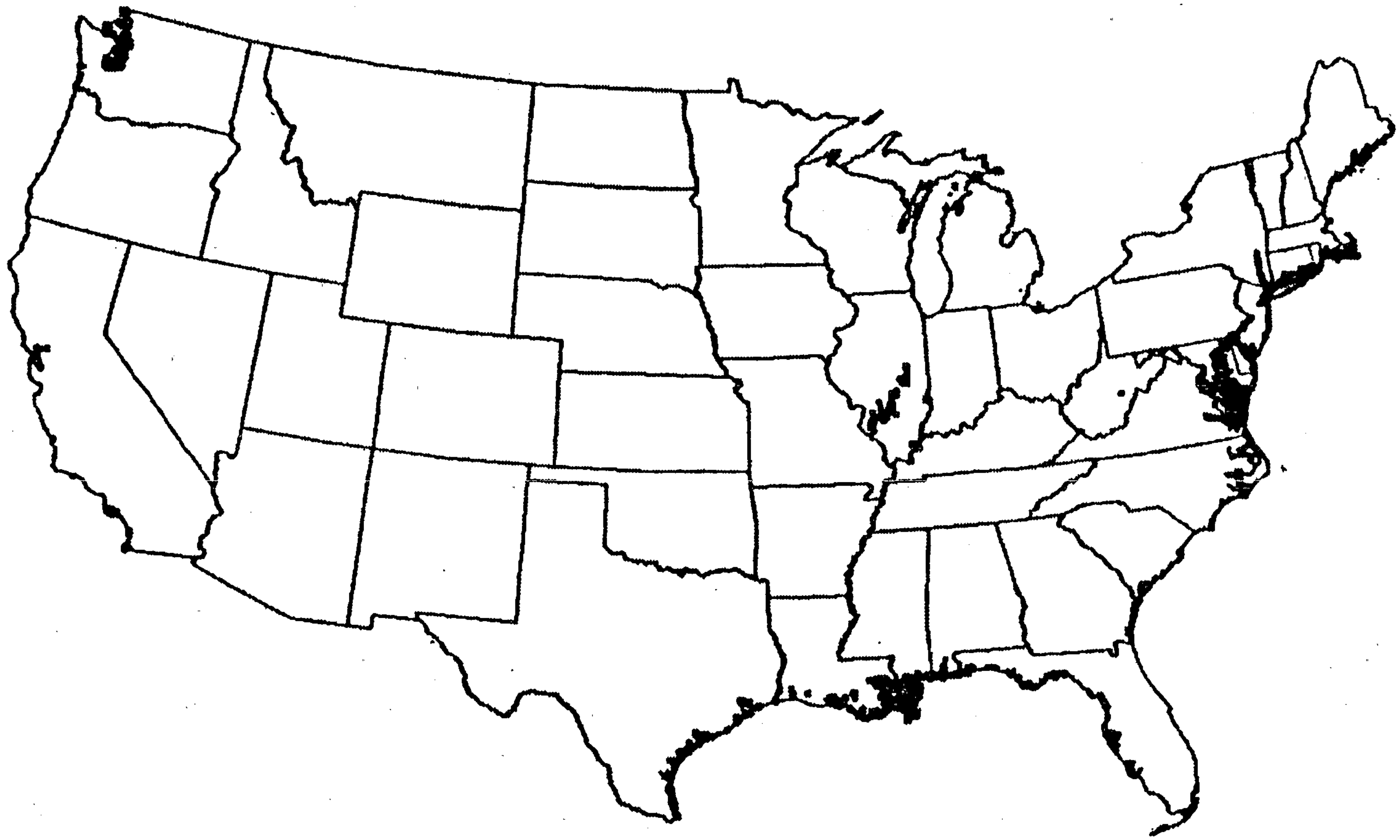
DESCRIPTION OF NSI DATA:
Location of Tissue Residue Stations



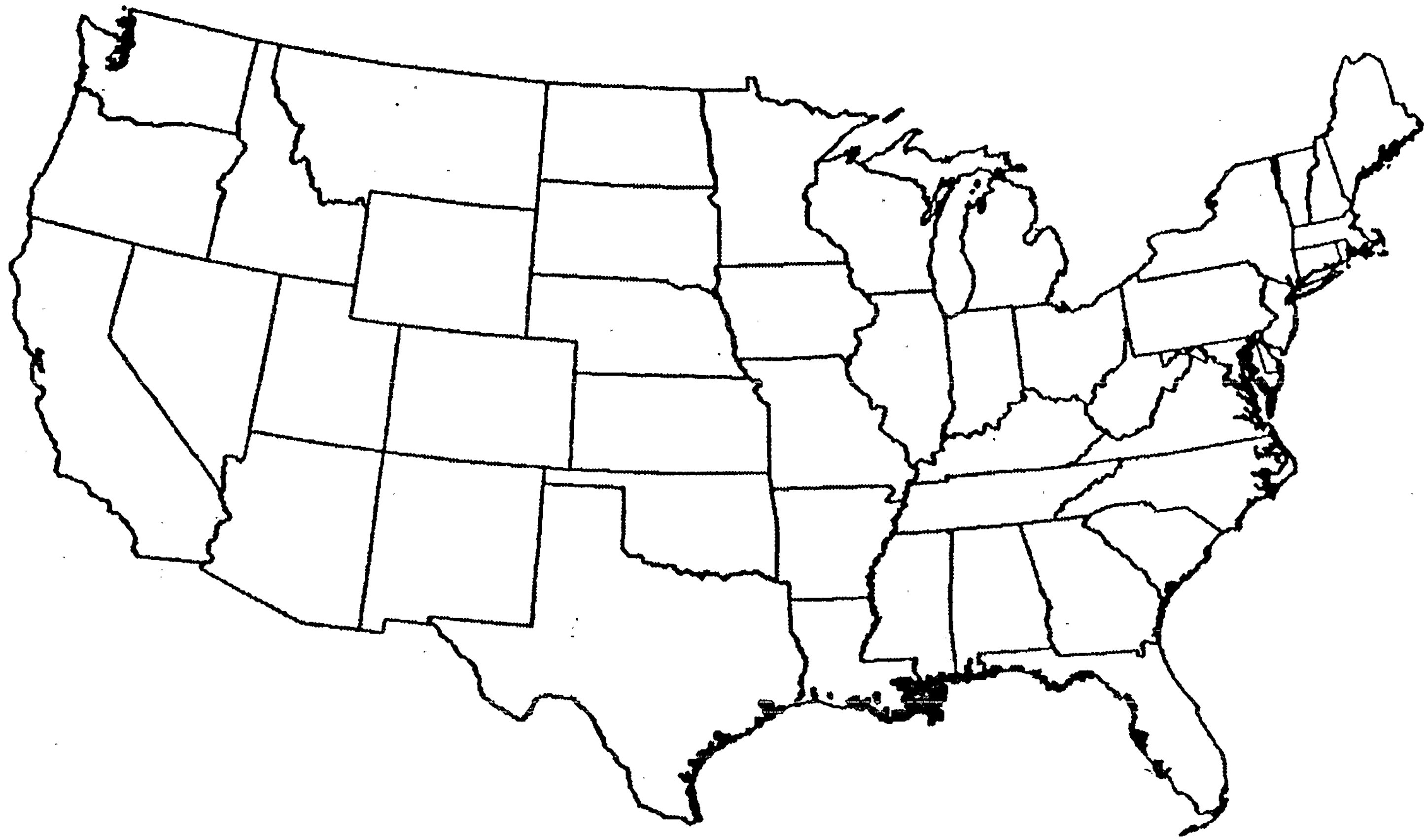
DESCRIPTION OF NSI DATA:
Location of Toxicity Stations



DESCRIPTION OF NSI DATA:
Location of Benthic Abundance Stations



DESCRIPTION OF NSI DATA:
Location of Histopathology Stations



PRELIMINARY EVALUATION OF SEDIMENT CHEMISTRY DATA: Overview of Approach

Waterbody-Segment Level of Analyses

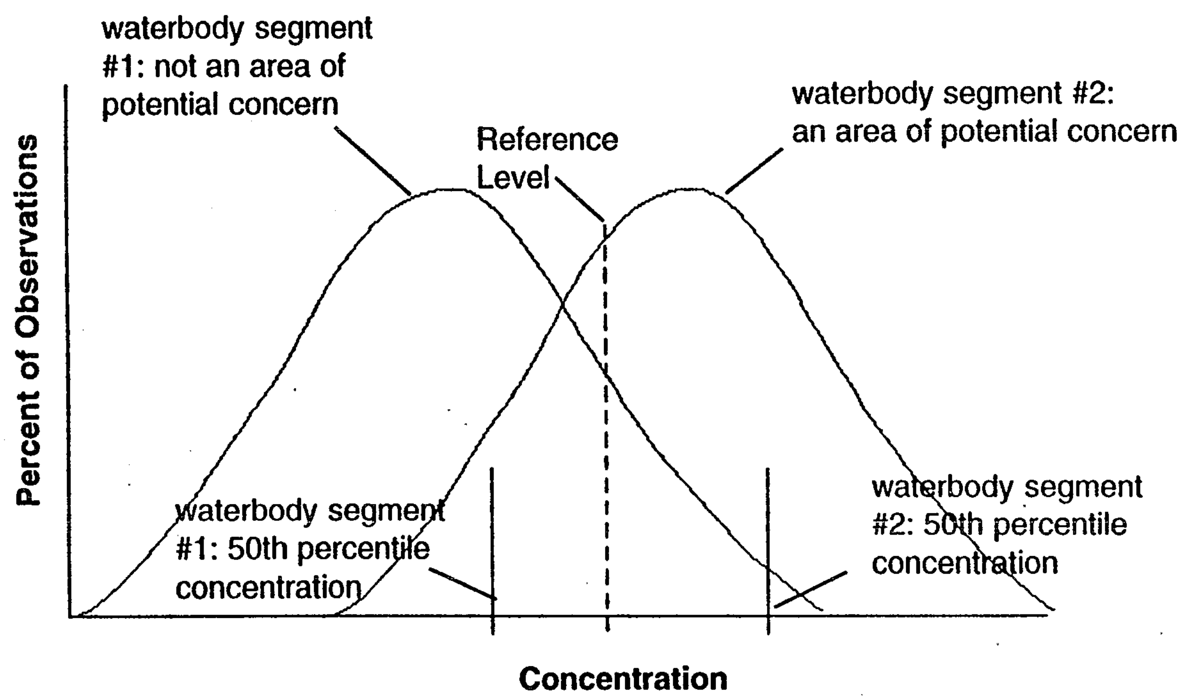
Threshold values

- Metals - ERMs (NOAA, 1990)
- Nonionic organics - EQPs (1% oc)
- Ionic organics - lowest AETs

Steps:

- Identify 50th percentile (median) concentrations for all observations for each analyte (nondetects and "less thans" treated as zero)
- If 50th percentile concentration greater than reference value, then consider contaminant of concern for that waterbody segment
- Any waterbody segments in which one or more contaminants of concern were identified are targeted as potential areas of concern

COMPARISON OF 50th PERCENTILE CONCENTRATION TO REFERENCE LEVEL



PRELIMINARY EVALUATION OF SEDIMENT CHEMISTRY DATA:

Top 20 Contaminants of Concern

(based on number of waterbody segments where 50th percentile concentrations exceed reference levels)

Contaminant	# of Waterbody Segments
Polychlorinated biphenyls	584
Chlordane	359
DDD	229
Lead	229
Zinc	226
PCB-1254	195
Anthracene	186
Pyrene	174
Heptachlor epoxide	137
DDE	130
Nickel	127
DDT	124
Heptachlor	105
PCB-1260	101
Aldrin	92
Mercury	84
Silver	83
PCB-1248	83
Cadmium	78
Chromium	77

NATIONAL GUIDANCE FOR ASSESSING THE RISKS OF CONSUMING CHEMICALLY CONTAMINATED FISH

Jeffrey D. Bigler
Fisheries Biologist
Office of Science and Technology
U.S. Environmental Protection Agency
Washington, DC

The Office of Science and Technology's (OST) Fish Contamination Program (FCP) provides technical assistance and guidance to State, Federal, and Tribal agencies for assessing human health risks associated with dietary exposure to chemically contaminated noncommercial freshwater and estuarine fish and shellfish. Technical assistance provided by the FCP includes the development of national databases and guidance documents for developing fish consumption advisories. This presentation provides an overview of the FCP guidance for assessing the risks of consuming chemically contaminated fish.

The FCP is producing guidance documents designed to provide the States, Tribes, and other interested parties with a scientifically defensible, cost effective methodology for developing, implementing, managing and communicating risk-based fish consumption advisories. All guidance is developed in a cooperative fashion with the States, Tribes, industry and environmental groups. The first volume of four guidance documents, titled Volume I: Fish Sampling and Analysis, was released in September 1993. This volume provides recommended methods for fish collection, sampling strategies, field collection procedures, chemical analysis, and data management. The guidance also provides profiles of 24 chemicals which have been identified as analytes of concern with respect to dietary exposure to chemical contaminants in fish. The second volume of the guidance series, Risk Assessment and Fish Consumption Limits, was released in June 1994. It provides chemical specific fish consumption limits for 24 analytes based on the amount and frequency of individual fish consumption. Specific fish consumption limits and advice for the general population and women of child-bearing age are provided. The third volume of the series, Risk Management, is under development and scheduled for release in late 1994. This document will identify and review management options and issues which should be considered in the development of fish consumption advisories. Topics covered include: variations in consumption patterns, health and nutritional benefits, cultural, societal and economic impacts, and options for limiting consumption. The fourth volume in the series, Risk Communication is also under development and scheduled for release in the fall of 1994. This document will address effective communication of fish consumption advisories to targeted audiences.

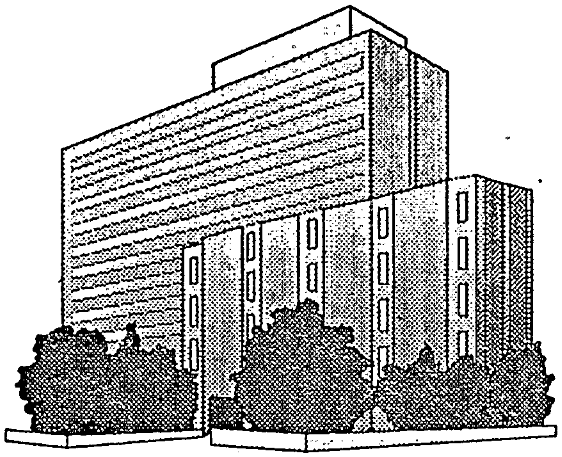
The guidance series developed by EPA provides the necessary information for developing, implementing, and communicating scientifically sound, cost effective risk based fish consumption advisories.

Environmental Protection Agency

Office of Science and Technology

Fish Contamination Section

Risk Assessment and Management Branch



EPA

OW

OST

SASD

RAMB

FCS

Program Objectives

To Establish a National Program by:

- Providing technical assistance to ensure cost-effective, scientifically defensible methods for developing consistent fish consumption advisory programs

- Improving information exchange and communication between programs

- Improving national database on fish contamination issues

Federal Action Plan

- Technical Guidance Documents
- Technical Conferences and Information Exchange
- National Database Management

Technical Guidance Documents

- Guidance for assessing chemical contaminant data for use in fish advisories
  - Volume I: Sampling and Analysis
  - Volume II: Risk Assessment and Fish Consumption Limits
  - Volume III: Risk Management
  - Volume IV: Risk Communication
- Nonregulatory
- Developed in cooperation with State, Federal, and tribal workgroup

EPA

Guidance For Assessing Chemical Contaminant Data For Use In Fish Advisories

Volume 1
Fish Sampling and Analysis

Purpose of Manual

- Provide guidance on sampling and analyzing contaminants in fish and shellfish tissue
- Promote consistency and comparability in the data used to issue advisories
- Provide a working document that can be updated as needed

EPA Fish Contaminant Workgroup

- FDA
- FWS
- ORSANCO
- NOAA
- TVA
- USGS

- Representatives from 26 States

Fish Sampling and Analysis Guidance Manual

Section 1: Introduction

Section 2: Monitoring Strategy

Section 3: Target Species

Section 4: Target Analytes

Section 5: Screening Values

Fish Sampling and Analysis Guidance Manual (continued)

Section 6: Field Procedures

Section 7: Laboratory Procedures for Sample Handling

Section 8: Laboratory Procedures for Sample Analysis

Section 9: Data Analysis and Reporting

Section 10: Supporting Documentation

Recommended Target Analytes

- Pollutants that have triggered advisories
- Pollutants detected in national/regional monitoring programs (e.g., USGS, USFWS, and NOAA)
- Pesticides with active registrations that have
  - Oral toxicity
  - Half-life $\geq$ 30 days
  - BCF > 300
  - Use profiles of concern
- Pollutants identified in literature as being of public health concern

Recommended Target Analytes

- Metals
  - Cadmium
  - Mercury
  - Selenium
- Chlorophenoxy Herbicides
  - Oxyfluorfen
- PCBs (Total Aroclors)
- Dioxins / dibenzofurans

Recommended Target Analytes

(continued)

- Organochlorine Pesticides
  - Chlordane (Total)
  - DDT (Total)
  - Dicofol
  - Dieldrin
  - Endosulfan (I and II)
  - Endrin
  - Heptachlor epoxide
  - Hexachlorobenzene
  - Lindane
  - Mirex
  - Toxaphene

Recommended Target Analytes

(continued)

- Organophosphate Pesticides
  - Carbophenothion
  - Chlorpyrifos
  - Diazinon
  - Disulfoton
  - Ethion
  - Terbufos

EPA

Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories

Volume 2
Risk Assessment and Fish Consumption Limits

Purpose of Manual

- Provide guidance on risk-based consumption limits for 23 contaminants in fish and shellfish tissue
- Promote consistency and comparability in the methodology used to assess risk
- Provide a working document that can be updated as needed

EPA Risk Assessment Workgroup

- FDA
- NOAA
- TVA
- USGS

- Representatives from 19 States
- Representatives from 3 Native American tribes

Risk Assessment and Fish Consumption Limits Guidance Manual

Part 1.

- Section 1: Introduction
- Section 2: Development and Use of Risk Based Consumption Limits
- Section 3: Risk Based Consumption Limit Tables

Part 2.

- Section 4: Risk Assessment Methods
- Section 5: Target Analyte Profiles

EPA

Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories

Volume 3
Risk Management

Purpose of Manual

- Provide information regarding the selection and implementation of various options for reducing risks associated with consumption of contaminated fish
- Provide a working document that can be updated as needed

EPA Risk Management Workgroup

- EPA
- FDA
- EDF
- TVA
- Representatives from 8 States
- Representatives from 6 Native American tribes
- National Fisheries Institute

Risk Management Guidance Manual

Section 1: Introduction

Section 2: Identification of Populations and Geographic Areas of Concern

Section 3: Options for Limiting Consumption

Section 4: Impacts of Limiting Consumption

Section 5: Decision Making Process

EPA

Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories

Volume 4
Risk Communication

Purpose of Manual

- Apply sound risk communication principles to health advisory process
- Provide examples of risk communication "tools" & techniques
- Provide a working document that can be updated as needed

EPA Risk Communication Development

<u>Workgroup</u>

- EPA HQ & Regions
- FDA
- TVA
- Representatives from 7 States & Canada

<u>National Review</u>

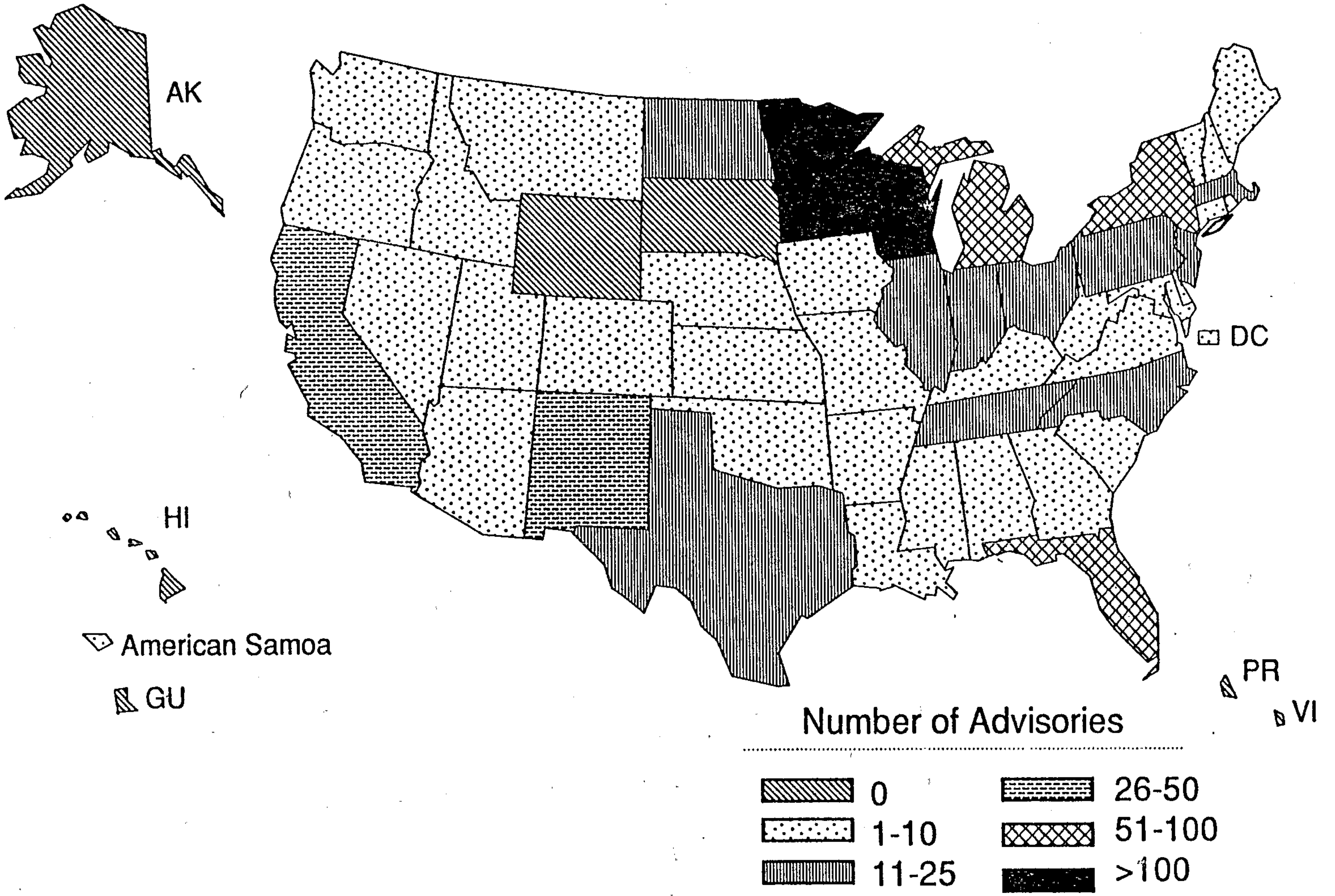
- All States, ORSANCO & Other Organizations

Risk Communication Guidance Manual

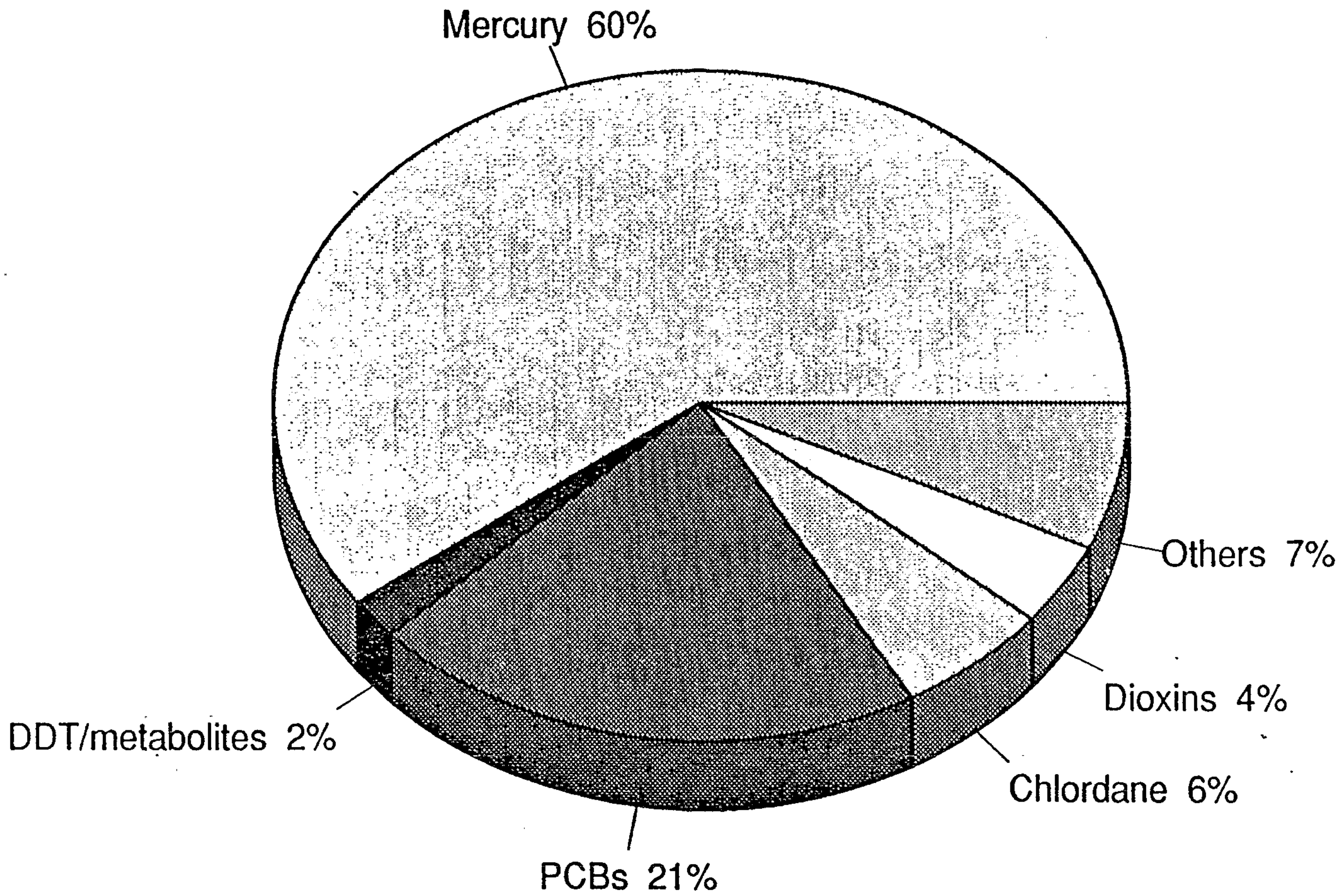
Major Components:

- Problem analysis / program objectives
- Audience identification & needs assessment
- Communication strategy design & implementation
- Program evaluation
- Responding to public inquiries
- Selected examples

State Fish Consumption Advisories

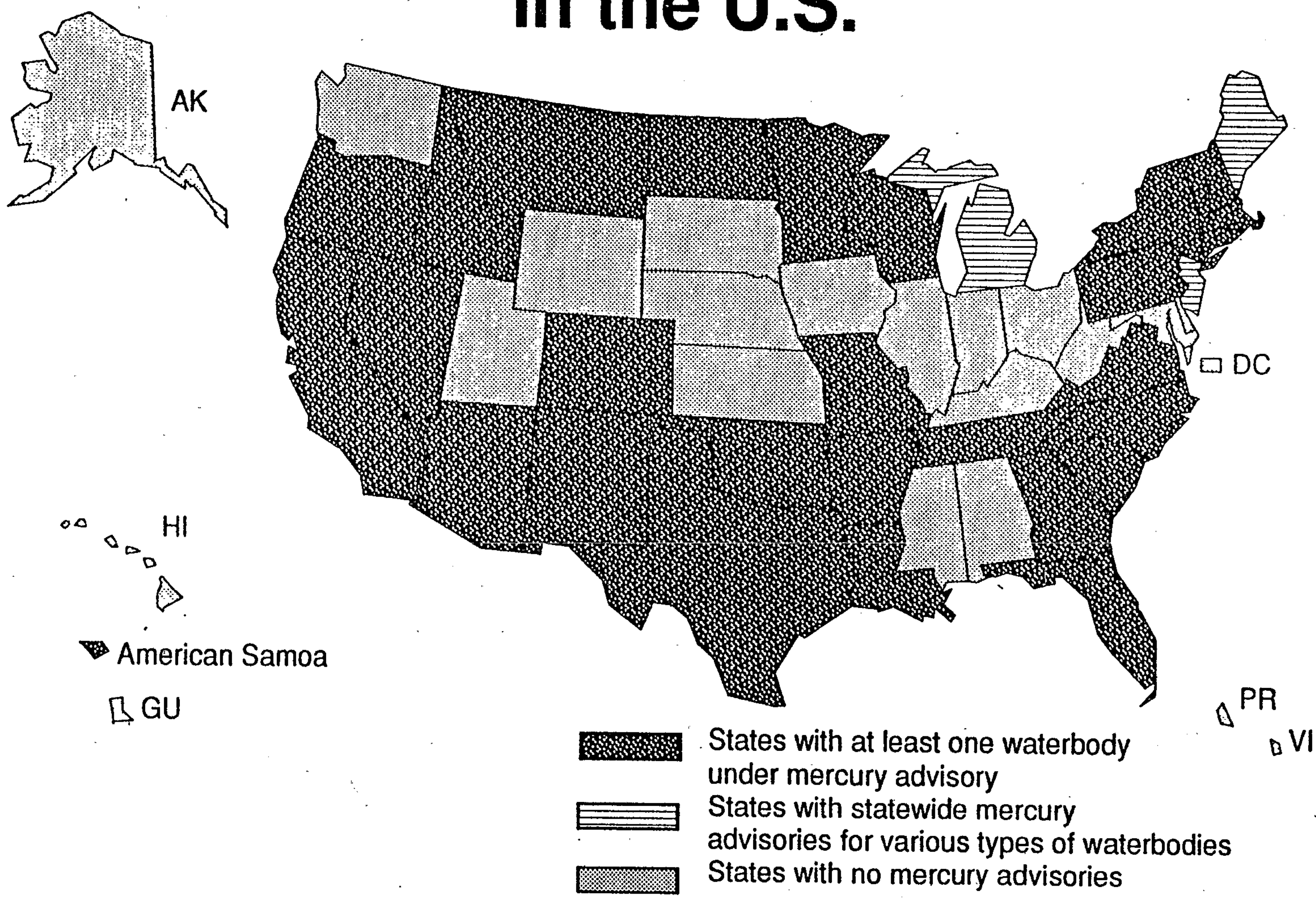


Contaminants in Advisories



Source: U.S. EPA, 1993.

Mercury Fish Consumption Advisories in the U.S.



EPA'S FISH TISSUE DATA REPOSITORY

William F. (Rick) Hoffmann
Environmental Scientist
Fish Contamination Section
Standards and Applied Science Division, OST
U.S. Environmental Protection Agency
Washington, DC

Abstract: A variety of federal, state, and private organizations currently collect data on chemical contaminants in fish and shellfish tissues. New national guidance has been issued by EPA on collection and analysis of fish tissue for development of fish consumption advisories. One important use of fish tissue contaminant data is to evaluate the potential risks to recreational and subsistence anglers from chemical contaminants. Although agencies could perform more sophisticated analyses by comparing data from other sources, they are currently unable to share data sets. National analyses are also difficult to perform because of difficulties assessing the data and inconsistencies in data sets. In response to state and other requests, EPA has begun to implement and maintain a national repository known as the National Fish Tissue Data Repository (NFTDR). The NFTDR is a powerful system designed for users with various levels of computer experience. It offers user-friendly menus, help screens, and technical dictionaries that make retrieving data relatively easy. Users can also transfer data to other software formats (i.e., SAS, ARC/Info, PC spreadsheet) for further analysis. In addition, EPA provides documentation that describes the NFTDR system, its data structure and reporting options. Technical assistance is provided to users of the system. The NFTDR, a component of EPA's Ocean Data Evaluation System (ODES), is maintained on EPA's mainframe at the National Computing Center in North Carolina.

Prior to FY94, EPA focused on establishing the NFTDR. In FY94, EPA is continuing with the development and implementation of the NFTDR. Activities include: conducting training workshops for states and other within each of the EPA Regions; developing an NFTDR demonstration package; and creating a database utility to verify that minimum data elements are maintained. EPA is also working with several states and other data collectors to test several pilot data sets. The experience gained from the pilot tests will be used to develop a data management policy and to identify further changes to the NFTDR. EPA will work with states and other data collection groups to expand the NFTDR database.

NFTDR Development

- Evaluated database alternatives
- Modified system capabilities
- Developed data entry package
- Prepared user documentation

Project Overview

NFTDR "Pilot Testing"

- Conduct briefings and training
- Provide technical support
- Evaluate trial data sets
- Draft data policy

Project Overview

National Fish Tissue Data Repository (NFTDR)

- Why Develop NFTDR?
- Project Overview
- System Structure and Capabilities

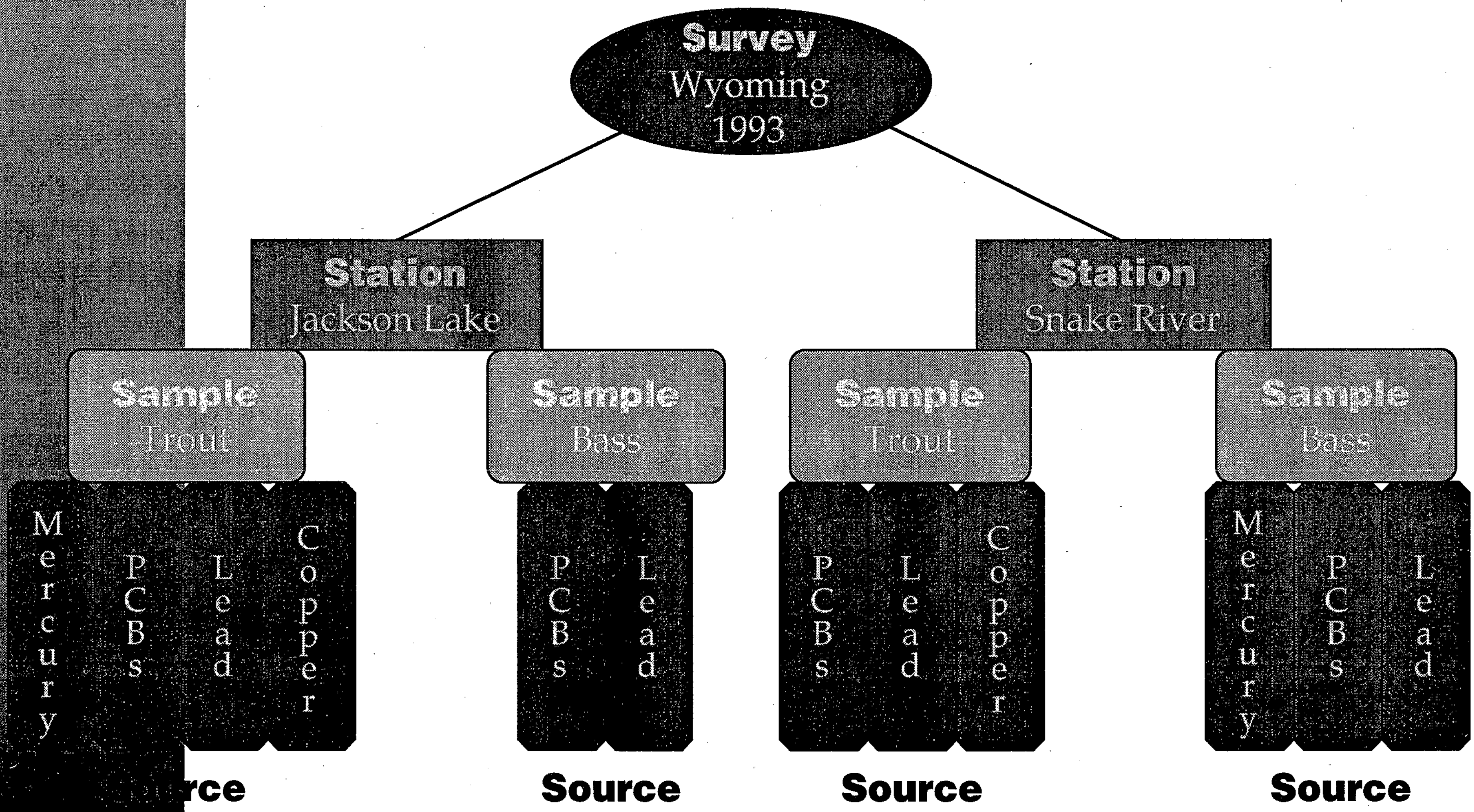
Presentation Overview

Why Develop NFTDR?

- Requested by States and interested parties
- Encourage regional, interstate and national cooperation
- Improve comparability and integrity of data
- Provide adequate technical support
- Simplify data exchange between data collectors and secondary users

Introduction

Database Structure



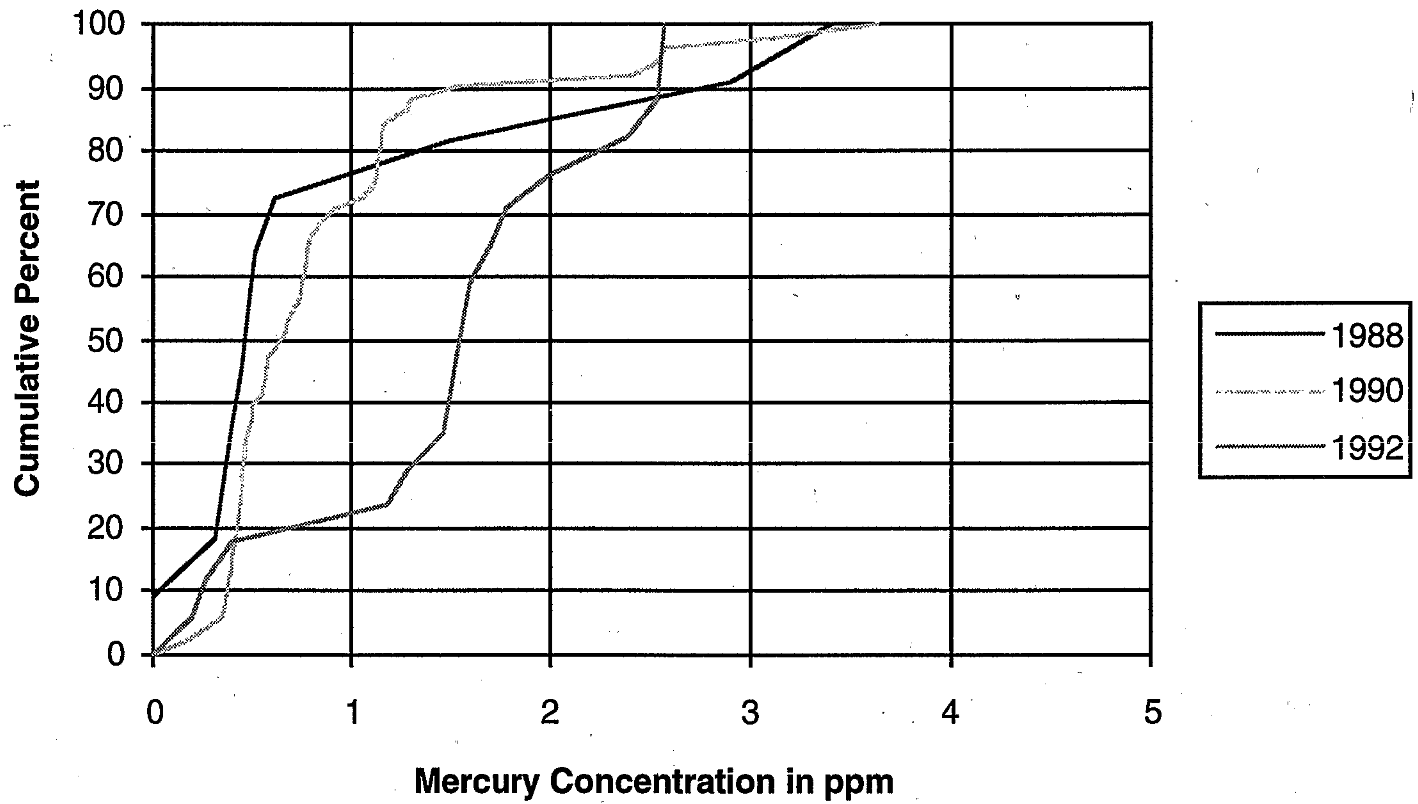
DATE(S): 900730 TO 900730
STATION(S): ALL STATIONS FOR GALVESTON BAY,NATIONAL ESTUARY PROGRAM

NODC TAXONOMIC CODE=877718020200

OBS	ODES STATION ID	TAXON	SAMPLING DATE
1	GBECR01	ARIUS FELIS	900730
2	GBECR01	ARIUS FELIS	900730
3	GBECR01	ARIUS FELIS	900730
4	GBECR01	ARIUS FELIS	900730
5	GBECR01	ARIUS FELIS	900730
6	GBECR01	ARIUS FELIS	900730

GEAR CODES
99 = MISCELLANEOUS(HAND-GATHERED,TRAPS,SHOVEL
LIFE STAGE CODES
8 = ADULT
ORGAN CODES
01 = MUSCLE

Sample Analysis Using the PC



Sample Analysis Using SAS

```
07/26/1993        10:55:33   ===========
+OUTPUT-----------------------------------------------------PROC PRINT suspended-+
 Command ===>
 NOTE:  Procedure PRINT has created 1 page(s) of output so far.
                                   The SAS System                              66
                                         11:01 Monday, July 26, 1993
```

OBS	STN_CD	YEAR	N	MIN	MAX	MEAN	STD
1	FLF0219	1990	3	0.29	0.64	0.416667	0.193993
2	FLF0220	1990	7	0.1	1.54	0.722857	0.508682
3	FLF0229	1990	6	0.65	1.11	0.771667	0.169873
4	FLF0230	1990	5	0.33	1.04	0.594	0.298379
5	FLF0239	1990	10	1.04	3.63	1.986	0.978686
6	FLF0245	1990	9	0.19	0.91	0.435556	0.280273
7	FLF0246	1990	19	0.05	0.78	0.353158	0.203553
8	FLF0247	1990	3	0.16	0.43	0.276667	0.138684
9	FLF0249	1990	19	0.04	1.28	0.495789	0.374586

```
           --------
           * ODES *
           --------

     ** BASIC OPTIONS MENU **

C = Scan CONTENTS of the ODES Data Base
D = Use the On-line DICTIONARIES
E = EXIT ODES
F = Show job status or FETCH reports and graphics
M = List the MENU of TOOLS
N = Review on-line NEWS (Updated 2/93)
R = ODES Interactive Data RETRIEVAL
S = STORET Data Retrieval
T = Use a TOOL

      *** ODES Hotline Numbers ***
(703)841-6279 or (510)283-3771 or (206)883-1912

> Please enter an OPTION and press RETURN >
```

Using NFTDR

- ➤ Data submitted in standard format
- ➤ EPA uploads data to NFTDR/ODES
- ➤ Data available in read only format
- ➤ Data access toll free to wide variety of users

System Capabilities

- Reference Information
- Graphics
- Standard Reports
- ASCII Text File
- SAS Datasets
- ARC/Info File

It's Easy to Say "Easy to Use"

- Completely menu-driven
- On-line dictionaries for all codes
- Extensive documentation
- *HELP is never more than a phone call away*

SESSION 4: Ad Hoc (Assessing Toxicity) - Questions & Answers

Q: Any plans to improve quality of data?

A: Yes. Currently combing out questionable data.
Evaluating suitability of threshold values for some chemicals.

Q: Have you done any sensitivity analysis on assumptions?

A: Yes, but only for the point source study so far.

Q: What sort of review is report going to get?

A: Peer review.

So far, most comments on methodology

Q: Recognizing the importance of TOC and AVS, is USGS including these variables?

A: I believe so.

Q: Concerned data released may cause problem if misinterpreted by public, as happened with toxic release inventory.

A: Data is categorized by quality and conclusions will take into account data limitation and uncertanity. Hopefully will be used responsibly.

Q: Have you accounted for the effect of decreasing detection limits on calculation of 50th percentile?

A: Good question, will look into it.

Q: How much of data was collected for purpose of identifying hot spots?

A: Varied.

Q: Will EPA develop a national strategy to address mercury emission?

A: We are holding a National forum on mercury in fish in New Orleans later this month.

Q: How much QA/QC info will be in data bases?

A: Will not continue to require same level QA/QC established for ODES. ODES set up for 301(L) program ocean discharge. Minimum, NFTDR will have some automatic checks looking for obvious omissions. Not sure at this point what level of QA/QC will be.

Q: Will EPA be developing national fish tissue criteria?

A: Fish consumption rates and fish tissue data are used in developing human health water quality criteria.

Q: How does database handle analytes not detected?

A: Considering adding another field for inputting the detection level rather than choosing to input either zero, 1/2 detection level, or the detection level.

Q: How, if at all, will you factor in use of different sample preparation methodology for example, skin on/off, fillet, or whole fish?

A: We've added capability to input information on methodology.

Q: Will data base support fish advisories for all states?

A: No, but another one does.

Q: How long are trials for data base?

A: Hoping to evaluate in October.

Ad Hoc Session

Monitoring To Support The Watershed Protection Approach

MONITORING TO SUPPORT THE WATERSHED PROTECTION APPROACH

Elizabeth Fellows **Moderator**
Chief, Monitoring Branch
Assessment and Watershed Protection Division
Office of Wetlands, Oceans and Watersheds
U.S. Environmental Protection Agency
Washington, DC

SUMMARY

The purpose of this session is to discuss water monitoring to support the watershed approach.

The theme is that to support watershed management--or indeed water management at any level, we need data of known quality from multiple sources.

This session will give a brief overview of framework of what is going on nationally and within EPA to address the question of getting better monitoring and assessment and reporting.

The question is how can we do a better job of assessing progress towards our water resource goals including the designated uses set in State water quality standards.

The Monitoring Branch at EPA compiles the State 305(b) reports into a biennial National Water Quality Inventory Report to Congress. The 1992 report is out, 1994 report is being worked on and will be out in 1995. A consistency workgroup of 22 States, 3 Tribes, EPA, and other federal agencies are working on guidelines for the 1996 report. They would like to replace the 2 year report with a linked series of 305(b) reports that would comprehensively report on the nation's waters over a 6-year cycle. During the 6-year cycle, "all" waters would be assessed but in a targeted way depending on the condition of and goals for the waters.

Framework for monitoring was presented. Times have changed so monitoring needs to change; it hasn't yet.

Reasons why monitoring should change:

- Watershed Approach
- biological monitoring
- Non-point Sources - difficult to deal with compared to point sources.
- Use of GIS as a tool

You never have enough data, but you have to act and can't wait for it to be perfect.

Major steps in revitalized monitoring program:

1. Redesign of monitoring coverage - base monitoring program assessing all waters. (Attachment 1)
2. Targeted monitoring according to the goals for and condition of the waters (Attachment 2)
3. Twenty-one Indicators - provides order/structure to measure national goals and State designated uses; provide skeleton to measure program effectiveness or compliance. (Attachment 3a and 3b)
4. Work on comparable methods - EPA Environmental Monitoring Management Council to address use of comparable methods within EPA; links to intergovernmental work.
5. Modernize data system - STORET is oldest and largest database around, modernize and take advantage of off-the-shelf technologies, add increased biological and metadata capacity.
6. Modernize reporting [i.e., 305(b)]- Reporting to include both States and Indian tribes.

An Intergovernmental Task Force on Monitoring (ITFM) was formed. It is a Federal-State-Tribal task force on monitoring with 20 official members and greater than 140-150 members on 8 workgroups. The ITFM is preparing final recommendations that are due out in January 1995.

Five types of monitoring are being addressed by ITFM:

status/trends
existing and emerging problems and risk-based ranking of them
monitoring for program design to fix problems
monitoring to evaluate program to determine if it's effective and
emergency response.

Since you do monitoring for different purposes, monitoring must be done differently.

Overall recommendation of the ITFM is to develop an integrated nationwide, voluntary strategy. Voluntary was the only thing that raised people's concerns (i.e.,will it work it it's voluntary?) Incentive is to get more data from others - especially important in a watershed focus.

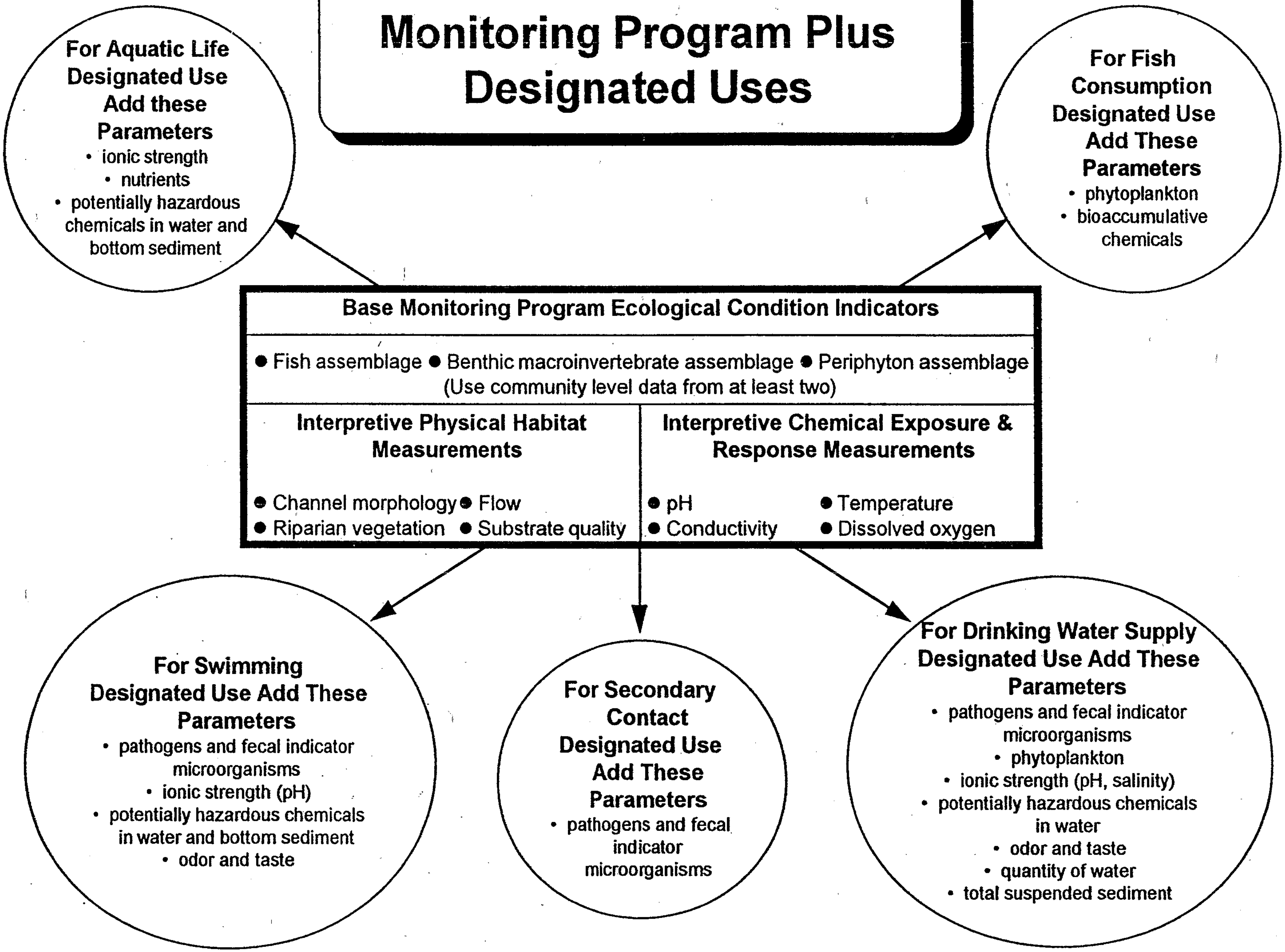
Strategy (depicted on overhead) includes:
indicators to measure nationwide goals and State designated uses
collaboration on all levels of monitoring Federal, State, Tribal, Regional, watershed, local
performance based methods to get at comparable methods
volunteer monitoring
compliance monitoring
data storage and retrieval - USGS modernizing their data base and EPA modernizing STORET
joint training

research needs
funding and
evaluation.

Strategy report (provided as handout) will be noticed in the Federal Register. Deadline for comments December 1.

There will be a permanent National Monitoring Council responsible for guidelines and program assessment. Implementation structure will include State and tribal teams and regional teams where needed.

Parameters for Base Stream Monitoring Program Plus Designated Uses



MONITORING TO SUPPORT THE WATERSHED PROTECTION APPROACH

James G. Horne
Special Assistant to the Director
Office of Wastewater Management
U.S. Environmental Protection Agency
Washington, DC

SUMMARY

How notion of goals and indicators are being translated by EPA through the National Goals project. This project involved working with stakeholders to obtain consensus on goals and use goals as benchmark.

Purposes of National Goals project
- Have EPA state a series of environmental goals for a 10-year period
- Involve stakeholders
- Develop indicators to measure progress against goals.

Intent is to move from measures of activity to measures of environmental effectiveness.

As part of this overall agency process, Office of Water drafting chapter on water goals.

Main agency goal areas are:
- clean and healthy land resources
- clean air and atmosphere
- clean and healthy water resources and
- multi-media objectives.

Office of Water is responsible for two major goals:
- clean surface and ground water and safe drinking water.

Eight of the 21 Office of Water environmental indicators were identified to measure to portray achievement of the EPA goals: designated use attainment, reduction of key pollutants, groundwater ambient condition, loss of wetlands, biological health of waters, drinking water standards violations, reduction of key contaminants causing such violations, and source water protection.

Stakeholders were involved in the process, public meetings were held around the country. These meetings were really brainstorm sessions. Input from these sessions was used to develop chapter for overall agency report. Second round of meetings will be held to receive comments on report (should begin mid to late Nov and conclude late Jan-early Feb). EPA will assess input and make revisions to report. The EPA report will be finalized and published on

Earth Day April 1995.

You can have national goals and environmental indicators, but if you don't have adequate monitoring programs with information from all sources that can be used in a consistent manner, it doesn't mean anything.

There is a project to test the use of the environmental indicators at the state level. The following states are willing to test use of the indicators and are participating in the project:AZ, DE, GA, ME, MD, OH, SC, WI.

QUESTIONS AND ANSWERS (end of speaker)

Q: What is current status of indicators? Will States use them? (Nature Conservancy)

A: Have asked States participating in project to look at Office of Water's long list of indicators and identify what they are using and if they added any indicators.

Q: Canals are classified as navigable. Many canals are privately owned. Will operator be responsible for monitoring?

A: That would be up to the State.

Q: Why didn't the list include states like VA, CA that lead in water quality issues?

A: The States were selected because they volunteered for the project and with help of watermonitoring coordinators and Regional NPDES authorities. Many States included in the project are on the leading edge in monitoring. No state that applied to be a pilot was turned down.

MONITORING TO SUPPORT THE WATERSHED PROTECTION APPROACH

Charles A. Kanetsky
Region Water Quality Monitoring Coordinator
U.S. Environmental Protection Agency
Region 3
Philadelphia, PA

SUMMARY

EPA Region 3 305(b) Consistency Issues:

Region 3 States use data from several monitoring programs to make determinations on use support of CWA fishable/swimmable goals. These data include conventional (e.g.) DO, pH, temperature), biological, and chemical parameters. States generally report this information on a watershed basis. Problems of consistency become obvious a we try to merge assessment information from a watershed that cross state lines.

All Region 3 States assess water quality data to determine aquatic life use support (fishable) based mostly on conventional and biological parameters. All Region 3 States follow EPA's guidance (% exceedence criteria) for conventional parameters. Although all of the States use biological data in these assessments, very little information is presented in the 305(b) Reports on exactly how the determination is made. For Toxics/chemical data, most States use best professional judgement in their determinations. Although not specifically stated in the guidance on toxic criteria. Two States did stipulate that they more favorably weigh the biological data over the chemical data. We believe the general reasons why States do not follow the guidance is that the EPA guidance is too stringent and that criteria are actually at the level of detection for many parameters (e.g. metals) and the States do not have enough confidence in data at the level of detection to make a determination on fishability.

The inconsistencies in the determination of swimmable use support are much more obvious. Only two States in Region 3 follow EPA's guidance. As a result, comparison between states vary dramatically. All Region 3 States have adopted EPA Criteria for bacteriological indicators. However, some States have additional criteria. Maryland requires a sanitary survey to verify a problem. Virginia uses an instantaneous maximum of 1000. West Virginia also applies best professional judgement to determine if a waterbody is a threat to public health. Pennsylvania chooses not to evaluate their waters for swimmability because of the limited number of bacteria samples collected. They do report on State Park Beach closures.

Recommendations:

EPA needs to define how the States are making use support determinations using biological data.

EPA needs to revisit independent application and its toxic guidance.

EPA needs to work with the States to utilize a more consistent approach in determining swimmable use support.

AQUATIC LIFE USE SUPPORT
1994 RIVERS AND STREAMS

State	Partial	Not	Criteria
DE	80 (10%)	100 (12%)	EPA-CONV,BIO,TOX
DC	0.2 (0.5%)	23 (65%)	EPA-CONV,BIO
MD	1766 (10%)	98 (0.5%)	EPA-CONV,BIO
PA	1956 (8%)	2691 (11%)	EPA-CONV,BIO,TOX
VA	1420 (4%)	389 (1%)	EPA-CONV,BIO,TOX
WV	3323 (63%)	592 (10%)	EPA-CONV,BIO,TOX

1986 GOLD BOOK
FRESHWATER PRIMARY RECREATION INDICATOR

	Mean	Single Beach	Sample MOD	Maximum Light	Maximum INFREQ
Enterococci	33	61	89	108	151
E. Coli	126	235	298	406	576

PRIMARY RECREATION USE SUPPORT
1994 RIVERS AND STREAMS

STATE	PARTIAL	NOT	CRITERIA
DE	119 (15%)	624 (78%)	EPA
DC	0	26.5 (96%)	EPA
MD	0	2.5 (0%)	SANITARY
PA	N/A	N/A	CLOSURES
VA	546 (2%)	205 (0.5%)	1000
WV (92)	1163 (23%)	463 (10%)	BPJ

MONITORING TO SUPPORT THE WATERSHED PROTECTION APPROACH

Chris O. Yoder
Manager, Ecological Assessment Section
Division of Surface Water
Ohio Environmental Protection Agency
Columbus, OH

SUMMARY

Parameters for base stream monitoring will be discussed.

A lot revolves around monitoring ecological conditions. Different water bodies should be monitored for different parameters that reflect the different designated uses.

Ohio's monitoring program has a resource intensive biomonitoring component. The State instituted a permit fee program to provide funds for monitoring program. Ohio prioritizes monitoring with a 10-year cycle for revisiting major streams and water bodies.

When Ohio prepares 305(b) report, they relate special actions with what they're seeing in water body.

State goal is 75% full restoration of streams not meeting designated uses by year 2000. If State maintains current progress, the goal won't be reached. Improving point sources will not enable goal to be reached; they need to look at nonpoint sources.

More than half of the state is not reporting any impaired habitat. They have good stressor and exposure information, but not good response indicators.

Mr. Yoder noted biocriteria initiative is needed to move forward; it brings along Watershed Approach, integrated points, habitat assessment, biodiversity, cumulative effects.

QUESTIONS AND ANSWERS (at end of speaker)

Q: We have indicators for fresh water. Is there any work on indicators for coastal estuaries? (NY City DEP)

A: We do have them for fresh water and will develop indicators for other water bodies. Both the ITFM and EPA;s coastal program are working on this.

C: We need flexibility to use resources more effectively.

C: There is a change at EPA. A shift from bean counting to watershed approach. Money should go where the problems are, but need resources for base programs such as monitoring.

C: Region 6 is working on grant to streamline programs. States can list waterbodies that need data for 106(b) dollars.

C: When going to holistic approach, go beyond testing water column. How are we going to train people to look at habitat assessment, testing sediments? Right there are now only 2 labs on the east coast qualified to do clean/ultra-clean methods.

C: Lab accreditation being worked on. It's a big issue in EPA's Environmental Monitoring Management Council. There will be national lab accreditation conference in next few months. This is a difficult issue for small municipalities; EPA hopes to get joint training programs and to make training available to municipalities at reduced costs.

Q: We heard a lot about new programs, new testing. Where do we get the money? We don't have the lab capability at State level and when we get data back, we're not sure what it means. It's a mandated initiative with no funding.

C: Clean testing will cost six times more.

C: At one sampling location, several different agencies monitor the same parameters. When will STORET be ready so we don't all have to have individual data systems or perform duplicative sampling? (Metro Denver)

A: A STORET will be fully modernized in 1997, but a prototype of part of the system will be available in November 1994. However, that will not alone solve the problems that you have with 8 different agencies sampling.

Session 5

Managing Risk:

Limitations And Barriers To Implementation

SESSION 5 - MANAGING RISK: LIMITATIONS AND BARRIERS TO IMPLEMENTATION

Chris Zarba **Session Moderator**
Health and Ecological Criteria Division
Office of Science and Technology
U.S. Environmental Protection Agency
Washington, DC

Abstract: This session covers how creative, well planned risk management strategies have been successfully implemented in watersheds. Case studies will be used to show how risk managers have used innovative approaches to solve problems within resource limitations. Of particular interest is a discussion on barriers that were encountered and the successful approaches that were adopted to overcome them.

NATURE CONSERVANCY BIORESERVE

Robert Paulson
Environmental Toxicologist
Bureau of Water Resources Management
Wisconsin Department of Natural Resources
Madison, WI

SUMMARY

Lower Green Bay Basin
25-26 subbasins, 6,000 sq. miles
Lower Fox River out of Lake Winnebag
40 nautical miles

Lower Fox - Industrialized
- Contaminants - PCBs, Dioxins, DDT, DDD, DDE, Mercury, lead
- Point sources, NP sources
- PCBs - Paper companies
  - Can link to effects in basin
  - Cross bills in herons and other birds
- As part of EPA funded project modeled it

Mass Balance Models
- 14 million dollar study

55 experts brought in
sediment transport models, water column models
organic carbon model
eutrophication model
modeled Green Bay and Lower Fox
Green Bay food chain model, toxics model
34 soft sediment areas/deposits contribute
PCBs - some concentration greater than 50 PPM

Based on data developed:
Green Bay/Fox Rivers Mass Balance Management Scenarios

Fish tissue - human health fish advisory, need to get to
50 ppb would take about 100 years
based on unlimited consumption
30,000-50,000 kg of PCB in sediments of river and bay
Point sources are insignificant to problem
25 year, no action, management strategy is not acceptable to get to levels

Remedial Action Plan-RAP-Fox River Coalition
Model of regional cooperation
local governments, industry, municipalities, sewerage districts, DNR, COE, etc.

Goal: figure out how, when and how to pay for contaminant sediment remediation

Accomplishments:
crossed political and philosophical boundaries to form group with common goal
priority ranking of upstream sites
raised 650,000 for R1/F5 of four deposits
conducted compatibility survey of local engineering firms
developed public information strategy
collected/analyzed data for downstream modeling decisions

Ongoing Activities:
Prioritize deposits

Some Sediments could be hazardous waste
PRP - demonstration project partially funded by federal money
Deposit "A" demonstration
remove 18% of PCBs above defer dam
assure authority for alternate disposal under TSCA
build local cooperation
Fox/Wolf Initiative - basin wide
started by non-profit groups to address nutrient and suspended solids control from nonpoint sources

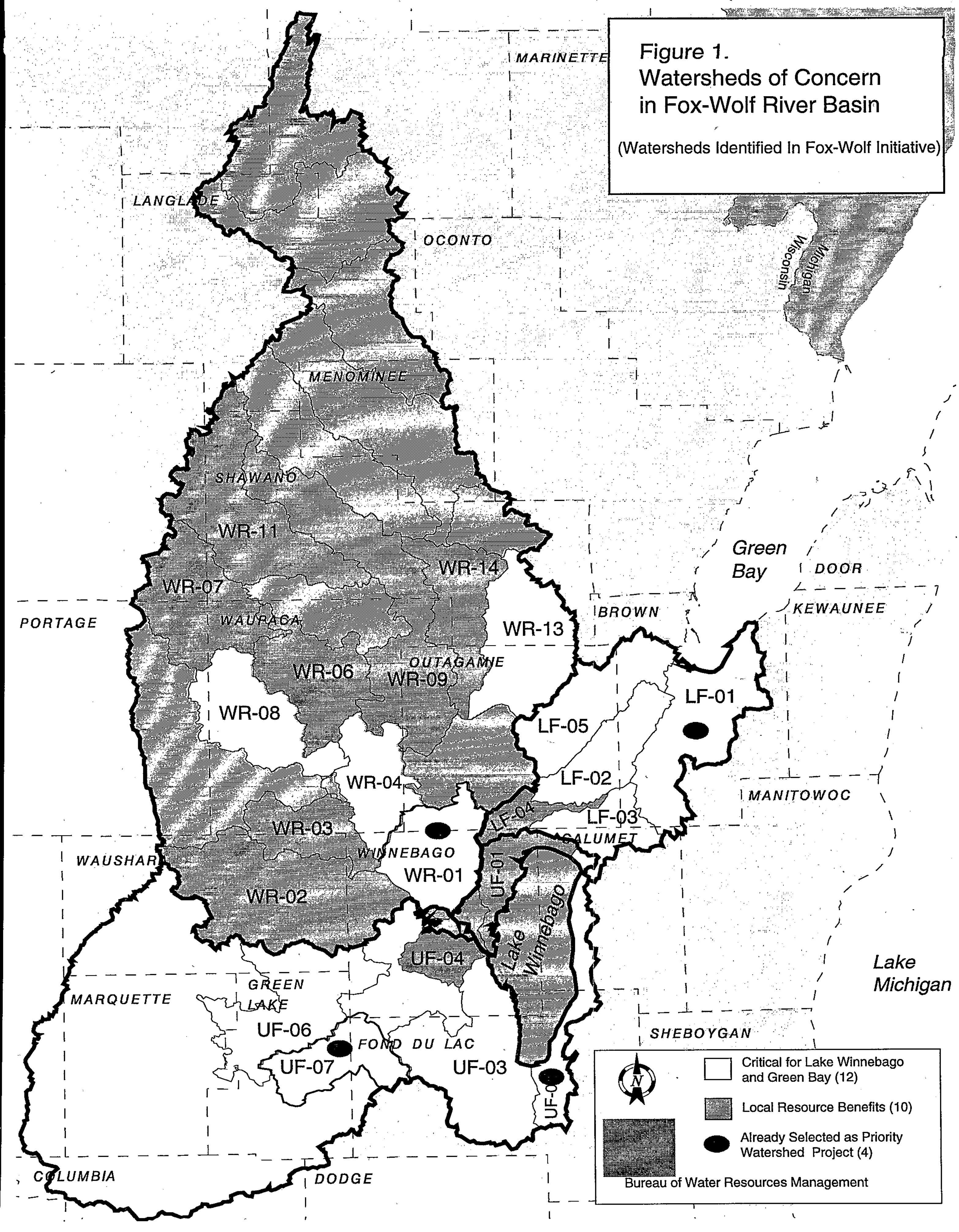


Figure 1.
Watersheds of Concern in Fox-Wolf River Basin

(Watersheds Identified In Fox-Wolf Initiative)

Contaminants in Lower Fox River Sediments

Polychlorinated Organics → PCBs

→ Dioxins

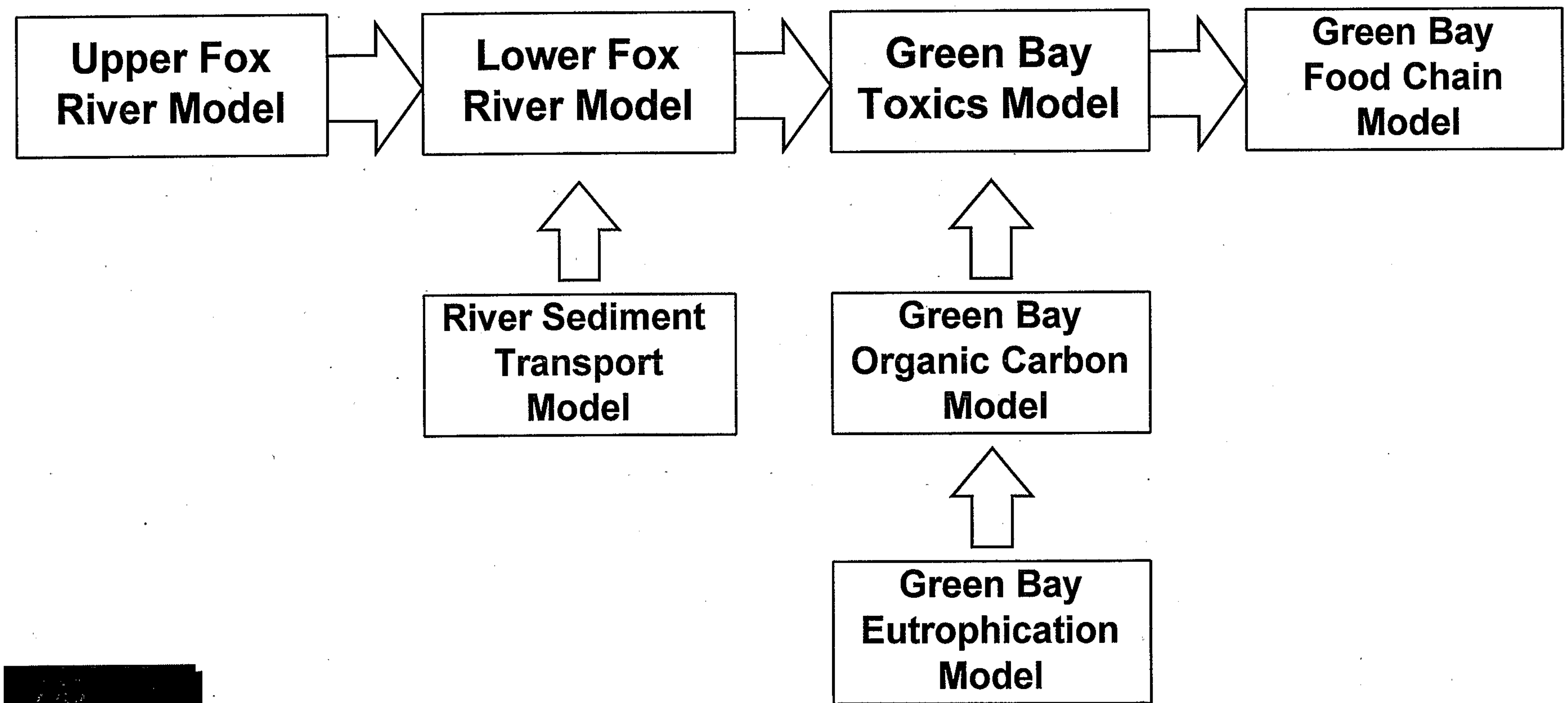
Organochlorides → DDT,DDD,DDE

Heavy Metals → Mercury

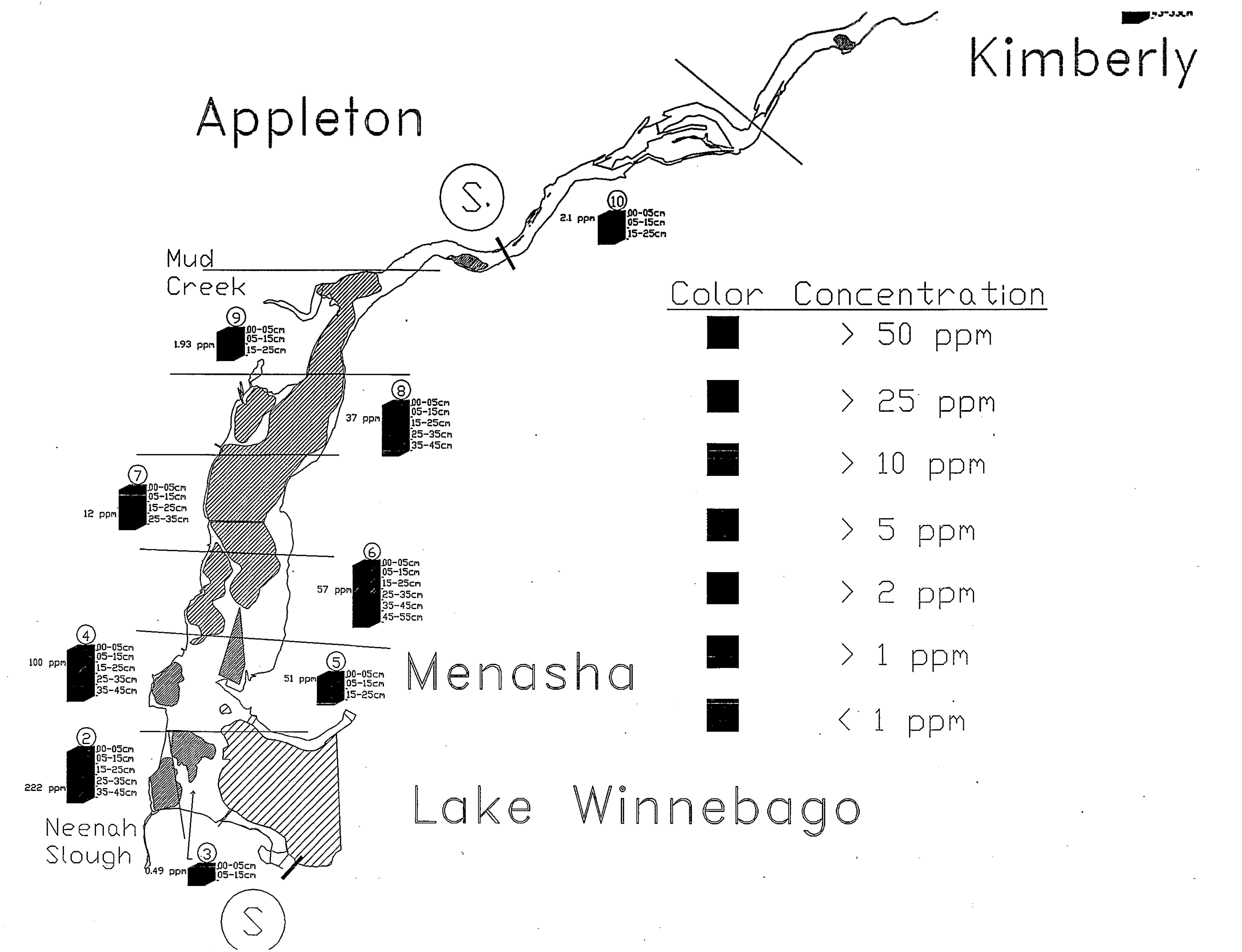
→ Lead

Ammonia

Mass Balance Models



Wisconsin Department of Natural Resources


Kimberly
Appleton
S.
10
2.1 ppm
00-05cm
05-15cm
15-25cm
Mud
Creek
9
1.93 ppm
00-05cm
05-15cm
15-25cm
8
37 ppm
00-05cm
05-15cm
15-25cm
25-35cm
35-45cm
7
12 ppm
00-05cm
05-15cm
15-25cm
25-35cm
6
57 ppm
00-05cm
05-15cm
15-25cm
25-35cm
35-45cm
45-55cm
4
100 ppm
00-05cm
05-15cm
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25-35cm
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5
51 ppm
00-05cm
05-15cm
15-25cm
Menasha
2
222 ppm
00-05cm
05-15cm
15-25cm
25-35cm
35-45cm
Neenah
Slough
3
0.49 ppm
00-05cm
05-15cm
S
Lake Winnebago
Color Concentration
> 50 ppm
> 25 ppm
> 10 ppm
> 5 ppm
> 2 ppm
> 1 ppm
< 1 ppm

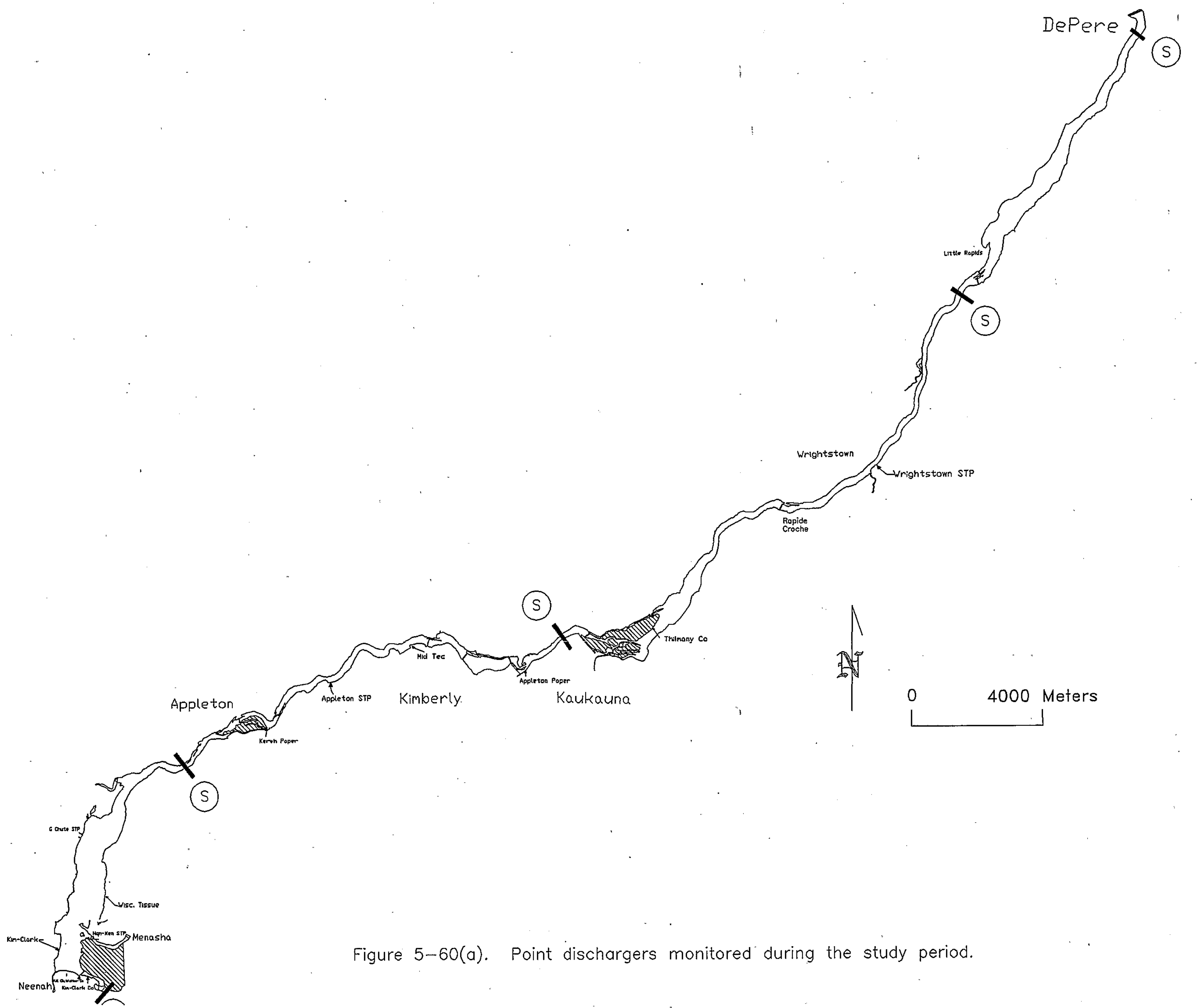
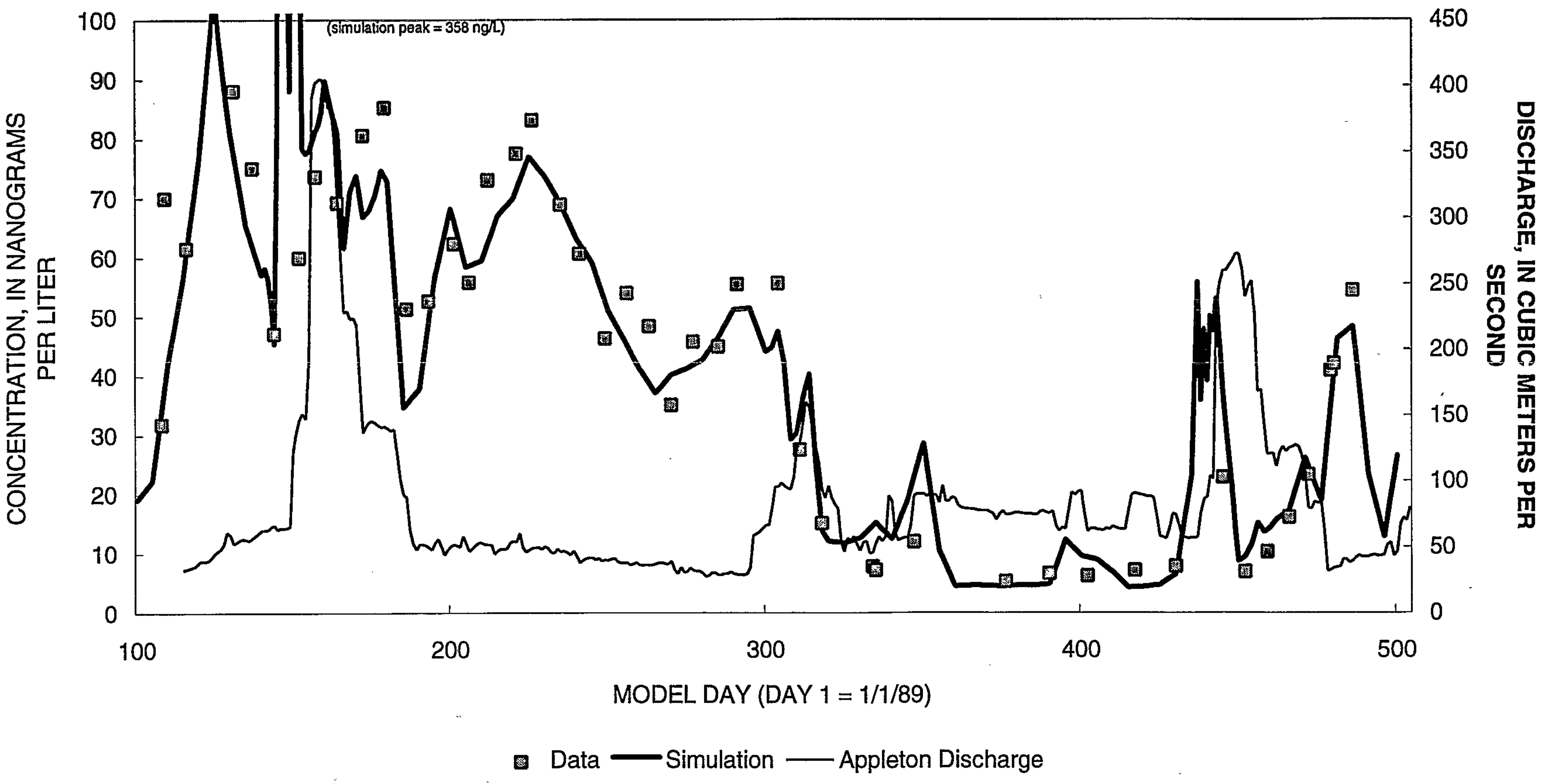
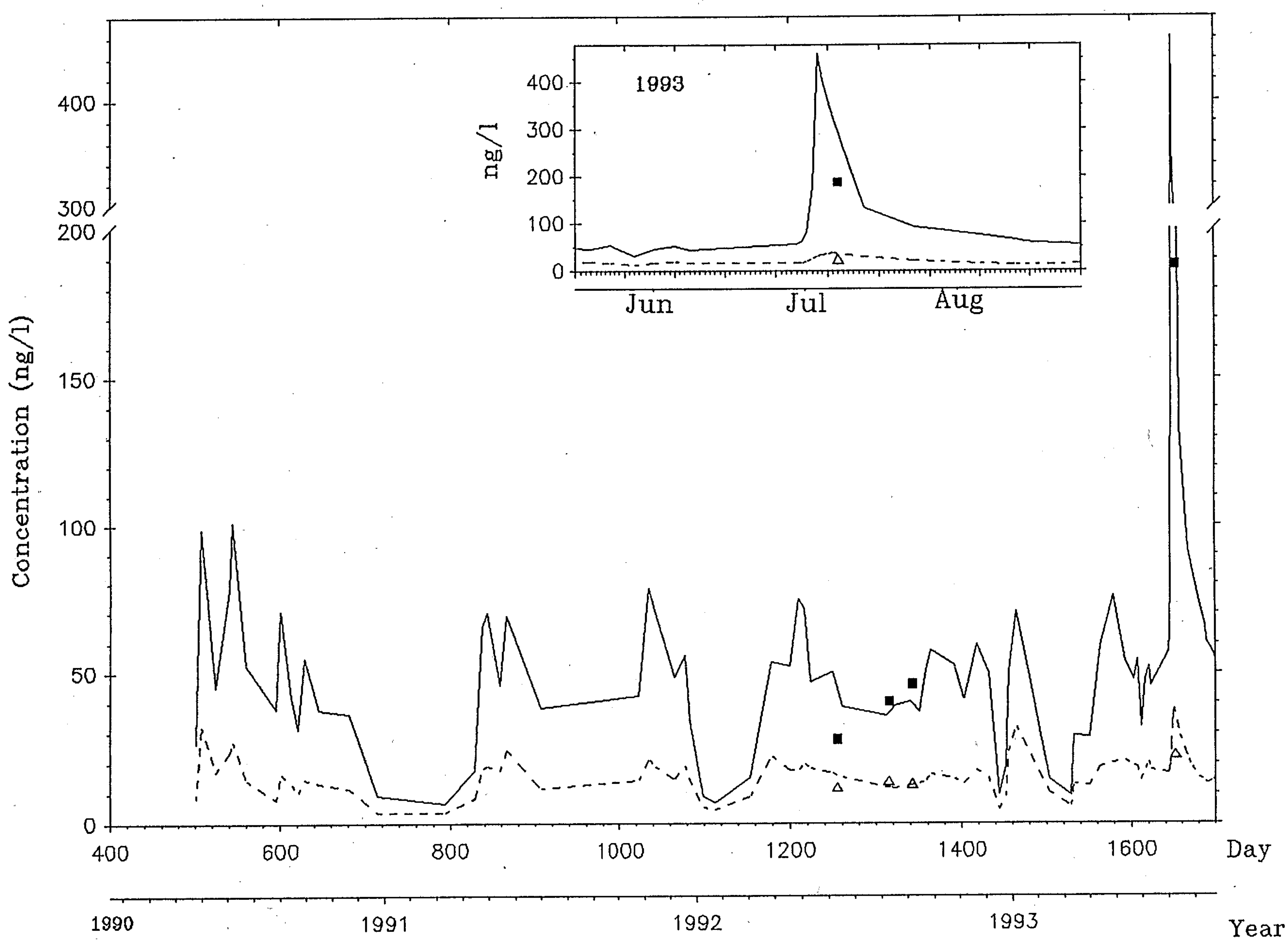


Figure 5–60(a). Point dischargers monitored during the study period.

Figure 6-8. Temporal profile of congener sumation total PCB concentration at DePere (segment 27).





Concentration of PCBs in water column

Segment #27, @DePere

Scenarios Selected for Simulation

- Bay Flushing-all loads and BC equals 0.0
- Base Run-1989 load and BC constant

1 No Man Made Remediation

2 Fox River Hundred Year Peak Flow Event

3 Above DePere Selected Remediation

4 Above and Below DePere Selected Remediation

5 10 Yr. Hindcast (not run - technical reasons)

6 Step PCB Load Reductions Above DePere

7 Fox River Peak Flow Clipping

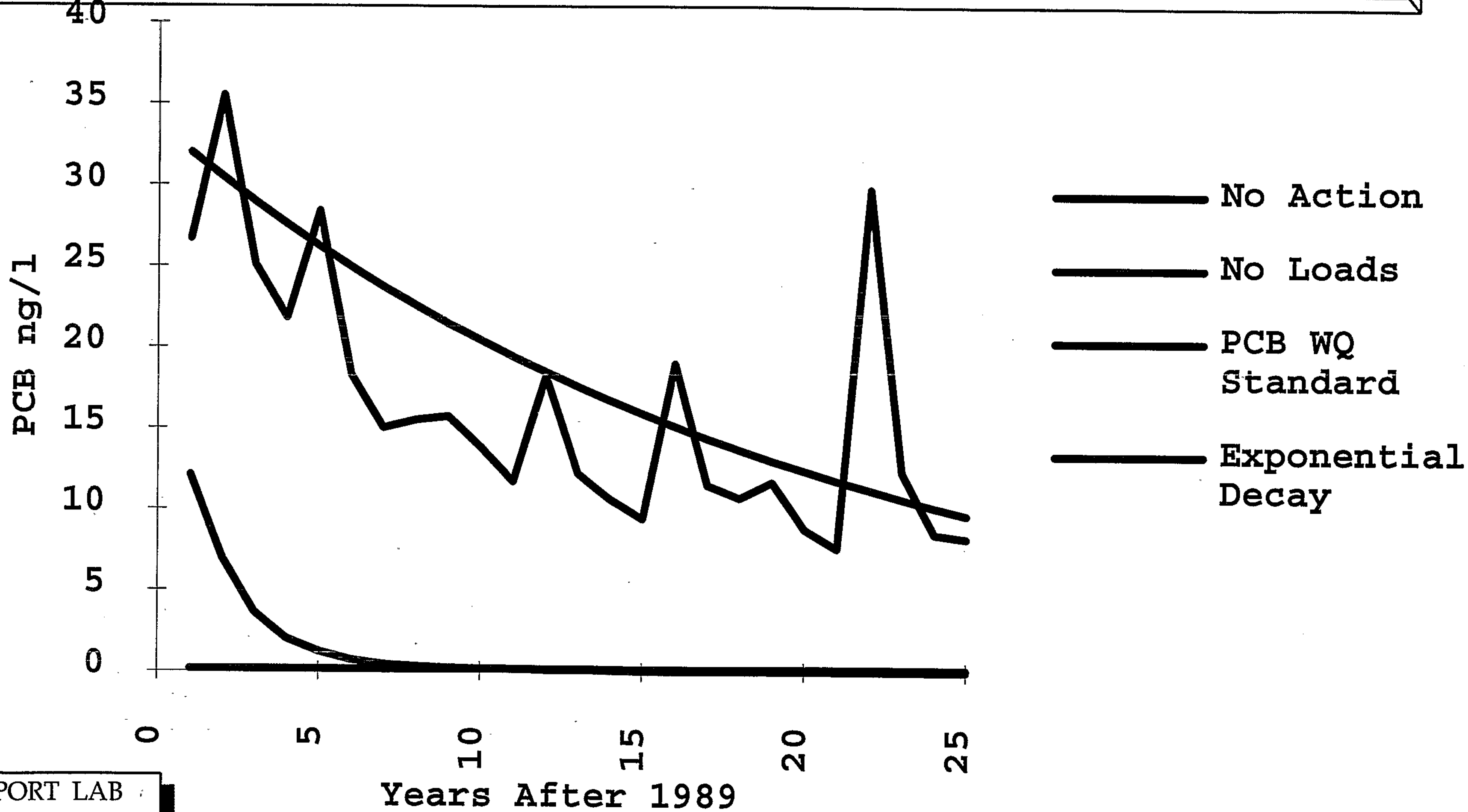
8 Fox River Phosphorus Load Step Reductions

Wisconsin Department of Natural Resources

Major Findings of the GBMBS

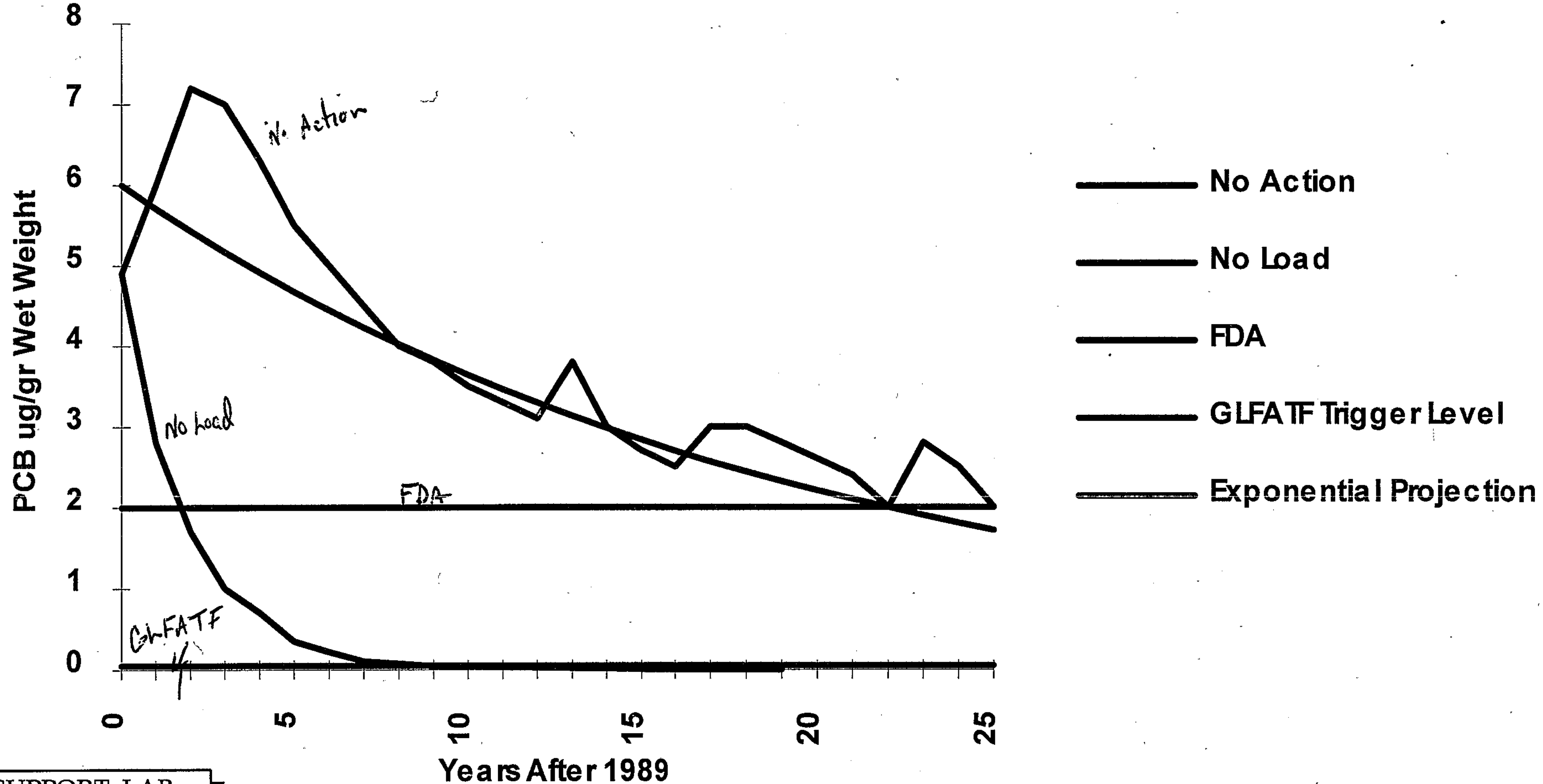
- 30,000 to 50,000 kg of PCB in Sediments of River and Bay
- Point Sources are now Insignificant to Transport
- 280 kg were Transported during 1989 to the Bay
- 25 Year Predictions Show Significant Decreases with NO ACTION for Transport and Fish
- Calibration of the Models for the Data Period was Good

GBTOX 25 Year Projection
Zone 1 Exponential Fit



GIS SUPPORT LAB
WATER RESOURCES
MANAGEMENT

GBFOOD 25 Year Projection
Zone 1 Exponential Fit



GIS SUPPORT LAB
WATER RESOURCES
MANAGEMENT

Fox River Coalition

Model of Regional Cooperation

- County Governments
- Municipalities
- Sewerage Districts
- Public Advisory Groups
- Industry
- Environmental Groups
- State Government
- Federal Partners

WISCONSIN
DEPT. OF NATURAL RESOURCES

Fox River Coalition

To develop a process for private/public participation in determining clean up levels , cost-effective methods, funding mechanisms and timetables for contaminated sediment remediation in the Lower Fox River.

WISCONSIN
DEPT. OF NATURAL RESOURCES

Fox River Coalition
Accomplishments

- Crossed political and philosophical boundaries to form group with a common goal
- Priority Ranking of upstream sites
- Raised **$650,000** for RI/FS of four deposits
- Conducted capability survey of local engineering firms
- Developed Public Information strategy
- Collected/analyzed data for downstream modeling decisions

WISCONSIN
DEPT. OF NATURAL RESOURCES

Fox River Coalition

Ongoing Activities

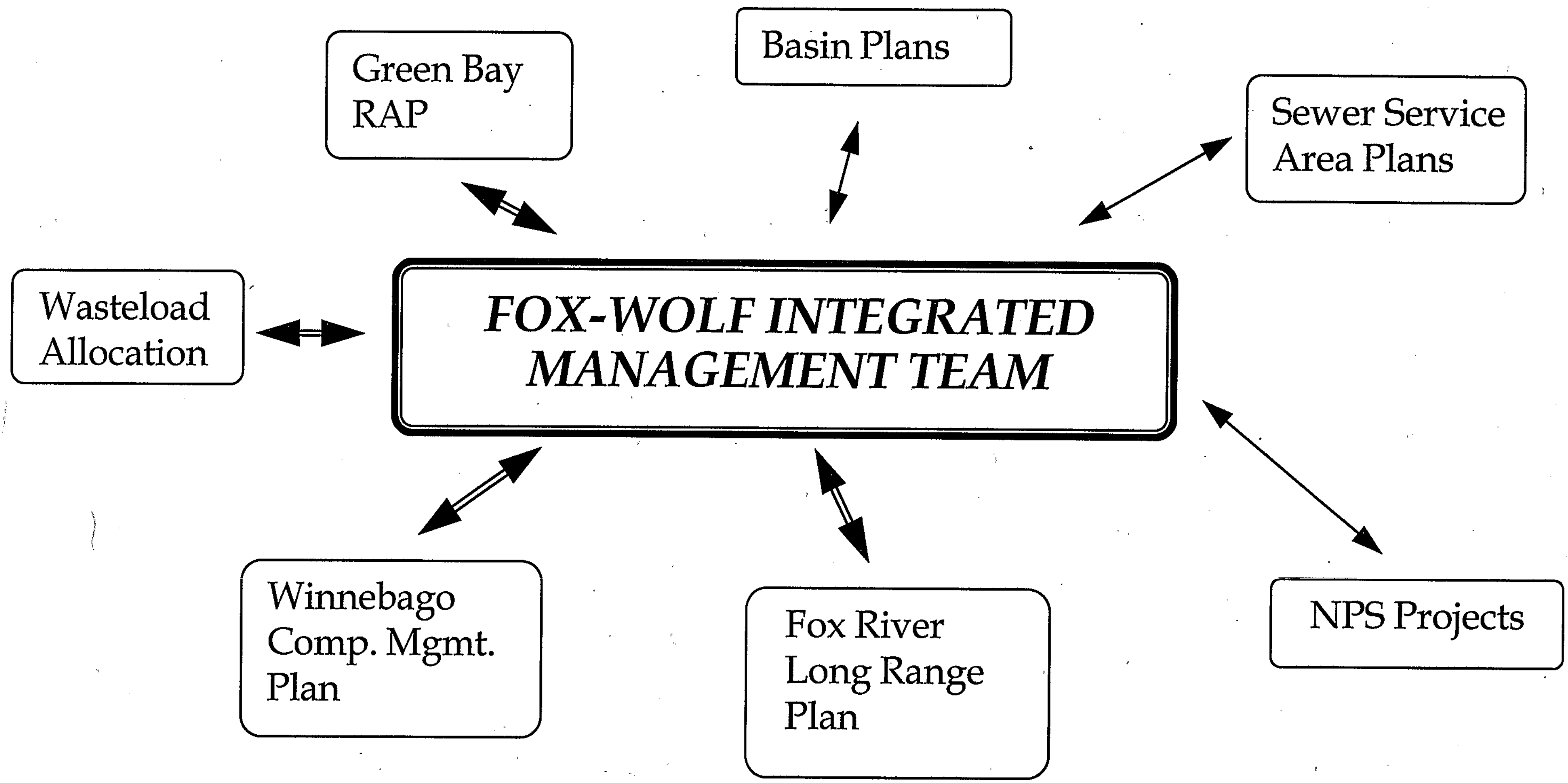
- Prioritize deposits below DePere dam
- Build local support for disposal options
- Develop funding mechanisms

WISCONSIN
DEPT. OF NATURAL RESOURCES

Deposit "A" Demonstration

- Remove ~ 18% (716 Kg) of PCBs above DePere dam
- Assume authority for alternate disposal under Toxic Substances Control Act (TSCA)
- Build local cooperation

WISCONSIN
DEPT. OF NATURAL RESOURCES


Green Bay RAP
Basin Plans
Sewer Service Area Plans
Wasteload Allocation
FOX-WOLF INTEGRATED MANAGEMENT TEAM
Winnebago Comp. Mgmt. Plan
Fox River Long Range Plan
NPS Projects

MILLTOWN RESERVOIR—CLARK FORK RIVER, MONTANA: A COMPREHENSIVE ECOLOGICAL RISK ASSESSMENT PROJECT

Julie DalSoglio
Remedial Project Manager
Montana Operations Office
U.S. Environmental Protection Agency
Region 8
Helena, MT

Abstract: U.S. EPA initiated an innovative ecological risk assessment at the Milltown Superfund Site in August 1989. The site is located in the Clark Fork River basin of Western Montana, and consists of 80 river miles and an 820 acre wetlands. The focus of the risk assessment is to identify and chronic impacts from contaminated sediments in these environments. Lack of established sediment quality criteria, the extent of habitats at the site, and anticipated complex sediment chemistry led to a unique laboratory and field based approach for the risk assessment. Ecological and toxicological studies were conducted by a team of government, university, and contractor scientists. This integrated risk assessment will help determine remedial action for the reservoir and sets the basis for additional studies within the basin.

SUMMARY

Approach is many times based on enforcement approach

Complex
- over 120 river miles
- consisted of largest superfund complex in US - 4 sites
- main industry, copper and gold mining
  - Active 1880-1882, 100 million tons of waste discharged to creek

another complex - smelting site - 15 square miles

Milltown site
- listed in 1982 because of ground water contamination
  - arsenic was at 10 times acceptable levels
- after dealing with human health issue the focus shifted to an ecological one
- risk assessment showed primary stressor in upper Clark fork basin was Milltown site
- strategy driven by concern from town of Dussela - 5 miles down stream
- fact that the wetlands environment is an artificial wetlands created by dam
- stakeholders
- problems
  - at start of project there was no EPA guidance to make ecological assessment

- assessment team stayed current with EPA thinking,
  - and was on track when guidance did come out

Ecological concerns
- trout populations down to below carrying capacity due to fish kills
- subtle impacts on wetland ecology altered biological community structure
- transfer of metals through food chain

factors affecting focus of risk assessment
- complex habitats of rivers, wetlands
- sediment

recommendations to overcoming barriers:
- use EPA guidance as framework and adapt to meet your situation

realizations
- one doesn't have to show that there is damage in order to list a site as superfund, just that there is a causeway for potential damage
- need to focus on entire watershed
- moved from lab approach to lab and field approach
- tiered approach to address problems

Objective of lab and field studies
- investigate relationships between metal concentrations in sediments and potential ecological effects
- evaluate impacts to plants and animals
- decrease uncertainty in risk

used USFWS, Oregon State, Clemson, University of Wyoming to help with lab and field work to achieve objectives

CHESAPEAKE BAY PROGRAM EXPERIENCE WITH NUTRIENT LOAD ALLOCATIONS MANAGING RISK: LESSONS LEARNED AND OVERCOMING BARRIERS

The Chesapeake Bay Program Experience with Nutrient Load Allocations

Ed Stigall
Chief, Technical Programs
Chesapeake Bay Program Office
U.S. Environmental Protection Agency
Region 3
Annapolis, MD

Abstract: The nitrogen and phosphorous load allocations for Chesapeake Bay will be presented and discussed as a case study. The various barriers and information gaps that had to be overcome will be discussed along with the processes that had to be followed to reach consensus by all parties on the appropriateness of the resulting load cap. This will include how environmental models were utilized to synthesize scientific knowledge and bring about paradigm shifts.

SUMMARY

One of the first barriers facing the Chesapeake Bay Program or any environmental program is to be able to clearly define and measure progress.

The Chesapeake Bay Program established a goal of 40% reduction in phosphorous and nitrogen.

Quantified the base load
Identified the controllable load
Calculated 40 % of the controllable load
Set year 2000 loading cap

In developing this goal, the program had to consider both nonpoint sources and point sources. We used a landscape driven land transport model (HPSF) to predict nonpoint source loads. We also had to consider how growth will increase loadings.

The Chesapeake Bay Program is tracking and communicating progress

Phosphorous - Point source loadings have already been reduced by 40%, though loadings may increase somewhat due to growth. Nonpoint source reductions have not met goal yet as measured from co-financed initiatives run by state agencies. Actual NPS reductions are probably higher when you consider potential reductions that are privately financed.

Nitrogen - Less progress has been made in reaching both point source and nonpoint source goals.

Benefits from nitrogen and phosphorous load reductions are measured by recovery of submerged aquatic vegetation. Data on distribution of SAV is collected through areal surveys and volunteer monitoring. SAV distribution is an index of habitat improvement for aquatic species. Other indicators include benthos and fish population.

Another barrier is understanding science. Encounter diverse opinions on problems and causes. In the Chesapeake Bay a three dimensional model shows that reducing nitrogen loadings in the lower bay will improve dissolved oxygen and reduce anoxic conditions higher in the Bay based on the circulation patterns of the Bay. The Chesapeake Bay is a stratified estuary with a salt water wedge moving up the Bay. The bay is phosphorous limited above the Bay Bridge and nitrogen limited from the Potomac River south. Anoxic conditions result from northward transport via the saltwater wedge of decomposing phytoplankton. Algal blooms stimulated by nitrogen enrichment below the Potomac, settle to the saltwater wedge during decomposition and are transported north where decomposition depletes dissolved oxygen.

A third barrier encountered by the CBP is abatement and control with a voluntary program.

Obtaining nonpoint source and point source reductions required persuasive arguments and strong, reliable data.

Barriers Ahead:

Financing an accelerated level of effort

Continued calibration of models with new data. Developing a biofeedback capacity in the model because as we continue to restore habitat and replenish the standing stock of fish and vegetation, we expect nutrient levels to be affected. We need to predict how much nitrogen and phosphorous will the standing stock bind.

Talk briefly about some examples of regulatory controls used for nonpoint source control:

Sediment and erosion controls at construction sites are being implemented by states and counties.

New developments are underway in controlling stormwater runoff

Urban stormwater is being controlled by NPDES permits

Evaluating possibility of using paragraph 6 of TSCA to make nutrients a 'prescription drug' so that before a large scale user can buy nutrients, he/she must have developed a management plan. Pennsylvania already has a requirement of nutrient management and both Virginia and Maryland have proposals before the state legislature.

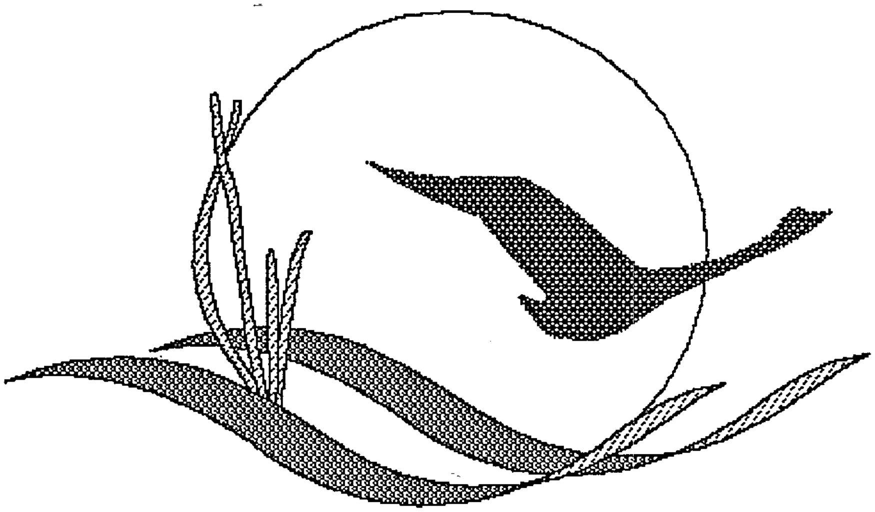
We are also working with fertilizer manufacturers to replace their product recommendations with regional recommendations from agricultural service. This will alter the recommended timing of fertilizer application and greatly reduce runoff.

SETTING CAPS FOR NUTRIENT LOADS

Chesapeake Bay Program Experience

in

Overcoming Barriers and Obstacles



BARRIERS WE HAVE OVERCOME

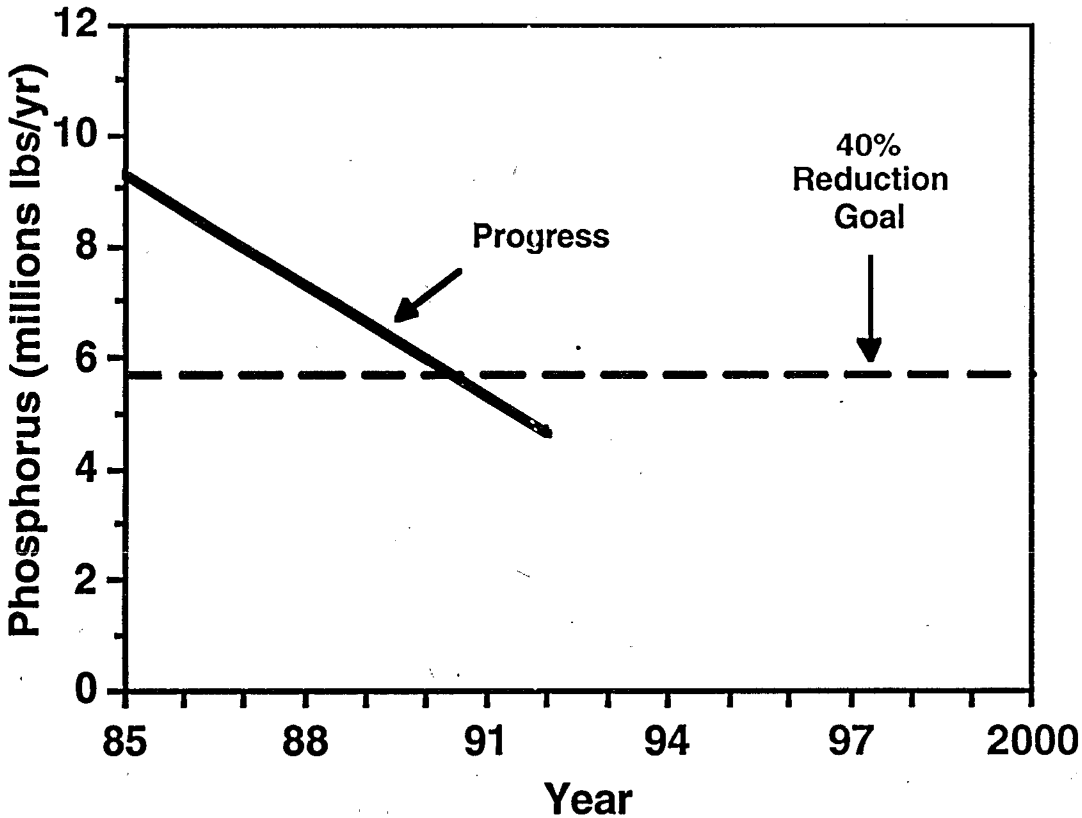
1. Measuring Progress and Demonstrating the Benefits

CHESAPEAKE BAY BASIN

STRATEGY REDUCTION
(millions of pounds)

	NITROGEN	PHOSPHOROUS
1985 Base Load	304.1	23.87
Controllable Load	185.5	21.08
40% of Controllable Load	74.2	8.43
Year 2000 Allocation Load (Cap)	229.9	15.44
Growth Increase Load(1985-1992)	14.6	1.50
Estimated 1992 Load with Growth	318.7	25.37
1992 Progress Run Load(Model)	288.1	18.34
Reduction Progess-to-date(1992)	30.6	7.03
Growth Increase Load(1993-2000)	16.6	1.71
Remaining Reduction	74.8	4.61

Point Source Phosphorus Loadings



Source: CBP Phase II Watershed Model

GOAL: 40% reduction in the 1985 loads by the year 2000.

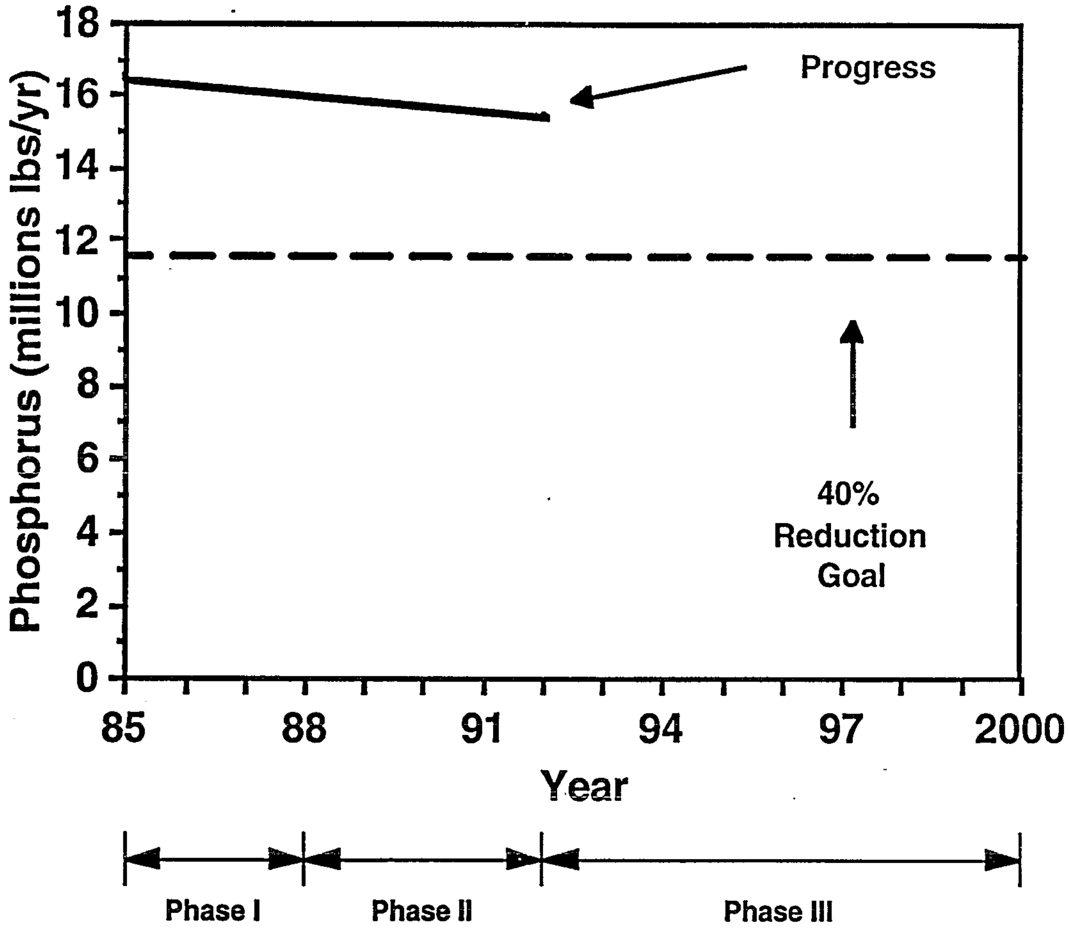
STATUS: Controllable point source phosphorus discharges, delivered to the Bay, have been reduced by over 40%.

More controls will be necessary to hold this level as the population and wastewater flows in the Bay's basin increase.

HIERARCHY LEVEL:

1 → 2 → **3** → 4 → 5 → 6

Nonpoint Source Phosphorus Loadings



Source: CBP Phase II Watershed Model

GOAL: 40% reduction by the year 2000.

STATUS: Over 700,000 acres with nutrient management plans (as of 1993).

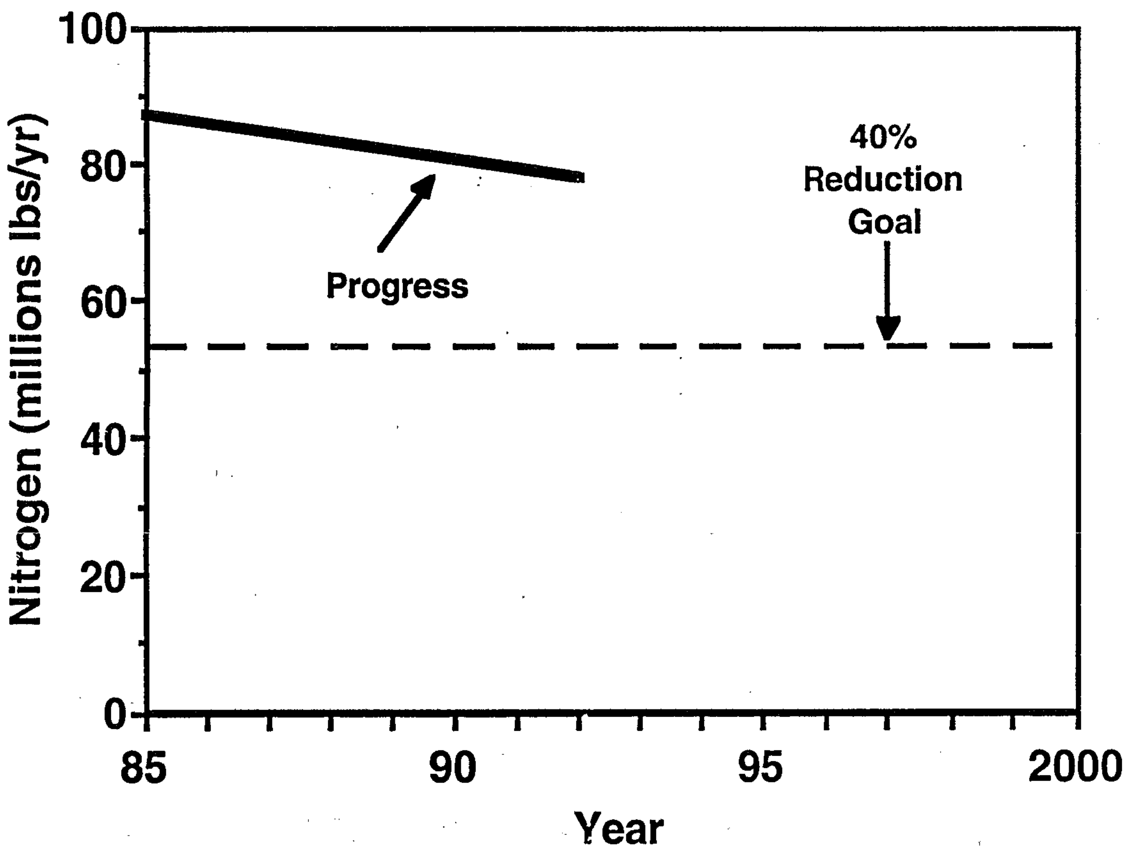
Over 1,700 animal waste storage systems (as of 1991).

Over 17,000 Best Management Practices (BMPs) in place.

HIERARCHY LEVEL:

1 → 2 → $\boxed{3}$ → 4 → 5 → 6

Point Source Nitrogen Loadings



Source: CBP Phase II Watershed Model

GOAL: 40% reduction in the 1985 loads by the year 2000.

STATUS: Nitrogen removal is at an early stage.

39 cities have upgrades planned.

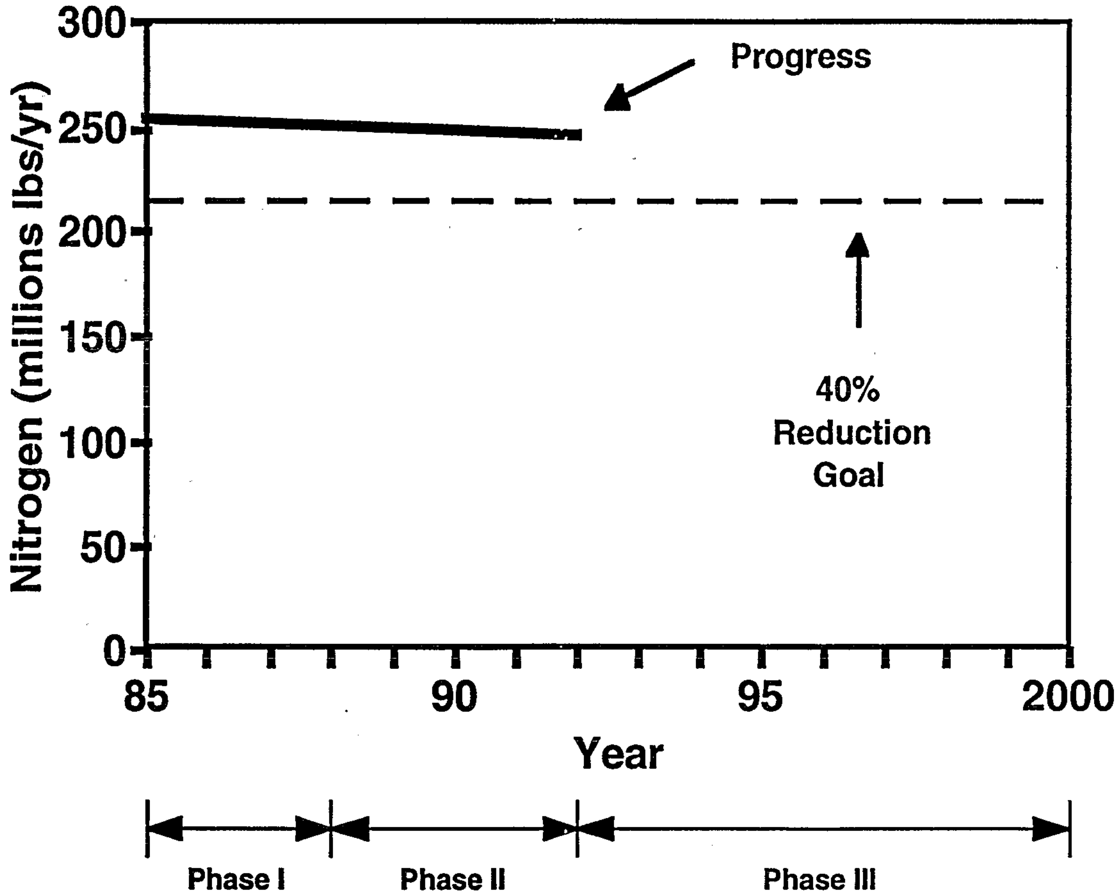
Since the 1987 Agreement, 8 cities have begun nitrogen removal.

Several large industries have also made reductions.

HIERARCHY LEVEL:

1 → 2 → 3 → 4 → 5 → 6

Nonpoint Source Nitrogen Loadings



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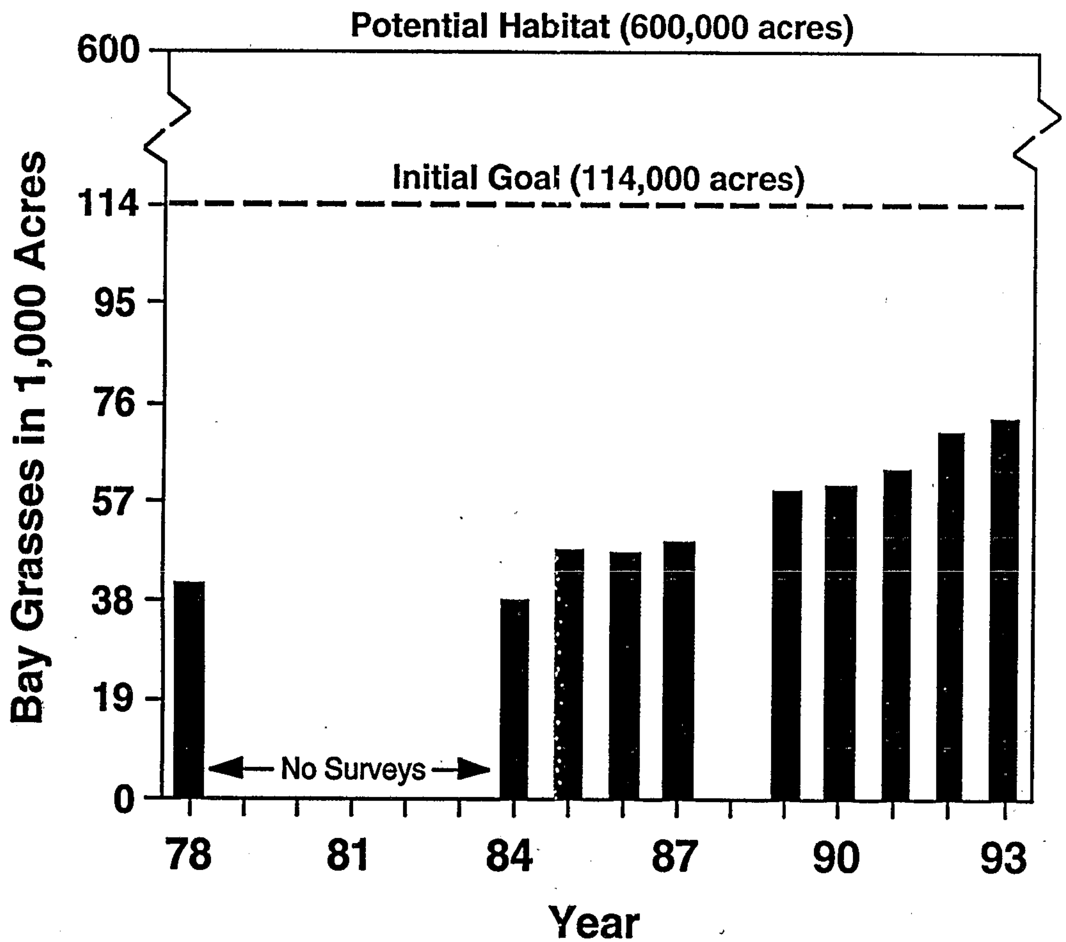
Over 17,000 Best Management Practices (BMPs) in place.

HIERARCHY LEVEL:

1 → 2 → **3** → 4 → 5 → 6

Acres of Bay Grasses



Source: Chesapeake Bay Data Base—Baywide.

GOAL: The initial goal is to restore Bay grasses to all areas where they were observed since 1970.

STATUS: Upward trend in the lower and mid-Bay since the mid-1980s.

Continued lack of upward trends in many western shore tributaries.

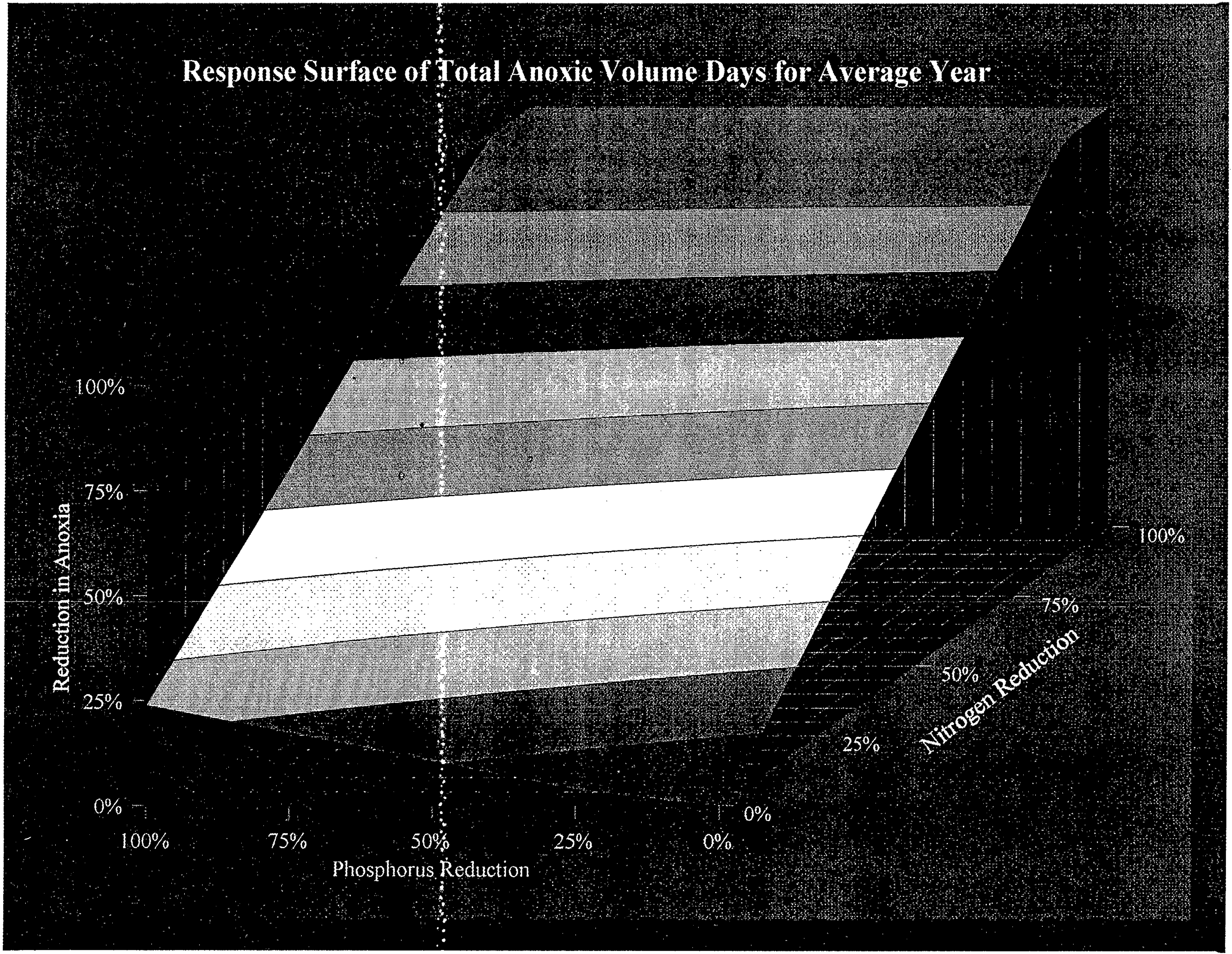
HIERARCHY LEVEL:

1 → 2 → 3 → 4 → 5 → 6

BARRIERS WE HAVE OVERCOME

1. *Measuring Progress and Demonstrating the Benefits*

2. *Understanding the Science*



Response Surface of Total Anoxic Volume Days for Average Year
Reduction in Anoxia
100%
75%
50%
25%
0%
100%
75%
50%
25%
0%
Phosphorus Reduction
0%
25%
50%
75%
100%
Nitrogen Reduction

BARRIERS WE HAVE OVERCOME

1. *Measuring Progress and Demonstrating the Benefits*
2. *Understanding the Science*
3. *Abatement and Control with a Voluntary Program*

BARRIERS WE HAVE OVERCOME

1. *Measuring Progress and Demonstrating the Benefits*

2. *Understanding the Science*

3. *Abatement and Control with a Voluntary Program*

BARRIERS STILL AHEAD

1. *Financing an accelerated level of effort.*

2. *As we continue to restore habitat and replenish standing stock of the fisheries will the nutrient levels be affected?*

NATURE CONSERVANCY BIORESERVE

W. William Weeks
Chief Operating Officer
The Nature Conservancy
Arlington, VA

SUMMARY

Ecosystem/Watershed Management

Nature Conservancy is moving towards protection of watersheds
- process for applying limited resources for conservation problems

Goal of Conservancy
- narrow issue = Protection of Biodiversity
- limits focus of Nature Conservancy
- Nature Conservancy interested in WQS/ criteria in relation to achieving stated goal
- generally, Nature Conservancy working in "easier places" where life issues exist, not remediation, but instead preservation

Focus - creation of habitat that is protected
- process
  - identifying stresses
  - tracing stresses to sources (social and economic)
- looking for things to measure
- not concerned if "remote" risks
- makes Nature Conservancy risk management "less cosmic"
- not looking for ideal standard; focus on specific biological standard that will protect stated goal

Goal of Planning Process of Nature Conservancy
- not satisfied in "management" of risk
- want to eliminate risk in watershed or conservation area
- need to get people to table
- unlike EPA, has no stick
- ways to get people involved
  - provide new information

Ecological Processes
- Nature Conservancy able to expand conservation strategies/objectives with growth of organization

but must be careful not to address issues at too large a scale
picking too large a scale may limit effectiveness of program
may not be able to focus on most important aspect
local cooperation through education/information

Lessons on Watershed Management - Process

identify systems
decide what you want to accomplish
objectives are key
ecosystems may be too large to focus on
possibly better to pick smaller scale projects

prioritize actions, focus resources
key is careful identification of system/species

identify stresses (threat)
biological stress
source of stress
identify ways to modify stress activity to address biological threat

trace to source

develop strategies
must acknowledge legitimacy of other people's goals
must look at how to adjust activities to achieve goals
recognize everyone's objectives without destroying ecosystem protection objective
goal - nonconfrontational activities/cooperation

decide what represents successes
don't focus on just carrying through activities
must set goal and measure

Result - Plan
Nature Conservancy has an advantage/plan is not public document
so can adjust plan along the way
organic document changing with experience
must move parties that appear to have different interests to a point where they realize that consensus can be reached where environmental/conservation goals can be achieved without unreasonably eliminating or ignoring the interest of the persons undertaking activities

SESSION 5: QUESTIONS AND ANSWERS

Q: Amoco. For Green Bay - Were you gathering a lot of fish tissue data? Who initiated the project?

A: Bob: DNR We have a fish tissue monitoring program. Data collected was fed into model.

Project just happened. Basin already has a RAP group but was broadened. DNR did not facilitate it, came through the RAP process.

Q: Tennessee. For Chesapeake - Chesapeake is obvious candidate for degradation process. Has this been considered?

A. Stigall: Approach it as a pollution prevention process. Have anti-degradation programs but looking at survivorship of the land under a pollution prevention program. Looking at effect of landscape from land uses. Not typical anti-degradation project.

Q: Are they harvesting vegetation in the Bay?

A: Stigall - No.

BREAKOUT GROUP DISCUSSIONS - GROUP 1

Robert Paulson **Group Moderator**
Environmental Toxicologist
Bureau of Water Resources Management
Wisconsin Department of Natural Resources
Madison, WI

SUMMARY

Want perspectives on barriers and how we get around them in risk assessments

Inflexible regulations (State or Federal)

In Wisconsin public had to be educated
RAP got the word out
Came up with Green Bay Backer Award
School education program

Questions and Answers

Q: How did WI come up with cost estimates for cost of Green Bay Project?

A: 14 Million dollars sponsored through EPA
RI/FS will look at the different deposits
Coalition will prioritize remediation and develop unit costs for the remediation
Looking at creative funding through cost sharing

Q: What is the time frame for WI project?

A: 50 years

Q: Did people know or comprehend the size of this project before getting into it?

A: Yes

Q: Barrier: Money to deal with entire watershed

A: Based on costs sometimes it will be the deciding factor to just leave the sediments there

Some may decide to settle for lesser goals and take a risk or put up dollars to do it.

That is where the RAP comes into the decision.

Q: Look at getting PRP to pass costs on to create a disincentive for these things happening in the future. If funding projects through government funds.

A: Needs some proactive approach to provide disincentives. Pollution prevention may be a way to provide incentives.

Q: FWS have related problem in New York. They know the source but do not know what to do with it.

PCBs are leaking and discharging into river
Inadequate standards process as to what constitutes a no discharge vs. no detectible discharge.
Permits have 1200 ppt PCB limits
If you allow a discharge of this magnitude, you are going to have sediment problems

Relates to several barriers:

Moving pollution around
Biologists vs. Engineers

Can't get engineers to implement BMPs because they think that they are unenforceable and will not take the risk.

Request to EPA: Need better detection limits

A: Or other types of methods to regulate and use the data

There is a proposed protocol for bioconcentratable compounds

Q: Barrier: People want numbers

All consultants and PRP want a number. If too high, does not meet environmental goals. If too low, will take it to court. Therefore need to be willing to do a watershed assessment.

Q: Nondetect thinking and enforcing WQS and permits always have been a numerical based program.

If EPA could push the mind set along for innovative criteria it would be helpful

A: Barrier Non-detect limits

Q: Detection limit always keep us from finding chemical concentrations that cause the effects

Therefore we need to move toward biological indicators

A: Barriers: Non-effect criteria
Bio-indicators
Biosurveys

Q: In WI what sort of barriers are you running into when you translate biological factors into something meaningful for tax payers?

A: Fish consumption advisories are one of the biggest things.

Q: Have you estimated what it would cost to get rid of fish advisories?

Until you cost that you will still have a public barrier.

A: When we get it costed, it then becomes a social decision and negotiation?

Mass balance started in 1989

Coalition only 1 1/2 years old

Q: Do you feel you have PCBs under control?

A: From point sources.

Q: But not from other sources?

A: No
Decision is generally that it will be unacceptable to wait it out.

Q: Need an innovative way to get it out without remediating sediments.

A: Looking at solidification and in place solutions.

Q: Los Angeles sanitation- discharge to dry stream and marine waters.

Involved in watershed project
River is 90% owned privately

Discharge to dry streams and create the habitats

Stockholders (30 fed, state, local and privately owned)
Trust is major issue

Private landholders have much bigger stake than government entity and remind them of that.

This has created a lot of barriers

Study has been going on for 1 1/2 years already and using up resources fast.

Barrier: Conflicting uses of watershed. Some seem like they override one another

Barrier: Issue of technology with sediments

Q: How many different statutes does WI project fall under?

A: TSCA, NRDA action against five mills from FWS. NRDA brought a lot of people to coalition.

Q: Subject to great lakes legislation?

A: Yes guidance for remedial action in GL LAMP, Great Lakes Initiative which won't be too disruptive to project because already incorporate many of the provisions into existing rules.

Q: Superfund?

A: Deposit A may have gone superfund or RCRA. Work with solid waste people in the state.

Could go through EARP process if necessary. Better to just get the stuff out of the river.

Q: Do your POTW discharges in WI have WET limits?

A: Yes since 1989. Mills have been meeting WET limits. Only one POTW not meeting limits.

Acute and chronic limits based on flow

Q: Numerical limits?

A: Must demonstrate that there is toxicity, then WI requires quarterly monitoring

One failure would kick you into another test in 21 days

Put them into a TIE phase in some instances to avoid limits in the permit.

<u>List of Barriers Developed in Break Out Session</u>

Inflexible regulations (state and federal)

Public Involvement

Money to deal with entire watershed

Disincentives to prevent future problems

Knowing source but can't do anything about it

Multi-media transfer

Biologist vs. Engineers

Non-Detect limits

Trust (private landowners have biggest stake)

Conflicting uses

Technology for sediment cleanup

BREAKOUT GROUP DISCUSSIONS - GROUP 2

Julie DalSoglio **Group Moderator**
Remedial Project Manager
Montana Operations Office
U.S. Environmental Protection Agency
Region 8
Helena, MT

SUMMARY

Two most critical barriers in ecological risk assessment
- lack of guidance
  - latter guidance validated direction
  - biological resource groups have been formed in each region
    - this is a helpful source that wasn't available at the beginning of the process
- lack of methodology
  - Primary question at Milltown - sediment toxicity
  - there was no standard methodology (EPA)
    - ISF&WS had developed some for Great Lakes and were interested in our project

Questions and Answers

C: We are trying to come up with a way to decide on fish advisories for lead in fish tissue. We don't have a standard for Pb. We are mainly working with EPA. We're seeing more lead in sediments in macro invertebrates. It appears to biodilute rather than bioaccumulate because we found more in vegetarian fish than in carnivorous. We found more lead in fish bones than in muscles etc. (Jeff Harvey)

Moving standards - as standards decrease do we move to more stringent controls?

Q: One of the problems we have is using data from other regions which may not be similar to your region. Example in Colorado is in selenium where most of the data is from California. How are we going to integrate interquality and quantity when several parties need to be coordinated? (Mark P.)

Julie. At Milltown we wanted to get away from labs and do site specific situations. For example, in fish studies we did we used invertebrate food sources from the Clark River. A problem with this is that it is extremely costly.

Water quality: It's not realistic to discuss quantity and quality as separate

issues. The two are so closely related that we must consider both.
One example: Agency set up sediment ponds to improve water quality and are being sued by public who claims the ponds allow for evaporation and therefore is a take on their water rates.

Q: We don't hear much about work on WQC. Why is this? (Julie)

A: Cost is the number one factor and burden of proof is a close second. People perceive the national standards as acceptable unless you can prove and educate people otherwise.

Q: How do you tie risk base assessment to compliance. There are questions as to if the correct regulation framework will even allow this. In addition, the public views this approach as one that is trying to avoid standards.

C: Consultants are pricey.

Q: How are we going to transfer this costly process to the poor communities (environmental justice).

Q: On-going issues of good labs and question of national accreditation.

A: We had a unique situation because we used universities etc. that saw our situation as a good experience and therefore helped keep costs down. (Julie)

C: In response to having site specific standards this would get overburdensome. He is trying to pool together areas with similar problems, such as coppers and using a similar standard for all these sites. (Dianne Feed, N.C.)

C: Our state is unique because the majority of our problems are non-point source, so its difficult to apply standards in a manner such as N.C. is doing. (Jeff Harvey)

C: One key barrier is an institutional barrier: science takes a long time and when an agency tells the public they're working on something without issuing a time-frame the public expects results soon. EPA develops standards and then walks away from them. We have standards that are 20 years old and haven't been updated. (Jerry Patamos)

C: Superfund is talking about more stringent national standards which is moving away from site-specific standards (Julie)

A: The idea behind this is to speed up the clean-up process. Site specific standards require both time and money. Another barrier is the guidance to apply drinking water standards to the aquifer as opposed to the tap. Many times it may be more effective to treat water at the tap instead of at the source. In addition, some treatment is required even if the source water meets the standards, this is required even though no risk assessment has been conducted to establish a thread of any kind.

BREAKOUT GROUP DISCUSSIONS - GROUP 3

Ed Stigall
Chief, Technical Programs
Chesapeake Bay Program Office
U.S. Environmental Protection Agency
Region 3
Annapolis, MD

SUMMARY

Request input on barriers encountered by participants.

C: One barrier encountered in the Chesapeake Bay was funding. The approach taken was to look around at other programs within the basin and identify ways that they could contribute to the CBP. Numerous agencies and organizations contribute technical assistance. Four federal agencies and one state provide staff to actually work in the Chesapeake Bay Program Office.

C: Another barrier identified is statutory authority at the local level, including enabling legislation, taxation authority, fee structure authority, and enforcement authority.

C: A barrier encountered in trying to implement nonpoint source controls is uniform application of requirements for diverse sources. It is important for the credibility of the program to be equitable across sources (e.g. construction, agriculture).

C: Establishing who gets to make decisions is sometimes a barrier to organizing a watershed management team.

R: A tip from the Chesapeake Bay Program is to get negotiation and consensus building training. Our program was designed to test/demonstrate a cooperative, non-command approach to restoration.

C: Availability and ability to generate reliable data is another barrier.

C: Interagency coordination is another barrier.

Questions and Answers: The Chesapeake Bay Program

Q: Where did the 40 percent reduction in nutrient loadings come from?

A: Estimate of what the nonpoint source program could achieve without new technology or funding. Then we modeled the impact of achieving this goal on ecosystem variables.

Q: How has the Chesapeake Bay communicated its message?

A: We have a number of mechanisms, including:
- Alliance for the Chesapeake Bay (grantee)
- Public Advisory Committee
- Citizen monitoring network

We are currently developing a program to train citizens on wetland designation.

Q: Who decided SAV should be an indicator?

A: Science and Technical Advisory Committee

Q: Do you attribute the return of SAV to progress in meeting the nutrient reduction goal?

A: Yes

Q: How much are chicken farms contributing to the nutrient loading in the Bay?

A: Poultry plants are using nutrient management practices to reduce loadings, including dry clean-up of chicken coops, storage of manure until spring fertilizer applications, and compost for disposal of dead chickens.

Q: Is groundwater a concern?

A: Most of the groundwater under the chicken farms violates nitrogen standards. We are hoping to study groundwater transport and flushing.

Q: When and how did the Chesapeake Bay Program get organized?

A: The process started in 1977 as an EPA research project under Tudor Davis. Following that study, the first Chesapeake Bay Agreement, signed in 1984, established the executive council and committees. We have received strong public support from the beginning.

Q: Was the early data on the Chesapeake Bay reliable?

A: Because bad data is worse than no data, we established groundrules on data quality.

Q: How did you get better data?

A: We have an extensive monitoring program that is model driven. All data collected feeds into the model, we do not collect any superfluous data.

Q: How does the CBP maintain communication?

A: We work very closely with stakeholders and other government agencies. We also maintain a directory of the Chesapeake Bay participants. We are also fortunate in that one of the key stakeholders, created by the Chesapeake Bay Agreement, is the Chesapeake Bay Commission. The Commission is composed of representatives from all the state legislatures. They provide a quick entre to the legislature which has proven invaluable in achieving timely solutions to critical problems.

Q: How did you estimate that the 40 (or 36) percent nutrient loadings were achievable?

A: Modeling

C: Looking at cost effectiveness analysis of BMPs.

BREAKOUT GROUP DISCUSSIONS - GROUP 4

W. William Weeks **Group Moderator**
Chief Operating Officer
The Nature Conservancy
Arlington, VA

SUMMARY

Task - Identify Common Barriers To Risk Management On Watershed Basis

Problems in understanding what "Watershed Management" means.
- disconnect between "resource" (rivers and streams) and permits
- too much focus on procedural (permitting) issues rather than looking at biological issues to determine appropriate management approaches
- discussion has not focused on biological health of rivers/wetlands, but instead on issuing permits to facilities in watershed
- no overriding goal
  - restoration
  - fishable?/swimable?

Reverse process in issuing permits
- need to change from "engineering" to "ecological" approach
  - permit writers mentality is that writing good permits will produce good water quality

Moving to ecological approach
- will create permit backlog
- will create problems in permit issuance process, which involves extensive negotiation; if watershed approach dictates specific permit limits, it will cause friction by lack of flexibility

Stakeholders Session

SUMMARY AND CONCLUSIONS

Betsy Southerland **Moderator**
Director, Standards and Applied Science Division
Office of Science and Technology
U.S. EPA
Washington, DC

We have assembled experts on the interests of tribes, state government, municipalities, industry, and environmental groups. These five people have spent the past three days trying to caucus with other conference participants so they could present a stakeholder opinion on the implementation issues involved with all five of the conference sessions. However, each of the stakeholders wants me to caution you that their comments will still reflect their personal opinions and interpretation. They will do the best they can to reflect their constituent groups.

The stakeholders listened to each session and then identified the implementation questions that could be derived from the science discussions in those sessions.

We heard in Session I that some toxics reside in the water column and their effects are on aquatic life. We knew that water quality criteria were needed to deal with those toxics. We also heard presentations that said many toxicants reside in the sediments, accumulate up the food chain and then cause problems for wildlife, or for human consumers of fish. We were told you need sediment or fish tissue criteria for these toxicants. Most of us had experience only with water quality criteria. We understood what was being done for acute and chronic toxicity for aquatic life or the human health methodology for water quality criteria. We didn't know what type of criteria to expect for new types of toxic chemical criteria based on sediment or fish tissue concentrations. The first management question we asked was "Should EPA put a higher priority on producing water quality criteria (with the methodology we were all familiar with) and develop criteria for more toxicants which persist in the water column and cause aquatic life effects?" Or, "Should EPA put a higher priority on developing methodologies for the new type of criteria for bioaccumulative toxic pollutants?"

In Session I we heard that the National Research Council had recommended that EPA use a default approach for toxics criteria. An EPA default value is derived from doing a risk assessment, which will produce a range of values, and then making a risk management decision in EPA as to what a single value or default value would be for that toxic chemical criterion. The alternative approach would be for EPA to do the risk assessment, provide the full range of values to the states and the tribes, and let the states and the tribes be responsible for making the risk management decisions needed to adopt a single value standard. Our second management question was "which type of criteria was preferable, the default or range of values criterion?"

In the second session we heard some excellent presentations on the different methods various states had developed to look at non-toxic problems. These methods were for watershed problems that were not related to chemical toxicants in the water column or the sediment. Instead, these problems involved nutrient enrichment, habitat degradation, sedimentation or clean sediment problems, and flow alteration. For this session, we developed the following management question, "Should EPA require states or tribes with flow problems, or clean sediment problems, or enrichment problems, to use these kinds of methods to interpret their narrative criterion. If so, EPA approval of the water quality standards program in some future triennial review would depend on the state or tribe having adopted these methods to interpret the narrative criterion. Or "Should EPA give out guidance and pilot studies on all the different ways you can assess these problems and not require these methods to be included in water quality standards programs.

In Session 3 we had a lot of discussion of ecological risk assessments and case studies. The first two sessions were on appropriate criteria or methods for attacking watershed problems, but session 3 was on how to go about identifying problems in a watershed. The management or implementation question we formulated was "What should EPA do to encourage the conduct of ecological risk assessments in high priority watersheds?" We thought ecological risk assessments were effective in determining whether chemical pollution, habitat alteration, nutrient enrichment, or maybe all of the above were causing watershed problems.. We were concerned about the expense of these assessments and questioned what EPA could do to promote them.

Sessions 4 and 5 included case studies and examples of how to fix watershed problems. The presenters identified what the problems were, selected the appropriate tools (whether they were chemical criteria or non-chemical type approaches), and decided how to fix the problems. Our management question was "Should EPA continue its independent applicability policy in which all types of criteria must be met?" When we used the term criteria, we meant chemical criteria as well as flow alteration, sedimentation, or nutrient methods. Some stakeholders felt that there would be an incentive for States and tribes to use new methods if they did not have to continue meeting the current chemical criteria.

Without any further ado, let me start with the first stakeholder. He is Daren Olsen. Daren is in charge of the water quality standards program for the Nez Perce Tribe. He is located in Lapwai, Idaho. His educational background is in watershed management.

STAKEHOLDER OBSERVATIONS - Tribal Perspective

Darren Olsen
Nez Perce Tribe
Lapwai, Idaho

As Betsy said, I was supposed to coordinate with other tribal representatives that were here at the conference. That was a tough assignment because I could not find any other tribal representatives and that reflects the lack of resources that the tribes have in developing and implementing standards for the reservations.

Question Number One: Should EPA put higher priority on producing water quality criteria for pollutants or on developing methodologies for new types of criteria? I found this to be a tricky question, in that EPA should invest in both producing criteria for more pollutants and continue to develop methodologies for new types of criteria. It is my opinion that EPA criteria plans should follow simple laws, such as the law of diminishing returns. Science can be defined as the successive approximation of the truth. To me that means we may never get to the total truth through science, and that we may never get the exact and perfect criteria to protect the use. If I want to go up and touch this wall and every five minutes I get closer to that wall, how long will it take to touch that wall. I won't get there in my lifetime and my children's children's lifetime. But there is a certain point where I am close enough to that wall to know the attributes of that wall.

The question is, when are we close enough to that criteria? To complete my answer, each investment EPA makes need to be flexible, and they should stop worrying about the mice when the elephants are trampling over them. EPA should concentrate on enforcement and on helping the tribes and states to enforce what good criteria there are.

Question Number Two: Should EPA develop criteria that consist of 1) a default based on risk or single value assessment and risk management decisions, or 2) ranges of values on risk assessment only. As a scientist, number two is clearly the correct answer. Ranges of value can promote more flexibility in developing the most appropriate criteria. But in all practicality the Nez Perce Tribe, and I might add some other tribes and states, do not have the resources or mechanisms to develop site-specific criteria. Therefore, EPA should provide a default value. But, if resources are there, then I would lean more towards developing site-specific criteria within a range.

From session number two, the first question was, "Should EPA require states to adopt methods for nutrient over-enrichment, habitat degradation, sedimentation and flow alteration, when appropriate, or leave this as a voluntary act by the states? It is my understanding that under the Clean Water Act, EPA has responsibility to see that the Act's objectives are met. If states are reluctant or dragging their feet toward adopting appropriate criteria, then it is the responsibility of EPA to see that states or tribes have the proper incentives and provide federal funding for this task, and allow innovative strategies produced by the states and tribes to be used to answer this complex issue.

Session number three, "What can EPA do to encourage the conduct of ecological risk assessment in high priority watersheds?" To encourage ecological risk assessments, there must be a modification and expansion of the scientific process for assessing risk at the watershed level. And what I mean by the watershed level, should actually be called the ecosystem level, especially when there are distinct ecosystems within the watersheds. And they should continue to encourage all stakeholders within that watershed to participate without reference to political boundaries with the cooperative mindset of all involved to protect that use.

And finally, **Session four,** "Should EPA continue its independent applicability policy under which all types of criteria must be met? I guess the purpose of me being here representative of a stakeholder, is to give my perspective on these important questions and not just to make friends. Therefore, with that behind me, I feel that EPA should absolutely continue its independent applicability policy. All indicators of the system are measured independently, yet are dependent upon each other. The opportunity to abuse this policy exists. Yet to protect the biological, chemical and physical properties of our nation's waters requires that all three type of criteria mut be met simutaneously. To conclude, I have a final comment. We have talked very much at this conference about applying the watershed approach. The major difference from states and tribes on this issue is that states are going through transition of implementing a watershed approach through their existing water quality standard program. Tribes are going through transition of developing and implementing water quality standards through an already existing watershed approach in the way they manage land and overall way of thinking for themselves. Both states and tribes should identify the abilities and limitations of each other and concentrate on working through the jurisdictional issues to protect uses of each water body.

Moderator: Our next speaker is Joel Cross, Manager of the Water Quality Management Planning Section in Illinois' Division of Water Pollution Control. His group is responsible for water quality standards, non-point source pollution, clean lakes and ambient monitoring. He is located in springfield, Illinois and his background is in aquatic biology.

STAKEHOLDER OBSERVATIONS - State Perspective

Joel Cross
Manager, Water Quality Management Planning Section
Illinois Division of Water Pollution Control

I think in general, from the states point of view, there were some things that we heard at this conference during the last three days that were very encouraging. Some of those things included one-size-doesn't necessarily fit-all situations; factoring in common-sense decision-making; integrating activities that are conducted by the regulatory agencies; and striving to achieve well-balanced type program in stakeholder involvement. I will offer my views with regard to the first management question dealing with a higher priority being placed on water quality criteria for more pollutants or developing methods for new types of criteria. I think if we are going to move toward more of an ecosystem approach, states are going to need more tools and criteria. At same time we can't ignore producing additional water quality criteria. At some point there has to be a balance that we have to strike based on available resources. I think states would like to see U.S. EPA develop a regular schedule for developing new criteria and reviewing current water quality criteria. States should not be required to adopt all national criteria. States should have flexibility to adopt appropriate criteria where necessary to achieve designated uses.

Question two involved whether a criterian should be a default value based on risk assessment and risk management decisions or a range of values. In talking with a few states during the conference, it seems that most favored the ranges of values, with guidance on selecting a value for site-specific watersheds. That was from a very small sampling of states, so there may be a large margin of error in that response. Regardless of the options that we choose, I think this begins to address the issue of implementation of criteria. States recommend that any new criteria published also include an implementation component that allows for state input. I think as states we recognize the need for consistency with regard to the implementation of criteria and standards.

Question three, "Should EPA require states states to adopt methods for nutrient over enrichment, habitat degradation, sedimentation and flow alteration, wherever appropriate or leave this as a voluntary act by the states? I think that most states believe this should remain a voluntary activity for states. U.S. EPA should certainly encourage states to adopt methods for these types of issues, including bio-criteria. EPA plays a vital role for providing technical information and assistance, and I think that role should be contiued and enhanced. The key word is require. Require seems to foster a top down approach, which doesn't promote innovation and aggressive approaches to complex watershed problems, especially when dealing with non-point source impact. I think that during the session, we heard several good papers and presentations from states and from other people from all over the country, with good examples and approaches.

Question four, "What can EPA do to encourage the conduct of ecological risk assessments for high priority watersheds?" I think there are many ways that EPA can do this. I'm just going to focus on a couple that I think are important. Comprehensive ecological risk assessments also need to be a voluntary objective for states, and that is strongly encouraged by incentives that are meaningful to states. Promising more funds from sources which cannot currently meet state needs provides no real incentive for states. The other issue that we spent a considerable amount of time on in this morning's breakout session dealt with removing barriers to implementing such an approach. I think EPA needs to continue to explore more ways of removing barriers to consolidating program elements and should promote integration, efficiency and effectiveness. For example, I think there are many examples of programs, such as the 404 dredge and fill program, the 319 program, the 303D process for listing impaired waters, the 305B process, all managed at the federal program in an isolated manner at this point. Yet there are very important interactions among the requirements of these programs. I don't think we can afford the luxury of continuing to devote separate equipment, staff time and efforts to these things in an isolated program kind of approach. I think integrating these programs would go a long way in encouraging states to begin to address ecological risk assessments.

Question five, "Should EPA continue its independent applicability policy under which all types of criteria must be met? I believe that we need to move beyond EPA's independent applicability policy. It is far too limiting and doesn't allow states to make best decisions in all cases. I don't think anyone would disagree that we need to use all tools and criteria where available, but when you do have conflicts in where criteria are met, common-sense needs to be factored into decision-making process. There is really no substitute for first-hand knowledge of the resource and the data collected when looking at whether all criteria may be applicable or appropriate. In conclusion, I would just like to say that states are obviously a big player, not only in development of water quality standards, but in implementation as well. It is important to remember that states have very elaborate and lengthy processes for adopting state water quality standards, many times involving several years of effort. As national criteria become more complex, and as more criteria are developed, States will be faced with many more challenges, not only in getting water quality standards, but also in creating an additional workload regarding implementation.

And finally, I would like to thank U.S. EPA for hosting this conference. I think there were some very interesting things that resulted from the conference during the last three days. I would also like to thank them for the opportunity to provide the State's point of view.

Moderator: Our next speaker is Bob Berger. He is with the East Bay Municpal Utility District. He is Manager of their regulatory planning and analysis group. They are located in San Francisco Bay. A great place! His educational background is in marine biology and biochemistry.

STAKEHOLDER OBSERVATIONS - Municipality Perspective

Robert Berger
East Bay Municipal Utility District
San Francisco, CA

Thank you. I would like to first thank Bill Kramer and Dave Sabock for giving me this opportunity. I jumped at the chance, because unlike most of the participants in this conference, I did not have to develop any materials, any audiovisual materials and I got a chance to give my talk at the end. Unfortunately, like most of life, the reality differs from the initial expectations. What it required me to do was sit through all the sessions, really pay attention and stay to the very end of the thing. I think yesterday's session showed that there was a real acceptance of the concepts that EPA is proposing to use as they go forward in water quality standards into the 21st century, but there were very different expectations as to how these concepts would be implemented. I think that is the key part, if we are going to have effective environmental control, then there has to be the buy in and support of that implementation by all the participating parties. I think the two themes I would like to have included in my comments is that in addition to risk assessment, I think there is going to be an element of risk taking in all of this, and certainly because I am a stakeholder, we would like fuller participation by the stakeholders in the process.

My answers to the two criteria questions are kind of guided by my past experience as well as some of the sentiments I heard here and agree with. I think unquestionably that we do need to move forward with the kinds of measurement and control tools that will support additional types of criteria. That's essential, in fact if we are going to have, and I think we should have the comprehensive water quality based management that EPA is proposing. And I think additional water quality criteria, as they are needed, also should be done. But I think all these types of criteria have to be developed with certain key components. One of these is they must be tied to implementation. That requires the development of necessary tools and the application of all those tools in a comprehensive way. And a balanced application between both point and non-point sources and across media, as we heard yesterday, about air. What you have been hearing is that a toolbox does exist. However, what we as regulated parties, as permit holders, and by in large what's in there right now are hammers. What we would like to see more screw drivers and perhaps some pliers that can be applied to everyone.

The second thought is it must be iterative. It must be based on good science and it must reflect always reflect the best and most up to date science. I think that is one of the failings of the water quality standards program, if you are looking at the chemicals. A lot of those were developed probably 13 years ago on information that was developed even prior to that. they have not been reviewed and evaluated in a comprehensive way by EPA, either looking at the methodology or the data acceptability, a well as the individual values. They are going to continue to play a major role in watershed management, and do have to be reviewed. But that should be applied to all the standards. And thirdly, they must be linked to relevant performance measures. That's going to get you the buy-in. While it may be easy to say, yes we are making progress because we are either above or below the chemical criteria, that really doesn't speak to whether the designated uses are being protected.

With regard to the second question, I think a range of values is the most appropriate. The states should be allowed the flexibility to accommodate what is now called place-based influences to make the standards most relevant to specific sites. And I would suggest as part of risk taking that flexibility for states should go even further so that the standard numeric value may be looked at differently. I'm not advocating narrative values, but what I am advocating is relevant values. Instead of a specific chemical concentration, we really could use bio-mass as a goal and criterion.

Moving on to non-toxic problems. I think it is important that EPA set expectations. Maybe not requirements, because I think as we move into these new programs it's going to require the buy-in of the particular stakeholders. The top down command and control approach is not going to be as effective now, and EPA's programs are going to be thought of as our programs. What EPA's got to do is develop nationally consistent expectations, which include environmental goals, the general programs to address these goals, and general progress in meeting the goals. Yes, I think requirements or incentives are necessary so that not only do states have the incentives to move forward, but they have the political coverage in justifying the needs not only to their legislatures, but to some of the people they will be regulating with these new tools.

With regard to ecological assessment, again the most effective way of having that performed is to present it as our program, not EPA's program, since this comprehensive asessment requires communication and involvement with stakeholders. We've seen that in previous talks on this panel and earlier panels. I think we have to build the confidence of the stakeholders in the process. We need to develop goals that are relevant and accepted. We need to have good measurement and control tools available now or the implementation of this, and they have to have certain criteria. They have to be scientifically valid. They have to be somewhat proven, and they have to be able to be comprehensively applied. I think we also have to provide clear and realistic expectations for the evolution of the water quality standards program. The program plan needs to include time-frames, and the general elements of the program. It needs to identify the incentives and disencentives that are going to be used to accomplish it. And again, first and foremost it needs real involvement of all stakeholders at all steps of the process.

With regard to independent applicability. Well, we've been through this a number of times. When EPA first brought this up two years ago, I thought the message was farily clearly sent at that time, that that is the way we were going. I don't think enough was heard in that hiatus, in that two years hiatus. I hope they have clearly heard today and during this conference that if, in fact you were going to put forth the kinds of programs that this is, the only way you can get it accomplished. And as part of that, perhaps I should just suggest, that they don't wait to get stakeholders involved, that they get them involved in the review process. It has been my experience, not only with EPA but with any bureaucracy that the greater refinement always constitutes greater ownership and the cement starts hardening on that document. We need to get involved now. And the second part of it is, we know we're not there yet, because the tools aren't there yet. In order for us to have a good evaluation, we are not throwing away all of the measurements, we're simply going to make all of them available when we make our comprehensive decision, and so that requires that a number of the tools be better developed than they are today.

I would like to close by suggesting a few things that may in fact facilitate the process. I think one of the things that may in fact facilitate the proces. I think one of the things that needs to be done and was brought out yesterday, is that EPA needs to organize a meeting that now really gets into what the water strategy is. I was kind of surprised in fact there is no clearly defined strategy on EPA's part to take us this far. What we have done I think at this conference is to name where we are going with these things. We've got the concepts out there, and we need to now start establishing a more consistent expectation of what those concepts mean to us before we move ahead. And that's got to happen soon and it has to involve all the stakeholders, And by all the stakeholders we are missing right now, I believe certainly the landowners, the farmers. We have to be encouraged to start contending this, because if in fact we intend to make them partners, they have to be aware and if not certainly enthusiastic about this, very aware of our determination to include them in this.

Again, I think we need to define common expectations, goals of the process, the general goals of this thing, obviously they are going to change, based on where they're implemented, but there needs to be an amount of minimal consistency throughout the nation on it. Time-frames, responsibilities and impediments.

The second thing as I said before is to develop the proper and appropriate meaurement and control tools that can be universally applied to all sources and stresses of pollution. The third thing that needs to be done is to reevaluate the current water criteria. That is going to be essential, not only for the current program, but because the criteria are the basis for watershed risk assessment as well. And a lot of this we need, the risk taking. Most of my experience has been in the hand wringing stages with a lot of EPA personnel and state personnel wanting to do non-point source controls, but not feeling they could go forward without the mandate of the Clean Water Act. I think that the presentations from Ohio, Idaho, South Florida, North Carolina, Chesapeake Bay, and Wisconsin show that people are willing to take those risks, that they are proceeding without legal mandates on this stuff, and are being successful. I think we need to get out the story on that and encourage more.

And fourth, to allow us the flexibility to be taking the kind of risk that we are going to need, we do need to pursue legislation. And I think we need to be pursuing it, maybe by joining hands. Maybe this is the first area that we get into as stakeholders. I didn't hear anybody say that non-point sources should not be controlled in some way. That did not happen this time. What we need to do is form an an alliance that can go to Congress and that says "yes," we represent the regulated municipalities, regulated industries, the States and environmental advocates, and we may not agree on all of it, but here are a couple of issues that we do agree on. I think that's how we have to get that flexibility in it, but again we are not always going to have that. I think we have to provide a little bit of risk taking for this.

Moderator: Our next speaker is Mary Buzby who represents Merck and Company pharmaceutical. She's in charge of water programs at Merck and Company. She's located at White House Station in New Jersey. And her backgound is in environmental science.

STAKEHOLDER OBERVATIONS - Industry Perspective

Mary Buzby
Merck and Company, Inc.
White House Station, New Jersey

Hello, I'm very happy to be here today, and I do want to thank my associates from other industrial representatives that are here. We talked about this and these ideas are shared among us. Before I start answering the questions, I thought I'd start by summarizing industry's perspective on some of the issues discussed here over the last few days. That should that make it easier to understand what our thinking is all about. First of all, industry heartily endorses the concept of the watershed management approach to water quality protection. In some cases the current water program fails to address ecosystem degradation, while the water quality standards are met, and other cases there is no apparent degradation but there are requirements to go further in reducing concentrations of certain compounds to meet numerical limits.

So second of all, we think that successful implementation of the watershed requires equal participation by all parties. Industry certainly wants to be at the table. We very much appreciate the opportunity to be here, and we want to contribute to the protection and the restoration of watersheds throughout the nation. We think we have some expertise, and we would like to see the large amount of money I'll talk about later, the money that we've spent on the environment, invested in real solutions to real problems. We agree that all stakeholders should come to the table in good faith. It was stated that this process would only work, if it's a process based on trust. We are committed to come to the table in good faith, to be consensus builders and to be objective in identifying the goals in correcting water quality problems, and implementing practices to achieve those goals.

A third basic issue or concept is that it's important for us to leverage our resources. Again we heard discussion about this throughout the meeting. We have to get to the point where we are investing our resources to achieve the best environmental benefit. Yesterday I was at one of the breakout sessions, and I heard discussions by one state representative that said that 72% of that state's water budget is spent on administration, NPDES implementation and construction grants program. Those three aspects of the water quality program consume 70% of the money that is available in that state. And clearly at the meeting that was supposed to be typical among the states. And that amount of money is disproportionate to the needs that were identified at the conference. For example, industry is very proud of the progress that the country, and that industry has made, along with EPA and the states under the NPDES program. However, it may be time for EPA to reevaluate the NPDES program to decide how this program can be developed into an asset to support the watershed approach to water quality management and to achieve our other nationwide water quality goals. The

NPDES program should not remain as a competing program, competing for resources and recognition in our water quality management efforts.

Our resources need to be spent developing meaningful data. Not necessarily convenient data, not necessarily easy data, but we have to get the data we need to make the correct management decisions. We have to solve real problems, not perceptions of problems. A true understanding of our ecosystem and it's magnificent diversity must be the basis of our decisions, and we can only make those decisions if we have the right data.

I think that many of you will be surprised at how much money industry spends complying with environmental regulations. Some of that money is not wisely invested. Industry would much rather invest in addressing real problems. Presently we generate reams of data, a lot of it is only for compliance and doesn't add value to the environment. An example of how we can use our money better, it was clear yesterday in a poster presentation by Amoco. Amoco joined in a joint venture with EPA to evaluate alternatives to regulated environmental practices. Here is an example where they had a requirement to control some systems under the regulation, they were required to control 3.4 tons per year of benzene and 170 tons of hydrocarbons at the cost of $31 million. As a result of this joint project with EPA, they demonstrated that an alternative would achieve much higher levels of pollutant reductions at a significant cost savings. And I think more and more we have to be doing this kind of approach to environmental management and environmental protection.

They also at the same time looked at a multi-media approach and found that they could remove 7,200 tons of BOCs for $54 million which is the required process, the mandated regulation and as an alternative that came up with little more emissions reductions for significant more savings. Now if the difference of those values were invested, now this is tons of money, this amount of money can make a big difference in the water quality program in a state. We need more flexibility in the regulatory process.

The fourth issue that we think is required, is there has to be an implementation strategy for watershed management that is flexible, that involves voluntary actions to achieve goals, and that moves away from the traditional stance of command and control. That is our basic philosophy. And now to answer the questions.

The first question was, Should EPA put a higher priority on producing water quality criteria for more pollutants or developing methodologies for new types of criteria. Our response is quite strong. Rather than put our resources into more numerical criteria, EPA should focus its high priority on developing new tools, new methodologies to define stresses in the environment. What we need are models, ways to link stresses to sources and to receptors, for example, biocriteria, and diversity indexes that could be broadly applied with guidance by EPA. In all cases, tools that are developed should be used by EPA and groups appropriately for individual situations. Many of us in the industrial community have had experiences where we have invested lots of effort and lots of energy in complying with numerical criteria which we knew were not problems with the environment. On the other hand, if there is a problem with numerical criteria, there is a need for numerical criteria, EPA should certainly go ahead and develop those. It's just that the development of numerical criteria should not stand in the way of development of new, more progressive tools that there is clear a need for.

The second question, Should EPA develop criteria that consists of a default value based on risk assessment and decisions, or ranges of values based on risk assessment only. Our answer is that there should be a range of values. A range of values is more flexible and allows for risk management decisions that reflect local needs, local opportunities and that are more appropriate for local communities. One thing I should say about the form of these questions is that both of these questions on session I are that should we do this, or should we do that. I think the tone of this conference it's been clear that whether should we do this, or that, we should recognize that there are a range of opportunities, a range of methods that can be implemented to improve the water environment and that we should not restrict any of them, and that we should use every opportunity we have to do the right thing.

The question from session two was, Should EPA require states to adopt methods for nutrient enrichment and habitat degradation and sedimentation or should they leave these methods to states for a voluntary practice. And we think that EPA should provide guidance, true guidance, goals and expectations to states and others on what methodologies are appropriate to address water quality issues. EPA and its research and development function has a broad charter to develop technical and scientifically-based guidance. States should be in a position to decide how to implement the guidance, and decide on what guidance should be implemented to achieve their goals. And when I say the states, I mean in fact the states, and the stakeholders involved in the watershed under consideration.

And the third session was about, What can EPA do to encourage ecological risk assessment in high priority waters? We think that for EPA to encourage ecological risk assessments they have to back off from the command and control posture. Command and control is fundamentally in conflict with the concepts we have heard at the meeting, with the concepts we have heard from those who have been successful in developing watershed management plans. EPA should continue modeling efforts, so that we can create tools that are useful to water managers in assessing risks. One thing I think we have to keep in mind that we have to allow time, we frequently get tied up in statutory mandates and in regulatory schedules that are unrealistic. We have to know what is real, what is possible, what's the most important and act in an ordered fashion to take care of the biggest problems first rather than tie us up in knots by coming up with unrealistic schedules and unrealistic expectations.

Also, in order for EPA to encourage ecological risk assessments, EPA should take very seriously, the question of education and the responsibility EPA has to educate all stakeholders. Frequently, especially individual citizens, are victims of fear, and they shouldn't live in fear. These are problems we can deal with, these are problems we can understand, these are problems we can learn about and the citizens deserve to know they are not victims of random poisoning. In fact, they should know we can address the contamination problems and protect everyone's well-being, including that of their ecosystems. We think that all participants should know what is going on in the water systems and understand what the impacts of individual citizens are, what the impacts of groups are on water quality. EPA should encourage the assessment of ecological risks, nourish the spirit of trust, and encourage an understanding of all points of view.

And finally, our sixth question, Should EPA continue its independent applicability policy that all types of criteria should be met? We say no. Independent applicability is counter-productive to fostering a watershed approach to water quality. EPA must go beyond command and control. They must rely on the experts we have heard here today and others throughout the country, to make good decisions that will target the real problems they understand and that will achieve compliance with realistic goals. All issues should be considered and all states must have the opportunity to prioritize what's important to them. In fact, as a nation, we should address what is wrong and make changes to correct problems.

In closing, I would like to echo the comments of William Weeks of the Nature Conservancy, where he said the essence of success is to accomplish conservation objectives, while co-mingling the interests of all stakeholders. The industrial community agrees. We are happy to be here. We look forward to working towards these goals; we look forward to meeting all of you again, and to help you understand our concerns and to implement effective solutions.

Moderator: Our last speaker is Jessica Landman. She is a senior attorney at NRDC and she is residing here in Washington, DC.

STAKEHOLDER OBSERVATIONS - Environmental Perspective

Jessica Landman
National Resources Defense Concil
Washington, DC

Good afternoon, I see I find myself as the last speaker, on the last panel of the last day, during what for my daughter would be prime naptime. And so I guess I have to ask, is this a reward or a punishment. Is this accident, coincidence. I just don't know what to make of it. Thank you Betsy for the opportunity of being here. I will confess I have polled nobody from the environmental community to give you reactions to the questions, so these can be billed only as my opinion and nobody else, but I think that if you conducted an independent and unscientific survey, you might find that many environmentalists if they were here, would agree with me.

First, Should EPA put a higher priority on writing water quality criteria of the traditional sort, or on developing methodologies for new types of criteria? My answer to that is that EPA should target its criteria. That doesn't sound like a direct answer, does it Betsy. Now let me be more general in my answer. EPA needs to have a system for deciding where its limited resources on criteria development are going to go. We support the approach that's taken in the area of effluent guidelines development, where EPA is compelled actually by the statute but they certainly don't need a mandate from Congress to do this, to periodically review its plans for how its going to develop criteria and where it's going to focus. Publish the proposed criteria in the Federal Register. Ask interested stakeholders for their opinion and then write that plan and abide by it. That's a pretty good idea. I don't really think any of us can give them a useful answer to the question, unless we are getting very specific. What chemical specific criteria are they proposing to write for us? I would like to see the proposed list, and then I would like to give them my opinion on it. And I think EPA should be encouraged to write a proposed plan for developing criteria in which they present what would be the best and strongest case for specific criteria, chemical specific ones they are thinking about and for the alternative ones they are thinking about in terms of sediment and wildlife and the like. Then they should ask all of us for our opinions and then they should publish a plan reflecting their considerations of those opinions. So let's have a system that all of us can systematically comment on EPA's game plan and give them our input.

And then I'll turn to the either/or question. Should EPA develop criteria that consists of default values that include the risk management component, or should they give the states a range of values from which to select and focus on the risk assessment angle only? Here I guess, I'd like to say my comments from here on in focus on a number of themes that I think reflect concerns to the environmental community. I think those themes that are important and what the conference has addressed already, are trust, accountability and fairness. People and citizens around the country, in environmental groups in particular, are having a problem with the trust issue. We talked about that yesterday. And the fairness issue is one of growing concern to us and to EPA, if you look at the President's Executive Order on Environmental Justice, for instance, the question of fairness is a critical issue. My concern is that we need to have some kind of national consensus achieved on some of the key risk management decisions that are part of the water quality criteria. Let's take for example, the question of cancer risk level. What level of risk is acceptable? Is it acceptable that one state would conclude that their citizens would accept a one in ten thousand cancer risk for every pollutant present in a complex waste stream? While the adjacent state picks a one in a hundred thousand and the state upstream picks one in a million? I don't think that's fair, and I don't think the public understands it and I think it contributes to the lack of trust that exists today between industrial discharges for example and the community residents who live downstream of their plants. And by the way, I don't mean to pick on industry here, but you are the ones who have had to address this very issue in the permitting context. I think we need some national dialogue on these questions, of what types of risk management decisions to make. I do not think its appropriate for states individually to arrive at decisions on these risk management questions that differ substantially and where it's clearly not fair to the citizens. That's from the standpoint of those exposed and from the standpoint of those regulated. So I favor default values based on risk management decisions and I also think its important that those decisions reflect an open dialogue where we directly confront the question of how much risk is appropriate and we reach some conclusions that apply to all of us around the country.

Next, Should EPA require states to adopt methods for essentially biocriteria such as nutrient over enrichment? Gee, I can't believe we are asking this question. Of course, EPA should require the states to adopt such methods. In fact, why in heavens name would states object to being instructed to adopt such methods, when we know that these are the criteria that provide us with useful measures about pollution problems that are attributable to polluted run-off. When everybody knows that you need meaningful measures to evaluate that type of pollution for purposes of accountability, for purposes of measuring water quality and having some useful measure for which to see whether progress is being made. Everybody today and yesterday has talked about the importance of performance and having goals to shoot for that are meaningful and that are quantifiable. I don't think there is a cookie cutter set of nutrient standards, for example, that are going to apply in every geographic region. Or that there are going to be habitat criteria that are universally applicable. But that is not the question. I notice Betsy that this question is very carefully worded. It talks about requirements that methods be adopted. It does not talk about systematically adopting the same method coast-to-coast. The point I guess that I'd like to focus on is that every state needs to have on the books meaningful methodologies for evaluating whether they are addressing polluted run-off sources. Therefore, EPA should require that they be adopted, but should be appropriately flexible in making sure that states can adopt ones that make sense for their geographic hydrologic situation.

The next question is What can EPA do to encourage the ecological risk assessment in high priority watersheds? Well, I think that's an easy one. Give people money, and they will do it. Just so you know, this was one of the issues that was considered in the context of the Clean Water Act reauthorization. Congress was prepared to reward programs in which communities invested the necessary resources to develop a watershed based program and showed they have a reasonable basis to conclude in that watershed there weren't going to be problems. For example, if a community could show because of an overall risk assessment that nutrients from sewage treatment plants would not cause problems, the community would be allowed additional flexibility in areas such as the length of time for which sewage treatment plant permits could be issued. In other words, Congress at least was willing to consider the possibility that there could be flexibility in the standard permitting program in those situations where a good case could be made, where that flexibility was appropriate. I think a lot more discussion has to occur before everyone can be on board for exactly what types of flexibility that might be. Longer permit terms was one thing Congress put on the table and perhaps changing the terms of those permits is something I bet some of the people in this room would like to put on the table. But the point is additional flexibility should go along with additional accountability and ability to demonstrate there is a basis for that flexibility. I think that's where the discussions ought to go.

Finally, we come back to that question on everybody's mind, should EPA continue the independent applicability policy? I must say, this seems to me to be a tempest in a teapot, but this is a battle in search of a battleground. In a sense, I think that there is an answer to this dilemma in really good data collection, and really good understanding of ecosystems. And maybe this is not a problem in North Carolina--is Steve Tedder still here? I'm not sure. Let's say you have a water body where you can demonstrate that the EPA default criterion for a metal is not appropriate because the local ecosystem is clearly supporting a balanced indigenous population, natural background levels make it inappropriate, etc., etc. Isn't that a case for a site specific water criterion? Why is that a case for kicking one of the legs out from under the independent applicability stool? I just don't see this as a good place to shed a lot of blood. It seems to me that a good state program isn't going to have to obsess on this issue too much longer. Let me give you an example based on the trust concept of why we have a problem with kicking one of the legs out from under the stool. A lot of environmental groups do battle with the Corps of Engineers about dredging permits--the dredge and disposal of contaminates. What we find and if there is anyone from the Corps of Engineers who would like to challenge me, please don't raise your hand. A test is performed on those materials. And the materials flunk the test. The Corps of Engineers searches and searches until it finds another test to perform on those materials until ultimately there can be a test found that can be performed on those materials, that the materials will pass. And then the materials can be dredged and disposed. That is one perception of an attempt to kick a leg out from the stool, and that is the trust problem that many of us probably confronts in dealing with environmental problems at the local level. That's not a useful direction for this debate to go.

Let me end on a note of trying to look for ways that all of us can marshall our resources the most effectively. We can work to consolidate and integrate reporting, monitoring and other types of redundant requirements. Some of them may even be irrelevant but they consume a lot of your efforts and ours too; 319 reports, 305B reports, 304L reports; the list goes on.

All of us in this room should turn to our colleagues in EPA and ask them, why can't all of these requirements be consolidated, coordinated, and made more comprehensive and more comprehensible to all of us. A few years ago EPA actually proposed a regulation that would have taken all of those reporting requirements and attempted to consolidate them and coordinate them into one unified effort. That occurred, but they were somewhat constrained by the statute in terms of the timelines for these things, but that occurred in an organized way that made sense to everybody and could have saved us a lot of time. That was a really good idea. I think it's one all of us could get behind, and I think it could be the first step in getting behind something like instead of a triennial review, a review that occurs every five years, instead of a biannual 305B report, one that occurs every five years. But one that contains meaningful information. A 5-year review process that really brings all the stakeholders together. If it happened less frequently, but more indepth it could probably have the support of many of the people in this room. Those are the kinds of things I think all of us could perhaps get together, agree on and maybe take our recommendations to the U.S. Congress, and maybe they would follow our suggestion, if we all made it together.

Which brings me to the point that Bob Berger made earlier. Although many states are doing a lot of good things and have made a lot of progress in addressing polluted run-off sources despite the absence of a stronger Clean Water Act that mandates that we do something and something enforceable with respect to polluted run-off, the fact is that a lot of states and EPA are really waiting for a clear signal from Congress . We are losing out by not having had that signal sent to us this year. For example, there was a presentation by Geoff Grubbs and others today about the TMDL process. Learn everything you can about waste load allocation in the absence of some mechanism to enforce a load application and make it meaningful with respect to polluted run-off sources. A TMDL will remain nothing but a paper exercise in many cases in many states. We really have to have a Clean Water Act that is more balanced in terms of the types of powers and authorities that it gives the federal government and the states to address polluted run-off sources as well as point sources.

Now why don't we have a stronger Clean Water Act this year? A number of people may have touched on this yesterday, I know I did yesterday, talking about gridlock here in Washington. Just so you know, not only would that legislation have given the states a lot more money, but it would also have significantly rolled back some of the pending unfunded mandates that are of the gravest concern to states who are trying to come up with the funds. Particularly in the area of stormwater and combined sewer overflows. I'm sure you know that October 1 is the deadline at which the moratorium on the obligation to have stormwater permits expires for small communities. That moratorium, once it expires, means that small communities are in fact liable for not having stormwater permits. I think this is an unfortunate situation. And one thing that I had a very difficult time understanding this year is why it was that state water quality agencies, the National Governor's Association and the National League of Cities did not support the enactment of a stronger Clean Water Act which would give you the tools that you need to address polluted runoff sources and get at some of the resource problems that you states have. Maybe some of you have very strong reasons for having been concerned about what was in those bills this year, but it's a lot of money that we are not going to be seeing, and it's a lot of opportunities for more flexibility in addressing wet weather flows that we're not going to be seeing as a result of the fact that that legislation didn't move. I guess I'd just like to say, let's try harder next year to come to agreement on some of the key improvements needed in the law and see if we can't move this process forward. Thank you very much.

Moderator: That completes our stakeholder observations, but we do have additional time because we cut short the summaries of the session managers. Does anybody want to make any comments regarding the questions that we had, or any comments in general about implementation issues? Yes, in the back.

Comments from Audience.

My name is Larry Shepard. I'm with EPA Region 7 in Kansas City. And I'd just like to make a very brief observation. If the definition of a stakeholder is someone who has a different albeit, slightly different perspective on an issue or a problem, than say other stakeholders, my observation is that if you look at the lineup of the stakeholders, the EPA regions are noticeably absent. And I guess the observation I'd like to make is that EPA regions are different than EPA headquarters because of the function they perform, which is sort of to be the buffer between the regulated community, states and EPA headquarters. The regions do have different perspectives, and I think throughout this whole meeting, I think the perspective that the regions represent has been under represented in the meeting. So I just wanted to share that thought.

Moderator: Well, do we have regional representatives here that would like to speak, again it doesn't have to be on the questions we came up with for the stakeholder panel, but just on any implementation issues?

Larry Shepard: I wouldn't presume to speak for all the regions, and I wouldn't even presume to speak for Region 7, but I can speak for myself as the standards coordinator in Region 7, and I guess I would like to mention a couple of things. One of them is in fact, what I would consider to be my answers to some of the questions.

Moderator: Go for it.

Larry Shepard: Thank you. As far as the question whether EPA should be looking at adopting new criteria, sediment criteria, wildlife criteria or more criteria, I think the answer should be that basically what we need is different criteria. Part of the problem is we whereas haven't exhausted the list of pollutants, we've covered a lot of categories. If you find metals in sediment, the control strategies you would implement may largely be the same to control all of those. If the NPDES permits says you have to take out lead, the chances are that whatever you have to do to take out lead, would also take out copper. The same thing kind of goes with the different kinds of organics, the bioaccummulatives, the fat soluble or water soluble organics, the strategies for control tend to be the same. So I guess I would question whether we need to have 142,000 criteria for organics, or whether we instead need to look at the notion of assessment. In other words, what triggers our cleanup. If we look somewhere and find a contaminant, or if we don't look for a particular contaminant, we never get to the point of controls. If we have enough information that suggest a level of pollution is bad, then we'll start that control process. So it seems if you've got enough pollutants on hand that trigger your decision to take an action, then you're OK. The problem is where we don't have the right end points in the case of sediments and wildlife. So I would say we should start looking to new methods. Although, certainly in a perfect world you could do both, but I would point the other way.

As far as the notion as whether we should have ranges of values, standards coordinators have been talking this week, and basically the way we feel is, you can do a risk assessment and you come up with a range of values that can be explained and supported by the notion of science. Although people have said that all science is good science, and if it's not good science it's not science. But at any rate if you come up with a range, and you support that with scientific position, however, you need one number to implement. You cannot implement a range. If you passed the range on down to the states, they will pick a number. Chances are the scientists won't pick a number. And chances are the risk managers won't pick a number. The Governor will pick a number. The legislature will pick a number. And the basis will not be technology, or science or risk management--it will be politics. So what we have said is, do your risk assessment, get a range, pick a number as risk managers, as EPA risk managers. Section 304A says EPA, that's what you are supposed to do. Get the information, make a guidance recommendation, we'll send that down to the states. The states always have the opportunity to go in and tweak one way or the other. Certainly they can be more stringent, they can be even less stringent, as long as the rational is supportable. What we have said is, get your risk assessment, get your range, EPA do the risk management decision. Give us a number, pass it on down. Generally that's what everyone is looking for in guidance. Because basically the regions or the states don't have the resources, the staffing or the expertise to go to court and make defenses over every number that pops up. So we need to do that at the headquarters level.

As far as independent application goes, not all the regions certainly present a unified position. I won't speak to that, but I will say that we had a workshop in Kansas City about three years ago, and one of the opponents of independent application said this is the way we look at the independent application. I have three goals in life. One is to be the EPA administrator, to win the lottery and win $10 million, and to marry some famous starlet. Now just because I don't become the EPA administrator doesn't mean that that is a bad thing and my life is a waste. Well basically that's the backwards way of looking at it. I have three goals. One is to stay out of prison. One is not to get AIDS, and one is to keep all my natural teeth. Now just because I don't keep all my natural teeth, means I should be happy about that. So it's basically, instead of looking at three positive things, you should be looking at three negative things. Just because you stay out of prison and you don't get AIDS, you should be happy about having all you teeth fall out. So that's the way we look at independent application.

The final thing I guess I would like to throw out for general thought is eco-risk. If you look at EPA's efforts for biological criteria, part of the problem with getting states to get into biological criteria is it is resource intensive, extremely resource intensive. If you ask people from Region 5 how much money and how much time went into their program to get to the point where they have numeric biologic criteria, it is astounding. It took years, and it took thousands, and thousands of EPA dollars and state dollars and Ohio EPA has devoted handfuls of their staff people to manage that program. And the states say yeah, that would be great, can you give us the money like you did Ohio EPA? Can you give us more money to sustain the staffing levels. Now for instance in Region 7, the states rely almost exclusively on EPA money to run the programs. The legislatures give virtually nothing to their state agencies to run the program, and they depend on us to get it done. So, whereas we are now pouring millions of dollars into the eco-regional approach and producing documents that can serve as the ballasts on freighters in the Great Lakes, maybe if some of that money could be steered toward the states. We keep talking about measuring and assessing, those biological criteria are critical to that, and we're never going to go anywhere until we get the funds and resources to get that done.

So although I agree with the eco-risk approach, I point out the resources that may or may not be misdirected. I also point out that maybe instead of worrying about measuring eco-risks, maybe we could take a look at the criteria we have in place or could have in place, if we protect the components of the ecosystem. The sediment, the water column, wildlife, get the biological assessment tools together, and if we implement those and NPDES permits and non-point source controls, if they ever come. I would say this would go a lot farther to protecting the ecosystem than if we spend hundreds of millions of dollars on pilot studies and documents that are taller than most of us who work at EPA. At any rate, those are my observations. Thanks.

Moderator: Thank you very much. There must be somebody else. I really want to encourage you to speak out. I think there have been some side bar conversations over the past three days, and this is a chance to do it in a plenary session. We have all the managers here from the program, and they really want to hear from you. Go ahead.

Thanks, I'm with EPA Region one, which is New England. I guess thinking about EPA regions, I said well yeah, we do have a different point of view. So I'm involved in a holistic watershed management project called the Merimac River Initiative. And just through that experience we've gone through a lot of what we've talked about here, the stakeholder involvement, the problem definition, all these things, and one of the real life observations we've made is so much of the decisions aren't at the local level. Maybe it's New England more than other places, but one of the biggest things we hear from the local people is the need for more information, for them to make informed decisions in a watershed context. And it's surprising to me that I haven't heard many people talk about information and the need to get information to the public who are the decision-makers. So I guess, you know, people talk about education and that sort of thing. But I think information management has become a pretty critical part of my watershed initiative. And I'm surprised I haven't heard more about it. And I guess one other observation is I still feel like there's a pretty big schism between the standards people and the way they talk and the watershed people. I consider myself a watershed person and not a standards person and I still feel like we need a lot of talking to come to a place where we can go to the stakeholder who really will be the steward. I really appreciate hearing from industry and environmental groups. I think that's terrific.

Moderator: Thank you. Can you clarify a little bit? What do you think the disconnect is between the standards and the watershed approach. Because presumably the standards are a tool of the watershed approach.

Region One Commenter: I know, but I think there is some language problems. The fellow from the Nature Conservancy also, it's just a language problem. When I go to talk to the public about designated uses and things like that. There is still some misunderstanding about what that really means for their lives. This reminds me of something else we are thinking about, going to the public to talk about designated uses again, and then what does that mean for standards and criteria, if those change.

Moderator: Ok. There were some excellent presentations yesterday on different types of designated uses. Any other people want to speak. Yes, over here.

Commenter: Hi. Tom Brosden, the New York City Environmental Protection. I just had a comment on independent applicability. I think some of the reasons people get kind of nervous about this is particularly when they are dealing with some of the standards that are outdated. A case in point was the salt water copper standards which many of you know about. We had a problem in New York, exceedances of the copper standards even though the biology in the receiving waters did not show a problem. And, Jessica, we did exactly what you implied. We did a site specific criteria, and we did it in conjunction with EPA and it worked out well. In fact, it cost almost $1 million to do a site specific criteria, and that's not an unusual price for some of the other ones that have been attempted. It took almost three years to complete. To update a criteria when we couldn't find a problem to begin with in the harbor. It's just a word to the wise. A site-specific criteria is one of the last things anybody wants to get into, because they are difficult to do and so costly and they divert resources from what we consider to be real problems like PCBs in fish, mercury in sediments, things like that. A final thing on independent applicability. Everyone is taking it as an all or none. Perhaps what we could do is just have a weight of evidence. You can use all three legs of the independent applicability, but have perhaps the biological evidence be weighted higher than the chemical evidence, which would be weighted higher than the wet testing which seems to be the least definite indicator of all.

Moderator: Thanks, that's an interesting suggestion. Anybody else?

Commenter: We are looking at a couple of things that we have been dancing around. Mike Harris from Amoco. One of the things that we are dancing around is for permit holders or responsible people whether they are non-point source or point-source if you are using a biological criteria or watershed ecological risk assessment, and the answer comes back, Gee, there still is an impairment. But the analysis says it has nothing to do with what I'm involved with. Whether its toxic or a non-toxic sediment. How are you going to handle that issue? In other words, you've got a three legged stool you fail a lab criteria, because the receiving water is impaired but when anybody looks at it it's because of something that has nothing to do with your discharge or run-off. That's one issue. Then it's going to be the same situation when you start looking at habitat impairment where the area is impaired but it's not a pollution problem. How are you going to deal with the various people you have to work with? There are decisions you have to address there, so don't ignore them while you attempt to embrace a new approach. The other thing when you talk about new standards, new criteria, keep in mind, this is one of the things that our Yorktown pollution prevention project came up with and emphasized. It's not a freebie to take it out of the water. If you take it out of the water, it goes some place else. In other words, there are some sort of perhaps indirect environmental costs associated with implementing a water specific criteria. And the multi-media issue is one thing I know EPA is aware of in the program offices, and now you are saying the place rangers, but keep in mind there are costs associated with implementing a specific criteria in terms of media transfer. Not everything will be destroyed; not everything at least in my industry where you take a raw material, petroleum and crude and you refine it. It's hard to change what's in a crude oil.

Moderator: Thank you very much. Anybody else? Yes.

Commenter: Mary Jo Garreis, Maryland Department of Environment. Concerning the need for specific state direction or requirements on the states to address issues like sediment, nutrients, whatever. I think that would be a mistake. And I believe that it would be because if EPA is very serious about this watershed approach; and if it actually works as we envision that it should, for every watershed that it is attempted on, those things are going to fall out. The watershed is going to point out whether you need nutrient requirements, whether you need whatevers, and I think the Chesapeake Bay experience has shown that when that happens, you can do a lot more with peer pressure, voluntary control in the absence of mandated regulatory control. I think we should give that opportunity to work rather than go into the command and control kind of requirements again to set up barriers that slow us down instead of actually accomplishing what we think they should do.

Moderator: Thank you. Anybody else?

Commenter: I'm Bob Oberthaler, State of New Jersey. One question on prioritization of types of criteria. Basically I think we need a balance of the kinds of specifics as well as the other tools to be developed, and I would like to echo what some of the speakers said about a schedule. A lot of us are in the midst of rule-making at the states and we don't know what EPA's schedule really is in the times we have gone out with rule-makings. Then EPA will come out with something and as I believe the man from Illinois said, sometimes it takes years to do these proposals. And we are in the middle of a proposal and the very thing EPA comes out with will be used against us on our proposal as we don't have up-to-date science or we aren't following the most current guidance from EPA. It puts us in a very embarrassing position because we didn't know the Agency was coming out with these things. The other thing is it doesn't matter to me whether it goes in the Federal Register as much but at least it's out there and people are aware of it, and that EPA delivers on time. That's another thing we hear, guidance is coming, guidance is coming and then sometimes it doesn't come. We don't know why it doesn't come, it just doesn't come. In terms of the overall conference proceedings I think one person said that it would be fruitful if a strategy would come out of this.

I was talking with Mary Jo at lunch, and she echoed that as well, that there should be a strategy. I had a comment yesterday, it would be nice to have a draft strategy developed and EPA went on the road into the regions with the draft strategy and got further stakeholder participation from the states, as well as the regulated community and environmental community. And then finalize that strategy. One of the elements that should be in it would be what she just kind of implied, is that it would be good to have voluntary things in terms of these new initiatives.

Moderator Comment: And the strategy would not just be on criteria development schedules, but would be on the implementation schedules also.

Bob Oberthaler: Yes. Thank you.

Moderator: Anybody else? Regions, States, anybody? Ok. With that we're going to close. I'd like to give another big hand for the stakeholder panel, and then we'll turn it over to Tudor Davies for his closing remarks.

Closing Remarks

CLOSING REMARKS

Tudor T. Davies
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Thank you all for being here. It's been excellent hearing your input and ideas. It's going to take us all time to review what we've heard, the side bar conversation we've had, as well as the formal presentations. I'd like to thank the staff who put all the time into getting all the speakers here, and the speakers for preparing. And I'd like to thank the people who cornered me in the corridor to give me their individual viewpoints so I would know all the things we do wrong and all the things we can do better. We'll think about those and try to help.

I think there were very thoughtful summaries here today. I think there were very thoughtful remarks at the end which I think reflect some major concerns in our community about how we actually move forward from the traditional criteria and standards program that we're all used to, to what may be a future program. We feel somewhat committed to at least in headquarters, although I hear the regions may not be the same degree of commitment, to moving forward from the traditional programs to looking at ecosystems in watersheds. We have some change to make in terms of philosophy. We have some risks to take, and we have to make the whole community comfortable in this movement. The Administrator expressed three major priorities that she was concerned about, the first being that nature is a system, that we don't move pollutants from one place to another. Secondly, that we think about pollution prevention, and thirdly, that we involve stakeholders. And we heard that from Bob Perchiasepe too. And I think Bob's concern was that we move forward on the basis of the base program that we have built over time. We have a lot of success, we should move forward from that base.

I think the following comments that I heard during the week, characterize the essence of this meeting.

Ecosystems are more complicated than we think was an interesting comment that I heard this morning. Another was communicated by one of the people who is concerned about whether we could move forward from the existing criteria and standards program. This person said to me, "Can the regulatory framework of the criteria and standards get us to ecosystem protection?" I think that is something we have to think about.

Then someone talked about science as a successive approximation to the truth. And I think we need to bear that very carefully in mind. And I loved the comment that Jessica had yesterday in terms of flexibility and particularly in terms of the independent applicability program. She indicated that you get flexibility perhaps by earning it. I didn't quite like "earning it", but the idea is that we can have flexibility in our system. We can have a relaxation of the independent applicability process, but what we've got to do is have information to show that we are protecting the environment either through criteria, either through biological indication or through effluent toxicity. We have had cases made to us where we've been shown that the information content lies in the biology and not in the criteria, and that we should understand, but we have to have information to make those judgments. We can't do it strictly on trust. And the statement that I thought was the most marvelous one of the whole meeting talked about competition between alternative uses and I think we'll all go away thinking about this. I thought that was a wonderful statement.

I think some of the things we have to do as we go away from here is we must continue education and outreach in the criteria and standards program. I think the academies we have run with the regions have been very successful. We have new programs that are coming on line with the tribes; we have new people coming into the states; and I think it's important that we continue this academy program that we ran this last year. We have had hundreds of people that have been involved in that, and I've had very strong comment on how useful and important they are. We've also run a series of workshops that have been mentioned on particular issues. I think that I would like to see those expanded over the next years so that we put more time on working with the states, regions and other stakeholders, particularly on regional issues. This is the way that we can share information and perhaps get out of this fear that I think is in the system about relaxing from our traditional programs as we move into watershed programs. I also need to say to respond to Bob Berger and to other commenters I heard, we want to have you involved as we develop procedures, guidance and new science. I think the model of the Annapolis meeting where we talked about metals is a good one. We got scientists, regulators, the affected people together to talk about the issues. This was a good meeting and we would like to use that model more into the future. I also sensed here, and I guess sensed elsewhere, that we, perhaps I should say the states, the EPA, the regions, the dischargers, we have a certain culture, we have a certain way of thinking and we are not well integrated with the resource industry. We've got a different philosophy, we've gone a different way with our science, and we're going to have to communicate better with them as we look at ecosystems and ecological protection. And I think we all have to step out to try to make that bridge. I've been working extensively on endangered species act coordination, and there are different philosophies, there is not a trust between us in those communities, and we have to build that.

We will work on a number of things over the next year that we'll involve you with. Use astainability analysis, and risk assessment, improving designated use guidance. We will try to make TMDLs more user friendly. And we hope that the contaminated sediment assessment will help you with your watershed listings. We're going to work on biological assessments of criteria; we will be seeking strong input on the over enrichment, nutrient criteria area, and also with human health methodology, particularly on mercury, dioxins, and lead. We will be looking to have involvement on an implementation manual for sediment criteria, in terms of the conceptual background to that. And we will be giving you lots of information on metals over the next period. As you know, we have done a reexamination of what we should use for metals. We are thinking very seriously about the dissolved metal issue. We are working with USGS to get out new clean techniques for measuring metals that will be developed over the next couple of months and also sampling techniques so that what we are dealing with is the real concentrations rather than the contaminated concentrations we have been dealing with in the past. So look for that information. We'll be looking for comment on it. I hope that that will solve some of the metals problems that we talked about when people go out and do site-specific criteria, and have problems with measuring levels of metals in the environment that are not the actual levels that are affecting organisms. Guidance on eco-risk assessment is something we'd like your involvement with, and I will continue to have dialogue on independent applicability.

One of the things I'd like to suggest over time and it's something we have suggested to our Administrator, is that we would like to specifically work with some pilot states on ecosystem management. You could have a lot of innovation, frankly the states try things usually before the federal government does. So if there are some states that would be interested in working with EPA headquarters, and regions perhaps on independent applicability, or different ideas on watershed approaches, we would like you to approach us so we could perhaps help with people and maybe some money, so we could move forward in this area.

I think that the concept of having a watershed strategy is one that the Office of Water endorses. We have tried to put together some structures to develop that strategy. The agency itself has a broader strategy to think about watersheds. And the example that we took for the contaminated sediment strategy, where we developed the strategy, published it and then we went out and had workshops may be again, what I think someone was suggesting, to get a strategy, take it out on the road and see what people think about it. I'll take that back.

The concept of a proposed plan for criteria development was one that was in the green book. The green book was the government proposal for the Clean Water Act. We there talked about having a plan, like the 304(m) plan that Jessica talked about for criteria development and guidance. I think that's still a good idea, something we should follow up on. And then we could get your comment on where we are going in a formal fashion.

I think the agency is sympathetic to the idea of longer periods for review of triennial review of standards; longer periods for permits is something again we talked about in the Clean Water Act. I think those are the things we should continue to have a dialogue on. I don't think anybody within EPA disagrees that we have got to deal with non-point source issues. We are dealing with it in some places. We're dealing with it where we have money, but it is I think the future for us. We were all exceedingly disappointed that we didn't have a Clean Water Act that allowed us to begin addressing that. We were looking for a signal. I think Jessica was right in that. We've got to move in some other way, and perhaps the farm bill of next year will be another mechanism for us to work with the Congress on this issue.

That's all I have to say. Again thank you so much for coming. Have a safe journey home. Thank you for you input. We'll reflect on your comments, and hopefully get the proceedings out quickly. Please be involved with us as we in a broader EPA sense work on the strategy that is needed for watershed and the issues for criteria and standards.

Thank you again.

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