United States
Environmental Protection
Agency

Office of Water
Washington, D.C.

August 1988

EPA

National Symposium on Water Quality Assessment

Meeting Summary

June 1-3, 1988
Annapolis, Maryland

Maryland
Department of
The Environment

MEETING SUMMARY

NATIONAL SYMPOSIUM ON WATER QUALITY ASSESSMENT
ANNAPOLIS, MARYLAND
June 1-3, 1988

Prepared by

Tetra Tech, Inc.
Lafayette, California

EPA Contract No. 68-03-3475

for

Monitoring and Data Support Division (WH-553)
U.S. Environmental Protection Agency
Washington, D.C. 20460

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1. OVERVIEW OF SYMPOSIUM

1. OVERVIEW OF NATIONAL SYMPOSIUM ON WATER QUALITY ASSESSMENT

The National Symposium on Water Quality Assessment was held June 1,2, and 3 in Annapolis, Maryland. The symposium followed the completion of a major review of EPA and State surface water monitoring activities discussed in Surface Water Monitoring: A Framework for Change (U.S. EPA Office of Water/Office of Policy, Planning, and Evaluation, September 1987).

The objectives of the meeting were to bring together representatives from EPA, State water agencies, and other Federal agencies to exchange information and ideas about the collection, analysis, management, and use of surface water quality information, and to develop specific recommendations on six key monitoring issues.

Geoffrey Grubbs (U.S. EPA) and Michael Haire (Maryland Department of the Environment) opened the meeting. The first day continued with a keynote address by Rebecca Hanmer, U.S. EPA Acting Assistant Administrator for Water, three panel discussions, presentations on nonpoint source monitoring, and an address by Abel Wolman, Professor Emeritus of The Johns Hopkins University. The second day included two concurrent technical sessions, six concurrent workgroup meetings, and finally a poster session. On the final day, the six workgroups reported their findings and recommendations at a plenary session.

This meeting summary includes the keynote address, abstracts for each of the presentations, issue papers and recommendations for each of the six workgroup sessions, and a summary of comments and recommendations made by participants in their evaluations of the meeting.

Included as appendices are a list of registrants, the agenda, contacts for the poster session presentations, and an informal EPA survey of state monitoring activities and resources.

2. KEYNOTE ADDRESS

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Rebecca W. Hanmer
Acting Assistant Administrator for Water
U.S. Environmental Protection Agency

It's a pleasure to be here this morning and have the opportunity of addressing this diverse group. It is particularly significant for me because I believe that you (and your counterparts who could not be here today) hold a critical key in the evolution of the water program.

I have watched this evolution first-hand throughout my career. In the 1960's I worked with the Federal Water Quality Act (FWQA) on water quality standards. In the 1970's and early 1980's the program was squarely centered on getting technology-based treatment standards implemented. Now the focus is back to water quality and the path of future evolution is clearly toward land-use management to control nonpoint sources and to protect critical habitats. From this point onward, monitoring and assessment are a critical function of the program.

I'd like to briefly explain why I think monitoring and assessment are so important.

The first reason concerns the continued progress of the water quality program. We as a society have invested hundreds of billions of dollars in point source controls; yet overall, from the meager information we have, the trend in water quality seems little better than static. There is a legitimate argument that this represents a major accomplishment in light of the growth in pollution generating activities. But the charge of the Clean Water Act is to restore the nation's waters, not hold the line. Only monitoring can tell us what's going on -- whether point sources, nonpoint sources, atmospheric deposition, in-place pollutants, or other problems are responsible.

The second reason concerns how we know what we think we know. Our whole process of establishing criteria and water quality standards, assessing waters, and determining permit conditions rests on numerous assumptions. We assume that a few critters tested in artificial laboratory conditions can represent an entire ecosystem. We generally ignore the influences of habitat altering processes. We assume that pollutants act independently of each other. And we assume that our toxicity testing and modeling procedures properly account for the effects of fluctuating exposure. I'm sure you can think of others. Considered all together, our assumptions are pretty amazing. Ambient monitoring, particularly biological assessments, come as close as we can get to the truth. And we need to learn the truth occasionally.

Third, monitoring provides a feedback loop. Any undertaking needs some means to determine success or failure. Too often we have focused on programmatic bean-counting to gauge our success. Although appropriate for a program driven by technology-based requirements, bean counting just doesn't cut it for a water quality-based program. We need to be able to show real progress and demonstrate accountability for our pollution control investments.

My last reason I am beginning to view as perhaps the most important. It concerns the question of funding. Federal funding for State programs is an area of critical concern. We are currently examining options for offsetting losses in Federal funding, but the bottom line is that the States will have to provide more of their own funds. I believe monitoring and assessment hold the key to generating public understanding, interest, and support. Such support will be absolutely essential if we hope to get State legislatures and local governments to provide the funds necessary to carry out water quality programs. I will be particularly interested in your recommendations on how we can educate, involve, and interest the public.

The organizers of this symposium have set out an interesting and ambitious agenda. The goal of the symposium is to develop a series of recommendations that will guide the formation of EPA/State workgroups and set priorities for technical projects. In embarking on your task, I would offer only one point of advice. My perception is that the people managing monitoring and assessment programs view their function as primarily one of support for other programs and also tend to focus on the details of their job (for example, managing data).

I'd encourage you to think in terms of a leadership role. Only your programs can tell us what the problems are and, in large measure, how to fix them. You should work on enhancing investigative capabilities, decision-making tools, and communication.

This symposium is just a first step. I believe that we at EPA now appreciate how important monitoring and assessment are, and I hope we can be a more active partner with the States in this program. It is important that this symposium be a beginning, not an end. Your work here in Annapolis should set in motion a process for education, consensus building, and action.

You have a sound base for moving forward. There is an active research program in several agencies. You have a breadth of experience that is enviable compared with other programs. I am confident that you will develop imaginative solutions to carry the monitoring and assessment program into the next decade. Thank you.

3. PANEL PRESENTATIONS

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PANEL #1: OBJECTIVES AND APPROACHES TO MONITORING

Water Quality Monitoring as an Information System

Robert Ward
Colorado State University

Water quality monitoring is increasingly being viewed as an "information system" as the need for information on water quality behavior in the environment shifts from a strictly problem-solving mode to that of ongoing management. To meet these changing information needs, the monitoring systems themselves often must be redesigned. The purpose of this paper is to describe a framework for monitoring system design that accounts for the evolving role of water quality information within water quality management.

Water quality monitoring is viewed as a system which can be defined as following the flow of information through its various tasks: 1) sampling; 2) laboratory analysis; 3) data handling; 4) data analysis; 5) reporting; and 6) use of the resulting information. To design a successful water quality "information" system, a designer must: 1) identify what information is sought; 2) establish a statistical basis for the design; 3) determine where samples will be taken, what will be measured, and how frequently to sample; 4) specify operating procedures for the entire system; and, in particular, 5) define the final information product (e.g., reports) to be produced.

The connection between information expectations and the statistical data analysis methods employed to meet these expectations is an area receiving increasing attention in the design of water information systems. This connection, in the above framework, is the key to successful development and implementation of a water quality information system.

State Perspective

Steven Tedder
North Carolina Division of Environmental Management

[Abstract not received]

EPA Perspective

Catherine Kuhlman
U.S. EPA, Region IX

[Abstract not received]

Citizen Perspective

Frances H. Flanigan
Alliance for the Chesapeake Bay, Inc.

My remarks on the subject of the citizen perspective on water quality assessment will cover three general points:

1) how public interest groups do - or could - use water quality information;

2) how the priorities of public interest groups coincide or conflict with the priorities of EPA and the states; and

3) new approaches to monitoring to provide more cost-effective information.

Throughout my remarks will run the theme that the public is one of your consumers and that their needs ought to be taken into account as you plan your assessment programs.

Public interest groups use - or could use - monitoring information for all of the following purposes:

1) education: to inform their members and the general public about environmental conditions, trends, changes and so forth;

2) program monitoring: to assess progress of environmental management programs by observing changes and improvements in water quality and/or living resources;

3) watchdogging: to assess the effectiveness of regulatory and enforcement programs;

4) policy development: to enable citizen activists to participate in an informed way in the process of program development and planning;

5) lobbying: to support programs, budgets, and new regulations.

Our priorities and yours often coincide but sometimes conflict. For example, citizens' groups have a great need for timely information; they need to have data analyzed and interpreted; and they need to be able to gain easy access to information. They sometimes want what you consider to be confidential data. They have a need for clear, nontechnical presentations of data, and they need a big picture view of what is happening in an ecosystem, rather than small, out-of-context pieces of information. Most managers undoubtedly have similar needs!

The use of citizen volunteers to collect data is a relatively new approach that I would like to encourage you to consider. Citizen volunteers have demonstrated that they can collect credible data for a wide variety of parameters. Examples include water quality data, observational data on habitat, observational data on problems such as spills and sediment pollution, and anecdotal information on long-term changes. The benefits of involving citizen volunteers in monitoring programs include more frequent data collection, less expensive data gathering, development of a sense of stewardship, building of an environmental ethic, and an increase in public awareness and concern that can lead to increased political support for your programs.

PANEL #2: REEVALUATING PROGRAM DESIGN: STATE PRESENTATIONS

Reevaluating Program Design in Montana

Loren L. Bahls
Montana Department of Health and Environmental Sciences

Montana is a large and varied headwaters state with a small, largely rural population. Among waterbodies with impaired beneficial uses, 95% (by size) are impaired by nonpoint sources and only 5% by point sources. The main sources of nonpoint pollution are agriculture, forest practices, mining, land disposal, and hydromodification. The principal pollutants are sediment, salts, heavy metals, and nutrients.

The State's assessment program has gone through three distinct phases during the past 33 years. From 1955 to 1972, the program consisted of intensive surveys to develop stream classifications and water quality standards. From 1972 to 1982, the program concentrated on Basin Water Quality Inventories and Management Plans and 208 Water Quality Studies. In 1977, Montana initiated seasonal ambient stream biomonitoring (for macro-invertebrates and periphyton) at 85 stations covering all of the State's 16 river basins. This program was discontinued in 1981 with the loss of 208 funds. Meanwhile, the State maintained a water quality monitoring network consisting of three fixed stations sampled monthly.

An unprecedented bloom of Anabaena on Flathead Lake and a controversial discharge permit for the Champion International (now Stone Container, Inc.) kraft paper mill near Missoula prompted the State to reevaluate its surface water monitoring program in 1983. Since 1983, most of Montana's monitoring resources have been directed at comprehensive programs in the Clark Fork and Flathead River Basins. Thirty-nine stations are sampled 16 times per year in these two programs for a variety of chemical, physical and biological parameters. A small number of intensive surveys are conducted each year using one or more of the following: chemical analyses, streambank physical feature inventories, instream biological assessments, and ambient or whole effluent _Ceriodaphnia_ bioassays. Fixed-station monitoring and intensive surveys are conducted in cooperation with a large number of federal, state and local water quality management agencies. State resources allocated to surface water quality monitoring by the Department of Health and Environmental Sciences amount to 2.3 FTEs and about $130,000 per year. Data are collected for a variety of reasons to serve a large number of management functions.

Surface Water Monitoring in New York State: Rotating Intensive Basin Studies

Peter Mack
New York State Department of Environmental Conservation

OBJECTIVES

Locate and identify water quality problems. Develop baseline data to investigate water quality related cause/effect relationships (e.g., bioavailability of in-place toxics) and provide data to support regulatory decisions.

PROGRAM

Each of New York's 17 major drainage basins is monitored extensively for two years over a total six-year statewide cycle.

Sampling stations include major interstate waters, critical use areas, stream segments with localized problems, and streams considered unimpacted or background.

Twenty-four water column samples are collected at each site, primarily during high flow periods. Analyses include heavy metals, volatile halogenated organics, and conventional pollutants. Six water column samples are subjected to ambient toxicity testing. Two composites of surficial sediments are analyzed for heavy metals, organochlorine pesticides, PCB's, total volatile solids, and grain size. Macroinvertebrates are collected several times at all sites and evaluated for structure. Tissue is analyzed for heavy metals, organochlorine pesticides, and PCB's. Finally, two to four species of fish are collected at each site and evaluated in the same manner as macroinvertebrates.

STATUS

We are in the second year of the first cycle. Reports will be available in the second half of 1989.

RESOURCES

Program resources include a staff of 10 with $644k available for analytical services. $200k of the above is provided by the U.S. Geological Survey through a cooperative agreement. $60k per year over a two-year start-up period is provided by the EPA Great Lakes National Program Office.

Toxic monitoring is expensive; eight years ago our program costs were less than half of those dedicated for today's needs.

Surface Water Quality Monitoring in Florida

Jerry Brooks
Florida Department of Environmental Regulations

Florida's surface water quality monitoring program has evolved over its 30 years of existence in response to changing demands. Two factors emerge as having the greatest effect on the monitoring program: the nature and extent of surface waters and a rapidly expanding population. Because of the diversity and extensiveness of Florida's surface waters, it is difficult to establish a monitoring network which provides sufficient data to address all management needs. Within the State the management needs are often different from one location to the other and change over time. This condition is exacerbated by an explosive rate of population growth.

A statewide coordinated monitoring program began in the early 1970's. This network consisted of approximately 100 fixed stations. Establishment of ambient water quality for selected waterbodies was the primary objective. Initially, there was little consistency between chemical and biological stations. Over a period of several years, this inconsistency was corrected. This network, although limited in its range of coverage, did accomplish its objective. During the mid to late 70's, development in the state increased significantly. Concomitantly, a shift in management data needs resulted. Site specific data for predictive modeling became a high priority. By the end of the decade, monitoring was beginning to focus on basin assessments. In 1983 the state formally implemented a monitoring program designed to focus on specific basins. The utility of the data resulting from this monitoring design are variable throughout the state. This variability results from the lack of a centrally coordinated monitoring plan and a clear statement of the State's objectives.

Five years after the initiation of basin monitoring, the State is again evaluating its monitoring programs. Recognized as important to this assessment is an identification of data needs. From these needs a clear statement of objectives will be established and prioritized. Prioritization is considered important due to funding limitations. With the objectives established, the most effective means for collection of the data will be assessed. This will involve the integration of data from various programs at the local, regional and state level. Following the collection and interpretation of data, a format for the documentation of results will be developed. This final task of documentation is considered to be important to ensure the data's availability for management decisions.

PRESENTATIONS: MONITORING FOR NONPOINT SOURCE EFFECTS

Monitoring for Nonpoint Source Impacts

John C. Clausen
Vermont Water Resources Research Center
University of Vermont

The need for well-designed nonpoint source (NPS) monitoring programs has intensified due to the nonpoint provisions of the Water Quality Act of 1987 (Section 319). When planning a nonpoint water quality study, the first decision should be to define the objectives of the study. Subsequent decisions are needed to determine parameters to be measured, sampling method, location and frequency of sampling, and a study design with a sound, statistical basis. Most of these decisions will vary with the objectives and the type of system studied (e.g., stream, lake, groundwater).

Parameter selections can be based on activity-water quality matrices, correlations among parameters, or on the probability of exceeding a standard. Grab samples will determine concentrations but composite sampling is needed for an estimate of the mass loading to a waterbody. Sampling locations are intimately related to study design. For stream systems, alternative designs include: single watersheds with before and after sampling, above and below sampling which also can occur before and after a treatment, use of paired watersheds, multiple watersheds, or nested watersheds. Use of a single watershed is susceptible to climate effects from year to year. Two watersheds, each in a different land use or treatment, are commonly used, but will not allow detection of treatment effects. Paired watersheds, however, which undergo a calibration period and a treatment period, allow detection of treatment effects and account for climatic variations as well. However, results may not be widely transferrable. Multiple watersheds (about 15 per treatment) can be used over wide regions which solve transferability problems. The frequency of collecting samples from nonpoint sources is often biased. The preferred frequency can be calculated based on the anticipated variation expected in the data or on the observed variation in previously measured data.

Several techniques are available for analysis of nonpoint source data. In complex, mixed land use watersheds, several methods of analyzing trends have emerged. These range from a simple time plot to time-series analysis. Some of these techniques are strongly influenced by climatic extremes. Models are also helpful in NPS studies; they can estimate (not measure) effectiveness of best management practices (BMP's), locate areas to target, and evaluate alternatives. Geographic Information Systems are particularly useful in tracking implementation and compliance.

Monitoring nonpoint sources is different than point sources. Nonpoint sources are driven by precipitation, a somewhat random event; whereas, point sources are more constant, with some exhibiting diurnal fluctuations. During storms, point sources are diluted but nonpoint sources are concentrated. In response to treatment, point sources often show quick improvements; nonpoint sources change more gradually. Within streams, recovery zones often exist below a point source. The entire stream system is usually impacted by nonpoint sources.

Several lessons have been learned from various NPS monitoring programs. The Model Implementation Program (1978-82) in seven states indicated that several years are needed to witness effects of NPS treatment, explicit goals and objectives are necessary, and adequate funding is associated with success. The Rural Clean Water Program experiences so far substantiate these needs.

Monitoring Nonpoint Source Perturbations With Aquatic Macroinvertebrates

Fred Mangum
U.S. Forest Service Intermountain Region Aquatic Ecosystem Analysis Laboratory

The Aquatic Macroinvertebrate Program is part of the U.S. Department of Agriculture Forest Service Intermountain Region's General Aquatic Wildlife System (GAWS). In the macroinvertebrate program, two diversity indices are used. The DAT Diversity Index combines dominance and number of taxa or species and the Biotic Condition Index or BCI integrates physical, chemical, and biological data to produce a numerical score for a stream, that is like a score on a test.

The BCI is sensitive to all types of environmental stress; is applicable to various types of streams; gives a linear assessment from unstressed to highly stressed conditions; is independent of sample size providing the sample contains a representative assemblage of species in the community; is based on data readily available or easily acquired; and meshes readily with, and supports, existing stream habitat and/or water quality management programs.

Aquatic macroinvertebrates continually monitor and respond to stream environmental conditions that result from natural and managed activities within a drainage. The macroinvertebrates have been found sensitive to nearly every form of perturbation that affects environmental quality of aquatic ecosystems.

Macroinvertebrate data have been effectively used by the Forest Service and other agencies to help make management decisions required of public land stewards. There have been many testimonies regarding the data's accuracy and utility for documenting conditions and trends, and it has been a key factor in out-of-court settlements for mitigations.

Examples of forms of pollution or perturbations often monitored on public lands are sedimentation, organic enrichment, heavy metals, pesticides, acid deposition or drainage, thermal extremes, and dewatering. These perturbations may be the result of toxic wastes, grazing activities, mining activities, regulated flows, or activities associated with timber harvest.

The USDA Forest Service Intermountain Region's Aquatic Ecosystem Analysis Laboratory has provided ecosystem evaluations for various government agencies since 1972, and an increase in monitoring efforts is expected.

PANEL #3: ECOLOGICAL/BIOLOGICAL CONSIDERATIONS IN MONITORING

Ecological/Biological Survey Methods

James Plafkin
U.S. Environmental Protection Agency

This presentation provides a basic primer on biological field methods for sampling fish and macroinvertebrates. Various types of sampling gear, such as bottom samplers and artificial substrates for benthos, and back pack, pram, and boat electroshockers for fish, are illustrated. The differences between qualitative and quantitative sampling, the importance of appropriate station siting, and the effects of temporal and spatial variability are discussed.

Recommendations on implementing biosurveys, developed at last December's National Biocriteria Workshop, are also presented. These recommendations point out the need for EPA to clarify the role of biosurveys and biosurvey data in water quality programs. They emphasize that biosurveys should be included within an integrated assessment strategy that includes chemical, bioassay, and habitat evaluations as well as analysis of the resident aquatic community. Within an integrated assessment strategy, biosurveys are particularly well suited for fulfilling fundamental ambient monitoring objectives: identifying impaired waterbodies, confirming impairments predicted from source data, and documenting the "environmental results" of control activities. Toxicity and chemical evaluations are, of course, needed to identify stress agents causing the detected impairment, to trace these agents to their sources, and to establish appropriate treatment requirements.

U.S. EPA should also develop technical guidance for conducting bioassessments. For example, guidance is needed on: developing QA procedures and data quality objectives (DQO's) for biosurveys, using ecoregions to help define biocriteria, and conducting habitat evaluations to assess impacts, particularly from nonpoint sources. In addition, EPA needs to revitalize its training programs for field personnel so that this guidance will be effective. Finally, EPA must provide strong support for data management systems that can efficiently process biological information.

This would include long-term maintenance of BIOS coupled with periodic improvements, e.g., incorporation of the ERAPT system developed by ERL - Corvallis and "canned" programs for analyzing popular indices such as the Index of Biotic Integrity and the Rapid Bioassessment Metrics.

Advantages of an Ecoregion Concept for Monitoring

Robert M. Hughes
U.S. EPA Environmental Research Laboratory - Corvallis

Many of our most important scientific and management questions require some sort of regionalization. Problems are too widespread and numerous to be treated on a site-by-site basis and ecosystems are too variable to be treated the same way nationwide. This presentation demonstrates the use of a regional framework for monitoring and for determining chemical and biological goals for surface waters. In four statewide case studies, an ecoregion map drawn from landscape characteristics was found to stratify effectively the naturally occurring variance in water quality and biological communities.

An ecoregion framework helps us apply sound ecological theory to establishing monitoring networks and to setting goals for entire states or regions of the country. Such a framework is an important bridge between site-specific and national approaches. When combined with appropriate statistical design, the ecoregional approach can provide precise expectations about large numbers of water bodies that would not be possible from traditional site-specific or river basin monitoring.

The Development and Use of Biological Criteria for Ohio Surface Waters

Chris O. Yoder
Ohio Environmental Protection Agency

Ohio EPA proposed the addition of biological criteria to its water quality standards regulations on November 2, 1987. Biological criteria are based on the measurable characteristics of fish and macroinvertebrate communities that are indigenous to Ohio streams and rivers. This represents a significant progression in Ohio's Water Quality Standards (WQS) regulations which have singularly relied in the past on a chemical approach for regulating and assessing surface water quality. While the chemical approach remains an essential element of the program, the addition of biological criteria significantly broadens the scope of surface water evaluation and protection.

Biological criteria are established by a knowledge of the structural and functional characteristics of fish and macroinvertebrate communities at selected reference sites across the state. This study design reflects the practical definition of biological integrity as the biological condition exhibited by the natural habitats of a region. Further organization of this approach was accomplished by using ecoregions of which Ohio has been divided into five. Seventy-six ecoregions have been defined for the U.S. and reflect a commonality of land use, land surface-form, potential natural vegetation, and soil type. Together, these factors determine the chemical and physical characteristics of the watersheds which in turn influence the biological characteristics. The results of sampling and analyzing fish and macroinvertebrate data from more than 300 reference sites statewide were used to establish attainable, baseline expectations for aquatic life stream use designations.

Biological criteria also provide the opportunity to recognize and account for the natural variability of the environment. This results in having different biological goals between ecoregions and between different size streams and rivers. This represents a shift from the traditional chemical approach where a single criterion is often applied to different situations. Primary uses of biological criteria are to define attainment/nonattainment of legislative goals, to set attainable conditions for various waterbodies, to assist in setting water discharge requirements, to identify and quantify environmental problems and successes, and to document changes over time. Biological criteria have meaningful application to virtually any surface water program that has as one of its objectives the protection of aquatic life.

The technical documentation and rationale for this approach to surface water assessment are available in a three volume set entitled Biological Criteria for the Protection of Aquatic Life. This report is available from the Ohio Division of Water Quality Monitoring and Assessment.

Biological Standards in Maine

David L. Courtemanch and Susan P. Davies
Maine Department of Environmental Protection

Considerable attention has recently been given to the role of the biological community as a source of important ambient monitoring information. The State of Maine is developing an ambient biomonitoring program through enactment of narrative biological standards in its water classification statutes and development of administrative rules for data interpretation. Program accountability is based on three considerations: political accountability (basis in law), administrative accountability (identification of unique role in monitoring), and scientific accountability (appropriate use of available metrics in a decision process).

A basis in law is found in the Federal Water Quality Act which sets goals to restore and maintain the biological integrity of the nation's waters and specifies interim goals to achieve fishable/swimmable quality.

The Act, however, does not provide a working definition for these goals. Using its water classification law, the State of Maine has established three levels of integrity in its standards: (1) "aquatic life as naturally occurs" for Classes AA and A, which is the most strict interpretation of integrity, (2) "without detrimental changes to the resident biological community" and "support indigenous species" for Class B, and (3) "maintain structure and function of the resident biological community" and "support indigenous fish species" for Class C which is an interpretation of fishable/swimmable quality. Definitions are further provided in the statute which specify ecological attributes of each standard.

Water quality standards can be used in either a regulating role specifying discharger performance or in a planning role specifying program goals. While the State of Maine found that it had adequate regulatory standards, these standards were insufficient to monitor program goals. The primary role of the biological information is to serve as impact standards assessing overall progress toward goals. By relaxing the regulatory function of biological information, constraints required in a legal environment are eased and the full value of biological information can be realized.

Scientific accountability has been afforded through the design of a decision procedure which specifically addresses the unique, defined ecological attributes of each standard. Use of metrics is individualized for each biological standard. Attainment of classification (program goal) is determined through a trichotomous decision key utilizing a hierarchial progression starting with the most powerful metric. Where a metric yields a high level of uncertainty, supplementary metrics and best professional judgment are used to resolve attainment.

4. TECHNICAL SESSIONS

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* * * Session A * * *

Fish Tissue Residue Monitoring

Walter L. Redmon
U.S. EPA Region V

The fish in a waterbody are exposed to many pollutants that enter that waterbody and, for bioaccumulative pollutants, can provide the best record of the presence of long-term low level exposure. Means exist for prediction of parameters most likely to accumulate, but actual fish tissue residue measurement has been proven a practical and reliable tool necessary to a complete environmental monitoring program. Tissue residues serve as a direct prediction of human exposure through sport and commercial fish consumption for many environmental toxicants which are present at levels too low to detect in water or effluent analysis. The U.S. EPA National Dioxin Study, as an example, identified through fish tissue analysis that bleaching of certain paper pulps was a major source of high level contamination of the environment. Earlier tissue work identified pesticides and mercury contamination as a concern, and later PCBs; Kepone, etc. The National Bioaccumulation Study is expanding on the dioxin study, developing a new, more sensitive residue scanning method and searching downstream of additional potential sources.

Multidisciplinary study design involving chemists and biologists from a variety of Federal and State agencies has proved critical to successful fish tissue residue studies. Nearly 20 years of residue trend analysis in Great Lakes fish show clear trends for several parameters. Key factors for study design are determined by the final uses of the data. Factors like species and size selection, numbers of samples, site selection, and season are critical to interpretation. Value of residue chemistry is controlled by data quality. Detection levels, precision and accuracy, extraction and cleanup procedures must be specified in any tissue analytical program, and the laboratories must be held to quality performance. Study design requires consideration of statistical methods, if any, to be employed and sampling to support the methods chosen. Whole fish samples from species which are heavy accumulators are chosen to screen for accumulative organics and for source identification, as well as some long-term trend analysis. Sampling for development of risk assessment and fish consumption advisories should emphasize locally important commercial and sport fish species and edible portion samples. Sampling costs can be limited or eliminated by coordination with fish sampling agencies and planning lead time.

The key element in most successful studies is experience. Thus, we recommend a small scale pilot study before any expensive project is undertaken. Advice and assistance from representatives of the EPA, Food and Drug Administration, U.S. Fish and Wildlife Service, and universities experienced in tissue monitoring should be sought, as should sampling assistance from State fisheries personnel and others who routinely collect fish from target areas. Together, intelligent data interpretation using both biology of the fish and residue chemistry will produce good information.

Volunteer Monitoring - Introduction

Meg Kerr
U.S. Environmental Protection Agency

EPA's September 1987 report, "Surface Water Monitoring: A Framework for Change" identified specific steps that EPA could take to address the inadequacies of past surface water monitoring programs. One recommendation of this study was that EPA investigate ways to incorporate "citizens watch programs" into the monitoring program.

Many water quality professionals are skeptical of using volunteers to help with surface water monitoring. These professionals believe that volunteers cannot collect useful data. However, some States have successfully planned, organized, and executed volunteer monitoring programs. They have found that a properly managed volunteer monitoring program can have significant paybacks including public education, constituency building, and collection of useful data.

A key element of a successful volunteer monitoring program is a real commitment to the program by the government agency. This includes:

- State staff assigned primary responsibility for the program;
- A clear understanding and acceptance of the program's objectives at all levels in the State water pollution control agency; and
- A clear understanding of how the collected data will be analyzed and utilized.

Volunteer Monitoring - Kentucky's Experience

Ken Cooke
Kentucky Division of Water

The Kentucky Division of Water operates a citizens' volunteer monitoring program for streams and rivers as part of its Water Watch Program. The volunteers are trained and equipped by the agency and asked to submit regular monthly reports on stream conditions for six physio-chemical parameters. After a year of operation, over 600 reports from 57 stations were received. Data are being used for background information on streams not covered by regular ambient monitoring. The information also led to a number of investigations of water quality violations.

Analysis of performance by various volunteer groups showed that performance of industrial environmental engineers, high school and college science teachers, and stream side land owners exceeded the 80% reporting rate goal; but performance of civic groups, fish and game clubs, and recreational groups fell below the 80% reporting rate. A positive relationship between scientific training and reporting rate was also found.

Ambient Toxicity Testing

Donald Mount
U.S. EPA Environmental Research Laboratory - Duluth

The ambient toxicity test consists of measuring the toxicity of ambient water samples. Usually such samples have no acute toxicity, so chronic tests must be used. The recent development of short duration chronic tests makes such ambient sample testing practical. The sensitivity of such tests is flow dependent. For point sources which are relatively constant in discharge volume, low receiving water flow is the critical flow. For land runoff and some leachate problems, higher flows or even flood conditions are the critical ones.

Ambient toxicity tests measure only toxicity and therefore their results are not expected to correlate with field measurements except where the impact on the aquatic community is largely due to toxicity. Field biological communities are impacted by many pressures other than toxic chemicals. In fact, there are no data to suggest that toxic chemicals are the most important stress on field communities since better treatment has been installed.

Since most waste treatment is installed to reduce toxic chemicals, toxicity tests are most specific for discharge evaluation. Since biological survey data are comprehensive and include effects of much more than those from discharges, they should be used where general well-being is of concern. Biological survey data are not as useful for specific NPDES concerns.

Status of Sediment Quality Criteria Development

Frank E. Gostomski
U.S. Environmental Protection Agency

EPA's Office of Water Regulations and Standards has been actively pursuing the development of numerical sediment criteria. These criteria are intended to assist in assessing toxicity and to aid in making decisions concerning contaminated sediments. These criteria are driven by biological and human health effects and are intended to be as protective as existing water quality criteria.

Considerable progress has been made with this effort, and as a result, the methodology used to develop sediment criteria for nonpolar organic contaminants will be presented to EPA's Science Advisory Board for review in 1988 and for metal contaminants at a later date. In an effort to better understand the role sediment criteria will be playing in evaluating hazardous waste sites and to develop insight on how to better focus future sediment criteria development activities, several pilot studies were conducted. These pilot studies focused on using interim sediment criteria developed for 11 contaminants and applying these criteria at active Superfund sites with contaminated sediment problems. For additional information, contact Christopher S. Zarba at (202) 475-7326.

Integrating Multidisciplinary Monitoring Data:

Maryland's Chesapeake Bay Program

Robert E. Magnien
Maryland Department of the Environment

Maryland initiated a comprehensive, multidisciplinary water quality monitoring program for Chesapeake Bay in 1984. This program has three major objectives:

1. Characterization: Developing baseline conditions on a Bay-wide basis for important water quality indicators.

2. Trends or Changes: Detecting the response of the Bay to management actions and to reveal potential water quality problems.

3. Processes: Interpreting multidisciplinary monitoring data along with research and modeling to achieve a better understanding of the factors controlling water quality and the linkage with living resources.

To adequately achieve these objectives for the major water quality concerns, a comprehensive set of water quality indicators was assembled into a coordinated design. Because the water quality concerns of Chesapeake Bay are complex (e.g., eutrophication), these water quality indicators are needed to reflect the multidisciplinary nature of the problems. This set of water quality indicators are broken down into seven major program components:

1. Chemical/Physical Properties
2. River Inputs
3. Phytoplankton
4. Zooplankton

5. Benthic Organisms
6. Ecosystem Processes
7. Toxicants

The major reason for conducting this monitoring program is to provide the information necessary to guide and evaluate management efforts aimed at restoring Chesapeake Bay water quality and living resources. Therefore, the results must be promptly analyzed, interpreted, and used in decision-making. A reporting process has been established that has as its foundation annual cumulative technical reports from each of the individual program components. On a biennial schedule, the information is assembled in a multidisciplinary framework that specifically addresses the major water quality concerns and management issues.

This multidisciplinary "Technical Synthesis" quantifies the ecological sequence of events from nutrient inputs to nutrient transport and fate to effects on phytoplankton growth. The plankton response is then evaluated for its effects on hypoxia and for its role as a food source for higher trophic levels. Information from the monitoring program is supplemented with research and mathematical modeling results to provide the most complete analysis possible. This synthesis of Chesapeake Bay water quality processes is interpreted together with the characterization and trend information to formulate recommendations on water quality management strategies. All of this analysis from the biennial synthesis is distilled down into a nontechnical report for the State legislature, water quality managers, and interested citizens. In addition to this ongoing Bay-wide data interpretation, the monitoring information is also used frequently to aid in the management of local or unanticipated water quality problems.

* * * Session B * * *

What's New in EPA Data Systems (Including BIOS)

Rod Frederick
U.S. Environmental Protection Agency

The Water Quality Data Systems Steering Committee was initially recommended in the Surface Water Monitoring Strategy in September 1987 to establish central coordination of EPA activities to integrate water related data. One of the Committee's first decisions is critical to the future of BIOS, EPA's National Biological Data Management System: a mission/systems requirements study for the tissue residue and toxicity components.

The broad roles of the Committee are to ensure that State and EPA needs are met by:

- summarizing existing systems;
- recommending system enhancements;
- developing integration strategies;

- promoting technology transfer and better documentation; and
- providing guidance on policy, management, and technical issues as necessary.

The Committee is still working out some of the details of how it will operate, but at the very least it will be providing advice to Office of Water (OW) Directors and the OW Senior Systems Manager.

The Committee is made up of members, who make decisions, and attendees, who provide advice to the members through three workgroups. Workgroups were given the following broad roles:

- Technical - provide advice on system capabilities and data quality issues;

- Policy - recommend system development and integration strategies; and

- Communication - recommend actions to improve system usefulness and increase awareness.

Decisions made by the Committee in its May 11, 1988, meeting were to establish some FY 90 initiatives, to work out details on how the Committee will function, and to develop criteria the Committee will use to evaluate the adequacy of water related data systems. There are a number of other workgroup recommendations the Committee will prioritize to develop an overall action plan by August. The Committee is very interested in keeping the States informed and in finding ways States can participate.

I have saved the BIOS Committee decision until last. A statement of work has been prepared by EPA's Office of Information Resources Management (OIRM) to implement a mission/systems requirements study. The study is designed to evaluate how tissue residue and toxicity components should be added to the existing field sampling survey system. The Committee specifically recommended that the tissue residue information in the Ocean Data Evaluation System (ODES) be considered for inclusion in BIOS as well as tissue residue information now included in STORET. The CETIS system for effluent toxicity test results will also be considered as well as addition of instream bioassay testing.

The purpose of the mission study is to document the clear programmatic need for the toxicity and tissue residue data. The purpose of the systems requirements study is to define the data elements based on the needs and uses for the data. Without this, users will have a hard time getting what they want out of the completed tissue residue and toxicity test BIOS systems. Those who want input into either study should contact Phil Lindenstruth, Lee Manning, or myself so that your needs can be included in the completed data system. OIRM estimates a completely functional system 18 months from July 1 when the study is expected to start.

The latest statistics on the BIOS field survey file are as follows:

- The taxonomic data base is current. There are 64,000 critters in the data base which is maintained by OIRM/NOAA.

- OIRM has trained seven regions and received requests for training in FY 89 from two others: Regions II & VI. Region VIII has not yet requested training.

- Standard STORET retrievals are available as are retrievals which read STORET data into SAS routines. EPA's Monitoring and Data Support Division and OIRM are looking into a SAS routine for use in rapid bioassessments.

Analysis of Historical Water Quality Data

Joseph F. Rinella, Stuart W. Mckenzie,
Gregory J. Fuhrer, and Timothy L. Miller
U.S. Geological Survey

The analysis of historical data can be used to 1) define water quality conditions at a point in time, 2) define changes over time, and 3) to the extent possible, assist in identifying the nature, location, severity, and cause of water quality problems. Generally, historical information for a basin is a compilation of data from many federal, state, and local agencies. Different agencies tend to collect data for different purposes; thus, inconsistencies exist in records between agencies owing to differences in sampling methods, sampling frequency, geographic coverage within a basin, constituents measured, length of record, and the quality assurance of sample handling, laboratory analysis, and data storage. Moreover, there is a dearth of historical data on potentially toxic substances--trace elements and especially man-made organic substances--and on biological data that could be used to estimate stream health. These myriad differences of data among agencies and the lack of certain relevant data create a formidable challenge to the interpreter of historical water quality conditions.

In the present study, these difficulties in the interpretation of existing data have been recognized by separating the analysis into two broad categories: qualitative and quantitative. In a qualitative characterization, all of the available data for a selected constituent are summarized for interpretation; consequently, the geographic coverage of the data is usually considerable throughout the basin, especially for most of the relatively inexpensive determinations of major inorganic constituents and nutrients. However, the qualitative interpretations are limited to general regional comparisons and identification of potential problem areas. These limitations result from data that were collected with 1) an unknown sampling objective, 2) unknown quality assurance, and 3) poor temporal coverage. The difficulty of overcoming these limitations increases as the data become older and fewer personnel at a collection agency are able to address these concerns. For some constituents, such as toxic man-made organic compounds and trace inorganic elements, even the geographic coverage of the historical data is poor and provides limited opportunities for interpretation.

The water quality data used in the quantitative analysis are a subset of the qualitative data and are representative of the seasonal and hydrologic conditions that occur at a station. The representative data are obtained by selecting stations with data that were collected during the same time period and generally at the same sampling frequency (for example, monthly). Unlike the qualitative analysis, quantitative data are used for intersite comparisons and for determining the seasonal and annual variability of concentrations. Additionally, results from time-trend analyses and estimates of constituent loads can provide valuable insights to water quality conditions, sources of loads, and causes of changes over time.

Examples of qualitative and quantitative analytical results are presented using historical data collected from the Yakima River basin in Washington, one of the Geological Survey's seven pilot studies (four surface-water studies and three groundwater studies) under the National Water Quality Assessment Program (Mckenzie and Rinella, 1987). Qualitative results for total phosphorus show a wide variability of concentrations for various types of conveyance channels in subbasins of the Yakima River basin. Surface-water drains containing irrigation-return flow show the largest concentrations and variability of phosphorus, while tributaries in the forested headwaters show the smallest concentrations and variability. Quantitative results for total phosphorus show that median concentrations increase in a downstream direction from 0.01 milligrams per liter at river mile 183 to 0.13 at river mile 30. Total phosphorus concentrations downstream of river mile 83 routinely exceed the desirable goal of 0.1 milligrams per liter for preventing plant nuisances in streams (U.S. Environmental Agency, 1986). The largest phosphorus concentrations were observed downstream of the major tributaries containing irrigation-return flows and point-source discharges. Time trends of total phosphorus showed significant decreasing concentrations at stations throughout the basin for the period 1974 to 1982. These trends may be associated with significant decreases in flow that also occurred during this same period. Procedures will be used to adjust the phosphorus concentrations for streamflow to determine whether these phosphorus trends were due to changes in streamflow or changes in other processes (Crawford, Slack, and Hirsch, 1983).

Quantitative results for DDT at a main-stem location near the mouth of the Yakima River indicate decreases in DDT concentrations for both water and fish tissue samples. These decreases occurred concurrently with the U.S. Environmental Protection Agency ban on DDT application in 1972. For one of the collecting agencies, DDT concentrations were largest during the snowmelt and irrigation season. DDT data from the other collecting agency revealed substantially smaller concentrations as a result of the limited number of samples collected during the snowmelt and irrigation season.

Results from such a retrospective analysis that includes both qualitative and quantitative approaches provide valuable insights to where additional water quality information is needed.

Water Quality Assessment in the State of Washington

Using the Waterbody System

Ed Rashin
Washington State Department of Ecology

The Washington State Department of Ecology utilized the EPA's Waterbody System (WBS) in preparing the 1988 305(b) and 319(a) statewide water quality assessment reports. The Waterbody System is a computerized information management system designed for compilation, storage, and retrieval of water quality assessment information. The WBS is designed to accommodate summary assessment information, such as designated use support status and causes and sources of water quality impairment.

Complete assessments on over 370 waterbodies in Washington State are stored in the WBS, and basic information has been entered on another 1000 designated waterbodies. The assessments are based on information from a variety of sources within and outside of the agency, including fixed-station monitoring data, local government and Indian tribe monitoring programs, intensive survey reports, and hazardous waste site investigation reports. Uniform criteria were applied to the information gathered to make the 15 or so determinations required to complete assessments on each waterbody. Use of the WBS in Washington has allowed a more comprehensive assessment of the state's surface waters than previously possible. In addition to enhancing reporting capabilities, WBS has allowed the assessment information to be stored in a way that is readily updated and accessible to those who need it.

The primary steps involved in implementing the WBS are: careful designation of waterbodies, development of uniform assessment criteria, summarization of assessment information on WBS coding forms, data entry, and data base checks. Once the proper information is entered into WBS and verified, preparation of summary data reports such as those required for the statewide water quality assessment reports is readily accomplished. In addition, the WBS is capable of generating various waterbody lists such as those required by Sections 303(d) and 304(l) of the revised Clean Water Act. The WBS facilitates sorting based on waterbody characteristics and assessment information and is useful in generating specialized reports and disseminating information. Use of dBaseIII Plus enhances the reporting and data management capabilities of the WBS.

Among the major advantages of the WBS is the fact that one data base meets several reporting needs, and the data base is readily updated to allow reporting of current information. The WBS is expected to improve the flow of assessment information to interested persons and decision-makers within the Department of Ecology, other agencies, and the general public. Our future plans for use of the WBS include: the development of customized data elements to accommodate assessment of groundwater and wetlands and the storage and use of more existing data, integration with the agency's geographical information system, and distribution of the WBS data base to potential users in Department of Ecology field operations and cooperating agencies.

Integrated Data Management and Analysis:

Geographic Information Systems (GIS)

Carol Russell
Arizona Department of Environmental Quality

The State of Arizona is using a Geographical Information System (GIS) for evaluation and assessment of nonpoint source pollution impacts. GIS can be used very effectively in two situations: 1) when one has a great deal of information, GIS can synthesize and summarize the data; and 2) with few data, some generalizations and projections can be made.

The roots of the geographic information system date back to the mid-eighteenth century with the development of accurate base maps. The idea of recording different layers of data on a series of similar base maps was in use at the time of the Revolutionary War. In fact, a map of the siege of Yorktown, done by the French cartographer Louis-Alexander Berthier, contained hinged overlays to show troop movements in the final battle.

Until computers were applied to mapping, all maps had one thing in common: the data base was a drawing on paper or film. The information was encoded in the form of points, lines, or areas (vector data). More recently, with the advent of aerial photography and satellite imagery, the information is in the form of photographs or magnetic tape. These digital data are not in the form of points, lines, and areas but are encoded in picture elements or pixels (cells) in a two dimension matrix also referred to as raster or grid cell data.

Overlays, in either vector or raster form, of topography, geology, soil type, and land can be very revealing. These specific-purpose maps are often referred to as "thematic" maps because they contain information about a single subject or theme. The thematic maps can be overlaid to visualize spatial relationships in information. An overlay program in itself can do no more than just overlaying transparencies, but it allows it to be done more quickly and more accurately.

GIS can make pretty maps, but it is a <u>very</u> expensive tool just to do that. In the same way that different aspects of the earth's surface do not function independently of each other, GIS systems allow data on sources, pollution concentrations, and health impacts to be linked together. GIS systems also allow data to be assessed, transformed, and manipulated interactively. This method of data manipulation can serve as a tool for studying environmental processes, analyzing the results of trends, or anticipating the possible results of planning decisions.

For example, in Arizona we plan on using modeling techniques such as CREAMS or the new SCS watershed model for nonpoint source assessments. The Agricultural NPS model simulates physical and chemical processes that take place within a watershed. One advantage is that this model can actually predict sediment transport and loadings, nutrient transport and loadings, and surface runoff volume. In Arizona the GIS system has served, and will serve, as a useful tool in integrated data management and analysis.

Fish Habitat as an Indicator of Water Quality

Rick Stowell
Nez Perce National Forest

The objective of this presentation is to convey to the audience the concept of fish habitat as an index of water quality and the health of designated beneficial uses. The presentation will also address fish habitat variables used in monitoring for nonpoint source pollution and will discuss a typical monitoring situation.

A major land management issue in the State of Idaho is the effect of nonpoint sediment pollution on a major salmon and steelhead fishery in the Columbia River Basin. The management of the timber resources in Idaho produces quantities of sediment in excess of the natural condition. The construction of roads to access this timber accounts for the greatest share of this excess sediment. A geologic formation called the Idaho Batholith is highly prone to erosion. When eroded, this material is essentially sand and easily reaches stream channels and is transported to/through fish habitat as bedload sediment. Sand bedload deposited in the stream substrate affects the spawning and rearing life stages of fish. These effects are cumulative in nature.

Using fish response models developed in Idaho, the Nez Perce National Forest has established management standards (Best Management Practices) to ensure protection of the fish resource (the beneficial use of the majority of stream and rivers on the Forest). How well these practices protect fish habitat from sediment impacts will be monitored several ways.

Monitoring of management practices first occurs on site (implementation monitoring). Planned practices for roads and logging are first monitored during project implementation. This monitoring is used to ensure that the practice is applied correctly.

The Forest will establish stations to monitor the effectiveness of Best Management Practices in protecting fish habitat in the streams affected by management activity. These stations are located at critical reaches essential to fish production, and each represents at least one of the habitats affected by sediment. The quality and quantity of habitat, and fish numbers, will be established at each station before and after management activity. If change is detected which exceeds the objectives for the stream, the practice will be modified or replaced. This is referred to as the Feed Back Loop. The modified practice will then be tested again for compliance by habitat monitoring.

5. WORKGROUP SESSIONS

5. WORKGROUP SESSIONS: ISSUE PAPERS AND RECOMMENDATIONS

Workgroup #1 on Biomonitoring

Workgroup Chair: Susan Davies,
Maine Department of Environmental Protection

*** * * Issue Paper * * ***

BACKGROUND

The Federal Water Pollution Control Act and its various amendments outline the basic framework for restoring and maintaining "the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a)). The Act prescribes two complementary approaches for achieving this objective: a technology-based approach, which involves national pipe standards, and a water quality-based approach. The latter approach involves designating ambient water quality criteria and standards for specific waterbodies, which then form the basis for regulation of pollutant inputs, both point and nonpoint, to that system. Essentially three types of criteria (endpoints) are used in the water quality-based approach: 1) chemical-specific criteria, 2) whole-effluent criteria, and 3) ambient biological criteria.

In 1984, U.S. EPA published the national "Policy for the Development of Water Quality-based Permit Limitations for Toxic Pollutants," which advocated the "use of an integrated strategy of both biological and chemical methods to address toxic and nonconventional pollutants [from point sources]." Although this policy included a strong chemical-specific component and alluded to the potential utility of ambient biological data for developing appropriate permit limits, the policy's primary purpose was to clarify and accentuate the role of whole-effluent toxicity testing in the water quality-based approach. In this regard, the policy has been very successful.

Although the emphasis in recent years has clearly been on implementing chemical and toxicity criteria, the use of ambient biological data has also expanded, though at an understandably slower rate. Without national policy or guidance, several States have developed their own bioassessment guidelines for discerning aquatic life use attainment and have used them to identify impaired waters, prioritize control actions, document environmental results, and report on water quality status. Certain States, notably Arkansas, Maine, and Ohio, have even developed comprehensive biological criteria that have been incorporated into their water quality standards.

Largely in response to growing interest among its States, EPA Region V recently drafted a "Strategy for the Use of Instream Biosurvey Data in Implementing the Goals, Objectives and Policies of the Clean Water Act." This draft statement attempts to articulate the role that biocriteria and ambient biological assessments should play in water quality programs. The objective of this workgroup is to consider certain fundamental issues raised in this document and to discuss the appropriateness of developing a national policy along similar lines.

GENERAL ISSUES

1. Do ambient bioassessments have enough potential utility to warrant a national policy supporting their use?

2. Which programs need bioassessments the most?

3. Is a comprehensive policy needed or should individual programs (monitoring, standards, permits, nonpoint sources, wetlands, marine, and estuaries) each develop their own?

4. Can technically defensible bioassessments also be cost-effective?

SPECIFIC ISSUES

1. Can bioassessments effectively discriminate point from nonpoint source impacts? toxic from nontoxic impacts? habitat from water quality impacts?

2. Can bioassessment methods be sufficiently standardized to be technically defensible? What would it take?

3. If bioassessment results conflict with chemical and/or toxicity assessments, which should take precedence? How might a "weight of evidence" approach be used?

4. How can bioassessments be used in developing wasteload allocations, chemical criteria, controls for nonpoint sources, or habitat criteria?

*** * * Workgroup Report * * ***

I. Participation

- Approximately 35 attendees in workgroup (mostly "hands-on" biologists)

- 13 States (Idaho, Maryland, Maine, North Dakota, Mississippi, North Carolina, South Carolina, Massachusetts, Texas, District of Columbia, Georgia, Oregon, and New Jersey)

- Four Regional EPA Offices represented (Regions 1, 4, 5, and 10)

- EPA - Headquarters Criteria and Standards Division

- EPA - Environmental Research Laboratory Corvallis

- Fish and Wildlife Service
- U.S. Geologic Survey

II. Major Conclusions

A. Unanimous workgroup support for issuing National Policy on biomonitoring

B. Benefits of National Policy

- Compel management recognition of the importance of instream assessment
- Justify allocations of State resources
- Justify use of Federal allocations (e.g., 106, 319, 205(j), Superfund 314)

C. Biosurvey must be integrated into existing programs

III. Uses of Biosurveys

A. Foundation for ambient monitoring programs

B. Problem identification/prioritization

- Sedimentation impacts
- Combined sewer overflows
- Nonpoint sources

C. Assessments and trends

- 305(b) Report
- 304(l) Toxics
- Nonpoint sources

D. Permitting and Compliance

- Site-specific criteria
- Wasteload allocation adjustment
- Episodic events

IV. Policy Development

A. Ensure opportunity for participation of all States and Regions (interaction of EPA Headquarters, Regions, and States)

B. Seek consensus of Chicago BioCriteria Workshop recommendations

C. Use Region V Statement of Use of Instream Biosurvey Data as Strawman Document

D. Allow opportunity for public comment of Biomonitoring Policy (Federal Register)

V. Areas of Concern

- How clean is clean?
- Avoid initiating another swing between water quality-based and effluent-based management.
- Will this policy lead to substantial site-specific revision of criteria?

Workgroup #2 on Trend Monitoring

Workgroup Chair: Robert E. Magnien
Maryland Department of the Environment

*** * * Issue Paper * * ***

BACKGROUND

This issue paper represents my attempt to develop a scope for the trend monitoring workgroup session so that it can meet its major objectives and result in specific recommendations during the limited time frame allotted. The suggestions I have presented below to achieve the objectives are merely that - suggestions. The first point of discussion in the workgroup should be to evaluate and modify, if necessary, what I have written and then move on. I look forward to hearing your ideas at the workgroup meeting. - REM

SPECIFIC ISSUES

EPA, in conjunction with the States, is currently in the process of reevaluating its surface water monitoring activities. This requires a careful examination of what is expected and achievable from monitoring programs. Trend detection is often identified as one of the principal objectives of water quality monitoring programs. This workgroup, as stated in the symposium agenda, will examine the question "To what extent, and to fulfill what objectives, should States and EPA document trends in water quality?". In attempting to answer the question, the group will focus on developing specific reasons and benefits, if any, for including detection of trend as one of the objectives for water quality monitoring programs. If time permits, the group may also discuss, in a general sense, the attainment of trend detection with the current level of resources and how trend detection objectives might fit into an overall water quality monitoring strategy.

A closer examination of the term "trend" is necessary to define the workgroup's scope. A strict definition of temporal trends usually indicates a directional type of change occurring in a consistent manner through time. Trend, however, in the context of water quality monitoring programs, is often used more loosely to include any "changes" in the system. For the purposes of this workgroup, I suggest that we adopt this broader definition and define the scope to include "trends or changes" through time.

In further examining the scope of this workgroup, there are spatial and temporal scales to consider as well as the numerous variables that may be measured. In terms of the spatial scales, these could range from a small zone of influence around a discharge to a nationwide perspective. To limit the scope of the workgroup to a manageable level, I would suggest that the upper bound of the spatial scale be confined to a basin-wide or statewide level. I don't believe much will be lost by taking this approach since the larger, nationwide perspective usually relies on the compilation of information developed on smaller spatial scales. The temporal scales for detecting trends or changes in waterbodies are usually thought of as several years or decades. This seems to be a reasonable time frame within which to work. As far as the variables to include, I would suggest taking a rather broad perspective to include physical, chemical and biological variables that would constitute indicators of water quality. I see the recommendations coming out of this workgroup as being somewhat generic to water quality monitoring programs. A more detailed evaluation than is possible at this workgroup session would be needed to rigorously define the selection of variables to meet the specific objectives of a particular monitoring effort. Nevertheless, it might be valuable to include in each workgroup recommendation a mention of the categories of variables that it would apply to.

Finally, I believe it might facilitate the development of recommendations if I were to list, as a starting point, objectives for a few categories of monitoring to detect trends or changes:

1. To document the response of a waterbody due to specific point or nonpoint controls implemented over a period of time or with a single event. The single event scenario, such as an upgrade in the treatment of sewage, would include what is commonly termed the "before and after" study. This is a large and important category that actually could be broken down into several, more limited objectives.

2. To identify changes in water quality that would reveal environmental problems requiring further study or action.

3. To quantify the relationship between a certain level of pollution control and the degree of change in the system. This differs from 1, above, in that a more rigorous level of data collection and analysis is required and the results might be used to predict the response to additional controls in that system or in other similar systems.

4. To better understand how an aquatic system responds through time to a lessening or worsening of an impact.

These preliminary objectives would need to be evaluated at the workgroup meeting. The resulting objectives could then be fleshed-out with more rationale and other supporting information. This information could then be used as the workgroup formulates its recommendations.

* * * Workgroup Report * * *

The workgroup on trend monitoring concentrated on achieving a strong definition and specific objectives for "trend monitoring". It was recognized that these fundamentals needed to be established before a reevaluation of monitoring programs and their priorities could proceed. The following definition of trend monitoring was agreed to by the workgroup participants:

Definition: A program to determine changes in water quality, both short and long term.

Having achieved a working definition, the group proceeded to discuss the objectives for conducting trend monitoring of surface water quality. This discussion led to the formulation of two fundamental types of objectives for trend monitoring:

Objective 1: Measure the water quality response to management actions.

Objective 2: Provide surveillance to guide development of water quality management strategies.

Most of the remaining discussion centered on identifying specific uses of monitoring information within the two categories of objectives. This served to test the generality and sufficiency of the two stated objectives. A list of these identified uses which are not meant to be exhaustive or in priority order are presented below.

Objective 1 - Uses:

1. Determine effectiveness of both point and nonpoint source pollution control programs.

2. Measure response to hydrologic modifications.

3. Determine whether water quality standards and habitat criteria have been attained.

4. Validate models by confirming predictions.

5. Determine effectiveness of regulation (use limits or bans) of toxicants.

6. Document water quality in support of permit development and enforcement.

7. Rank and prioritize waterbodies in response to statutory requirements.

8. Judge the effectiveness of Superfund actions.

9. Evaluate water quality response to biological resource management.

Objective 2 - Uses:

1. Early warning system (temporal extrapolation).

2. Spatial extrapolation to judge regional impacts.

3. Identify public health concerns (e.g., bacteriological contamination).

4. Establish baseline from which to detect trends.

5. Track potential impacts of land use modification and/or population changes.

6. Determine current status of waterbodies as a secondary benefit of a trend detection program.

7. Quantify natural variability (short term, long term, catastrophic) to permit identification of anthropogenic effects.

8. Measure trend in irretrievable impacts (e.g., acid mine drainage) and environmental catastrophes.

9. Assess habitat viability.

10. Meet commitments of interstate/international commitments and compacts.

In summary, the workgroup established a number of recommendations that it would like to see carried forward in future discussions involving the evaluation of surface water monitoring activities.

Recommendations:

1. Trend monitoring is a necessary component of most surface water quality monitoring programs.

2. Trend monitoring should be accompanied by defined objectives.

3. States should work together with EPA in:

   a. setting priorities for trend monitoring.
   b. setting priorities for trend monitoring vs. other objectives.
   c. the process of moving from objectives into the design phase of future monitoring efforts.

4. Guidance documents should be prepared to provide technical assistance and consistency in monitoring programs.

Workgroup #3 on Assessment Criteria/Assessment Approaches

Workgroup Chair: Ben Eusebio
U.S. EPA Region X

*** * * Issue Paper * * ***

BACKGROUND

The EPA report, Surface Water Monitoring: A Framework for Change, responding to recurring criticisms of the water quality assessment process, recommends that EPA "issue guidance on efficacious approaches to characterization, problem identification and trend assessment." Others concur that guidance is needed to improve the ability of the assessment process to provide for the timely identification of emerging problems, to document the environmental results of pollution control efforts, and to support other management needs.

EPA is committed to developing monitoring and assessment guidance to meet State needs. EPA should not, and will not, however, develop guidance in a vacuum. States must identify what kinds of guidance would be of greatest use and what questions should be addressed in their development. One or more study proposals (related to Specific Issues 1 and 3 below) will be presented during this session.

The objective of this workgroup is to arrive at recommendations on what type of guidance States need in the area of assessment methods, monitoring program guidance, and assessment criteria. It is beyond the scope of this half-day session to arrive at specific assessment directions. The purpose here will be to "brainstorm" a list of concerns we would like to see addressed in the near future. EPA staff, with contractor assistance and direction from multi-agency workgroups, will then begin to develop the guidance recommended here.

Workgroup participants should note that the focus of this group will be to develop recommendations for technical and program guidance needed to improve the assessment process. Other workgroups will address related issues. Workgroup #5 participants will develop recommendations on priorities among assessment objectives and initiatives for the 1990 and 1992 Section 305(b) reports. Workgroup #2 participants will examine the role of trend assessments in State and Federal monitoring programs.

SPECIFIC ISSUES

1. Assessment Methods

The methods used to conduct a water quality assessment should be based on current and future management objectives, the assessor's resources and capabilities, and other factors. Any guidance document should, to the extent practicable, take these factors into account along with scientific and statistical considerations that provide the basis for most guidance.

The workgroup is asked to develop recommendations on whether guidance is needed to:

- conduct trend assessments;
- conduct biological surveys;
- inform States of the range of assessment methods currently in use; their applicability in meeting specific monitoring objectives; their advantages, disadvantages, and cost;
- define data quality objectives and statistical standards for "monitoring-level" and "evaluation-level" assessments.

If the workgroup recommends that guidance be developed, how should it be structured and what factors should receive emphasis?

2. <u>State Monitoring Program Guidance</u>

The report <u>Surface Water Monitoring: A Framework for Change</u> recommends that States take stock of their surface water monitoring programs, identify their weaknesses, and outline their goals for the next five years (Recommendation 1a). On the first day of the symposium, three States will discuss how they have restructured their programs. One proposal is for EPA and States to develop comprehensive State monitoring program guidance that would be based upon studies and discussions underway or planned.

Among the issues to discuss are:

- whether the need and willingness exists among States to reexamine the structure of their monitoring programs and whether a guidance document would be useful;
- what factors (e.g., future management needs, resource availability, roles of chemical and biological monitoring, site and parameter selection, site rotation, cost-effectiveness, State-specific vs. national factors and objectives) should be considered in such a guidance document?

3. <u>Assessment Criteria</u>

The 1988 Section 305(b) guidelines encourage the use of all levels and kinds of water quality information in classifying use-support status, but guidance on how this information should be applied is limited to a few paragraphs and a one-page "figure." Is guidance needed to provide more detailed direction on water status classification? If so, where is guidance needed most?

Some ideas here include:

- reviewing current practices and developing recommendations for data analyses to determine use-support status using water column chemistry data;

- assigning different levels of "confidence" to use-support status according to the adequacy of the monitoring data. For example, use-support (fully, partially, not meeting uses) could be described as "confirmed" or "tentative" depending on whether or not the data meets certain, well-defined statistical standards;

- providing clearer definitions and specific examples of waters where uses are "threatened" or "suspected";

- providing guidance on determining use-support using data (e.g., sediment contamination, habitat and biotic conditions) that cannot be directly related to numeric water quality criteria;

- giving specific direction on how to apply "evaluative" information (e.g., land use and source information, anecdotal statements, qualitative observations) in a waterbody assessment.

4. National Monitoring Programs (to be discussed if time permits)

National monitoring programs (e.g., Aquatic Life, Dioxin, Bioaccumulation, and Acid Rain Surveys) have been oriented towards meeting issue-specific national assessment objectives. There has been interest in recent years in developing massive networks to assess national water quality status and trends. Examples include the U.S. Geological Survey's National Ambient Water Quality Assessment (NAWQA) program, and the EPA Office of Research and Development's Ecological Monitoring and Assessment Program (EMAP).

- How useful and cost-effective are uniform, statistically designed, national surveys in assessing water quality?

- Who should be involved in the original selection and design of national surveys? Because State and Regional monitoring staff are often asked to support sample collection and coordination efforts and because State agency managers and planners would like to make maximum use of the results, shouldn't they provide input early in the process?

- Should there be more written direction to ensure that parameters, data quality objectives, and statistical standards match the management objectives of the study?

*** * * Workgroup Report * * ***

Four issues were addressed:

1. Assessment Methods
2. State Monitoring Program Guidance
3. Assessment Criteria
4. National Monitoring Programs

The following four sections summarize the workgroup's findings and recommendations for each issue. The group attempted to identify specific issues needing attention, products that would address each identified issue, and whether EPA should give high, medium, or low priority to preparation of each product.

Issue 1: Assessment Methods

The workgroup first discussed the need for clear definitions. Several members of the group felt that there was a need to:

- more clearly interpret the Clean Water Act's fishable/swimmable goal;

- develop consistent definitions of:

  - trends
  - use-attainability
  - biological integrity
  - threatened and full protection (need consistency between 305(b) and WQS)
  - natural conditions.

The workgroup specifically recommended that one or more documents be developed to address the following three topics.

- The group gave high priority to interpreting and clarifying Clean Water Act and program management goals;

- The group gave high/medium priority to proceeding with EPA's plan to study the capability of existing and emerging monitoring methods to meet specific monitoring program objectives; and

- The group also recommended that guidance be developed on the use of historic data (e.g., QA, other agencies' data).

Issue 2: State Monitoring Program Guidance

State participants were asked to assess the need for programmatic guidance that would assist States in clarifying their objectives and evaluating how well their programs meet their objectives. They were also asked what factors should be considered in such guidance.

There was a consensus that the 1976 Basic Water Monitoring Program be updated. The workgroup suggested that the guidance articulate minimum "requirements" but permit maximum flexibility for States to facilitate its implementation. This effort was given a high priority.

Issue 3: Assessment Criteria

Two needs were identified:

1. The workgroup recommended that EPA assist States in developing integrated, holistic assessment criteria for evaluating the fishable/swimmable and beneficial use attainment of all of their surface waters (rivers, lakes, estuaries, wetlands). The criteria would incorporate information on the chemical and biological condition of the water and would account for site-specific differences in habitat. Guidance would be provided on how to resolve conflicting indications of use-attainment. This effort was given a high priority.

   The guidance would include information on assessment methodologies appropriate to the specified criteria. A range of acceptable methodologies would be presented, allowing States to select methods in keeping with their resource constraints.

2. The group discussed EPA's plan to develop guidance on making use-support decisions from chemical water column data. The guidance will discuss ways to incorporate consideration of duration and frequency of criteria exceedences into the decision-making process. The workgroup gave this project a low priority and suggested that the guidance document also address Data Quality Objectives.

Issue 4: National Monitoring Programs

The workgroup agreed that there was a need for national and regional studies. "Cross-state issues", for example, were clearly seen to call for a regional or national approach. The group emphasized, however, that States and Regions should be involved in planning national studies early in their development.

Workgroup #4 on Improving Access and Use of Existing Data

Workgroup Chair: Thomas Holloway,
U.S. EPA Region VII

*** * * Issue Paper * * ***

BACKGROUND

One of the major findings of a recent study of surface water monitoring programs is that water quality data are not being used in the management of programs. EPA has attempted to develop and provide to the States data management systems with evidently less than satisfactory results. This workgroup should focus on the "disconnect" between management needs and data system outputs, EPA's role in the broad context of program implementation, and priorities for specific actions recognizing that resources are limited.

SPECIFIC ISSUES

1. What can we conclude about which forms of data analysis and output are needed to support management decisions?

2. What data management activities are EPA required to undertake by statute, regulation, or agreement? What data management activities should EPA conduct to take advantage of economy of scale and national implementation?

The following are only potential activities the group might consider:

- data repository and large scale analysis service prior to downloading for final analyses;

- maintaining the integrity of nationally important data bases like location data (Reach, etc.); and

- providing full analytical services as a software company.

3. What lessons can be learned from past efforts to improve the use of data?

4. What additional specific recommendations can be developed? What priorities should be recommended?

As a starting point for discussion, the following position paper was prepared with input from EPA Region VIII and EPA Headquarters. The discussions at the workgroup meeting are summarized at the end of the position paper.

POSITION PAPER

EPA and State agencies have spent significant portions of their budgets to collect vast amounts of environmental monitoring data, which exist in diverse locations in electronic and hard copy formats. However, because those data are often difficult to access, analyze and interpret, they are not always well utilized to support environmental management decisions. The result, which is by no means unique to EPA, has been described by Ward, Loftis, and McBride as the "Data Rich, Information Poor Syndrome" (Environmental Management 10:291-297, 1986).

The mismatch between water monitoring and management decisions has been cited in several studies, including reports by the General Accounting Office ("Better Monitoring Techniques are Needed to Assess the Quality of Rivers and Streams", 1981), the EPA Office of Water ("Improving Surface Water Monitoring for Decision-Making: A Framework for Change", 1987), and the EPA Science Advisory Board ("Draft Report of the Surface Water Monitoring Subcommittee Environmental Transport and Fate Committee", 1987), Similar mismatches exist for other media. Those mismatches result in ineffective use of time, money and effort.

EPA has developed significant capabilities for data handling, data analysis and information presentation which could help Program Divisions make better management decisions by extracting pertinent information from monitoring data. However, many of those capabilities are not widely known or used.

This position paper presents in draft form a strategy by which the agency can shift from an "Information Poor" to an "Information Adequate" condition. It addresses specifically four of the recommendations made in the SAB report (1987).

- That analysts be employed to use data management systems to aggregate, analyze and summarize scientific data for use by Agency decision makers to identify and prioritize environmental problems.

- That computerized data management systems be developed which facilitate the rapid and efficient storage, sorting, assessment and analysis of scientific data.

- That the storage and use of environmental data be coordinated across media and between EPA, other Federal and State agencies.

- That emphasis be placed on the importance of precisely defining the purpose (objectives) of a monitoring program before design and implementation begin.

Strategy Overview

The strategy includes a short-term component and a longer term component:

- Optimize access to and use of existing data.

- Optimize future data collection and data use by carefully considering diverse information needs prior to data collection.

Strategy Outline

A. Optimize access to and use of existing data:

Over 300 data bases are available Agency-wide to provide multi-media environmental, political, geographical and other data. Information Resource Management (IRM) Inventories, which describe the capabilities of each existing Data Base, are available on Regional and Agency-wide levels. The data in these data bases could provide environmental management information, without new data collection efforts, if access and analysis capabilities can be improved. At the same time, each data base and each integration software effort has significant costs for planning, development and maintenance. The process of optimizing access and use will require choices among good options to ensure that maximum useful information is obtained from the limited resources available. The strategy proposed for discussion is to establish small work groups which will:

- Survey the information content, by use, of the data bases in IRM.

- Prioritize those data bases by potential for impacting environmental management decisions and by potential for use by technical personnel.

- Explore ways to integrate those data bases which have the highest priority and whose data are most compatible. That exploration would be closely coordinated with the Steering Committee on Water Quality Data Systems.

- Explore procedures for downloading and uploading data between PC's and mainframes. That exploration would be closely coordinated with the Steering Committee for Water Quality Data Systems. Initial efforts are underway in the STORET Enhancement Program of the Office of Groundwater and OIRM.

- Assemble examples of data integration, data analysis and data interpretation techniques, which meet the management and technical needs identified earlier, with emphasis on graphical techniques.

- Develop simple, clear documentation of how those examples were produced.

- Present workshop(s) for Program Offices, States and Regional Offices, emphasizing the types of data analysis which could help them and the techniques for doing those analyses.

- Emphasize interpretive reports of monitoring studies, as opposed to the data summaries.

- Explore capabilities of Geographic Information Systems and their application to environmental management decisions.

- Recommend other specific actions which the Office of Water, the Regions and the States can take as a group or individually to optimize the use of existing data. These recommendations may include staffing, hardware and software.

B. Optimize both the future collection and use of scientific data by carefully considering diverse information needs prior to data collection, and by coordinating monitoring efforts among different organizations.

The objectives for most water monitoring studies have been only vaguely defined. As a result, the data collected have often failed to address the real questions which managers need answered (Ward, 1985). A similar situation holds for other media. Therefore, within-program coordination is essential to effective monitoring.

Air, water, RCRA and Superfund programs may have interests in the same geographic area, as would other Federal agencies. Multiple monitoring efforts may be conducted in the same place by different programs and agencies. Coordination between those groups would improve the cost-effectiveness of monitoring.

Coordination within and between programs and agencies is difficult and should be recognized as a long-term effort. The following strategy is proposed:

- Encourage long-range planning of monitoring activities in all media.
- Establish communication between programs and agencies to coordinate monitoring objectives and efforts. Target specific data for sharing between organizations and work with those organizations to implement that data sharing.
- Encourage multi-purpose data collection efforts to maximize information content while minimizing expenses.
- Identify specific primary and secondary uses of data prior to data collection.
- Ensure that statistical design criteria; network design; and procedures for sampling, preservation, laboratory analysis, quality control, data management, data analysis and information reporting are documented prior to sampling.
- Explore emerging technologies (such as artificial intelligence, remote sensing, laser disks, etc.) as a means to enhance the planning, collection, interpretation and presentation of monitoring studies.

*** * * Workgroup Report * * ***

The Workgroup on Improving Access and Use of Existing Data focused on the mismatch between the information needed in order to make the best environmental management decisions and the current outputs from existing data systems (including paper files). That mismatch has been described by Ward, et al. (1986). The discussion centered around three questions:

1. What information do managers need to make good decisions?

2. What barriers keep us from using the existing data to provide that information?

3. How can those barriers be removed or reduced?

The group recognized that managers need information on problems, priorities and costs, and that simple and concise presentations of that information are more effective (and demonstrate a better understanding of the problems) than complex presentations.

The Workgroup directs the following recommendations (arranged in descending priority order) to the Water Quality Data Systems Steering Committee:

1. EPA should maintain national data bases which are easy to use, which maintain current data, which use current technology, and which provide for easy upload/download from/to personal computers. Recognizing the extraordinary power available at minimal prices in the growing decentralized/P.C. environment, EPA will need to provide strong leadership to ensure that the national systems meet State needs (and that the States therefore have a strong incentive to use the national systems). This recommendation will take time to implement and is intended as long-term advice to set a direction for EPA information processing development.

2. EPA should actively "market" existing data systems. Those systems have numerous capabilities which can meet information needs. However, many managers do not know about those capabilities or how to use them. We need to do a better job of communicating to them the value which existing systems provide.

3. EPA should proceed with development of a Statement of Work for Data Systems Modernization. Fourth-generation computer technology now available commercially provides capabilities for much easier data analysis and display than do current EPA systems. Future EPA data systems should make full use of those capabilities. The Workgroup recognizes that the system modernization process will take time and intends this as a long-term recommendation.

4. While the Data Systems Modernization is being planned, EPA should finish and maintain the General Query Software to provide data integration capabilities for existing systems. Under that software, a user should be able to access data from multiple data bases (STORET, PCS, GICS, etc.) at a single terminal session without having to learn different systems for logging onto and accessing data from those individual data bases.

5. EPA should develop mandatory data quality labeling requirements for the data to be stored in its data systems so that users will know the quality of the data they use for management decisions.

6. EPA should establish a clearing-house for software developed by States and Regions. Talented people working for those organizations have developed programs for water quality assessment, data analysis, upload/download of data, etc., which could be useful to other Regions and States. The clearing-house would make information about those programs available to a wide audience.

7. EPA should provide resources to keep up with developing technology. Although the unit cost of computing capability is dropping rapidly, the fast pace of improvements in computer technology quickly makes equipment obsolete. Therefore, continuing investment in new hardware and software is necessary.

8. EPA should provide funds for State training and use of the National Computer Center.

Workgroup #5 on Future Assessments/National Reporting

Workgroup Chair: Bruce Newton
U.S. Environmental Protection Agency

*** * * Issue Paper * * ***

INTRODUCTION

The purpose of this paper is to define the issues to be discussed during the workgroup session. Because we will have approximately three hours to discuss the issues and outline a statement, it is important that we limit the scope of the issues we consider. I welcome comments and opportunities to discuss the issues and plans for the session. Regardless of your workgroup preference, please feel free to call me at (202 or FTS) 382-7074.

GENERAL FOCUS

The broad goals of this workgroup are twofold. First, we should look at the kind of assessments that will be important in the future, suggest priorities, and suggest how priorities should be implemented. For this question we should specifically consider the Water Quality Act assessments (Sections 314, 319, and 304(l)). Second, we should examine the national reporting process for communicating water quality status and program results to Congress and the public and suggest improvements.

BACKGROUND

The Water Quality Act of 1987 represents an attempt by Congress to correct a perceived deficiency in the water quality program. The perceived deficiency is that we (EPA and the States) don't know where the problems are or, if we do, are unwilling to tell the public or address the problems. The Congressional response was to require statutory "assessments that call for some nine specific lists of waters."

Prompted by these new statutory requirements and a major internal study of monitoring, EPA and the States are beginning to reexamine surface water monitoring activities. No one needs to be reminded that the resources available for monitoring activities are insufficient to support all possible monitoring objectives. Those responsible for monitoring must assess their present and future needs, identify their priorities, and direct their limited resources to achieving their most important objectives.

In this era of constant or declining budgets, water quality programs need to develop and maintain public support. Program managers need to successfully communicate water quality information to the public to demonstrate results and accountability. EPA and the States need to develop a consensus on how to make necessary improvements in reporting and communicating with the public.

SPECIFIC ISSUES

A. Future Assessments

1. How do we characterize the current emphasis of the monitoring/assessment program? What objectives will be important in the future?

   The following are suggested as possible objectives which monitoring could be designed to support:

   - determine trends in water quality;
   - enhance public understanding and support for water quality programs;
   - identify impaired/threatened waters;
   - evaluate the effectiveness of control measures;
   - identify emerging problems;
   - characterize natural resources; and
   - provide data needed to implement controls.

2. What specific steps do we recommend EPA and the States take to ensure that future assessment needs are met?

3. Should we undertake a major comparative assessment to mark the 20th anniversary of the FWPCA in 1992? How should it be accomplished?

B. Reporting and Communication

1. How can we make the reporting process more effective and credible?

2. What are the major problems in national reporting?

3. On which facets should we concentrate to improve national reporting? The following are suggestions:

   - better assess public health risk;
   - prepare inventories or assessments or document threats to ecological resources;
   - document trends over time;
   - attempt to resolve inconsistencies in total waters definitions;
   - increase uniformity in use support decisions;
   - assess status of specific waters (impairment causes and sources);
   - evaluate program effectiveness; and
   - increase coverage (waters assessed).

*** * * Workgroup Report * * ***

The composition of the workgroup was largely State managers of monitoring programs. We spent the first hour discussing what the various objectives of monitoring are and the best ways to accomplish them. This discussion turned out to be very useful to achieving a common understanding of what is meant by the various terms for objectives (e.g., trend monitoring vs. problem identification). The discussion also provided a wealth of information based on the experiences of the workgroup members.

After we achieved a common understanding of terms, we conducted an exercise to rank how we perceived the current emphasis among the various objectives and how we thought the emphasis should be placed in the future to meet program needs. The ranking was done by voting. The results are presented in the following chart (emphasis rank is in descending order):

PROGRAM EMPHASIS

<u>Currently</u>	<u>In the Future</u>
ID Waters	ID Waters
Controls Development	Evaluate Controls
Assess Trends	Controls Development
Evaluate Controls	Assess Trends
Characterize Ecological Resources	Develop Public Support
Develop Public Support	Characterize Ecological Resources

An explanation or discussion for each of the objectives follow below. The discussion is by the order of the ranking for future program emphasis.

ID Waters - This objective was expanded to include identifying emerging problems and developing information for targeting (in addition to identifying impaired and threatened waters). This continues as top priority.

Evaluating Controls - This was narrowly defined as evaluating specific control actions (not broad-based trends). The objective was considered to include developing and assessing new control techniques. It was strongly felt that this objective cannot be met through a broad-based program design (or "network") but requires carefully designed studies. This was second priority (and moved up from the "current" ranking) because we need to show our efforts are working, we need to address new problems with relatively untested control techniques (e.g., NPS controls), and we need to justify societal costs of controls.

Supporting Controls Development - Although this is a high priority (because our business is regulation), the workgroup felt it must be kept in perspective. This objective should not dominate the entire program.

Trend Assessment - This was defined as measuring broad-based changes (e.g., on a Statewide basis). Much discussion centered on this topic. A distribution was drawn between the "standard" approach of fixed station networks routinely sampled for physical/chemical characteristics and other approaches such as infrequently repeated intensive surveys and habitat/biology characteristics. Workgroup members were generally very negative about the value of the standard approach. Although a high program priority in the past and currently for many States, the State workgroup members had concluded that the data generated was of little value either for assessing trends or for any other program use. Most had cut back their efforts on fixed station data collection. One State had spent several work years on data analysis and concluded that trends could only be discerned for sediment and nutrients. The workgroup felt that EPA should examine other approaches to determining trends in water quality.

Enhancing Public Knowledge and Support - This is included because this could be an objective for monitoring. As funding becomes more scarce, public support in State Legislatures can be important. The workgroup felt that, although this objective is important, it should not be a major item in the program.

Characterizing Ecological Resources - This was included because recent Congressional pressure and the interest of the EPA Administrator have focused on the status of ecological resources. Although not a major priority in and of itself, the workgroup felt this was somewhat connected to identification of waters.

We next addressed the specific questions contained in the issue paper. For each question, the group formulated a statement or list of recommendations as outlined below.

A. Recommendations for EPA to ensure that future assessment needs are met:

1. Develop guidance on monitoring program design, data analysis, and NPS designs.

2. Provide coordination and technology transfer

   a. More national meetings like this one
   b. Regional meetings (bring in experts)
   c. Profile State programs and distribute
   d. Keep up newsletter.

3. Increase ESD technical support.

4. Take a more active role in interagency and inter-State communication.

5. Provide flexibility on SPMS commitments through SCWS process.

6. Support shifting monitoring responsibilities to "users".

B. Should we do a major comparative assessment to mark the 20th anniversary of the FWPCA in 1992?

The workgroup felt that a detailed analytical assessment would be a waste of time because nothing is comparable between then and now (the problems have changed, the data collected, and the methods used have changed, etc.). If anything is to be done, the group recommended basing it on qualitative information focused on regional summaries.

C. How can we make reporting and communication more effective?

1. Reporting between monitoring personnel and management:

   - the analyst needs to understand managers needs;
   - all reports must have interpretation, recommendations, and implications of recommendations;
   - need to use graphics and maps; and
   - more PC's are needed to support making better reports.

2. National reporting through the 305(b) process:

   - increase uniformity in use support decisions;
   - provide more assistance in assessing health risk;
   - resolve inconsistencies in total waters definitions; and
   - increase coverage (make use of other agencies).

Workgroup #6 on Ambient Discharger Monitoring

Workgroup Chair: Carol Hudson Jones,
U.S. EPA Office of Water Enforcement and Permits

*** * * Issue Paper * * ***

BACKGROUND

This issue paper is designed to serve as a discussion guide for a work group meeting at the Surface Water Monitoring Symposium June 1-3, 1988. It covers key issues surrounding a draft feasibility study on Requiring Permittees to Conduct Ambient Monitoring. EPA is seeking comment and discussion of these key issues to be incorporated as appropriate into the final report.

The need for the report arose from a major study EPA initiated in 1985 to determine where the Agency's surface water monitoring program should be heading to meet the information needs of the 1990's. The study resulted in the issuance of a report in 1987, "Surface Water Monitoring: A Framework for Change". One of the six recommendations in the report was to conduct a feasibility study on requiring NPDES permittees to conduct ambient monitoring.

The following is based on a draft feasibility study written by EPA's Office of Water Enforcement and Permits. There are two major questions: 1) Should permittees conduct ambient monitoring? and 2) Should permittees pay permit fees to fund ambient monitoring? The following discussion leads the reader through the major issues.

Why Do Regions/States Need Ambient Monitoring?

The major uses of ambient monitoring data include to:

- revise water quality standards;
- assess whether water quality standards are met;
- develop permits;
- assess the effect of a discharge;
- conduct water quality trend analyses;
- develop lists of impaired waters for 304(l) including determining whether additional toxics controls are needed;
- develop 305(b) reports; and
- verify 301(h) variances.

Where Do We Need Additional Ambient Monitoring Most?

What are the most critical areas of monitoring which are needed? toxics monitoring for 304(l) assessments? etc. For which of the uses listed above is there currently a significant need for data?

ISSUE 1: SHOULD PERMITTEES CONDUCT AMBIENT MONITORING?

What Types of Monitoring Could the Permittee Conduct?

Ambient monitoring can vary from simple temperature readings to whole effluent toxicity monitoring and biosurveys. Some monitoring requires technical expertise and judgment while other types are more straight forward. Are permittees technically capable of conducting ambient monitoring? What types? Is there sufficient laboratory capacity to conduct increased analyses? Would the uncertainty in the quality of the data render it useless?

Recommendation:

Monitoring by permittees should generally be simple and straight forward (including some types of toxics monitoring); complex types of monitoring and those which require significant judgment cannot be accurately conducted by the great majority of permittees. Sufficient guidance should be supplied and conditions established to ensure the quality of the data.

What Are the Pros and Cons of Permittee Conducted Monitoring?

Depending on the type and purpose for which the monitoring is conducted, it can be used to:

Pros:

- identify and/or characterize water quality problems
- help identify program priorities
- measure the effect of the program on water quality
- reduce the cost to the agency of monitoring
- fill gaps in monitoring data

Cons:

Costs/Impact of Implementation

- increases cost to permittee
- increases reporting/paperwork burden to permittee
- increases burden on agencies to implement, manage data, enforce, etc.

Permitting

- slows the process if permittees request hearings/appeals

Enforcement

- cannot enforce permit based on ambient monitoring
- would we enforce these monitoring requirements? impose penalties for violations? etc.

Data Quality and Use

- data may be of poor and unknown quality
- may be insufficient lab capacity
- data may be biased, inaccurate to favor the permittee
- are we prepared to handle and use the additional data?

What is the Feasibility of Requiring Permittees to Conduct Ambient Monitoring?

EPA believes it has the authority under Section 308 of the Clean Water Act to require permittees to conduct ambient monitoring although permittees may challenge the requirement especially if monitoring appears unrelated to their discharge and/or it imposes a large burden.

Recommendations:

1. It is appropriate for permittees to conduct ambient monitoring. The focus of these activities should include:

   - to develop a permit (waste load allocations, permit limits, etc.);
   - to assess the impact of the discharge on the receiving waters;
   - to determine whether the receiving water should be listed as "impaired" under 304(l) including determining whether additional toxic controls are needed; and
   - to verify 301(h) permits.

2. EPA should develop policy and guidance, with State participation, on permittee conducted ambient monitoring, and to provide details on the extent of application (i.e., in all cases, only for groups of permittees or a case-by-case basis).

3. Permittees should generally be required to conduct simple, straight-forward monitoring as many types of monitoring are very complex, expensive and/or require great amounts of skill and judgment to design and implement the monitoring. Complex monitoring may be required in cases where the permittee has the technical ability to competently conduct highly complex types of monitoring.

Related Discussion Issues

1. Should permittees be required to conduct ambient monitoring? Should it be limited to certain applications? Are the uses listed above appropriate reasons to require monitoring? Why are States currently requiring this (where done)?

2. Is permittee monitoring for the purpose of assessing the impact of the discharge on the receiving water inappropriate as we already certify that all permits ensure water quality standards are met?

3. Should permittees be required to conduct ambient monitoring or should permittees be encouraged outside of the permit to conduct it, especially where the permittee has an incentive to do this?

4. Will the resources saved through permittee monitoring outbalance the resources required to impose and implement the conditions? Should they?

5. How can the quality of the monitoring data be ensured if conducted by permittees?

6. What types of experiences have States had in requiring permittees to conduct ambient monitoring?

7. If permittees should be required to conduct ambient monitoring, what should EPA's role be? Should EPA require States and Regions to incorporate this into permits? Should EPA leave implementation up to individual Regions and States?

8. Should EPA focus implementation on certain types of permittees? e.g., those on "suspected" impaired water bodies according to 304(l)? geographic areas? allow States and Regions to conduct on a case-by-case basis?

9. Where should this ambient monitoring data be stored? in STORET? PCS? left up to Regions and States? Do we need a link to enforcement systems to track any nonreporting?

ISSUE 2: SHOULD PERMITTEES PAY FEES TO FUND AMBIENT MONITORING?

An EPA Task Force on Fees recently recommended that requiring fees for delegated programs not be pursued until the many issues surrounding the impact on state programs could be resolved.

According to EPA's Office of General Counsel, EPA has general authority to impose fees, but would require statutory changes to retain the fees for any purpose, including for ambient monitoring.

What role should EPA play in implementing permit fees to fund ambient monitoring? Should EPA pursue federal legislation to allow imposition of permit fees to fund monitoring? Should EPA encourage/not encourage/provide technical assistance to States to obtain this authority, etc.?

Related Discussion Issues

- What impact would a federal fee program have on delegated States? What are the equity issues if state and federal fees are different?
- To what extent are States already using fees to fund ambient monitoring? What has been the result?
- To what extent are States using penalties collected in enforcement actions to fund ambient monitoring? Should EPA encourage States to develop this type of authority?
- If fees were used, how would fees be calculated? take national costs and divide by number of permittees participating? based on type of permit? based on monitoring needs by State?

- Should fees be imposed for all permittees, a subset based on type of permit, geographic location, etc.?
- How can fees be used to ensure that staff to conduct work are available? (Collection of fees does not mean that FTE are available or that skilled staff are available to conduct the monitoring.)
- What would an agency do if fees were not paid? refuse the permit, enforce?

* * * Workgroup Report * * *

ISSUE 1: <u>Is it feasible for permittees to conduct ambient monitoring?</u>

CONSENSUS: Yes, for all direct discharge permittees.

- Primarily for the purpose of:
  - developing permits including wasteload allocation, etc.
  - assessing whether water quality standards are met
  - assessing general effectiveness of program or permit.
- The focus should be to require permittees to do ambient monitoring <u>when data are needed</u>, i.e., where there is a potential impact on water quality after consideration of:
  - dilution of discharge
  - types of contaminants
  - public concern
  - location
  - change in conditions
  - lack of data to verify wasteload allocation, etc.
- When permittee monitoring is required, it may be through a variety of vehicles including the permit, consent agreement, state vehicle, etc.
- The permittee should submit a monitoring plan for review which details how data quality will be ensured.

RECOMMENDATION: Workgroup recommends EPA conduct a comparison of State data to permittee generated data. The purpose of the comparison is to assess the overall quality of permittee generated data.

ISSUE 2: <u>Is it feasible to require permit fees to fund ambient monitoring?</u>

CONSENSUS:
- Fees are feasible and can be useful but will not supply all the funds necessary to do ambient monitoring.

- Fees can be used in combination with permittee conducted discharger monitoring.

- Use of permittee monitoring and fees must be State's decision.

RECOMMENDATION: Workgroup suggested that surveys of State use of permittee conducted monitoring and the extent States impose permit fees would be useful. On fees, the group was interested in the size of the fees and whether the State agency retained the funds or whether they went into the State's general treasury.

6. EVALUATION OF SYMPOSIUM

6. EVALUATION OF SYMPOSIUM

SUMMARY OF COMMENTS AND RECOMMENDATIONS MADE BY PARTICIPANTS

A total of 83 evaluations were received.

Question 1: Do you feel that the meeting objectives were clear?

Answer:

Yes:	49
Mostly:	12
Somewhat:	5
No:	3

Do you feel that the meeting objectives were fulfilled?

Answer: Most participants felt the meeting objectives were fulfilled but some qualified their answers by saying the follow up to the symposium would determine the fulfillment of the objectives.

Question 2: What aspects of the meeting did you like best? (Ranked in order of most frequent responses)

Answer:

- Workgroups;
- Interaction with federal/state/local representatives
- State representatives liked hearing what is being done in other states;
- Poster sessions;
- Long breaks and after-hour opportunities to meet informally and exchange ideas;
- Panel presentations; specifically panel discussions on non-point source monitoring;
- State presentations on monitoring and assessment techniques;
- Concurrent sessions on volunteer monitoring and sediment criteria; and
- Meeting accommodations.

Question 3: What aspects of the meeting did you like least? (Ranked in order of most frequent responses)

Answer:

- Concurrent sessions (conflicting sessions limited ability to attend all sessions of interest);
- Absence of key EPA headquarter personnel in workgroups;
- Concurrent sessions not well prepared;
- Workgroups were too large;
- Panel presentations on day 1 were redundant. Too much time spent on theory and definition;

- Too many EPA headquarter presentations, EPA headquarters overwhelmed the meeting with presence as well as opinions; and
- Visual aids (overheads and slides were not of good quality).

Question 4: How do you rate the meeting overall?

Answer:		
	Excellent:	20
	Good to Excellent:	10
	Good:	46
	Average to Good:	2
	Average:	3
	Poor:	0

Questions 5 and 6: Please provide suggestions for follow-up meetings and identify issues that you feel were not adequately covered during the meeting.

Answer: General Suggestions

- Repeat this meeting on an annual basis;
- Future meetings should address more specific topics;
- More time should have been allowed for workgroup discussions;
- States should be involved in the planning phase for future meetings;
- Follow up with a newsletter or some form of communication on issues raised at the meeting and future courses of action;
- Regional/state workshops should first be conducted and recommendations can then be brought to a national meeting;
- Encourage open communication in the use of data between states, regions, and other agencies to avoid reinventing the wheel; and
- Include additional presentations from States on "successful programs".

Recommendations for Which Participants Expressed Support or Recommended Specifically That EPA Implement (Recommendations made more than once are listed with an asterisk):

On Monitoring/Assessment Methods

* Provide technical assistance and training on biomonitoring (update Cornie Weber's methods manual); provide assistance specifically on conducting biological assessments in lakes and estuaries;

* Develop guidance on nonpoint source design (including before/after studies, cause/effect studies);

* Develop standardized protocols for fish tissue monitoring;
* Develop guidance on assessing nonchemical (habitat) impacts;
- Develop guidance outlining considerations specific to monitoring in each waterbody type: marine, estuarine, riverine, lacustrine, wetlands; and
- Prepare a bibliography of field monitoring methods manuals developed by States.

<u>On Assessment Criteria</u>

* Develop guidance on proper statistical methods for handling, analyzing, and interpreting data;
- Develop guidance on using satellite images to determine turbidity or other parameters in surface waters;
- Provide assistance on assessing use-attainment in lakes;
- Provide guidance on how to define exceedences of criteria; and
- Provide guidance on classifying waters as threatened (especially lakes).

<u>On Monitoring Programs/Assessment</u>

* Develop guidance on monitoring program design; define a model program (update Basic Water Monitoring Program document); set requirements and spell out resources required for a minimum acceptable monitoring program; decide on importance of fixed station/trend monitoring; encourage monitoring with a geographic focus;
* Develop policy on role of biomonitoring; maintain balance between chemical/physical/toxicity/biological survey methods;
- Provide guidance on how to use assessments not just to report status but to plan, set priorities, and for public communication; and to determine how monitoring staff in State water quality agencies relate to other water quality program elements;
- Profile State programs; identify range of methods/ protocols used by States;
- Integrate groundwater and/or coastal waters with surface water program;

- Provide guidance and policy on coordinating water quality monitoring programs with fisheries management programs;
- Provide guidance on tribal water quality and fisheries monitoring issues;
- Take more active role in interagency and interstate communication (e.g., continue newsletter);
- Offer more flexibility on SPMS commitments through SCWS process;
- Shift monitoring responsibilities to "users"; and
- Place more emphasis on monitoring to evaluate controls.

<u>On 305(b) Reporting</u>

- Review findings of 1988 Sections 304(l), 319, and 305(b) reports; identify areas that need improvement for 1990 and 1992;
- Increase uniformity in use-support decisions;
- Provide more assistance in assessing health risk;
- Resolve inconsistencies in total waters definitions; and
- Make use of other agencies' data to increase coverage.

<u>On Funding</u>

- Identify innovative funding mechanisms to support baseline monitoring (e.g., Superfund, fees);
- Determine whether States need regulations to secure funding;
- Determine level of resources necessary for adequate monitoring programs;
- Promote the development of cooperative monitoring networks (e.g., New Jersey's cooperative coastal monitoring program explained during poster session).

APPENDICES

APPENDIX A

List of Registrants

List of Registrants

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APPENDIX B

Symposium Agenda

National Symposium on Water Quality Assessment
June 1,2,3 1988 at Annapolis, MD

Wednesday, June 1: Objectives and Major Issues in Monitoring

8:30 **Welcome/Introduction:** Geoffrey Grubbs, U.S. EPA Headquarters, and Michael Haire, Maryland Department of the Environment

8:40 **Keynote Address:** Rebecca Hanmer, U.S. EPA Headquarters Acting Assistant Administrator for Water

9:00 **Panel #1: Objectives and Approaches to Monitoring**

- Monitoring as an Information System: Robert Ward, Colorado State University
- State Perspective: Steven Tedder, North Carolina Division of Environmental Management
- EPA Perspective: Catherine Kuhlman, U.S. EPA Region IX
- Public Interest Group Perspective: Frances Flanigan, Alliance for the Chesapeake Bay

10:30 Break

10:50 **Panel #2: Reevaluating Program Design: State Presentations**

- Loren Bahls, Montana Dept. of Health and Environmental Science
- Peter Mack, NY Department of Environmental Conservation
- Jerry Brooks, Florida Department of Environmental Regulations

12:20 Lunch

1:20 **Presentation: Monitoring for Non-point Source Effects**

- Jack Clausen, University of Vermont
- Fred Mangum, U.S. Forest Service

2:20 **Panel #3: Ecological/Biological Considerations in Monitoring**

- Ecological/Biological Survey Methods: James Plafkin, U.S. EPA Headquarters
- Ecoregion Concept: Robert Hughes, U.S. EPA Environmental Research Laboratory, Corvallis
- Biological Criteria: Chris Yoder, Ohio EPA, and David Courtemanch, Maine Department of Environmental Protection

3:20 Break

3:35 **Panel #3 continued**

4:35 Adjourn

6:30 Dinner with guest speaker Abel Wolman, Professor Emeritus, The Johns Hopkins University

Thursday, June 2: Concurrent Technical Sessions

Session A

8:30 Fish Tissue Residue Monitoring: Pete Redmon, U.S. EPA, Region V

9:10 Volunteer Monitoring: Meg Kerr, U.S. EPA Headquarters, and Ken Cooke, Kentucky Division of Water

9:50 Ambient Toxicity Testing: What is its Role?: Donald Mount, U.S. EPA Environmental Research Laboratory, Duluth

10:30 Break

10:50 Sediment Criteria: Frank Gostomski, U.S. EPA Headquarters

11:30 Integrating Multidisciplinary Monitoring Data: Maryland's Chesapeake Bay Program: Robert Magnien, Maryland Department of the Environment

12:10 Lunch

Sesssion B

8:30 U.S. EPA Data System Support (and what's new with BIOS?): Rod Frederick and Karen Klima, U.S. EPA Headquarters

9:10 Getting the Most from Existing Data: Joseph Rinella, Yakima River Basin National Ambient Water Quality Assessment (NAWQA) pilot project, U.S. Geological Survey

9:50 The Waterbody System: Bruce Newton, U.S. EPA Headquarters, and Ed Rashin, Washington Department of Ecology

10:30 Break

10:50 Integrated Data Management and Analysis: Geographic Information Systems (GIS): Carol Russell, Arizona Department of Environmental Quality, and George Collins, U.S. EPA, Region IV

11:30 U.S. Forest Service: Evaluating Habitat Impacts: Rick Stowell, Nez Perce National Forest, U.S. Forest Service

12:10 Lunch

National Symposium on
Water Quality Assessment
June 1,2,3 1988 at Annapolis, MD

Thursday, June 2 Continued:

1:10-4:30 Concurrent Workgroup Sessions

[1] **Workgroup on Biomonitoring:** Chaired by Susan Davies, Maine Department of Environmental Protection

[2] **Workgroup on Trend Monitoring:** Chaired by Robert Magnien, Maryland Department of the Environment

[3] **Workgroup on Assessment Approaches/ Assessment Criteria:** Chaired by Ben Eusebio, U.S. EPA, Region X

[4] **Workgroup on Improving Access and Use of Existing Data:** Chaired by Thomas Holloway, U.S. EPA , Region VII

[5] **Workgroup on Future Assessments/ National Reporting:** Chaired by Bruce Newton, U.S. EPA Headquarters

[6] **Workgroup on Ambient Discharger Monitoring:** Chaired by Carol Hudson Jones, U.S. EPA Headquarters

4:30-6:00: Poster Session

Topics to include:

- New Jersey's cooperative coastal monitoring program
- Use of GIS's in environmental decision making
- Maine's biomonitoring program
- User friendly system for screening permittees for biomonitoring toxicity tests
- Using assessment information for priority setting: A spreadsheet model
- Ocean Data Evaluation System Demonstration
- Application of Ecoregions to aquatic resources assessment and management
- Big Picture assessment of POTWs - A case study
- Chesapeake Bay water quality monitoring program and data management system
- USGS project to develop methods for estimating state-wide statistics on "use support" based on land-use data
- EPA's long-term monitoring project: studies of surface water acidification
- Comparison of chemical-specific, toxicity, and biosurvey based evaluations of water quality
- Fish toxics monitoring in Massachusetts
- Section 305(b) waterbody system
- The River Reach system

Friday, June 3

Workgroup Presentations and Concluding Discussion

8:30 Workgroup reports
Each workgroup chair will present conclusions and recommendations. General discussion to follow (30 minutes per workgroup)

10:00 Break

10:20 Workgroup reports and discussion (continued)

12:00 Lunch

1:00 Concluding Discussion: Where do we go from here? Geoffrey Grubbs, U.S. EPA Headquarters, and Michael Haire, Maryland Department of the Environment

2:00 Adjourn

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MARYLAND
DEPARTMENT OF
THE ENVIRONMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

APPENDIX C

Contacts for Poster Session Topics

CONTACTS FOR POSTER SESSION TOPICS

Topic	Contact/Organization
Resource Maps for Gulf Coast	Dan Farrow NOAA
Use of GIS's in Arizona	Carol Russell Arizona Department of Environmental Quality
Maine's Biomonitoring Program	Susan Davies Maine Dept. of Environmental Protection
User Friendly System for Screening Permittees for Biomonitoring Toxicity Tests	David Eng U.S. EPA
Ocean Data Evaluation System Demonstration	Robert King U.S. EPA
Application of Ecoregions to Aquatic Resources Assessment and Management	Fred Mangum U.S. Forest Service
USGS Project to Develop Methods for Estimating State-wide Statistics on "Use Support" Based on Land-use Data	Richard Smith USGS
EPA's Long-term Monitoring Project: Studies of Surface Water Acidification	Avis Newell U.S. EPA - Corvallis
Comparison of Chemical-specific, Toxicity, and Biosurvey Based Evaluations of Water Quality	Ed Rankin Ohio EPA
Section 305(b) Waterbody System	Karen Klima U.S. EPA
The River Reach System	Robert Horn U.S. EPA
Water Watch Program	Ken Cooke Kentucky Division of Water
Enhanced STORET Demonstration	Phil Taylor, Paul Evanhouse U.S. EPA

APPENDIX D

Informal EPA Survey of State Monitoring Activities: Summary of Results

INFORMAL EPA SURVEY OF STATE MONITORING ACTIVITIES: SUMMARY OF RESULTS

In April and May 1988 EPA Regional staff were asked to complete a short questionnaire to provide rough estimates of the scope and nature of State monitoring activities. EPA Regional staff provided some estimates through their working knowledge of State programs; in other cases States provided estimates.

Fifty two questionnaires were distributed. Responses were received for forty three States, Puerto Rico, and the District of Columbia. Respondents were asked to choose one of several possible answers for each question.

The original questionnaire included eleven questions. Responses to those questions that appeared to have been interpreted ambiguously are not included in this summary of results. The results for seven questions are presented below in the form of bar charts alongside a restatement of the question. The possible answers are given on the horizontal axis of each chart. The height of each bar is proportional to the number of States which chose each answer.

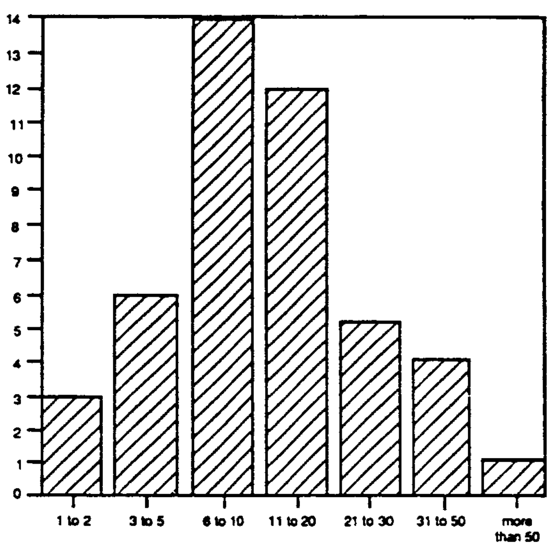
For more information, contact Wayne Praskins of the U.S EPA's Monitoring and Data Support Division at (202) 382-7074.

I. STATE MONITORING PROGRAM STAFF (Questions Nos. 1 - 3)

SUMMARY: The first three questions address State monitoring program staff. Survey respondents were first asked to estimate the total number of staff in each State's surface water monitoring program. The most common response was 6 to 10 "full time equivalents" (FTEs). One person working full time on monitoring would count as one FTE. Survey respondents estimated that in most States the number of staff available for monitoring activities stayed the same during the past five years, though more States were thought to have increased, rather than decreased, the number of staff. When asked to estimate the number of staff who could be described as biologists, the most common response was 3 to 5 FTEs. See questions nos. 1 - 3 below for a full statement of each question and response.

1. Estimate the total effort (FTEs) devoted to surface water monitoring activities. [Monitoring activities were defined to include: design of monitoring networks and surveys; collection of physical, chemical, and biological samples instream or in effluent; data analysis (e.g., modeling, 305(b) report preparation); data management. Monitoring activities were defined to exclude: monitoring for discharger compliance inspections; laboratory analysis; clerical support.]

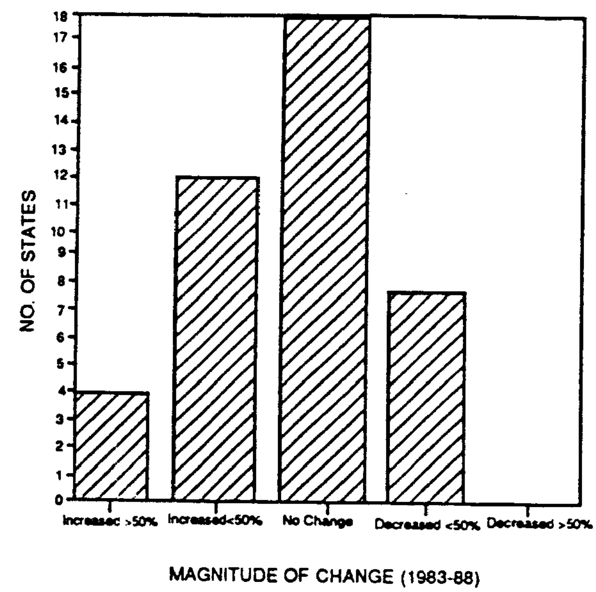
STATE MONITORING PROGRAM STAFF



TOTAL STAFF (FTEs)

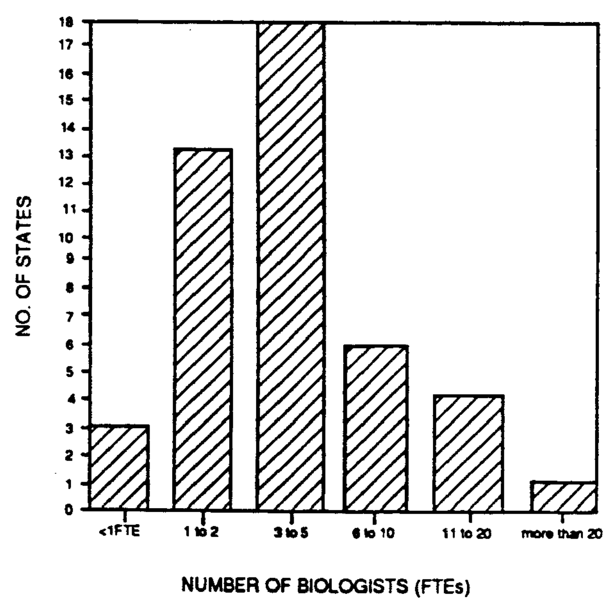
2. How has the number of FTEs changed since 1983?

STATE MONITORING PROGRAM STAFF



3. For those best described as professional staff, how many, based on their duties, could be described as biologists?

STATE MONITORING PROGRAM STAFF



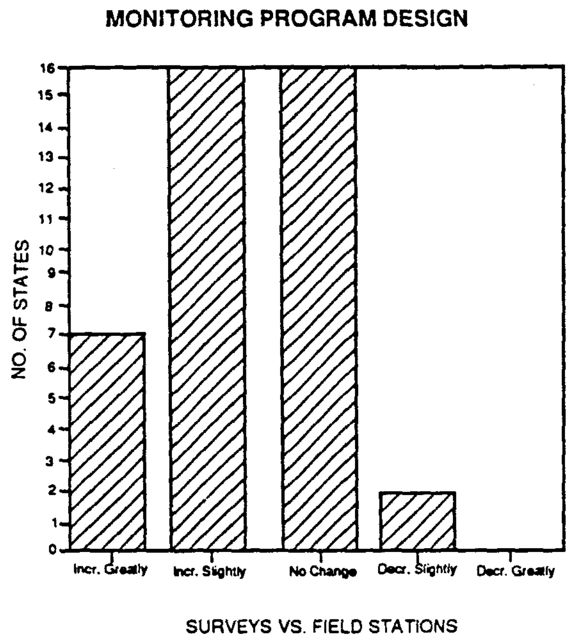
II. MONITORING PROGRAM DESIGN (Questions Nos. 4 - 6)

SUMMARY: Survey respondents estimated that in the past five years a majority of States put greater effort (measured in FTEs) into conducting surveys than on maintaining networks of fixed stations.

When asked how much effort (in FTEs) States devote to biological assessments in relation to chemical specific monitoring, most respondents indicated either a 90%/10% or 75%/25% mix between resources devoted toward chemical and biological monitoring, respectively. See questions nos. 4 - 6 below for a full statement of each question and response.

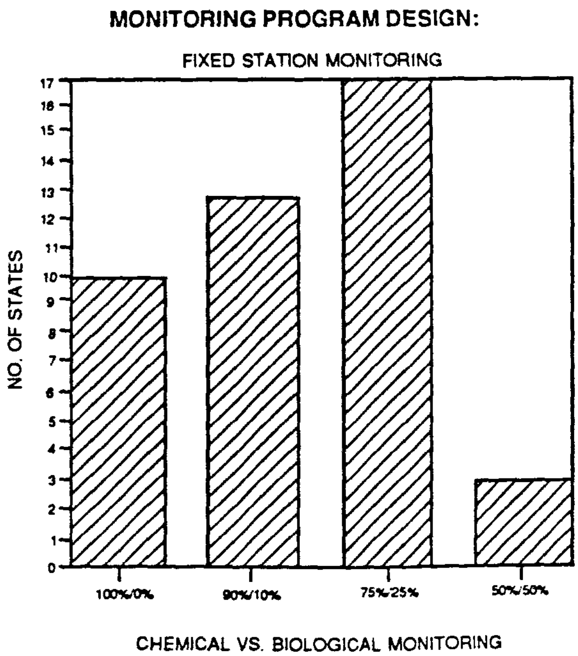
4. Has the relative effort (in FTEs) devoted to surveys vs. fixed station monitoring changed since 1983? [choose best answer]

* surveys have **increased greatly** relative to fixed stations
* surveys have **increased slightly** relative to fixed stations
* **no change**
* surveys have **decreased slightly** relative to fixed stations
* surveys have **decreased greatly** relative to fixed stations



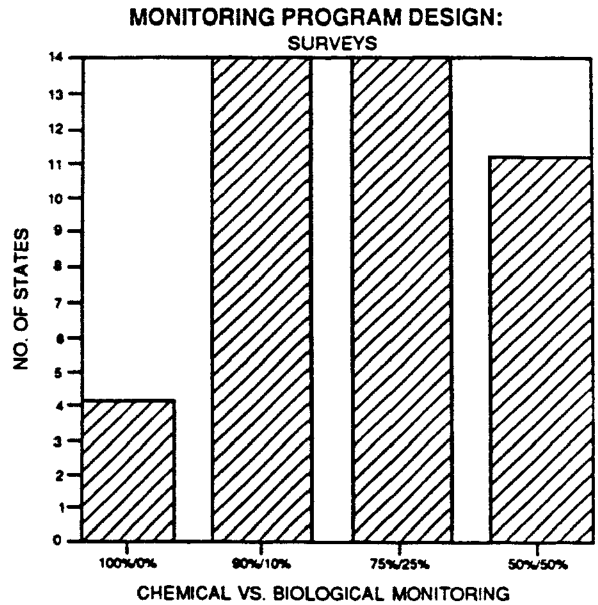
5. For the State's fixed station network, estimate the percentage of resources (FTEs) devoted to chemical-specific monitoring (whether in the water-column, sediments, or fish tissue), and to biological assessments (qualitative or quantitative surveys of aquatic populations). [choose best answer]

* 100% chemical/0% biological
* 90% chemical/10% biological
* 75% chemical/25% biological
* 50% chemical/50% biological



6. For surveys conducted in the past year, on the average, what percentage of resources (FTEs) has been directed toward chemical-specific monitoring vs. biological monitoring? [choose best answer]

* 100% chemical/0% biological
* 90% chemical/10% biological
* 75% chemical/25% biological
* 50% chemical/50% biological



III. USE OF FIXED STATION DATA (Question No.7)

__SUMMARY:__ When asked what use they made of fixed station ambient monitoring data, survey respondents estimated that most States used ambient fixed station data primarily to prepare section 305(b) reports or on a case-by-case basis. Only a few respondents indicated that States make extensive use of ambient data to set program priorities. See question no. 7 below for a full statement of the question and response.

7. Which statement best describes how the State uses fixed station monitoring data? [choose one statement]

* Data entered into STORET but **seldom** used
* Data used primarily **for 305(b) reports**
* Data used **on case-by-case basis** (e.g., to assist in reviewing permits)
* Data used **extensively** to set program priorities