ILLINOIS WATER RESEARCH NEEDS

AND

A CATALOG OF WATER RESEARCH IN ILLINOIS

Special Report No. 5

of the

Illinois State Water Plan Task Force

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ABSTRACT

This report was prepared to (1) help identify Illinois water-related research needs; (2) help identify research that may be addressing those information needs; and (3) help stimulate research in areas where information is needed. Section I is a summary of the research needs identified by agencies of the Illinois State Water Plan Task Force. Section II is an inventory of current research projects being conducted in Illinois that was compiled by a survey of state agencies, universities, and consulting firms. A subject index is provided.

KEYWORDS: Research needs, Research catalog, Research inventory, Water resources planning, Illinois State Water Plan

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This report was compiled and edited by Glenn E. Stout and Richard Buhr, Water Resources Center, UIUC. It was reviewed by members of the State Water Plan Task Force.

INTRODUCTION

Early in 1982, the Illinois State Water Plan Task Force identified a number of problems in water resources planning and operation that significantly affect program administration. These issues were designated "operating issues" because they relate to ongoing programs and procedures.

One operating issue that the task force selected for further study was water resources research. In studying water plan issues, task force members have identified many areas where research is needed to provide information for developing state water policies and for improving management of the state's water resources. Recognizing that some research is being conducted by faculty members of the state's universities and by personnel of most of the task force agencies, the task force decided that the present report should be compiled to: (1) identify Illinois water-related research needs; (2) identify research that may already be addressing those information needs; and (3) stimulate research in the areas where information is needed.

The Water Resources Center (WRC), University of Illinois at Urbana-Champaign, was asked to prepare this report. One of the WRC's missions is to help coordinate water research conducted at state educational institutions and to disseminate information on that research. As part of this mission, the WRC holds annual meetings that focus on various aspects of Illinois water research, and the WRC has also published two catalogs of Illinois water research projects in the past. The first catalog, "Water Resources Research in Illinois," was published in September 1967. The second, entitled "Catalog of Water Resources Research in Illinois," was published in July 1977.

The Report

To prepare the report at hand, the WRC focused its May 1982 annual meeting on the topic of the water research needs of the Illinois state water planning effort. In June it also conducted a survey of state agencies and researchers asking them to report current water resources research projects that they were conducting or supporting. The results of this meeting and survey are reported in the first two sections of this publication.

Section I of this report, "Water Research Needs Based Upon the Illinois State Planning Effort," is a summary of the research needs identified by agencies of the Water Plan Task Force at the WRC's 1982 annual meeting.

Section II, "A Catalog of Water Research in Illinois," is an inventory of current water research projects in Illinois that was compiled from the survey of state agencies and researchers. Twenty-four agencies, universities, and consulting firms responded, reporting more than 160 projects.

The appendix of this report is a subject index to the catalog. This index was organized with the research needs of the State Water Plan agencies in mind. Many, but not all, of the major index entries are taken directly from the issues that the task force is addressing. Other major index entries, however, were chosen to facilitate searches by researchers who may not be familiar with the structure of the task force's plan of study.

Recommendations

The Illinois State Water Plan Task Force recommends that state agencies, colleges, and universities work closely together to provide research and information for the management of the state's water resources:

1. With the assistance of this report, state agency personnel should contact researchers identified as conducting research relevant to their needs and begin a mutually beneficial dialogue.
2. Reseachers at Illinois colleges, universities, and state scientific surveys should consult with state agencies and should begin addressing the research needs of the State Water Plan Task Force.
3. State water resources planners and researchers should continue to meet annually to share information on water resources research and research needs.
4. In light of the current federal philosophy that water resources planning and management are state responsibilities and in light of federal cutbacks in water research funds, the State of Illinois should greatly increase its support of water data collection and research programs, and private industry should begin to sponsor a program of water research in Illinois. This program should (1) address the problems and research needs of local government and agencies managing the water resources of Illinois and (2) provide opportunities for students at our colleges and universities to participate in water resources research to ensure that qualified professionals will continue to be available to Illinois agencies and industries in the future.

I. WATER RESEARCH NEEDS BASED UPON THE ILLINOIS STATE PLANNING EFFORT

1. A SUMMARY OF THE 1982 ANNUAL MEETING OF THE WATER RESOURCES CENTER, UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

On May 17, 1982, the Water Resources Center of the University of Illinois at Urbana-Champaign held its annual meeting at the Illini Union. The theme of the meeting was "Short- and Long-Term Research Needs - Based Upon the Illinois State Water Planning Effort." Members from the Illinois State Water Plan Task Force identified areas of needed research in relation to the state planning effort. Other participants from state and federal agencies and from universities around the state were invited to respond to the prepared presentations of the task force members. This report is a summary of the research needs identified at that meeting and of responses following the meeting.

In addition to specific research topics, several general considerations were brought up at the meeting by various participants.

- A research need of overall importance is the support, maintenance, management, and improvement of an adequate data base. This issue is especially critical at the present time because of budget cuts that will be affecting Illinois's data collection system. Basic data collection programs need the support of the entire research community and should be allowed to compete on an equal basis for research dollars. Any research directed toward methods that would improve the maintenance and support of our water resource data base and efficiencies of data collection are of prime importance. This data base is essential for research, planning, and decision making. A plan for a statewide data and information center to manage data has

been developed by the three scientific surveys of Illinois and is being proposed for state implementation.

- Different problems require different approaches to research. Structured research programs are needed to address problems such as acid rain or erosion and sedimentation. Other types of problems should be approached largely through unstructured research. Examples of the latter are the problems of barium, radium, and organic compounds in our drinking water or the aquatic biology of our wetlands, streams, lakes, and estuaries. Major well-defined problems may require an interdisciplinary approach.
- Any reasonable plan of water resources research must consider the issue of training water resources professionals. The universities are the only institutions that can provide this function. Long-term research goals should consider the educational issue.
- There is a need to take an ecosystem approach to research. Too often [illegible] addresses the effects of problems rather than the causes. [illegible] integrate economics and ecology in a manner that [illegible] various activities that either [illegible] to the [illegible]

The following specific research needs are broken down by the eleven issues identified by the State Water Plan Task Force. Although some basic research has been undertaken on many of these issues, it appears that the current state of knowledge should be developed for the use of the public and governmental agencies. The extent of knowledge will vary considerably from one topic to another since some of the suggested research needs are relatively new topics while others have been studied for a number of years. The expansion of our modern manufacturing, energy, and agricultural industries will continue to introduce new chemical and biological products into our environment and place ever greater demands on the region's water resources. The impacts of these demands must constantly be studied and monitored to ensure a safe environment and adequate water resources for the region's future.

2. RESEARCH NEEDS IN RELATION TO STATE WATER PLAN EMERGING ISSUES

2.1 Erosion and Sediment Control

A. Research needs for the targeting of resources and the monitoring of progress of Illinois' erosion and sediment control program

1. Verification of computer models for estimating soil erosion and delivery ratios, for selecting priority areas, for measuring the effectiveness of soil conservation practices for typical Illinois watersheds. Determination of how the data obtained for one area of the state can be applied to other areas. (The Blue Creek and Highland Silver Lake watershed projects will establish a base for this effort. As the data become available, its use for other areas of the state will be examined.)
2. Determination of the contribution of bank and gully erosion and channel scouring toward the sediment load of streams.
3. Continued investigation of sedimentation rates of Illinois's lakes and reservoirs, especially in northern Illinois where less data is available. This investigation should include pre-treatment and post-treatment studies on lakes that will be affected by a land treatment watershed project to evaluate the effectiveness of applied conservation practices on the sedimentation rate.
4. Quantification of the sediment carried by streams. (The sediment monitoring network established in 1981 was designed to collect baseline sediment data at approximately 50 stations statewide. Budget reductions have resulted in a reevaluation of the program network and a reduction in the number of sampling stations. The

future of the sediment monitoring network is in jeopardy and unless external support is found it will be discontinued.)

5. Refinement of models to quantify the affinity and the transport characteristics of trace metals and other pollutants with fine sediments. A strategy then needs to be developed to reduce the movements of those pollutants with sediment.

B. Evaluation of conservation and land treatment practices.

1. Evaluation of the effects of reduced tillage systems on water quality, i.e., evaluate how tillage practices resulting from the use of new equipment and the use of new and additional pesticides required for reduced tillage systems affect overall water quality.
2. Determination of the economic impact of reduced tillage systems in terms of the farmer and society.
3. Development of techniques for conserving soil during fall and winter months on moderate slopes that have been planted with soybeans.
4. Evaluation of the combined techniques of zero tillage and the close cropping of soybeans on soil conservation.
5. Benchmark studies, data on lake sedimentation, and a stream sediment monitoring network for evaluating the effectiveness of conservation practices.
6. Examination of the incentive system and strategies for speeding up the adoption of known technologies in conserving soil and improving water quality.
7. Evaluation of structural measures in soil conservation practice.
8. Evaluation of the integration of government programs, such as Payment in Kind (PIK), with soil conservation measures.

2.2 Integration of Water Quality and Quantity Management

A. Improvement of environmental indices for monitoring toxics such as pesticides and industrial toxics.

B. The design of a groundwater quality monitoring network. The State Water Survey currently monitors groundwater levels from a network of shallow wells in areas remote from pumping centers and from approximately 100 wells in the vicinity of pumping centers.

C. Development of a program to determine "safe yields" for ground and surface supplies in critical areas and alternative sources.

D. Development of effective programs and practices to optimize reservoir release management.

E. Development of economic, environmental, and engineering principles for water-blending practices, using surface/groundwater to augment existing public supply surface reservoirs.

F. Measurement of the physical, chemical, and biological effects of tow traffic in the Mississippi, Illinois, Kaskaskia, and Ohio rivers. Development and implementation of measures to mitigate these effects.

G. Development of lock and dam optimization management to include water quality.

H. Development of regional relationships for riffle pool sequencing in order to better define available habitat for aquatic life. Also relate this information to the development of construction procedures for channel relocations.

I. Development of ecological classifications for benthic stream macroinvertebrates by stream order and physiographic province.

J. Development of instream habitat index and associated biological and chemical characteristics for Illinois streams.

K. Evaluation of water quality improvements resulting from urban stormwater detention.

2.3 Protection of Underground Water

A. Development of adequate characterization methodologies to determine the level of protection desired for underground waters of the state. Underground waters of the state need to be classified into use-classifications that take into account potential as well as current uses and are inclusive of both consumptive and other uses.

B. Identification and classification of users and uses of underground waters. This includes identifying public and private interests as well as distinguishing between consumptive and nonconsumptive uses. The State Water Survey has been coordinating a statewide program since 1928 with these objectives. Funding support is needed after September 1983.

C. Development of a resource inventory, which would include the quality, quantity, and location of existing underground waters and their recharge areas and regional flow systems. This inventory should include data and information management as well as resource management.

D. Development of optimum practices to minimize aquifer quality degradation. This issue includes technical research on interaquifer contamination transfer, interaquifer blending, and sealing of abandoned wells.

E. Evaluation of the roles and responsibilities of public, private, and governmental interests with respect to underground water.

Determination of the legal definition of water rights and needs at the state level.

F. Evaluation of the degradation and depletion of our underground waters. This evaluation includes degradation sources, susceptibility, pollution control strategies, adequacy, availability, and depletion.

2.4 Water Conservation

A. An analytical evaluation of the effectiveness of various water conservation strategies through studies of water usage before and after implementation of the various strategies.

B. Surveys of the effectiveness of water conservation programs implemented and evaluated in other states in order to learn from their successes or failures.

C. Development of conservation techniques for "Illinois type" industries.

D. Development of efficient irrigation technology for Illinois soils and crops.

E. Investigation of re-use of urban stormwater runoff captured for flood control purposes.

F. Investigation of economic and social impacts of regulated withdrawals of water in high competition areas.

2.5 Flood Damage Mitigation

The Illinois State Water Survey has received a grant from the National Science Foundation to prepare a comprehensive national plan of research on floods and their mitigation. Results of this study should be looked at closely for those research tasks particularly relevant to Illinois. Research needs identified by the Water Plan Task Force are the following:

A. Development of better methods for evaluating the cost-benefits and cumulative impacts of multiple rural levee placements.

B. Development of better methods for evaluating environmental impacts of various floodplain activities that require permits.

C. Development of effective programs and practices to optimize reservoir release management for existing dams.

D. Development of technologies to reduce urban flooding.

E. Development of more reliable methods for the determination of flood frequency from streamflow records.

2.6 Competition for Water

A. Water supply management.

1. Aquifer development evaluations.
2. Groundwater/surface water interactions.
3. Conjunctive use of groundwater and surface water.
4. Impacts of mining operations on aquifers.
5. Role of desalination technology in water reuse and in areas of highly mineralized and radioactive waters in Illinois
6. Improved reservoir operations.
7. Climatological studies on drought projections-occurrence/duration.
8. Research on physics of clouds for enhancement of precipitation.

B. Water demand management.

1. Water conservation for Illinois industry.
2. A study of local institutional organizations to manage the use of water effectively.
3. Irrigation.

a. Efficient technology.

(1) Development of efficient water storage, distribution, and collection systems for irrigation water.

(2) Development of water and energy efficient irrigation technology.

(3) Refinement of models and data for efficient irrigation management.

(4) Development of short-term weather forecasting to provide data for use in management models.

(5) Determination of crops and varieties that respond to irrigation for maximum quality and production.

b. Economic potential.

(1) Development of economic models to identify acreage and practices with the potential for profitable irrigation.

(2) Determination of the response to irrigation by soil types.

(3) Determination of water availability in relation to soil types.

(4) Identification of long-term weather patterns and development of long-term forecasts to provide data for use in economic feasibility models.

c. Irrigation-related water conflicts.

(1) Determination of areas where irrigation is likely to expand.

(2) Identification of areas of potential competition for available water supplies.

(3) Determination of necessary changes in water use law and institutions to resolve conflicts.

4. Water use projections.

5. Instream flow requirements.

6. Development of a basic model that will integrate natural streamflow conditions with known withdrawals and return flows.

C. Administrative capabilities.

1. Improved water law.

2. Regional allocation methodologies.

2.7 Aquatic and Riparian Habitat

A. Wetlands.

1. Identification of the locations and sizes of Illinois's wetlands and the collection of sufficient information on each of these wetlands to allow the development of a classification scheme with designated priorities that identifies the preservation values and significance of each value in relation to all other values.

B. Streams.

1. Development of a methodology for the determination of the stream flow levels needed to protect fishes and other aquatic life inhabiting Illinois streams.

a. Selection of indicator fish and/or invertebrate species for each of the 18 major basins in the state.

b. Development of preference curves for indicator species in relation to flow, substrate, and other habitat requirements.

2. Analysis and evaluation of various habitat enhancement techniques in relationship to the management of both natural and altered channels in Illinois.

3. Development of a method to assess the cumulative impacts of the variety of construction projects that are affecting Illinois streams. (A method to assess at what point the impacts of

construction damage stream ecosystems to the point of no return as natural systems.)

4. Information on the importance of species diversity and the ecological roles and habitat needs of the forage fish of Illinois streams.
5. Development of regional relationships for riffle pool sequencing in order to better define available habitat for aquatic life. Also analyze this information for use in designing procedures for channel relocations.
6. Development of ecological classifications for benthic stream macroinvertebrates by stream order and physiographic province.
7. Development of instream habitat index and associated biological and chemical characteristics for Illinois streams.
8. Development of long-term studies on large river systems. With funding from the National Science Foundation, the Natural History Survey and other state scientific surveys are initiating a 5-20 year study of basic ecological concepts and the effects of sedimentation, pollution, and users on the Mississippi and Illinois rivers.
9. Development of seasonal hydrologic relationships to determine the persistence of pools during drought periods.

C. Large flood control reservoirs.

1. The development of methods for pinpointing the locations of the prime sources of pesticides and heavy metals that contaminate fish flesh and the development of corrective measures to significantly reduce the impact of these contaminants on reservoir life forms.

2. Models of the dynamics of reservoir food chains and species interaction.
3. Information on the influence of water level manipulation on reservoir fish populations and their forage base.
4. The development of effective reservoir habitat enhancement techniques.
5. Refinement of creel census (angler harvest) procedures to achieve efficiency, economy, and accuracy.
6. Investigation of methods of operation that would serve flood control needs with minimum impact on habitat.

D. Inland impoundments.

1. The development of detailed scenarios concerning the influence of pesticides, sedimentation, and erosion on lake ecosystems and the translation of this information into effective, affordable, and socially acceptable management responses.
2. Development of affordable and effective biological control measures for aquatic macrophytes.
3. Analysis of the aquatic species population dynamics that operate in Illinois's glacial lakes and the implications this has for the management of artificial lake environments.
4. Information related to fish stocking policies ranging from interspecific competition and interaction to the most desirable forage base for exotic cool water predator fish such as walleye and musky and the development of artificial spawning habitats for them.
5. The development of methods for pinpointing the locations of the prime sources of pesticides and heavy metals that contaminate

fish flesh and the development of corrective measures to reduce the impact of these contaminants on small recreational impoundments of streams and rivers.

6. Identification of the sources of sediment influx into Peoria lake and the development of cost effective methods to mitigate this problem. Peoria Lake, which is a part of the Illinois Waterway, is a unique water resource serving a large metropolitan area. The lake is used extensively for boating, sailing, skiing, fishing, and other recreational purposes, in addition to serving as a waterway for the transportation of agricultural and industrial commodities. Off-channel areas of the lake are heavily silted up.

E. Lake Michigan.

1. Development of effective imprinting methods to ensure the return of spawning adult salmonids to Illinois waters for egg taking.
2. Development of methods to enhance the utilization of Illinois stocked salmonids in Illinois waters.
3. Information on the magnitude of loss of small salmonids due to impingement and entrainment at the various water intakes along the lakefront.
4. Information on the life history requirements and population dynamics of both commercially and recreationally harvested fish species in the Illinois portion of Lake Michigan. Translation of this information into management responses.

F. Identification of the causes of fish kills, disappearance of desirable flora and fauna, and other environmental degradation so that appropriate mitigative measures can be developed.

2.8 Water-Based Recreation

A. Information on the intensity and diversity of recreational use on Illinois public and homeowner-controlled lakes.

B. Methods for determining optimum recreational use-carrying capacities on lakes and streams.

C. Development of techniques for achieving control of recreational use and a concurrent mediation of spatial conflicts.

D. Examination of Illinois riparian case laws and other case law in the nation to determine the public's rights to access and use water areas for recreation purposes. Determination of IDOC and IEPA's responsibilites for managing these water resources. Determination of riparian landowner liability when public use occurs on an adjacent navigable stream.

E. Determination of the impact of the barge industry on small boating.

2.9 Atmospheric Changes and Management Issues

A. Research to better define climate-society interactions.

B. Determination of the types of climatic changes occuring in Illinois and the causes and impacts of these changes.

C. Determination of the sources, transport, transformation, and deposition of pollutants, plus their impacts on the water resources of Illinois.

D. Determination of the magnitude of the acid precipitation issue.

1. What is the current trend of precipitation acidity?

2. What is the response of natural precipitation chemistry to increased fossil fuel consumption?
3. What is the response of Illinois waters, soils, weather, and agriculture to various chemical components of precipitation?

E. Information on the sources, transport, and deposition of pollutants; information on the effects of CO_2 and particulates on climate and, in turn, on the water resources of Illinois.

F. A ten-year program to determine whether and how precipitation can be increased and by how much. As an alternative, an evaluation of operational rainfall enhancement projects over a three-year period of time should be conducted.

G. Determination of the environmental effects of rainfall enhancement and the physical, social and economic impacts of enhanced rainfall.

H. Determination of the effects and frequency of droughts and their effects on public water supplies and navigation.

I. Determination of climate changes and snowfall changes and whether this is affecting migration from the state. Determine the relationship of snowfall and weather in relationship to roads and construction techniques.

J. Determination of the possible relationships between weather changes and the future of irrigation in Illinois.

K. Determination of the impact of increasing urban rainfall on urban flooding and urban stormwater management.

2.10 Drought Contingency Planning

A. Development of more accurate methods for predicting droughts and determining the rate of incidence of droughts and the probabilities of the durations of droughts.

B. Development of models for accurate water supply planning that would calculate appropriate supply levels necessary to respond to various degrees of drought.

C. Determination of the possibility of sustaining conservation measures over a long period of time. Development of effective methods for sustaining conservation measures over a long period of time.

2.11 Illinois Water Use Law

A. Development of a set of legal principles and factual characteristics that can be used to define public waters in Illinois and indicate the full extent of state water management authority (research is in progress).

B. Collection of the factual information for individual waters of the state to determine whether such waters can be classified as public with respect to the set of legal principles and characteristics developed to define public waters. Depending on the legal principles and pertinent factual characteristics developed, this research could involve exhaustive historical research, hydrologic evaluations, title searches, and so forth.

3. RESEARCH NEEDS IN RELATION TO ONGOING STATE PROGRAMS

3.1 Water Quality

A. Evaluation of the effect of intermittent discharging and developing substrate for nitrifying bacteria in enhancing the wastewater treatment in lagoon systems.

B. Evaluation of risks of Naeglora fowerli for recreation and the drinking of thermally enriched waters.

C. Development of toxicity testing that provides a better estimate of actual instream toxicity.

D. Research on "Best Management Practices" for application of currently used pesticides.

E. Development of water/sediment data. Application of existing data to show problem areas, seasonal trends, and regional trends. Development of relationships for lower flows for sediment concentration and turbidity.

F. Development of procedures to effectively assess site-specific relationships (assimilation) of treated waste effluents discharging into small streams.

G. Development of demonstration projects to assess the potential of "aquaculture" for treating domestic sewage.

H. Classification of Illinois streams based on differing responses in terms of toxicity following introduction of substances that are now concentration limited (standards) i.e., heavy metals, etc.

I. Study of impacts of wastes from water treatment plants discharging to different water courses.

J. Development of economical alternative methods of waste disposal for water treatment plants.

K. Investigation of economic and environmental impacts of sewage effluents to receiving waters, if chlorination is discontinued by law.

L. Evaluation of the necessity of suspended solids standards (30 mg/l or 12 mg/l) in sewage effluents for different streams.

3.2 Public Water Supplies

A. Studies on the economic and technical strategies for defluoridation required by regulations.

B. Development of disposal alternatives for zeolite softener brine waste.

C. Determination of sanitary significance of "false positives" for coliform membrane filter technique.

D. Evaluation of health effects of public water supply operator exposure to low level H_2S.

E. Studies on the possibility of augmenting the water supplies of western and southern Illinois. Sufficient water exists in western and southern Illinois, although much of it is too high in salt content to serve some water needs. Research the possibility of using separate water sources (one for nonpotable, one for potable); desalination; interbasin transfers; and alternative sources.

F. Research on the possibility of artificially recharging aquifers, and research on water reuse for Illinois.

G. Research on second generation pollutants, the by-products of our efforts to clean up water or air--lime softening sludges high in barium, zeolite brines, flue-gas desulfurization wastes, fly ash, spent caustics, oil/coal development by-products. Drinking water plant operators need to be filled in on the symptoms of serious problems.

H. Research on lake rehabilitation.

I. Research on aquifer rehabilitation.

J. Determination of the locations of alternative emergency water supplies for major population centers.

3.3 Miscellaneous

A. Aquaculture--the use of thermal effluents of utilities, "waste" water

from agriculture and industry, and by-products from agri-energy industry.

B. Genetic manipulations--development of organisms that can best utilize the available environments, e.g., acid lakes, aquaculture systems.

C. Research on dewatering lake bottom sediment.

D. Determination of the optimal agricultural use of lake water and sediments from dredging.

E. Determination of the impact of lowhead hydropower on navigation.

II. CATALOG OF WATER RESEARCH IN ILLINOIS

The research projects in this catalog are listed by investigating agency. Most of the projects were considered active as of August 1982. The key below explains the format and the abbreviations used. In addition, a subject index is presented in the appendix.

Researchers and users of research results who have a need for more information about specific projects should direct their inquiries to the principal investigator at the agency or institution listed. There may be other projects in Illinois that are not listed in this catalog. If any have been overlooked, we would appreciate receiving information on them.

KEY

P.I.	Principal Investigator(s)
S.O.F.	Source of Funding
F.L.C.	Funding Level Classification*
Dates	Inclusive Dates
Obj.	Objectives or Brief Description

*The following funding classes, while not revealing the exact amount of funding, indicate the scale of the project. The following categories indicate the total amount for the entire grant period (unless otherwise indicated):

A. Under $10,000
B. $10,000-$25,000
C. $25,000-$100,000
D. $100,000-$500,000
E. Over $500,000

1. ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439

1.1

Title: PHYSICAL ASPECTS OF OCEAN KELP FARMING

P.I. J. D. Ditmars and D.-P. Wang, Energy & Environmental Systems Division, Argonne National Laboratory

S.O.F. Gas Research Institute

F.L.C. C

Dates: January 1982 through September 1982

Obj: Examination by means of models of the interactions between the physical ocean environment (currents and waves) and man-made kelp farms. In particular, consideration is given to the damping of currents and waves by the farm and the implications of those modifications on environmental impacts.

1.2

Title: REGIONAL INFLUENCE OF OCEAN THERMAL ENERGY CONVERSION PLANT OPERATION

P.I. J. D. Ditmars and D.-P. Wang, Energy & Environmental Systems Division, Argonne National Laboratory

S.O.F. Office of Ocean Minerals and Energy, National Oceanic and Atmospheric Administration

F.L.C. D

Dates: August 1982 through August 1983

Obj: Numerical modeling of a limited-area coastal region in which the effects of intakes and discharges of ocean thermal energy conversion plants are simulated in order to estimate the regional and water column impacts of the large volumes fluxes moved by the plant.

1.3

Title: TAGGED DREDGED MATERIAL DISPOSAL EXPERIMENTS

P.I. J. D. Ditmars and D. L. McCown, Energy & Environmental Systems Division, Argonne National Laboratory

S.O.F. United States Army Corps of Engineers, Rock Island District

F.L.C. C

Dates: August 1981 through August 1983

Obj: Sand dredged from the Mississippi River in the Gordon's Ferry area was tagged with dyed sand prior to downstream thalweg disposal. Sampling of bottom sediments in the vicinity and downstream of the disposal site provides a measure of the fate of the tagged material.

2. BRADLEY UNIVERSITY
Peoria, Illinois 61625

2.1

Title: PERIPHYTON ACCRUAL RATES IN A POWER PLANT COOLING RESERVOIR

P.I. B. J. Mathis, Department of Biology, Bradley University

S.O.F. Central Illinois Light Company

F.L.C. A

Dates: June 1, 1982, through May 31, 1983

Obj: Plexiglass slides are to be placed at seventeen stations and two depths to correlate periphyton growth rates with light penetration and temperature regimes.

2.2

Title: USE OF HESTER-DENDY SAMPLERS TO DETERMINE DISTRIBUTION OF AQUATIC INVERTEBRATES IN A POWER PLANT COOLING RESERVOIR

P.I. B. J. Mathis, Department of Biology, Bradley University

S.O.F. Central Illinois Light Company

F.L.C. A

Dates: June 1, 1981, through September 1, 1982

Obj: Hester-Dendy samplers were located at three depths and seventeen stations. Samplers were exchanged at approximately one month intervals and aquatic invertebrates were removed, counted and identified. Species diversity will be correlated with depth and temperature regimes.

3. DATA RESOURCES, INC.
24 Hartwell Avenue, Lexington, Massachusetts 02173

3.1

Title: INLAND WATERWAY COMMODITY FORECAST STUDY FOR THE STATE OF ILLINOIS

P.I. Data Resources, Inc.

S.O.F. Illinois Department of Transportation

F.L.C. C

Dates: June 1982 through January 1983

Obj: To develop forecasts of commodities and tonnage to be shipped on the navigable inland rivers of the state, and to identify the extent or size of the hinterland or drawing areas for waterway segments. The results will be used to determine the need for improvements to the waterway system and for terminal facilities to handle the future cargoes.

4. EASTERN ILLINOIS UNIVERSITY
Charleston, Illinois 61920

4.1

Title: BIOLOGICAL STREAM SURVEY - MATTOON

P.I. L. S. Whitley and L. Durham, Department of Zoology, Eastern Illinois University

S.O.F. Illinois Environmental Protection Agency and City of Mattoon

F.L.C. C

Dates: July 1982 through June 1983

Obj: To determine biological effects of sewage outfalls on two streams near Mattoon, Illinois.

5. GOVERNOR'S STATE UNIVERSITY
Park Forest, Illinois 60466

5.1

Title: ATMOSPHERIC LOADING IN THE GREAT LAKES REGION

P.I.: Herman Sievering, Environmental Science Program, Governor's State University

S.O.F. United States Environmental Protection Agency

F.L.C. D

Dates: October 1, 1981, through September 30, 1983

Obj: To obtain particulate matter elemental and chemical compound data for interpretation in Great Lakes pollution loading network and models. To further our understanding of atmospheric particle exchange at the air/water interface.

6. ILLINOIS DEPARTMENT OF AGRICULTURE
Emerson Building, State Fairgrounds, Springfield, Illinois 62706

6.1

Title: AGRICULTURAL IMPACT ASSESSMENT OF AN INCREASED LAKE MICHIGAN DIVERSION

P.I. Marvin Hubbell, Resource Planner, Illinois Department of Agriculture

S.O.F. United States Army Corps of Engineers

F.L.C. B

Dates: November 16, 1981, through September 30, 1982

Obj: To identify potential impacts to agriculture (cropping patterns, drainage impacts, flooding, topography, soil erosion) resulting from an increased diversion of Lake Michigan water. Benefits and costs will be identified.

7. ILLINOIS DEPARTMENT OF TRANSPORTATION
2300 South Dirksen Parkway, Springfield, Illinois 62764

7.1

Title: BARGE TERMINAL CAPACITY STUDY: A COMMODITY SPECIFIC APPROACH TO PORT PLANNING

P.I. James A. Johnson, Ports Management Section, Illinois Department of Transportation

S.O.F. Illinois Department of Transportation

F.L.C. A

Dates: July 1982 through January 1983

Obj: To develop a methodology to estimate the current cargo handling capability of river terminals in the state. The methodology will be used in conjunction with forecasts of barge traffic to plan for necessary improvements to existing terminals and for the development of new terminals.

7.2

Title: DIRECTORY OF LAKE AND RIVER TERMINALS IN ILLINOIS

P.I. James A. Johnson, Ports Management Section, Illinois Department of Transportation

S.O.F. Illinois Department of Transportation

F.L.C. B

Dates: January 1981 through July 1982

Obj: To prepare a directory of all identified waterway terminal facilities in the state that are currently involved in waterborne commerce. The purpose of the directory is to assist the state in port and waterway planning and to assist potential shippers in terminal selection.

8. ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2200 Churchill Road, Springfield, Illinois 62706

8.1

Title: COMPARATIVE EVALUATION OF NATURAL AND MODIFIED CHANNEL CHARACTERISTICS TO ESTABLISH WATER QUALITY USE ATTAINMENT

P.I. Doug Crandall, Illinois Environmental Protection Agency

S.O.F. United States Environmental Protection Agency, Clean Water Act

F.L.C. C

Dates: August 1981 through September 1983

Obj: The project will utilize the prior 208 studies on intermittent streams and various intensive stream surveys. These studies will be augmented by site specific studies of various stream systems to define the absolute potential of both altered rural and urban stream segments relative to unaltered segments. The protocol and findings of these efforts will result in formulation and implementation of proposed stream alteration policy.

8.2

Title: DEVELOPMENT OF A WATER QUALITY MANAGEMENT/GROUNDWATER INTEGRATION PROGRAM

P.I. Doug Crandall, Illinois Environmental Protection Agency; Jim Gibb, Illinois State Water Survey; and Keros Cartwright, Illinois State Geological Survey

S.O.F. United States Environmental Protection Agency, Clean Water Act

F.L.C. C

Dates: June 1981 through September 1983

Obj: This prototype study is a comprehensive review and analysis of the groundwater resources in the Sangamon River Basin. Tasks include analyzing information on aquifer susceptibility and contamination sources, characterizing groundwater flow, conducting trend analysis of water quality data from public water supplies, assessing groundwater use and resource use conflicts, and analyzing the baseflow contribution to surface water quality. This project also includes several tasks needed in working towards a statewide strategy for groundwater management. Tasks include reviewing of the roles of state agencies in groundwater management, identifying gaps in current control strategies, and developing strategy proposals.

8.3

Title: COMPREHENSIVE MONITORING AND EVALUATION FOR THE HIGHLAND SILVER LAKE WATERSHED

P.I. Tom Davenport and Robert Clarke, Illinois Environmental Protection Agency; and Ming T. Lee, Illinois State Water Survey

S.O.F. United States Department of Agriculture, Rural Clean Water Program

F.L.C. E

Dates: October 1981 through October 1986

Obj: The water quality monitoring strategy incorporates a multiple monitoring site approach to measure the duration, timing, and extent of nonpoint source pollutions. Major components of the monitoring strategy include the following: (1) tributary/sub-basin monitoring, (2) field/best management practices monitoring, (3) lake monitoring, (4) biological monitoring, (5) stream geometry and channel characteristics study, (6) lake sedimentation surveys, (7) watershed mapping and modeling.

First year data (FY 1982) will establish the preinstallation water quality characteristics of the lake and bay area, tributary streams, field areas, and sub-basins. The second year data will augment the baseline information and begin to monitor the effects of actual Best Management Practices implementation. Comprehensive physical monitoring efforts in the third year will provide a data base for evaluation of actual changes in water quality from a field basis and measure any changes of water quality in the lake and its tributary streams. Additional monitoring and analysis during the fourth and fifth years will make possible a more accurate assessment of the full effects of the program.
(see 21.28)

8.4

Title: MONITORING AND EVALUATION OF THE EFFECTS OF APPLIED AGRICULTURAL BEST MANAGEMENT PRACTICES ON WATER QUALITY

P.I. Tom Davenport and Robert Clarke, Illinois Environmental Protection Agency; and Ming T. Lee, Illinois State Water Survey

S.O.F. United States Environmental Protection Agency, Clean Water Act

F.L.C. E

Dates: May 1979 through September 1983

Obj: The purpose of this project is to interpret preliminary trends in water quality data collected from project inception through October 1982 as part of the Blue Creek Watershed project. The primary purpose of this monitoring and evaluation project is to determine the actual yield of pollutants from a variety of agricultural practices to downstream receiving water and its effect upon the water quality and reasonable uses of the water resources.
(see 21.27)

8.5

Title: DEVELOPMENT OF REGULATORY PROGRAM CRITERIA FOR FLOW VARIABLE POLLUTANTS

P.I. William Rice and Tom Davenport, Illinois Environmental Protection Agency; and Larry Toler, United States Geological Survey

S.O.F. United States Environmental Protection Agency, Clean Water Act

F.L.C. C

Dates: June 1981 through September 1983

Obj: This project will evaluate and recommend the overall approach to develop flow variable sediment and associated pollutant transport criteria for lakes and streams.

Work to be performed will include a detailed literature search and evaluation of the USGS-IEPA ambient water quality and flow monitoring data. A gravimetric data base will be developed and compared to the historical turbidity baseline. The criteria will be based upon low, medium, and high flow periods. Extensive use of the monitoring results from the Blue Creek monitoring and evaluation project and data base from the Nationwide Urban Runoff Program effort will supplement the efforts to allow comparison of before/after Best Management Practices implementation to achieve the water quality goals. The analyses will factor the relationships of flow, river stage/lake detention, groundwater impact and water quality associated with runoff waters, and stream/lake use characteristics. The output will include nonpoint source target criteria for key network stations to monitor progress and redirect implementation efforts to achieve the Clean Water Act goals and objectives.

8.6

Title: LAKE MICHIGAN FLOW DIVERSION STRATEGY BASED ON WATER QUALITY TRADEOFFS IN THE ILLINOIS RIVER

P.I. William Rice and Jim Pendowski, Illinois Environmental Protection Agency; and Krishan Singh, Illinois State Water Survey

S.O.F. United States Environmental Protection Agency

F.L.C. C

Dates: January 1981 through September 1982

Obj: This project used existing water quality models and developed a flow system to study flow diversion from Lake Michigan and water quality in the Illinois River. Parameters of particular concern in this study were ammonia and biological oxygen demand. The project output outlined an approach to a management strategy taking into account effluent from the Chicago area, Lake Michigan diversions and water release from dams to maintain reasonable water quality in the Illinois River. A 7-day, 10-year low flow map was to be updated (ISWS Bulletin 57, map 2).
(see 21.37)

8.7

Title: NATIONWIDE URBAN RUNOFF PROGRAM (PHASE III)

P.I. William Rice and Wendy Coleman, Illinois Environmental Protection Agency; and Mike Bender, Illinois State Water Survey

S.O.F. United States Environmental Protection Agency, Clean Water Act

F.L.C. D

Dates: July 1981 through September 1983

Obj: This phase of the project will evaluate the effect of urban runoff on the quality of the receiving stream. A comprehensive data collection program will be used to establish the quantity and quality of dry weather and wet weather flow for a small agricultural basin upstream from and downstream from a significant urban contribution. The effect of municipal street sweeping upon the quality of urban runoff and the impact of that runoff on the receiving stream will be demonstrated by simulating the reduction in loading from the urban area as a result of various intensities of municipal sweeping. Existing conditions in the stream, upstream and downstream from the urban contribution will also be documented.
(see 21.39)

9. ILLINOIS INSTITUTE OF TECHNOLOGY
IIT Center, Chicago, Illinois 60616

9.1

Title: BIOAVAILABILITY OF QUATERNARY AMINES IN AQUATIC SYSTEMS

P.I. H. E. Allen, Pritzker Department of Environmental Engineering, Illinois Institute of Technology

S.O.F. Proctor & Gamble

F.L.C. C

Dates: July 1, 1981, through August 31, 1983

Obj: Unavailable

9.2

Title: METAL SPECIATION AND SEPARATION

P.I. C. N. Haas, Pritzker Department of Environmental Engineering, Illinois Institute of Technology

S.O.F. Industrial Waste Elimination Research Center, United States Environmental Protection Agency

F.L.C. D

Dates: January 1, 1982, through December 31, 1982

Obj: Unavailable

9.3

Title: MICROBIOLOGICAL ALTERATIONS IN WATER QUALITY IN DISTRIBUTION SYSTEMS AND GRANULAR ACTIVATED CARBON

P.I. C. N. Haas, Pritzker Department of Environmental Engineering, Illinois Institute of Technology

S.O.F. United States Environmental Protection Agency

F.L.C. C

Dates: January 1, 1980, through June 30, 1982

Obj: Unavailable

9.4

Title: WASTEWATER TREATABILITY STUDY

P.I. C. N. Haas, Pritzker Department of Environmental Engineering, Illinois Institute of Technology

S.O.F. Modine Manufacturing Company

F.L.C. B

Dates: June 1, 1982, through August 31, 1982

Obj: Unavailable

9.5

Title: EVALUATION OF THE DYNAMICS OF MULTICOMPONENT SORPTION/DESORPTION PROCESSES WITH DIFFERENTIAL REACTOR COLUMNS

P.I. K. E. Noll, Pritzker Department of Environmental Engineering, Illinois Institute of Technology

S.O.F. Industrial Waste Elimination Research Center, United States Environmental Protection Agency

F.L.C. D

Dates: January 1, 1982, through December 31, 1982

Obj: Unavailable

9.6

Title: EXPERIMENTAL STUDIES ON ANAEROBIC TREATMENT

P.I. J. W. Patterson, Pritzker Department of Environmental Engineering, Illinois Institute of Technology

S.O.F. Smith, Kline & French

F.L.C. B

Dates: January 11, 1982, through September 11, 1982

Obj: Unavailable

10. LAKE MICHIGAN FEDERATION
53 West Jackson Boulevard, Suite 1710, Chicago, Illinois 60604

10.1

Title: ALTERNATIVE WASTEWATER TREATMENT TECHNOLOGIES RESOURCE CENTER

P.I. Kathleen M. Brennan, Lake Michigan Federation

S.O.F. Private Foundation

F.L.C. C

Dates: October 1, 1981, through September 30, 1983

Obj: To develop a resource center on alternative technologies for the treatment of municipal wastewater. To summarize the information in the noncirculating library materials in two overview papers for distribution to communities in the Lake Michigan drainage area. To present three one-day workshops on the use, financing, and management of small-scale treatment alternatives to local officials and citizens' groups in the basin.

10.2

Title: WETLANDS MANAGEMENT PROGRAM

P.I. Gerald A. Paulson, Lake Michigan Federation

S.O.F. Private Foundation

F.L.C. C

Dates: January 1, 1982, through December 31, 1983

Obj: To develop a resource center on wetlands management for the Lake Michigan basin and to work with local communities to find cost-effective strategies to manage their wetland resources. Also, to compile and disseminate information on wetland values and the regulation of wetlands.

11. METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO
100 East Erie Street, Chicago, Illinois 60611

11.1

Title: ECOSYSTEMATIC STUDY -- FISH SURVEY OF THE METROPOLITAN CHICAGO WATERWAY SYSTEM

P.I. S. G. Dennison and S. J. Sedita, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. C (yearly)

Dates: September 1974 through present

Obj: The objective of this survey is the determination of the distribution and abundance of fishes within the streams and deep draft waterways in the Chicago Metropolitan Area and the determination of the relationship of these parameters to the water quality of these waterways.

11.2

Title: MONITORING OF SOUTHWESTERN LAKE MICHIGAN WITH RESPECT TO ZION NUCLEAR POWER PLANT DISCHARGE

P.I. L. Kristoff, D. Lordi, C. Lue-Hing, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. Unavailable

Dates: October 1973 through present

Obj: To monitor the radiological water quality of southwestern Lake Michigan, under jurisdiction of the district, in order to ascertain if any changes occur as a result of discharges from Zion Nuclear Power Plant.

11.3

Title: ECOSYSTEMATIC STUDY -- BACTERIAL STUDY OF METROPOLITAN CHICAGO WATERWAYS

P.I. Parnell O'Brien and S. J. Sedita, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. B (yearly)

Dates: January 1974 through December 1983

Obj: To develop baseline data of bacterial indicator organism concentrations, Salmonella and Pseudomonas aeruginosa) in streams and deep-draft waterways under the jurisdiction of the Metropolitan Sanitary District of Greater Chicago.

11.4

Title: OPERATION LAKEWATCH

P.I. Parnell O'Brien and S. J. Sedita, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. C (yearly)

Dates: July 1980 through present

Obj: To develop baseline chemical and bacterial data on the southwestern shore of Lake Michigan and to monitor and correct various pollutant discharges to Lake Michigan emanating from the Chicago area.

11.5

Title: ENVIRONMENTAL PROTECTION SYSTEM AT FULTON COUNTY, ILLINOIS

P.I. J. R. Peterson and R. I. Pietz, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. D (yearly)

Dates: 1970 through present

Obj: To determine the impact of sewage sludge fertilization on the water resources of the Metropolitan Sanitary District of Greater Chicago Fulton County land reclamation site.

11.6

Title: SURFACE WATER RESOURCES SURVEY AT FULTON COUNTY, ILLINOIS

P.I. J. R. Peterson and R. I. Pietz, Research and Development Department, Metropolitan Sanitary District of Greater Chicago; and Larry Toler, United States Geological Survey

S.O.F. Metropolitan Sanitary District of Greater Chicago and United States Geological Survey

F.L.C. C (yearly)

Dates: 1972 through present

Obj: Hydrological data is collected on streams flowing through the Metropolitan Sanitary District of Greater Chicago's Fulton County land reclamation project. This study is to determine the impact of sewage sludge application on the area's water resources.

11.7

Title: IMPROVEMENTS IN DISSOLVED OXYGEN LEVELS BY ARTIFICIAL INSTREAM AERATION IN CHICAGO WATERWAYS

P.I. Irwin Polls and Booker Washington, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. D

Dates: October 1979 through July 1982

Obj: To evaluate the performance of the Devon Avenue Instream Aeration Station on the North Shore Channel as follows: (1) to determine the oxygen uptake, oxygen transfer rate, and oxygen transfer efficacy; (2) to determine the optimum operational mode of the blowers; (3) to determine the impact of instream aeration on downstream water quality.

11.8

Title: ECOSYSTEMATIC STUDY -- ALGAE SURVEY OF THE METROPOLITAN CHICAGO WATERWAY SYSTEM

P.I. W. Schmeelk and S. J. Sedita, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. C (yearly)

Dates: January 1974 through present

Obj: To develop baseline data of algal densities, compositions, and distributions in each of the waterways under the jurisdiction of the Metropolitan Sanitary District of Greater Chicago. By using these indigenous biota, to evaluate the water quality of each of the waterways.

11.9

Title: WATERWAYS NITRIFICATION

P.I. Booker Washington and Bernard Sawyer, Research and Development Department, Metropolitan Sanitary District of Greater Chicago

S.O.F. Metropolitan Sanitary District of Greater Chicago

F.L.C. C

Dates: September 1979 through December 1982

Obj: To determine the amount of instream nitrification that could occur in the man-made waterway system of the Metropolitan Sanitary District of Greater Chicago.

12. NATURAL HISTORY SURVEY DIVISION OF THE ILLINOIS DEPARTMENT OF ENERGY AND NATURAL RESOURCES
Natural Resources Building, University of Illinois, Champaign 61820

12.1

Title: COOPERATIVE WATERFOWL RESEARCH

P.I. Frank C. Bellrose, Stephen P. Havera, and Glen C. Sanderson, Illinois Natural History Survey

S.O.F. Illinois Department of Conservation and United States Fish and Wildlife Service

F.L.C. D

Dates: May 1, 1980, through June 30, 1984

Obj: To determine the distribution of fall, winter, and spring waterfowl populations, to denote trends in abundance of waterfowl populations from 1939 to 1979, and to determine the chronology of waterfowl migration in Illinois. To determine the pristine and current distribution of waterfowl habitat and to document the current food habits of waterfowl in Illinois. To determine species composition, distribution, and hunter success of the Illinois waterfowl harvest at public shooting grounds and private duck clubs and to evaluate the effects of various hunting regulations on the harvest. To collate information and data generated from this project in a manuscript for publication as a book. Waterfowl produce wastes that affect water quality.

12.2

Title: THE EFFECTS OF HIGH TOTAL DISSOLVED SOLID LEVELS ON ILLINOIS MACROINVERTEBRATES

P.I. A. R. Brigham and J. D. Unzicker, Illinois State Natural History Survey

S.O.F. Illinois Department of Energy and Natural Resources

F.L.C. B

Dates: 1980 through 1981

Obj: To study effects of high total dissolved solid levels on macroinvertebrates.

12.3

Title: WATER QUALITY IN FRANK HOLTEN LAKE

P.I. A. R. Brigham, Illinois Natural History Survey

S.O.F. Illinois Department of Conservation

F.L.C. A

Dates: July 1, 1982, through June 30, 1985

Obj: To perform water quality analyses for lake restoration at Frank Holten Lake.

12.4

Title: EFFECTS OF USING HYBRID CARP TO CONTROL AQUATIC VEGETATION

P.I. Robert W. Gorden and Michael J. Wiley, Illinois Natural History Survey

S.O.F. Illinois Department of Conservation and United States Fish and Wildlife Service

F.L.C. E

Dates: April 1, 1980, through March 31, 1984

Obj: (1) To determine the effects of hybrid carp (Ctenopharyngodon idella female x Hypothalmichthys nobilis male) on the aquatic macrophytes, sportfish populations, lower trophic levels, and nutrient cycling and energy flow of aquatic ecosystems; (2) to compare those effects with herbicide (simazine and potassium endothall) applications on all ecosystem components; (3) to determine if the hybrid carp is sterile; (4) to develop a conceptual, predictive model that will provide analyses of management strategies.

12.5

Title: EFFECTS OF PROPOSED LAKE MICHIGAN DIVERSION ON WATERFOWL HABITAT IN THE ILLINOIS RIVER

P.I. Stephen P. Havera, Illinois Natural History Survey

S.O.F. United States Army Corps of Engineers, Chicago District, via Division of Water Resources, Illinois Department of Transportation

F.L.C. C

Dates: October 1, 1981, through December 31, 1982

Obj: To evaluate the mitigation required to replace losses of waterfowl habitat resulting from four proposed rates of diverted Lake Michigan water into the Illinois River. The four proposed diversion rates to be investigated are 7,000 cubic feet per second (cfs), 5,500 cfs, 4,800 cfs, and an arbitrary rate that would provide the most favorable cost/benefit ratio.

12.6

Title: PROPOSED EFFECTS OF LAKE MICHIGAN DIVERSION ON TERRESTRIAL HABITAT IN THE ILLINOIS RIVER VALLEY

P.I. Stephen P. Havera, Wildlife Research Station, Illinois Natural History Survey

S.O.F. United States Army Corps of Engineers, via Illinois Department of Transportation, Division of Water Resources

F.L.C. B

Dates: October 1, 1981, through September 30, 1982

Obj: This particular study will evaluate the impacts to the terrestrial habitat and corresponding impacts to waterfowl resulting from lower diversion plans than originally proposed by the Corps of Engineers. This study will also address possible mitigation measures that would be required to offset the losses of available habitat that may occur with an increased diversion of Lake Michigan water at Chicago as well as a schedule of diversion that may enhance waterfowl productivity.

12.7

Title: INVESTIGATIONS OF THE BIOLOGICAL COMMUNITIES OF THE KANKAKEE RIVER AND THE BRAIDWOOD COOLING POND

P.I. R. Weldon Larimore, Illinois Natural History Survey

S.O.F. Commonwealth Edison Company, Chicago, Illinois

F.L.C. E

Dates: July 1, 1981, through June 30, 1984

Obj: (1) To determine the preoperational effects of the Braidwood Power Plant on the river communities of the Kankakee River; (2) To determine the early colonization of the Braidwood Cooling Pond, a former strip-mine area. To study early colonization of phytoplankton, benthos, zooplankton, and fish, both qualitatively and quantitatively. Also to provide baseline data that would help indicate the future of any problems in water quality or lake management.

12.8

Title: SEASONAL AND DAILY MICROHABITAT SELECTION BY ILLINOIS STREAM FISHES

P.I. R. Weldon Larimore, Illinois Natural History Survey

S.O.F. Illinois Department of Transportation

F.L.C. C

Dates: March 1, 1980, through May 20, 1982

Obj: A study of the fishes in three streams was done to evaluate the combination of hydraulic conditions and habitat types most frequently utilized by various Illinois stream fishes during different life stages and times of the year.

12.9

Title: AN ELECTROFISHING SURVEY ON THE ILLINOIS RIVER - ANALYSIS OF HIGH WATER LEVELS ON FISH POPULATIONS

P.I. Kenneth Lubinski, Aquatic Biology Section, Illinois Natural History Survey

S.O.F. United States Army Corps of Engineers, and Illinois Department of Transportation, Division of Water Resources

F.L.C. A

Dates: September 1, 1981, through October 31, 1982

Obj: This particular study by the Natural History Survey is a continuation of an ongoing fisheries study. Because abnormally high water levels throughout 1981 resemble very closely what might happen if an increased diversion of Lake Michigan water at Chicago were allowed, the continuation of this study will offer a unique chance to investigate the effects of an increased diversion on the fishery of the Illinois River.

12.10

Title: ECOLOGICAL STUDIES OF NATIVE FISHES

P.I. L. M. Page, Illinois Natural History Survey, Department of Energy and Natural Resources

S.O.F. State of Illinois

F.L.C. C

Dates: Continuous

Obj: To determine ecological characteristics of native fishes. The data generated (mainly life history characteristics) are used in systematic and broader ecological studies, in assessing environmental impacts, and in protecting species and ecosystems.

12.11

Title: SEDIMENT TOXICITY STUDY

P.I. Richard E. Sparks, Aquatic Biology Section, Illinois Natural History Survey

S.O.F. United States Army Corps of Engineers, via Illinois Department of Transportation, Division of Water Resources

F.L.C. B

Dates: September 1, 1981, through July 31, 1983

Obj: This research will measure the toxicity of sediments in the upper Illinois River and analyze the impacts to the sediments and benthic community from an increased diversion of Lake Michigan water.

12.12

Title: TOXICITY OF SEDIMENTS IN THE ILLINOIS WATERWAY

P.I. Richard E. Sparks, Aquatic Biology Section, Illinois Natural History Survey

S.O.F. Illinois Department of Transportation, Division of Water Resources, and United States Army Corps of Engineers

F.L.C. B

Dates: September 1, 1981, through September 30, 1982

Obj: To measure the toxicity of sediments in the upper Illinois River, using a representative organism from the benthic community which once occurred in the upper River, the fingernail clam Musculium transversum.

12.13

Title: AN ELECTROFISHING SURVEY TO DETERMINE THE EFFECTS OF HIGH WATER IN 1981

P.I. Richard E. Sparks and Kenneth S. Lubinski, Aquatic Biology Section, Illinois Natural History Survey

S.O.F. United States Army Corps of Engineers, Chicago District

F.L.C. A

Dates: March 1982 through November 1982

Obj: An electrofishing survey of the Illinois River will be made in 1982 and the results compared to historical annual surveys to assess the relationship between water levels and fish populations. We anticipate that strong 1982 populations will be evident following high spring and summer flows and the availability of increased habitat in 1981 and 1982.

12.14

Title: IDENTIFICATION OF THE WATER QUALITY FACTORS WHICH PREVENT FINGERNAIL CLAMS FROM RECOLONIZING THE ILLINOIS RIVER - PHASE II

P.I. R. E. Sparks, Illinois Natural History Survey and A. A. Paparo, Southern Illinois University

S.O.F. United States Department of the Interior

F.L.C. C

Dates: February 1, 1980, through September 30, 1982

Obj: To follow up leads on the sensitivity of fingernail clams to pollutants by (1) measuring the effects of fluoride, cadmium, lead, and Illinois River sediment containing these materials on the survival, growth, and reproduction of intact fingernail clams; (2) determining the effects of fluoride, cadmium, and contaminated sediment on the ciliary beating rate of isolated clam gills; and (3) measuring the effects of fluoride, cadmium, lead, and contaminated sediment on the structure and composition of clam shells.

12.15

Title: LONG-TERM ECOLOGICAL RESEARCH ON THE ILLINOIS AND UPPER MISSISSIPPI RIVERS

P.I. R. E. Sparks and K. S. Lubinski, Illinois Natural History Survey; R. V. Anderson, Western Illinois University; N. G. Bhowmik, Illinois State Water Survey; and D. L. Gross, Illinois State Geological Survey

S.O.F. National Science Foundation

F.L.C. E

Dates: January 15, 1982, through December 30, 1986

Obj: To gather ecological data over a long period of time so that predictions of the effects of disturbances on the plants, animals, and vital processes occurring in river ecosystems can be tested and the understanding of river ecosystems and their responses to disturbances can be improved.

12.16

Title: WATER QUALITY INVESTIGATIONS AT LAKE SHELBYVILLE

P.I. Ted Storck, Illinois Natural History Survey

S.O.F. United States Army Corps of Engineers

F.L.C. C

Dates: October 1981 through September 1982

Obj: (1) To determine whether degradation exists in the Kaskaskia or Okaw rivers or Lake Shelbyville; (2) to provide warning of detrimental effects to water use; (3) to determine whether the reservoir causes quality problems or quality improvements; (4) to pinpoint degradation and determine changes necessary to improve operations or designs.

Collections are analyzed for chemical-physical parameters including BOD, CO_2, COD, chlorides, DO, dissolved solids, hardness, nitrate, nitrite, ammonia, total nitrogen, pH, phosphate, sulfate, and turbidity. Also benthos, plant pigments, and fecal coliform levels are sampled during the year.