Attachment A

CLINTON POWER STATION

Environmental Monitoring Program

PREOPERATIONAL BIOLOGICAL REPORT

1978 - 1986

EXECUTIVE SUMMARY

Introduction and
Chapter Table of Contents

prepared by
ILLINOIS POWER COMPANY
Environmental Affairs Dept.
Field Biology Laboratory
1987

CLINTON POWER STATION
ENVIRONMENTAL MONITORING PROGRAM
PREOPERATIONAL BIOLOGICAL REPORT
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VOLUME 1

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Preface

This report summarizes preoperational results of the biological portion of the Clinton Power Station Environmental Monitoring Program (EMP). The biological portion of the EMP was conducted by the Field Biology Section of the Environmental Affairs Department of Illinois Power Company. The report is divided into five chapters covering each of the biological disciplines sampled. Each chapter was authored by the person responsible for that discipline. Authors for chapters are as follows:

Periphyton	Ronald L. Willmore
Phytoplankton	Ronald L. Willmore
Zooplankton	Thomas V. Clevenger
Benthos	Thomas V. Clevenger
Fisheries	M. Stephen Pallo

The report was edited by James A. Smithson and Thomas V. Clevenger. Computer programming and data processing support was provided by David W. Plunkett and Jill A. Hardin. Mary A. Monahan was responsible for typing the report and was assisted by Gretchen S. Williamson. Independent review of the specific chapters was provided by Dr. Roy C. Heidinger for Fisheries, Mark J. Wetzel for Benthos, and William R. Cody for Periphyton, Phytoplankton, and Zooplankton.

EXECUTIVE SUMMARY
Clinton Power Station
Environmental Monitoring Program
Preoperational Biological Report
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An ongoing Environmental Monitoring Program (EMP) was initiated in 1972 to fulfill Nuclear Regulatory Commission commitments. The purpose of the EMP is to assess environmental changes associated with the construction and operation of Clinton Power Station (CPS). Construction activities of Clinton Lake and CPS were assessed in several previous reports.

The purpose of this report is to present comprehensive summaries of biological monitoring data collected prior to the operation of CPS (May 1978 through December 1986). These data will be compared to subsequent data to assess changes in biological communities due to operation of CPS. The major emphasis was to characterize natural variabilities of periphyton, phytoplankton, zooplankton, benthic macroinvertebrate, and fish communities.

There were no rare or endangered species, or unusual biological communities. Overall, the biological communities are similar to those in several other Illinois reservoirs. Communities in Clinton Lake followed successional patterns which are typical for newly inundated reservoirs.

Clinton Lake communities expanded rapidly and were relatively unstable during the initial two or three years after inundation. Several populations declined during the third to fifth year, and biological communities were more stable during the last four years. This stabilization should facilitate segregation of environmental changes due to natural succession and to CPS operations.

Communities in the main lake were generally distinct from those near the headwater areas. Biological communities at the North Fork end of the lake were often least similar.

Periphyton

Periphyton is composed of algae which forms a slippery brown or green layer on rocks, logs, and other substrata in lakes and streams. Diatoms, green algae, and blue-green algae comprised most of the periphyton in Clinton Lake. Diatoms comprised 65-98% of the community and accounted for four of the five most abundant species. Algal densities and chlorophyll *a* concentrations were greatest in 1983. Algal densities were generally greatest near the discharge canal.

The community downstream of the dam had greater species diversity and lower densities than the lake. Algal densities and chlorophyll *a* concentrations were more consistent during the last four years.

Phytoplankton

Phytoplankton is the plant portion of the plankton community which, through photosynthesis, provides the primary energy source for aquatic ecosystems. Diatoms, green algae, dinoflagelates, and blue-green algae comprised the majority of phytoplankton in Clinton Lake. Shifts in dominant groups from blue-green algae to diatoms to green algae occurred

as Clinton Lake aged. Seasonal densities of major groups were similar to other reservoirs.

Headwater communities, especially at the North Fork, were distinct. There was a trend for water clarity and primary productivity to increase from headwaters to midlake areas. Composition of the stream phytoplankton community was similar to the lake, except the stream had a greater percentage of diatoms and a lower percentage of green algae. Maximum stream phytoplankton densities usually occurred in winter. Areas downstream of the lake were more productive than headwater areas due to the inflow of phytoplankton from the well-developed community in Clinton Lake.

Zooplankton

Zooplankton constitutes the animal portion of the plankton community. Rotifera, Cladocera, and Copepoda comprise the dominant groups. Community composition suggests productive conditions in Clinton Lake. Gradual changes occurred and the community became more similar as Clinton Lake aged. Midlake areas had similar distributions of dominant organisms and communities. Likewise, communities at the headwater areas were similar. Most of the dominant organisms had greater abundances during spring and fall.

Zooplankton was more abundant downstream of Clinton Lake compared to headwater areas. This was due to the inflow of zooplankton from the well-developed community in Clinton Lake. This influence was limited as there were downstream reductions in densities. The influence of Clinton Lake was also demonstrated at headwater areas where densities increased as waters slowed at the confluence with Clinton Lake.

Benthic Macroinvertebrates

Benthic macroinvertebrates are animals which live on or in the bottom substrata of lakes and streams. Midges and segmented worms comprise the dominant groups in Clinton Lake. The community is characterized by low diversity, and species which indicate productive, warm-water conditions. There was a general trend for increases in mean densities from headwaters to midlake areas. Asiatic clams (Corbicula) were collected in Clinton Lake in 1986. This clam could cause problems in CPS water systems. The community in Salt Creek had greater densities and species diversities than Clinton Lake.

Fisheries

Gizzard shad, common carp, white crappie, bluegill, and largemouth bass were the most common fish in Clinton Lake. Walleye, tiger muskellunge, and hybrid striped bass populations were established by, and are dependent on, fish stockings. These species adapted to the lake and diversified the recreational fishery. Largemouth bass, walleye, and tiger muskellunge populations were supplemented with stockings from on-site rearing ponds.

Growth and condition of most species were generally best in the earlier years of reservoir development. In later years, growth and condition compared favorably to other reservoirs. The community remained relatively stable during the last four years. There were slight

differences between communities at midlake and headwaters. Gizzard shad were the dominant prey for game fishes. External parasites and abnormalities were encountered infrequently.

The stream communities were dominated by minnows. As headwater communities developed, there was a reduction in stream species and an increase in species from Clinton Lake. The community downstream of Clinton Lake was composed of stream species.

INTRODUCTION

Purpose and Scope of Monitoring Program

An Environmental Monitoring Program (EMP) was implemented by Illinois Power Company to satisfy requirements of various permits and licenses related to the construction of the Clinton Power Station (CPS). Several reports have been generated to analyze the results of monitoring efforts during preconstruction, construction, and lake formation phases of the EMP (Table 1). The purpose of this report is to synthesize, in a single document, results of preoperational, baseline data which will constitute a comparative background for assessments of operational effects of the CPS on the aquatic ecosystems of Clinton Lake, Salt Creek, and the North Fork. Accordingly, this report will encompass environmental monitoring data during the period between establishment of normal pool elevation for Clinton Lake (May 1978) and the initial phases of CPS operations (January 1987).

The major focus in these analyses is the development of seasonal and year-to-year variability in the structure of aquatic communities. Variabilities in aquatic communities were derived from efforts encompassing quantitative studies of periphyton, phytoplankton, zooplankton, benthic macroinvertebrates, and fish. The basic monitoring design consisted of periodic, quantitative sample collections from representative sampling sites distributed throughout areas which will receive varying amounts of thermal influence from CPS operations. Specific methods, results and discussions are presented in the respective chapters for each of the disciplines.

Table 1 Chronological synopsis of reports which contain environmental data pertinent to the Clinton Power Station, Clinton, Illinois

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Illinois Power Company. 1973. "Clinton Power Station Units 1 and 2. Applicants Environmental Report, Construction Permit Stage", Vols. 1 through 4 and Supplements. Docket Nos. 50-461 and 50-462, Oct. 26, 1973.

United States Atomic Energy Commission. 1974. Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2. Illinois Power Company, Docket Nos. 50-461 and 50-462.

Industrial Bio-Test Laboratories, Inc. 1975. Clinton Preconstruction Environmental Monitoring May 1974 Through April 1975. Annual Report to Sargent and Lundy Engineers. Chicago, Illinois.

_____ 1976. Clinton Preconstruction Environmental Monitoring May 1975 Through April 1976. Annual Report to Sargent and Lundy Engineers. Chicago, Illinois.

_____ 1977. Environmental Monitoring May 1976 Through April 1977 Construction Phase Clinton Power Station. Annual Report to Sargent and Lundy Engineers. Chicago, Illinois.

_____ 1978. Environmental Monitoring May 1977 Through April 1978 Construction and Lake-Filling Phases Clinton Power Station. Annual Report to Sargent and Lundy Engineers. Chicago, Illinois.

Illinois Power Company. 1979. Clinton Power Station Units 1 and 2. Environmental Report Operating License Stage.

Energy Impact Associates. 1980. Thermal Demonstration Pursuant to Illinois Pollution Control Board Rules and Regulations Chapter 3, Rule 203(i)(10). Prepared for Illinois Power Company, Clinton Power Station Unit 1. P. O. Box 1899, Pittsburgh, Pennsylvania 15230.

Illinois Power Company. 1982. Clinton Power Station Environmental Monitoring Program. Biological Report May 1978-November 1980 Volumes 1-4. Environmental Affairs Department Field Biology Laboratory, Decatur, Illinois.

U.S. Nuclear Regulatory Commission. 1982. Final Environmental Statement Related to the Operation of the Clinton Power Station, Unit No. 1. Illinois Power Company et al.

Kurzawski, K. F. 1984. Clinton Lake Creel Survey 1982-1983. Illinois Power Company, Decatur, Illinois.

Table 1 (continued)

Illinois Power Company. 1985. Clinton Power Station Environmental Monitoring Program. Biological Report 1981-1983. Volumes 1-4. Environmental Affairs Department Field Biology Laboratory, Decatur, Illinois.

_____ 1986. Clinton Lake Preoperational Environmental Monitoring Program. Water Quality Report. Environmental Affairs Department, Decatur, Illinois.

Description of Environs and Clinton Power Station

The Clinton Power Station is located in DeWitt County approximately 9.6 km (6 mi) east of Clinton and 96 km (60 mi) northeast of Springfield (Figure 1). The CPS is a 950 MW nuclear-fueled, electric generating station. The station utilizes a once-through cooling system. Circulating water is withdrawn from the North Fork arm of Clinton Lake, passes through the CPS condenser, flows through a 5.0 km (3.1 mi) discharge flume, and is discharged to the Salt Creek arm of the lake (Figure 1).

Clinton Lake is a 1,981 ha (4,895 a) impoundment which was built to provide cooling water for the CPS (Table 2). The lake was formed by an earthen dam constructed 366 m (400 yd) downstream from the confluence of Salt Creek and the North Fork. Dam construction was completed October 12, 1977, and Clinton Lake reached normal pool elevation, which is 210 m (690 ft) (Table 2), on May 17, 1978. The inundated valleys of the North Fork and Salt Creek resulted in an impoundment which is roughly V-shaped. The North Fork arm of the lake extends about 13 km (8 mi) and the Salt Creek arm 25.6 km (16 mi) from the dam. Clinton Lake has a storage capacity of 9.15×10^7 m^3 (74,200 acre ft) and an average depth of 4.6 m (15.2 ft). Most of the 209 km (130 mi) of shoreline is wooded. The valleys of the North Fork and Salt Creek were extensively wooded. Timber within the main lake basin was removed prior to lake filling; however, most of the vegetation was left intact in areas which became large coves.

Clinton Lake and much of the surrounding land is leased to the Illinois Department of Conservation (IDOC). The IDOC has opened the area to the public for many recreational activities such as fishing, hunting, swimming, hiking, cross-country skiing, camping, and boating. Fishing and the associated fisheries management program have effected the development

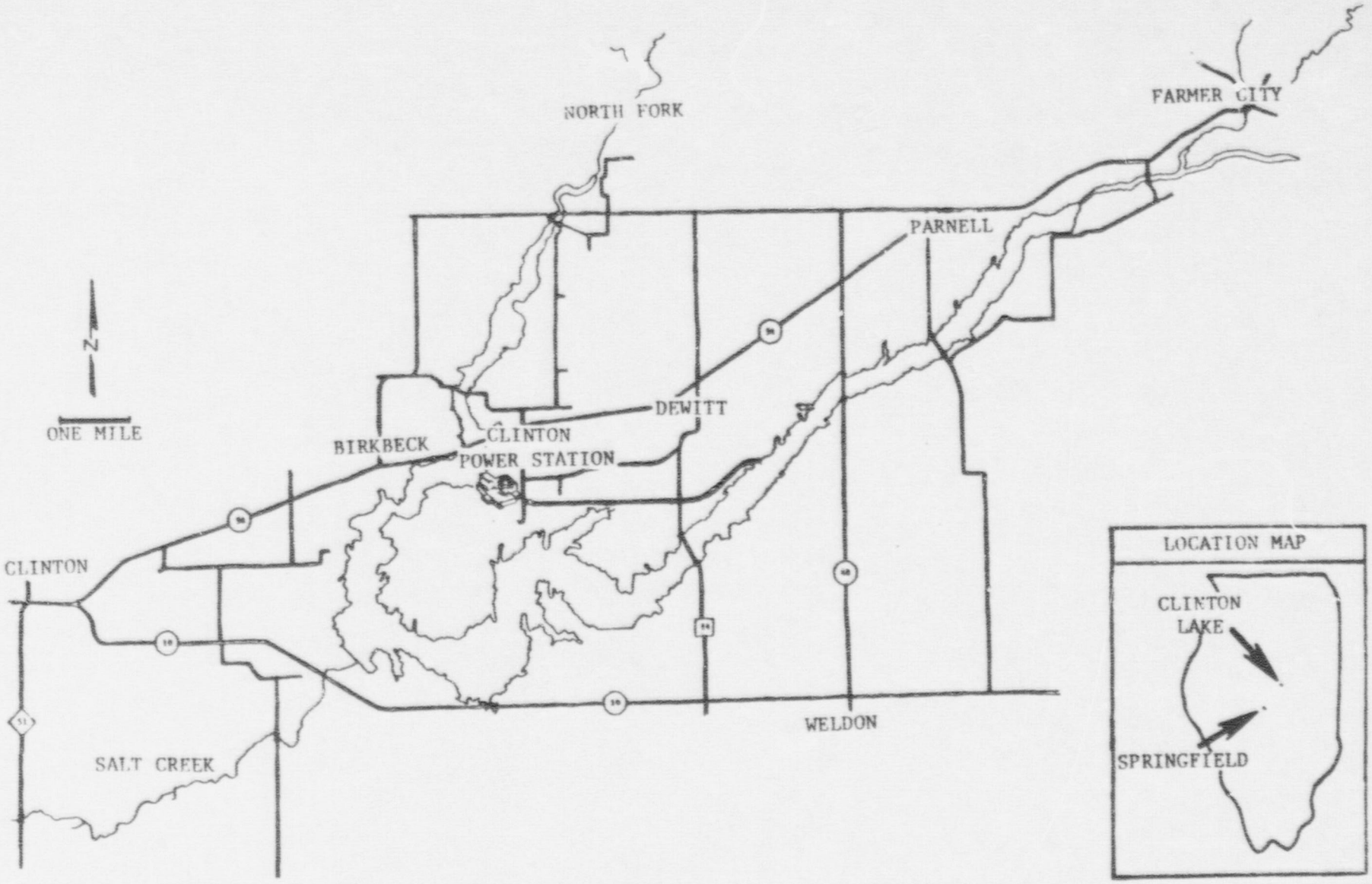

Figure 1. Map of Clinton Lake, DeWitt County, Illinois.

Table 2 Selected hydrological features of Clinton Lake, near Clinton, Illinois.

Parameter	Metric	English
Surface area	1981 ha	4,895 a
Average depth	4.6 m	15.2 ft
Maximum depth	13.7 m	45 ft
Shoreline length	209 km	130 mi
Storage capacity	9.15×10^7 m^3	74,200 acre-ft
Watershed	766.6 km^2	296 mi^2
Shoreline development	13.2*	13.2*
Normal pool elevation	210 m	690 ft
Length of North Fork arm	12.8 km	8 mi
Length of Salt Creek arm	25.6 km	16 mi

*Number represents an index without units

of the aquatic communities in Clinton Lake. The sport fishery is managed in part by supplemental stockings of native and experimental fish species. Information from the EMP has been, and will continue to be, useful in the evaluation of the fisheries management programs.

Chapter 1

PERIPHYTON

by

Ronald L. Willmore

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PHYTOPLANKTON

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Ronald L. Willmore

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ZOOPLANKTON

by

Thomas V. Clevenger

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Chapter 4

BENTHIC MACROINVERTEBRATES

by

Thomas V. Clevenger

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Chapter 5

FISHERIES

by

M. Stephen Pallo

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ILLINOIS POWER COMPANY

500 SOUTH 27TH STREET, DECATUR, ILLINOIS 62525-1805

March 30, 1988

Ms. Pat Lindsey
Compliance Assurance Specialist
Division of Water Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

Dear Ms. Lindsey:

Clinton Power Station
Environmental Monitoring Program
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In accordance with Special Condition No. 9 of NPDES Permit IL0036919, enclosed please find two complete 7-volume sets of the referenced final report. This report summarizes the findings, conclusions, and recommendations resulting from the monitoring of the periphyton, phytoplankton, zooplankton, benthos, and fisheries in Clinton Lake over the referenced time period. It comprehensively characterizes the condition of the lake with respect to these resources prior to the release of warm-water discharges from the station.

The Field Biology Section (James A. Smithson, Supervisor) of the Environmental Affairs Department was responsible for the performance of these investigations. Should you have any questions regarding the enclosed report, please feel free to contact Mr. Smithson at 217-424-6475.

Sincerely,

ILLINOIS POWER COMPANY

Thomas L. Davis, P.E.
Supervisor - Environmental
Engineering

TLD18:pjs

enclosure