United States
Environmental Protection
Agency

Office of Acid Deposition,
Environmental Monitoring and
Quality Assurance
Washington DC 20460

EPA/600/M-90/001
April 1990

Research and Development

EPA AERP status

The Aquatic Effects Research Program (AERP) *status* provides information on AEF projects dealing with the effects of acidic deposition on U.S. surface waters. Our objectives are to:

- assist organizations involved in acidic deposition research to avoid duplicatior of efforts and to make maximum use of related research,
- promote communication among the Environmental Protection Agency (EPA), state agencies, and organizations involved in acidic deposition monitoring activities, and
- provide a mechanism to distribute available AERP information.

AQUATIC EFFECTS RESEARCH PROGRAM-AN OVERVIEW

In 1980, Congress passed the Acid Precipitation Act, thus establishing the Interagency Task Force on Acid Precipitation. Given a 10-year mandate, the Task Force implemented the National Acid Precipitation Assessment Program (NAPAP) to investigate the causes and effects of acidic deposition. NAPAP includes task groups formed to study emissions and controls, atmospheric chemistry, atmospheric transport, atmospheric deposition and air quality, terrestrial effects, aquatic effects, effects on materials and cultural resources, and direct and indirect human health effects.

The AERP, formed in 1983 as part of the NAPAP Aquatic Effects Task Group, is responsible for assessing the effects of acidic deposition on aquatic ecosystems. Already, published AERP reports have described the chemical characteristics of lake and stream resources in regions of the United States potentially sensitive to acidic deposition. Complementing these findings, a report to be published in early 1990 summarizes correlative relationships between watershed and surface water chemica characteristics and projects future conditions for two deposition scenarios in the Northeast and two in the Southern Blue Ridge Province. (See Direct/Delayed Response Project article, page 5. For a complete list of published AERP documents see the mail order form attached to this *status*.)

By 1990, the end of the 10-year mandate, Congress requires NAPAP to provide a full assessment of the acidic deposition phenomenon. An important aspect of current AERP efforts involves synthesizing results from past and current research to describe the state of the science for acidic deposition effects on aquatic systems. Another aspect involves integrating the state-of-science information with illustrative emission control scenarios to provide an assessment useful for policy decisions concerning alternative control strategies. A group of AERP scientists is now workin on this task, which will provide valuable aquatic information for the NAPAP reports Congress. A summary of these activities can be found on page 9.

Status of AERP Activities--This issue of the *status* includes sections that provide information about recently published AERP materials and projects in progress. Table 1 summarizes the present status of projects within the AERP.

Project	Design	Implementation	Reporting
National Surface Water Survey			
National Lake Survey-Phase I (East and West)	Complete	Complete	Complete
National Lake Survey-Phase II (Northeast)	Complete	Complete	1990
National Stream Survey-Phase I	Complete	Complete	Complete
Direct/Delayed Response Project			
Northeast and Southern Blue Ridge Province	Complete	Complete	Complete
Mid-Appalachian Region	Complete	Ongoing	Fall 1990
Watershed Processes and Manipulations			
Watershed Manipulation Project	Complete	Ongoing	Dec. 1992
Watershed Recovery Project	Complete	Ongoing	Fall 1990
Little Rock Lake Experimental Acidification Project	Ongoing	Ongoing	Annually
Episodic Response Project			
Episodes	Complete	Ongoing	1990/1991
Regional Episodic and Acidic Manipulations Project	Complete	Ongoing	Summer 1990
Temporally Integrated Monitoring of Ecosystems	Ongoing	1991	Annually
Biologically Relevant Chemistry	Ongoing	Ongoing	Summer 1990
Indirect Human Health Effects	Complete	Complete	Fall 1990

Table 1. Present status and projected dates for stages of major AERP projects.

AERP FEATURE ARTICLE

Long-Term Monitoring (LTM) and Temporally Integrated Monitoring of Ecosystems (TIME) Projects

Long-term monitoring of surface water resources plays a pivotal role in the assessment of acidic deposition effects. The Long-Term Monitoring (LTM) and Temporally Integrated Monitoring of Ecosystems (TIME) projects represent two responses by the AERP to establish a data base on trends in aquatic effects of acidic deposition on acid-sensitive surface waters.

LTM was initiated in 1983, prior to initiation of the National Surface Water Survey (NSWS) and the establishment of the AERP. LTM incorporated sites from other ongoing or planned monitoring networks involved in studies of acid-sensitive surface waters across a regional and national range of acidic deposition. The LTM network, whose current configuration is shown in Figure 1, is composed of 85 sites in six regions of the United States. Samples for chemical analysis are collected and analyzed on a monthly or seasonal schedule by individual cooperators (Table 2). The quality assurance program is coordinated at the EPA Environmental Research Laboratory in Corvallis, Oregon and includes participation in an international round-robin, natural audit program coordinated by the Canadian Long-Range Transport of Atmospheric Pollutants (LRTAP) program. A description of the 1985 configuration of the LTM project is given in Newell et al. (*Analysis of Data from Long-Term Monitoring of Lakes*, EPA/600/4-87/014; to obtain copies of this report and others mentioned in this article, contact the Technical Director listed at the end of this article.) Despite the short data record (4 to 7 years), some trends in water quality at LTM sites have been detected (Figure 2), including decreases in sulfate concentrations in the Northeast and decreases in acid neutralizing capacity (ANC) in some of the New York and Upper Midwest sites. Sediment cores for paleolimnological examination have recently been collected from many LTM lakes. These cores will help corroborate recent trends observed in these lakes and put recent changes into the perspective of long-term (>100 years) trends.

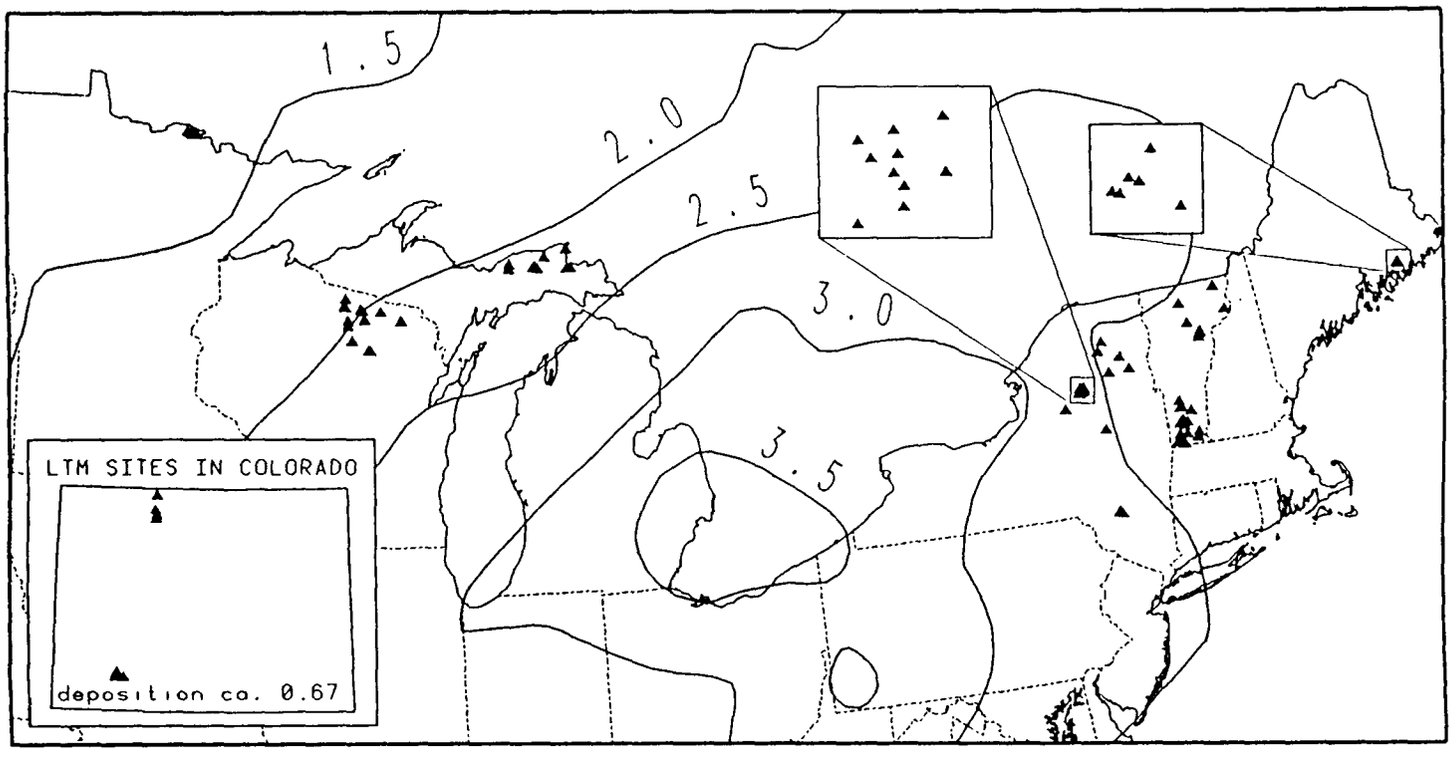

Figure 1. Location of Long-Term Monitoring (LTM) sites in Maine, Vermont, New York, Colorado (inset), and the Upper Midwest. Isopleths of sulfate wet deposition (g/m^2/yr, 1980-84) are overlaid to indicate the range in deposition that these sites experience.

The foundation for many of the AERP projects is the use of randomly selected probability sample sites to provide population estimates on a regional basis.

Since the LTM sites were not selected statistically, the questions of how or whether results from this network could be used in regional assessments gave rise to the TIME project. TIME was designed with four goals in mind: (1) to provide regional early warning signals of surface water acidification or recovery; (2) to provide an ongoing assessment of regional patterns or trends in surface water acidification or recovery; (3) to assess the extent to which observed spatial and temporal patterns in surface water chemistry correspond with model forecasts; and (4) to assess the relationships between patterns in surface water chemistry and patterns in atmospheric deposition. The current TIME design combines temporally intensive monitoring at a small number of trend sites in each region with spatially extensive, regional resurveys of sites selected from a statistical population frame.

Planning for the TIME project has emphasized the need to evaluate statistical techniques for data analysis as part of the design process to ensure that the final design will produce data that specifically address the four goals of TIME. Planning activities have included:

- Evaluations of over a dozen statistical techniques, both univariate and multivariate, for trend detection in time series data. Seasonal Kendall tests, and analysis of covariance on ranked data, were selected as the trend detection methods of choice (discussed further in Loftis et al., *An Evaluation of Trend Detection Techniques for Use in Water Quality Monitoring Programs*, EPA/600/3-89/037).

- Reviews of the potential for using biological indicators in the assessment of surface wate acidification. Successful monitoring plans for fish, amphibians, zooplankton, algae (periphyton, chrysophytes, dinoflaggelates, diatoms, greens and bluegreens), and macroinvertebrates will be presented in an

Location	Principal Investigator(s)	Affiliation	Number of Sites	Start	Sampling Schedule	Comments
Adirondacks	Charles Driscoll	Syracuse University	15 lakes	Spring 1985	Monthly	Historical data are available (sampled monthly, from 1982-1984)[a].
Vermont	Wallace McLean Doug Burnham Jim Kellogg	Vermont Agency of Environmental Conservation	24 lakes	Winter 1981	4 seasons per year	Changes in sampling and analytical methods were made in spring 1985 which may affect trend interpretation.
Maine	Terry Haines Steve Kahl	U.S. Fish and Wildlife Service; University of Maine	5 lakes	Fall 1982	3 seasons per year	
Upper Midwest	Patrick Brezonik Katherine Webster	University of Minnesota; Wisconsin Department of Natural Resources	27 lakes[b]	Fall 1983	3 seasons per year	Historical data are available (sampled sporadically on a seasonal basis, from 1978 to 1983)[c].
Rocky Mountains	John Turk	U.S. Geological Survey, Denver	10 lakes	Summer 1985	Monthly in summer	
Catskill Mountains	Pete Murdoch	U.S. Geological Survey, Albany	4 streams	Fall 1983	9 times per year	Sampling is flow directed.

[a] Data collected by Syracuse University for most of these lakes between 1982 and 1985 were funded by the Electric Power Research Institute under the Regional Integrated Lake Watershed Acidification Study.

[b] Four lakes in Minnesota; 12 lakes in Wisconsin; 11 lakes in Michigan.

[c] Data collected by the University of Minnesota-Duluth and the Wisconsin Department of Natural Resources through a cooperative agreement with the Environmental Research Laboratory-Duluth are available for most of these lakes for the period 1978-1983. The sampling schedule for these lakes was variable, ranging from twice a year to seasonally, and included multiple samples per lake.

Table 2. EPA Long-Term Monitoring Project.

upcoming EPA report, *The Role of Biomonitoring in Assessing the Aquatic Effects of Acidic Deposition.*

- Multivariate analyses of NSWS data sets and development of conceptual models which will allow correlation of nonrandomly selected sites (as in LTM) to probability samples such as the NSWS and the regional resurveys planned for TIME.

Other areas identified for development have included assessing the adequacy of existing deposition networks for the TIME objectives, developing statistical techniques to relate patterns and trends in one monitoring network (e.g., deposition) to another network with different spatial and temporal resolution (e.g., surface waters), developing statistical techniques for analysis of biological data, and developing an approach for evaluating model forecasts of surface water acidification. Several papers on these topics will appear in the *Proceedings of an International Symposium on the Design of Water Quality Information Systems* (in press, to be published by Colorado State University). In 1989, the TIME and LTM projects were reassigned from the AERP to the EPA Environmental Monitoring and Assessment Program (EMAP). EMAP has the broad mission to provide periodic descriptions of general ecosystem health across the United States. Thus, EMAP treats several different target resources (near coastal environments, forests, wetlands, agroecosystems, deserts, grasslands, tundra, and air) in addition to surface waters. EMAP intends to monitor a range of stressor indicators (unlike current monitoring aimed specifically at acidic deposition), and a range of exposure and response indicators, with a particular emphasis on biological responses. The EMAP design is a tiered, hierarchical approach whose foundation is an evenly spaced sampling grid of about 12,500 points. For more information about EMAP contact:

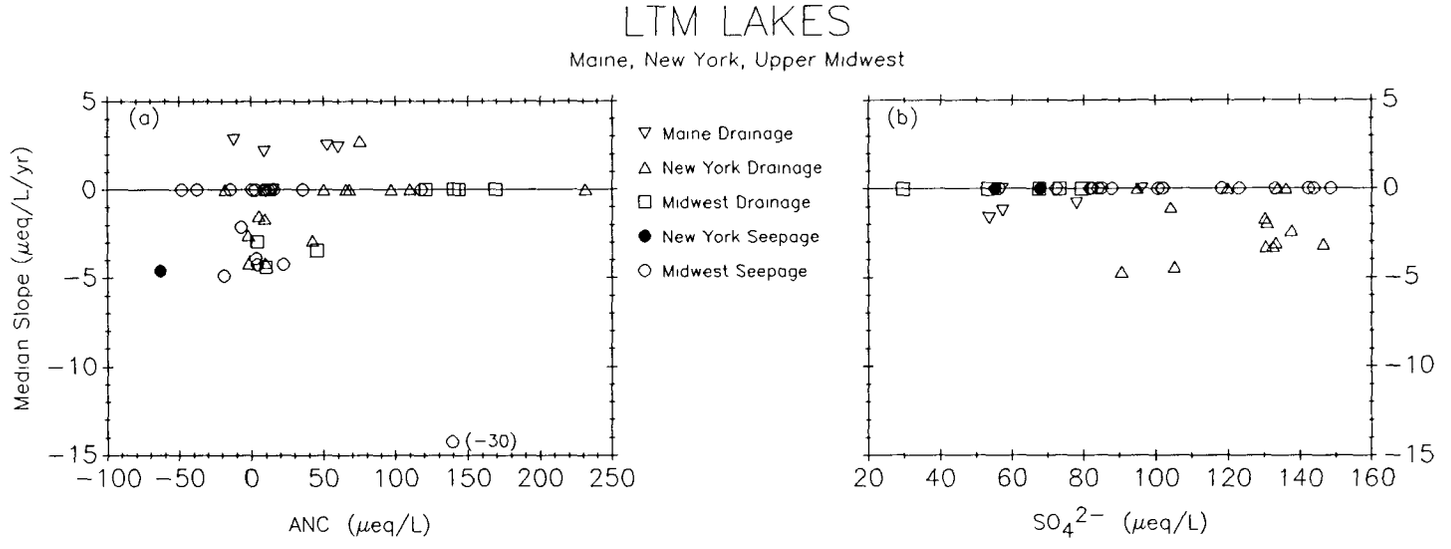

Figure 2. Trends in (a) acid neutralizing capacity (ANC) and (b) sulfate in Long-Term Monitoring (LTM) lakes, as a function of their fall 1984 concentrations (coinciding with the Eastern Lake Survey of the National Surface Water Survey). Values on y axis are median slopes from seasonal Kendall tests; nonsignificant trends (p > 0.10) are shown with slopes of zero.

Jay Messer
EMAP Deputy Director
EPA/Atmospheric Research and
Exposure Assessment Laboratory
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Research Triangle Park, North Carolina 27711
(919) 541-0150

One of EMAP's goals is to provide assessments of the effectiveness of regulatory programs, such as the proposed amendments to the Clean Air Act. Under EMAP, the TIME and LTM projects will evolve to meet this goal. The general EMAP design will be augmented to allow the monitoring of a specific stressor (acidic deposition) and a set of regulatory programs (emissions reductions).

For more information about the TIME and LTM projects, and to obtain copies of reports cited in this article, contact:

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CURRENT AERP ACTIVITIES

Summarized below are the AERP activities that are currently in progress.

Direct/Delayed Response Project (DDRP)

The Direct/Delayed Response Project (DDRP) was designed to examine critical scientific and policy questions regarding potential future acidification [loss of acid neutralizing capacity (ANC)] in eastern watersheds (April 1989 *status).* The final report for lakes in the Northeast and stream reaches of the Southern Blue Ridge Province was released in July 1989; major findings were reported in the July *status.* The report, entitled *Direct/Delayed Response Project: Future Effects of Long-Term Sulfur Deposition on Surface Water Chemistry in the Northeast and Southern Blue Ridge Province, Volumes I-IV* (EPA/600/3-89/061a through d) will be available in earl 1990.

Data analyses continue for 36 DDRP watersheds being studied in the Mid-Appalachian Region (October 1988 *status*), and results will be reported as part of NAPAP 1990 Integrated Assessment. These analyses are focusing on the Level II (Single Factor Response Time Estimates) and Level III (Integrated Watershed) modeling activities analogous to those performed for the Northeast and Southern Blue Ridge Province regions. Only a single Level III watershed model--Model of Acidification of Groundwater in Catchments (MAGIC)--is being used in the Mid-Appalachian studies, because the three models used for the Northeast and Southern Blue Ridge Province analyses yielded similar results.

Correction to DDRP article in September 1989 *status:*

Tables 2 and 3 on page 5 of the September issue of the AERP *status* (EPA/600/M-89/022) contained a number of erroneous entries with regard, principally, to the 95 percent confidence estimates of the projections of the DDRP. The corrected values appear in the accompanying tables published here. Figure 3

Time from Present Year	Number of Lakes[a] Constant Deposition ANC <0	Constant Deposition ANC <50	Decreased Deposition ANC <0	Decreased Deposition ANC <50
0	162[b] 5%	880[b] 27%	162[b] 5%	880[b] 27%
20	161 (245) 5% (8%)	648 (319) 20% (10%)	136 (230) 4% (7%)	621 (313) 19% (10%)
50	186 (251) 6% (8%)	648 (329) 20% (10%)	87 (237) 3% (7%)	586 (331) 18% (10%)

[a] % is percentage of the target population of 3,227 lakes; ( ) indicate 95 percent confidence estimates.
[b] Indicates estimate from National Surface Water Survey-Phase I sample for the same 123 lakes; target population = 3,227 lakes.
[c] Projections are based on 123 lake/watersheds successfully calibrated by MAGIC.
[d] See Figure 3 for definition of the deposition scenarios used.

Table 3. Lakes in the Northeast Projected to have ANC Values < 0 and < 50 μeq/L for Constant and Decreased Sulfur Deposition [c,d]

Time from Present (year)	Number of Stream Reaches[a] Constant Deposition ANC <0	Constant Deposition ANC <50	Decreased Deposition ANC <0	Decreased Deposition ANC <50
0	0[b] 0%	3[b] 0.2%	0[b] 0%	3[b] 0.2%
20	0 0%	187 (310) 14% (23%)	0 0%	187 (314) 14% (24%)
50	129 (295) 10% (22%)	203 (333) 15% (25%)	159 (291) 12% (22%)	340 (359) 26% (27%)

[a] % is percentage of the target population of 1,323 stream reaches; ( ) indicate 95 percent confidence estimates.
[b] Indicates estimate from National Surface Water Survey, Pilot Stream Survey sample for the same 30 streams; target population = 1,323 stream reaches.
[c] Projections are based on 30 stream/watersheds successfully calibrated by MAGIC.
[d] See Figure 3 for definition of the deposition scenarios used.

Table 4. Southern Blue Ridge Province Stream Reaches Projected to have ANC Values < 0 and < 50 μeq/L for Constant and Decreased Sulfur Deposition [c,d]

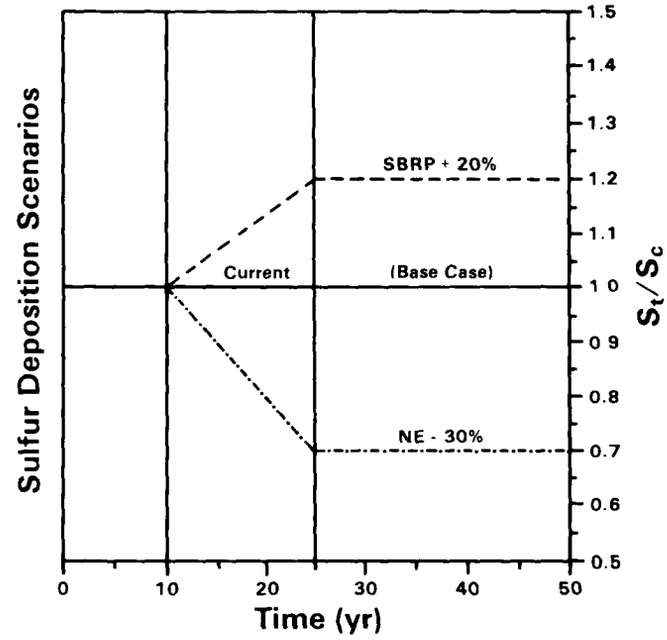
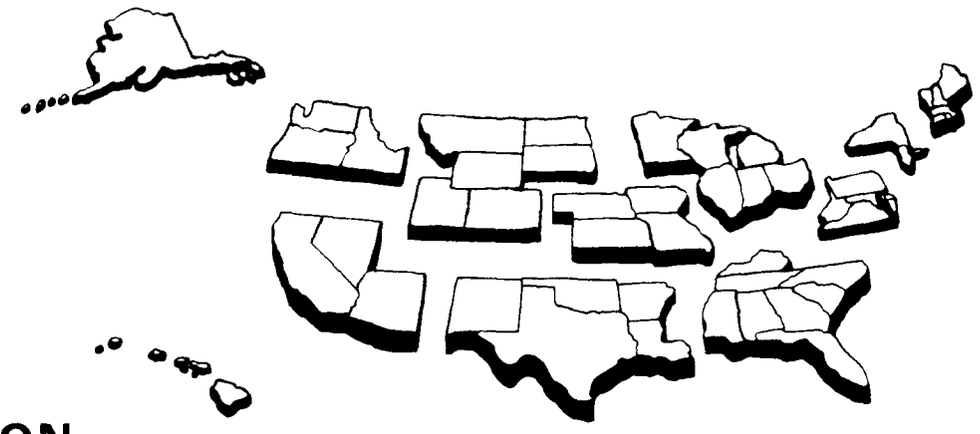


Figure 3. Sulfur deposition scenarios for the Northeast (NE) and Southern Blue Ridge Province (SBRP) for Level II and Level III analyses. Ratio of total sulfur deposition at time t (S_t) to current total sulfur deposition (S_c).



STATE INFORMATION

The AERP status provides a forum for states to exchange information and update activities. Highlighted state activities are presented below.

California

As part of the five-year Atmospheric Acidity Protection Program, the California Air Resources Board recently funded three major projects to investigate the effects of acidic deposition on aquatic ecosystems of the Sierra Nevada. These projects include:

- *Watershed Monitoring*--A contract was awarded to the University of California, Santa Barbara, to monitor watershed and lake geochemistry year-round at seven high-elevation locations in the Sierra Nevada. The focus of this project will be the collection of long-term data on watershed characteristics and lake dynamics to determine the impacts of acidic deposition.

- *Alpine Wet Deposition Network*--The University of California, Santa Barbara, was selected to install and operate a 10-station network for a period of 4 years to monitor the variability of wet deposition on the alpine zone in the Sierra Nevada on both spatial and temporal scales. This network will include snowpack sampling and rain event collections at elevations above 9,000 feet. These deposition data will be used to improve regional lake acidification assessments.

- *Aquatic Biota Studies*--Contracts were awarded to investigators to carry out surveys and dose-response studies of aquatic species in lakes and streams in the Sierra Nevada. Both economically important species and indicator species will be studied during the 1990-91 field seasons.

Address inquiries on the above information to:

Kathy Tonnessen
Research Division
Air Resources Board
P.O. Box 2815
Sacramento, California 95812
(916) 324-1744

Florida

The Florida Department of Environmental Regulation has been conducting studies of Florida's sensitive lakes in order to characterize their chemistry and biology, evaluate historical changes in water chemistry, and evaluate factors contributing to their acid neutralizing capacity (ANC). The Florida Soft Water Lakes Study project, completed in the fall of 1989, evaluated the fish status and water chemistry of 12 acidic soft water lakes. The Florida Sensitive Lakes Reassessment Study project is evaluating whether historical water chemistry changes have occurred among Florida lakes. The Florida Seepage Lakes Study is currently evaluating the factors that regulate ANC, including groundwater contributions.

Address inquiries on above information to:

Curtis E. Watkins
Florida Department of
Environmental Regulation
2600 Blair Stone Road
Twin Towers Office Building
Tallahassee, Florida 32399
(904) 488-0782

Announcement

Due to AERP budget reductions and prioritization of research dollars within the program, publication of the *status* will end with the next issue, which is scheduled for September 1990.

In the final issue of the *status*, a reader-contribution section will replace the state activities section. The new section will include articles on state activities but will also present reader-contributed articles as well. The reader-contribution section is intended to be an open forum for exchange of information among acidic deposition researchers. All researchers are invited to contribute brief articles on monitoring and research activities in which they are involved. The deadline for submission is May 7 for publication in the September issue.

Please submit information or inquiries to:

J.Y. Aoyama
AERP State Information Coordinator
1050 E. Flamingo, Suite 209
Las Vegas, Nevada 89119
(702) 734-3288

(referenced in footnote *d* of both tables) is also presented here. The corrected values will appear in the published version of the final report for the DDRP and do not affect the conclusions and discussion presented in the previous issue of the AERP *status*.

Address inquiries concerning DDRP to:

M. Robbins Church
DDRP Technical Director
EPA/Environmental Research Laboratory-Corvallis
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Corvallis, Oregon 97333
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FTS: 420-4666, ext. 304

Watershed Processes and Manipulations

The Watershed Manipulation Project, Watershed Recovery Project, and Little Rock Lake Experimental Acidification Project are watershed studies that were undertaken to investigate the processes that control the effects of acidic deposition on surface waters. Progress in each of these projects follow:

Watershed Manipulation Project (WMP)--Process-oriented research in the WMP was designed to examine the quantitative and qualitative responses of watershed soils and surface waters to altered levels of acidic deposition. Manipulation studies have been conducted at laboratory, plot, and catchment scales. Using a paired catchment approach, one catchment was artificially acidified by applying ammonium sulfate, with the other serving as a control. The first manipulation occurred in November 1989. At catchments located in southeastern Maine, hypothesis tests have been conducted through the cooperative efforts of a site team, six scientific task teams, a modeling team, and an EPA management team. The laboratory and plot studies have yielded several preliminary findings. Results through June 1989 were incorporated into a draft findings report that was completed in December 1989.

Address inquiries concerning WMP to:

Jeffrey J. Lee
WMP Technical Director
EPA/Environmental Research Laboratory-Corvallis
200 S.W. 35th Street
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FTS: 420-4666, ext. 318

Little Rock Lake Experimental Acidification Project--The first year of the Little Rock Lake treatment basin acidification to the lowest intended pH level of 4.6 is progressing smoothly. Approximately the same amount of acid (400 liters) was added during the summer of 1989 as was required to establish pH levels of 5.6 and 5.1 in 1985 and 1987, respectively. This is approximately twice the amount of acid required during the second year at each pH level, or approximately 4 and 2 times the background levels of acidic deposition, respectively. A *Mougeotia*-dominated algal complex appeared in greater quantities this year than last (the second year at pH 5.1) but was still substantially less prevalent than during the first year at pH 5.1. An inconsistent response of *Mougeotia* growth to low pH also has been observed in Max Lake, a system located near Little Rock Lake with a natural pH of 5.1. Blue-green algae essentially have been eliminated in the treatment basin but remain common in the reference half of the lake. The treatment basin continues to be more transparent on the average and more blue in color than the reference basin. The reduction in zooplankton species has accelerated at pH 4.6, with only 5 of the approximately 20 or so original, dominan species remaining. Many indirect as well as direct effects on zooplankton have been observed.

Reproduction of largemouth bass and rock bass ceased at pH 4.6. Although adults nested and some spawning occurred, no fry were produced. Adults of both species appear physiologically and morphologically normal, but population levels are

dropping due to declining recruitment. Complementary laboratory studies have demonstrated that survival of young-of-the-year largemouth bass is reduced under water quality conditions (temperature, Ca^{2+}, Al^{3+}) simulating the treatment basin of Little Rock Lake at pH 5.1 during the winter (113 days of exposure). Yellow perch appear to be surviving and reproducing as well or better in the treatment basin as in the reference basin. Results from the summer of 1989 for many chemical and biological studies will be presented in a subsequent issue of the *status.* Several reports on the Little Rock Lake project became available during the summer, including presentations made in Geneva, Switzerland; Freiburg and Munich, Germany; Toronto, Canada; Anchorage and Fairbanks, Alaska; and Madison, Wisconsin.

Address inquiries concerning the abovementioned reports and presentations or the Little Rock Lake Experimental Acidification Project to:

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Little Rock Lake Experimental Acidification Project
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Episodic Response Project (ERP)

Episodic acidification is the process by which lakes and streams experience short-term decreases of ANC. An episode is an occurrence of a short-term decrease of ANC, usually during hydrological events (periods of increased streamflow due to rainstorms or snowmelt) and over time scales of hours to weeks. Typically, changes in other water quality parameters, such as pH, base cations, or species of dissolved aluminum, accompany episodes. Changes in calcium and aluminum have the potential to impact aquatic biota.

In the past, most approaches to quantifying episodes have been only partially successful, primarily because of the unpredictable nature of rainstorms and snowmelt. As a result, the ERP is being conducted to answer key questions about episodic acidification. The ERP goals are to (1) quantify the occurrence of episodes in four or five streams in each of three areas, the Northern Appalachian Plateau in Pennsylvania and the Adirondack and Catskill Mountains in New York state, (2) describe biological responses to episodes, and (3) develop and evaluate regionally applicable models of episodic acidification.

Eastern Episodes--One year of field research has been completed, the results of which are being analyzed and will be included in the upcoming NAPAP State-of-Science reports and Integrated Assessment. Cooperating research groups at the Adirondack Lakes Survey Corporation, Pennsylvania State University, and the United States Geological Survey conducted intensive biological and hydrochemical research during the fall of 1989. Biological experiments include wild fish transplants and population-level assessments, field bioassays, and radiotelemetry work. Hydrochemical data are being collected with a combination of automated and manual sampling approaches.

Address inquiries concerning ERP to:

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(503) 757-4666, ext. 354
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Regional Episodic and Acidic Manipulations Project (REAM)--After manipulation of whole catchments by enhancing acidic deposition, REAM studied and provided data of its effects on surface water quality. At the United States Department of Agriculture (USDA) Forest Service at Fernow Experimental Forest near Parsons, West Virginia, scientists monitored the responses of streams to acidification on both chronic and episodic time scales.

Using a paired catchment approach, one catchment was artificially acidified by applying ammonium sulfate, with the other serving as a control. Manipulations began in January 1989. Subsequent applications followed in July and October. Application rates of sulfate were approximately three times the

seasonal ambient rate. Annual ambient sulfate deposition at Fernow was about 790 eq/ha. Monthly ambient sulfate deposition was about 25 eq/ha in January, 150 eq/ha in July, and 40 eq/ha in October.

Observations in both streams at the site have shown episodic depressions in pH and increases in sulfate concentrations associated with storms. For the most part, these changes were not associated with the manipulations. The only changes in stream chemistry caused by the applications of ammonium sulfate were transient increases in ammonium and sulfate concentrations during the first storm following each application. These changes were caused by runoff of ammonium sulfate, and were an artifact of the application methods. Oxygen-18 data for stream water, soil water, and precipitation was used to examine hydrologic routing in the catchments. Biological studies have been funded and initiated by the USDA Forest Service at the site.

Address inquiries concerning REAM to:

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SYNTHESIS AND INTEGRATION ACTIVITIES

State-of-Science/Technology (SOS/T) Reports--The seven Aquatic Effects Task Group SOS/T reports will be presented in February at an international meeting at Hilton Head Island, South Carolina. Summaries for each of the 28 NAPAP SOS/T reports, including the aquatic effects reports, will be distributed to all participants at the meeting. Each participant will receive a copy of one SOS/T report of their choice. Additional reports can be purchased. To receive a copy of the Summaries document or to purchase individual SOS/T reports, please contact:

Patricia Irving
Office of the Director
National Acid Precipitation Assessment Program
722 Jackson Place, N.W.
Washington, D.C. 20503
(202) 395-5771

Technical Information Project--The Technical Information Project disseminates information on AERP activities to state agencies, organizations, and technical audiences. Distributed information includes the following items:

- Major Report with Companion Documents - These document sets consist of a compilation of the manuals and reports used during or prepared as a result of a particular AERP project. Companion documents to each major data report include field operations and quality assurance reports, quality assurance plans, and analytical methods manuals. Document sets for the Eastern Lake Survey - Phase I, Western Lake Survey, National Stream Survey, and DDRP are available through the mail order form in this *status.*

- Data Bases - Each data base consists of two components: (1) a computer diskette or tape containing the validated data base for a particular AERP project, and (2) a user's guide with instructions on how to use the disk or tape. Information about how the quality of the data was assessed is included. Data bases fo the Eastern Lake Survey - Phase I and Western Lake Survey are available through the mail orde form in this *status.*

- Handbooks - Handbooks are guidance documents that contain procedures for field an laboratory operations for surface water and soi chemistry sampling. They are beneficial to those organizations involved in designing and implementing monitoring activities related to acidic deposition. *The Handbook of Methods for Acid Deposition Studies, Laboratory Analysi*

for Surface Water Chemistry is available through the order form in this issue.

NOTE: **Due to a printing error, a draft version of the *Handbook of Methods for Acid Deposition Studies, Field Operations for Surface Water Chemistry*, EPA/600/4-89/020, was published and distributed. If you have received a copy of this document, please destroy it. The correct copy will be sent to you as soon as it is available.**

Address inquiries concerning the AERP Technical Information Project to:

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(FTS): 545-2358

AERP ANNOUNCEMENTS

The Eastern Lake Survey-Phase II (ELS-II) zooplankton data are now available on magnetic computer tapes and in two reports by A.J. Tessier and R.J. Horowitz.

The first report, entitled *Analysis and Interpretation of Zooplankton Samples Collected During Phase II of the National Lake Survey* (Academy of National Sciences of Philadelphia (ANSP) Report #88-18), contains data and analyses of samples collected from 146 lakes in the Northeastern United States: the abundance of each species and each size class of zooplankton, lake variance in zooplankton assemblages, and the composition of zooplankton assemblages in relation to physical/chemical features of the lakes.

The second report, entitled *Zooplankton Community Patterns and Relationships to Environmental Parameters in High Elevation Lakes in Maine* (ANSP Report #88-25), includes data on zooplankton samples taken from 83 lakes in Maine, and the relationships between zooplankton assemblages and the physical/chemical parameters of the lakes. Address inquiries about acquisition of the ELS-II zooplankton data and reports to:

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(503) 757-4666, ext. 428
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HANDBOOKS

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Handbook of Methods for Acid Deposition Studies, Field Operations for Surface Water Chemistry . . . . . 600/4-89/020 -----

PROJECT DESCRIPTORS

Research Activity Descriptors, FY 1988 . . . 600/9-88/006 -----

Research Activity Descriptors, FY 1989 . . . 600/9-89/059 -----

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