

Funding for Federal Great Lakes Environmental Programs

A Reference Guide

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Endorsed by:

Center for the Great Lakes
Council of Great Lakes Governors
Great Lakes Commission
Great Lakes United
Lake Michigan Federation
Northeast-Midwest Institute
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Executive Summary

The Great Lakes and St. Lawrence River make up the world's largest freshwater system. It is a unique and irreplaceable treasure, a resource of regional, national, and international significance. The source of drinking water for 23 million Americans, this system also provides food to millions throughout the continent, it offers a source of raw material for industry and provides transportation, recreation, and inspiration.

The Great Lakes, however, suffer from decades of heavy industrial and commercial use, run-off from city streets and agricultural land, and extensive coastal development. The threat from spills of oil or hazardous substances continues unabated. Invasions by non-indigenous aquatic creatures such as the recently arrived zebra mussels and the ruffe, in addition to the ubiquitous sea lamprey, cause damage.

Such problems are not new. Federal, state and provincial governments have spent billions of dollars on research, monitoring and management of the problems to restore the Great Lakes' environment. Their combined efforts have resulted in real progress: phosphorus pollution is curtailed and sea lamprey populations are under control. Other challenges, including zebra mussels and air toxics, are newly recognized and must be addressed. Because of the lakes' size and the commitment residents have shown, the lakes often pose test-cases for research and restoration efforts as well as innovative public policy initiatives.

Officials from the Great Lakes region have established far-reaching goals and innovative cooperative arrangements in an effort to spur Great Lakes restoration and protection. The U.S.-Canada Great Lakes Water Quality Agreement--a binational agreement outlining a restoration strategy for the Lakes--is unique in advocating an ecosystem approach where sources and effects of pollutions are analyzed in an integrated manner. In 1986 governors of the eight surrounding states signed the Toxics Substances Agreement which outlines an aggressive multimedia effort to prevent and control toxic pollution. They followed up in 1989 by establishing the \$100-million Great Lakes Protection Fund to carry out the agreement.

Federal funding for most Great Lakes water-resource protection, however, has declined in real dollars during the last decade. Even though fiscal 1990 funding remained at or above fiscal 1989 appropriation levels for most programs, in real dollars the funding is still 11 percent below 1981 levels (not including the construction grants program). The Bush Administration's fiscal 1991 budget proposal would cut \$5.9 million from these programs. Another \$125.4 million would be cut from wastewater treatment grants to the region. While state governments have increased their financial contributions to Great Lakes protection, regional commitments cannot fill the funding gap. As a consequence, essential monitoring, research, enforcement, and protection programs may be cut. This paper reports on what would occur in each Great Lakes program if the fiscal 1991 budget request is enacted into law unchanged.

Great Lakes research and management are at a critical juncture. Investments over the past 20 years are now paying dividends. Funding reductions not only threaten future progress but may undermine progress already achieved. Research and management cannot be turned on and off like tapwater, as the lamprey control program illustrates. Failure to administer adequate quantities of lampricide in one year means that more lampreys will develop to breed a few years hence. The effect is not immediate, but it will occur, and an abundant fishery that has made very significant progress in the struggle to recover its former bounty and economic value will be the victim.

The cosponsors of this paper--Center for the Great Lakes, Council of Great Lakes Governors, Great Lakes Commission, Great Lakes United, Lake Michigan Federation, Northeast-Midwest Institute, and Sierra Club--represent different constituencies. Yet we share one common vision for the Great Lakes, that it should be a clean and healthy ecosystem providing drinking water, food, raw material, transportation, recreation, and inspiration for this generation and those to come. We speak as one voice calling upon the Congress and the administration to maintain and enhance the federal role in Great Lakes water resource protection efforts.

This reference guide highlights programs critical to the region for which continued financial support is essential. While this list is not all inclusive, it discusses regional and national programs that play major roles in Great Lakes protection and restoration. Recognizing the fiscal constraints on Congress and the federal government, the sponsoring organizations urge consideration of the programs and funding levels presented here.

Environmental Protection Agency (EPA) Programs

- o The \$2.4 billion authorized by the Clean Water Act (CWA) for allocation to states to capitalize state revolving loan funds should be appropriated in full.
- o The \$75 million authorized by the CWA for allocation to states under the Section 106 State Enforcement Grants program should be funded in full.
- o Section 319 of the CWA to implement state nonpoint source pollution control plans should receive the authorized \$130 million.
- o The Great Lakes National Program Office should receive the entire \$15.9 million authorized by the CWA for research, monitoring, and analysis.
- o The Large Lakes Research Laboratory needs \$5.7 million simply to reach its fiscal 1980 inflation-adjusted funding level to continue its study of air-water interchange of toxic chemicals, model total lake loadings of toxics, and expanded wetlands research.
- o The new EPA-coordinated Contaminated Sediments Task Force needs \$5 million to develop contaminated sediments standards, document the extent of contamination problems nationwide, and evaluate cleanup technologies.

National Oceanic and Atmospheric Administration (NOAA) Programs

- o The \$40.6 million authorized by the Coastal Zone Management Act should be appropriated to NOAA for allocation to states with approved Section 306 Coastal Zone Management programs to help them manage shoreline use and protect sensitive wildlife habitats.
- o The \$1.5 million authorized by the Coastal Zone Management Act for allocation to eligible interstate projects under the Section 309 program should be appropriated.
- o The Sea Grants program should receive the authorized \$64 million for allocation to eligible universities for water-resources research with more emphasis placed on epidemiology studies, toxics-effects research, and cleanup and source-reduction technology development.
- o The Great Lakes Environmental Research Laboratory should receive \$5.4 million to reach its fiscal 1980 level and increase its toxics-effects research; it needs \$2.5 million for a new research laboratory.

Other Funding Needs

- o The Fish and Wildlife Service (FWS) National Fisheries Research Center needs \$6 million to establish a wildlife specimen data bank and purchase a new research vessel.
- o The Great Lakes Fisheries Commission needs \$9.4 million to continue ongoing sea lamprey control and research efforts; another \$1.3 million would allow the commission to make capital investments needed to study the use of sterile male sea lamprey as a control method.
- o Authorizing legislation, recently filed in both houses of Congress, and \$8.0 million are needed to begin research on control techniques for non-indigenous aquatic nuisances, particularly zebra mussels, and prevent the introduction of others.

1. Background

As the twentieth anniversary of Earth Day approaches, a renewed commitment to environmental protection and restoration is needed at all levels of government. Achievements during the past two decades show environmental degradation can be reversed, but much remains to be done around the Great Lakes.

Tests have identified over 1,000 chemicals in the Great Lakes, many of them toxic. Once ingested by organisms, they travel up the food chain, becoming progressively more concentrated in fish, shellfish, birds and other wildlife, as well as humans. Remediation of contaminated sediments, control of nonpoint sources of pollution, and reduction of atmospheric deposition of toxins are some of the most pressing pollution problems.

Because of the presence of DDT, PCBs, dioxins, furans, aldrin, dieldrin and mercury in many fish, the Great Lakes states and the province of Ontario issue consumption advisories for many species, including the popular salmon and lake trout. In December 1988, Michigan issued advisories for fish in all of its inland lakes because of mercury contamination. Atmospheric deposition is the most probable source for that contamination. Alarming levels of fish cancers and reproductive failure among lake trout, as well as well-documented deformities and reproductive failures of colonial nesting birds are found throughout the Great Lakes. All of these anomalies have been linked to toxic pollution.

With several Great Lakes fish now "off limits" to women and children and highly restricted for adult males, the extent of toxic pollution and its impact on commerce and human health have attracted significant attention. Moreover, many urban and industrial centers in the Great Lakes region fail to meet existing health standards for ozone (smog) and toxic pollutants (in particular, volatile organic compounds). Thus, residents of the Great Lakes region get a double dose of toxics--through the air they breathe and the food they eat.

In addition to the toxics problem, the region must continue to address nutrient pollution. Through modeling and monitoring scientists found that excess phosphorous or nutrient pollution led to unnaturally large algae and bacteria populations and suffocatingly low oxygen concentrations in the water. These conditions made many areas of the lakes uninhabitable for fish and other organisms. Improvements in sewage treatment plants and strong state laws limiting phosphorous emissions have reduced the nutrient-pollution problem significantly. However, many localized areas of the Lakes continue to suffer from low oxygen concentrations in the summer.

The problems confronting the Great Lakes, unfortunately, are not unique to the region. Rivers, harbors, and lakes around the country are faced with similar nutrient and toxic-chemical pollution. Great Lakes researchers and policymakers are exemplary, however, in the leadership role they have taken in understanding and addressing these problems. The work done in the region has consistently set the standards for cleanup efforts in other water bodies, both because of the quality of the work and the timeliness of policy

implementation. Scientists in the region are developing models for toxics control and testing methods of remediating contaminated sediments; the results of this work should be valuable to many areas faced with toxics problems.

Federal funding for basic research, monitoring, and enforcement programs to restore and protect the Great Lakes declined 11 percent in real dollars between 1981 and 1990. (This figure does not include construction grants, for which funding declined 45 percent in real dollars. Construction grants were omitted because the program's size would overshadow funding effects on other programs.) At the same time, however, program needs expanded as a result of new legal requirements and the complexities of addressing toxic pollution.

In 1987, Congress reauthorized the Clean Water Act and created several new national programs to accelerate progress toward fishable and swimmable water. EPA estimates that states will need an additional \$225 million in fiscal 1995 in order to carry out these new requirements.

The United States and Canada updated the Great Lakes Water Quality Agreement in 1987 with new provisions to strengthen and accelerate cleanup and protection efforts. The agreement is unique in its recognition of multimedia sources of pollution and the cross-media impacts of pollution control. The agreement addresses municipal and industrial discharges, as well as atmospheric deposition, urban and agricultural runoff, contaminated sediments, and the need for source reduction. When signed, it was heralded by the region's governors, EPA, and environmentalists as a strong and far-reaching commitment to Great Lakes water quality.

State and local governments have made environmental protection one of their top priorities. In addition to supporting the Great Lakes Water Quality Agreement, the governors of the region signed the Toxic Substances Agreement in 1986, outlining a coordinated, multimedia approach to reducing toxics. In February 1989, they also established a \$100-million Great Lakes Protection Fund, the interest from which will help support badly needed research efforts.

State, local, and federal governments have spent billions of dollars so far just to address the phosphorous problem. However, billions more are needed to further reduce phosphorous emissions, curtail toxic inputs, clean up contaminated sites, and continue fishery restoration.

Federal funds are essential to the restoration of water quality. Eleven federal programs are highlighted in this paper because of their importance to the region: five federal agencies with regional offices working specifically on Great Lakes resource protection and six major national programs for environmental protection. These programs are important for meeting the goals of the Great Lakes Water Quality Agreement, but they should not be viewed as a conclusive list. Many other programs play a valuable role in Great Lakes protection. The five regional offices are:

- o Environmental Protection Agency (EPA)'s Great Lakes National Program Office (GLNPO);
- o EPA's Large Lakes Research Laboratory;
- o National Oceanic and Atmospheric Administration (NOAA)'s Great Lakes Environmental Research Laboratory;

- o Fish and Wildlife Service (FWS)'s National Fisheries Research Center;
and
- o Department of State's Great Lakes Fisheries Commission.

The six national programs are:

- o EPA's Clean Water Act sewage treatment plant construction grants and state revolving loan funds;
- o EPA's Clean Water Act Section 106 state enforcement grants;
- o EPA's Clean Water Act Section 319 nonpoint-source pollution control grants;
- o NOAA's Coastal Zone Management Section 306 state grants;
- o NOAA's Coastal Zone Management Section 309 interstate grants; and
- o NOAA's Sea Grant.

2. Programs Serving the Great Lakes

In the last 30 years, Congress has established and supported several programs that play a crucial role in restoring Great Lakes water quality. The four major agencies involved with environmental protection and natural resource conservation--the Environmental Protection Agency, the Department of the Interior, the Department of Commerce, and the Department of State--have offices in the region devoted to research, monitoring, and enforcement activities. This section outlines the work these offices do, describes key national programs for Great Lakes restoration, and presents budgetary information.

For most of these programs, at first glance funding appears to have increased slightly over the past decade. However, actual dollars available for research have declined dramatically as a result of inflation and increased overhead costs. The Great Lakes Environmental Research Laboratory shows the effects of this process quite well. The laboratory's total funding increased 64 percent between fiscal 1980 and 1989, but after losses to overhead costs and inflation the funds left for research declined 36 percent.

Great Lakes National Program Office, Chicago, Illinois, EPA

The Great Lakes National Program Office (GLNPO) was created in 1978 to oversee the United States' fulfillment of its obligations under the Great Lakes Water Quality Agreement with Canada "to restore and maintain the physical, chemical, and biological integrity of the Great Lakes Basin ecosystem."¹ In 1987 the Clean Water Act formally recognized the Great Lakes as a valuable national resource and established a statutory mandate for GLNPO to lead U.S. implementation of the Great Lakes Water Quality Agreement.

To fulfill this mandate, GLNPO carries out a wide range of monitoring and research activities. The monitoring work includes water sampling throughout the five lakes, mass-balance studies in Green Bay, Wisconsin, and analysis of all sources of lake pollution. The office researches and evaluates technologies to clean up contaminated sediments. It also creates computer models of the relationship between pollution sources. Moreover, GLNPO works with Canadian officials to set water-quality standards, develop lakewide-management plans, and report on the progress in meeting these and other mandates of the agreement.

The currently authorized funding level for GLNPO is \$15.9 million, \$4.9 million for existing programs and \$11 million for new responsibilities authorized under the Clean Water Act of 1987. While Congress has appropriated some of the new funding, it has not been adequate to meet all the new responsibilities. Annual reporting and contaminated sediments research are the only areas of the Great Lakes Water Quality Agreement to which the office has been able to devote significant financial and staff resources.

1 International Joint Commission, Great Lakes Water Quality Agreement of 1978. (United States and Canada, 1978), pg. 8.

The president's \$12.3 million request for fiscal 1991, a 7 percent cut from actual funds received in fiscal 1990, will have wide-ranging effects on GLNPO programs. In particular these cuts will limit the use of new ship and laboratory capabilities for the toxics monitoring program and the development of lakewide management plans; jeopardize U.S. commitments to Canada on joint development and implementation of the Lake Ontario Management Plan; impede implementation of a binational Atmospheric Deposition Network for toxics; and slow development and implementation of Remedial Action Plans.

Large Lakes Research Laboratory, Duluth, Minnesota, and Grosse Ile, Michigan, EPA

With a much smaller budget and staff than GLNPO, the Large Lakes Research Laboratory supports GLNPO's research activities as its major function. The laboratory helped develop the mass-balance study in Green Bay, Wisconsin, and created models to compute "total lake-loading limits" for toxic substances. These models, much like those built to guide the reduction of phosphorus in Lake Erie in the mid-1970s, are the research basis for development of lakewide management plans.

Funding for this program has dropped steadily since fiscal 1980, both in actual and inflation-adjusted dollars. The program now operates on \$2 million annually. The 1989 equivalent of 1980 dollars adjusted for inflation is \$5.7 million. The president's fiscal 1991 request at approximately \$2 million represents a 2 percent increase over 1990 funding and 4 percent over 1989, a very small but upward trend.

National Fisheries Research Center, Ann Arbor, Michigan, Fish and Wildlife Service, Department of the Interior

The National Fisheries Research Center, formerly the Great Lakes Fisheries Research Laboratory, monitors and studies the size and habitat of Great Lakes fish and wildlife and the effects that toxic contaminants have on them. The center's mandate is to help evaluate and rehabilitate the valuable fish resources and habitats of the Great Lakes. The center's activities include review of the distribution, abundance, and stability of recreational and forage fish and wildlife populations; analysis of the effects of fishing and environmental stresses; assessment of the concentration and effects of contaminants on fish and wildlife; and studies of the impact of contaminated sediments and harbor dredging on fish.

This office operates on an annual budget of \$3 million, a figure close to its 1980 level considering inflation. New capital commitments of \$3 million are needed for a wildlife specimen data bank and \$3 million for a research vessel.

The fiscal 1991 request would reduce funding by 9 percent to slightly under \$3.0 million. Twenty percent of the research expeditions for data collection would be eliminated if this figure is enacted.

Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan, National Oceanic and Atmospheric Administration, Department of Commerce

The Great Lakes Environmental Research Laboratory's mission is to improve understanding of environmental processes and develop methods of understanding environmental systems. The laboratory, for instance, has devised hydrological models for forecasting the effects of water diversions and climate change on lake levels. It also investigates the transport of toxic chemicals, hazardous spill remediation, and storm warning.

The laboratory received \$4.7 million in fiscal 1990. While increases in allocations have outpaced inflation, available research funds have declined 36 percent when rising overhead costs are considered. If funding were adjusted for these costs, the office needs \$5.4 million in fiscal 1991. In addition a new research vessel at a cost of \$3 million is needed. Enactment of the president's fiscal 1991 budget request of \$3.1 million, representing a 34 percent cut, would necessitate a loss of 20 positions.

Great Lakes Fisheries Commission, Ann Arbor, Michigan, Department of State

The Great Lakes Fisheries Commission was founded jointly by the United States and Canada in 1955 to oversee Great Lakes fisheries. The Commission's mandate is to develop and coordinate fishery research, advise governments on measures to improve fisheries, and formulate and implement programs to eradicate or minimize sea lamprey populations. The commission was formed in large part to respond to the decimation of the Great Lakes fisheries by the sea lamprey in the 1940s.

The commission receives approximately \$4.5 million annually from the U.S. government. Adjusted for inflation, this figure represents a decline of 24 percent since 1980. To meet operating expense shortfalls in the past, the commission has rolled over funds from year to year. These funds, however, are now exhausted. The commission needs \$10.8 million from the United States in fiscal 1991 (which will be matched proportionately by Canada) to continue operating and make capital investments for research.

In fiscal 1990 Congress raised the appropriation to \$6.5 million to maintain current levels of sea lamprey control. The Bush Administration has requested only \$5.2 million for fiscal 1991. Because this commission is funded proportionately by Canada and the U.S., funding reductions by the U.S. have a direct impact on funding from Canada.

The proposed level of funding will lead to a resurgence of sea lamprey in the lakes and consequent reduction in fish populations. It would require cuts in all the commission's efforts, particularly the sea lamprey control program which constitutes 85 percent of the budget. Because lake trout are more vulnerable than other species to the predations of the lamprey, changes in control operations will be lake-specific. Measures on Lake Superior will continue at the present level because its trout population is mostly self-sustaining; treatment of Lakes Huron, Michigan, and Ontario would be reduced by 40 percent; treatment of Lake Erie, recently begun, would cease. Experts predict that reductions of this magnitude will double sea lamprey numbers in ten years; fishable stocks of lake trout and salmon would fall by 50 percent and will continue to decline thereafter. Development and implementation of alternative sea lamprey control methods will be deferred.

Clean Water Act Sewage Treatment Plant Construction Grants and State Revolving Loan Funds

The sewage-treatment construction grants program was established in 1970 to provide states with matching grants for construction and improvement of sewage-treatment plants. One of the most important sources of funding for pollution control to date, this program has helped reduce phosphorous or nutrient problems in the lakes and throughout the nation. Between 1971 and 1986, the Great Lakes states and the federal government spent about \$8 billion to construct and improve sewage-treatment facilities.

In 1981 the categories of construction eligible for funding were greatly reduced. However, the law allows governors to use up to 20 percent of the federal allotment for non-sewage-treatment-specific projects allowed prior to 1981. The law provided for small set-asides for waste treatment projects in rural areas, for innovative and alternative treatment projects, and for state water-quality and construction grants management. The 1987 Amendments to the Clean Water Act established additional set-asides for management of nonpoint-source pollution and estuarine protection programs.

In the 1987 amendments Congress ended the construction grants program as of 1990 and established a State Revolving Loan Fund program to replace it "in perpetuity." The amendments authorized \$2.6 billion for construction grants for the Great Lakes states through 1990 and \$3.1 billion to capitalize the revolving loan funds for 1989 to 1994. (The latter figure assumes continuation of the funding factors established for the years 1987-1990.)

When the president's fiscal 1991 budget request to capitalize the state revolving loan funds is combined with appropriations in fiscal 1989 and fiscal 1990, total appropriations for the program would be 75 percent of the amount authorized by the CWA. The Great Lakes states will have received \$1.3 billion rather than \$1.6 billion.

Clean Water Act Section 106 State Enforcement Grants

Enforcement grants provide states with crucial revenue to develop, issue, monitor, and enforce compliance with Clean Water Act discharge permits. State officials also use this money to develop water-quality standards and create nonpoint-source pollution-control plans. The program was established in 1972 and currently is authorized at \$75 million annually. The \$81.7 million requested for this program in fiscal 1991 includes \$9.1 million to replace funds lost when a construction grants setaside expired. Funding for these grants must be reauthorized.

Clean Water Act Section 319 Nonpoint Source Pollution-Control Grants

In the past, nonpoint source pollution-control efforts were funded under the Clean Water Act Section 208 program. However, that program was phased out in 1981. During the debates preceding the 1987 amendments, Congress realized the increasing importance of nonpoint sources of pollution and created a grants program under Section 319. This nonpoint-source program provides states with funding to develop and implement plans for controlling such pollution.

The program was authorized for \$400 million over a four-year period, to expire after fiscal 1991. Nevertheless, this program received its first monies, \$36.9 million, in fiscal 1990 by congressional initiative. In its request for fiscal 1991, the administration seeks only \$14.3 million of the authorized \$130 million, and a 61 percent cut from the fiscal 1990 level. This reduction would mean a funding drop from \$2.8 million to \$1.0 million, and a loss of 21 staff positions in the Great Lakes states.

Coastal Zone Management Section 306 State Grants

The Federal Coastal Zone Management program was created in 1972 to coordinate development and resource protection in sensitive coastal areas. Coastal states with approved programs receive grants to implement coastal-management programs. Four Great Lakes states--Michigan, New York, Pennsylvania and Wisconsin--currently are enrolled in the program; the application of a fifth state, Ohio, is pending.

The State Grants program is authorized at \$40.6 million annually. Appropriations of approximately \$33 million per year have provided Great Lakes states with about \$5.6 million annually. Enactment of the fiscal 1991 budget request of \$30 million would cause a 10 percent reduction in available grant monies. Funding for this program must be reauthorized.

Coastal Zone Management Section 309 Interstate Grants

The Interstate Grants program provides funds for programs that coordinate multistate regional activities for shoreline protection and resource management. This program was established in 1985 and is authorized at \$1.5 million per year. It has received approximately \$1 million annually through congressional initiative, except in fiscal 1990 when funding was reduced to \$400,000. Organizations in the Great Lakes region have received about \$0.1 million annually. Neither the Reagan nor Bush Administrations have requested funds for this program. Funding for this program must be reauthorized.

Sea Grants

The Sea Grant program was established over 20 years ago to promote scientific research on and use of marine resources. Congress envisioned the Sea Grant program accomplishing for marine and coastal resources what land grants did for agriculture.

The program was level funded for the past eight years; it is authorized at \$64 million. The \$27.5 million requested for fiscal 1991 would support only the research portion of the program at its fiscal 1990 level and remove all funding for the Marine Advisory Services component. Funding for this program must be reauthorized.

3. Sources of Pollution in the Great Lakes

Although the sources of Great Lakes pollution are numerous and varied, restoration efforts have focused on industrial discharges and municipal sewage. Billions of dollars have been spent at the local, state, and federal levels to control these sources. Despite some success in reduced discharges, pollutants continue to enter the lakes from other less easily identified and controlled sources like urban and agricultural runoff, atmospheric deposition, and contaminated sediments.

Controlling these sources requires research and monitoring to target cleanup efforts and develop enforcement plans. The major areas where activities are needed to restore water quality are discussed below.

Municipal and Industrial Point Sources

Pollution-control efforts to date have depended largely on two federal programs--construction grants and state enforcement grants. While these programs are key to environmental restoration, federal funding for them declined 51 percent in real dollars since 1980.

The Clean Water Act's sewage-treatment-plant construction grants have provided most of the funds for cleaning up the Great Lakes. Between 1971 and 1986, the Great Lakes states and the federal government spent about \$8 billion to construct and improve sewage treatment plants. Even more funds, however, are needed to deal with nutrient pollution and continue present measures. In 1988, an EPA survey estimated that the eight Great Lakes states need an additional \$27 billion by the year 2008 for municipal wastewater treatment improvements. The Great Lakes states must complete more than 700 projects to ensure that municipalities meet at least secondary treatment standards.

The 1987 CWA Amendments authorized \$2.6 billion in federal matching grants from fiscal 1987 through fiscal 1990. Another \$3.1 billion is authorized to capitalize Great Lakes states' revolving loan funds between fiscal 1989 and fiscal 1994. Actual appropriations to date, however, have fallen far short of these targets. At a minimum appropriations should be at the authorized level. Future appropriations should be adjusted to compensate for past reductions.

State officials use the Clean Water Act's Section 106 state enforcement grants to develop, issue, and monitor compliance with discharge permits. While availability of funds is not necessarily tied to state records on enforcement, states face a long and expensive task in developing defensible water-quality standards and enforcing them, particularly as standards are subject to legal appeal. Section 106 is authorized at \$75 million per year; Congress appropriated \$74.7 million in fiscal 1990. The administration has requested \$81.7 million for fiscal 1991 entirely for abatement, control, and compliance programs.

Urban and Agricultural Runoff

As municipal and industrial point sources of pollution are brought into compliance with existing pollution-control laws, runoff from cities and farms has been recognized as an important source of pollution to the Great Lakes and coastal waters nationwide. Recent information from EPA reveals that nonpoint sources are responsible for 76 percent of the pollution loadings to the nation's lakes, 65 percent to our rivers and streams, and 45 percent to our coastal bays and estuaries. Soil erosion in the eight Great Lakes states totals some 900 million tons annually.

In the past, Congress appropriated grants for nonpoint-source control under Section 208 of the Clean Water Act. This program, however, was discontinued in fiscal 1981. Recognizing the increased severity of the problem, Congress authorized \$400 million in 1987 under Section 319 to help states develop and implement nonpoint-source pollution-control plans. No funds were appropriated for the program until fiscal 1990 when Congress designated \$36.9 million. The Bush Administration has requested \$14.3 million for fiscal 1991. While state efforts to address nonpoint-source pollution will continue regardless, they will be limited without increased federal assistance. The full \$130 million authorized by the Clean Water Act should be appropriated.

Aside from the EPA nonpoint-source program, several smaller programs have been authorized under the CWA for research or demonstration of nonpoint-source pollution control. Increasingly, the Department of Agriculture (USDA) is devoting resources to water-quality protection in its soil-conservation efforts. The 1985 farm bill, which must be reauthorized in 1990, established the successful conservation reserve program in which USDA takes highly erodible land out of production by renting it from farmers. The Soil Conservation Service and the Agricultural Stabilization and Conservation Service are placing increased emphasis on water-quality protection in their soil-conservation efforts.

Atmospheric Deposition of Toxics

Scientists find that a significant portion of the toxics entering the lakes comes from the atmosphere. Chemicals emitted from factories--some even continents away--are deposited in the Great Lakes. Chlorinated hydrocarbons, heavy metals, and PAHs head the list of chemicals of concern, but others probably are present. Half or more of the toxic pollution found in Lakes Michigan, Huron, and Superior comes from airborne deposition. A significant portion of Lake Erie and Lake Ontario pollution also comes from the air.

In spite of the damage from air toxics, U.S. monitoring, research, and regulation are minimal. Atmospheric-deposition monitoring in the Great Lakes currently covers a few conventional pollutants and heavy metals, and sampling is limited to one site in Lake Michigan. EPA has set national air regulations for only seven toxins.

The Great Lakes National Program Office and the Large Lakes Research Laboratory are planning to expand atmospheric-monitoring efforts to include two additional sites in Lake Michigan and establish stations on the other lakes. Several other actions are required as well.

First, more sampling stations are needed and more chemicals--solvents, dioxin, and PCB--must be monitored. Sophisticated equipment, capable of positively identifying or "thumbprinting" specific chemicals to their source, is critical to establish source-receptor relationships. Second, more research is needed on the relationship between air-water interchange of chemicals. While as much as 90 percent of the PCBs entering Lake Superior come from the atmosphere, it is not clear how much simply is revolatilized from the lakes and how much is entering the system from new sources. Finally, additional epidemiological studies are needed for understanding toxic effects on humans, fish, and wildlife. (This point is discussed in greater depth below in the Toxics Monitoring and Research section.)

The EPA Great Lakes National Program Office and the EPA Large Lakes Research Laboratory would perform much of the work outlined here if they were provided with additional funding. Giving the Great Lakes National Program Office the full authorized level of \$15.9 million would enable it to increase the frequency, quality, and amount of chemical sampling. Increasing the EPA Large Lakes Research Laboratory's appropriation to \$5.7 million (the 1989 equivalent of fiscal 1980 funding when adjusted for inflation) would allow it to expand research on air-water interchange of toxic chemicals.

Contaminated Sediments

Years of heavy industrial and commercial use have polluted many of the region's harbors, rivers, and inlets, leaving the sediments with large quantities of toxic organic chemicals and heavy metals. These toxics, ingested by bottom-feeding organisms and resuspended by animal and water movement or by dredging, stay in the system indefinitely.

Twenty-seven areas on the U.S. side of the Great Lakes are known to contain contaminated sediments. In most cases, scientists have not determined the full extent of the contamination or the effects on the biota. However, in the few places where extensive research has been done the findings are quite daunting. In Kalamazoo, Michigan, for instance, 230,000 pounds of PCBs are lodged in the sediments of the river. Over 1 million pounds of PCBs are located in and around Waukegan Harbor. Although exact amounts are unknown, the Grand Calumet River and Indiana Harbor bottoms are polluted up to ten feet deep with PCBs, heavy metals, and other contaminants. Tests by EPA, Region V, indicate that the sediments are highly toxic to aquatic life. EPA obtained similar results from sediments in the Detroit River.

The Clean Water Act authorized GLNPO to begin research on cleanup technologies for contaminated sediments as part of a comprehensive Great Lakes program. The entire program was authorized at \$55 million over five years, with 40 percent to be devoted to sediments work. To date, the program has received only partial funding.

Predicted costs for cleanup are staggering. The Army Corps of Engineers estimated that, on average, cleanup of 1 million pounds of contaminated sediments including research, development, and remediation costs would cost approximately \$265 million.

While Congress grapples with financing the cleanup, several areas demand immediate attention. First, EPA needs to develop standards for sediment toxicity and determining a definition of clean. Such standards will help the agency and states identify problem areas, develop toxic-hotspot cleanup strategies, and guide Corps of Engineers maintenance-dredging activities.

Second, the Congressional Office of Technology Assessment should perform a comprehensive computer review to identify problem areas around the country and analyze remedial technologies. Contaminated sediments are concentrated in heavily populated and industrialized coastal areas nationwide. A more complete accounting of these problem areas will help in developing a remediation program.

In conjunction with these efforts, a full-scale contaminated sediments task force should be established within EPA. An ad-hoc intraagency team currently meets to develop criteria, investigate enforcement techniques, and document the extent of the problem. An annual budget of \$5 million would allow the task force to accelerate this work, particularly in developing sediment criteria and evaluating cleanup technologies.

Toxics Monitoring and Research

Scientists and policymakers have enjoyed some success in curbing nutrient pollution through monitoring, research, and enforcement efforts. They developed models to indicate which sources of phosphorus were the most prevalent and how these sources should be reduced to achieve water quality goals.

The process of targeting toxics for reductions is far more complex. Over 1,000 chemicals in the lakes could cause health problems in various populations. However, only a handful of those chemicals are monitored and their effects analyzed. The health impacts, moreover, can take years to show up, particularly cancers, thus making relationships difficult to assess. Several projects should be undertaken to improve understanding and control of toxic chemicals.

A wildlife specimen data bank is an important longstanding need that continues to go unrealized because of funding shortfalls. Tissue, egg, and organism samples from a variety of locations around the lakes should be stored in a single location. If scientists find new evidence linking harmful effects to particular chemicals, they could use the data bank to analyze historical samples and determine contamination trends. The FWS, National Fisheries Research Center would be well positioned to house the data bank with its central location in Michigan and its related work with wildlife and fish.

All the research laboratories in the region need more funds to evaluate the effects of toxics on fish, wildlife, and human health. Particularly important are studies to determine the accumulation of toxic pollutants in humans via the food chain; analyze the potential impact of toxics on fertility, fetal development, and early childhood development; and analyze the health consequences of urban air pollution.

Capital funds are required to purchase badly needed equipment. The Fish and Wildlife Service operates a 42-year-old renovated Gillnet tug in need of

renovation and repair for safety and research reasons. Because of funding constraints, FWS has put off improvements. The cost of necessary changes now exceeds the value of the boat itself, and at least \$3 million is needed to purchase a new boat. The Great Lakes Environmental Research Laboratory faces the same problem with its 41-year-old research vessel. That office is unable to perform overnight trips or interagency research because of the cramped quarters. A new boat would cost an estimated \$3 million.

Finally, an interagency office should be designated to coordinate the many federally funded Great Lakes research programs. This office should maintain a comprehensive computerized data base of Great Lakes research, which would be available to federal and state agencies, research institutions, environmental organizations and individuals pursuing research in environmental quality. The coordination function is a clear necessity in a period of extremely scarce research dollars and difficult choices in research priorities.

Fisheries Resource Protection

Aside from the problems caused by toxics, Great Lakes fish are threatened by non-native fish and the sea lamprey. Since the 1950s when the lake trout suffered devastating losses from sea lamprey predation, Great Lakes resource managers have spent considerable money and time on controlling and minimizing the lamprey population. Sea lampreys entered the lakes through the Erie Canal in 1835. Over the years, the Great Lakes Fisheries Commission developed a fairly effective chemical, lampricide, to control the population. Because of the difficulties in purchasing the chemical and concern over its continuous application, the commission also has experimented with physical barriers, electrical barriers, and sterile males for population control.

The Bush Administration's proposed funding is inadequate to meet program needs. In order to operate within budget constraints, the commission has deferred capital investments and frequently rolled over unused revenue from previous years to compensate for budget shortfalls. However, these revenues are now used up. Furthermore, the commission can no longer defer capital investments needed for research. If the United States increases appropriations for the commission to \$10.8 million, the Canadian government has agreed to match this funding proportionately. The commission would use \$9.4 million to continue sea lamprey control and research; \$1.3 million would enable it to make capital investments needed to study the use of sterile male sea lamprey as a control method.

If Congress does not increase the appropriation, the commission expects to reduce chemical applications on Lakes Michigan, Huron, and Ontario by 40 percent. Reductions of this magnitude will lead to a resurgence of sea lamprey in these lakes. In Lake Ontario, experts project that sea lamprey numbers will double in ten years, and the fishable stocks of lake trout and salmon will fall by 50 percent and will continue to decline thereafter. Similar forecasts are expected for Lakes Michigan and Huron. In addition, the commission will discontinue its research on alternative nonchemical control methods.

Shoreline Planning and Resource Protection

Sensible long-range planning and research efforts are essential to protecting sensitive Great Lakes shoreline areas. Of particular concern are wetlands, which form an important breeding and feeding ground for fish and wildlife. Vast portions of these areas were destroyed in the early part of this century. The Large Lakes Research Laboratory needs more funds for monitoring and research to better understand the life-support functions of wetlands. These activities will improve its ability to target protection and restoration efforts.

The NOAA Coastal Zone Management program provides funds to states for planning shoreline developments sensitive to wetland and wildlife-resource needs. Four Great Lakes states participate in the program and have received \$5.6 million annually. While the Reagan Administration recommended ending this program every year since 1981, Congress has continued to appropriate funds. Funding uncertainties, however, restrict long-range planning efforts.

Non-Indigenous Aquatic Nuisances

During the past decade several species, including zebra mussels and river ruffe, were accidentally introduced into the Great Lakes. Their populations are expanding quickly in the absence of predators; their effects on local fish are largely unknown. The zebra mussel, which reproduces very rapidly, colonizes almost any hard surface, clogs water intake pipes and filters, and feeds on the small creatures which nourish baby sportfish, has been found in Lakes Erie, Ontario, and Michigan. Experts estimate that the mollusk will cost the region \$5 billion over ten years in facilities maintenance and effects on fisheries. Effects from the presence of the ruffe, which is in Lake Superior, are developing more slowly.

Legislation has been filed in Congress to prevent introduction of other aquatic nuisances and support research to develop suitable control techniques for those creatures already present. When enacted the measure authorizes \$4 million for prevention and \$4 million more for research annually for five years.

4. Conclusions

An array of important research, monitoring, enforcement, and protection efforts are threatened by the decline in federal Great Lakes funding. The 11 programs listed play critical roles in Great Lakes cleanup.

Perhaps the most difficult tasks facing Great Lakes scientists and policymakers are to reduce toxic inputs to the lakes and find ways to remove or isolate those already there. Programs such as sewage-treatment-plant construction grants and state-enforcement grants will continue to be the most important in cutting inputs from industrial and municipal discharges.

As reduction of these point sources progresses, however, increasing attention must be paid to the less-understood sources, such as contaminated sediments, urban and agricultural runoff, and atmospheric deposition. To achieve water-quality standards and continue moving toward "zero discharge" of toxics, inputs from these sources must be reduced. Several programs already exist that aid in controlling nonpoint sources of pollution inputs to the lakes. The most comprehensive of these, the Clean Water Act, section 319 Nonpoint Source Program, has never received substantial funding.

Only in recent years have scientists come to understand the significance of atmospheric deposition and contaminated sediments as sources of pollution. Recent studies suggest that fully one-quarter of all contaminants entering the lakes are deposited from the air. Many of the fish advisories are linked to toxics in the sediments. Controlling these sources will be extremely difficult. Initial help will come from research on remedial technologies for contaminated sediments, toxics effects, and the relative significance of different sources.

The Great Lakes states, continuing to show their commitment to protection and restoration, recently established the \$100-million Great Lakes Protection Fund. Ideally, the fund will generate \$10 million annually to support research. Great Lakes states also will continue to fund state pollution-control programs for point and nonpoint sources.

Successful protection and restoration of the lakes, however, requires a renewal of federal commitments. While recognizing fiscal constraints faced by Congress and the administration, adequate federal funding levels in fiscal 1991 are necessary for full implementation of targeted programs. The sponsoring organizations recommend the following as guidance in the appropriations process. Generally, the numbers are either those authorized or the 1980 funding level adjusted for inflation.

- o The entire \$2.4 billion authorized under CWA should be appropriated to EPA for allocation to states to capitalize state revolving loan funds.
- o The section 106 state enforcement-grants program should receive the \$75 million authorized by CWA for EPA to allocate to states.

- o The full \$130 million authorized by CWA should be appropriated to EPA for allocation to states under section 319 to implement nonpoint-source pollution-control plans.
- o The \$40.6 million authorized by the Coastal Zone Management Act should be appropriated to NOAA for allocation to states with approved Section 306 Coastal Zone Management programs to help them manage shoreline use and protect sensitive wildlife habitats.
- o The \$1.5 million authorized by the Coastal Zone Management Act for allocation to eligible interstate projects under the Section 309 program should be appropriated.
- o The authorized \$64 million should be appropriated to the Sea Grants program for water resources research at eligible universities. However, more emphasis should be placed on epidemiology studies, toxics effects research, and cleanup and source reduction technology development.
- o The authorized \$15.9 million should be appropriated to the Great Lakes National Program Office for monitoring and analysis of water quality and atmospheric deposition, development of mass balance models for targeting toxics control, demonstration of contaminated sediments remediation technologies, and research coordination.
- o Appropriation of \$5.7 million to the Large Lakes Research Laboratory, 1980 level funding adjusted for inflation, would allow the laboratory to study air-water interchange of toxic chemicals, model total lake loadings of toxics, and expand wetlands research.
- o The Great Lakes Environmental Research Laboratory should receive \$5.4 million to match 1980 support when adjusted for inflation and overhead costs. This amount would allow the laboratory to increase toxics effects research. The laboratory needs another \$3 million for a new research vessel.
- o Six million dollars is needed by FWS National Fisheries Research Center to establish the wildlife specimen data bank and purchase a new research vessel.
- o The Great Lakes Fisheries Commission needs \$9.4 million to continue ongoing sea lamprey control and research efforts. An additional \$1.3 million would allow the commission to make capital investments needed to study the use of sterile male sea lamprey as a control method.
- o The new EPA-coordinated Contaminated Sediments Task Force needs \$5 million to develop contaminated sediments standards, document the extent of contamination problems nationwide, and evaluate cleanup technologies.
- o Authorizing legislation, recently filed in both houses of Congress, and \$8.0 million are needed to begin research on control techniques for non-indigenous aquatic nuisances, particularly zebra mussels, and prevent the introduction of any others.

History of Federal Funding for Great Lakes Programs
(in millions of dollars)

Program	Actual									Estimate	Bush's
	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	Request 1991
<u>National Programs</u> ¹											
Construction Grants and State Revolving Loans, EPA	938.4	880.7	871.7	891.8	891.8	664.7	867.4	836.1	686.7	707.8	582.4
<u>Other National Programs</u> ¹											
Enforcement Grants, EPA	14.3	14.9	15.1	15.1	15.1	15.6	15.5	14.9	16.5	17.7	19.9 ²
Nonpoint Source, EPA	7.4	---	---	---	---	---	---	0.0	0.0	2.8	1.0 ²
Sea Grant, NOAA ³	3.8	4.9	5.2	5.2	5.4	5.6	5.6	5.7	5.7	5.7	3.9 ²
Coastal Zone Mang., State Grants, NOAA ⁴	5.1	6.4	3.6	1.6	7.6	5.5	5.6	5.3	5.3	5.3	4.7 ²
Coastal Zone Mang., Interstate Grants, NOAA	---	---	---	---	0.2	0.1	0.1	0.1	0.1	0.04 ⁵	0.0
Subtotal	30.6	26.2	23.9	21.9	28.3	26.8	26.8	26.0	27.6	31.5	29.5
<u>Regional Programs</u> ⁶											
Great Lakes Natl. Program Office, EPA	6.0	5.4	4.7	4.0	6.5	4.8	5.3	10.9	13.4	13.1	12.2
Large Lakes Lab., EPA	3.1	2.5	2.5	2.5	2.5	2.4	1.9	1.9	1.9	1.9	2.0
Great Lakes Env. Research Lab., NOAA	3.2	3.4	3.5	3.6	3.8	3.9	4.1	4.5	4.9	4.7	3.1
Natl. Fisheries Research Ctr., FWS	2.1	2.1	2.1	2.1	2.3	2.8	2.9	3.2	3.0	3.3	3.0
Great Lakes Fishery Commission, State Dept.	4.0	4.3	4.3	4.4	4.4	4.7	4.7	4.5	4.6	6.4	5.2
Subtotal	18.4	17.7	17.1	16.6	19.5	18.6	18.9	25.0	27.8	29.4	25.5
<u>Total</u>	987.4	924.6	912.7	930.3	939.6	710.1	913.1	887.1	742.1	768.7	637.4

1. Only funds allocated to Great Lakes states included: IL, IN, MI, MN, NY, OH, PA, and WI.

2. Percent of total funds requested based on fiscal 1989 ratio.
3. No funds are allocated to Pennsylvania. Fiscal 1989 levels were used for NOAA grant programs in fiscal 1990 since a breakout is not available yet.
4. Includes only money allocated to states with programs (Michigan, New York, Pennsylvania, and Wisconsin) under section 306.
5. Funds received from this program were insufficient to influence the total funding to the region.
6. Does not include any money received from interagency agreements.

SOURCES: EPA, Construction Grants Funding: Melanie Laforce, OMPC, February 1989; Sandra Duncan, MCD, December 1989. Enforcement Grants and Nonpoint Source Funding: Tim Icke, OW, OWRS, February 1989; Thomas Davenport, Region V Budget Office, Steven Wilson, Budget Division, March 1990. Great Lakes National Program Office, June 1988; March 1990. Large Lakes Research Laboratory, Bill Richardson, Branch Chief, July 1988; March 1990. EPA, Budget Justification, Fiscal 1990, Washington, D.C., 1988; Budget Justification, Fiscal 1991, Washington, D.C., 1989. NOAA, GLERL, CZM and Sea Grants Funding: Alan Thomas, Deputy Assistant Administrator for Oceanic and Atmospheric Research, History, testimony before the Committee on Public Works and Transportation, House of Representatives, March 3, 1987; Bill Metcalf, NOAA, February 1989; Michael Parsons, Michigan Sea Grant, March 1990; Marcia Horton, NOAA, CZM Summary of Financial Assistance Programs, NOAA, October 1987, and February 1989; Jimmy Trusdale, Office of the Comptroller, NOAA, February 1989; Susan Kaplan, Department of Commerce, Budget Office, March 1990; Gary Magnussen, Coastal States' Organization, March 1990. Great Lakes Environmental Research Laboratory, Al Beeton, Director, GLERL Funding: History & Cost Summary FY 80 - FY 89, January 1989, S.J. Bolsenga, Assistant to Director (Acting), March 1990. FWS, Great Lakes National Fisheries Research Center, David Walsh, Assistant Director, June 1988; Jon Stanley, Director, March 1990; Pam Haze, Congressional Liaison, Fish & Wildlife Service, February 1989, January and March 1990. Great Lakes Fisheries Commission, funding history, Carlos Fetterolf, Executive Secretary, February 1989, March 1990.

Funding Recommendations for Federal Great Lakes Programs
(in millions of dollars)

Program	FY 1981 \$		Estimate FY 1990	Bush's Request FY 1991	Ideal FY 1991
	FY 1981	Adjusted for Inflation to FY 1990 \$			
<u>National Programs</u> ¹					
Construction Grants and State Revolving Loans, EPA	938.4 (3,304.8)	1,313.8 (4,626.7)	707.8 (2,050.0)	582.4 (1,600.0)	883.5 (2,400.0) ²
<u>Other National Programs</u> ¹					
Enforcement Grants, EPA	14.3 (51.2)	20.0 (71.7)	17.7 (72.6)	19.9 (81.7) ²	18.3 (75.0)
Nonpoint Source, EPA ³	7.4 (15.0)	10.4 (21.0)	2.8 (36.9)	1.0 (14.3)	9.9 (130.0)
Sea Grant, NOAA	3.8 (38.7)	5.3 (54.2)	5.7 (42.3)	3.9 (27.5)	8.9 (64.0)
Coastal Zone Management, State Grants, NOAA ⁴	5.1 (51.6)	7.1 (72.2)	5.3 (33.8)	4.7 (29.8)	6.5 (40.6)
Coastal Zone Management, Interstate Grants, NOAA	---	---	0.04 ⁵ (0.4)	0.0 (0.0)	0.1 (1.5)
Subtotal:	30.6	42.8	31.5	29.5	43.7
<u>Regional Programs</u> ⁶					
Great Lakes Natl. Program Office, EPA	6.0	8.4	13.1	12.2	15.9
Large Lakes Lab., EPA	3.1	4.3	1.9	2.0	5.7
Great Lakes Env. Research Lab., NOAA	3.2	4.5	4.7	3.1	7.9
Natl. Fisheries Research Ctr., FWS	2.1	2.9	3.3	3.0	8.9
Great Lakes Fishery Commission, Dept. of State	4.0	5.6	6.4	5.2	10.8
Subtotal:	18.4	25.8	29.4	25.5	49.2
TOTAL:	987.4	1382.4	768.7	637.4	976.4

1. Only funds allocated to Great Lakes states included: IL, IN, MI, MN, NY, OH, PA, and WI. Numbers in parentheses are national funding level. For the enforcement, sea, and coastal zone management grants, fiscal 1991 regional recommendations are derived by applying the regional/federal funding ratio from fiscal 1989.

2. This request appears to be a \$6.7 million increase over the authorized level; however, the justification designates \$9.1 million as partial replacement for revenues lost when a setaside in the construction grants program expired. Thus \$72.6 million of the authorized \$75 million is requested for fiscal 1991.
3. Includes Clean Water Act sections 208 and 319 funds.
4. Includes only money allocated to states with Coastal Zone Management section 306 program.
5. Funds allocated to the Great Lakes states were not sufficient to influence the total money to programs.
6. Does not include any money received from interagency agreements.

SOURCES: EPA, Construction Grants Funding: Melanie Laforce, OMPC, February 1989; Sandra Duncan, MCD, December 1989. Enforcement Grants and Nonpoint Source Funding: Tim Icke, OW, OWRS, February 1989; Thomas Davenport, Region V Budget Office, Steven Wilson, Budget Division, March 1990. Great Lakes National Program Office, June 1988; March 1990. Large Lakes Research Laboratory, Bill Richardson, Branch Chief, July 1988; March 1990. EPA, Budget Justification, Fiscal 1990, Washington, D.C., 1988; Budget Justification, Fiscal 1991, Washington, D.C., 1989. NOAA, GLERL, CZM and Sea Grants Funding: Alan Thomas, Deputy Assistant Administrator for Oceanic and Atmospheric Research, History, testimony before the Committee on Public Works and Transportation, House of Representatives, March 3, 1987; Bill Metcalf, NOAA, February 1989; Michael Parsons, Michigan Sea Grant, March 1990; Marcia Horton, NOAA, CZM Summary of Financial Assistance Programs, NOAA, October 1987, and February 1989; Jimmy Trusdale, Office of the Comptroller, NOAA, February 1989; Susan Kaplan, Department of Commerce, Budget Office, March 1990; Gary Magnussen, Coastal States' Organization, March 1990. Great Lakes Environmental Research Laboratory, Al Beeton, Director, GLERL Funding: History & Cost Summary FY 80 - FY 89, January 1989, S.J. Bolsenga, Assistant to Director (Acting), March 1990. FWS, Great Lakes National Fisheries Research Center, David Walsh, Assistant Director, June 1988; Jon Stanley, Director, March 1990; Pam Haze, Congressional Liaison, Fish & Wildlife Service, February 1989, January and March 1990. Great Lakes Fisheries Commission, funding history, Carlos Fetterolf, Executive Secretary, February 1989, March 1990.