

Clean Lakes Program

1990 Annual Report



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Clean Lakes Program

1990 Annual Report

Office of Wetlands, Oceans and Watersheds
Office of Water
U.S. ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C.

1991

Prepared by The Terrene Institute for the U.S. Environmental Protection Agency. Publication does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

EPA Regional Clean Lakes coordinators contributed the information for this Clean Lakes Program Annual Report.

The report was compiled by EPA Headquarters Clean Lakes Program staff; Susan Ratcliffe, project officer.

Lura Taggart Svestka of JT&A, inc., designed and produced the report.
Cover photo of Pyramid Lake, Arizona, by Terri Hollingsworth.

Distributed by the



1000 Connecticut Avenue, N.W.
Suite 802
Washington, DC 20036
(202) 833-8317
Fax: (202) 466-8554



Contents

Introduction	1
Region I	4
Region II	7
Region III	9
Region IV	11
Region V	13
Region VI	16
Region VII	18
Region VIII	22
Region IX	25
Region X	27
Regional Offices and Coordinators	31

Introduction

The Clean Lakes Program moved into the final decade of the century clearly committed to supporting total lake and watershed management from initial diagnosis through post-restoration monitoring. Continuing its grass-roots orientation as the Federal partner in State lake protection programs, the Clean Lakes Program covered the entire scope of its mandate in 1990.

The 102 newly awarded Clean Lakes cooperative agreements encompassed all four phases of the program:

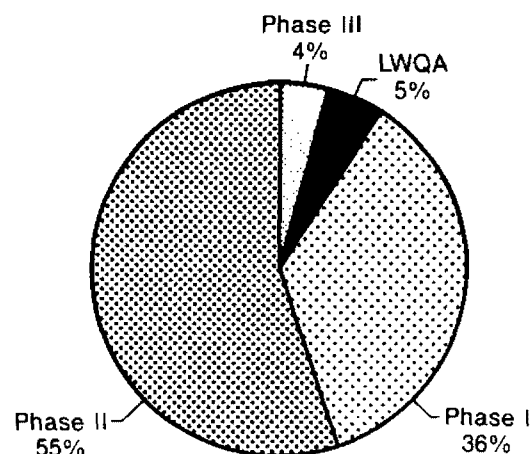
- **State/Tribal Lake Water Quality Assessments (LWQAs):** must be performed biennially by States or Tribes to attain or maintain eligibility for Clean Lakes Program funding. In submitting their 1990 Clean Water Act section 305(b) reports (April 1990), States were to include the information required by section 314. The National Water Quality Inventory Report that contains this information is now being prepared.
- **Diagnostic/Feasibility Studies (Phase I):** must be completed first, to determine the actual work that needs to be done under a Phase II.
- **Restoration/Implementation Projects (Phase II):** put into effect the recommendations of the Phase I studies.
- **Post-restoration Monitoring Studies (Phase III):** determine through monitoring the longevity, progress, and success of the Phase II project.

Forty-four States, one territory, and 15 Indian Tribes received financial assistance in Fiscal Year 1990 totalling slightly more than \$12 million. Diag-

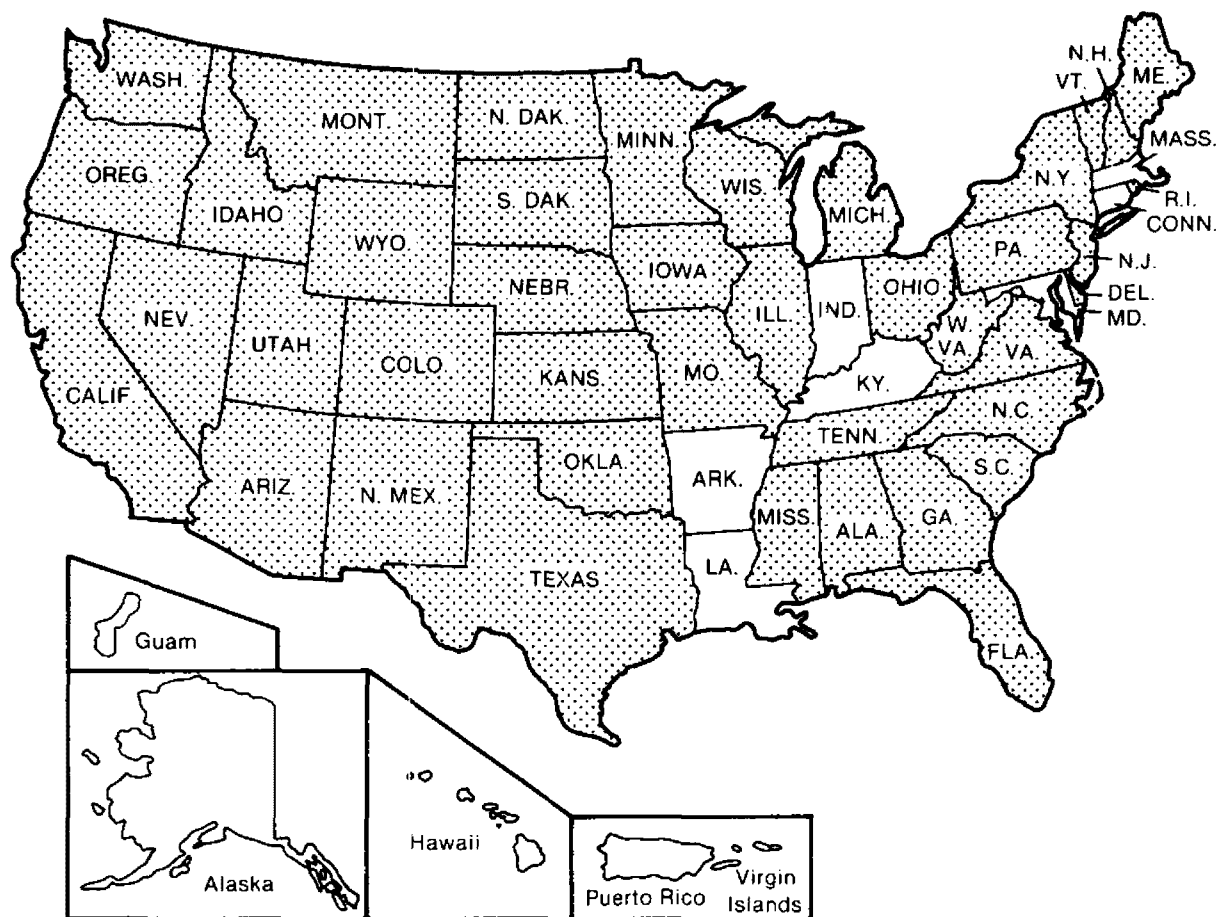
nostic/Feasibility Studies (Phase I) constituted more than half the agreements, slightly less than a third of the financial assistance. About half the Federal funds went into Restoration/Implementation Projects (Phase II). Lake Water Quality Assessments and Post-restoration Monitoring Studies together accounted for less than \$1 million with 14 awards.

Most significantly, however, Native American Indian Tribes dramatically increased their participation in the program. Fifteen Tribes became eligible for—and received—Clean Lakes financial assistance this year, in contrast to three the previous year and only one in 1987.

Percentage of Clean Lakes FY 90 funds spent on project types.



State/Tribal Lake Water Quality Assessments
Phase I — Diagnostic/Feasibility Studies
Phase II — Restoration/Implementation Projects
Phase III — Post-Restoration Monitoring Studies



States marked with dots received Clean Lakes FY 90 cooperative agreements.

Indian Tribe Agreements

The U.S. Environmental Protection Agency (EPA), which administers the Clean Lakes Program, maintains a special policy for Native American Indian Tribes that enables a Tribe to be treated as a State. This reflects EPA's recognition of Tribal governments as independent authorities for reservation affairs—sovereign entities, not political subdivisions of States. Thus, a Tribe designated as a State may apply for and receive grants to conduct Clean Lakes and other EPA water quality projects on Tribal lands. (This report associates the Tribes with States simply for geographical reference.)

During Fiscal Year 1990, two California Tribes—the Colorado River Indian Tribes and the Fort Mojave Indian Tribe—were given State status and each received \$100,000 to conduct Phase I diagnostic-feasibility studies. The Colorado River Tribe will use the funds to study water quality on Deer Island

Lake and 12-Mile Lake, while the Fort Mojave Tribe will employ the funds for similar studies of Twin and Long lakes.

Another Tribe designated as a State in 1990, the Pueblo of Acoma, received \$455,454 in Phase II funding to restore Lake Acomita in New Mexico.

Seventy-seven percent of the LWQA awards were to Indian Tribes. The Red Lake, White Earth and Mille Lacs Bands of the Minnesota Chippewa Tribes continued their Lake Water Quality Assessments. Nine other Tribes—the Poarch Band of Creek Indians (Alabama), the Eastern Band of Cherokees (North Carolina), Wind River Tribe (Wyoming), Blackfeet Tribe (Montana), Turtle Mountain Chippewa Tribe (North Dakota), Southern Ute Tribe (Colorado), Nez Perce and Coeur d'Alene Tribes (Idaho), and Klamath Tribe (Oregon)—received a total of \$362,596 in FY 1990 to begin or continue LWQAs. This accounted for 53 percent of the LWQA financial assistance.

FY 1990 CLEAN LAKES AWARDS			
Lake Water Quality Assessments	13	\$	685,066
Diagnostic/Feasibility Studies	60	\$	4,386,323
Restoration/Implementation Projects	25	\$	6,649,002
Post-Restoration Monitoring Studies	4	\$	439,875
TOTAL	102		\$12,133,266*

* Remaining funds from FY 89 allocation included.

Other Program Activities

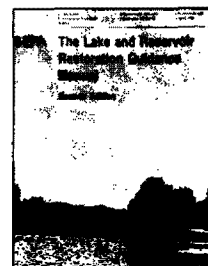
Information and education are the cornerstones of the Clean Lakes Program, which continues to support the transfer of technical information to the States and citizens. The Program participates in national and international conferences and citizen workshops, publishes manuals and other materials, and continues to support the Clean Lakes Clearinghouse database.

Conferences

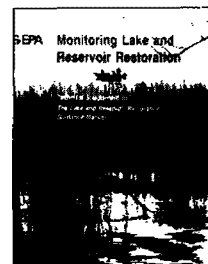
- **Enhancing States' Lake Management Programs:** This May 1990 conference in Chicago focused on stormwater management and local nonpoint source issues. Clean Lakes Program regional and headquarters staff participated in the sessions.
- **International Lake & Reservoir Symposium:** More than 600 people attended the North American Lake Management Society's 10th annual symposium, which brings together the citizen and lake association community with the academic, governmental, and business interests concerned with lake issues.
- **Regional Workshops:** The Clean Lakes Program continued to support and participate in workshops for citizens interested in learning how to protect and manage their lake/reservoir resources. Georgia conducted such a workshop in May, followed by Pennsylvania and Michigan in June. Although regional in nature, all these workshops led to the formation of State lake associations.

Publications

- **Lake & Reservoir Restoration Guidance Manual:** The second edition of this popular guide for the lake community was completed, and several thousand have already been distributed. The original authors revised and updated the information contained in the Manual, to assure its continued applicability to lake restoration.



- **Monitoring Lake & Reservoir Restoration:** This first technical supplement to the *Lake & Reservoir Restoration Guidance Manual* was prepared and distributed this year. A second technical supplement is now under way.



- **Clean Lakes Demonstration Program: 1989 Annual Report to Congress:** Section 314(d) of the 1987 amendments to the Clean Water Act established a demonstration program to develop pollution control techniques for lakes that could serve as models for similar restoration projects on other lakes. This report summarizes the status of each demonstration project and describes the work undertaken by the EPA Clean Lakes Program as well as by others involved in these projects.

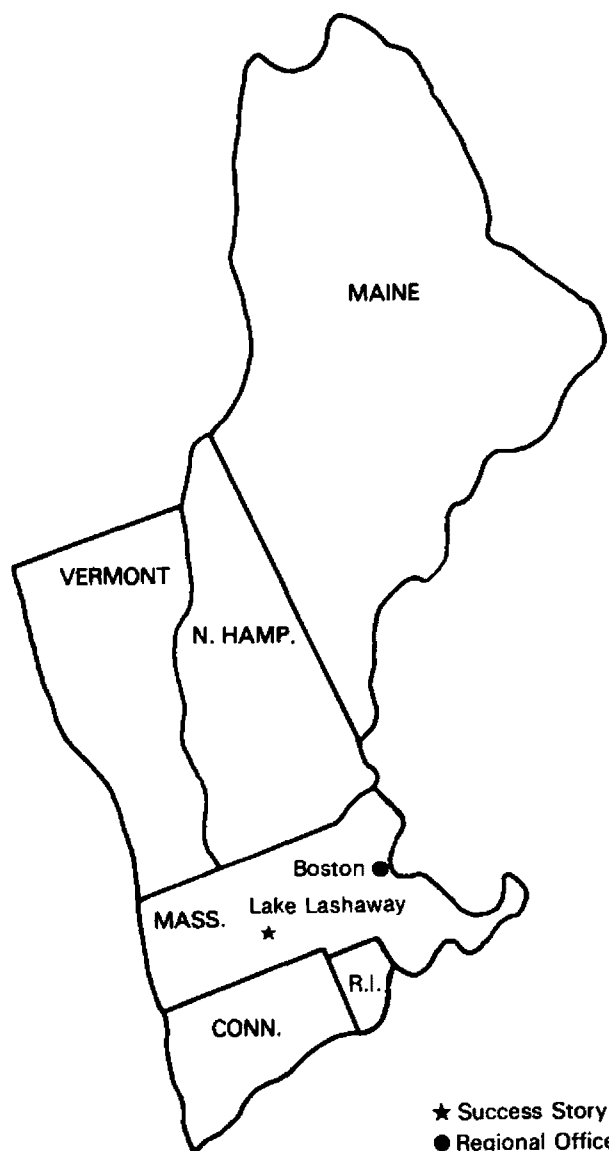
Clean Lakes Clearinghouse

EPA continued to respond to requests for information from citizens, lake associations, States, and others throughout the Nation. Two staff with library and database expertise maintain the Clearinghouse, continually screening and inputting new material.

Region I

Every State in Region I participated in the Clean Lakes Program during Fiscal Year 1990, with two—Maine and New Hampshire—beginning post-restoration monitoring projects this year. The Region worked closely with the States in managing the program's activities, particularly in

- ❑ Guiding the States' preparation of financial assistance applications to ensure consistency and high quality;
- ❑ Conducting technical reviews and making funding recommendations for all Clean Lakes Program applications;
- ❑ Awarding nine new Clean Lakes cooperative agreements with the States;
- ❑ Managing 37 active projects to ensure that interim goals were being accomplished, time requirements met, and special grant conditions followed;
- ❑ Visiting many Clean Lakes Phase II projects to verify progress toward completion of lake restoration; and
- ❑ Reviewing and providing comments on sub-State agreements to ensure regulatory control for the maintenance of lake projects. Such supervision is essential to preserving a lake's water quality once restoration has been completed.



Success Story: Lake Lashaway, Massachusetts

The story of Lake Lashaway—the first Clean Lakes project in Massachusetts—began when residents around the lake found a new way to use their old bedsprings.

During the 1970s, homeowners living beside Lake Lashaway were dragging their old bedsprings along the shoreline in a desperate effort to remove tangled masses of vegetation that hampered access to the lake. The lake suffered from nutrient loading and suspended solids both from its periphery and

its large watershed; fanwort and bushy pondweed covered much of the surface.

By 1978, aesthetic and recreational activities were so diminished that the Lake Lashaway Community Association and the two towns bordering the lake joined forces to fund a eutrophication study. In March 1980, EPA agreed to award Phase I Clean Lakes financial assistance to complete a feasibility study, and, a year later, approved a Phase II award to restore the lake.

The major components of the Phase II project were the design and construction of a lake level

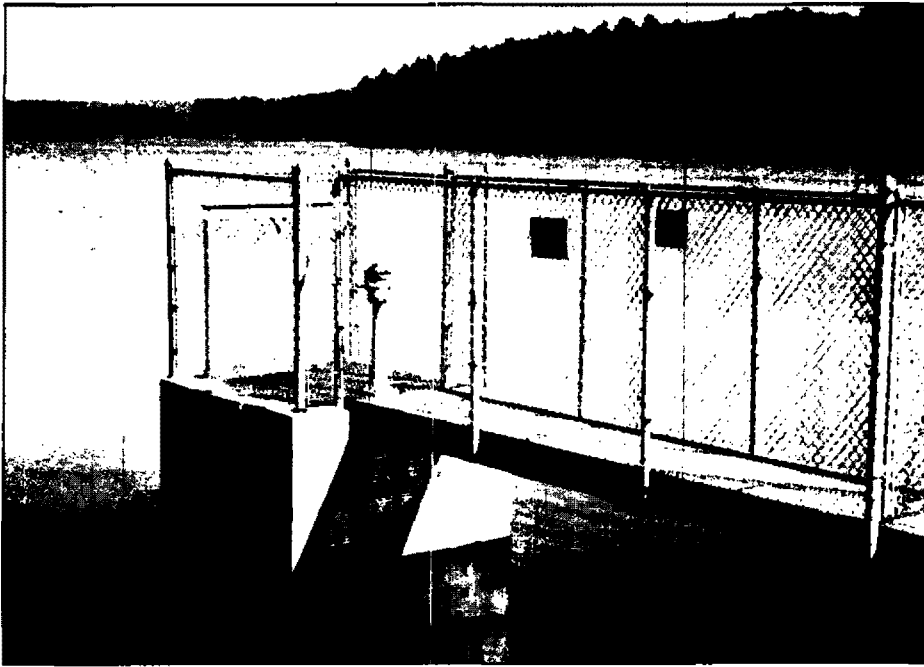
Region I — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Connecticut	Statewide	LWQA
	Bantam Lake	Phase II
	Candlewood Lake	Phase II
	Lake Warramaug	Phase II
Maine	Statewide	LWQA
	China Lake	Phase II
	Lake Cobbossee	Phase II
	Long Lake	Phase I
	Webber Lake	Phase II
	Three Mile Pond	Phase II
Massachusetts	Statewide	LWQA
	Lake Buel	Phase II
	Lake Cochituate	Phase II
	Dunn's Pond	Phase II
	Hill's Pond	Phase II
	Lower Mystic Lake	Phase II
	Porter Lake	Phase II
	Sluice, Flax, and Floating Bridge Ponds	Phase II
	Spy Pond	Phase II
	Eagle Pond	Phase II
	Whitman's Pond	Phase II
New Hampshire	Statewide	LWQA
	Beaver Lake	Phase I
	Mendum's Pond	Phase I
	Webster Lake	Phase I
Rhode Island	Statewide	LWQA
	Lake Washington	Phase I
	Olney Pond	Phase I
Vermont	Statewide	LWQA
	Lake Champlain	Phase I

FY 1990 Awards

		AMOUNT (\$)
Maine	Chickawaukie Lake Phase II	141,190
	Medawaska Lake Phase I	88,830
	Cochnewagon Lake Phase III	68,348
New Hampshire	Beaver Lake Phase I	27,225
	Robinson/	
	Otternick Ponds Phase I	99,999
	Kezar Lake Phase III	121,577
Rhode Island	Watchaug Pond Phase I	100,000
Vermont	Lake Champlain Phase I	120,000
	Lake Bomoseen* Phase II	588,000
TOTAL	. . . . .	\$1,355,169

* Demonstration project



Taken just prior to drawdown of the water level, this photo shows the outlet control structure at the south end of Lake Lashaway, including the fenced catwalk, sluice gate valve, and outlet chamber. Photo by Robert C. Haynes.

control structure to facilitate drawdown. Construction began in September 1982, and the sluice gate that controlled the new outlet structure was opened 80 days later. A full 8-foot drawdown had to be postponed for two years until a retention dam was built to protect the wetlands that bordered the inflowing tributary.

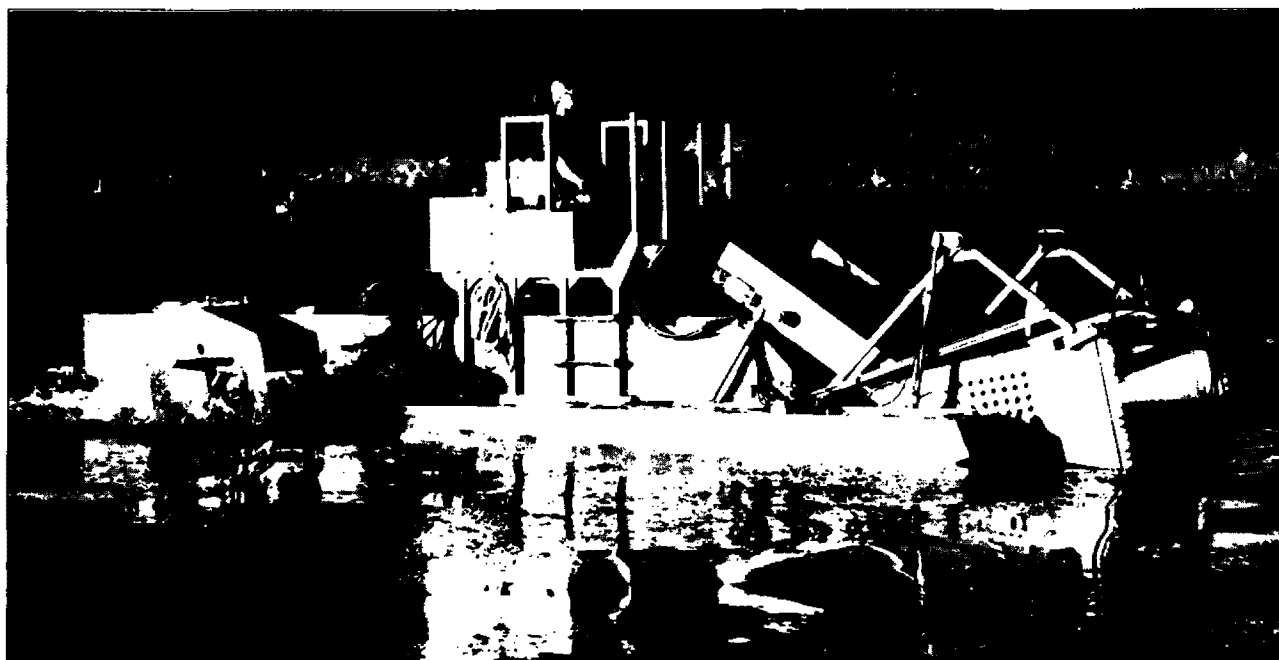
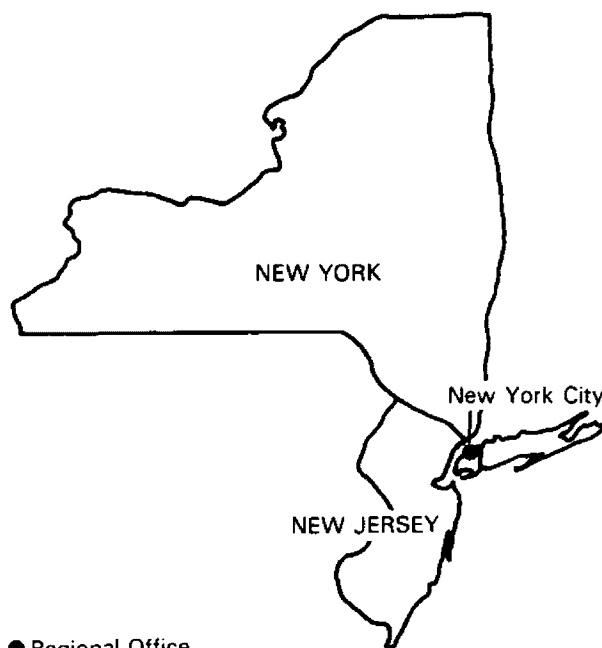
The outlet structure's effect on the lake was dramatic and unequivocal. Before construction, nuisance macrophytes covered 70 percent of the lake; by the winter of 1984-85, the drawdown resulting from the new structure had decimated the two populations of macrophytes that had marred the lake.

During six continuous years of winter drawdown, Lake Lashaway has remained free of nuisance macrophytes. Aesthetic and recreational activities have rebounded, as has shoreline management. In 1985, the two towns bordering the lake established a new beach, and the lake association built a permanent boat ramp in 1987 after completion of a State-funded dredging project. Sail and ski club activities are in full swing, and the Massachusetts Bass Fishing Club has put Lake Lashaway back on its regular tournament circuit. Moreover, annual operation and maintenance costs associated with the control structure are negligible.

Region II

The use of weed harvesting as a lake management technique spawned much interest in Region II this year; the Region visited a number of lake communities in both New York and New Jersey to provide information on weed harvesting. Other activities in Region II's management of the Clean Lakes Program included:

- ☐ Management of New York's Onondaga Lake, including convening the Onondaga Lake Management Conference, awarding a \$500,000 demonstration grant to help finance the conference's work; reviewing research proposals, and beginning a Phase I study;
- ☐ Completion of Phase II projects in New Jersey's Etra Lake and Iroquois Lakes;
- ☐ Completion of LWQA assessments in New York, New Jersey, and Puerto Rico; and
- ☐ Site visits to several lakes in New York and New Jersey to demonstrate the effectiveness of weed harvesting.



A weed harvester at work.

Region II — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Puerto Rico	Lake La Plata	Phase II
New Jersey	Allentown Lake	Phase II
	Lake Hopatcong	Phase II
	Deal Lake*	Phase II
	Greenwood Lake	Phase II
New York	Saratoga Lake	Phase II
	Irondequoit Bay	Phase II
	Belmont Lake	Phase II
	Van Cortlandt Park Lake	Phase II
	Collins Lake	Phase II

FY 1990 Awards

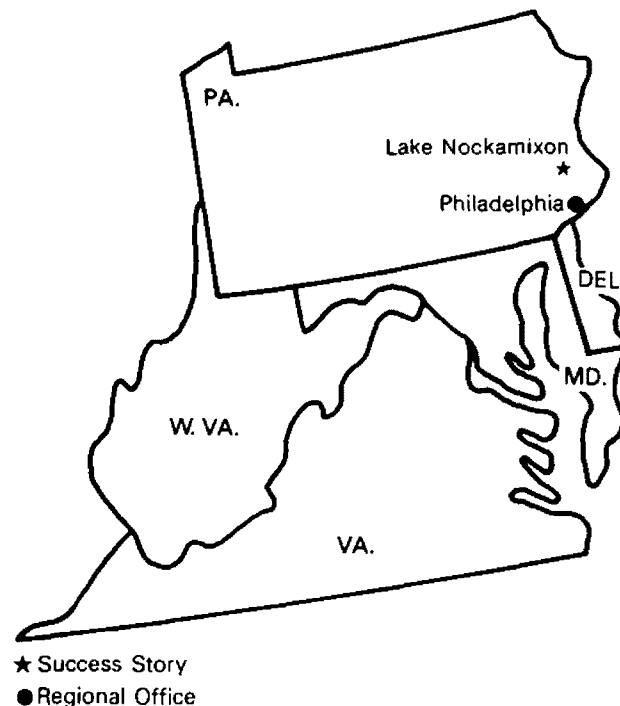
		AMOUNT (\$)
New Jersey	Manahawkin Lake Phase II	412,440
New York	Lake Champlain Phase I	134,860
	Lake Onondaga Phase II	500,000
	Lake George Phase II	25,000
TOTAL	. . . . .	\$1,072,300

*Demonstration project

Region III

A Clean Lakes project in Maryland was completed during Fiscal Year 1990, as management of the Clean Lakes Program in Region III included the following activities:

- ❑ Completion of the technical review, grant application, and funding recommendations for Delaware's LWQA;
- ❑ Completion of the Loch Raven Clean Lakes Project in Maryland;
- ❑ Participation by EPA Clean Lakes staff in a workshop on the Loch Raven project conducted by the Maryland Department of the Environment;
- ❑ On-site visits to Lakes Wallenpaupack and Nockamixon in Pennsylvania; and
- ❑ Completion of sampling for West Virginia's LWQA.

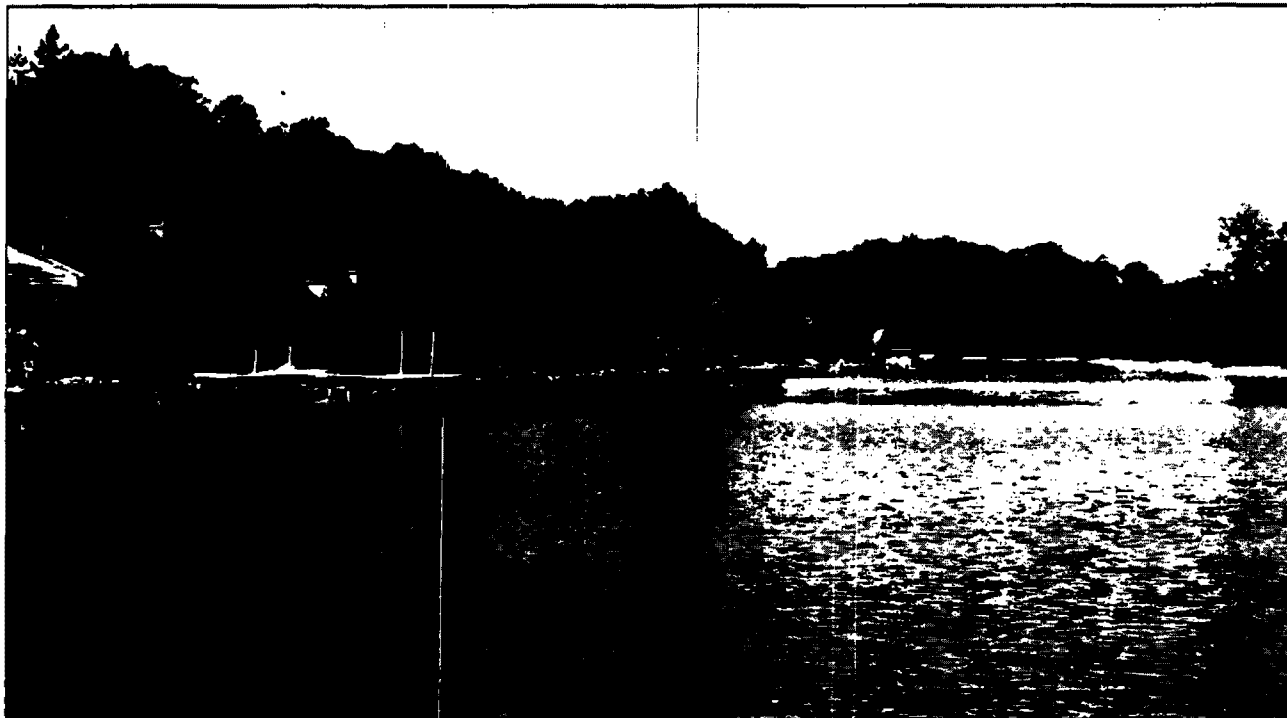


Region III—Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Maryland	Loch Raven Reservoir	Restoration/Implementation
Pennsylvania	Lake Nockamixon	Restoration/Implementation
	Lake Wallenpaupack	Restoration/Implementation
Virginia	Lake Chesdin	Restoration/Implementation
	Rivanna Reservoir	Restoration/Implementation
	Big Cherry Reservoir	Diagnostic/Feasibility Study
Delaware	Silver Lake	Diagnostic/Feasibility Study

FY 1990 Awards

			AMOUNT (\$)
Delaware	Lums Pond	Phase I	39,769
	Silver Lake	Phase II	101,202
Pennsylvania	Lake Jean	Phase I	64,600
	Lake Ontelaunee	Phase I	100,000
	Lake Luxembourg	Phase I	44,000
	Lake Wallenpaupack	Phase II	240,529
Virginia	Big Cherry Reservoir	Phase II	32,000
West Virginia	Hurricane Lake	Phase I	45,500
TOTAL	. . . . .		\$667,600



Success Story: Lake Nockamixon, Pennsylvania

Created by the Pennsylvania Department of Human Resources (DER) in 1973, Lake Nockamixon is a 1,500-acre reservoir located in Nockamixon State Park in upper Bucks County, Pennsylvania. The lake is one of the most popular recreational facilities in eastern Pennsylvania, drawing fishing, sailing, and hiking enthusiasts to its waters, which are also a potential water supply.

Since its creation, Lake Nockamixon has been plagued by low dissolved oxygen concentrations, high nutrient levels, and algal blooms. Excessive nutrients from agriculture, erosion, and a large wastewater treatment facility caused most of the lake's water quality problems. In response to public outcry over the poor quality of the water and fishery, the DER appropriated funds to conduct a Phase I study of the lake. The study recommended upgrading the wastewater treatment facility and implement agricultural BMPs to reduce the suspended sediments and phosphorus in the agricultural runoff.

To implement the recommendations, a multi-agency steering committee was formed. The committee included representatives of the Bucks County Conservation District (BCCD), DER, the Pennsylvania Fish Commission, Pennsylvania Bureau of State Parks, Pennsylvania Game Commission, Bucks County Health Department, USDA's Soil Conservation Service (SCS), USDA's Agricultural Stabilization and Conservation Service (ASCS), and the local farmers' association. The steering committee met every six to eight weeks for about a year to exchange information, solve problems, and ensure that the Phase I recommendations were carried out.

A Federal grant funded the upgrading of the wastewater treatment plant so that the facility could reduce the phosphorus in the effluent. And in 1988, the BCCD obtained Phase II funding to implement agricultural BMPs. Conservation measures were instituted on 95 percent of the cropland and pasture land upstream from and draining into the lake.

Region IV

A great deal of citizen concern about the deteriorating water quality of Georgia's lakes—particularly West Point Lake, recipient of Atlanta wastewater—spawned interest in protective measures for the State's lake resources. Region IV was instrumental in the production of landmark water quality standards that were enacted as part of historic water protection legislation passed by the Georgia General Assembly. Other accomplishments of the Region's Clean Lakes Program during Fiscal Year 1990 included:

- ❑ Assisted in drafting landmark lake water quality standards for Georgia that were subsequently enacted by the Georgia General Assembly;
- ❑ Managed 18 active projects, completing LWQAs in Alabama and Florida and a Phase II at Lake Jackson (Florida);
- ❑ Awarded financial assistance for diagnostic/feasibility studies on a large interstate lake—West Point, with approximately 23,000 acres in Georgia and approximately 3,000 acres in Alabama—that has been significantly affected by point source pollution (nutrients) and toxics; and
- ❑ Supported work on several lakes with major nonpoint source problems that seriously affect their area's economies: Georgia's Lakes Lanier (38,000 acres) and Walter F. George (45,000 acres) have a combined visitor day total of 25.6 million per year; fishing in Alabama's Lake Weiss (30,000 acres) is estimated to contribute \$11 million to the local economy.

To encourage the development of university limnology programs, States in this Region have subcontracted LWQA studies and/or Phase I activities to several colleges or universities, including



Florida State University, University of Georgia, La Grange College (Georgia), Auburn University (Alabama), the University of Southern Mississippi, Tennessee Technical University, and Murray State University (Kentucky). North Georgia College at Dahlonega also will be doing some work under an arrangement with the University of Georgia.

Region IV — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Alabama	Statewide	LWQA (completed)
Florida	Statewide	LWQA (completed)
	Lake Jackson	Phase II
	Lake Munson	Phase I
Georgia	Statewide	LWQA
	Lake Jackson	Phase I
Kentucky	Statewide	LWQA
Mississippi	Wolf Lake	Phase I
	Moon Lake	Phase I
	Lake Washington	Phase I
North Carolina	Statewide	LWQA
	Umstead State Park Lake	Phase II
	Big Lake	Phase II
South Carolina	Statewide	LWQA
	Lake Edgar A. Brown	Phase I
Tennessee	Cove Lake	Phase I
	Fall Creek Lake	Phase I

FY 1990 Awards

		AMOUNT (\$)
Alabama	Weiss Reservoir Phase I	100,000
	West Point Lake Phase I	100,000
Poarch Band of Creek Indians (Ala.)	LWQA	10,000
Florida	Lake Lawne Phase I	100,000
Georgia	West Point Lake Phase I	100,000
	Lake Lanier Phase I	100,000
	Lake Walter F. George Phase I	100,000
Mississippi	Statewide LWQA	100,000
North Carolina	High Rock Lake Phase I	100,000
	Long Lake Phase I	100,000
	Big Lake Phase II	100,000
Eastern Band of Cherokees (N.C.)	LWQA	15,000
South Carolina	Lake Bowen Phase I	100,000
	Goose Creek Reservoir Phase I	25,200
Tennessee	Statewide LWQA	100,000
TOTAL		\$1,250,200

Region V

Region V works with many State, Federal, and local organizations—including several Chippewa Indian Tribes—in fulfilling the mandates of the Clean Lakes Program. The Region co-sponsored a third annual national meeting for State lake managers and also participated in annual State lake association conferences. The Region's activities during Fiscal Year 1990 included:

- ❑ Co-sponsoring the National State Lake Managers/Nonpoint Source Conference held in Chicago;
- ❑ Participating in annual conferences convened by the Illinois Lake Management Association, the Indiana Lake Management Association, the Michigan Lakes and Streams Association, the Ohio Lake Management Society, and the Michigan Lake Management Society;
- ❑ Continuing to work with State agencies, the U.S. Army Corps of Engineers, and local organizations to implement the Sauk Lake Demonstration Project in Minnesota;
- ❑ Working with the Red Lake, White Earth, and Mille Lacs Bands of the Minnesota



★ Success Story
● Regional Office

Chippewa Indian Tribes to develop laboratory quality assurance programs for their LWQAs; and

↳ Managing 86 Clean Lakes grants and beginning to close out several.



Region V — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Illinois	Statewide . . . . .	.LWQA
	Lake Pittsfield . . . . .	.Phase I
	Lake Springfield . . . . .	.Phase II
	Skokie Lagoons . . . . .	.Phase II
	Herrick Lake . . . . .	.Phase I
	Charleston Side Channel . . . . .	.Phase I
	McCullom Lake . . . . .	.Phase I
	Lake Pickneyville . . . . .	.Phase I
Indiana	Frank Holten State Park Lakes . . . . .	.Phase III
	Statewide . . . . .	.LWQA
Michigan	Skinner Lake . . . . .	.Phase II
	Statewide . . . . .	.LWQA
	Lake Lansing . . . . .	.Phase III
	Elk River Chain of Lakes . . . . .	.Phase I
Minnesota	Lake Mitchell . . . . .	.Phase I
	Statewide . . . . .	.LWQA
Chippewa Tribe Lakes (Minn.)	Big Stone Lake . . . . .	.Phase II
	Clearwater Chain of Lakes . . . . .	.Phase II
	Golden Lake . . . . .	.Phase II
	Lake Ripley . . . . .	.Phase I
	Tanner's Lake . . . . .	.Phase I
	Medicine Lake . . . . .	.Phase II
	Moore Lake . . . . .	.Phase II
	Lake Riley . . . . .	.Phase II
	Upper & Lower Prior Lakes . . . . .	.Phase I
	Sauk River Chain of Lakes . . . . .	.Phase I
	Big Kandiyohi Lake . . . . .	.Phase I
	French Lake . . . . .	.Phase I
	East Side Lake . . . . .	.Phase I
	Florence Lake . . . . .	.Phase I
	Long Lake . . . . .	.Phase I
	Algomet Lake . . . . .	.Phase I
	Bemidji/Irving Lakes . . . . .	.Phase I
	Grove Lake . . . . .	.Phase I
	Sallie/Detroit Lakes . . . . .	.Phase I
	Sauk Lake . . . . .	.Phase I
	White Earth Chippewa Tribe (Minn.) . . . . .	.LWQA
	Red Lake Chippewa Tribe (Minn.) . . . . .	.LWQA
	Mille Lacs Chippewa Tribe (Minn.) . . . . .	.LWQA
	Bay River Chain of Lakes (Minn.) . . . . .	.Phase I
Ohio	Statewide . . . . .	.LWQA
	Winton Lake . . . . .	.Phase I
	Sippo Lake . . . . .	.Phase I
Wisconsin	Statewide . . . . .	.LWQA
	Lake Comus . . . . .	.Phase II
	Delavan Lake . . . . .	.Phase II
	Lake Henry . . . . .	.Phase II
	Lake Noquebay . . . . .	.Phase II
	Milwaukee Urban Lakes . . . . .	.Phase II
	Upper Willow Reservoir . . . . .	.Phase II
	Bass Lake . . . . .	.Phase I
	Pickereel/Crane Lakes . . . . .	.Phase I
	Wind Lake . . . . .	.Phase I
	8 Lakes . . . . .	.Phase III

Region V — FY 1990 Awards

STATE	PROJECT	COOPERATIVE AGREEMENT	AMOUNT (\$)
Illinois	Chicago Park Lagoons	Phase I	50,000
	Sherman Park Lagoon	Phase II	100,000
	Skokie Lagoons	Phase II	430,341
	East & West Paris Lakes	Phase I	40,000
	Lake Lou Yeager	Phase I	50,000
Michigan	Portage Lake	Phase I	30,000
	Marble-Coldwater Chain of Lakes	Phase II	115,000
	East & West Glen Lakes	Phase I	27,000
	Hamlin Lake	Phase I	47,250
	Higgins Lake	Phase I	24,760
	Morrison Lake	Phase II	125,306
Minnesota	Long Year Lake	Phase I	50,000
	Koronis-Rice Lakes	Phase I	50,000
Ohio	Dillon Reservoir	Phase I	50,000
	Indian Lake	Phase II	165,000
	Twin Lakes	Phase III	124,950
Wisconsin	Fish Lake	Phase I	15,950
	Delavan Lake	Phase II	468,000
	Bass Lake	Phase I	10,993
TOTAL			\$1,974,550

Success Story: Lake McCarrons, Minnesota

Lake McCarrons, an 81-acre lake in suburban St. Paul, had been suffering from algal blooms, weed growth, low hypolimnetic dissolved oxygen, excessive nutrient loadings from the watershed and lake sediments, and excessive sediment deposition in the lakebed. To combat these problems, a Phase I study of the lake recommended construction of a sedimentation basin, six small wetland treatment chambers, and storm sewer sump to trap sediment. The Minnesota Pollution Control Agency and the City of Roseville used a \$194,316 Phase II Clean Lakes award to implement those recommendations.

Post-implementation evaluation of the treatment system by the Metropolitan Council of the Twin Cities showed encouraging results. Although the lake's water quality and trophic state did not change, the detention system and wetland treatment chambers did reduce loadings of total phosphorus and total dissolved phosphorus, as well as several other pollutants.

Analyses of 21 storms that occurred from September 1986 to June 1988 showed that the treatment system had cut total phosphorus loadings 78 percent from pre-treatment levels. Total dissolved phosphorus had dropped 53 percent; total Kjeldahl nitrogen, 85 percent; total volatile and suspended solids, 94 percent each; chemical oxygen demand, 93 percent; nitrate, 63 percent; total nitrogen, 83 percent; and total lead, 90 percent.

Region VI

The first Native American Indian Clean Lakes project in Region VI began during Fiscal Year 1990. Three national demonstration projects are also among the active projects managed by Region VI. This year the Clean Lakes Program in the Region included the following activities:

- ☐ Guiding the States' preparation of project applications to ensure high quality, competitive applications;
- ☐ Visiting Oklahoma's Lake Hefner to observe LORAN bathymetric mapping techniques and lake monitoring procedures;
- ☐ Visiting Oklahoma's Northeast Lake to see part of the watershed, and observe dredging operations and the final stages of the project;
- ☐ Conducting technical reviews, making funding recommendations, and awarding funds for six new Clean Lakes projects;
- ☐ Managing 19 active projects, including three national demonstration projects, to ensure that workplan requirements and grant conditions were met; and
- ☐ Beginning the first Native American Tribes Clean Lakes project in the Region by awarding funds for a Phase II project to the Pueblo of Acoma to restore Acomita Lake.



Region VI — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Arkansas	Beaver Lake*	Phase I
Louisiana	City Lakes	Phase II
New Mexico	Statewide	LWQA
	Lake McGaffey	Phase I
Oklahoma	Statewide	LWQA
	Northeast Lake	Phase II
	Lake Lawtonka	Phase II
	Lake Ellsworth	Phase I
	Lake Hefner	Phase I
	Grand Lake o' the Cherokees	Phase I
Texas	Lake Houston*	Phase I
	Lake Worth*	Phase I
	Town Lake	Phase I

FY 1990 Awards

			AMOUNT (\$)
Pueblo of Acoma (New Mex.)	Lake Acomita	Phase II	455,454
Oklahoma	Meadow Lake	Phase I	62,730
	Lake Eufaula	Phase I	100,000
	Lake Chichasha	Phase I	93,286
Texas	Statewide	LWQA	91,330
	Lake Worth*	Phase II	1,723,706
TOTAL	. . . . .		\$2,526,506

*Demonstration project

Success Story: Acomita Lake, Pueblo of Acoma, New Mexico

Acomita Lake is a 70-acre reservoir with a 17-square-mile watershed located on the Pueblo of Acoma about 20 miles west of Grants, New Mexico. Completed in 1939, the dam that created the reservoir was originally built to store irrigation water diverted from the Rio San Jose. In 1961, the Pueblo began stocking rainbow trout, and the lake was managed for put-and-take fishing as well as irrigation water storage.

When the lake's water quality deteriorated to the point that it could no longer sustain a trout fishery, the lake was drained. A Phase I-equivalent study concluded that the lake was suffering from excessive sedimentation and nutrient loading from the Rio San Jose, which was receiving treated waste-

water discharges from the town of Grants. To solve the problem, the Acoma Pueblo used EPA funds to build sediment retaining structures in the lake watershed in 1985.

Building on this success, the Pueblo of Acoma was given State status in August 1990—one of the first Tribes in the program's history to be so designated—and became eligible for Clean Lakes assistance, which was awarded in September 1990. The Tribe received funding for a Phase II project that includes designing a constructed wetlands in the upper reach of the reservoir, dredging the reservoir to remove accumulated sediments and increase depth, and instituting restorative measures. The latter are designed to help the lake once again become a high quality fishery. To that end, the Clean Lakes project is being coordinated with a Bureau of Native American Affairs dam restoration project.

Region VII

The Clean Lakes Program in Region VII worked with all its States and many citizen groups to meet the needs of the Region's lake resources. Active management of ongoing projects and outreach to begin new projects and volunteer monitoring programs took priority. In addition to developing guidelines for State applications for Clean Lakes funds, the Region began tracking these projects with a computerized system. Other Fiscal Year 1990 activities included:

- ☐ Preparing detailed regional guidelines for fiscal year 1990 application development to ensure that grant applications would be consistent with regulations and program intentions. These guidelines included checklists to rate project merit and application quality and completeness so applications could be ranked for funding;
- ☐ Awarding supplemental funding for Iowa's LWQA to develop and implement a comprehensive monitoring strategy (including volunteers) for glacial lakes in northwestern Iowa;
- ☐ Announcing FY 1990 awards with press conferences and site tours. These events not only generated positive publicity for the Clean Lakes Program, EPA, States, and local project sponsors, but also kicked off the information and education activities for each project;
- ☐ Actively managing 15 ongoing Clean Lakes projects, including visits to 10 projects, and quarterly reviews of each project for compliance with scheduled workplans and grant conditions;
- ☐ Implementing a Clean Lakes Program computerized tracking system;
- ☐ Planning and providing funding for two conferences slated for 1991: a regional lake management conference in Des Moines June 10-12; and "Water Quality Issues of the 1990s" sessions for the April conference of the Kansas Water Pollution Control Association.



★ Success Story
● Regional Office

- ☐ Encouraging initiation of volunteer monitoring programs throughout the region. These included programs for Cedar Rapids and Corydon Lake, Iowa; the Iowa Great Lakes; and areas in Nebraska and Missouri. In addition, the Region encouraged incorporation of citizen monitoring components into new Clean Lakes projects;
- ☐ Providing guidance and funding for the video, "Lake Restoration: an Investment That Pays Off," by the Iowa Department of Natural Resources;
- ☐ Adding lake management and wetlands components to FY 1991 State-EPA agreements, and working with wetlands and nonpoint source program staffs to add wetlands and nonpoint source components to Clean Lakes projects; and
- ☐ Participating in a field trial of a Soil Conservation Service procedure to evaluate the trophic condition of waterbodies based on assessments of watershed activities and management alternatives.

Success Story: Iowa's Clean Lakes Program

The Clean Lakes Program has been a key factor in improving the water quality of Iowa's lakes. In the past decade, over \$6 million of Clean Lakes Program funding has been matched by State and local funds

Region VII — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Iowa	Statewide	LWQA
	Ahquabi Lake	Phase II
	Black Hawk Lake	Phase II
	Iowa Lake	Phase I
	Pine Lakes	Phase I
	Swan Lake	Phase II
	Union Grove Lake	Phase II
Kansas	Statewide	LWQA
	Lone Star Lake	Phase II
Missouri	Statewide	LWQA
	Springfork Lake	Phase I
	Swope Park Lake	Phase II
Nebraska	Statewide	LWQA
	Lower Elkhorn Lakes	Phase I
	Salt Valley Lakes	Phase I

FY 1990 Awards

		AMOUNT (\$)
Iowa	Statewide LWQA	4,500
	Little Wall Lake Phase I	34,118
	Lake Ahquabi Phase II	24,000
	Lake Miami Phase I	15,925
Kansas	Herington Reservoir Phase I	73,432
	Ford County Lake Phase II	231,825
Missouri	Lamar Lake Phase I	68,000
	Jacomo/ Prairie Lee Lakes Phase I	100,000
	Rothwell Lake Phase I	47,000
Nebraska	Papio Lakes Phase I	77,000
	Summit Lake Phase I	26,600
TOTAL	. . . . .	\$702,400

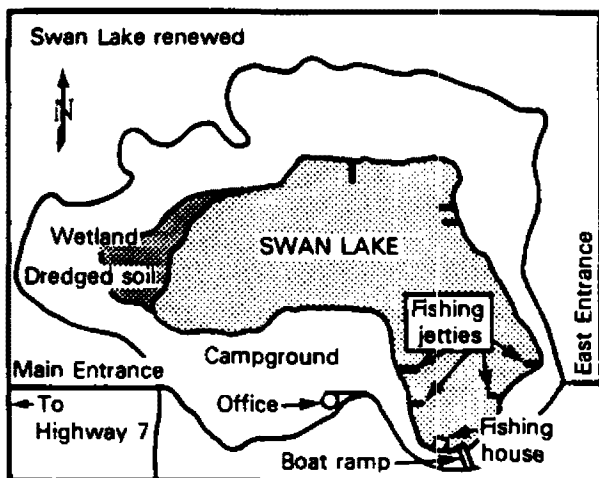
to develop and/or implement plans to protect and restore 13 Iowa lakes. The projects have leveraged funds from other sources to ensure cost-effective water quality protection and improvement, demonstrated better ways to prevent pollution and restore lakes, and generated considerable local interest and support for lake restoration and management. Two of Iowa's successful Clean Lakes projects, Swan Lake and Green Valley Lake, are highlighted here.

SWAN LAKE

Turbidity, sedimentation, nuisance algal blooms, and frequent winter fishkills plagued Swan Lake, a 130-acre lake in west central Iowa—until a protection and restoration plan by the Iowa Department of

Natural Resources and Carroll County was developed and implemented with the help of Clean Lakes Program funding.

To begin the \$601,500 Phase II renovation project, Swan Lake was drained in 1982. The lake was deepened and dredged material was placed in the upper end to create a wetland. The restored lake was reduced to 116 acres and deepened from a maximum of 6 feet to a maximum of 15 feet (an average of 4 to 6 feet). While the lake was drained, an aeration system and 72 units of fish habitat were installed. The entire shoreline was riprapped and 10 fishing jetties were built to increase water depth near the shore, improve shore angling areas, and reduce wind-generated sediment suspension. In



addition, two new water sources—a well and a tile line—were installed. In 1985, the lake was stocked with sport fish.

The project also included measures to minimize future nonpoint source pollution on the lake. These included construction of diversion terraces to control erosion and runoff, establishment of grassed waterways, and the setting aside of highly erodible lands under the U.S. Department of Agriculture's Conservation Reserve Program.

The project has significantly reduced Swan Lake's sedimentation and turbidity, and ensured survival of the lake's fish populations. These improvements in turn have produced significant social and economic benefits for the area surrounding the lake. In 1990, visits to Swan Lake State Park were up 170 percent from the number of visits in 1986, and camping in the park more than doubled



Fishing use—and success—dramatically increased following restoration of Swan Lake, which now has the highest standing stock of largemouth bass of any Iowa state lake surveyed.

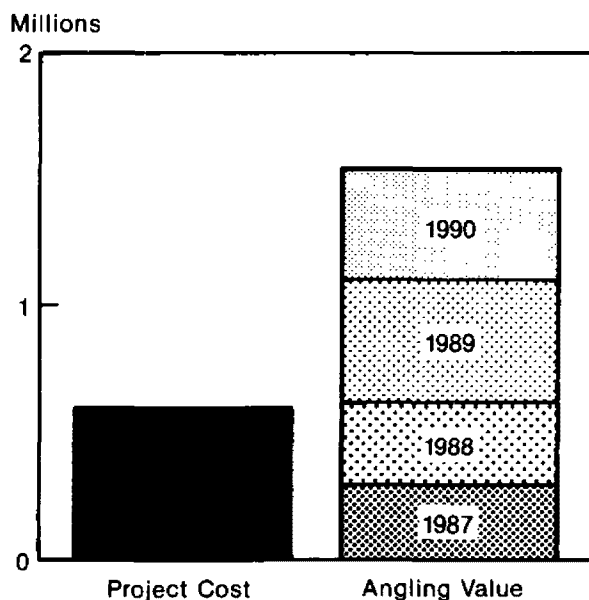
during the same period. Between 1982 and 1989, the number of anglers at the lake increased more than sevenfold, and the catch increased fivefold between 1986 and 1990. The lake now has the largest standing stock of largemouth bass of any State lake surveyed in Iowa.

Moreover, the increase in angling value alone offset the project's cost in only two years. From 1987 through 1990, the value of fishing at Swan Lake exceeded \$1.75 million. Between 1986 and 1990, concession income at the park quadrupled; camping receipts in 1990 were 2.5 times higher than those of 1986.



Frequent fishkills plagued both Swan and Green Valley lakes before restoration.

Swan Lake angling value, 1986-1990.



GREEN VALLEY LAKE

Green Valley Lake, a 428-acre lake built in 1952 in south central Iowa, suffered from numerous water quality problems. Watershed erosion delivered sediment and nutrients to the lake, resulting in sedimentation, nuisance blue-green algal blooms, odors, dissolved oxygen deficiencies, fishkills, and fishery degradation.

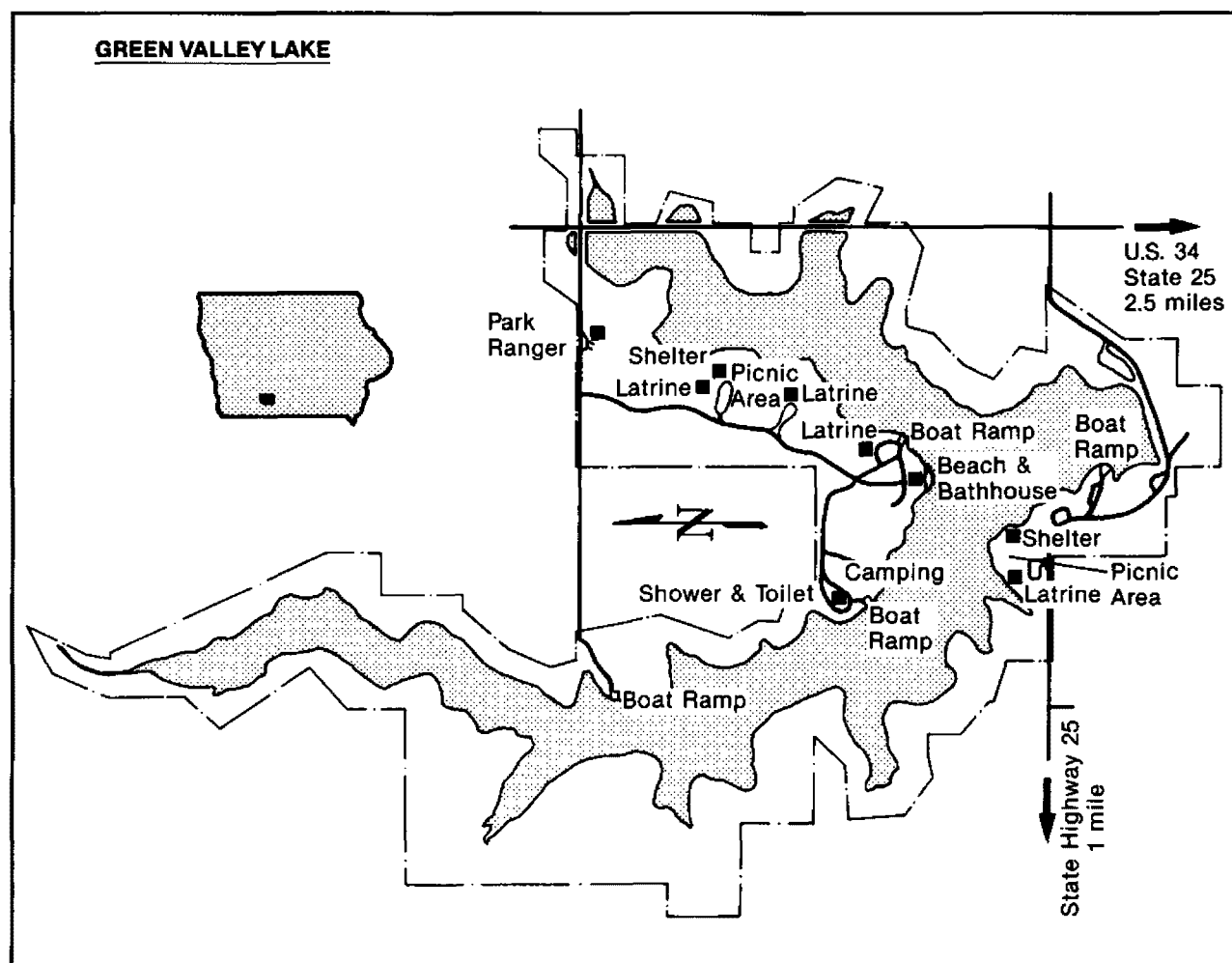
The Iowa Department of Natural Resources used \$368,484 of a Clean Lakes award plus matching State and local funds to implement a two-part program to reduce the amount of eroded soil and associated nutrients entering the lake.

With the cooperation of the Union County Soil Conservation District and funds from the Iowa Department of Agriculture and Land Stewardship and the U.S. Department of Agriculture, the Department first implemented best management practices

(BMPs) in the agricultural watershed surrounding the lake. Landowners paid 25 percent of the costs.

Limestone aggregate dikes were then built in the two major arms of the lake to retard flow so that sediment and nutrient loading to the lake would decline. The dikes were effective sediment and nutrient traps, and also helped retard resuspension of sediment in the upper arms of the lake.

The project decreased sediment delivery to Green Valley Lake by half. Water quality improved significantly: total phosphorus, ammonia, and organic nitrogen concentrations all decreased; chlorophyll *a* concentrations dropped fourfold; blue-green algae abundance decreased 20-fold; and fish growth rates increased. These changes brought a positive response from the public: fishing hours increased 1.5-fold, and swimming activity by nearly fivefold.



Region VIII

Seven new Clean Lakes projects began in Region VIII during Fiscal Year 1990, four of them LWQA awards to Native American Indian Tribes. As an integral component of managing 11 active projects, the Region visited project sites to verify progress. In addition, management of the Clean Lakes Program in Region VIII included the following activities:

- ☐ Conducting technical reviews and making funding recommendations for all Clean Lakes Program applications;
- ☐ Awarding financial assistance for seven new Clean Lakes Program projects and one continuing research program;
- ☐ Awarding four LWQA grants to Native American Indian Tribes;
- ☐ Managing 11 active projects to ensure that interim goals were being accomplished, time requirements met, and special grant conditions followed; and
- ☐ Visiting project sites to verify progress.

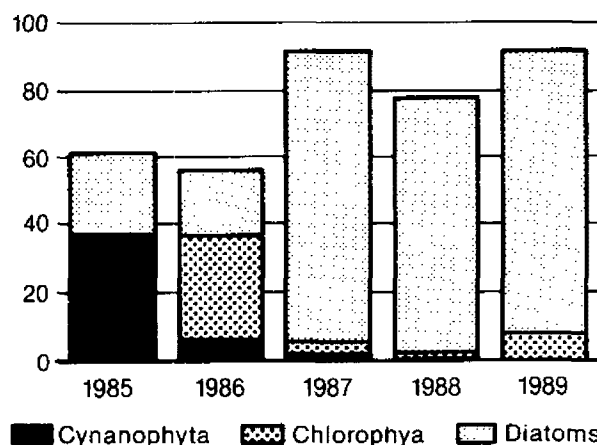
Success Story: Deer Creek Reservoir, Utah

Deer Creek Reservoir, a 2,965-acre impoundment in northern Utah, has long been an important source of hydroelectric power and drinking and irrigation water, as well as a significant recreational and wildlife area for the region. However, until recently the reservoir's water quality was adversely affected by both point and nonpoint pollution sources, resulting in algal blooms and high nutrient levels. A Phase I Clean Lakes study determined that the total annual phosphorus load needed to be reduced by 45 percent—about 11,149 kg per year—to reduce the rate of eutrophication in the reservoir.

The Phase I study identified several sources of the phosphorus: wastewater treatment facilities, dairies and feedlots, erosion, fish hatcheries, urban stormwater runoff, irrigation practices, and urban development. The dairy farmers and feedlots alone



Percent of Sum Important Species Index by Group in Deer Creek Net Plankton.



were contributing about 3,000 kg per year, and were targeted for Phase II Clean Lakes assistance awarded in 1985.

The Phase II program funding enabled the dairy farmers to institute best management practices such as piping open ditches and streams through corrals and pastures, installing off-stream watering troughs, building manure bunkers to contain wastes, installing waste ponds with systems for liquid waste application, and fencing stream corridors to prevent cattle from entering the water.

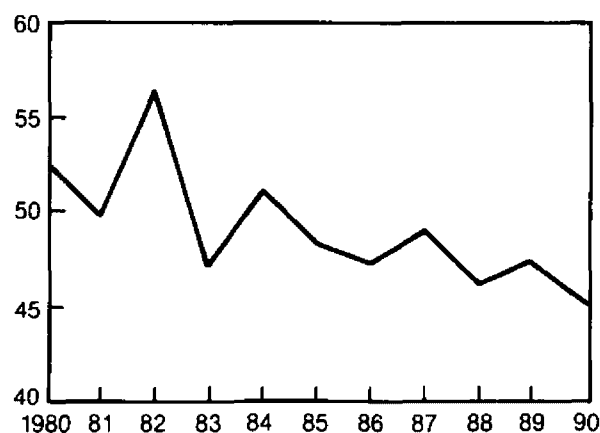
Region VIII — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Colorado	Statewide	LWQA
	Sloan Lake	Phase II
	Bear Creek Reservoir	Phase I
North Dakota	Blue-green algae	Special Study
South Dakota	Statewide	LWQA
	Big Stone Lake	Phase II
	Lake Herman	Phase II
Utah	Statewide	LWQA
	Deer Creek Reservoir	Phase II
	Scofield Reservoir	Phase II
	Pineview Reservoir	Phase I

FY 1990 Awards

		AMOUNT (\$)
Southern Ute Tribe (Colo.)	LWQA	7,200
Blackfeet Tribe (Mont.)	LWQA	36,000
Turtle Mountain Chippewa Tribe (N.Dak.)	LWQA	17,365
South Dakota	Punished Woman's Lake	Phase II 200,000
	Campbell Lake	Phase I 100,000
	Hendricks Lake	Phase I 100,000
	Swan Lake	Phase I 100,000
Utah	East Canyon Reservoir	Phase I 100,000
	Utah Lake	Phase I 100,000
	Salem Lake	Phase I 35,000
Wind River Tribe (Wyom.)	LWQA	74,936
TOTAL		\$805,501

Deer Creek Reservoir Average TSI Values.





Post-implementation loading estimates show that the Phase II project has reduced phosphorus loading to the reservoir by 1,000 kg per year. Other major phosphorus decreases have resulted from the abandonment of two wastewater treatment plants, construction of fish hatchery detention ponds, and operation of the Snake Creek Rural Clean Water Program. When additional reductions expected from the filling of a reservoir upstream from Deer Creek

are realized, the original phosphorus reduction goal of 11,149 kg per year will have been met.

In the meantime, total phosphorus concentrations in the lake have declined over the past few years, and water quality has improved significantly. Algal species composition has shifted away from blue-green dominance toward a community dominated by diatoms and green algae, which is indicative of better water quality. In addition, the overall average trophic state index has declined.

Region IX

Work with Native American Indian Tribes figured prominently in this Region's activities during Fiscal Year 1990, with the Region advising the States and Tribes on applications that resulted in two new diagnostic/feasibility studies on Indian lands. Ongoing management of the Clean Lakes Program in Region IX also included the following activities:

- ☐ Providing guidance to the States and Native American Indian Tribes in developing the Clean Lakes project applications and work programs for the fiscal year 1990 funding cycle;
- ☐ Managing five ongoing Clean Lakes projects, including site visits to several;
- ☐ Awarding financial assistance to nine new Clean Lakes projects.



● Regional Office

Region IX — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Arizona	Statewide	LWQA
	Roosevelt Lake	Phase I
	Painted Rocks Lake	Phase I
California	Statewide	LWQA
Nevada	Statewide	LWQA

FY 1990 Awards

			AMOUNT (\$)
Arizona	Rainbow Lake	Phase I	100,000
California	Clear Lake	Phase I	100,000
	Eagle Lake	Phase I	96,000
	Lake Naciminto	Phase I	76,216
	Guajome Lake	Phase I	90,000
	Big Bear Lake	Phase I	98,656
Colorado River Indian Tribes	Deer Island and Twelve Mile Lakes	Phase I	100,000
Fort Mojave Indian Tribe	Twin Lakes and Long Lake	Phase I	100,000
Nevada	Cave Rock Lake (Lake Tahoe)	Phase II	92,628
TOTAL	. . . . .		\$853,500

Success Story: Colorado River Tribes' and Fort Mojave Tribe's Clean Lakes Programs

This year, two Indian Tribes—the Colorado River and the Fort Mojave—applied for and received status as States. The EPA designation enabled the Tribe to directly receive \$200,000 for two Clean Lakes Phase I projects without having to enter into a sub-State agreement. Among the first in the program ever awarded to Native American Indian Tribes, these awards reflect EPA's Native American policy, which recognizes Tribal governments as sovereign for reservation affairs.

To further support the effort, Region IX has established a Native American work group to improve coordination among EPA offices and the Tribes. In addition, a strong outreach effort by the Water Management Division's senior staff resulted in the Tribes' involvement in the Clean Lakes Program.

The Tribes will use the awards to conduct Phase I diagnostic-feasibility studies on four lakes, all in Arizona. The Colorado River Tribes will focus on Deer Island Lake and Twelve-Mile Lake, while the Fort Mojave Tribe will concentrate on Twin and Long Lakes.



Regional Administrator Daniel W. McGovern (left) and Tribal Chairman Daniel Eddy, Jr., sign the Colorado River Tribes' historic application for State status. Photo by Jim Tiffin, Parker Pioneer, Parker, Ariz.

Region X

During fiscal year 1990, the Region X Clean Lakes Program provided financial and technical support to a wide range of projects, including activities on small community lakes as well as major interstate watersheds. Specific activities included the following:

- ☐ Approving LWQA grants for three Native American Tribes;
- ☐ Funding four new Phase I projects;
- ☐ Managing 19 ongoing Clean Lakes projects and closing out one project;
- ☐ Managing a study of a large watershed extending over three States, with the Lake Pend Oreille Clean Lakes project in Idaho at its center;
- ☐ Co-sponsoring the fourth annual Washington State Lake Protection Association Conference in Spokane;



★ Success Story
● Regional Office

- ☐ Requiring that a total maximum daily load/wasteload allocation be submitted to EPA upon completion of all new Phase I projects;
- ☐ Visiting four Clean Lakes projects; and
- ☐ Managing a Phase III study on the long-term effectiveness of alum treatment.

Early in April 1990, representatives from the Departments of Ecology and Wildlife and the Water Research Center surveyed Giffin Lake's algae, which smothered the lake by June.



Region X — Active Projects

STATE	PROJECT	COOPERATIVE AGREEMENT
Idaho	Statewide	LWQA
	Lake Pend Oreille*	Phase I
Oregon	Statewide	LWQA
	Devil's Lake	Phase II
	Sturgeon Lake	Phase II
Washington	Statewide	LWQA
	Lake Fenwick	Phase I
	Giffin Lake	Phase I
	Green Lake	Phase II
	Moses Lake	Phase II
	Pine Lake	Phase II

* section 525 project

FY 1990 Awards

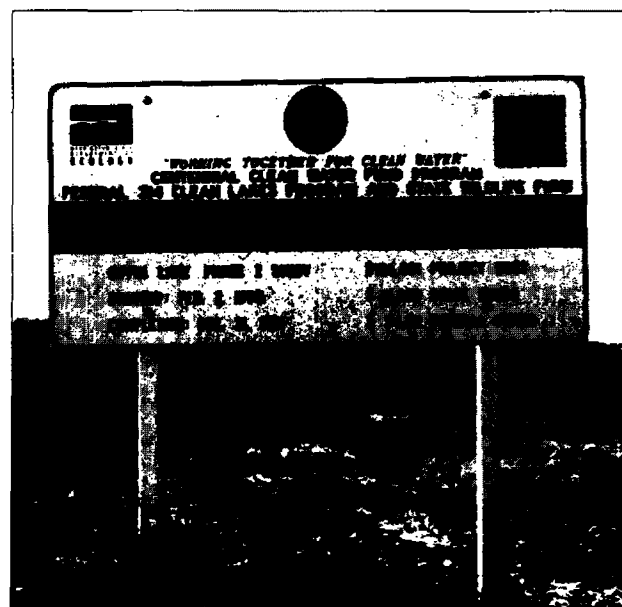
			AMOUNT (\$)
Idaho	Winchester Lake	Phase II	167,212
	Cocolalla Lake	Phase I	56,424
	Crystal Springs	Phase II	45,000
Nez Perce Tribe (Idaho)		LWQA	50,735
Coeur d'Alene Tribe (Idaho)		LWQA	90,000
Oregon	Devils Lake	Phase II	104,127
	Sturgeon Lake	Phase II	30,137
	Klamath Tribe	LWQA	61,360
Washington	American Lake	Phase I	100,000
	Washington Lakes	Phase III	125,000
TOTAL			\$829,635

Success Story: Giffin Lake, Washington

Giffin Lake is a prime fishing, naturalist, and waterfowl area in south central Washington. The lake is popular with senior citizens and the disabled because of its easy access, and with bird watchers because it is adjacent to a State wildlife refuge.

In addition, dairy and croplands are an important part of the watershed. With so many users and visitors, it is no surprise that as weeds grew on the lake, so did the volume of complaints to the Washington Department of Wildlife.

In the past, short-term or piecemeal solutions, such as herbicides, had been used to control the weeds. But as the situation grew more complex and the complaints more numerous, the Depart-



ment of Wildlife decided to use the comprehensive approach of the EPA Clean Lakes Program.

The Department of Wildlife realized that the challenging diversity of the lake's users represented an opportunity. The Department turned their complaints into action by including the diverse lake interests in an advisory committee that includes representatives from the South Yakima Conservation District, the Yakima Farm Bureau, Drainage Improvement District #12, the Mid-Co-

lumbia Walleye Club, Audubon Society, Washington State Water Research Center, Yakima County Senior Information and Assistance Program, and the Washington Department of Ecology.

Although the Giffin Lake Phase I study is only a year old, EPA and the Department of Wildlife are optimistic about its prospects for success because this Clean Lakes project addresses the social as well as the biological complexities of the Giffin Lake community.

U.S. ENVIRONMENTAL PROTECTION AGENCY
Regional Clean Lakes Coordinators

Region I

CT, ME, MA, NH, RI, VT

Warren Howard

Water Management Division
U.S. EPA - Region I
Room 2103
John F. Kennedy Federal Building
Boston, MA 02203
Tel: (617) 835-3515
Fax: (617) 835-4940

Region II

NJ, NY, PR, VI

Terry Faber (2WM-WSP)

U.S. EPA - Region II
Room 805
26 Federal Plaza
New York, NY 10278
Tel: (212) 264-8708
Fax: (212) 264-2194/8100

Region III

DE, DC, MD, PA, VA, WV

Hank Zygmunt (3WM10)

U.S. EPA - Region III
841 Chestnut Street
Philadelphia, PA 19107
Tel: (215) 597-3429
Fax: (215) 597-3359

Region IV

AL, FL, GA, KY, MS, NC, SC, TN

Howard Marshall

U.S. EPA - Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365
Tel: (404) 257-1040
Fax: (404) 347-3269

Region V

IL, IN, MI, MN, OH, WI

Tom Davenport (5WQS-TUB)

(Don Roberts)
U.S. EPA - Region V
230 South Dearborn Street
Chicago, IL 60604
Tel: (312) 886-0209
Fax: (312) 886-1420

Region VI

AR, LA, NM, OK, TX

Mike Bira (6W-QS)

U.S. EPA - Region VI
1445 Ross Avenue, 12th Floor
Dallas, TX 75202-2733
Tel: (214) 655-7140
Fax: (214) 655-6490

Region VII

IA, KS, MO, NE

Donna Sefton

Water Management Division
U.S. EPA - Region VII
726 Minnesota Avenue
Kansas City, KS 66101
Tel: (913) 551-7500
Fax: (913) 551-7765

Region VIII

CO, MT, ND, SD, UT, WY

David Rathke (8WM-WQ)

U.S. EPA - Region VIII
999 18th Street
Denver, CO 80202-2405
Tel: (303) 330-1574
Fax: (303) 330-1647

Region IX

AS, AZ, CA, GU, HI, MP, NV, TT

Wendell Smith (W-3)

U.S. EPA - Region IX
75 Hawthorne Street
San Francisco, CA 94105
Tel: (415) 744-2018
Fax: (415) 484-1078

Region X

AK, ID, OR, WA

Judith Leckrone (WD-139)

U.S. EPA Region X
1200 Sixth Avenue
Seattle, WA 98101
Tel: (206) 339-6911
Fax: (206) 339-0165/0139



1000 Connecticut Avenue, N.W.
Suite 802
Washington, DC 20036
(202) 833-8317
Fax: (202) 466-8554