

GB
1625
.18
A87
1989



General Assembly of Iowa ●
Park and Recreation Enhancement Study Committee ●
Legislative Service Bureau ●

PART I

Assessment of Iowa's Artificial and Natural Lakes

DECEMBER 1989

CONSULTANT

T D-89
IA. Alcov

GBA

GEORGE BUTLER ASSOCIATES, INC.
Engineers / Architects / Landscape Architects / Planners

**ASSESSMENT OF IOWA'S
ARTIFICIAL AND NATURAL LAKES**

Part I Report

**Prepared Pursuant to
a Legislative Council Study Request**

PARK AND RECREATION ENHANCEMENT STUDY COMMITTEE MEMBERS:

Co-chairs: Senator James R. Riordan
Representative Dennis H. Black

Senate Members: Emil J. Husak
Kenneth D Scott
Wilmer Rensink
Norman J. Goodwin

House Members: David Schrader
Josephine Gruhn
Wendell C. Pellett
Phil Tyrrell

Assistance and coordination provided by the Legislative Service Bureau.

STUDY CONSULTANT:

George Butler Associates, Inc.
Suite 200
2055 Ironwood Court
P.O. Box 1520
Ames, Iowa 50010
515/292-1520
Project Manager: David L. Dahlquist, Firm Associate

Subconsultant services provided by:
Dr. Robert Robertson

This report accepted by the Study Committee on November 29, 1989.

CONTENTS

SUMMARY REPORT	1
OBSERVATIONS RESULTING FROM THE PART I STUDY EFFORT	A-1
RECOMMENDATIONS FOR FUTURE ACTION	B-1
SCOPE OF LAKES ASSESSMENT--PART I	C-1
REVIEW OF STATE AND FEDERAL LAKE PROGRAMS	D-1
REVIEW OF SURFACE WATER PROGRAMS FOR SELECTED STATES ...	E-1
APPENDIX	
REFERENCES REVIEWED	AA-1
EPA PRIORITY WATER-RELATED DATA SYSTEMS	AB-1

ASSESSMENT OF IOWA'S ARTIFICIAL AND NATURAL LAKES

SUMMARY REPORT--PART I

Lakes are important to Iowa. Our 236 lakes and 47,700 ponds provide many economic and social benefits. Numerous lakes provide drinking water supply for thousands of Iowa residents. Lake-based recreation activities--fishing, swimming, boating and others--provide millions of visitor days of recreation for Iowans and state visitors. Furthermore, lakes provide flood control and cooling water, enhanced property values, fish and wildlife habitat, and valuable ecological and aesthetic resources.

Since lakes serve so many diverse needs and opportunities, they are also economically significant. Clearly economic growth in Iowa is dependent on the supply of good quality water, and the public uses and benefits of Iowa's water resources is heavily dependent upon lakes.

In many ways, Iowa excels in protecting and managing its water resources and lakes. Recent legislative initiatives in the area of ground water protection; resource enhancement and protection funding; and the aggressiveness of the Iowa Department of Natural Resources in securing federal funding for new fishing lakes, implementing Clean Lakes projects, and conducting numerous fish surveys and stocking programs in public lakes all point to the increasing importance which lakes hold for Iowa's future.

However, Iowa's lakes are still in trouble: 45 percent of lake acreage assessed by the Iowa Environmental Protection Agency in 1985 had uses that were moderately to severely impaired from nuisance growth of aquatic weeds and algae, turbidity, sedimentation, and/or toxicants. An additional 39 percent of the state's total lake acreage was considered threatened. More recent data suggest that siltation is getting even worse.

Recognizing the importance of Iowa's lakes, the Legislative Council in 1989 appointed the Park and Recreation Enhancement Study Committee to assess current and future needs for artificial and natural lakes. After a review of the information gathered by its consultant, George Butler Associates of Ames, the Committee concluded that:

- **The planning and management of Iowa's artificial and natural lakes are governed by a varied set of federal and state mandates that are constantly evolving. An equally wide variety of funding sources have been used to finance lake restoration and the construction of new lakes.**
- **The planning and management activities for Iowa lakes (as well as the data**

bases that support these activities) are not widely known by professionals and are even less well understood by interest groups and the general public.

- Comprehensive, long range, statewide policies for the restoration and management of existing lakes and the construction of new lakes need to be strengthened and more clearly defined. The Legislature needs to establish goals and objectives for the formulation of these policies by the Department of Natural Resources and the Department of Agriculture and Land Stewardship.
- Additional funding will be needed to protect and enhance existing lakes, as well as to plan and construct new lakes.
- Generally, informed individuals suggest there are numerous reasons to support the creation of new lakes in Iowa. Two assurances which many people believe must be demonstrated prior to the construction of any new lakes are that water quality can be sustained and that new lakes will be long living. These perceptions can be translated to mean a need to protect the relatively high financial investment associated with the construction and long term management of lakes.
- Improvements need to be made to the process for selecting sites and planning new lakes to more fully consider tourism, water supply and use, natural areas protection and management, public input and other important factors.

The Committee's recommendations for future action include:

- Increase the awareness and support of policy-makers, professionals, and the general public for Iowa lake restoration, management and construction projects.
- Explore alternatives for implementing protection and management techniques for state lake watersheds.
- Adopt statewide goals and objectives for construction of new lakes, rehabilitation of existing lakes, and management of all lakes.
- Incorporate objectives for state lakes in other statewide planning processes.

- **Expand state lakes data bases and improve lake management planning and decision-making processes.**
- **Stabilize and expand funding levels for state lakes programs.**

Additional information about this study and its recommendations may be obtained by contacting Thane Johnson, Legislative Service Bureau, State House, Des Moines, Iowa 50309, phone 515 281-3566; or the study consultants.

This report accepted by the Park and Recreation Enhancement Study Committee on November 29, 1989.

OBSERVATIONS RESULTING FROM THE PART I STUDY EFFORT

The work of the consultant for the Part I of the lakes study included reviewing selected literature and interviewing a limited number of individuals with professional and academic interest in the condition of lakes in Iowa. The purpose of this study is not to assess individual lake projects, but rather to examine statewide policies and programs on natural and artificial lakes.

The literature reviewed included documents provided by the Department of Natural Resources, the Department of Agriculture and Land Stewardship, and federal agencies; as well as materials obtained by the consultant from other public sources. Interviews were conducted with various state and federal agencies staff; authors of various studies and reports on lakes in Iowa and in other states; scientists, researchers and scholars; engineers; and planners with various interests in water-based recreation and water-based resource management.

The observations presented here represent the professional judgement made by the consultant based on the review of literature and interviews.

- The planning and management of Iowa's artificial and natural lakes are governed by a varied set of federal and state mandates that are constantly evolving. An equally wide variety of funding sources have been used to finance lake restoration and construction of new lakes.
- The planning and management activities for Iowa lakes (as well as the data bases that support these activities) are not widely known by professionals and are even less well understood by interest groups and the general public.
- Comprehensive, long range, statewide policies for the restoration and management of existing lakes and the construction of new lakes need to be strengthened and more clearly defined. The Legislature needs to establish goals and objectives for the formulation of these policies by the Department of Natural Resources and the Department of Agriculture and Land Stewardship.
- Additional funding will be needed to protect and enhance existing lakes, as well as to plan and construct new lakes.

- Generally, informed individuals suggest there are numerous reasons to support the creation of new lakes in Iowa. Two assurances which many people believe must be demonstrated prior to the construction of any new lakes are that water quality can be sustained and that new lakes will be long living. These perceptions can be translated to mean a need to protect the relatively high financial investment associated with the construction and long term management of lakes.
- Improvements need to be made to the process for selecting sites and planning new lakes to more fully consider tourism, water supply and use, natural areas protection and management, public input and other important factors.

OBSERVATIONS

- Lakes planning and management governed by varied and evolving federal and state mandates; improvements financed by varied funding sources

- Planning and management activities are not widely known

- Goals and objectives from the Legislature needed in order to strengthen and define statewide policies

- Additional funding needed for existing and new lakes

- To support new lakes, public needs to be assured that water quality can be sustained and that new lakes will be long living

- Site selection and planning for new lakes needs to consider tourism, water supply, natural areas protection and other important factors

RECOMMENDATIONS FOR FUTURE ACTION

Based on the observations made through the review of documented information and interviews conducted by the consultant, a series of recommendations are presented for future discussion, action, and implementation.

These recommendations are intended to supplement existing planning, management and implementation activities mandated by federal legislation and undertaken by state agencies. The purpose of these recommendations is to improve and expand, rather than to replace, current programs.

1. INCREASE THE AWARENESS AND SUPPORT OF POLICY-MAKERS, PROFESSIONALS, AND THE GENERAL PUBLIC OF IOWA LAKE RESTORATION, MANAGEMENT AND CONSTRUCTION PROJECTS

To address the apparent lack of understanding about existing planning and management activities, of lakes-related issues, and of available options, it is recommended that increased emphasis be placed on education and information programs regarding these aspects of lakes in Iowa. Options for accomplishing this recommendation include:

- a. Sponsorship of an "Iowa Lakes Symposium". This activity is recommended for implementation by the Study Committee (Part II), the Legislative Council and/or the General Assembly using a portion of the funds currently allocated for this lakes assessment. (See the end of this section for additional information on this recommendation.)
- b. Preparation and distribution of new literature and informative programs to schools, libraries and the general public regarding lake issues and programs offered by federal and state agencies.
- c. Formation of an "Iowa Lakes Management Association" to serve as a forum for the exchange of policy and technical information related to lakes. Membership would include managers of Iowa lakes and professionals with various interests in the future of lakes.
- d. Implement a Volunteer Lake Monitoring Program (VLMP) similar to those of other states.

2. **EXPLORE ALTERNATIVES FOR IMPLEMENTING PROTECTION AND MANAGEMENT TECHNIQUES FOR STATE LAKE WATERSHEDS**

The combined watershed area of the 107 publicly owned lakes evaluated in 1980 is approximately 635,000 acres or less than 2% of the land area of the state. Program alternatives should be explored to bring a greater proportion of these watersheds under acceptable soil loss levels. Additionally, other means for reducing the sediment loads of in-flows to lakes should be examined, such as sediment trapping techniques of various types. Other alternatives for protecting and managing watersheds include:

- a. Examination of the characteristics and quantity of in-flow sediments and non-point pollutants. Focus corrective programs on the most severe sources, as opposed to uniformly treating a minimum proportion of the total watershed.
- b. Alternative funding incentives for landowners.
- c. Cost sharing programs.
- d. Providing positive education programs to land owners that stress costs and benefits.
- e. Stressing implementation of various point and non-point watershed management practices.
- f. Integrating programs and measures to protect state lake watersheds (less than 2% of the state's land area) with measures to implement the state's Year 2000 Open Space Goal (10% of the state's land area).

3. **ADOPT STATEWIDE GOALS AND OBJECTIVES FOR CONSTRUCTION OF NEW LAKES, REHABILITATION OF EXISTING LAKES, AND MANAGEMENT OF ALL LAKES**

While the Iowa Code and Administrative Rules provide policy direction for some aspects of state lakes, a number of other aspects lack clear policy direction. After receiving user and citizen input and reviewing an assessment of available policy alternatives, an integrated and comprehensive policy statement should be proposed for adoption by the General Assembly. The scope of the policy should include long range goals and objectives for:

- a. protecting and enhancing existing lakes,
- b. creating new lakes, and
- c. establishing acceptable uses for stored water resources in Iowa.

Soliciting and reporting public input and preparing policy options and assessments is another activity recommended for completion. A portion of the funds currently allocated for this lakes assessment could be used for this purpose.

4. INCORPORATE OBJECTIVES FOR STATE LAKES IN OTHER STATEWIDE PLANNING PROCESSES

While not widely recognized, statewide planning directed toward meeting state and federal water quality requirements and making improved fishing opportunities is currently in place. However, a number of needs and opportunities are not being realized since planning for lake rehabilitation and creation of new lakes is not fully integrated with other issues requiring statewide planning.

Greater integration of lake planning should be included with these statewide planning programs:

- a. Incorporation of other active and passive water-based recreation opportunities
- b. Integration with regional recreational and natural resource protection planning such with the state recreation trails plan and the state open space mandates
- c. Expanded tourism development
- d. Increased water supply for municipal, rural and regional public use as well as for consumption by livestock and agricultural irrigation
- e. Overall rural economic development
- f. Others

5. EXPAND STATE LAKES DATA BASES AND IMPROVE LAKE MANAGEMENT PLANNING AND DECISION-MAKING PROCESSES

Integrating planning for lakes with planning activities for other issues, improving the quality and effectiveness of public input and developing a long range strategy for managing, protecting and developing Iowa's lakes will require a greater commitment to gather useful information and conduct ongoing planning activities. Specifically, the tasks listed below should be undertaken. (It is recognized that some of these may be programmed for implementation.)

- a. Monitoring, collecting, and reporting field data for a wide variety of water-related factors for Iowa's lakes. (Refer to the Appendix for EPA chart on Priority Water-related Data Systems.)
- b. Sampling, reporting, and incorporating the findings of lake-user and Iowa resident and non-resident attitudes, perceptions, and satisfaction levels with Iowa lakes.
- c. Increase coordination within DNR divisions and between DNR, DALs, DED and others.
- d. Prepare a comprehensive state lake management plan which specifically addresses the needs of existing lakes as well as the needs and opportunities for new lakes.
- e. Improve the public relations for aspects related to lake management, watershed protection and creation of new lakes.
- f. Prepare site-specific watershed management plans for the watersheds of each State managed lake. The purpose of each plan should be to establish watershed management practices which assure long term and reasonably high levels of water quality for each affected lake by correcting various point and non-point sources of pollution.
- g. Prepare lake-specific restoration and management plans for each State managed lake. The purpose of each plan should be to establish the in-lake management practices that assure long term and reasonably high levels of water quality for the each lake. Lake-specific management plans should be integrally linked with the watershed management plan recommendations.

6. STABILIZE AND EXPAND FUNDING LEVELS FOR STATE LAKES PROGRAMS

In order to meet the apparent needs for rehabilitation, reconstruction and creation of Iowa lakes, a significant and steady flow of funding will be needed. Activities requiring funding will include these and others:

- a. Planning and design
- b. Data base creation and maintenance
- c. Research projects
- d. Property acquisition
- e. Watershed projections of various kinds
- f. Dredging
- g. In-lake improvements for several purposes
- h. Dam and outlet construction and reconstruction
- i. Aeration projects
- j. Water quality and quantity monitoring
- k. Shoreline stabilization
- l. Support facilities including docks, fishing piers, parking lots, restrooms and others
- m. Fish re-stocking
- n. Marketing and public education
- o. Professional staff, field managers, technicians and others

An important part of preparing a statewide lake management plan would be to establish priorities of funding for the activities listed above. A schedule of funding needs should be established and updated annually to address the following:

- a. Immediate or short term needs

b. Intermediate needs

c. Long term needs

IOWA LAKES SYMPOSIUM

The Iowa Lakes Symposium would provide:

- The first opportunity for managers of lakes in Iowa to assemble and discuss areas of interest.
- A focal point for the dissemination of knowledge on Iowa lakes.
- An important first step in focusing media attention on the magnitude of the problems associated with lakes in Iowa.
- Identification of individuals and agencies with expertise to direct the protection of important water and natural resources.
- A method to identify key issues facing lake management and construction in Iowa.
- A means to get scientific issues out before the public.
- A forum for the Iowa Department of Natural Resources and the Iowa Department of the Land Stewardship and Agriculture to disseminate information on current lake management programs and projects.
- A forum for federal agencies to disseminate information on current programs and funding opportunities.
- An opportunity to "bridge gaps" within and between state and federal agencies.

Approximately 250 people would be expected to attend the conference to be held in Des Moines, in early June, 1990. The conference could be divided into a number of subject areas, such as, (1) policy and planning related issues, (2) natural resources and biological aspects, (3) economic aspects, and others. The format of the conference could be designed to allow for considerable input from individuals attending the meeting. After the presentation of papers, group discussions could be held to suggest solutions to the environmental and economic problems involved in the management and protection of Iowa's surface water resources. Each discussion group would be directed by a discussion leader and a recorder would keep records of discussions. These would be summarized and presented to those in attendance at the close of the conference.

Participants could be asked to focus on four different areas. These could include: (1) problems dealing with management of surface water resources, (2) ranking of those problems with an indication of whether problems were local or state wide, (3) which problems need immediate action, and (4) identification of ways to solve those problems.

Welcomes and Keynote Addresses

Conferees could be welcomed by the leaders of the State Legislature. Keynote speakers could include cabinet level officers of federal resource management agencies with responsibilities for the management and protection of surface water resources (e.g. Secretary of the Department of Interior or Agriculture). Speakers could address issues associated with surface water resources, the possible consequences of inadequate water management, or the trends towards greater state and local authority, and government responsibilities for the management/protection/enhancement of surface water resources.

Key Issue Sessions

The Symposium could include sessions addressing topics in the following general areas:

- Sedimentation.
- Erosion Control.
- Water Quality.
- Aquatic Habitat.
- Recreation.
- Drinking Water Supply.
- Waste Water Disposal.
- Hydropower.
- Agriculture.
- Economic Development.

New Lake Construction.

Development of Comprehensive Plan for Surface Water Resources.

Tourism.

The actual objectives and agenda of the Symposium would be developed through a planning committee which would include representatives of state and federal agencies, interest groups, the academic community, state legislators and concerned individuals. The conference would incur benefits through each stage of the symposium planning process.

RECOMMENDATIONS FOR FUTURE ACTION

- 1. Increase the awareness and support of policy-makers, professionals, and the general public for Iowa lake restoration, management and construction projects**
- 2. Explore alternatives for implementing protection and management techniques for state lake watersheds**
- 3. Adopt statewide goals and objectives for construction of new lakes, rehabilitation of existing lakes, and management of all lakes**
- 4. Incorporate objectives for state lakes in other statewide planning processes**
- 5. Expand state lakes data bases and improve lake management planning and decision-making processes**
- 6. Stabilize and expand funding levels for state lakes programs**

SCOPE OF THE LAKES ASSESSMENT -- PART I

STUDY MANDATE AND BACKGROUND

The assessment of Iowa's artificial and natural lakes was requested by the Legislative Council in response to legislative deliberations and actions during the 1989 session of the General Assembly.

The Legislative Council appointed the Park and Recreation Enhancement Study Committee (membership list presented on the following page) to study current and future needs for artificial and natural lakes, state parks, forests, and recreational areas in Iowa and make recommendations on the development of new facilities and restoration and management of existing facilities.

The Study Committee divided the lakes assessment effort into two parts. For Part I, the Study Committee directed the consultant to collect information from various sources and report findings to the Study Committee. The Study Committee would then determine the need for and scope of further assessment work.

From the Part I work, recommendations for completing further assessment of lakes were made, including sponsoring a seminar or conference on issues related to the management of existing lakes and creation of new lakes in Iowa.

The Study Committee's mandate is to complete the entire lake assessment by January, 1990. One hundred thousand dollars is allocated for the completion of the lakes assessment. The contract for consultant services to complete Part I is not to exceed twenty-two thousand dollars.

For Part I, the consultant services contract was approved on September 22, 1989 and work began in early October. Work of the consultant on Part I was completed on December 1, 1989.

STUDY CONSULTANT:

George Butler Associates, Inc.
Suite 200
2055 Ironwood Court
P.O. Box 1520
Ames, Iowa 50010
515/292-1520
Project Manager: David L. Dahlquist, Firm Associate

Subconsultant services provided by:
Dr. Robert Robertson

PARK AND RECREATION ENHANCEMENT STUDY COMMITTEE

Study Committee Co-Chairs

Senator James R. Riordan
P.O. Box 11
Waukee, Iowa 50263
H - 515/224-9894
O - 515/223-1000

Representative Dennis H. Black
R.R. 1, Box 77
Grinnell, Iowa 50112
H - 515/527-3172
O - 515/792-9780

Study Committee Members

Senator Emil J. Husak
R.R. 2
Toledo, Iowa 52342
H - 515/484-2158

Representative David Schrader
R.R. 2
Monroe, Iowa 50170
H - 515/259-2882

Senator Kenneth D. Scott
R.R. 2, Box 174
Clear Lake, Iowa 50428
O - 515/357-3439

Representative Josephine Gruhn
R.R. Box 7347
Spirit Lake, Iowa 51360
H - 712/336-1120

Senator Wilmer Rensink
R.R. 1, Box 81
Sioux Center, Iowa 51250
H - 712/722-4010

Representative Wendell C. Pellett
206 E. 21st Street
Atlantic, Iowa 50022
H - 712/243-2834

Senator Norman J. Goodwin
1219 - 4th Avenue
DeWitt, Iowa 52742
H - 319/659-5652

Representative Phil Tyrrell
222 N. Mill, Box 159
North English, Iowa 52316
H - 319/664-3075
O - 319/664-3161

REVIEW OF STATE AND FEDERAL LAKE PROGRAMS

A. State Water Quality Programs:

1. Publicly Owned Lakes Program (Iowa Financial Incentive Program):

The Publicly Owned Lakes Program (POLP) is administered by the Department of Agriculture and Land Stewardship's Soil Conservation Division. The POLP is used to cost-share up to 75 percent of the approved cost of permanent soil conservation practices installed in watersheds above publicly owned lakes and reservoirs. These lakes and reservoirs are identified on a priority list established annually by the Department of Natural Resources.

Up to 10 percent of the State's total cost-share appropriation may be used for the Publicly Owned Lakes Program with the State Soil Conservation Committee annually determining the amount allocated to this program. The Division of Soil Conservation gives first priority to projects where a commitment has been made to use state cost-share dollars to match other public funds.

In Fiscal Year 1989, \$323,498 (FY 1990 \$339,439) was available to fund the program. For the past five years, the number of watersheds receiving funding has been limited so that approximately \$30,000 per year is available for each. Watershed projects currently receiving funding are the areas below:

Union Grove Lake	Black Hawk Lake
Lake Ahquabi	Lake Darling
Lake Geode	Hawthorn Lake
Lake of the Hills	Lake Icaria
Rock Creek Lake	Volga Lake
Red Haw Lake	

2. Water Protection Projects:

The Iowa State Legislature adopted House File 2381 in 1988. This legislation established a state water protection fund and authorized soil and water conservation districts to carry out projects to protect surface and ground waters from point and non-point sources of pollution. HF 2381 assigned overall responsibility for the administration of the program and its funds to the Department of Agriculture and Land Stewardship, Division of Soil Conservation. For the first year of this program, the Legislature funded the program with \$500,000 of lottery revenues. HF 2381 allows these funds to be used for a variety of purposes, including administrative, operational, and personnel support to projects, as well as for the structural and management measures being used in the

project. Since this is a relatively new program, complete documentation of the projects funded were not readily available. However, the division expects to work closely with the Department of Natural Resources and with other state and federal resource agencies in selecting projects to be funded.

B. Federal Water Quality Programs:

1. Clean Water Act - Section 208:

Requires states to develop comprehensive water quality management programs. Statewide, Section 208 planning activities were conducted by the Department of Environmental Quality (now the Environmental Protection Division with the Department of Natural Resources), and agricultural non-point pollution programs were conducted by the Department of Soil Conservation (now the Iowa Department of Agriculture and Land Stewardship). In addition, two regional planning agencies, Rathbun 208 and Des Moines 208, were designated to conduct more detailed planning for their respective areas. These planning activities resulted in the development of the 1979 Iowa State Wide Water Quality Management Plan.

2. Rural Clean Water Program:

The Clean Water Act of 1977 established the Rural Clean Water Program (RCWP). Funds for the Rural Clean Water Program were not made available until the 1980 Agriculture Appropriations Act provided \$50 million in FY 1980. The purpose of RCWP is to provide financial assistance to landowners for installing Best Management Practices (BMPs) to control excess discharge of agricultural chemicals and animal wastes into streams or impoundments and thus improve water quality. The program is administered primarily by the Agricultural Stabilization & Conservation Service (ASCS) with project selection and allocation to states taking place at the national level. State ASCS offices transfer funds to county ASCS offices where landowners enter into contracts for 3 to 10 years. SCS works with landowners to develop long term contracts and provides technical assistance to implement BMPs as contained in each contract. The contracts establish the installation of specific BMPs and the cost-share rate (ordinarily 75 percent for installation of practices). Up to 100 percent of cost is available from RCWP for technical assistance. The national coordinating committee (NCC) assists ASCS in administration of the program and includes a USDA representative and an EPA representative. The regulations require that water quality concerns for a potential project be identified through the state's water quality planning process. In selecting target projects the NCC takes the following things into account:

- severity of the non-point pollution problem;

- potential public benefits associated with the project;
- feasibility of controlling the problem within the life of the project;
- suitability of the project in testing programs, policies, and procedures for control of non-point sources;
- state and local participation in the project; and
- project's contribution to meeting national water quality goals.

The RCWP funded the Prairie Rose Lake Project at \$596,000 for ten years. It is one of 21 projects initiated nationwide in 1980 and is still active. No other RCWP projects have been funded in Iowa.

3. Clean Lakes Program:

Section 314 of the Clean Water Act, established the Clean Lakes Program (CLP). The CLP provides financial assistance for research and implementation projects aimed at controlling pollution of publicly owned freshwater lakes for the purpose of improving water quality in degraded lakes. The program is administered at the federal level by the Environmental Protection Agency (Region 7 in Kansas City, Kansas). The regional clean water coordinator selects projects and determines awards for states. In Iowa the Department of Natural Resources (DNR) administers the program and may contract with firms or other agencies to conduct lake pollution studies or to carry out lake protection and restoration projects (DNR selects lake projects based on the 1980 Baachman study). Funds for implementing soil conservation practices to control non-point pollution programs are channeled through the Department of Agriculture and Land Stewardship, Division of Soil Conservation to county soil and water conservation districts for cost-sharing with landowners.

The Clean Lakes Program offers financial assistance to States through four types of cooperative agreements:

- 1) Lake Water Quality Assessments. The Clean Lakes Program requires each state to provide a list of threatened or impaired lakes within its boundaries. The states must rank these lakes based upon the severity of their pollution problems to ensure that severely degraded lakes are reviewed and considered for restoration activities and grant awards.

The Federal Government is authorized to provide financial assistance to states for up to 50 percent of the cost of completing the assessment; however, no more than \$50,000 per year can be awarded to any state for its study.

The Iowa DNR received \$95,500 in FY 1989 to complete a lake assessment project for 23 publicly owned lakes.

- 2) Diagnostic/Feasibility Study. Once the list of the threatened or impaired lakes has been completed (by DNR) and approved (by US EPA), the Clean Lake Program may fund a more comprehensive study of specific lakes in order to determine the causes and extent of pollution, to evaluate possible solutions, and to recommend the most feasible and cost-effective method for restoring and protecting water quality.

The Federal grant may award up to 70 percent of the costs of the study; however, no more than \$100,000 will be awarded for any one study.

Black Hawk Lake	- Federal Grant - \$23,658 - Completed 1983
Swan Lake	- Federal Grant - \$17,708 - Completed 1979
Union Grove Lake	- Federal Grant - \$23,658 - Completed 1983
Iowa Lake	- Federal Grant - \$10,600 - Completed 1989
Upper/Lower Pine	- Federal Grant - \$36,032 - On-Going
Little Wall Lake	- Federal Grant - \$23,658 - On-Going

- 3) Implementation. Funds awarded can be used for actual restoration work in the lake as well as for implementation of management practices in the watershed. Implementation projects require a non-federal match of 50 percent.

Black Hawk Lake	- Federal Grant - \$994,965 - On-going
Blue Lake	- Federal Grant - \$563,400 - Comp. 1982
Green Valley Lake	- Federal Grant - \$569,500 - Comp. 1987
Lenox Lake	- Federal Grant - \$100,000 - Comp. 1979
Manawa Lake	- Federal Grant - \$2,061,000 - On-Going
Oelwein Lake	- Federal Grant - \$59,490 - Comp. 1988
Swan Lake	- Federal Grant - \$300,750 - Comp. 1987
Union Grove Lake	- Federal Grant - \$894,494 - On-Going
Ahquabi Lake	- Federal Grant - \$160,500 - On-Going

- 4) Post-Implementation Monitoring. The Clean Lakes Program will fund studies to evaluate the long-term effectiveness of various restoration techniques and technologies. Funding assistance of up to \$125,000 will be available for each study; however, a 30 percent non-federal match will be required.

Black Hawk Lake - Federal Grant - \$36,000 - On-Going
Green Valley Lake - Federal Grant - \$10,806 - On-Going

In Iowa the early projects consisted primarily of dredging to extend lake life with little regard to prevent the cause of the problem. The early years of the Clean Lakes Program did not emphasize control of non-point source pollution; however, Iowa became one of the first states to include non-point pollution control efforts. For example:

Swan Lake - included watershed diversion, fish renovation and restocking, supplemental water supply, lake aeration, lake excavation and jetty construction.

Union Grove Lake - included land acquisition, dredging, construction of sediment basin and water quality monitoring.

Blue Lake - included dredging, dike construction, construction of a retention basin and a well and pump house.

Lake Manawa - included a supplemental water supply, dike excavation, dredging and shoreline protection.

4. Clean Water Act of 1987 - Sections 205 (j) (5) and 319

The Clean Water Act of 1987 added Section 319 - Non-point Source Management Programs as a requirement for individual states to complete an assessment of non-point source pollution problems in the states' surface waters and groundwater, and to develop a management plan to address non-point source problems identified in the assessment report. Section 205 (j)(5) provided funds to assist states in assessing non-point pollution problems and for the development of a comprehensive management plan.

Section 314 (h) established a funding program to provide financial assistance that could be applied toward enforcement activities, technical assistance, education, technology transfer, monitoring and evaluation for the purpose of implementation of the state's non-point source program. As part of the state's ongoing water quality planning activities, pursuant to efforts initiated by Section 208, Iowa has adequate data and assessments available for some water bodies, particularly lakes, that are ready for development of 319 projects.

C. Federal Soil Conservation Program:

1. Watershed Protection and Flood Prevention Act (PL-566):

The Watershed Protection and Flood Prevention Act was enacted in 1954 to provide technical and financial assistance for project development and implementation which protects and develops land and water resources. The program is administered by the Soil Conservation Service, which allocates funds for plan development and implementation of individual projects. The administration of the individual projects is carried out by the local Soil and Water Conservation Districts or the county board of supervisors.

Projects are limited to watersheds less than 25,000 acres in size and may include such purposes as flood control, water quality improvement, recreation development, fish and wildlife developments, rural water supply, and erosion control. These projects also provide the opportunity for local communities to include municipal and industrial water supply in selected reservoir sites. For example these funds have been for projects in the following watersheds: Walter Creek, Twelve Mile Creek, and Little Creek.

Construction cost share incentives for the purposes listed below are:

- flood control	100 %
- water quality improvement	65 %
- recreation development	50 %
- fish and wildlife development	50 %
- rural water supply	50 %
- erosion control	65 %

PL - 566 funds cannot be used to purchase land rights for operation, maintenance, and replacement of established projects, except that such funds may be used to cost share up to 50 percent of the land rights for the purpose of fish and wildlife and recreation developments.

Iowa has made good use of PL-566 funds:

- 32 projects completed
- 22 projects in progress
- 16 in various stages of application or planning

A majority of the projects have been developed in western and southern Iowa where a well developed topography results in higher potential erosion rates and flooding.

2. Resource Conservation and Development (RC&D):

The Resource Conservation and Development Program was established by Section 102 of the Food and Agriculture Act of 1962 and given permanent authorization in the Food and Agriculture Act of 1982. RC&D is administered by the Soil Conservation Service at the national and state levels. At the local level each RC&D project is administered by a steering committee appointed by local sponsors of the RC&D area (typically county board of supervisors and county soil conservation districts).

The specific goals of the projects originate at the local level but they must be consistent with long-range activities for resource conservation and development in rural areas. Land-based problems such as flood control, soil erosion, fish and wildlife habitat, agricultural water resources and community facilities or local unemployment are examples of RC&D project targets.

Cost share incentives for RC&D construction projects are as follows:

- flood control	100 %
- agricultural water resource management	50 %
- recreation developments	50 %
- fish and wildlife developments	50 %
- land purchase for recreation or F/W dev.	50 %

Iowa has 6 RC&D areas (a total of 34 counties are included):

- Northeast Iowa has conducted woodland and pasture improvements and constructed a grade stabilization structure to protect a stream passing through a 130-acre park.
- Southern Iowa has assisted in flood prevention above Creston and in land modification to limit flooding and pollution in the area.
- Chariton Valley has been very active in completing the Lake Rathbun fish hatchery and in protecting both the City of Chariton's water supply and Lake Morris, from sedimentation impacts.
- Golden Hills used funds to implement non-point controls in the watershed of Arrowhead Lake in Pottawattamie County.
- Geode Wonderland
- Pathfinder

3. Little Sioux Flood Prevention Project:

The Little Sioux Flood Prevention program was authorized by the Flood Control Act of 1944 and has current program authority extending to 1992. The area includes 4,500 square miles (2,880,000 acres) extending from Nobles and Jackson counties in southwestern Minnesota southward some 135 miles to its point of confluence with the Missouri River (approximately halfway between Sioux City, Iowa and Omaha, Nebraska).

The program is administered by the Soil Conservation Service which provides allocations of funds for plan development and implementation of individual projects. The Little Sioux Works Committee, made up of commissioners and supervisors within the participating counties makes decisions regarding the priorities for planning and implementation. Individual project administration is carried out by local sponsors, which normally includes the soil and water conservation district plus the county board of supervisors.

Projects are not limited in size and include all types of erosion control plus flood prevention. Individual requests for fish and wildlife developments, recreation developments and municipal and industrial water supply may be considered and added as plan modifications that are not included in the original act. Local sponsors are responsible for the acquisition of landright and operation, maintenance, and replacement.

Financial incentives for RC&D construction projects are as follows:

- flood prevention	100 %
- conservation practices	75 %
- recreation developments	75 %
- water supply	75 %

Public Law 534 funds have been used extensively in Iowa:

- 82 projects completed
- 18 in progress
- 24 currently being planned

D. State Fish\Wildlife and Recreation Enhancement Programs:

1. Iowa Department of Natural Resources Lake Capital Improvement Program.

This program is established to improve access to Iowa's water resources. The primary funding mechanism for this program is the Iowa Marine Fuel Tax.

Fiscal Year 1988/1989

Meadow Lake	Boat Ramp and Jetty Construction	-----
Clear Lake	Winter Aeration/Airline Replacement	\$19,440
Beaver Lake	Dam Construction	-----
Prairie Lake	Boat Ramp Construction	\$20,400
Spirit Lake	Boat Ramp Construction	\$49,570
Rock Creek Lake	Boat Ramp & Parking Lot	\$62,725
Lake McBride	Fishing Jetties	\$25,460
Lake McBride	Boat Ramp Replaced	\$9,400
Pleasant Creek	Shore and Jetty Rip Rapped	\$19,545
Viking Lake	Boat Ramp Replaced	\$13,250
Black Hawk Lake	Two Boat Ramps	\$39,665

Fiscal Year 1987/1988

Lake Icaria	Silt Basins, jetties, piers, boat ramps dam/jetty repair	\$505,380
Storm Lake	Jetty Repair	\$22,280
Beaver Lake	Consultant Study	\$21,340
Springbrook Lake	Jetties	\$25,920
Crystal Lake	Boat Ramp	\$29,890
Pine Lake	Consultant Study	\$19,985
Silver Lake	Boat Ramp	\$16,880
Union Grove Lake	Site Preparation	\$46,870
	Dredging	\$232,505
	Sediment Basin	\$137,815

Fiscal Year 1986/1987

Rathbun Lake	Boat Ramp	\$74,200
Spirit Lake	Fishing Pier	\$115,765
West Okobogi	Boat Ramps	\$25,830
Lower Pine Lake	Boat Ramp	\$41,430
Upper Pine Lake	Jetties	\$31,650
Lake Pahoja	Aeration System	\$23,465
Big Creek Lake	Jetties	\$77,155
Lake Manawa	Boat Ramps	\$10,680

Blackhawk Pits	Boat Ramps	\$16,915
Arrowhead Lake	Boat Ramps	\$20,035
Green Valley Lake	Two Boat Ramps	\$13,752
Twelve Mile Lake	Boat Ramp	\$223,005

Fiscal Year 1985/1986

Mormon Trail Pond	Jetties	\$14,600
Swan Lake	Boat Ramp	\$20,735
Swan Lake	Water Well	\$31,775
Clear Lake	Aeration System	\$110,895
Trumbull Lake	Boat Ramp	\$42,860
Little River Lake	Sediment Basin	100,055
Diamond Lake	Boat Ramp	\$13,325
East Okoboji Lake	Boat Ramp	\$17,670
Swan Lake	Boat Ramp	\$15,600
Little Wall Lake	Shoreline Protection	\$27,790
Crystal Lake	Aeration System	\$23,355
Viking Lake	Boat Ramp	\$19,375
Five Island Lake	Two Boat Ramps	\$25,010
Green Valley Lake	Sediment Dike and Jetties	\$253,023
Morse Lake	Boat Ramp	\$16,695
Lake Cornelia	Fishing Jetty	\$21,975
State Lake Feasibility Study		\$52,500

Fiscal Year 1984/1985

Swan Lake	Test Water Well	\$3,595
Swan Lake	Aeration System	\$23,425
Clear Lake	Boat Ramp	\$7,730
Spirit Lake	Boat Ramp	\$18,470
Minnewahta Lake	Boat Ramp	\$7,170
Ingham Lake	Shoreline Rip Rap	\$7,890
Ingham Lake	Aeration System	\$30,310
Swan Lake	Boat Ramp	\$20,095
Big Creek Lake	Boat Ramp Repair	\$7,400
Silver Lake	Aeration System	\$23,195

E. Federal Fish and Wildlife Enhancement Programs

1. Dingel/Johnson with Wallop-Brough Amendment.

Federal aid is available for projects having as their purpose the restoration, conservation, management, and enhancement of sport fish, and the provision for public use and benefits from these resources (50 CFR 80.5). The funds for this program come from an excess tax on manufacturers of tackle and sporting equipment (Walnut-Brough expanded the number and types of items taxed). The monies are distributed to the states based upon the number of hunting and fishing licenses sold in each state. The federal monies require a 25 percent state match (non-federal sources).

These projects must have purposes related to:

- Protecting, developing, or improving fish habitat to sustain or enhance sport fish populations.
- Introducing fish species into suitable habitats to restore or maintain sport fish populations.
- Gathering information on the abundance, condition, or factors which affect fish populations to develop sport fish population practices.
- Overcoming or moderating biological limiting factors that affect the growth or well-being of sport fish populations.
- Gathering information on public use and demand for sport fish resources and the determination of program action to meet demand.
- Providing access or facilities for public use of sport fish resources.
- Providing information to the public on use opportunities or Federal Aid Project Areas.
- Controlling public use to protect resources or facilities and to provide for public safety on Federal Aid Projects.

A general listing of the Iowa Sport Fish Restoration projects are as follows:

<u>Sport Fish Restoration Projects (Completed 1981 -1988)</u>	<u>Federal</u>	<u>State</u>
Twelve Mile Lake Boat Ramps and Fish Structure	\$93,859	\$31,286
Five Island Lake Aeration System	\$33,185	\$11,061
Blue Lake Aeration System	\$17,636	\$5,879
Little River Lake 6 Fish Jetties and Fish Structures	\$95,000	\$23,750
Lake Icaria Boat Ramps	\$41,373	\$13,791
Silver Lake Aeration System	\$17,396	\$5,799
Ingham Lake Aeration System	\$22,734	\$7,578
Lake Feasibilities of Four Sites	\$39,375	\$13,125
Lake Cornelia Fish Jetty	\$16,483	\$5,494
Crystal Lake Aeration System	\$17,518	\$5,839
Clear Lake Aeration System	\$83,170	\$27,723
Mormon Trail Lake Fish Jetties	\$10,957	\$3,652
Decorah Hatchery Restoration	\$116,250	\$38,750
Raccoon River Fishing Riffle	\$11,321	\$3,773

	<u>Federal</u>	<u>State</u>
Big Creek Lake Fish Jetties	\$49,747	\$16,582
Lake Pahojō Aeration System	\$17,168	\$5,723
Upper Pine Lake Fishing Jetties	\$23,743	\$7,914
Spirt Lake Fishing Pier	\$84,884	\$28,295
Lake Icaria Silt Basin	\$377,990	\$125,997
Decorah Hatchery Restoration	\$1,734,849	\$578,283
 <u>Active Sport Fishery Restoration Projects</u>		
Center, Walnut Creek, Marsh and Silver Lakes Aeration Systems	\$51,230	\$17,077
MacBride, Big Creek, Spirt, Manawa and Clear Lake Fish Cleaning Facilities	\$140,250	\$46,750
Meadow, Black Hawk, Big Creek, Darling, Storm, and MacBride Lakes Jetties and Piers	\$191,881	\$63,960
Black Hawk Lake Fish Barrier	\$58,569	\$19,523
Beaver Lake Dam Construction, Fishing Jetties, Fish Structures and Roads	\$321,781	\$107,260
Des Moines River Fishing Riffle	\$23,972	\$7,991
Rathbun Reservoir Hatchery Multilevel Intake and Oxygen Injection System	\$238,781	\$79,594

Future Sport Fish Restoration Projects

Indian Creek Lake - Construction of silt basin, fish structures, fishing jetties and roads (before lake is built).

Brushy Creek Lake - partially funded, to include dam construction, and construction of fish structure, fishing jetties and roads.

Big Creek Lake - restoration, to include construction of sediment basins, jetties, shore line rip rap and fish structures.

Lake Wapello - restoration, to include silt basins, fish structures, and fishing jetties.

Twelve Mile Lake - to include shore line access development.

Continue to construct fishing jetties and piers, fish cleaning facilities, silt basin, fish barriers, and fish structures and existing lakes.

Continue to acquire land at four sites for the purpose of constructing fish lakes at each site.

Three Mile Lake - to include development and construction of roads, fishing jetties and fish structures.

REVIEW OF SURFACE WATER PROGRAMS FOR SELECTED STATES

This review of surface water programs consists of two components. The first lists agencies which are responsible for the planning and management of surface water resources for each of the 50 states. The second provides a detailed examination of six selected states.

Review of State Agency Responsibility (50 States)

This section provides a preliminary compilation of the state surface water program information. It includes two types of information:

- A listing of all agencies which were identified as being associated with some aspect of the management or administration of the identified states' surface water resources.
- A determination was made of each agency's primary responsibility for their state's surface water resources. The agencies were categorized based on their legislative or administrative mandate. Four very general types of mandates were considered:
 - 1) **Development:** This category allows for the identification of those agencies with mandates/responsibilities which include the development of surface water resources (e.g. the construction of new lakes, recreation resorts, etc.).
 - 2) **Regulatory:** This category allows for the identification of those agencies with mandates/responsibilities which include a regulatory component (e.g. responsible for setting policy or enforcing regulations related to surface water resources).
 - 3) **Data base management:** This category allows for the identification of those state agencies with mandates/responsibilities which include the development and maintenance of a data system regarding surface water resources.
 - 4) **Management:** This category allows for the identification of those state agencies with mandates/responsibilities which include the effective management of surface water resources.

It is interesting to note the number of states which have departments, divisions or offices with "Water Resources" in the agency's title. For example, the states of Idaho, Oregon, California, South Dakota and Vermont, were the only states with "Departments" of Water Resources, whereas, nearly thirty states had "Divisions", "Bureaus" or "Offices" related to water resources.

REVIEW OF STATE PROGRAMS

State	Agency Name	Development	Regulatory	Data Base	Management
Alabama	Dept. Environmental Management	no	yes	yes	yes
	Dept. Conservation and Natural Resources	yes	no	no	yes
Alaska	Dept. Environmental Conservation	some	yes	no	no
	Dept. Natural Resources	yes	no	yes	yes
Arizona	Dept. Environmental Quality	no	yes	yes	no
	Land Department	yes	no	yes	yes
	Outdoor Rec Coordinating Comm.	yes	no	no	yes
	Comm. on the Arizona Environment	no	no	no	no
Arkansas	Dept. Parks and Tourism	yes	no	yes	yes
	Dept. Pollution Control and Ecology	no	yes	yes	no
	Natural and Scenic Rivers Comm.	no	some	yes	no
California	Dept. Food and Agriculture	no	yes	yes	no
	Office of Planning and Research	yes	no	no	yes
	California Water Commission	no	no	no	no
	Dept. Parks and Recreation	yes	no	no	yes
	Dept. of Water Resources	yes	no	no	yes
Colorado	Department of Health	no	yes	yes	no
	Dept. of Natural Resources	yes	no	no	yes
Connecticut	Dept. Environmental Protection (Commissioner)	yes	yes	yes	yes
	Water Resource Unit (Director)	no	yes	yes	no
	Office State Parks and Recreation (Dir)	yes	no	yes	yes
Delaware	Dept. of Natural Resources and Env. Control	yes	yes	yes	yes
	Div. Water Resources	yes	no	yes	yes
	Div. Parks and Recreation	yes	no	no	yes
	Div. Soil and Water Conservation	yes	yes	no	yes
Florida	Dept. of Agriculture and Consumer Services	yes	yes	no	no
	Dept. of Environmental Regulation	no	yes	yes	no
	Dept. of Natural Resources	yes	no	yes	yes
	Div. Recreation and Parks	yes	yes	no	yes
	Div. of Resource Management	no	yes	no	yes
Div. of State Lands	yes	no	no	yes	
Georgia	Dept. of Natural Resources	yes	yes	yes	yes
	Environmental Protection Agency	no	yes	yes	no
	Water Protection Branch	no	yes	no	no
	Parks and Recreation Division	yes	no	no	yes
	Maintenance and Construction Sec.	yes	no	no	yes
Guam	Department of Agriculture	yes	no	yes	yes
	Environmental Protection Agency	no	yes	yes	no

State	Agency Name	Development	Regulatory	Data Base	Management
Hawaii	Dept. Land and Natural Resources	yes	yes	no	yes
	Division of Aquatic Resources	no	no	yes	yes
	Division of Resources and Enforcement	no	yes	yes	no
	Office of Environmental Quality Control	no	no	no	no
Idaho	Department of Health and Welfare	no	yes	yes	no
	Department of Parks and Recreation	yes	no	no	yes
	Department of Water Resources	yes	yes	yes	no
	State Soil Conservation Commission	no	no	no	no
Illinois	Dept. of Conservation	yes	no	yes	no
	Dept. of Natural Resources	no	yes	yes	no
	State Water Survey	no	no	yes	no
	Department of Transportation	yes	yes	yes	no
	Division of Water Resources	no	yes	yes	no
	Illinois Environmental Protection Agency	no	yes	yes	yes
	Water Pollution Control Public Water Supplies	no yes	yes no	yes yes	no no
Indiana	Department of Natural Resources	yes	yes	yes	yes
	Division of Outdoor Recreation	yes	no	yes	yes
	Division of Water Resources	no	yes	no	yes
	Division of Reservoir Management	yes	no	no	yes
	Division of Reclamation	yes	no	no	yes
	Division of Information Systems	no	no	yes	no
Department of Environmental Management	no	yes	yes	yes	
Iowa	Department of Agriculture and Land Stewardship	no	yes	yes	yes
	Department of Natural Resources	yes	yes	yes	yes
	Environmental Protection Commission	no	yes	no	yes
	Environmental Protection Division	no	yes	yes	no
	Parks, Recreation and Preserves Division Fish and Wildlife Division	yes yes	no yes	yes yes	no yes
Kansas	Joint Council on Recreation	no	no	yes	no
	Department of Wildlife and Parks	yes	yes	yes	yes
	Land Development and Management Div.	yes	no	yes	yes
	State Board of Agriculture	yes	no	yes	yes
	Division of Water Resources	yes	no	yes	yes
	State Department of Health and Environment	no	yes	no	no
	Bureau of Water Protection Water Office	no yes	yes yes	yes yes	no yes
Kentucky	Dept. of Fish and Wildlife Resources	yes	yes	yes	yes
	Dept. of Parks	yes	no	no	yes
	Environmental Quality Commission	no	yes	yes	no
	Department of Environmental Protection	no	yes	yes	yes
	Department for Natural Resources	no	yes	yes	yes
Louisiana	Dept. of Wildlife and Fisheries	yes	yes	yes	yes
	Dept. of Culture Recreation and Tourism	yes	no	no	yes
	State Soil and Water Conservation Committee	no	no	no	no
Maine	Dept. Agriculture, Food, and Rural Resources	yes	yes	yes	yes
	Dept. of Conservation	yes	yes	yes	yes
	Bureau of Parks and Recreation	yes	no	no	yes
	Dept. of Inland Fisheries and Wildlife	yes	yes	yes	yes
	Bureau of Resource Management	yes	yes	yes	yes

State	Agency Name	Development	Regulatory	Data Base	Management
Maryland	Dept. of Agriculture	no	yes	no	yes
	Dept. of Natural Resources	yes	yes	yes	yes
	Water Resource Administration	yes	no	yes	yes
	Department of the Environment	no	yes	no	yes
	Water Management Administration	no	yes	yes	yes
Massachusetts	Executive Office of Environmental Affairs	no	yes	yes	no
	Water Resources Commission	no	yes	no	no
	Dept. of Environmental Management	yes	yes	yes	yes
	Water Resources	yes	yes	yes	yes
	Dept. of Environmental Quality Engineering	yes	no	yes	yes
	Water Supply	yes	yes	yes	yes
	Water Pollution Control	no	yes	yes	yes
	Dept. Metropolitan District Commission	yes	yes	yes	yes
	Division of Watershed Management	yes	no	no	yes
Dept. of F/W and Environmental Law	no	yes	yes	no	
Michigan	Dept. of Agriculture	yes	no	yes	yes
	Dept. of Natural Resources	yes	yes	yes	yes
	Land and Water Management Division	yes	yes	yes	yes
	Surface Water Quality Division	yes	yes	yes	yes
	Water Resources Commission	no	yes	yes	no
Minnesota	Dept. of Agriculture	yes	yes	yes	yes
	Dept. of Natural Resources	yes	yes	yes	yes
	Div. of Water Resources	yes	yes	yes	yes
	Pollution Control Agency	no	yes	yes	no
Mississippi	Department of Natural Resources	yes	yes	yes	yes
	Bureau of Land and Water Resources	no	yes	yes	no
	Bureau of Recreation and Parks	yes	no	no	yes
	Bureau of Pollution Control	no	yes	yes	no
Missouri	Dept. of Conservation	yes	no	yes	yes
	Dept. of Natural Resources	yes	yes	yes	yes
	Water Pollution Control Division	no	yes	yes	no
	Division of Parks and Recreation	yes	no	yes	yes
Montana	Dept. of Fish, Wildlife and Parks	yes	yes	yes	yes
	Dept. of Natural Resources and Conservation	no	yes	no	yes
	Environmental Quality Council	no	no	no	no
	Dept. of Health and Environmental Sciences	no	yes	yes	no
Nebraska	Dept. of Environmental Control	no	yes	yes	no
	Water Quality Division	no	yes	yes	no
	Dept. of Water Resources	no	yes	yes	no
	Game and Parks Commission	yes	no	no	yes
	Natural Resources Commission	no	no	no	no
Nevada	Dept. of Conservation and Natural Resources	yes	yes	yes	yes
	Div. of Water Resources	yes	no	yes	yes
	Div. of Environmental Protection	no	yes	yes	no
	Dept. of Wildlife	yes	yes	yes	yes
	Div. of Habitat	yes	yes	yes	yes

State	Agency Name	Development	Regulatory	Data Base	Management
New Hampshire	Dept. of Environmental Services	no	yes	yes	no
	Water Supply and Pollution Control Div.	no	yes	yes	no
	Water Resources Division	no	yes	yes	no
	Dept. Resources Economic Development	yes	no	no	yes
New Jersey	Dept. of Agriculture	yes	no	yes	yes
	Division of Rural Resources	yes	no	yes	yes
	Coordinator Soil and Water Conservation	yes	no	yes	yes
	Dept. of Environmental Protection	yes	yes	yes	yes
	Division of Water Resources	no	yes	yes	no
	Division of Parks and Forestry	yes	no	no	yes
New Mexico	Green Acres and Recreation Program	no	no	yes	no
	Environmental Improvement Division	no	yes	yes	no
	Natural Resource Department	yes	no	yes	yes
	Resource Management and Development Div.	yes	no	no	yes
	Park and Recreation Division	yes	no	yes	yes
New York	Soil and Water Conservation Div.	yes	no	no	yes
	State Stream Commission	no	no	yes	yes
	Adirondack Park Agency	yes	no	no	yes
	Dept. of Environmental Conservation	yes	yes	yes	yes
	Division of Water	no	yes	yes	no
	Division of Lands and Forests	yes	no	yes	yes
	Div. of Planning and Information Systems	no	no	yes	no
	Environmental Protection Bureau	no	yes	no	yes
Office of Energy Con. and Env. Planning	no	yes	no	no	
North Carolina	Dept. Natural Resources /Community Dev.	yes	yes	yes	no
	Soil and Water Conservation Comm.	yes	no	no	yes
	Office of Water Resources	no	yes	yes	no
North Dakota	Department of Health	no	yes	yes	no
	Div. Water Supply and Pollution Control	no	yes	yes	no
	Div. Environmental Enforcement	no	yes	yes	no
	Parks and Recreation Department	yes	no	yes	yes
	Water Commission	yes	no	yes	yes
Ohio	Dept. of Natural Resources	yes	no	yes	yes
	Div. of Water	yes	no	yes	yes
	Environmental Protection Agency	no	yes	yes	no
	Div. of Water of Programs	no	yes	yes	no
	Div. of Water Quality and Monitoring	no	yes	yes	no
Oklahoma	Tourism and Recreation Dept.	yes	yes	yes	yes
	Dept. of Health	no	yes	yes	no
Oregon	Dept. of Environmental Quality	no	yes	yes	no
	Div. Water Quality	no	yes	yes	no
	Dept. of Fish and Wildlife	yes	yes	yes	yes
	Div. Habitat, Conservation and Planning	yes	yes	yes	yes
	Dept. of Transportation	yes	yes	yes	yes
	Div. Parks and Recreation	yes	yes	yes	yes
	Water Resource Department	yes	yes	yes	yes
	Water Policy Review Board	no	yes	yes	no

State	Agency Name	Development	Regulatory	Data Base	Management
Pennsylvania	Dept. of Agriculture	yes	yes	yes	yes
	Dept. of Environmental Resources	yes	yes	yes	yes
	Bureau of Water Projects	yes	no	no	yes
	Bureau of Water Resource Management	no	yes	yes	no
Rhode Island	Dept. of Environmental Management	yes	yes	yes	yes
	Div. of Water Resources	no	yes	yes	no
	Div. of Freshwater Wetlands	no	yes	yes	yes
	State Water Resources Board	no	no	no	no
South Carolina	Dept. of Health and Environmental Control	no	yes	yes	no
	Dept. of Parks, Recreation and Tourism	yes	yes	yes	yes
	State Land Resources Conservation Comm.	yes	yes	yes	yes
	Division of Sediment and Erosion Control	yes	yes	yes	yes
	Division of Dams and Reservoirs	yes	no	yes	yes
	Water Resources Commission	no	yes	yes	yes
South Dakota	Dept. of Minerals and Environment	no	yes	yes	no
	Dept. of Water and Natural Resources	no	yes	yes	yes
	Game, Fish and Parks Department	yes	no	no	yes
Tennessee	Dept. of Conservation	yes	yes	yes	yes
	Water Quality Review Board	no	yes	no	yes
Texas	Department of Health	no	yes	yes	no
	General Land Office	yes	yes	yes	yes
	Parks and Wildlife Department	yes	no	yes	yes
	Texas Water Development Board	yes	yes	yes	yes
	Water Commission	no	no	no	no
Utah	Dept. of Natural Resources	yes	yes	yes	yes
	Division of Parks and Recreation	yes	no	yes	yes
	Division of Water Resources	no	yes	yes	yes
	Division of Water Rights	no	yes	yes	yes
Vermont	Dept. Forests, Parks and Recreation	yes	no	yes	yes
	Dept. of Water Resources and Env. Eng.	no	yes	yes	yes
Virginia	Council on the Environment	no	yes	yes	no
	Dept. of Conservation and Historic Resources	yes	yes	yes	yes
	Div. of Parks and Resources	yes	no	no	yes
	Soil and Water Conservation Board	no	yes	yes	no
	Dept. of Mines Minerals and Energy	yes	yes	yes	no
	Water Control Board	no	yes	yes	no
Washington	Dept. of Ecology	no	yes	yes	no
	Dept. of Natural Resources	yes	yes	yes	yes
West Virginia	Dept. of Natural Resources	yes	yes	yes	yes
	Div. of Water Resources	yes	yes	yes	yes
	Geologic and Economic Survey	no	no	yes	no

State	Agency Name	Development	Regulatory	Data Base	Management
Wisconsin	Dept. of Natural Resources	yes	yes	no	yes
	Bureau of Water Resource Management	yes	yes	no	yes
	Water Regulation and Enforcement	no	yes	no	yes
	Geological and Natural History Survey	no	no	yes	no
Wyoming	Economic Development & Stabilization Board	yes	no	yes	yes
	Environmental Quality Board	no	yes	yes	no
	Recreation Commission	yes	no	yes	yes

Surface Water Programs of Six Selected States

1. Illinois:

Illinois has three primary agencies with responsibilities associated with the State's surface water resources: the State Survey System, the Illinois Environmental Protection Agency (a Division of the Department of Energy and Natural Resources), and the Illinois Department of Conservation (Division of Fish & Wildlife, Impoundment Program). Each of these programs are briefly summarized.

- Illinois State Survey - is administered through the Department of Energy and Natural Resources. The state surveys (Geology, Water, and Natural History) are housed at the University of Illinois Urbana-Champaign. The State Surveys are responsible for the collection and maintenance of data related to Illinois natural resources. Many of the staff have joint appointments with the University, while the Department of Energy and Natural Resources funds the position. Each of the surveys publish yearly reports on their given subject area.
- Illinois Environmental Protection Agency, Division of Water Pollution Control is charged with protecting, enhancing, and restoring the quality and usability of lake ecosystems. The Division takes an integrated, multidisciplinary approach to lake use enhancement involving watershed protection and in-lake management to mitigate past damage. The program includes:
 - Monitoring and lake classification guide to decision making. A Volunteer Lake Monitoring Program (VLMP) and an Ambient Lake Monitoring Program.
 - Development and implementation of lake/watershed management plans for public use.
 - Technical assistance and coordination to promote planning and implementation initiatives funded by other sources.

The Division also trains VLMP volunteers and assists in the development of watershed protection plans. The Division employs three full time aquatic biologists, plus regional office technicians and aquatic biologists.

- Illinois Department of Conservation, Division of Fish & Wildlife (Impoundment Program) - the program has stewardship of protecting, enhancing and insuring the wise use of aquatic resources in order to sustain quality angling for sport-fishermen. The program focuses on data collection, management techniques (including consultations with both public and private impoundment managers), and public information. Staff includes a program manager, five regional fisheries administrators, and 17 district fisheries managers.

2. Minnesota:

Minnesota has one agency with specific responsibilities for lake resources--the Minnesota Pollution Control Agency (MPCA). This agency is charged with preserving and protecting Minnesota's lakes and increasing and enhancing their public use and enjoyment. The MPCA stresses protection and management through the use of grants on specific lakes.

The key elements of the MPCA program are:

- Minnesota Clean Lakes Program: Since 1977 the MPCA has supplemented the Federal Clean Lakes Program. The MPCA feels that local leadership, control and coordination play a key role in a project's success. Most projects are initiated at the local level and a local project team is responsible for implementing the project and meeting the grant objectives. The MPCA evaluates and prioritizes grant proposals before submitting them to the US EPA. To date, 48 lakes have been involved in the program.
- Lake classification: About 1200 of Minnesota's 15,000 lakes have been classified.
- Routine monitoring: Thirty-five lakes are monitored annually for the effects of acid deposition, and about 100 are monitored for water quality.
- Citizen Lakes Monitoring Program: About 285 lakes are enrolled in this program. The MPCA has initiated a pilot program to assist lake associations in collecting and interpreting water quality data. Five associations are currently enrolled.
- Public education: MPCA staff routinely speak to interested public groups about lake protection. The handbook "Citizens Guide to Lake Protection" was drafted in conjunction with Gray Freshwater Biological Institute and is available for distribution. The report, "Tropic Status of Minnesota Lakes", provides water quality data on over 1,000 lakes.

One position administers and coordinates the MPCA lakes program.

3. Missouri:

Missouri's surface water resource program is managed by the Department of Natural Resource's Division of Environmental Quality. The program is designed to enhance the beneficial uses of Missouri's lake resources. The program serves as a clearing house for lake monitoring and management activities. The program has conducted a very limited review of the lake monitoring and management activities of 50 publicly owned lakes. The program is administered by a limnologist/aquatic biologist.

4. Kansas:

Kansas's surface water program is administered by the Department of Health and Environment's Bureau of Water Protection Division. The purpose of the program is to provide water quality information about lakes and to address public and departmental concerns. The program stresses data acquisition and investigation of individual lake problems and the assessment of generic problems such as eutrophication or non-point sources. Response to public concern is a key focus of the program. The program typically conducts the routine monitoring of 15-30 lakes per year. The program also conducts a number of special investigations. These projects are undertaken in cooperation with other state, local or federal agencies. Examples include: 1) the formation of trihalomethanes in drinking water supply reservoirs, 2) the occurrence or persistence of pesticides in drinking water reservoirs, and 3) the effects of non-point pollution sources on lake water quality. The Division also undertakes investigative surveys in response to the public's notification of observed lake problems. The program has four staff persons with biology backgrounds and 3-5 part-time technicians to assist in water quality analysis.

5. North Dakota:

North Dakota's surface water program is administered by the Department of Health's Division of Water Supply & Pollution Control. The Division maintains a Lake Restoration Program which provides matching funds for lake restoration and protection projects. The program deals with projects on natural and man-made lakes with public recreation facilities. Under the Lake Restoration Program, grants are provided for projects designed to reduce lake eutrophication through watershed and/or inlake treatments. State grants of up to 25 percent of the project's costs may be made when federal funds are available. Currently the program has \$150,000 available for two years.

6. Wisconsin:

Wisconsin's surface water program is administered by the Wisconsin Department of Natural Resources. The purpose of the program is to protect and maintain Wisconsin's lake resources for future generations; to carry out measures that protect and maintain lakes; and to strive for active coordination between the many governmental programs and personnel that work on lakes. The program guides local lake management organizations across the state in planning and carrying out a variety of lake protection measures including soil and water conservation, lake user education and advocacy for local protective regulations.

Specifically, the program includes:

- Outreach and technical assistance: The program provides day-to-day guidance to lake property owners on how to identify needs, find and interpret lake/watershed information, and evaluate management alternatives. Each year local actions are promoted on "key" lakes which need special protection.
- Self-help monitoring: Volunteers are trained to measure water clarity and lake levels. Each user volunteer receives an interpretation of their lake data and a statewide summary report. Their data provides the DNR with long term data on a larger number of lakes than it could survey.
- Education activities: In conjunction with the University of Wisconsin-Extension, the DNR provides water quality information to help lake property owners. Assistance is available through conventions, workshops, field days, and publications such as: "The Lake in Your Community", "Lake Tides", a newsletter, and "A Guide to Lake Management Law".
- Trend monitoring: Fifty representative lakes across the state are monitored for physical, chemical, biological, and watershed changes. This data is used as an evaluation tool to compare lakes statewide and to provide policy direction.
- Research and demonstration projects: The intent of this element is to develop, test, and demonstrate lake protection and management techniques which can be used by local organizations.

The program consists of six lake management coordinators in 6 DNR district offices and four staff members in the Central Office with expertise in organization/planning, engineering, limnology and hydrogeology.

TITLE	AUTHOR	DOCUMENT DATE	GENERAL TOPIC
Study of Dredging Programs, Benefits, et	Economics Research Associates	December 1974	Dredging Benefits, Costs and Effects
Fish Management Section Operations	unknown	1988	fish habitat, population, fish kill
Recreation/Tourism Survey	Grapentine Company, Inc.	November 1985	rec. activities, protection, mapping
Losing Ground	U.S. Ag. Soil Conservation	1986	Soil erosion & efforts to combat it
The Iowa 25 year Conservation Plan	J. Crane, Jr. and G. Olcott	1933	Conservation of soil, water, woods, wildlife, game
Iowa Action Plan 1990-1992	DNR	unknown	Open space, conservation, land management, parks, etc.
Land Aquisition Programs & Priorities	DNR	unknown	Divisions (fish & wild, park & rec., forests) acres etc
Iowa SCORP (Statewide Comp. Outdoor Plan)	DNR	1988	assessment of outdoor recreation resources
Iowa Open Space Plan	DNR	1988	supplement to 1988 SCORP
Clean Lakes Classification Study Iowa	Fisheries & Dept. Animal Ecology, ISU	August 27, 1980	ranking of Iowa lakes for priority cleanup
Clean Lakes Program, Black Hawk, IA	unknown	unknown	feasibility and diagnostic study
Swan Lake Restoration (Phase 1)	Bachmann, Lohnes, Bonneau	January 1, 1982	diagnostic and feasibility study 4 pollution abatement
Lake Iowa	DNR	May 1989	diagnostic and feasibility study
Union Grove Lake Restoration	Iowa Conservation Commission	January 1983	diagnostic and feasibility study
Green Valley Lake Clean Lakes Project	DNR	July 80 - June 86	six year summary of activities
Stocking List 1989	unknown	1989	fish hatchery statistics
Aeration of lakes subject to winterkill	Iowa Conservation Comm. (Fisheries Sec.)	June 15, 1982	need, objectives, benefits, impact, approach, location
Summer Aeration of Small Lakes	DNR	unknown	objectives, approach, location
Water Quality Improvement at Lake Icaria	unknown	unknown	need, objective, expected results, approach
Construction of Fish Cleaning Facilities	unknown	unknown	need, objective, expected results, approach, sites
Water Quality at Little River Lake	unknown	unknown	need, objective, results, approach to improvement
Improvement of Twelve Mile Lake	unknown	unknown	needs, objectives, expected results, approach, altern
Little River Lake Fishing Jetty & Reff	unknown	June 83 - July 84	federal aid development & operations work plan
Land Aquis. Proposal for 5 Fishing Lakes	DNR Fisheries Bureau	unknown	environmental assessment and program narrative
Construction of Jetties & Piers in Iowa	unknown	unknown	need, objective, results expected, approach, location
Smoke Hollow Lake Feasibility Study	Brice, Petrides-Donohue & Assoc.	February 10, 1987	study for construction of fishing & recreational lake
Little Whiskey Lake Feasibility Study	Brice, Petrides-Donohue & Assoc.	June 30, 1987	study for construction of fishing & recreational lake
Whitewater Lake Feasibility Study	Brice, Petrides-Donohue & Assoc.	February 10, 1987	study for construction of fishing & recreational lake
Lake Shawtee Feasibility Study	Brice, Petrides-Donohue & Assoc.	December 31, 1986	study for construction of fishing & recreation lake
Lost Grove Lake Feasibility Study	Brice, Petrides-Donohue & Assoc.	September 4, 1987	study for construction of fishing & recreational lake
Deer Creek Lake Feasibility Study	Brice, Petrides-Donohue & Assoc.	February 11, 1987	study for construction of fishing & recreational lake
Eastern Iowa Lake Location Study	Brice, Petrides-Donohue & Assoc.	June 1987	potential lake sites south hwy 64 & east hwy 38
Federal Aid Manual	U.S. Dept. of Interior (Fish & Wildlife)	unknown	acts, rules, reporting, management, admin., etc.
Iowa Boating Regulations	DNR	1988	rules on registration, accidents, speed, etc.
Iowa Hunting & Trapping Regulations	DNR	1989	regulations on deer, waterfowl, birds, turkey, etc.
Iowa Fishing Regulations	DNR	1989	licensing, where permitted, etc.
Fishing Guide	DNR	unknown	location, type of fish, boat & camping access
Aeration of Winterkill Lakes, Study #104	Iowa Conservation Commission (Fisheries)	July 78 - June 81	effects, cost, distribution, circulation
Beaver Lake Program Narrative	unknown	unknown	problem, objective, results, approach
Fishing in Iowa	Central Research Corporation	May 1986	survey of Iowa anglers
Fishing in Iowa	IMR Opinion Research	February 1982	survey of Iowa anglers
Fishing in Iowa (two booklets)	survey of Iowa anglers	Spring 1986	survey
Feasibility Study Brushy Creek Park	Brice, Petrides-Donohue & Assoc.	January 1988	feasibility study
Water Impoundment Opportunities	U.S. Dept. of Ag. Soil Conservation	1979	Southern Iowa Rivers Basin Study
A Management Plan for Iowa State Parks	Department of Natural Resources	1989	categorization, cost & efficiency, staffing, organizing
Contribution of Outdoor Recreation to	Council of State Planning Agencies	1985	contribution of outdoor recreation to state eco. devel.
Iowa Protected Water Areas (General Plan	Iowa Conservation Commission	March 1981	program to protect scenic & natural lakes, rivers, etc.
Brushy Creek State Recreation Area	Iowa Conservation Commission	Sept. 1982	environmental impact study
Arizona's Other Lakes	Arizona State Parks	1988	listing of lakes and facilities
Arizona Lakes Study (SCORP)	Arizona State Parks	1989	purpose, methodology, SLIF Investments, etc.
Arizona Statewide Comp. Outdoor Rec. Plan	Arizona State Parks	1989	state profile, resource assessment, trends, etc.
The 1985 State Water Plan	Iowa Dept. Water, Air & Waste Management	1985	approach, background, issues & alternatives, recommend
Public Opinions re Outdoor Rec. in CA	Calif. Dept. Park and Recreation	Sept. 1987	survey of public opinions and attitudes/outdoor rec.
Lake & Reservoir Restoration Guide (Rob)	Environmental Protection Agency	Feb. 1988	manual for restoring & protecting lakes & reservoirs
Lake Line/North Amer. Lake Society (Rob)	North Amer. Lake Management Society	Nov. 1989	bimonthly newsletter
Nat'l Conference Lake Management (Rob)	Northeastern IL. Planning Commission	May 1988	various methods used by different states 4 management
Clean Lakes Program (Rob)	North Amer. Lake Management Society	April 1989	pamphlet for general public
Lake Conservation Handbook (Rob)	North Amer. Lake Management Society	April 1989	pamphlet for general public
Lake Line/North Amer. Lake Society (Rob)	North Amer. Lake Management Society	Sept. 1989	bimonthly newsletter
Lake Line/North Amer. Lake Society (Rob)	North Amer. Lake Management Society	Oct. 1989	bimonthly newsletter
Annual Report 1988 (Rob)	North Amer. Lake Management Society	1988	yearly report and progress

EPA/OW Priority Water-Related Data Systems

SYSTEM

	DATABASES								INDICES				ANALYTICAL TOOLS
	BIOS* Biological Data System	FRDS Federal Reporting Data System	GIC* Grants Information Control System	NEEDS* Needs Survey File	ODES* Ocean Data Evaluation System	PCS Permit Compliance System	STORET* Storage and Retrieval of Water Quality Data	WBS* The Waterbody System	DWS Drinking Water System	GAGE Stream Gage/Flow File	IFD Industrial Facilities Discharge File	REACH* The Reach File	WQAS* Water Quality Analysis System
COMPUTER	IBM 3090	IBM 3090	IBM 3090	IBM 3090, Prime	IBM 3090, Prime, PC	IBM 3090	IBM 3090	IBM 3090, PC	IBM 3090	IBM 3090	IBM 3090	IBM 3090, PC	IBM 3090
CONTACTS	Phil Lindenstruth 202 382-7220 800 424-9067	A.W. Marks 202 382-5515	Janie Latta 202 382-5831	Joyce Hudson 202 382-7251	Robert King 202 475-7119	Dela Ng 202 475-8323	Phil Lindenstruth 202 382-7220 800 424-9067	Meg Kerr 202-382-7056	Phil Taylor 202 382-7046	Phil Taylor 202 382-7046	Phil Taylor 202 382-7046	Phil Taylor 202 382-7046	Phil Taylor 202 382-7046
SIGNIFICANT INFORMATION	biol. info., taxonomy, field survey results	public drinking water systems inventory, non-compliance, enforcement data	construction grant data	facility ID, NPDES no., treatment process, flow, population served	WQ data, physical charact., species abundance, permit conditions, NPDES no.	wastewater effluent composition, DMR data, NPDES no.	WQ data, physical charact., species abundance, chemical conc.	waterbody ID, designated use, causes & sources of use impairment	facility ID, intakes, sources, population served	data types; sample freq.; mean, annual, & 7Q10 flow; estimates	facility ID, NPDES no., SIC code, direct/indirect discharge	stream connection relationships, name, segment ID	Same as STORET, REACH, IFD, DWS, & GAGE
LOCATION IDENTIFIERS	same as STORET	facility name & address, lat./long. (from address)		county code, place code, SMSA, congressional district	lat./long., county codes, POTW name & address	lat./long., river basin, city/county code	lat./long., HUC code, reach no., basin, ecoregion, county code	lat./long., county code, basin, reach no.	lat./long., HUC code		lat./long., HUC code, reach no., basin, county code	lat./long., HUC code	Same as STORET, REACH, IFD, DWS, & GAGE
OUTPUTS	same as STORET	tabular arrays, reports	tabular arrays, reports	tabular arrays, reports	stat. anal., tabular arrays, plots, map graphics, reports	tabular arrays, reports	stat. anal., tabular arrays, plots, map graphics, reports	tabular arrays, reports, maps	tabular arrays, reports	tabular arrays, reports	tabular arrays, reports	tabular arrays, reports, flow diagrams	stat. anal., tabular arrays, plots, map graphics, reports
CAPABILITIES	60,000+ species	interactive, quarterly updates		interactive retrievals, menu selections, help screens, PC down-loading	QA/QC checks & on-line reports, stat. anal. tools, graphics down-loading	manager's PC retrieval, PC down-loading, interactive retrievals	menu selections, QC checks, help screens	waterbody assessment (no raw WQ data)				inter-system index & linking mechanism	menu & keyword selections, access to other systems; advanced function printing

DATABASES — Store and receive raw data INDICES — Databases to which access is indirect ANALYTICAL TOOLS — Receive data through indices and databases for analytical purposes

STATE LIBRARY OF IOWA



3 1723 02094 2587