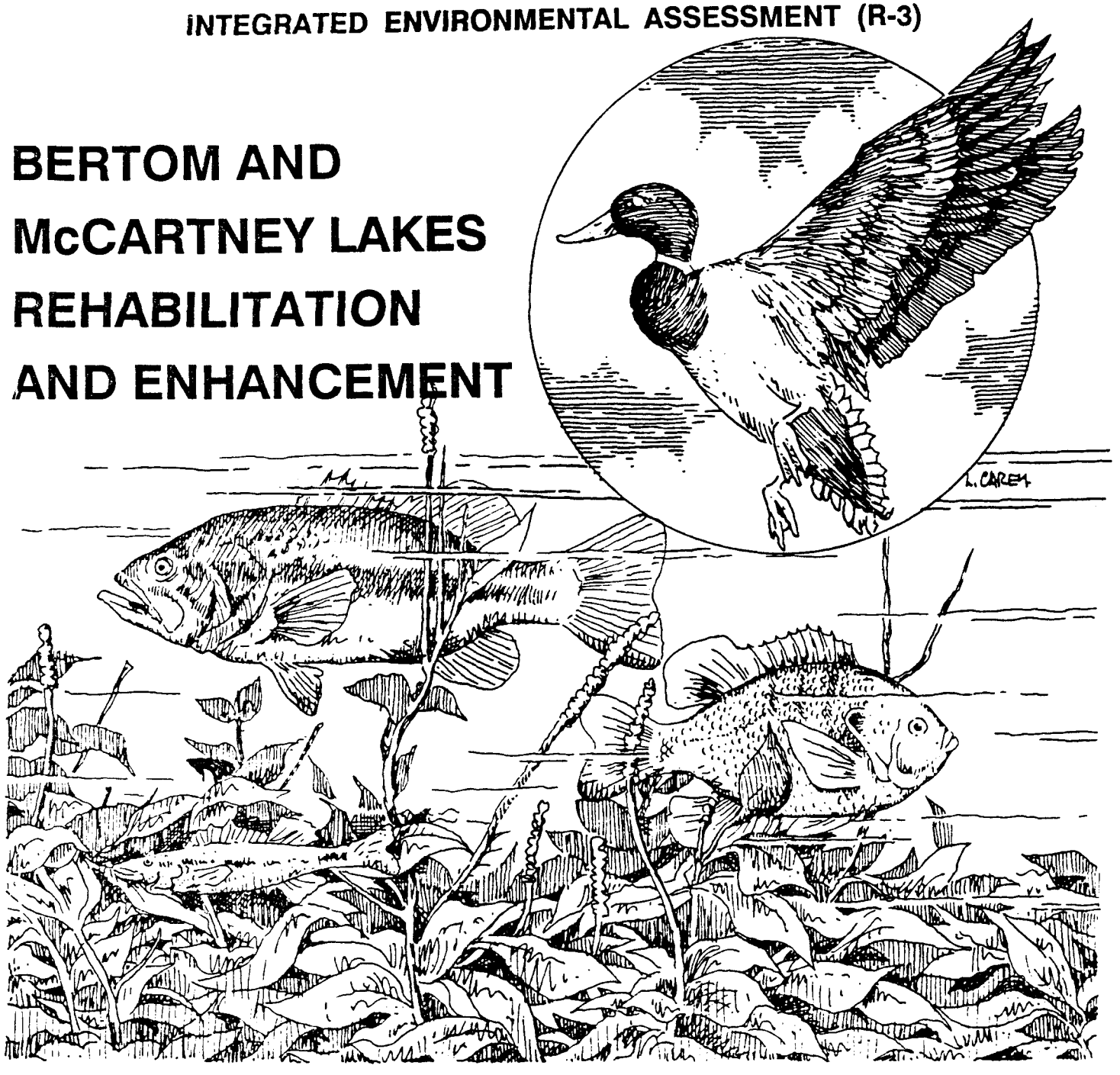
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT WITH
INTEGRATED ENVIRONMENTAL ASSESSMENT (R-3)

BERTOM AND McCARTNEY LAKES REHABILITATION AND ENHANCEMENT



JUNE 1989

US Army Corps of Engineers
Rock Island District

POOL 11
UPPER MISSISSIPPI RIVER
GRANT COUNTY, WISCONSIN

CENCR-17585S

8 June 1989
CLEVENSTINE/nlh/386

STATEMENT OF FINDINGS

I. Project Description.

A. This statement concerns a proposal by the Rock Island District, Corps of Engineers (NCR), to perform work pursuant to the Environmental Management Program (EMP) - Habitat Rehabilitation and Enhancement Program (HREP) at the location known as Bertom-McCartney Lakes, Grant County, Wisconsin. This work involves dredging, island construction, and rock fill placement.

B. An Environmental Assessment (EA) addressing effects of the proposed project has been prepared and circulated for public review, along with a Section 404(b)(1) Evaluation. This review was completed on May 19, 1989. The Public Notice for this project was issued April 27, 1989.

II. Statutory Authorities and Administrative Determination.

A. I have reviewed and evaluated, in light of the overall public interest, the documents and factors concerning this permit application, as well as the stated views of other interested Federal and non-Federal agencies and the concerned public.

B. The possible consequences of this proposed work have been studied in accordance with regulations published in 33 CFR Part 230 (Appendix B), 33 CFR Parts 320 to 340, 40 CFR Part 230 (if applicable), and 33 CFR Part 240 (Implementation of Executive Order 11988, Flood Plain Management).

III. Public Interest Review. The public notice issued for the project on May 27, 1989, was sent to the following places: post offices; appropriate city and county officials; adjoining property owners; appropriate State and Federal agencies; local, regional, and national shipping

entities; and other interested parties. A mailing list for the public notice is included in the permit application file. The following points are considered pertinent:

A. Federal Agencies (responding to the EA integrated within the Detailed Project Report).

1. Letter from the U.S. Environmental Protection Agency, Region V, dated May 26, 1989, stating no objection to the proposed project and that the proposed project should not adversely affect human health or significantly degrade the environment.

2. Letter from the U.S. Department of the Interior, Office of Environmental Project Review, dated May 24, 1989, identifying inconsistency regarding discussion of endangered species (bald eagle) and stating that no significant impacts to mineral resources are anticipated from the proposed work. Inconsistencies in the DPR regarding endangered species have been corrected and corrected pages inserted into the final document. This agency recommended inclusion of language to that effect in future project documentation. The purpose of that language is to indicate that mineral resources are considered during project planning. The referenced language has been included in the final report.

3. Letter from U.S. Department of Health and Human Services dated May 12, 1989, stating concurrence with the findings of the report [and] that the described project will not pose extraordinary risks to public health or safety.

4. Letter from the U.S. Environmental Protection Agency, Region VII, dated May 9, 1989, stating no comment on the project at this time.

5. Letter from the U.S. Fish and Wildlife Service, dated May 2, 1989, stating support for the report. The letter noted inconsistencies between the report and the draft Agreement for Operation, Maintenance, and Rehabilitation. These inconsistencies are being rectified through ongoing coordination with USFWS Region III, and will be reflected in the final Agreement for Operation, Maintenance, and Rehabilitation. The letter noted conflicting discussion of endangered species. The appropriate corrections have been made and forwarded to USFWS Region III. The letter also noted Corps intent to pursue a joint Finding Of No Significant Impact (FONSI) with Region III. Subsequent interagency discussion has resulted in the decision to prepare separate agency FONSI documents.

6. Letter from the U.S. Fish and Wildlife Service, dated March 21, 1989, providing a signed compatibility determination for the selected alternative.

B. State Agencies (responding to the EA or project coordination letters).

1. Letter from the State of Wisconsin, Department of Natural Resources, Southern District Headquarters, dated May 30, 1989, stating that the proposed rehabilitation work appears to be in accord with previously agreed upon Environmental Management Program guidelines with no further comment.

2. Letter from the State of Wisconsin, Department of Natural Resources, dated May 26, 1989, stating support for the project and that the Department agrees to cooperate with the [U.S.] Fish and Wildlife Service to assure that operation, maintenance, and any mutually agreed upon rehabilitation, as described in the Definite Project Report, will be accomplished in accordance with Section 906(e) of the Water Resources Development Act of 1986.

3. Letter of intent from the State of Wisconsin, Department of Natural Resources, dated May 26, 1989, committing the Department to cooperate with the Fish and Wildlife Service in the operation and maintenance of the project as described in the Definite Project Report.

4. Letter from the State of Iowa, Bureau of Historic Preservation, dated May 2, 1989, recommending project approval.

C. Federal Agencies (responding to the Section 404 Public Notice).

1. Letter from the U.S. Fish and Wildlife Service, dated May 17, 1989, stating no objection to issuance of the related permits.

2. No other Federal agencies have responded to the public notice for this project.

D. State Agencies (responding to the Section 404 Public Notice and Section 401 certification application).

1. Letter from the State of Wisconsin, Department of Natural Resources, Western District Headquarters, dated March 6, 1989, stating that the Department has made an initial decision to grant water quality certification that the project will meet State water quality laws. This correspondence is related to construction of underwater rock features of the project.

2. Letter from the State of Wisconsin, Department of Natural Resources, Western District Headquarters, dated February 21, 1989, stating that the Department is granting water quality certification because there is reasonable assurance that the activity will be conducted in a manner that will not violate the standards enumerated in s. NR 299.05(1).

The certification is granted provided the following conditions are met:

1. Water quality limitations and monitoring requirements for carriage water discharges as described in Table 1 (attached) shall be met.

2. The granting of this water quality certification is contingent upon receiving approval for this project from the River Resources Coordination Team (RRCT).

3. At least 5 working days prior to the beginning of the discharge, the applicant shall notify the Department of Natural Resources of their intent to commence dredging. Please notify John Sullivan at La Crosse, Wisconsin, phone (608) 785-9000.

4. Within 5 working days after the completion of the discharge, the applicant shall notify the Department of Natural Resources of the completion. Please notify John Sullivan at (608) 785-9000.

5. The Corps shall allow the Department reasonable entry and access to the discharge site in order to inspect the discharge for compliance with the certification and applicable laws.

6. The project shall be completed and designed as described.

E. Individuals or Organized Groups.

Letter from the Wisconsin Boundary Area Commission, dated May 11, 1989, recommending approval and implementation of the plan ... as proposed.

IV. Summary of Environmental Impact Review.

A. An Environmental Assessment (EA) has been prepared for the project. This review has not identified any potentially significant adverse effects under terms of the proposed activity. Thus, a FONSI was prepared and is included in the EA.

B. The Section 404(b)(1) Evaluation prepared for this project concluded that the proposed activity will comply with the guidelines set forth in 40 CFR Part 230 with appropriate conditions as discussed in the evaluation document and this Statement of Findings.

V. Summary of Findings. I find that performance of the project under the conditions set forth, and as prescribed by regulations published in 33 CFR Part 230 (Appendix B), 33 CFR Parts 320 to 340, 40 CFR Part 230 (if applicable), and 33 CFR Part 250 (Implementation of Executive Order 11988, Flood Plain Management), is in the public interest.

12 June 89
Date

Neil A. Smart
Colonel, U.S. Army
District Engineer

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING - P.O. BOX 2004
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO ATTENTION OF

CENCR-PD-R

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM DEFINITE PROJECT REPORT *WITH INTEGRATED ENVIRONMENTAL ASSESSMENT* (R-3)

BERTOM AND McCARTNEY LAKES REHABILITATION AND ENHANCEMENT

POOL 11, MISSISSIPPI RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN

JUNE 1989

ACKNOWLEDGMENT

Primary study team personnel who are familiar with the technical aspects of the study are listed below:

PROJECT MANAGER: Andrew J. Bruzewicz

PROJECT ENGINEER: Barbara Lee Kimler, P.E.

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ENVIRONMENTAL STUDIES: Robert A. Clevenstine

CULTURAL RESOURCES: Kenneth A. Barr

SOCIO-ECONOMIC ANALYSIS: Patricia L. Risser

GEOTECHNICAL: Donald H. Bawmann

WATER QUALITY: David P. Bierl

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TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

TABLE OF CONTENTS (Cont'd)

List of Tables

List of Plates

List of Appendices

EXECUTIVE SUMMARY

The Bertom and McCartney Lakes backwater complex is located on the east bank of Pool 11 approximately 3 river miles south of Cassville, Wisconsin (see plate 1). The proposed project features would lie entirely within an area of the Upper Mississippi River National Wildlife and Fish Refuge that is closed to hunting and trapping during the fall waterfowl migration. All project lands are owned by the United States. Some of the lands were acquired by the U.S. Fish and Wildlife Service (USFWS) for the Upper Mississippi River Wildlife and Fish Refuge. The remainder were acquired by the Corps of Engineers for the Mississippi River Nine-foot Channel project and are managed by the U.S. Fish and Wildlife Service under the terms of a cooperative agreement between the Department of the Army and the Department of the Interior dated February 14, 1963.

Sedimentation is occurring in this backwater complex due to normal fluvial processes of the river and erosion from adjacent upland drainage systems. Sedimentation is rapidly decreasing the extent and diversity of aquatic habitat in the project area. Physical changes such as shoaling and substrate burial combine with resultant turbidity and temperature elevations to produce less than optimal conditions for aquatic life. Three problems have been identified in the project areas affected by sedimentation: (1) winter oxygen demands brought on by decaying vegetation and low light conditions in shallow protected areas and low velocity habitats create fish kill situations; (2) wind and wave action on unprotected shoals results in sediment resuspension and turbidity which in turn prevents light penetration and establishment of aquatic vegetation during the growing season; and (3) fish attracted to the stable temperatures of anoxic spring-fed flows are trapped and killed in the spring areas by a combination of shoaling, ice cover, and a lack of inflow and circulation.

Alternative locations for backwater rehabilitation within or adjacent to Pool 11 have been considered. Bluff encroachment on both sides of this pool results in a relatively narrow floodplain with limited potential for habitat improvement (see plate 6). Upper Pool 11 currently supports extensive quantities of bottomland hardwood terrestrial habitat, while lower Pool 11 is predominantly open water. A critical need for aquatic habitat diversification and off-channel deepwater restoration has been documented for this reach of the river (unpublished report, Fish and Wildlife Interagency Committee, 1987).

Sites possessing the integrated emergent wetland environment that is most receptive to and provides the greatest benefits from rehabilitation and enhancement are found throughout Pool 11. The Bertom and McCartney Lakes backwater complex, located at mid-pool, is one site that incorporates the areal extent, habitat characteristics, and land-use status necessary to meet habitat improvement objectives for Pool 11.

Project objectives for this backwater complex include: improving fish wintering habitat; establishing an aquatic vegetation bed for migratory waterfowl and fisheries benefits; reducing bedload sediment entry; and providing additional, diversified habitat for benthic and aquatic communities.

The project objectives will be realized by dredging deepwater channels and connections to spring-fed sloughs; building a barrier island from the dredged material; constructing a rock partial closing structure; and installing rock substrate and protective cover structures.

The alternative features selected for this habitat rehabilitation and enhancement project include: extensive dredging of McCartney Lake's adjacent side channels and sloughs; in-water confined placement of dredged material; construction of an underwater rock partial closing structure; and placement of rock substrate and protective cover structures in a side channel.

Dredging activities proposed for this project will result in the hydraulic removal of approximately 400,000 cubic yards of fine-grained sediments from the side channels and sloughs adjacent to McCartney Lake. A ring containment levee will be constructed at a site in the middle of McCartney Lake. Dredged material will be placed within this ring. The resulting island feature will be oriented and shaped to provide wind fetch protection to approximately 10 acres of lower McCartney Lake on the lee side of the island. Within this protected area, an aquatic vegetation bed will establish itself. An underwater rock partial closing structure will be constructed at the backwater opening immediately upstream from Coalpit Slough. This structure has been designed to impede the ingress of bedload sediment to this backwater complex. This structure will be tied to adjacent banks with riprap protection wings to prevent flanking during periods of high flow.

Fish and mussel habitat will be enhanced by lining approximately 1,500 feet of an existing side channel adjacent to Coalpit Slough with rock. The selected side channel has a minimum bottom width of 50 feet. The rock to be used will be of several different sizes, gradations, and types in order to further diversify the habitat. This component of the project will include the installation of submerged, protective structures developed to provide resting, feeding, and escape cover for fish.

Upland placement of dredged material was proposed as a project alternative but not selected due to unacceptably high operational costs and inherent difficulties associated with obtaining necessary easements. Shoreline confined dredged material placement was rejected due to the resultant terrestrial habitat degradation. Construction of a partial closing structure across Coalpit Slough, originally perceived to be a major access point for river bedload materials to this backwater complex, was eliminated from the selected design following evaluation of soundings which revealed an existing, natural submerged berm at this location. This berm is already providing the bedload impedance that is desired. Dredging in Bertom Lake was removed from the plan due to the potential disruption of existing migratory waterfowl habitat.

Average annual operation and maintenance costs of the project are estimated to be $5,500 per year. The USFWS will be the responsible agency for securing all operation and maintenance costs, in cooperation with the non-Federal sponsor, the Wisconsin Department of Natural Resources.

Rehabilitation is reconstructive work which cannot be accurately estimated. The U.S. Army Corps of Engineers, as stated in the Agreement for Operation, Maintenance, and Rehabilitation, will be responsible for the Federal share of any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements identified in the Definite Project Report and that is needed as a result of specific storm or flood events.

The potential habitat enhancement benefits to the Bertom and McCartney Lakes backwater complex from this project will include the addition of: approximately 200 acre-feet of off-channel, deepwater aquatic habitat; 1,800 square feet of lentic-lotic habitat access cross-sectional area; approximately 10 acres of aquatic vegetation bed on the lee side of the in-water dredged material placement site; and 10,000 square yards of rock substrate habitat. Reduced bedload sediment access to this backwater complex, improved dissolved oxygen concentrations during critical seasonal stress periods, and the addition of protective cover opportunities for fish in the project area also will be realized.

The deepwater channels to be created by dredging will provide needed winter fisheries habitat as well as entrance and exit channels to spring-fed sloughs. The orientation and geometry of the in-water dredged material placement site will provide substantial wind fetch protection to lower McCartney Lake. Reduced turbidity in this protected area will result in aquatic conditions receptive to the establishment of beneficial aquatic plant species. The rock substrate and protective cover structures to be installed will diversify the aquatic and benthic habitat available within Pool 11. The rock partial closing structure will not only inhibit bedload sediment from reaching this backwater complex, but also will provide additional rock habitat.

It is proposed that quantitative physical and chemical parameter measurements be collected to evaluate project performance with respect to the stated project objectives. Qualitative field observations would be completed by the USFWS and submitted to the Corps of Engineers as part of the annual management report for Cooperative Agreement lands. Collection of the quantitative data, including dissolved oxygen, water temperature, point water velocity, and depth of ice and snow cover measurements during the critical seasonal stress periods, annual areal surveys, and quinquennial mussel surveys and hydrographic soundings and substrate analyses of the dredged channels, dredged openings, rock habitat area, and partial closing structure, would be the responsibility of the Corps of Engineers.

The District Engineer has reviewed the project outputs and determined that implementation of the identified plan is justified and in the Federal interest. The project area is managed as a National Wildlife Refuge within the meaning of Section 906(e) of the 1986 Water Resources Development Act. Therefore, approval for construction of the Bertom and McCartney Lakes habitat rehabilitation and enhancement project is recommended by the Rock Island District Engineer at a 100 percent Federal cost estimated at $2,912,000. The District Engineer further recommends that funds in the amount $82,000 be allocated as quickly as possible for the preparation of plans and specifications.

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BERTOM AND McCARTNEY LAKES
REHABILITATION AND ENHANCEMENT

POOL 11, RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN

1. INTRODUCTION.

a. Purpose. The purpose of this report is to present a detailed proposal for the rehabilitation and enhancement of Bertom and McCartney Lakes. This report provides planning, engineering, and sufficient construction details of the selected plan to allow final design and construction to proceed subsequent to approval of this document.

b. Resource Problems and Opportunities. The primary resource problem in the study area is continual sedimentation of backwater aquatic and wetland habitats. Sedimentation is the primary aquatic resource problem throughout the Upper Mississippi River (UMR), and is believed to be responsible for changes in the sport fishery, declines in the commercial fishery, and losses of habitat for migratory waterfowl, throughout the pooled portions of the river.

In the study area, the opportunity exists to restore aquatic habitat, improve aquatic and wetland values, and protect restored or remaining habitat by reducing sediment input to the study area.

c. Scope of Study. The geographical scope of the study area is shown on plates 1, 2 and 3. Emphasis was placed on developing project features which were located on existing Government-owned lands. Although additional land could be purchased by non-Federal interests, alternatives with land acquisition were generally not pursued due to policy, scheduling, and funding constraints.

Field surveys were performed in developing sedimentation estimates and estimating excavation/dredging quantities. Surveyed sections will be used to evaluate post-construction performance.

Soil borings were taken to assess sediment types, to verify foundations of proposed structures, and to determine excavation/dredging difficulty. Water quality sampling was initiated at the commencement of the study and will continue through construction.

Fish and waterfowl observations within the study area were made by the Wisconsin Department of Natural Resources (WDNR). These observations will assist in evaluating project performance.

d. Format of Report. The report is organized to follow a general problem solving format. The purpose and problems are presented in Section 1. Section 2 provides an overview of how and why Bertom and McCartney Lakes was selected as a project within the Environmental Management Program. Section 3 establishes the baseline for existing resources. Section 4 provides the objectives of the project. Sections 5 and 6 propose and evaluate project alternatives, and Sections 7 and 8 describe the selected plan. Section 9 is an assessment of environmental effects from the proposed plan. Section 10 provides a summary of project accomplishments and benefits. Sections 11, 12, and 13 describe estimated operation and maintenance considerations, performance monitoring, and detailed cost estimates for both initial construction and annual operation and maintenance. Sections 14, 15, 16, and 17 provide a summary of implementation requirements and coordination. Sections 18 and 19 present the conclusions and recommendations. A Joint Finding of No Significant Impact follows the main report.

Drawings (plates) have been furnished to provide sufficient detail to allow review of the existing features and the proposed plan. Plates 1 through 5 show the project location, the recommended plan, and alternative plans. Plate 6 shows adjacent watersheds which were studied to evaluate adjacent sedimentation effects. Plates 7 and 8 show 22 years of hydrographic record of the Mississippi River at the proposed project site. These hydrographs provide the relationship between river flood events and proposed containment levee heights. Plates 9 and 10 show soil borings which were used to evaluate foundation effects and excavation/fill methods. Plates 11 through 14 provide plan views of the selected alternative. Plate 15 provides section views for the selected plan. Plates 16 through 26 show and provide a basis for future monitoring ranges.

e. Authority. The authority for this report is provided by the 1985 Supplemental Appropriations Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The proposed project would be funded and constructed under this authorization. Section 1103 is summarized as follows:

Section 1103. UPPER MISSISSIPPI RIVER PLAN

(a) (1) This section may be cited as the Upper Mississippi River Management Act of 1986.

(2) To ensure the coordinated development and enhancement of the Upper Mississippi River system (UMR), it is hereby declared to be the intent of Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system. Congress further recognizes that this system provides a diversity of opportunities and experiences. The system shall be administered and regulated in recognition of its several purposes.

(e) (1) The Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, is authorized to undertake, as identified in the Master Plan -

(A) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement...

2. GENERAL PROJECT SELECTION PROCESS.

a. Eligibility Criteria. A design memorandum did not exist at the time of the enactment of Section 1103. Therefore, the North Central Division, U.S. Army Corps of Engineers, completed a "General Plan" for the implementation of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP) in January 1986. The U.S. Fish and Wildlife Service (USFWS), Region 3, and the five affected states (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) participated through the Upper Mississippi River Basin Association (UMRBA). Programmatic updates of the General Plan for budget planning and policy development are accomplished through Annual Addendums.

Coordination with the states and the USFWS during the preparation of the General Plan and Annual Addendums led to an examination of the Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Master Plan, completed by the Upper Mississippi River Basin Commission in 1981, was the basis for the recommendations enacted into law in Section 1103. The Master Plan report and the General Plan identified examples of potential habitat rehabilitation and enhancement techniques. Consideration of the Federal interest and Federal policies has resulted in the conclusions below:

(1) First Annual Addendum. The Master Plan report ... and the authorizing legislation do not pose explicit constraints on the kinds of projects to be implemented under the UMRS-EMP. For habitat projects, the main eligibility criteria should be that a direct relationship should exist between the project and the central problem as defined by the Master Plan, i.e., the sedimentation of backwaters and side channels of the UMRS. Other criteria include geographic proximity to the river (for erosion control), other agency missions, and whether the condition is the result of deferred maintenance.

(2) Second Annual Addendum. The types of projects that are definitely within the realm of Corps of Engineers implementation authorities include the following:

- backwater dredging
- dike and levee construction
- island construction
- bank stabilization
- side channel openings/closures
- wing and closing dam modifications
- aeration and water control systems
- waterfowl nesting cover (as a complement to one of the other project types)
- acquisition of wildlife lands (for wetland restoration and protection.) Note: By letter of February 5, 1988, the Office of the Chief of Engineers directed that such projects not be pursued.

A number of innovative structural and nonstructural solutions which address human-induced impacts, particularly those related to navigation traffic and operation and maintenance of the navigation system, could result in significant long-term protection of UMRS habitat. Therefore, proposed projects which include such measures will not be categorically excluded from consideration, but the policy and technical feasibility of each of these measures will be investigated on a case-by-case basis and recommended only after consideration of system-wide effects.

b. Selection Process. Projects are nominated for inclusion in the District's habitat program by the respective State conservation agencies and the USFWS based on agency management objectives. To assist in the project formulation process, the Fish and Wildlife Interagency Committee (FWIC) convened a series of meetings in 1986 to consider critical habitat needs along the Mississippi River. At these meetings, biologists who are responsible for managing the river evaluated the available habitat on a pool-by-pool basis. This analysis revealed deficiencies [(such as feeding, resting, and loafing areas for migratory waterfowl, absence of deepwater habitat off the main channel for fish and diving ducks, as well as types of habitat in abundant supply (e.g., mature bottomland hardwood)]. With this information, projects being considered will most accurately reflect broader regional needs in addition to representing the best site-specific choices.

Rock Island District assists the State and the USFWS agencies proposing habitat projects through use of an in-house task force with members from the design, hydraulics, channel maintenance, environmental, and waterways planning branches. As projects are being conceptualized, this group meets on-site with State and USFWS personnel to examine as fully as possible what site-specific benefits would be both desirable and feasible from an engineering standpoint.

As input to the District to assist in the final selection of projects to be included in the program, the FWIC ranks projects according to the biological benefits that they could provide. Each project is considered, and project alternatives to increase habitat benefits for fish, waterfowl, and other wildlife are suggested. Every project is ranked according to the benefits provided as high, medium, or low.

The FWIC rankings are forwarded to the District and to the River Resources Coordinating Team (RRCT), an interagency policy group which meets to coordinate Mississippi River activities. The RRCT examines the FWIC rankings and includes consideration of the broader policy perspectives of the agencies submitting the projects. The RRCT-recommended rankings also are submitted to the District, and the District then formulates and submits a recommended program to the EMP program manager at North Central Division.

Projects consequently have been screened by biologists closely acquainted with the rivers. Resource needs and deficiencies have been considered on a pool-by-pool basis to ensure that regional needs are being met and that the best expertise available is being used to optimize the habitat benefits created at the most suitable locations.

c. Specific Site Selection. Through the preceding process of evaluation and nomination, the Bertom and McCartney Lakes project was recommended and supported as capable of providing significant aquatic and waterfowl benefits. These benefits will be realized by implementing the proposed features. The selected site is entirely located on existing federally owned lands.

Other potential locations adjacent to or within the Pool 11 reach, encompassing River Miles (RM) 615 to 583, were evaluated for possible waterfowl and aquatic habitat rehabilitation and enhancement projects. The presence of steep bluffs, which encroach upon both sides of Pool 11, limit the extent of the floodplain along this reach of the river. Upland locations are considered to be not feasible due to the surface water supply and river adjacency requirements of this program. Recognition that high per unit biological productivity can occur within mid-pool river reaches assisted in the final site selection. Lower Pool 11, below the Bertom and McCartney Lakes backwater complex, is primarily open water and is currently under consideration for construction of islands to ameliorate wind-induced waves and resultant turbidity with additional benefit to waterfowl. Reaches upstream of the proposed site consist predominantly of bottomland hardwoods with limited integrated emergent wetland habitat necessary for aquatic and wetland habitat development. The Turkey River bottoms area, located on the west bank of Pool 11 approximately at RM 609 to RM 608 is currently under consideration for conversion from agriculture to moist soil management unit development.

Given the purposes identified for the Bertom and McCartney Lakes rehabilitation and enhancement project, within the context of the overall Pool 11 resource goals, the Pool 11 Islands and Turkey River Bottoms projects are separate and potentially complete actions that will contribute their own specific benefits to Pool 11 while complementing the benefits from the Bertom and McCartney Lakes project. These projects were not considered further at this time due to the differences between the opportunities provided by their low terrestrial (Turkey River Bottoms) and drowned and eroding islands (Pool 11 Islands) context and those opportunities which the proposed project will achieve.

The Cassville Slough, which courses roughly parallel to the main river channel from RM 615 to RM 608, and its environs possess limited habitat development potential due to high flow velocities and the predominance of sands.

The following conditions and location-specific attributes provided support for final selection of the Bertom and McCartney Lakes backwater complex site: documented, seasonally low to near zero dissolved oxygen levels and advanced sedimentation conditions; a stable chute with direct connection to the main channel appropriate for placement of rock substrate and installation of man-made, fisheries cover structures; and the presence of natural springs.

Additionally, the historic value of this backwater complex as a migratory waterfowl and aquatic habitat is well established. Observed reductions in waterfowl utilization during the fall migration and winter fish kills support the documented deterioration and loss of aquatic habitat within this backwater complex.

3. ASSESSMENT OF EXISTING RESOURCES.

a. Resource History. The project area consists of two backwater lakes connected to the main river by braided meanders at the upstream end and openings to the Hurricane Island side channel at the downstream end (see plate 2). The area lies within about 3,500 acres of open water, emergent wetland, and bottomland forest vegetation. At the time of impoundment, circa 1935, the project area contained an estimated 2,000 acres of open water, including shallows and flooded stumpfields. Since that time, about 600 surface acres have been lost, and remaining average water depths have been reduced to 4 feet or less throughout the Bertom-McCartney Lakes complex.

In Bertom Lake, shallower water depths have allowed the establishment of extensive rooted and floating aquatic plant beds. Shallower depths also have allowed warmer water temperatures with correspondingly lower dissolved oxygen levels. Where wind fetch is not blocked by land forms, wave action has inhibited plant growth and increased turbidity by resuspension of sediment in McCartney Lake.

All project lands are owned by the United States. Some of the lands were acquired by the USFWS for the Upper Mississippi River Wildlife and Fish Refuge. The remainder were acquired by the Corps of Engineers for the Mississippi River Nine-foot Channel project and are managed by the USFWS under the terms of a cooperative agreement between the Department of the Army and the Department of the Interior dated February 14, 1963.

b. Land Use. The project site is located within a national wildlife refuge. All land uses are those associated with the management of natural resources for national benefit. The majority of project construction will take place on parcels owned by the USFWS. Table 3-1 is a summary of existing features of the project area.

TABLE 3-1

Bertom and McCartney Lakes
Existing Features *

Aquatic Conditions	Approximate Area - Acres
Main Channel	---
Main Channel Border	---
Side Channel	---
Sloughs (Running)	125
Aquatic Bed (Shallow Rooted Vegetation)	500
Open Water	1,258
Total Aquatic	1,983

TABLE 3-1 (Cont'd)

Terrestrial/Wetland Conditions

Forest	570
Brush	---
Meadow	---
Sand (Unvegetated)	6
Mudflat (Vegetated/Emergent)	100
Agriculture	---
Developed (Recreation Access)	2
Total Terrestrial	678
	2,661

* Includes habitat from river miles 598.5 to 693.5.

c. Aquatic Resources. Permanent year-round aquatic habitat in Bertom and McCartney Lakes is primarily shallow, less than 4 feet deep throughout most of the project area. Remnants of a channel or slough, remaining from preimpoundment, run through the project area and reach depths of 9 feet in upper McCartney Lake.

Aquatic habitat in the project area is being lost to sedimentation. These sediments range from sand to fine silts and clays. Deposition in the Bertom Lake portion of the study area is predominantly sandy, heavier sediment, while McCartney Lake is filling with finer material. The difference is likely due to differences in the hydraulic characteristics of the meandered channels entering the two areas and seasonal flow conditions from Bertom into McCartney Lake.

During recent years, the surface of Bertom Lake has been almost entirely covered with rooted or floating aquatic plants by late summer. Typical plant species are American lotus, pondweed (Potamogeton) species, coontail, and duckweed.

With winter ice cover, these areas display very little habitat value due primarily to reduced oxygen levels brought on by decaying vegetation and low light conditions. In low or no velocity habitats, decaying vegetation creates oxygen demands beyond levels that can be replaced through photosynthesis or inflow. In areas where fish cannot escape these conditions, winter fish kills result.

McCartney Lake, although shallow, has not become as vegetated as Bertom Lake due to turbidity/clarity limitations from suspended sediments. Finer sediments in McCartney Lake are resuspended through combinations of flow and wind and wave action. Vegetated shallows in McCartney Lake are limited to the leeward side of land masses and near-shore areas. Along the Wisconsin bank are areas where spring flows enter McCartney Lake. Typically, these springs are extremely low in dissolved oxygen, but have fairly constant temperatures. Flows displaying constant temperatures can be fish attractants

during seasonal extremes and can concentrate fish in areas of critically low oxygen during both summer and winter. During summer, photosynthetic activity ameliorates oxygen deficits in the spring areas. In combination, shoaling and winter ice cover can trap fish which have concentrated in spring areas. Without current inflow, mixing, or adequate photosynthetic activity, oxygen levels decrease and any fish trapped in spring areas suffocate at this time.

d. Terrestrial and Wetland Resources. Terrestrial habitat is a relatively small component of the total project area and consists of silver maple association forest. Typical of river bottomlands, the silver maple forest also may be considered wetland, as defined by soils, hydrology, and plant species.

Bottomland forest values include nesting and feeding for songbirds, wood ducks, and waterbirds; and forage and cover for furbearers, small mammals, and game species. A great blue heron rookery is present at approximate RM 600.9L in the area between Dago Slough and McCartney Lake.

Typical wetland habitat is extensive throughout the project area and consists of vegetated shallows containing the species noted above. Temporary shallows or mudflats are dominated by arrowhead and smartweed. Canary grass and rice cutgrass appear between vegetated mudflats and forested elevations.

Wildlife values associated with the above habitat include feeding, resting, and nursery cover for furbearers and a variety of birds and mammals. Migratory waterfowl use of the area occurs primarily in Bertom Lake and the adjacent Hay Meadow Lake area. Waterfowl food production varies annually according to water level fluctuations, and has increased during the last 2 years, primarily due to low water levels and increased water clarity during the spring and summer growing period. However, low water levels, coupled with sedimentation, have reduced the total water surface area available to migratory waterfowl. Unless flooded, much of the food production on vegetated mudflats cannot be used by waterfowl.

e. Water Quality. Water quality conditions within the project area are adequate to support the indigenous aquatic life during most periods; however, recent Corps and WDNR studies have shown that, on occasion, dissolved oxygen concentrations can fall to levels considered detrimental to aquatic life. A WDNR study performed on August 13-20, 1987, in a shallow side slough along the eastern shore of McCartney Lake showed that 90 percent of the hourly dissolved oxygen concentrations were less than the State standard of 5 mg/l.

Bulk sediment and elutriate analysis results indicate that ammonia nitrogen would be the only parameter of concern during dredging operations. Several heavy metals were present in the sediment; however, small concentrations of these metals in the elutriate attest to their relative insolubility.

Analysis results of sediment and water quality testing are discussed in detail in Appendix B - Clean Water Act, Section 404(b)(1) Evaluation. Given the minimum settling time planned for dredged material within the island containment basin, suspended solids entering the water column of the Mississippi River are not anticipated to settle out to any significant degree. With the exception of ammonia nitrogen, no significant contaminant or potential for contamination was found during analysis of sediments proposed to

be dredged for this project. Ammonia nitrogen is a natural constituent of the riverine environment and is toxic only under a specific set of circumstances, i.e., high temperatures, high pH values, stagnation, and high extant concentrations. The contractor will be required to comply with WDNR water quality certification limitations and requirements for ammonia nitrogen. Therefore, through either construction scheduling and/or special construction techniques (such as aeration), ammonia nitrogen concentrations will not exceed State standards.

f. Endangered Species. The only federally listed endangered species known from the project area is the bald eagle (Haliaeetus leucocephalus). The bald eagle is generally a winter migrant in the project area. State-listed endangered species for Grant County are generally excluded from the project site by habitat requirements, with the exception of the bald eagle.

g. Cultural Resources. An archeological sample survey and historic properties overview of Mississippi River Pool 11 entitled Archaeological Investigations, Navigation Pool 11, Upper Mississippi River Basin (Overstreet 1985) indicates that a number of prehistoric sites have been documented adjacent to the upper reaches of Bertom Lake, including a Woodland mound group. However, no underwater or submerged properties have been documented in the vicinity of the project area.

h. Adjacent Water Projects. The proposed Bertom and McCartney Lakes project is adjacent to the Mississippi River 9-Foot Channel, as authorized by the River and Harbor Act of July 3, 1930. Proposed project features of this report will not affect navigation.

i. Sedimentation. A study was conducted to evaluate sedimentation in the Bertom and McCartney area during the period 1938 through 1988. The scope of this study consisted of determining net deposition from 1938 (pre-lock and dam) through 1988. The average total sedimentation rate for the overall Bertom and McCartney area has been approximately 0.39 inch/year. It has been found that the Upper Bertom Lake area is subject to a higher influx of river bedload sandy sediments. The average sedimentation rate for Bertom Lake is 0.70 inch/year.

The two predominant sedimentation sources are the Mississippi River and adjacent upland erosion. A comparison of river versus upland erosion is presented in table 3-2.

TABLE 3-2

Comparison of River Versus
Upland Erosion Sedimentation

Sedimentation Source	Annual Volume (Acre-Feet/Yr)	Portion of Total (%)
Adjacent Watershed	4.3	12.2
River	30.9	87.8
Net	35.2	100.0

4. PROJECT OBJECTIVES.

The project goals, objectives, and enhancement potential are presented in table 4-1.

TABLE 4-1

Project Goals, Objectives, and Enhancement Potential

Goal	Objectives	Unit of Measure	Enhancement Potential Existing	Enhancement Potential Target
Enhance aquatic habitat	Restore deep (6 ft.) aquatic habitat	ac-ft (CY)	0	250 (400,000)
	Restore lentic-lotic habitat access cross-sectional area	sq.ft.	300	1,800
	Increase rock substrate aquatic habitat	sq.yd.	0	10,000
	Establish mussel bed	no./sq.yd.	0	10
	Reduce movement of bedload sediment into Bertom Lake	in./yr.	0.70	0.55
	Improve dissolved oxygen concentration during critical seasonal stress periods	mg/l	5.0 mg/l	5.0 mg/l
Enhance migratory waterfowl habitat	Establish aquatic vegetation bed	acre	0	10

Project goals and objectives were defined during initial project selection in Pool 11 and planning enhancement measures for the middle portion of the pool. These goals and objectives were identified in an unpublished draft report prepared by the FWIC. The draft report is entitled Goals for Management of Fish and Wildlife Resources and Habitat Rehabilitation and Enhancement for Pools 11-22.

In order to meet the aquatic enhancement goal, restoration of deep aquatic habitat is intended to provide year-round aquatic habitat where shoaling and ice cover limit availability. Restoration of access between lentic (non-flowing) and lotic (flowing channel) habitat areas will prevent entrapment of fish in newly dredged areas by allowing exhange between them. In addition, restoration of the cross-sectional area will improve mixing between the two habitats, thereby improving dissolved oxygen (DO) concentrations throughout the project area. Increasing rock substrate will provide benthic habitat diversity in an area with a predominantly fine-grained bottom. Reduction of

bedload sediment movement into the backwater will extend the life of the existing aquatic resources as well as the proposed project action. All of the foregoing measures are anticipated to measurably improve physical habitat components, temperature regimes, and DO concentrations where DO has limited the value of existing aquatic habitat.

In order to meet the goal of migratory waterfowl habitat enhancement, a portion of the project will provide increased food plant production in an aquatic plant bed. Placement of dredged material in an island configuration will provide a wind-sheltered area in McCartney Lake. Reduction of wind fetch will, in turn, reduce sediment resuspension and improve water clarity to a point suitable for rooted aquatic plant establishment.

5. ALTERNATIVES.

a. Alternative A - No Federal Action. No Federal action would consist of no Federal funds being provided to meet the project purposes.

b. Alternative B - Partial Closing Structures. This alternative consists of the construction of submerged rock-fill structures across existing openings into the Bertom Lake backwater complex. Two locations were considered, one across Coalpit Slough and one across the next backwater opening upstream (see plate 4). The purpose of these structures would be to reduce the ingress of river bedload materials without impacting overall flow regimes into the complex. The partial closing structures would be tied into the adjacent banks with riprap-protected wings to prevent flanking during periods of high flow.

c. Alternative C - Fish and Mussel Rock Habitat. This alternative consists of providing a rock channel bottom to enhance the fish and mussel habitat in the existing slough adjacent to Coalpit Slough (see plate 14). The channel would be approximately 1,500 feet long with a minimum 50-foot bottom width as shown on plate 15. Several different rock types and gradations would be used to diversify the habitat. Also, fish structures will be installed.

d. Alternative D - Bertom Lake Dredging. Dredging in Bertom Lake would be performed as shown on plate 4. Approximately 160,000 cubic yards of sand materials would be hydraulically dredged and used for the construction of a ring dike for a confined dredged material placement site.

e. Alternative E - McCartney Lake Dredging. Dredging in McCartney Lake side channels and sloughs would be as shown on plates 4 and 5. Approximately 400,000 cubic yards of fine-grained sediments would be hydraulically dredged and placed in a confined placement site as described in Alternatives F through H. Approximately 160,000 cubic yards of sandy material would be required to create a ring berm for the confined placement site.

f. Alternative F - Upland Dredged Material Placement Site. This placement site would be located on privately owned lands on top of the bluffs adjacent to the Bertom and McCartney complex. The containment levee for this site would be constructed from adjacent borrow.

g. Alternative G - Shoreline Confined Dredged Material Placement Site. Two locations for a shoreline placement site were considered as shown on plate 5. The shoreline placement site would utilize existing shoreline for the foundation of all or part of the containment levee.

h. Alternative H - In-Water Confined Dredged Material Placement Site. Three locations for this placement site were considered as shown on plate 5. These alternative sites consist of constructing a ring containment levee in shallow, open water. The levee would be constructed either hydraulically from dredged sand from Bertom Lake or mechanically or hydraulically from adjacent borrow. The levee would be constructed to a 2-year frequency event with 2 feet of freeboard.

6. EVALUATION OF ALTERNATIVES.

Alternative A, no Federal action, would not meet the project objectives of improving aquatic habitat and diversity and enhancing waterfowl habitat.

Alternative B, partial closing structures, was evaluated. Soundings taken at the proposed structure locations revealed that the Coalpit Slough opening is already heavily silted in. Construction of a partial closing structure at this location would require extensive excavation. Because the opening already has a natural partial closure, construction of a new structure at this location would produce no benefits. Construction of a new structure would require dredging and placement of the existing sediments which form the natural partial closure.

A partial closing structure across the slough entrance upstream from Coalpit Slough would help to deter the entrance of river bedload into the Bertom Lake complex. This would enhance aquatic habitat by meeting the project objective of reducing the movement of bedload sediment into the backwater complex. It also would serve as protection and provide an additional structure for the proposed fish and mussel rock habitat immediately downstream.

In Alternative C, the fish and mussel rock habitat was evaluated. The construction of the rock bottom channel and installation of fish structures would enhance aquatic habitat by meeting the project objective of increasing rock substrate aquatic habitat and establishing a mussel bed.

Alternative D, Bertom Lake dredging, was studied. The sandy material dredged from Bertom Lake would greatly facilitate the construction of a ring levee for the confined placement site as well as increase the deepwater fish habitat in Bertom Lake.

However, this alternative would disturb the already well established migratory waterfowl habitat. Presently Bertom Lake access is poor, thereby protecting waterfowl from disturbance by fishermen. Dredging of the lake would open access to the lake as well as potentially increase the sport fish population. Both of these factors will result in a dramatic increase of fisherman and consequent waterfowl disturbance in the refuge.

Alternative E, McCartney Lake side channel and slough dredging, was evaluated. Side channel and slough dredging would enhance aquatic habitat by meeting the project objectives of restoring lentic-lotic habitat access cross-sectional area and restoring deep aquatic habitat. This dredging will provide 200 acre-feet of deepwater habitat as well as 1,800 square feet of lentic-lotic access. This lentic-lotic area would decrease fish winter kill by providing entrance and exit channels between the oxygen-deficient spring-fed areas to the oxygenated areas of McCartney Lake. The proposed dredging also will increase side channel flow in some areas, thereby improving oxygen exchange between the spring-fed areas and the main lake. This will meet the project objective of improving dissolved oxygen concentration during critical seasonal stress periods.

Alternative F consists of placing dredged material in an upland dredged material placement site on top of the bluffs. This alternative was dismissed due to the impracticality of pumping dredged material against a head of more than 200 feet. Also, acquisition of construction easements would be required for this alternative since this area is beyond the boundaries of the Federal lands. Use of an upland site for dredged material placement would not contribute to the project objective of establishing an aquatic vegetation bed.

Alternative G consists of placing dredged material in a shoreline confined material site. This alternative would, in effect, increase the area of the existing land mass between McCartney Lake and the Mississippi River. However, the existing shoreline areas which would be utilized for this site already provide superior migratory waterfowl habitat, and creation of a shoreline placement site would destroy the value of that existing habitat without offering new habitat of equivalent value. Depending on location, this could require the clearing of up to 10 acres of bottomland forest habitat for the construction of the confined placement site which would not meet the project objective of aquatic vegetation bed creation.

For Alternative H, the in-water confined dredged material placement site, three locations were considered: an upstream site, a downstream site, and a middle site (see plate 3). All three sites would consist of constructing a ring containment levee in shallow, open water. The three sites were located such that they would be constructed on firm foundations with very little recent sediment deposition as determined from the composite cross sections. Of the three locations, the middle site is the most desirable from a natural resource perspective. This location effectively breaks the McCartney Lake wind fetch length in half, thereby reducing turbidity caused by wave action sediment resuspension. This, in turn, will result in the natural creation of an aquatic vegetation bed on the lee side of the island.

7. SELECTED PLAN WITH DETAILED DESCRIPTION.

a. General Description. Alternatives B, C, E, and H were selected to be recommended for project construction. The construction of the partial closing structures (Alternative B), the fish and mussel rock habitat (Alternative C), the McCartney Lake dredging (Alternative E), and placement of dredged material in the in-water confined dredged material placement site (Alternative H), all meet project objectives and are cost-effective.

b. Partial Closing Structure. A submerged rock partial closing structure will be placed across the mouth of the slough entrance immediately upstream from Coalpit Slough (see plate 14). The top elevation of the structure will be 599 MSL, which will provide 4 feet of water above the top of the structure at flat pool conditions. This will allow sufficient flow over the structure such that its construction will not significantly impact the overall flow regime of the backwater complex.

The closing structure will have 1 vertical on 1 horizontal side slopes with a 5-foot bench on the riverside slope. This bench will be located 3 feet above the river bottom (see plate 15). The top width is 5 feet. The closing structure will be tied into the banks with riprap protection wings extending along the riverbank as shown on plate 14.

c. Fish and Mussel Rock Habitat. It is proposed to improve aquatic habitat in the inlet channel to Bertom Lake by providing a rock substrate channel bottom and installing fish structures. Reference plates 2, 14, and 15. Rock substrate is lacking in the project area, as well as throughout most of the UMR. The intention of rock placement at the proposed site is to provide habitat diversity for aquatic invertebrates, including mussels. Fishery benefit also will be realized with provision of a stable rock substrate in flowing water.

The rock substrate will be placed to appropriate elevations to prevent restrictions to flow through that reach of the channel. Also, an existing log jam at the west end of the channel will be removed. This will allow sufficient flow to sweep fine sediments from the rock substrate under normal seasonal flow conditions. Clear rock substrates are utilized by a variety of invertebrates and fish species not found on fine silt-clay substrates in the Mississippi River.

The length of the fish and mussel rock habitat channel is 1,500 feet and will be divided into seven discrete sections (see plate 14). The first section immediately following the partial closing structure will be 300 feet long; the remaining sections will be 200 feet long. The channel design includes a uniform bottom width of 50 feet (except in section 1 and existing areas wider than 50 feet) with 1 vertical on 2 relatively horizontal side slopes (see plate 15). The existing channel will be excavated by dragline or clamshell as required to achieve the minimum bottom width and to provide for unrestricted channel flow. The excavated material will be placed on the right bank of the channel and spread to prevent the creation of a berm.

Each channel section will have a different rock substrate material. The stone will vary from section to section by size, gradation, and rock type. Final stone selection will be based on geographical availability of gradations and rock types as well as stability under projected flow conditions. The rock will be placed in descending order by size such that section 1, immediately adjacent to the partial closing structure, will have the largest graded stone. The layer thickness of rock substrate will vary as dictated by stone size.

The fish and mussel rock habitat also will include habitat structures such as sections of reinforced concrete pipe and LUNKERS. LUNKERS is an acronym for Little Underwater Neighborhood Keepers Encompassing Rheotactic Salmonids.

These structures, originally designed as part of a trout habitat improvement program initiated by the WDNR, consist of a submerged system of planking which is then installed into a stream bank to provide resting, feeding, and escape cover for fish. Details of the LUNKERS structures are shown on plate 14.

d. McCartney Lake Dredging. McCartney Lake dredging will take place as shown in plates 3, 11, 12, 13, and 15. Dredging will be performed in the side channels and sloughs to ensure a minimum water depth of 6 feet throughout the project life as shown in table 8-1. There will be a minimum water depth of 10 feet in the cut area adjacent to the railroad tracks from station 126+00 to station 136+00.

e. In-Water Confined Dredged Material Placement Site. The in-water confined placement site will be constructed to the configuration shown in plates 3 and 15. The top elevation of the containment levee will be 610 MSL and the levee height will vary from 7 to 11 feet. The containment levee will be built mechanically from sand materials which underlie clayey overburden in the area enclosed by the containment levee. The top 6 inches of the levee will be covered with the clayey material to facilitate revegetation.

Column settling analyses were performed to determine the required total volume, surface area, and settling time for dredged material containment. The dredged material will require approximately 12 percent more volume than the in situ sediments. The contained dredged material will need 22 acres of surface area to achieve a settling time of 26 hours. This will provide an effluent suspended solids concentration of 75 mg/l which corresponds to a removal efficiency of 95 percent.

8. DESIGN AND CONSTRUCTION CONSIDERATIONS.

a. Existing Site Elevations. Mobilization of construction equipment (hydraulic dredge and barge-mounted equipment) into McCartney Lake can be accomplished when river levels are at or above flat pool. Once mobilized, the utilization of this equipment is relatively independent of river stage. Conventional barge-mounted equipment can be used for the construction of the partial closing structure, the fish and mussel rock habitat, and the containment levee for the dredged material placement site.

b. Dredging Depths and Equipment. It is anticipated that all McCartney Lake dredging will be accomplished with a large (16") cutterhead hydraulic dredge. The containment levee will be built by barge-mounted dragline or clamshell in compliance with water quality certification recommendations. All of the fish and mussel rock habitat excavation can be accomplished with a barge-mounted backhoe.

The selected dredging depth was based upon water clearance as shown on table 8-1.

TABLE 8-1

Basis of Dredging Depth

Elevation (MSL)	Description
603.0	Pool 11 flat pool
- 1.0	Present low-flow winter regulation
- 6.0	Maintained water depth
- 2.0	60 years of sediment
_____	(.4 inch per year)
594.0	Minimum dredge depth

c. Dredged Material Placement Site.

(1) Containment Levee. The containment levee for the dredged material placement site will be constructed from adjacent interior sand borrow. Slope stability analyses reveal that the levee will be stable and can have side slopes as steep as 3.5 vertical to horizontal. Final design may incorporate flatter slopes to minimize shaping requirements.

(2) Placement Site. The final design of the placement site will provide contractor options for placement methods while meeting effluent standards. The final design may require a two-cell disposal area. One cell would be in use while the other cell would be settling and consolidating. To achieve a suspended solids removal efficiency of 95 percent for dredging effluent, an average detention time of 26 hours is required. The final area required for placement may vary due to sediment types and settling characteristics.

d. Borrow Sites/Construction Materials.

(1) Borrow Sites. Sand embankment for the containment levee will be obtained from the interior of the placement site. This will require the removal and stockpiling of 2 to 4 feet of silty clay overburden which overlays the sand borrow. The stockpiled material will remain in the interior of the containment ring.

(2) Construction Materials. Only common construction materials are required for this project. Riprap, bedding, rock fill, and rock substrate are available from nearby river terminals and would be transported by floating barge to the project site. Required embankment materials are available on site.

e. Erosion Control.

(1) Containment Levee. Based on projected flow velocities, erosion control for flow protection is not required for the containment levee slopes. The orientation of the confined placement site reduces wind fetch such that the maximum wave heights attacking the levee slopes will be less than 2 feet. Final design may incorporate flatter exterior slopes to accommodate vegetation growth and provide protection against wave wash erosion.

(2) Rock Habitat Channel. Presently, the channel in which the rock habitat is to be constructed has stable banks and does not show signs of active erosion. However, since bank armoring is required in the vicinity of the fish structures, bank protection will be provided for the entire habitat channel to prevent migration of the channel.

f. Construction Restrictions. Because construction activities will be taking place in seasonally sensitive areas, special construction phasing will be implemented to minimize temporary disturbances in the refuge. Contract documents will require that construction of the fish and mussel rock habitat and the partial closing structure be completed before October 1, 1990. Further, construction of the containment levee and subsequent dredging will not be permitted to begin until July 1, 1990.

g. Permits. A Section 401 water quality certificate has been obtained from WDNR and is contained in appendix A. A Section 404(b)(1) evaluation is contained in appendix B. The USFWS will issue a Special Use Permit after all plans and specifications have been finalized and prior to advertisement of the construction contract.

9. ENVIRONMENTAL EFFECTS.

a. Summary of Effects. Effects on natural and cultural resources are summarized in table 9-1.

TABLE 9-1

Effects of the Proposed Project on
Natural and Cultural Resources

Type of Resource	Authority	Measurement of Effects
Air	Clean Air Act, as amended (42 U.S.C. 1657h-7, et seq.)	No significant effect
Endangered and threatened species critical habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531, et seq.)	No significant impacts anticipated
Fish and wildlife	Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.)	Restoration of lost aquatic habitat anticipated to benefit fish and migratory waterfowl
Floodplains	Executive Order 11988, Flood Plain Management	Preservation and restoration of natural and beneficial values
Historic and cultural properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.)	No significant effect
Prime and unique farmland	CEQ Memorandum of August 1, 1980; Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act	No significant effect
Water quality	Clean Water Act of 1977, amended (33 U.S.C. 1251, et seq.)	Improved circulation and mixing anticipated to improve water quality
Wetlands	Executive Order 11990, Protection of Wetlands, Clean Water Act of 1977, as amended (43 U.S.C. 1857h-7, et seq.)	Present in planning area; enhancement anticipated
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271, et seq.)	Not present in planning area

b. Economic and Social Effects. This analysis examines the socio-economic effects associated with the proposed habitat rehabilitation project.

(1) Community and Regional Growth. No impacts to the growth of the community or region would be realized as a result of the project.

(2) Displacement of People. No residential displacements would be necessitated by the proposed environmental enhancement project.

(3) Community Cohesion. No significant impacts to community cohesion would be noticed due to the nature of the project and its limited area of influence. The project site is located in a rural setting with limited residential development. While the project incidentally would improve the area for fish and wildlife resources, the resulting increase in recreation activity would not significantly impact area residents or property owners.

(4) Property Values and Tax Revenues. The potential value of property within the project area could increase slightly as a result of the proposed project. This land is in Federal ownership, however, so an increase in its value would not increase local tax revenues.

(5) Public Facilities and Services. The proposed environmental enhancement project would maintain and enhance recreational opportunities within Pool 11. The project site is federally owned and zoned by both the Corps of Engineers and USFWS for low-density recreation and wildlife management.

(6) Life, Health, and Safety. Currently, the Bertom and McCartney Lakes complex poses no threats to life, health, or safety of recreationists or others in the area. The proposed project would not impact current conditions in regard to these areas of concern.

(7) Employment and Labor Force. Project construction would slightly increase short-term employment opportunities in the project area. The project would not directly affect the permanent employment or labor force in Grant County.

(8) Business and Industrial Development. Changes in business and industrial activity during project construction would not be noticed. The project would require no business relocations.

(9) Farm Displacement. No farms would be affected as the project site is located entirely on federally owned land.

(10) Noise Levels. Heavy machinery would generate an increase in noise during the construction and dredging process. This increase would disturb wildlife and recreationists at the complex. However, the project site is located in an area with limited residential or other development. No significant long-term impacts would result.

(11) Aesthetics. No significant impacts to area aesthetics would result from the project.

c. Natural Resource Effects.

(1) Aquatic System. The proposed project will initially increase deep aquatic habitat by about 200 acre-feet. These deepwater areas will improve overall aquatic habitat quality and provide ingress and egress to oxygen deficit-prone areas. Flow increase in some of the side channel dredge areas is expected to increase slightly the introduction and mixing of more oxygen-rich water into low-velocity areas of McCartney Lake. By providing entrance and exit channels for fish, trapping and winter/summer kill potential should be significantly reduced in nonflowing areas of McCartney Lake.

About 1,500 linear feet of rock bottom substrate will be provided in the Bertom Lake inlet channel. As currently planned, this substrate will consist of larger grade limestones at the riverward entrance to the channel, intermediate grades in the middle section, followed by a gravel/cobble section.

Dredged material will be placed to form an island approximately in the middle of McCartney Lake. The island is designed to reduce wind fetch and resultant sediment resuspension.

Dredging activity will destroy the existing benthic community along the aligment of the dredge cut and at the location of island development. The benthic community is anticipated to recover, throughout the dredge cut, within about 1 year following dredging activity.

Approximately 30 acres of nonvegetated shallow aquatic habitat will be converted to terrestrial and wetland habitat. Along the Bertom Lake inlet channel, rock placement will replace the existing fine substrate and associated benthic community. Because of the preponderance of fine substrates found throughout the project area under a wide range of velocities, the impact of rock substrate conversion is considered to be insignificant. Rock substrate placement will provide much-needed habitat diversity in the Bertom-McCartney Lakes complex.

(2) Terrestrial/Wetland System. Effects to the existing terrestrial resources are limited to bankline placement of materials removed from the Bertom Lake inlet channel. Material will be selectively removed from points along the channel to allow rock placement while maintaining existing channel dimensions. This material will be spread to avoid the appearance of a berm, or mounds along the bank.

Island construction will add approximately 22 acres of wet soils suitable for establishment of emergent wetland and bottomland type vegetation. The island perimeter will be the highest portion of the island with interior elevations at or near water level.

d. Cultural Resource Effects. Construction activities to execute the recommended plan (Alternatives B, C, E, and H) will be restricted to aquatic backwater channels with no impact to terrestrial landforms. Based on the design plans and the absence of any documented underwater or submerged

resources in the project area, the undertaking will not impact any significant historic properties. If unanticipated historic properties are encountered during the dredging operation, construction will immediately stop until such time as the Regional Director, USFWS Region III; the Commander, Rock Island District, Corps of Engineers; and the Wisconsin State Historic Preservation Officer determine the appropriate treatment for the materials. Furthermore, if consideration is given to construction of alternatives other than the preferred plan, additional historic properties evaluation and coordination will be necessary.

e. Adverse Effects Which Cannot Be Avoided. Temporary elevations in turbidity/suspended solids in the containment basin effluent mixing zone are unavoidable. Temporary elevations in dust, noise, and equipment exhaust also are unavoidable.

f. Short-Term Use Versus Long-Term Productivity. The project is intended to increase the long-term ecological productivity of the Bertom-McCartney Lakes area of the Upper Mississippi River National Wildlife and Fish Refuge. Therefore, the short-term effects resulting from project construction are considered to be acceptable.

g. Irreversible or Irretrievable Resource Commitments. Time, labor, fuel, and other necessary construction materials are considered to be irretrievable. Conversion of aquatic habitat for island construction will be irreversible, considering the shift in vegetational components and wildlife value.

h. Compliance With Environmental Quality Statutes. Compliance is summarized in table 9-2.

TABLE 9-2

Relationship of Plans to Environmental Protection Statutes and Other Environmental Requirements

Federal Policies	Compliance
Archaeological and Historic Preservation Act, 16 U.S.C. 469, et seq.	Full compliance
Clean Air Act, as amended, 42 U.S.C. 1857h-7, et seq.	Full compliance
Clean Water Act (Federal Water Pollution Control Act) 33 U.S.C. 1251, et seq.	Full compliance
Endangered Species Act, 16 U.S.C. 1531,et seq.	Full compliance
Federal Water Project Recreation Act, 16 U.S.C. 460-1(12), et seq.	Full compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 601, et seq.	Full compliance
Land and Water Conservation Fund Act, 16 U.S.C. 460/-460/-11, et seq.	Not applicable
National Environmental Policy Act, 42 U.S.C. 4321, et seq.	Full compliance
National Historic Preservation Act, 16 U.S.C. 470a, et seq.	Full compliance
National Wildlife Refuge System Administration Act, 16 U.S.C. 668DD-668EE	Full compliance
River and Harbors Act, 33 U.S.C. 403, et seq.	Full compliance
Upper Mississippi River Wildlife and Fish Refuge Act, 16 U.S.C. 721, et seq.	Full compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	Not applicable
Wild and Scenic Rivers Act, 16 U.S.C. 1271, et seq.	Full compliance
Flood Plain Management (Executive Order 11988)	Full compliance

TABLE 9-2 (Cont'd)

Federal Policies	Compliance
Protection of Wetlands (Executive Order 11990)	Full compliance
Environmental Effects Abroad of Major Federal Actions (Executive Order 12114)	*Not applicable*
Farmland Protection Act	Full compliance
Analysis of Impacts on Prime and Unique Farmland (CEQ Memorandum, 11 Aug 80)	Full compliance

NOTES

a. Full compliance. Having met all requirements of the statute for the current stage of planning (either preauthorization or postauthorization).

b. Partial compliance. Not having met some of the requirements that normally are met in the current stage of planning. Partial compliance entries should be explained in appropriate places in the report and referenced in the table.

c. Noncompliance. Violation of a requirement of the statute. Noncompliance entries should be explained in appropriate places in the report and referenced in the table.

d. Not applicable. No requirements for the statute required; compliance for the current stage of planning.

(1) Endangered Species. The *Fish and Wildlife Coordination Act* Report (CAR), dated March 13, 1989, noted the bald eagle (Haliaeetus leucocephalus) as the only federally-listed endangered species present in the project area. The CAR indicated that no impacts to the bald eagle are anticipated for this project. The following discussion constitutes the Biological Assessment (BA) for this project.

While bald eagles are generally limited to winter residency in the project area, eagle use of the project site involves nesting between McCartney Lake and the river. Temporary disruption of eagle foraging behavior is the primary potential effect of construction activity around the project sites. Given the mobility of the species and the proximity of available foraging habitat throughout the study area, it is anticipated that disturbance of foraging birds will not affect the wintering bald eagle population. Construction activities in the McCartney Lake area will be staged to avoid or minimize effects to nesting eagles.

State endangered species information was solicited from the WDNR by the Rock Island District. WDNR staff indicated that the bald eagle was of primary concern. Rare species such as the bobcat and river otter may use the project area for travel or forage; therefore, construction may interrupt these species' foraging or travel patterns through the area. No permanent alteration of foraging or travel is anticipated at this time.

Other species of concern for the project area also include the Forster's tern (Sterna forsteri) and the black tern (Chlidonias niger). These species are known to nest in shoreline flotsam and debris piles. Family groups, adult and juveniles, have been observed in the area. Also, due to the presence of a great blue heron rookery and the active bald eagle nest, nesting avifauna will require consideration during project scheduling. By expanding low elevation/shoreline habitat, island construction is planned to be of overall benefit to shorebirds and waterfowl in the project area. Potential effects to endangered avifauna are limited to noise disturbance from equipment operation and personnel. Existing nesting areas will not be altered.

In consideration of the foregoing information, the proposed project is expected to have no effect on State or federally listed endangered species.

(2) National Historic Preservation Act and Archeological and Historic Preservation Act. Construction of the preferred plan will not impact any significant historic properties. By letter dated February 8, 1989, the Wisconsin State Historic Preservation Officer concurred with this determination. The project may, therefore, proceed in full compliance with all appropriate historic preservation laws. This action was coordinated for Rock Island District fee land by the Rock Island District and for USFWS fee land by the USFWS.

(3) Federal Water Project Recreation Act. The construction of the proposed project would have no effect on provisions of this act.

(4) Fish and Wildlife Coordination Act. The project is being sponsored by the USFWS and coordinated with the WNDR and other interested agencies and organizations. The CAR is located in Appendix A - Correspondence.

The CAR concurred that the type of work proposed should have no effect on federally listed endangered species and indicated that the proposed work should have no significant adverse effects on fish and wildlife resources in the project area(s). Also, no mitigation features were recommended for this action.

(5) Wild and Scenic Rivers Act. No rivers listed as "wild and scenic" or rivers in the inventory for listing as "wild and scenic" will be affected by the project.

(6) Executive Order 11988 (Flood Plain Management). Executive Order 11988 directs Federal agencies to: (1) avoid development in the floodplain unless it is the only practical alternative; (2) reduce the hazards and risks associated with floods; (3) minimize the impact of floods on human safety, health, and welfare; and (4) restore and preserve the natural and beneficial values of the floodplain. The proposed action is in accordance with Executive Order 11988.

(7) Executive Order 11990 (Protection of Wetlands). Executive Order 11990 directs Federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when a practicable alternative exists. Wetland definitions apply to the entire project area. The proposed project is intended to increase the life of the Bertom-McCartney Lakes backwater complex, including the wetlands therein. The proposed dredged material placement in about 22 acres of aquatic habitat will result in ground elevations suitable for establishment of flood-tolerant wetland vegetation species. The resultant elevations will not, however, remove the area from the wetland regulatory limits established by Corps of Engineers guidelines. Also, no placement activities will proceed without concurrence of Federal and State agencies in support of all applicable permits.

(8) Mineral Resources. Consultation with the Department of Interior, Bureau of Mines, indicates that the proposed project will have no effect on mineral resources in the project area.

10. SUMMARY OF PROJECT ACCOMPLISHMENTS.

Major benefits to the Bertom and McCartney Lakes backwater complex resulting from the full implementation of the selected plan will include: increased quality, quantity, and diversity of aquatic habitat; additional waterfowl habitat; and reduced bedload sediment access.

Aquatic habitat will be improved by providing year-round access to McCartney Lake side channels and sloughs. These areas have experienced a number of fish kills due to low dissolved oxygen. The proposed project should eliminate these conditions by providing connection to the main river and deeper channel areas. The construction of the deep water channels adjacent to the shallow vegetated areas of McCartney Lake will provide ideal conditions for both forage and sport fishes. The construction of deeper channels in the backwater area of the river will provide critically needed wintering habitat for several fish species.

Aquatic and benthic habitat will be diversified by lining a selected length of side channel with rock of varying types, sizes, and gradations. Protective fish cover structures will be placed within this chute to provide additional habitat enhancement.

Enchancement of the migratory waterfowl habitat will be realized by constructing an island feature which will provide a wind-sheltered area suitable for rooted aquatic plant establishment.

Ingress of river bedload materials will be reduced by constructing a submerged, rock-fill structure across an existing opening into this back-water area.

11. OPERATION AND MAINTENANCE CONSIDERATIONS.

a. Project Data Summary. Table 11-1 presents a summary of project data.

TABLE 11-1

Project Data Summary

Partial Closing Structure		
Rock Fill	3,000 (1,875)	Tons (CY)
Length	100	Feet
Top Width	5	Feet
Top Elevation	599	MSL
Side Slopes	1:1	Vertical: Horizontal Includes 5' wide bench 3' above the channel bottom on the riverward slope
Rock Protection Wings		
Rock fill	1,500 (940)	Tons (CY)
Riprap	1,500 (940)	Tons (CY)
Bedding	200 (125)	Tons (CY)
Top width	5	Feet
Top elevation	605	MSL
Side slopes	1:2	Vertical: Horizontal From elevation 605-599
	1:1	Vertical: Horizontal From elevation 599 to channel bottom; 5' wide bench at elevation 599.
Fish and Mussel Rock Habitat		
Length	1,500	Feet
Minimum Bottom Width	50	Feet
Average Depth of Rock Substrate	2	Feet
Minimum Water Depth	4	Feet
Side Slopes	1:2	Vertical: Horizontal
Rock Substrate	9,000 (5,625)	Tons (CY)
McCartney Lake Dredging		
Approximate Length	8,200	Feet
Bottom Width	75 or 150 1/	Feet
Bottom Elevation	594 or 590 1/	MSL
Volume of Excavation	400,000	CY

TABLE-11-1 (Cont'd)

Dredged Material Placement Site

Area	22	Acres
Average Material Depth	8	Feet
Minimum Capacity	450,000	CY
Containment Levee		
Volume	160,000	CY
Top elevation	610	MSL
Top width	10	Feet
Minimum side slopes	1:3.5	Vertical: Horizontal

1/ As shown on plates 11 through 13.

b. Operation. The USFWS would be the responsible Federal agency for project operation, maintenance and rehabilitation under provisions of Section 906(e) of the Water Resources Development Act of 1986 (P.L. 99-662). There are no estimated operation costs for this project.

c. Maintenance and Rehabilitation. The proposed features have been designed to ensure low annual maintenance requirements. The principal maintenance activities will include rock inspection and riprap replacement. The estimated annual maintenance and rehabilitation costs are presented in table 13-2. The Rock Island District will prepare an operation and maintenance manual for the USFWS.

12. PROJECT PERFORMANCE ASSESSMENT.

The purpose of this section is to summarize monitoring of the project. The principal types, purposes, and responsibility of project monitoring are presented in table 12-1. The plan for post-construction qualitative field observations and quantitative measurements are presented in tables 12-2 and 12-3, respectively. Estimated annual monitoring costs are presented in table 13-3.

TABLE 12-1

Monitoring Plan

Type Monitoring	Purpose	Responsibility	Comments
Pre-project	Establish need of proposed project features	Sponsor (coordinated with WDNR)	See Attachment to Appendix B
Design	Establish base-line conditions consistent with project goals and objectives and meet specific permit/environmental requirements	Corps of Engineers	See Plates 16-26 and Appendix B
Construction	Assess construction impacts and meet permit requirements	Corps of Engineers	To be included in construction contract documents
Post-Construction	Assess performance of project relative to goals and objectives	1. Sponsor (qualitative) 2. Corps of Engineers (quantitative)	1. Table 12-2 2. Table 12-3

TABLE 12-2

Annual Post-Construction Qualitative Field Observations 1/

Goal	Objectives	Field Observations
Enhance aquatic habitat	Restore deep (6 ft.) aquatic habitat	As observed
	Restore lentic-lotic habitat access cross-sectional area	As observed
	Increase rock substrate aquatic habitat	As observed
	Establish mussel bed	As observed
	Reduce movement of bedload sediment into the backwater complex	As observed
	Improve dissolved oxygen concentration during critical seasonal stress periods	As observed
Enhance migratory waterfowl habitat	Establish aquatic vegetation bed	As observed

1/ To be submitted to Corps of Engineers by USFWS with annual management report for Cooperative Agreement lands.

TABLE 12-3

Post-Construction Quantitative Measurements

Project Goals	Objectives	Unit of Measure	Monitoring Plan	Monitoring Intervals (years)
Enhance aquatic habitat	Restore deep (6') aquatic habitat volume	ac-ft. (CY)	Perform hydrographic soundings of dredged areas	5
	Restore lentic-lotic habitat access cross-sectional area	sq ft	Perform hydrographic soundings of dredged openings	5
	Increase rock substrate aquatic habitat	sq yd	Perform hydrographic soundings of rock habitat area and substrate analysis	5
	Establish mussel bed	no./sq yd	Perform mussel survey	5
	Reduce movement of bedload sediment into the backwater complex	in/yr	Perform hydrographic soundings of Bertom Lake area	5
	Improve dissolved oxygen concentration during critical seasonal stress periods	mg/l	Perform dissolved oxygen measurements	0.25 1/
		deg.	Measure water temperature	0.25 1/
		ft/sec	Measure point water velocity	0.25 1/
		in	Measure depth of ice and snow cover	0.25 1/
Enhance migratory waterfowl habitat	Establish aquatic vegetation bed	ac	Perform areal surveys	1

1/ Monitoring interval to correlate with critical seasonal stress periods.

13. COST ESTIMATES.

A detailed estimate of initial construction costs is presented in table 13-1. A detailed estimate of operation, maintenance, and rehabilitation costs is presented in table 13-2. Estimated costs for project monitoring are identified in table 13-3. Quantities may vary during final design and construction.

TABLE 13-1

Detailed Estimate of Cost
(May 1989 Price Level)

Item	Quantity	Unit	Unit Cost ($)	Total Cost ($)	
PARTIAL CLOSING STRUCTURE					
Random Rock Fill	4,500	Ton	18.00	81,000	
Riprap	1,500	Ton	20.00	30,000	
Bedding	200	Ton	16.00	3,200	
				114,200	
FISH AND MUSSEL ROCK HABITAT					
Rock Substrate	9,000	Ton	18.00	162,000	
Excavation	2,800	CY	3.00	8,400	
				170,400	
McCARTNEY LAKE DREDGING AND CONFINED PLACEMENT					
Dredging	400,000	CY	3.50	1,400,000	
Embankment and Excavation					
Clearing	60,000	CY	1.55	93,000	
Placement Site Embankment	160,000	CY	3.50	560,000	
Water Control	1	Job	Sum	15,000	
Seeding	3	AC	2,500.00	7,500	
				2,075,500	
Subtotal				2,360,100	
Contingencies				353,900	
				2,714,000	
Engineering and Design				242,000	1/
Supervision and Administration				136,000	1/
TOTAL PROJECT				3,092,000	

1/ Includes General Design Cost of $180,000.

TABLE 13-2

Estimated Annual Operation, Maintenance, and Rehabilitation Costs
(May 1989 Price Level)

Item	Quantity	Unit	Unit Cost ($)	Total Cost ($)
Operation				1/
Maintenance				
Inspection	32	hr	30	960
LUNKER Cleanout	8	hr	30	240
Rock replacement (RIPRAP)	150	tn	24.00	3,600
Rehabilitation				2/
Subtotal - Operation, Maintenance, and Rehabilitation				4,800
Contingencies				700
Total Per Year				5,500

1/ No operation costs are identified.

2/ Rehabilitation cannot be accurately estimated. Rehabilitation is reconstructive work that significantly exceeds the annual operation and maintenance requirements identified above and which is needed as the result of major storm or flood events.

14. REAL ESTATE REQUIREMENTS.

a. General. All project lands are owned by the United States. Some of the lands were acquired by the USFWS for the Upper Mississippi River Wildlife and Fish Refuge. The remainder were acquired by the Corps of Engineers for the Mississippi River Nine-foot Channel project and are managed by the USFWS under the terms of a cooperative agreement between the Department of the Army and the Department of the Interior dated February 14, 1963.

b. Local Cooperation Agreements/Cost-Sharing. Funds for the initial construction of the proposed project are proposed for 100 percent Federal funding for first costs. Since the project lands are all managed as a National Wildlife Refuge by the USFWS, the Water Resources Development Act of 1986 (Public Law 99-662) is the basis for the first cost Federal funding and provides:

> Section 906. FISH AND WILDLIFE MITIGATION
>
> (e) ...the first cost of such enhancement shall be a Federal cost when - such activities are located on lands managed as a national wildlife refuge.

TABLE 13-3

Estimated Annual Monitoring Costs
(May 1989 Price Levels)

Monitoring Type	Monitoring Activity	Average Annual Cost ($)
Pre-project		1/
Design		1/
Construction		1/
Post-construction		
a. Quantitative	Hydrographic survey and associated substrate analysis	1,160
	Mussel survey	400
	Water quality monitoring to include dissolved oxygen, temperature, point velocity, and depth of ice and snow cover measurements	870
	Areal survey	240
b. Qualitative 2/		0
Subtotal Monitoring		2,670
Contingencies		430
Total Per Year		3,100

1/ These costs are incorporated in project planning, design, and construction costs.

2/ To be included in USFWS annual management report for Cooperative Agreement lands; no significant increase in cost is identified.

A draft agreement between the Corps of Engineers and the USFWS has been included in this report as appendix C. Estimated operation and maintenance costs are presented in table 13-2.

c. Construction Easements. All project features are located on lands owned by the Federal Government. Prior to advertisement of the construction contract, the USFWS will provide a special use permit authorizing work on Department of Interior lands. Construction easements will not be required. The USFWS has prepared a Compatibility Report which is contained in appendix A.

15. SCHEDULE FOR DESIGN AND CONSTRUCTION.

Table 15-1 presents the schedule of project completion steps.

TABLE 15-1

Project Implementation Schedule

Requirement	Scheduled Date
Submit Draft DPR to Corps of Engineers, North Central Division and Participating Agencies for Review	Jan 89
Formal Distribution of DPR for Public and Agency Review	Apr 89
Submit Final and Public Reviewed DPR to North Central Division	Jun 89
Receive Plans and Specifications Funds	Aug 89
Construction Approval by Assistant Secretary of the Army (Civil Works)	Sep 89
Submit Final Plans and Specifications to North Central Division for Review and Approval	Sep 89
Advertise Contract	Oct 89
Award Contract	Dec 89
Complete Construction	Dec 91

16. IMPLEMENTATION RESPONSIBILITIES AND VIEWS.

a. Corps of Engineers. The Corps of Engineers, Rock Island District, is responsible for project management and coordination with the USFWS, the State of Wisconsin, and other affected agencies. The Rock Island District will submit the subject DPR; program funds; finalize plans and specifications; complete all NEPA requirements; advertise and award a construction contract; and perform construction contract supervision and administration.

b. U.S. Fish and Wildlife Service. The USFWS is the Federal sponsor and will ensure that all project features are compatible with Refuge purposes. In accordance with the National Wildlife Refuge System Administration Act (16 USC 668) and the Upper Mississippi River Wildlife and Fish Refuge Act (16 USC 721, et seq.), a Refuge Compatibility Determination and Refuge Approval will be required prior to project construction.

The USFWS also will ensure that the operation and maintenance functions described in table 13-2 of this report are performed in accordance with Section 906(e) of the Water Resources Development Act of 1986 (P.L. 99-662).

c. Wisconsin Department of Natural Resources. The WDNR, the project proponent, is responsible for all pre-project monitoring necessary to establish the need for the proposed project features. As a proponent of the project, WDNR has provided technical and other advisory assistance during all phases of project development and will continue to provide assistance during project implementation. The WDNR has agreed to cooperate with the operation and maintenance of the project in accordance with Section 906(e) of the Water Resources Development Act of 1986 in a letter dated May 26, 1989.

17. COORDINATION, PUBLIC VIEWS, AND COMMENTS.

a. Coordination Meetings. Close coordination between Corps of Engineers, USFWS, and WDNR personnel was effected during the study period. A listing of meetings follows:

(1) October 7-8, 1986, initial on-site scoping session.

(2) February 24, 1987, discussed project scope and objectives.

(3) July 14, 1988, further discussed project scope and objectives.

(4) November 9, 1988, discussed/coordinated preliminary DPR.

b. Public Meeting. A public meeting, sponsored by the WDNR, was held in Cassville, Wisconsin, on March 14, 1989.

c. Environmental Review Process. This project meets the requirements of the National Environmental Policy Act as evidenced by the integrated Environmental Assessment and Finding of No Significant Impact.

18. CONCLUSIONS.

The Bertom and McCartney Lakes backwater complex has traditionally provided outstanding fisheries and waterfowl habitat. The environmental value of this acreage complements the documented per unit high biological productivity of the mid-pool reaches. Advanced sedimentation has diminished the habitat value of this area by reducing average water depth to 4 feet or less throughout the complex. Aquatic macrophytic growth and constriction is occurring at an increasing rate, particularly within Bertom Lake. The habitat value of this backwater complex also has been impacted by dissolved oxygen levels on a seasonal basis being reduced to near zero due to oxygen demands of decaying vegetation, low light conditions, and reduced inflow and water depths.

The selection and implementation of project Alternatives B, C, E, and H (the partial closing structure, fish and mussel rock habitat, Bertom and McCartney Lake dredging, and in-water confined dredged material placement, respectively) will provide additional off-channel deep water habitat, ingress and egress for fish to spring-fed sloughs, an island with accompanying littoral zone, rock substrate and protective cover, and reduced bedload sediment access to Bertom Lake.

Hydraulic dredging of the upper side channels and sloughs that are part of the McCartney Lake complex will provide about 200 acre-feet of deepwater fisheries habitat. Confined placement of the dredged material will create an island in lower McCartney Lake. A 10-acre littoral zone will be established on the lee side of the island as a direct result of reduced wind fetch and turbidity. The placement of rock substrate over 1,500 feet of a slough with a minimum bottom width of 50 feet will provide important fish and mussel habitat in this reach of the pool. The installation of protective cover structures will add needed resting, feeding, and escape cover for fish. Construction of a rock partial closing structure in the side channel directly upstream from Coalpit Slough will serve to reduce the quantities of bedload sediment reaching this backwater complex.

The composite benefit resulting from implementation of these project components will be an extension of the productive life expectancy of this backwater complex by up to 60 years. The value of this project is significant to maintaining and improving the UMR ecosystem. Therefore, expenditure of public funds for the finalization of plans and specifications and future construction of this project is justified.

19. RECOMMENDATIONS.

I have weighed the accomplishments to be obtained from this environmental rehabilitation and enhancement project against its cost and have considered the alternatives, impacts, and scope of the proposed project. In my judgment, this project, as proposed, justifies expenditure of Federal funds. I recommend that the Secretary of the Army approve construction to include: dredging of selected side channels and sloughs adjacent to McCartney Lake; in-water placement of dredged material within a containment levee; development of

rock habitat and installation of protective cover structures; and construction of a partial closing structure for the purpose of rehabilitating and enhancing the aquatic and waterfowl habitat of the Upper Mississippi River Wildlife and Fish Refuge Bertom and McCartney Lakes backwater complex. The estimated Federal construction cost of this project is $2,912,000. This amount would be 100 percent Federal cost according to Section 906(e)(3) of Public Law 99-662. I further recommend that funds in the amount of $82,000 be allocated as quickly as possible for the preparation of plans and specifications.

7 July 89
Date

Neil A. Smart
Colonel, U.S. Army
District Engineer

FINDING OF NO SIGNIFICANT IMPACT

Having reviewed the information contained in this environmental assessment, I find that construction of the Bertom and McCartney Lakes Rehabilitation and Enhancement project will have no significant adverse impacts on the environment; therefore, preparation of an Environmental Impact Statement (EIS) is not required. This determination may be reevaluated if warranted by later developments. Factors that were considered in making this determination were:

a. The project will improve the quality of fish and wildlife habitat through habitat restoration and enhancement.

b. Aside from the conversion of shallow aquatic habitat to deep water and island habitat, this project will have negligible adverse effects on existing natural resources.

c. Public review of this document has resulted in no significant comments.

d. The project is in compliance with Sections 401 and 404 of the Clean Water Act.

12 June 89
Date

Neil A. Smart
Colonel, U.S. Army
District Engineer

APPENDIX A

CORRESPONDENCE

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (R-3)

BERTOM AND McCARTNEY LAKES
REHABILITATION AND ENHANCEMENT

POOL 11, MISSISSIPPI RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN

APPENDIX A
CORRESPONDENCE

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
UPPER MISSISSIPPI RIVER REFUGE COMPLEX
P. O. Box 2484
LaCrosse, Wisconsin 54601

IN REPLY REFER TO

TAKE PRIDE IN AMERICA

January 17, 1989

Mr. Andy Bruzewicz
Rock Island Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204

Dear Mr. Bruzewicz:

After Discussing the results of the Bertom/McCartney Lake project meeting held on November 9, 1988, the Fish and Wildlife Service would like to add the following comments:

Island Site Location and Purpose: The dredge material disposal island was moved back to the original location established in the initial project scoping meeting by John Lyons (FWS) and Ron Nicklaus (WDNR). This location will maximize secondary aquatic/waterfowl habitat benefits in McCartney Lake. Other locations accomplish only the primary benefit of providing a dredge material disposal area.

Sensitive Areas and Construction Phasing: This project will be constructed in a "Closed Area" of the Upper Mississippi River National Wildlife and Fish Refuge. Because of this we would like to limit construction to no more than one fall season. In addition, there should be no construction during the waterfowl hunting season in the closed area north of the boat landing. Also, a heron rookery and a bald eagle nest near the construction area (see attached map) may require protection zones around them. To minimize impacts to the projects we will work with your engineers and biologist to better define the areas requiring protection and the construction timing of the project.

Water Quality: Lake Onalaska EMP project (St. Paul District) illustrated the need for detailed backwater sediment sampling and analysis up-front in the planning process. Problems with this project demonstrate that we have little information about the chemical make up of these materials and must be extremely conservative in our approach. We offer this agency's assistance in establishing a scope of work for water quality impact analysis

which will be necessary to design this project as well as other EMP projects.

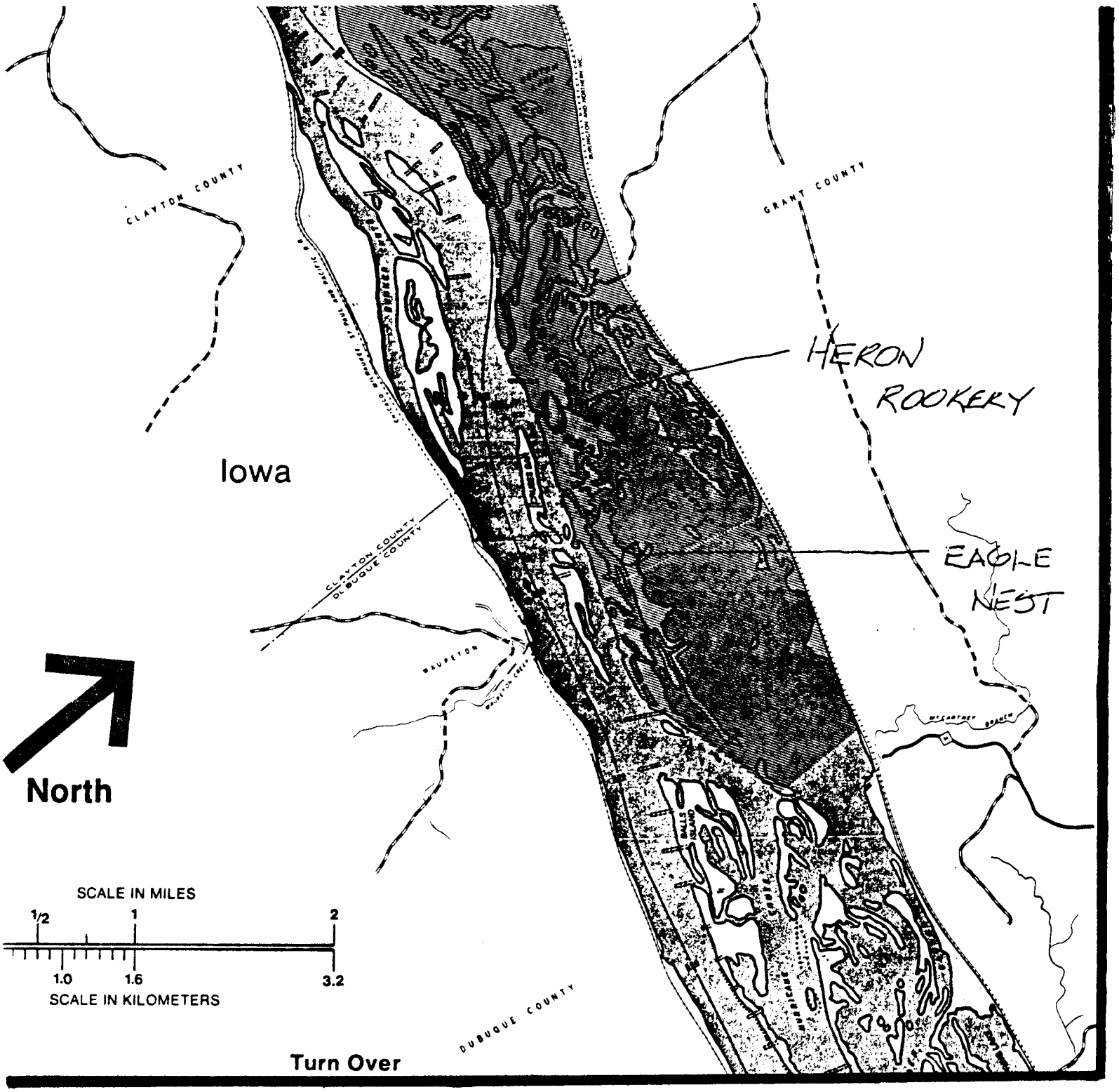
Wetlands and Channel Design: During construction of the Coal Pit Slough channel no material should be side cast into wetland areas other than the flood plain forest. The Service also believes that the placement of the proposed six foot pipe sections (1100 lbs.) in flood prone areas must be accomplished in a manner that does not make them a navigation hazard. We understand the intent, however, there are similar pipes in Drain Haul Cut, Pool 9 which are hazards to navigation and too large to remove or move.

If you have any further questions please contact Keith Beseke, EMP Coordinator at 507-452-4232.

Sincerely,

Richard F. Berry
Complex Manager

cc: John Lyons, UMR-McGregor
Hannibal Bolton, FAO
Chuck Gibbons, RO-SS
John Lennartson, UMR
Chuck Davis, RIFO
Pam Thiel, WI DNR
Barbara Lee, RICOE


CLAYTON COUNTY
GRANT COUNTY
HERON
ROOKERY
Iowa
EAGLE
NEST
CLAYTON COUNTY
DUBUQUE COUNTY
MAQUOKETA
North
SCALE IN MILES
1/2
1
2
1.0
1.6
3.2
SCALE IN KILOMETERS
DUBUQUE COUNTY
Turn Over

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

January 19, 1989

File Ref 1650

Mr. Dudley M. Hanson
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Hanson:

The Bureau of Endangered Resources has reviewed the project area described in your letter of December 21, 1988 for the proposed Habitat Rehabilitation and Enhancement Program (HREP) project, Grant County.

We have no occurrence records of endangered or threatened animal or plant species, nor of any Natural Areas or communities on the project areas in Bertom Lake and McCartney Lake.

Endangered resources occurring **close to, but not on**, the actual project area that might be impacted include (in response to your information request item a.):

Arcidens confragosus (rock pocketbook mussel), proposed State-threatened, occurs in Section 12 of T2N R4W and Section 27 & 30 of T3N R5W.
Quadrula nodulata (wartyback mussel), proposed State-threatened, occurs in Section 7 of T2N R3W, Sections 5, 10, & 12 of T2N R4W, and Section 28 of T3N R5W.
Ammocrypta asprella (crystal darter), State-endangered, has occurred in this segment of the Mississippi River at Cassville. The observation date for this occurrence record is August 8, 1927.
Lampsilis higginsi (Higgins' eye pearly mussel), Federally and State-endangered, occurs in the vicinity - one specimen collected just off of Hurricane Island.
Three Haliaeetus leucocephalus (bald eagle), Federally and State-endangered, nesting sites occur in the NE1/2 of Section 11 of T2N R4W - two are located near Snyder Slough, the other is located "at the north end of island (± river mile 600)." Refer to the enclosure from our "Endangered and Nongame Species Handbook" for bald eagle nest management guidelines.
Casmerodius albus (great egret), State-threatened, occurs in the NW1/4 of the NW1/4 of Section 6 of T2N R4W between McCartney Lake and the main channel and Sections 28, 33, & 34 of T3N R5W.

Also enclosed for your information and review are copies of two 1984 Breeding Bird Survey Summary Sheets for this area.

Per your request item b., these surrounding areas are critical habitat for the bald eagles and great egrets, as well as for many of the breeding birds identified on the enclosed surveys.

Information request items c. and d. should be determined and coordinated by DNR wildlife area field staff. However, we ask that you adhere to the enclosed portion of the "Endangered and Nongame Species Handbook" on the bald eagle management guidelines, which are consistent with the Federal guidelines, wnen working within these areas. Therefore, we recommend that no rehabilitation-related activities (dredging, disposal, equipment movement, etc.) be performed within the vicinity of the bald eagles (and great egrets) from February 15 to August 1.

The specific occurrence location of endangered resources is sensitive information and has been provided for the analysis and review of this project. Exact locations should not be reprinted in any publicly disseminated documents.

Please send future requests for Endangered/Threatened species information to: Ronald F. Nicotera
Bureau of Endangered Resources
Department of Natural Resources
P.O. Box 7921
Madison, WI 53707

Sincerely,

C. D. Besadny
Secretary, Department of Natural Resources

cc: Ronald F. Nicotera - ER/4
DuWayne Gebken - EA/6
Harold Meier - SD
Carl Batha - SD

THE STATE HISTORICAL SOCIETY OF WISCONSIN

H. Nicholas Muller III, Director

816 State Street
Madison, Wisconsin 53706
608 262-3266

HISTORIC PRESERVATION DIVISION

February 8, 1989

Mr. Dudley Hanson, Chief
Rock Island District, Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204

SHSW: #88-2239
RE: Draft Definite Project Report for Enhancement of Bertom & McCartney Lakes

Dear Mr. Hanson:

We have reviewed the above-referenced project as required for compliance with Section 106 of the National Historic Preservation Act and 36 CFR Part 800: Protection of Historic Properties, the regulations of the Advisory Council on Historic Preservation governing the Section 106 review process.

We believe the project as described in the draft report will not affect any properties that are listed in, or known to be eligible for inclusion in, the National Register of Historic Places.

We remind you that 36 CFR 800.4 includes the requirement that you seek information, as appropriate to the undertaking, from Indian tribes, local governments, public and private organizations and other parties likely to have knowledge of or concerns with historic properties in the project area.

If there are any questions concerning this matter, please contact Judy Patton of my staff at (608) 262-2732.

Sincerely,

Richard W. Dexter
Chief, Compliance and Archeology Section

RWD:lkr

0247a

1656a

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
State Office Building, Room 104
3550 Mormon Coulee Road
La Crosse, WI 54601
608-785-9000

Carroll D. Besadny
Secretary

February 13, 1989

File Ref. 1600-1-3

Colonel Neil Smart
U.S. Army Corps of Engineers
P.O. Box 2004
Rock Island, IL 61204-2004

Dear Colonel Smart:

At a February 8 meeting on the Bertom and McCartney Lakes Rehabilitation Project, we discussed our detailed comments on the Definite Project Report with your staff, the Fish and Wildlife Service and the Iowa Department of Natural Resources. We were assured that our recommendations will be considered and changes will appear in the next report.

I understand that revised project objectives and monitoring requirements are being developed by your staff. We will work together with you and the Fish and Wildlife Service to finalize mutually acceptable objectives and monitoring requirements. It is very important that our monitoring efforts are coordinated.

During the plans and specification phase of the project, we will work with you and the Fish and Wildlife Service to further define the fish and mussel habitat aspect of the project. This development is located in an existing side channel adjacent to Coalpit Slough.

We believe that the ring containment levee should be constructed mechanically. We do not feel that the contractor could meet an acceptable water quality guideline for total suspended solids if the containment levee is built hydraulically. This concept will be further discussed in our forthcoming water quality certification response.

If you have any questions or need further information, contact Pam Thiel at 608-785-9000.

Sincerely,

Terry Moe
Western Boundary River Coordinator

TM:jb

cc: Keith Beseke - FWS
Kevin Szcodronski - IDNR
Craig Thompson - WDNR

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UPPER MISSISSIPPI RIVER NATIONAL WILDLIFE AND FISH REFUGE
51 E. Fourth Street - Room 101
Winona, Minnesota 55987

IN REPLY REFER TO:

February 16, 1989

Mr. Andy Bruzewicz
Rock Island Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204

Dear Mr. Bruzewicz:

This provides Fish and Wildlife Service comments on the review draft of the Definite Project Report with Integrated Environmental Assessment (R-3) for the Bertom and McCartney Lakes Rehabilitation project. These comments are in addition to comments made on the project in our January 17, 1989 memorandum.

The document does not reference the National Wildlife Refuge System Administration Act of 1966 or the Upper Mississippi River Wild Life and Fish Refuge Act. This project is being built on lands managed as part of the Upper Mississippi River National Wildlife and Fish Refuge (Refuge), therefore, a Refuge compatibility determination and Refuge approval is needed before the project can be constructed. The document should discuss these laws and their implications. We have forwarded a compatibility determination based on the selected alternative discussed in this draft report to our Regional Director for approval. Approval of the project will be formally provided by the Regional Director after completion of the final project report.

The project report lacks adequate discussion of the cooperating status of the Fish and Wildlife Service under the National Environmental Policy Act. The final Definite Project Report should reference the cooperating status of the Service, and the Finding of No Significant Impact (FONSI) should be jointly signed by the Corps and the Service. Alternatively, the Corps can provide a copy of the final approved project report and assessment for our adoption and preparation of an independent FONSI.

Paragraph 9.d. on page 19, discussing unanticipated archeological discoveries during construction, erroneously assigns treatment decisions to the Rock Island District Archeologist and the Wisconsin State Historic Preservation Officer. The Regional Director is the deciding official, and he would call in the Departmental Consulting Archeologist because most of the project is being built on Service fee-title land.

Paragraph 16.b on page 29 is incomplete. Service responsibilities include finding the project compatible with refuge purposes, approving the project and issuing a special use permit.

The review draft report sections on operation and maintenance need to be rewritten to be consistent with the decisions made by Regional Director Gritman and Brigader General Vander Els. At this time the Service gives preliminary approval to the operations and maintenance functions outlined in your revised Table 13-2 mailed to us on February 10, 1989. Final approval will be provided by the Regional Director in his comment letter on the final approved project report. The Service does not agree to any rehabilitation costs that exceed project design criteria.

If you have any questions please contact Keith Beseke, Environmental Management Program Coordinator at 507-452-4232.

Sincerely,

Richard F. Berry

Richard F. Berry

cc: John Lyons, McGregor
Hannibal Bolton FAO
Chuck Gibbons, RO-SS
Jim Lennartson, UMR
Chuck Davis, RIFO
Pam Thiel, WIDNR
Barbara Lee, RICOE

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Western District Headquarters
1300 W. Clairemont Avenue
Call Box 4001
Eau Claire, WI 54702-4001

Carroll D. Besadny
Secretary

February 21, 1989 File Ref: 3500

Mr. Doyle W. McCully, P.E.
Chief, Engineering Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building - P.O. Box 2004
Rock Island, IL 61204-2004

Dear Mr. McCully:

The Department of Natural Resources has examined the application of the Corps of Engineers for water quality certification for the Bertom and McCartney Lakes Habitat Rehabilitation and Enhancement Project in Pool 11, Upper Mississippi River, miles 599 through 603, Grant County, Wisconsin.

The Department is granting water quality certification because there is reasonable assurance that the activity will be conducted in a manner that will not violate the standards enumerated in s. NR 299.05(1).

The certification is granted provided the following conditions are met:

1. Water quality limitations and monitoring requirements for carriage water discharges as described in Table 1 (attached) shall be met.

2. The granting of this water quality certification is contingent upon receiving approval for this project from the River Resources Coordinating Team (RRCT).

3. At least five working days prior to the beginning of the discharge, the applicant shall notify the Department of Natural Resources of their intent to commence dredging. Please notify John Sullivan at La Crosse, WI; phone (608) 785-9000.

4. Within five working days after the completion of the discharge, the applicant shall notify the Department of Natural Resources of the completion. Please notify John Sullivan at (608) 785-9000.

5. The Corps shall allow the Department reasonable entry and access to the discharge site in order to inspect the discharge for compliance with the certification and applicable laws.

6. The project shall be completed and designed as described.

We would also like to suggest that the containment berm for the disposal of fine sediments be constructed using the mechanical method rather than the hydraulic method. Mr. Sullivan is concerned that if the hydraulic method is used, fine sediments will be introduced into the cutter head of the dredge and would contribute to a serious problem of suspended solids and sedimentation off-site. Please review this problem and consider the mechanical method in order to preserve the off-site resources.

Sincerely,

Edward J. Bourget
District Water Management Supervisor

Enc.
c: J. Sullivan - LAX
P. Thiel - LAX
Keith Beseke, USFWS, 51 East 4th St., Room 101, Winona, MN 55987
Kevin Szcodronski, Iowa DNR, Wallace State Office Building, Des Moines, IA 50319
WZ/EB021.sz

Table 1. Water quality limitations and monitoring requirements for proposed carriage water discharge to McCartney Lake from the in-water confined disposal facility.

Period	Total NH3-N mg (weekly avg) Carriage Water	TSS mg/l (daily max) Carriage Water	TSS (daily max) Lake*	DO (min) Lake*
Jan. - April		500	80	5
May	1.9	500	80	5
June	3.2	500	80	5
July-August	8.2	500	80	5
September		500	80	5
Oct. - Dec.		500	80	5

* To be met at a distance no greater than 500 ft from the outlet structure(s) from the in-water disposal facility. The sample shall represent a composite sample collected downstream of the containment basin. Sampling procedures and locations shall be approved by the Department before discharge begins. During periods of low DO or high TSS (ie. greater than 80 mg/l) due to background conditions, DO and TSS levels shall meet background concentrations.

Carriage water discharge samples shall be collected at the point of discharge to McCartney Lake (outlet of containment basin). If carriage water discharge to McCartney Lake occurs at more than one location on a particular sampling day, all sites shall be sampled. Sampling procedures and locations shall be approved by the Department before discharge begins.

Monitoring Requirements For Periods of Discharge to Lake:

Location	Period	Parameter(s)	Frequency
Carriage Water	April-Nov.	DO, TSS Temp, pH, NH3	3 / week
McCartney Lake	April-Nov.	DO, TSS Temp, pH	3 / week
" "	May-Aug.	NH3-N	3 / week
Miss. River	April-Nov.	DO, TSS Temp, pH, NH3	1 / week

State of Wisconsin \ **DEPARTMENT OF NATURAL RESOURCES**
Western District Headquarters
1300 W. Clairemont Avenue
Call Box 4001
Eau Claire, WI 54702-4001

Carroll D. Besadny
Secretary

March 6, 1989

File Ref: 3560
3-WC-89-2715

U.S. Army Corps of Engineers
Rock Island District
Clock Tower Bldg.
P.O. Box 2004
Rock Island, IL 61204-2004
Attn: Barb Lee

Dear Ms. Lee:

Re: Application for a permit to construct a submerged rock structure across an existing opening into a Bertom Lake backwater complex and to provide a rock channel bottom in an adjacent slough to Coalpit Slough, Mississippi River, Pool 11, Grant County, Wisconsin

We are enclosing a "Notice of Proposed DNR Permit" for your project. State law requires that you have this notice published at your expense in the Grant County Herald Independent, Box 310, Lancaster, Wisconsin 53813. The proof of publication must be submitted to this office as soon as possible. Thirty days after the notice has been published, the Department will make a final decision with respect to your application. If the Department, however, receives written objections to the application, we are required by State Statutes to proceed to a public hearing.

If we have not received proof of publication by April 15, 1989, we will assume that you are no longer interested in the project and will take the necessary steps to dismiss your application.

Any questions you might have on these procedures should be referred to me at (715) 839-3770.

Sincerely,

Edward J. Bourget
District Water Management Supervisor

Enc.
WZ/EB028.sz

NOTICE OF A PROPOSED DNR PERMIT, NUMBER 3-WC-89-2715

The Corps of Engineers, Rock Island District, Clock Tower Building, P.O. Box 2004, Rock Island, IL 61204-2004, has applied to the Department of Natural Resources for a permit to construct a submerged rock structure across an existing opening into the Bertom Lake backwater complex. The location of the partial closing structure is the next backwater opening upstream from Coalpit Slough. The closing structure will reduce the ingress of riverbed load materials into the backwater complex. The applicant also proposes to provide a rock channel bottom to enhance the fish and mussel habitat in the existing slough adjacent to Coalpit Slough. Fish structures, called Lunkers, will also be placed into the channel.

If you want to know more about this project, you should contact Edward J. Bourget at DNR's Western District office, telephone (715) 839-3730, and ask to see the application and plans or have a copy of the application sent to you. If you do not feel the permit should be granted, write to the Western District office, explaining your objections. Your letter should ask for a public hearing and state that you or your representative will testify at the hearing. A contested case public hearing will be scheduled if the Western District office receives a written objection by the expiration of this notice, which is 30 days from the publishing date. Notice of the time and place of the hearing will be provided as required by state law. Unless timely objections are received, the Department may issue its decision without a hearing.

The Department has made an initial decision to grant water quality certification that the project will meet state water quality laws.

Dated at Eau Claire, Wisconsin March 6, 1989

STATE OF WISCONSIN, DEPARTMENT OF NATURAL RESOURCES
For the Secretary

By Edward J. Bourget
Edward J. Bourget
District Water Management Supervisor

WZ/EB028.sz

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

IN REPLY REFER TO:
COM: 309/793-5800
FTS: 386-5800

March 13, 1989

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building, P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This constitutes our Fish and Wildlife Coordination Act report on the Bertom and McCartney Lakes Habitat Rehabilitation and Enhancement Project, Mississippi River Pool 11, Grant County, Wisconsin. The project is a component of the Upper Mississippi River System Environmental Management Program authorized by the 1985 Supplemental Appropriation Act (Public Law 99-88) and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The authority for this report is contained in Section 2 of the Fish and Wildlife Coordination Act of 1958 (Public Law 85-624).

Part of the lands and waters to be used for this project are under the primary jurisdiction of our agency, and were acquired for the Upper Mississippi National Wildlife and Fish Refuge. The remainder of the lands were acquired by your agency for the navigation project, but are managed as a part of the refuge in keeping with a cooperative agreement and a General Plan. Therefore, provisions of the National Wildlife Refuge Administration Act require that a compatibility statement, finding of no significant impact, and special use permit be approved by our Regional Director prior to construction. The project planning process dictates that our statement be completed at the same time as your final report and environmental statement. It is for this reason that we have been designated as a cooperating agency for the purposes of compliance with the National Environmental Policy Act.

BACKGROUND

The goal of the Upper Mississippi River System Environmental Management Program is to implement "...numerous enhancement efforts...to preserve, protect, and restore habitat that is

deteriorating due to natural and man-induced activities." The objective of these enhancement efforts is to recover some of the river's structural diversity (chutes, vegetated backwaters, and consolidated substrates) that has been lost to sedimentation.

PROJECT DESCRIPTION

The Bertom and McCartney Lakes project is located in a backwater complex on the east bank of Pool 11 about three river miles south of Cassville, Wisconsin. The lands and waters proposed for this project are owned by the United States, and most were acquired by the Fish and Wildlife Service for the Upper Mississippi River Wildlife and Fish Refuge. The remainder of the acreage was acquired by the Corps of Engineers for the navigation project, but is managed as a part of the refuge under a cooperative agreement and General Plan. The proposed project would enhance aquatic diversity through removal of approximately 40,000 cubic yards of fine-grained accumulated sediments from the side channels and sloughs of McCartney Lake. The dredged material would be placed within a ring containment levee in the lower portion of the lake. The island created with this disposal technique will be oriented and shaped to provide wind fetch protection to approximately 40 acres of the lower lake. Reduced turbidity in the lee (downwind) of the island will encourage the establishment of rooted submerged vegetation.

An underwater rock partial closing structure would be constructed at a backwater opening upstream of Coalpit Slough to retard ingress of bedload sediments into the backwater complex. Fish and mussel habitat in the 50-foot wide side channel protected by the closing structure will be enhanced by placement of approximately 1,500 lineal feet of rock in various sizes, gradations and types. The channel will be further enhanced by placement of submerged structures referred to as "LUNKERS," that will provide resting, feeding and escape cover for fish.

EXISTING FISH AND WILDLIFE RESOURCES

When Pool 11 was impounded circa 1935 the Bertom-McCartney Lake study area was a productive, diverse backwater complex that provided important benefits to fish and wildlife resources in that reach of the river system. Current conditions in the complex still attract significant waterfowl use, particularly in Bertom Lake, and the project site is located in a "closed area" of the refuge. The importance of Bertom Lake as a waterfowl resting area is enhanced by the fact that boater ingress into that portion of the backwater is restricted by shallow water. Waterfowl use of McCartney Lake is less extensive because beds of submerged and floating vegetation have not become established because of wind-induced turbidity. An active heron rookery is located at approximately river mile 601 on the northwestern shore of the lake.

Several springs are located along the shore of McCartney Lake. The constant water temperatures provided by the spring flows attract fish into the area when water temperatures in adjacent areas are warmer or colder than optimum. Fish can become trapped in the backwater by dropping pool levels or when the sloughs freeze to the bottom, and low dissolved oxygen levels can cause fish kills. The decaying submerged plants (e.g. pond weed, American lotus and coontail)in the backwater complex, particularly in Bertom Lake, exacerbate the oxygen deficiency.

Sediment deposition from flood events (89%) and the adjacent watershed (12%) have reduced the amount of open water in the project area from approximately 2,000 surface acres in 1935, to less than 1300 acres currently. Average water depths today throughout the complex have been reduced to less than four feet. The habitat classifications in the area are listed in the following table.

Table 1- Existing conditions.

HABITAT	ACRES
Slough (between main channel & backwater).....	125
Aquatic plant beds.....	500
Open water.....	1258
Forested.....	570
Sand.....	6
Mudflat (vegetated/emerg.).....	100
Recreation/developed.....	2
TOTAL.....	2661

The shallow water and large areas of submerged and floating aquatic plants in the backwater provide important spring and summer spawning and brood habitat for a variety of fishes, in spite of sporadic low dissolved oxygen levels.

Bald eagles (Haliaeetus leucocephalus), a federally listed endangered species, are known to utilize habitats in the project area. An active eagle nest is located on the western shore of McCartney Lake at river mile 600, and careful coordination will be required to assure that adequate protection zones and construction schedules are incorporated into the project plans and specifications.

FUTURE WITHOUT THE PROJECT

The quality and quantity of aquatic habitat in the Bertom-McCartney backwater complex will continue to degenerate if management measures are not implemented to reduce the rate of sedimentation. Waterfowl use would be expected to continue for a number of years, and wildlife wetland species, such as raccoons and muskrat will find the area more attractive as open water areas give way to mud flats and eventual forestation. Good soil conservation practices in the adjacent watersheds could reduce the sediment load from that source. However, there are no non-structural measures that can be implemented to significantly retard the rate of habitat conversion caused by the sediments arriving from river high flows.

FUTURE WITH THE PROJECT

Significant aquatic benefits will accrue immediately if the proposed side channel and slough dredging is accomplished in McCartney Lake. Deeper water and improved flows will reduce the dissolved oxygen problems that currently reduce habitat quality. The rock-lined channel will provide increased habitat diversity by providing a substrate that is not commonly found in the project area. Approximately 22 acres of backwater lake habitat will be lost to construction of the ring levee containment area and dredged material disposal. However, the area to be lost is not considered to be of high value because of its soft bottom sediments and lack of submerged plant growth. Waterfowl use in that section of McCartney Lake is not considered significant, in part because of the area's wind fetch.

The loss of open water habitat in McCartney Lake should be more than offset by the addition of approximately 34 acres of deep water winter refuge habitat for fish near the springs. In addition, the island disposal site has been designed to provide wind protection to about 14 acres of open water, creating favorable conditions for potential establishment of a littoral zone.

CONCLUSIONS AND RECOMMENDATIONS

The proposed features for the Bertom-McCartney project should provide enhancement benefits in keeping with the goals of the Environmental Management Program. Accumulated sediments will be removed from the backwater complex to reestablish aquatic diversity, create fish refuge habitat, and prevent conditions conducive to extensive fish kills because of low dissolved oxygen levels. Design of the disposal island to provide a protected area for establishment of a littoral zone may provide additional improvements. The rock-lined inlet channel will provide further habitat diversity.

Incidental waterfowl benefits may accrue in connection with the disposal island feature, in the form of island nesting cover and littoral zone development on the lee side. The site selection for the island has been coordinated with refuge personnel to reduce the likelihood of adverse impacts to existing migratory bird values in McCartney Lake. Development of plans and specifications may require further refinements of the disposal site design, and any changes will necessitate additional coordination to assure compatibility with refuge purposes. Likewise, the fact that this project will be constructed in a closed portion of the refuge, in the vicinity of an existing bald eagle nest and heron rookery, dictate that construction schedules must be established to prevent disruption of those sites and other wildlife resources.

In summary, we recommend that close coordination continue on this project during the development of plans and specifications. If you have any questions regarding these comments please do not hesitate to contact me.

Sincerely,

Richard C. Nelson
Field Supervisor

cc: UMNWFR-La Crosse
UMNWFR-Winona
FWS (AFWE)
FWS (AWR)
WI DNR (Pam Thiel)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UPPER MISSISSIPPI RIVER NATIONAL WILDLIFE AND FISH REFUGE
51 E. Fourth Street - Room 101
Winona, Minnesota 55987

IN REPLY REFER TO:

March 21, 1989

Mr. Andy Bruzewicz
Rock Island Corps of Engineers
Clock Towner Building
P.O. Box 2004
Rock Island, Illinois 61204

Dear Mr. Bruzewicz:

Attached is a signed compatibility determination for the selected alternative discussed in the draft Definite Project Report with Integrated Environmental Assessment (R-3) for the Bertom and McCartney Lake Rehabilitation project.

If you have any questions please contact Keith Beseke, Environmental Management Program Coordinator at 507/452-4232.

Sincerely,

Richard F. Berry
Complex Manager

Attachment

cc: John Lyons, McGregor District
Church Gibbons, RO -SS
Barbara Lee, RICOE
Pam Thiel, WI DNR2

Upper Mississippi River National
Wildlife and Fish Refuge
Established 1924
Compatibility Study
Bertom and McCartney Lake Rehabilitation

Establishment Authority:

Public Law No. 268, 68th Congress, The Upper Mississippi River Wildlife and Fish Refuge Act.

Purpose for Which Established:

"The refuge shall be established and maintained (a) as a refuge and breeding place for migratory birds included in the terms of the convention between the United States and Great Britain for the protection of migratory birds, concluded August 16, 1916, and (b) to such extent as the Secretary of Agriculture may by regulations prescribe, as a refuge and breeding place for other wild birds, game animals, fur-bearing animals, and for the conservation of wild flowers and aquatic plants, and (c) to such extent as the Secretary of Commerce may by regulations prescribe a refuge and breeding place for fish and other aquatic animal life."

Description of Proposed Use:

The proposal is a Habitat Rehabilitation and Enhancement project authorized by the Water Resource Development Act of 1986 (Pub. L. 99-662). The proposed project will be constructed in Bertom and McCartney Lake (Pool 11) and involves the following major project components:

a. Hydraulically dredge approximately 400,000 cubic yards of fine grained sediments from the side channels and sloughs of McCartney Lake.

b. Place dredged material within a ring containment levee to be constructed in lower McCartney Lake. Total amount of material in the containment area including the levee will be approximately 560,000 cubic yards.

c. Line a side channel over a distance of approximately 1,500 feet with rock of several different types, sizes, and gradations.

d. Construct a submerged rockfill structure across one opening between the main channel and this backwater complex.

Objectives of the project are to enhance this backwater complex by:

a. Improving fish wintering habitat by creating deep water channels and connections to spring-fed sloughs.

b. Installing rock substrate and protective cover structures to benefit benthic and aquatic communities.

c. Reducing bedload sediment entry into the area.

d. Establishing aquatic vegetation in a littoral zone adjacent to the new island for waterfowl and fisheries benefits.

Complete details of the project, including maps and engineering drawings, are contained in the draft report entitled, "Upper Mississippi River System Environmental Management Program Definite Project Report with Integrated Environmental Assessment (R-3) Bertom and McCartney Lakes Rehabilitation and Enhancement, Pool 11, Upper Mississippi River, Grant County, Wisconsin," prepared by the Rock Island District, Corps of Engineers.

Anticipated Impacts on Refuge Purposes:

As a result of the project the fishery, migratory bird, aquatic plant and other wildlife populations should increase which will be a direct benefit toward maintaining and accomplishing refuge purposes. The above mentioned report contains detailed information on the project's impacts on fish, wildlife and plant species.

Justification:

The proposed project is compatible as it works toward the accomplishment of the stated objectives and purposes of the refuge.

Determination:

The proposed project is compatible with purposes for which the refuge was established.

Determined by: _____ 2/16/89
James R. Lennartson — Date

Reviewed by: _____ 2/24/89
Date

Concurred by: _____ 2/27/89
Acting Regional Director — Date

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

30 MAR 1989

Neil A. Smart
District Engineer
U.S. Army Corps of Engineers, Rock Island District
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 612204-2004

Dear Mr. Smart:

In accordance with Section 309 of the Clean Air Act and the National Environmental Policy Act, the U. S. Environmental Protection Agency (USEPA) of Region V, has reviewed the Definite Project Report with Integrated Environmental Assessment (EA) for the Upper Mississippi River, Pool 11, river miles 599 through 603 in Grant County, Wisconsin. The purpose of the project is to improve fisheries, migratory waterfowl, and aquatic habitats. The proposed project would consist of the construction of submerged rock-fill structures, fish and mussel habitat, dredging of McCartney Lake, and a confined material levee (CML). Upon completion of the project the circular levee would be capped with overburden and converted to a wetland.

The partial closing of the channels would consist of the construction of submerged rock-fill structures across existing openings to Bertom Lake. The two locations for the construction site would be Coalpit Slough, and a backwater opening upstream. The partial closing structures would be tied into the adjacent banks with riprap protection wings to prevent flanking of water during high flows. The design of the proposed structures would not significantly affect the flow of water through the channels. The purpose of these structures would be to reduce the ingress of river bedload materials into the backwater complex.

The fish and mussel rock habitat would be approximately 1,500 feet long with a 50 foot bottom width. The channel would consist of several different types of rock. The sides of the channel would consist of various grades. The stone habitat would be in 200 to 400 feet segments. This would create a diversity of aquatic habitat. The location would be adjacent to Coalpit Slough.

The location of the CML would be in McCartney Lake. The CML would be constructed from sand dredged from Bertom Lake or an adjacent borrow site. The circular levee would be constructed for a 2 year flood frequency event with 2 feet of free board. Approximately 23 acres would be required for the construction of the levee and the disposal of dredge material. Approximately 400,000 cubic yards of fine grained sediments would be hydraulically dredged from McCartney Lake side channel and slough. The dredged material would be placed in the CML. Upon completion of the dredging, the levee would be capped with overburden and wetland vegetation would be established.

CORPS OF ENGINEERS RESPONSES

Page 1

1. This is an accurate description of the proposed project.

Based on the technical information provided to us, we request that additional analysis be conducted. We have concerns that the proposed project could result in adverse environmental impacts. The potential negative impacts would be directly related to the dredging of sediment, that has a high concentration of ammonia nitrogen. The high concentration of ammonia nitrogen was found in both the bulk chemical and elutriate analysis. The release of ammonia nitrogen could be significant in both exposed sediment and the elutriate that would be generated through dredging and island construction. The nitrification of the ammonia nitrogen that would be released could significantly decrease the dissolved oxygen. The decrease in dissolved oxygen, due to the ammonia nitrogen, could disrupt the food chain and potentially cause fish kills.

We offer the following recommendations for the Environmental Assessment. Based on the technical information provided, we recommend that both sediment and elutriate be biologically tested. The additional testing would help determine if the release of ammonia nitrogen would result in adverse impacts. For sediment analysis a chronic bioassay should be conducted. Both acute and chronic bioassays should be performed for the elutriate. The chronic bioassay for the sediment should utilize the method describe in Nelson et al.(3), using a member of the genus Chironomus as the test organism. This would insure accurate measurement of the toxic effects of ammonia nitrogen on organisms that are constantly present in the sediment. For the elutriate, both chronic and acute bioassay should be performed. The methods that should be used for acute and chronic is Nebeker et al.(1)(2) respectively. To simulate the possible conditions at the levee, the elutriate methods should be modified to use ammonia gas or ammonia hydroxide to maintain the concentrations in each test chamber. The concentrations can be held constant by regulating the ammonia gas or ammonia hydroxide into the chambers. The following criteria should also be included in the bioassay: the number of samples and locations should be identical to the sampling format in the EA. For the elutriate chronic bioassay, the concentration should be diluted to replicate the conditions that would be present at the proposed circular levee. If you have any questions with the recommended methods or modifications, please contact Dr. Alan Nebeker of the Corvalas Environmental Research Laboratory at FTS 420-4875 or (503) 757-4875. Based upon the bioassay results, it can be determined whether or not modifications to the project will be required.

Additional information should be provided on the rate of flow of water in McCartney Lake. The information should also include the rate of diffusion for water through the proposed circular levee. This combined with the bioassay analysis, would provide the information necessary to determine if adverse impacts that are associated with ammonia nitrogen, could occur under the conditions that would be present during construction.

CORPS OF ENGINEERS RESPONSES (Cont'd):

Page 2

2. The Rock Island District does not agree with the need for further analysis of sediment to be dredged from McCartney Lake. Ammonia nitrogen is a natural component of the riverine sytem and its levels are subject to periodic elevation and dilution through natural fluvial processes.

3. Given the total volume of water in the area, the presence of flow, and wind-induced mixing, significant nitrification effects are anticipated to be ameliorated. Any adverse effects from dredging sediments containing ammonia nitrogen will be localized and temporary. Therefore food chain effects will also be localized and temporary.

4. Project design has resulted in features which minimize disturbance to sediment, or which provide confinement and settling of dredged material and elutriate. These features have been reviewed by the US Fish and Wildlife Service (FWS) and the Wisconsin Department of Natural Resources (WDNR).

5. Review by WDNR resulted in issuance of certification under Section 401 of the Clean Water Act for the project, as proposed.

6. While effects to local biota may be realized by execution of the project, these effects are anticipated to be minimal and temporary. Agencies involved in the planning and design process for this project concur that the long-term gains resulting from this project outweigh the effects from temporary elevations in ammonia nitrogen at the project site.

7. If bioassay were to be used, it is unlikely that chronic analysis would be applicable or relevant to actual project conditions. Following dredging and island creation, no further disturbance to dredged materials will occur. Thus, there will be no repeated (chronic) input of ammonia nitrogen to the aquatic system.

8. Flow rates in the project area are highly variable by season, as are river stages relative to diffusion rates through the circular [island] levee. As stated in 2, above environmental conditions are anticipated to ameliorate potential combined conditions relative to dilution of ammonia nitrogen.

We request that all procedures, raw data, and statistical tests be provided with the refined information for review and comment. Thank you for the opportunity to comment on the EA for the rehabilitation project. If you have any questions or comments, please contact Al Fenedick of my staff at (312) 886-6872.

Sincerely yours,

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

enclosure

CORPS OF ENGINEERS REPONSES (Cont'd):

9. Given the foregoing information, the Rock Island District maintains that no further analysis is warranted for this project. While the comments are valid in the context of analysis of unknown sediment constituents, no significant levels of other toxic materials, i.e. pesticides or heavy metals, were identified during sediment and elutriate analysis.

10. The Rock Island District appreciates the concerns provided and will consider them in future projects where potential significant sediment toxicity exist.

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW
WASHINGTON, D.C. 20240

TAKE PRIDE IN AMERICA

APR 14 1989

ER 89/302

Mr. Andrew Bruzewicz
District Engineer
U.S. Army Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Mr. Bruzewicz:

This is in regard to the request for the Department of the Interior's comments on the Bertom and McCartney Lakes, Grant County, Wisconsin.

This is to inform you that the Department will have comments, but will be unable to reply within the allotted time. Please consider this letter as a request for an extension of time in which to comment on the application.

Our comments should be available about May 26, 1989.

Sincerely,

John H. Farrell
Acting Director

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FEDERAL BUILDING, FORT SNELLING
TWIN CITIES, MINNESOTA 55111

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
FWS/ARW

MAY 2 _ 1989

Colonel Neil A. Smart
District Engineer
U. S. Army Engineering District, Rock Island
ATTN: Planning Division
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This letter responds to your notice dated April 11, 1989, for written comments on the Draft Definite Project Report with Integrated Environmental Assessment for the Bertom and McCartney Lakes Rehabilitation and Enhancement Project.

Overall the project seems to reflect the cooperating status of the U. S. Fish and Wildlife Service (Service) and the Army Corps of Engineers (Corps) in designing a project that should enhance fishery resources without adverse impact on migratory bird habitat; that in fact there will also be some migratory bird habitat gain from this project. We note further that the project report seems to address refuge concerns contained in the February 16, 1989 letter although there are some inconsistencies within the report and between the report and the Agreement for Operation, Maintenance, and Rehabilitation. The refuge letter dated January 17, 1989, raised concerns that seem to have been avoided in the report. Some of these concerns can be addressed during construction design and planning, and we support this report with the understanding that refuge concerns will be resolved before this project goes to contract.

Summary page 3 regarding qualitative and quantitative measurements includes monitoring activities by the Service to which we have not agreed. The summary also seems inconsistent with the division of responsibilities in tables 12-1, 12-2, and 12-3. We will accept the division listed in the tables wherein the Service performs qualitative observations and the Corps conducts the quantitative measuring.

Endangered species consideration, specifically bald eagle, is addressed several times in the report (e.g., pp. 9, 23, 24). Only in the paragraph about "Other species of concern" is reference made to the nearby active bald eagle nest as reported in the refuge letter of January 17 and its attached map and the Coordination Act Report (p. A-17). Elsewhere the report states there are no records of eagle nests in the project area. In fact, an eagle nest was located in McCartney Lake in the southeastern part of project, and the eagles

have relocated that nest a short distance downstream but still in the project area. Construction activities must be phased to avoid disturbing nesting eagles, mitigation to be arranged with the refuge.

The Service will assure that operation and maintenance requirements of the project as defined in the Definite Project Report will be accomplished in accordance with Section 906 (e) of the Water Resources Development Act of 1986. We desire to reiterate our position to assume responsibility for appropriate operation and maintenance costs but not for rehabilitation costs. The agreement in Appendix C is a correct statement of the responsibilities and we will sign the agreement when you send it to us. The refuge will be issuing the right-of-entry permit for construction purposes at the appropriate time.

You have elected to prepare a joint finding of no significant impact which is an appropriate method of documenting the decision for this cooperating agency project. At completion of the public comment period for the definite project report, if no substantive changes are made, we will sign the joint finding when you send it to us.

We anticipate that any unresolved matters will be resolved between the refuge and your staff during construction planning and we appreciate the cooperation that makes this kind of project possible.

Sincerely,

James C. Gritman

James C. Gritman
Regional Director

State Historical Society of Iowa

The Historical Division of the Department of Cultural Affairs

May 2, 1989

Mr. Neil A. Smart
Chief, Operations Division
Rock Island Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, IL 61203-2004

RE: COE - CENCR-17585S - CLAYTON COUNTY - FISH HABITAT IMPROVEMENTS AT APPROXIMATE MISSISSIPPI RIVER MILE 599 TO 603 - DREDGING, ROCKFILL, AND CHANEL SIDING

Dear Mr. Smart:

Based on the information you provided, we find that there are no historic properties which might be affected by the proposed undertaking. Therefore, we recommend project approval.

However, if the proposed project work uncovers an item or items which might be of archeological, historical or architectural interest, or if important new archeological, historical or architectural data come to light in the project area, you should make reasonable efforts to avoid or minimize harm to the property until the significance of the discovery can be determined.

Should you have any questions or if the office can be of further assistance to you, please contact the Review & Compliance program at 515-281-8743.

Sincerely,

Kay Simpson
Archeologist, Review and Compliance Program
Bureau of Historic Preservation

/mtm

cc: Dudley M. Hanson, COE

howe printing co., inc.
P.O. BOX 149 / PRAIRIE DU CHIEN, WIS. 53821 / (608) 326-2441

May 5, 1989

Andrew Bruzewics
U.S. Army Engineer District
Rock Island Planning Division
Clock Tower Building
Box 2004
Rock Island, Ill. 61204

Dear Andrew:

Bertom and McCartney Lakes project report, along with the environmental assessment, has been reviewed. These backwaters are also deemed important to the areas of the Upper Mississippi River and its future.

The Wisconsin Conservation Congress has pioneered some of the early considerations of having backwater protected and re-enhanced. This is a broad public representation of needs and desires to have many of the backwaters improved as their quality had declined.

The Conservation Congress backs this Bertom and McCartney Lakes total project. The benefits to be gained for future generations of public uses are difficult to predict. These backwaters will become an improved fishery. There will be improvements to the aquatic feeds for the migrating birds. There is the potential of other area related projects of this backwater complex.

Making the backwaters most productive for the future uses of this exceptional resource has been the goal of the Conservation Congress. Please continue with other similar efforts of this style. The people working on this project indicated a broad appreciation of the complexity of dealing with the many issues and small conflicts.

Continuing to have a broad area of public access of these areas during various seasons and conditions is important. These issues will be worked upon at the completion of the project.

Thanks for providing these backwaters into one of the beneficial projects.

Sincerely,

William H. Howe
Special Mississippi River Study Coordinator
Wis. Conservation Congress

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

May 9, 1989

Colonel Neil A. Smart
District Engineer
ATTN: Planning Division
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

RE: Upper Mississippi River System - Environmental Management Program Draft Definite Project Report and Environmental Assessment for the Bertom and McCartney Lakes Rehabilitation and Enhancement Project

This letter is in response to your request for comments on the document referenced above. The coordinated effort for the planning and management of the Bertom and McCarty Lake work is evident in the EA. We are pleased to see the result of cooperating agencies culminating in a project that will enhance and maintain aquatic habitat along the Mississippi River corridor.

The Environmental Protection Agency has no comments at this time. If you have any questions, please write to me or call Mr. Dewayne Knott at (913) 236-2823. Thank you for the opportunity to comment.

Sincerely yours,

Michael J. Bronoski

for Lawrence M. Cavin
Chief, Environmental Review
and Coordination Section

cc: Mr. James C. Gritman, Regional Director,
U.S. Fish and Wildlife Service, Twin Cities, Minnesota

MINNESOTA-WISCONSIN BOUNDARY AREA COMMISSION
619 SECOND STREET, HUDSON, WISCONSIN 54016-1576
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Minnesota Telephone (612) 436-7131
Wisconsin Telephone (715) 386-9444

May 11, 1989

Colonel Neil A. Smart, District Engineer
U. S. Army Corps of Engineer District, Rock Island
ATTN: Planning Division
Clock Tower Building - P. O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This responds to your invitation for comments on the Draft Definite Project Report and Environmental Assessment for the Bertom and McCartney Lakes project, an activity of the Upper Mississippi River System Environmental Management Program (UMRS-EMP).

I am quite familiar with this proposal. As chairman of the Minnesota-Wisconsin Boundary Area Commission's Mississippi River Regional Committee, I attended the Corps public meeting on this project on March 14, 1989 at Cassville, Wisconsin. It was also a featured topic at the MWBAC-sponsored MRPF at Cassville, which I chaired, on June 22, 1988.

As you know, the Boundary Area Commission has been directly involved in all of the major management plan formulation efforts on the UMRS for the past 15 years. In the context of the systemic approach to river improvements, the Commission offers five specific comments about the Bertom and McCartney Lakes UMRS-EMP proposal:

1. The statement that "a critical need for aquatic habitat diversification and off-channel deepwater restoration has been documented for this reach of the river" (p. S-1) is very true. This project is properly aimed at correcting the most pervasive and damaging problem on the entire UMRS, that of backwater and side-channel sedimentation. This is consistent with the established needs for rehabilitation of such areas as identified in the Comprehensive Master Plan for Management of the Upper Mississippi River System, as approved by Congress in Sec. 1103 of P. L. 99-662 in 1986.

2. It is well-accepted that the UMRS is a multi-purpose, nationally-significant resource. This project, as proposed, is designed to produce multiple benefits for fisheries, waterfowl and recreation needs in Pool 11. We agree that implementation of the plan is justified in the Federal interest, as indicated in your statement as District Engineer, and that it conforms to the multi-purpose use and development concept.

3. The project plan calls for beneficial use of dredged material, which is another established criterion for wise management of the UMRS. This strategy will result in the creation of a barrier island to benefit aquatic habitat in McCartney Lake. This type of improvement is an appropriate feature and should provide benefits similar to those in other UMRS backwater improvement projects, such a Weaver Bottoms in Pool 5 and Lake Onalaska in Pool 7.

4. The Rock Island District is commended for the excellent coordination of the planning for this project with other agencies and the public, which has brought about wide support for the plan. We are particularly impressed with the close cooperation of our State of Wisconsin staff, particularly Dr. Dave Kennedy, Pam Thiel, John Sullivan and Kurt Wilke, in providing the necessary pre-project monitoring information which underscores the degradation and needed remedial actions. This interagency, interdisciplinary approach portrays the cooperative sharing of expertise that has become a hallmark of UMRS work since the innovative GREAT River Studies in the 1970's.

5. The Commission endorses the Project Implementation Schedule (p. 33) as being reasonable and prudent. We hope that the approvals will be expedited and would urge you to keep the Commission advised of any significant changes in the plan or construction schedule.

In summary, the Commission congratulates and thanks the Rock Island District for a job well done and recommends approval and implementation of the plan for improvement of Bertom and McCartney Lakes as proposed.

Very truly yours,

William Howe

Commissioner William Howe, Chairman
Mississippi River Regional Committee
Prairie du Chien, Wisconsin

cc: Representative Steve Gunderson
Terry Moe, Wisconsin DNR
BAC Commissioners

United States Department of the Interior

OFFICE OF ENVIRONMENTAL PROJECT REVIEW

230 S DEARBORN, SUITE 3423
CHICAGO, ILLINOIS 60604

ER 89/302

May 24, 1989

Colonel Neil A. Smart
District Engineer
U.S. Army Engineer District - Rock Island
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

The Department of the Interior (Department) has reviewed the Draft Definite Project Report with Integrated Environmental Assessment for the Bertom and McCartney Lakes Rehabilitation and Enhancement Project, Pool 11, Mississippi River Miles 599 through 603, Grant County, Wisconsin. The Department does not object to this project. We do, however, have the following comments.

Fish and Wildlife Resources

Endangered species, specifically the bald eagle, are addressed several times in the document (e.g., pages 9, 23, 24). The nearby active bald eagle nest that was addressed in the Fish and Wildlife Service's letter of January 17, 1989, and Fish and Wildlife Coordination Act Report of March 13, 1989, is referenced only in the section on "Other Species of Concern." Elsewhere the document states that there are no records of eagle nest in the project area.

Mineral Resources

Although the report does not mention mineral resources, this proposed project is of a type that we anticipate no significant impact to the mineral resources (sand and gravel) in the area. Therefore, we suggest a statement to that effect be incorporated in subsequent versions of the document. Such an inclusion would provide users of the document with the knowledge that mineral resources were considered during project planning.

The opportunity to comment on this document is appreciated.

Sincerely,

Sheila Minor Huff
Regional Environmental Officer

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny, Secretary
Box 7921
Madison, Wisconsin 53707
TELEFAX NO. 608-267-3579
TDD NO. 608-267-6897

May 26, 1989 1660-1

Colonel Neil A. Smart
District Engineer
U.S. Army Corps of Engineers
Rock Island District
Post Office Box 2004
Rock Island, IL 61204-2004

Dear Colonel Smart:

The Wisconsin Department of Natural Resources supports the Environmental Management Program Bertom and McCartney Lakes Project in Pool 11 of the Mississippi River.

Upon completion and final acceptance of the project by the Corps of Engineers and the Fish and Wildlife Service, the Department agrees to cooperate with the Fish and Wildlife Service to assure that operation, maintenance, and any mutually agreed upon rehabilitation as described in the Definite Project Report, will be accomplished in accordance with Section 906(e) of the Water Resources Development Act of 1986.

Sincerely,

C.D. Besadny
Secretary

cc: Brigadier General Theodore Vander Els
James Gritman
James Lissack-WD
Terry Moe-La Crosse

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny, Secretary
Box 7921
Madison, Wisconsin 53707
TELEFAX NO. 608-267-3579
TDD NO. 608-267-6897

May 26, 1989 1660-1

Mr. James C. Gritman
Regional Director
U.S. Fish and Wildlife Service
Federal Building, Fort Snelling
Twin Cities, MN 55111

Dear Mr. Gritman:

With this letter of intent, I wish to commit the Wisconsin Department of Natural Resources to the Bertom and McCartney Lakes Project for the Environmental Management Program in Pool 11 of the Mississippi River.

Upon completion and final acceptance of the project by the Corps of Engineers and Fish and Wildlife Service, the Department agrees to cooperate with the Fish and Wildlife Service in the operation and maintenance of the project as described in the Definite Project Report.

Sincerely,

C.D. Besadny
Secretary

cc: Brigadier General Theodore Vander Els
Colonel Neil A. Smart
James Lissack-WD
Terry Moe-La Crosse

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

26 MAY 1989

Mr. Neil A. Smart
District Engineer
U.S. Army Corps of Engineers, Rock Island District
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 612204-2004

Dear Mr. Smart:

We have further reviewed the additional information for the Environmental Assessment for the Mississippi River, Pool 11, river miles 599 through 603 in Grant County, Wisconsin. The purpose of the project is to improve fisheries, migratory waterfowl, and aquatic habitats. The proposed project would consist of the, dredging of McCartney Lake, construction of submerged rockfill structures, fish and mussel habitat, and a confined material levee. Upon completion of the project the circular levee would be capped with overburden and converted to wetlands.

Based on the review of the additional information provided by Mr. John Sullivan of the Wisconsin Department of Natural Resources, our Agency no longer has any objections to the proposed dredging and island creation.. The additional information adequately addressed our concerns stated in our letter dated March 30, 1989. The water quality and effluent requirements for Section 401 certification, should adequately cover the potential for oxygen depletion and ammonia toxicity associated with dredging McCartney Lake.

The proposed project for Bertom and McCartney Lakes should not adversely affect human heath or significantly degrade the environment. In fact the proposed project will provide additional wildlife habitat. The appropriate measures used for the control dust, noise, and erosion during dredging operation/island creation should be sufficient to alleviate the moderate or short-term impacts that are likely to occur.

Thank you for the opportunity to review the EA and additional information on water quality certification for Bertom and McCartney Lakes project. If you have any questions or comments, please contact Al Fenedick at (312) 886-6872.

Sincerely yours,

William D. Franz

William D. Franz, Chief
Environmental Review Branch
Planning and Management Division

State of Wisconsin \ **DEPARTMENT OF NATURAL RESOURCES**

Southern District Headquarters
3911 Fish Hatchery Road
Fitchburg, WI 53711-5397

Carroll D. Besadny
Secretary

May 30, 1989 1600

Colonel Neil A. Smart
U.S. Army District Engineer
Rock Island District
Corps of Engineers
Clock Tower Building
P.O. Box 2004
Rock Island, IL 61204-2004

SUBJECT: Bertom and McCartney Lakes Rehabilitation and Enhancement Project Report and Integrated Environmental Assessment, Upper Mississippi River, Pool 11, Grant County, WI

Dear Colonel Smart:

The Southern District office of the Wisconsin Department of Natural Resources has completed its review of this document.

The proposed rehabilitation work appears to be in accord with previously agreed upon Environmental Management Program guidelines. We have no other comments on this document.

Thank you for this review opportunity.

Sincerely,

James R. Huntoon
Southern District Director

JRH/JDP/jdp
cc: Dave Kennedy - La Crosse
Tom Lovejoy - Eau Claire
Craig Thompson - La Crosse
Gordon Priegel - Southern District
EA/6

United States Department of the Interior
FISH AND WILDLIFE SERVICE
FEDERAL BUILDING, FORT SNELLING
TWIN CITIES, MINNESOTA 55111

IN REPLY REFER TO:

FWS/ARW-SS

JUN 30 1989

Colonel Neil A. Smart
District Engineer
U. S. Army Engineering District, Rock Island
ATTN: Planning Division
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

Attached as you requested is our signed Finding of No Significant Impact for the Bertom and McCartney Lakes Rehabilitation and Enhancement Project. This Finding is based on your Draft Definite Project Report circulated with your notice dated April 11, 1989, as amended by the attachments to your letter of June 1, 1989. The Service will assume operation and maintenance requirements as outlined in the report and will sign the agreement as written in Appendix C. As stated in past correspondence the Service cannot agree to assume any responsibility for rehabilitation costs that exceed project design criteria. We would appreciate receiving a copy of the Final Definite Project Report when it is available.

We look forward to continued progress on this project.

Sincerely

Marvin E. Moriarty
Acting Regional Director

Attachment

UNITED STATES FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ACTION MEMORANDUM
(REGION 3)

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and have determined that the action of (describe): permitting the U.S. Army Corps of Engineers to proceed with the Environmental Management Program habitat and rehabilitation project at Bertom and McCartney Lakes at rive miles 599-603, Pool 11 of the Upper Mississippi River National Wildlife and Fish Refuge

- is a categorical exclusion as provided by 516 DM 6 Appendix 1. No further documentation will be made.

xx is found not to have significant environmental effects as determined by the attached Environmental Assessment and Finding of No Significant Impact.

- is found to have special environmental conditions as described in the attached Environmental Assessment. The attached Finding of No Significant Impact will not be final nor any actions taken pending a 30-day period for public review (40 CFR 1501.4(e)(2)).

- is found to have significant effects, and therefore a "Notice of Intent" will be published in the Federal Register to prepare an Environmental Impact Statement before the project is considered further.

- is denied because of environmental damage, Service policy, or mandate.

- is an emergency situation. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents (list)

Regional Director — Date 6/30/89

(1) Richard A. Fuelstahl — Acting Project Leader (UMR) — Date 6/22/89
(2) RHPS — Date 6-20-89
(3) WAM1 — Date 6/26/89
(4) Acting RPC — Date 6/27/89
(5) ARD — Date 6/29/89
(6) AE — Date

Form - R3-251 (7/86)

FINDING OF NO SIGNIFICANT IMPACT

For the reasons presented below and based on an evaluation of the information contained in the supporting references, I have determined that the Bertom and McCartney Lakes rehabilitation and enhancement project involving (1) dredging deepwater channels, (2) building a barrier island, (3) constructing an underwater rock partial closing structure, and (4) placing rock substrate and protective cover structures is not a major Federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. An Environmental Impact Statement will, accordingly, not be prepared.

Reasons

The project will be phased to avoid disruption of bald eagle foraging; there will be no impacts on endangered or threatened species or their habitat. There will be no effects on properties on or eligible for the National Register of Historic Places. The project is in compliance with Sections 401 and 404 of the Clean Water Act. Overall the project reverses degradation of floodplain habitat associated with siltation and erosions and will improve the quality of fish and wildlife habitat.

Supporting References

1. Draft Definite Project Report with Integrated Environmental Assessment as amended June 1, 1989.

Acting Regional Director Date 6/30/89

Distribution: AE (Master File)
EHC/BFA--Washington, DC
COE, Rock Island
SS
UMR through WAM1

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

APPENDIX B

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (R-3)

BERTOM AND McCARTNEY LAKES
REHABILITATION AND ENHANCEMENT

POOL 11, MISSISSIPPI RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN

APPENDIX B
CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

List of Tables

ATTACHMENT:

Wisconsin Summary Reports

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (R-3)

BERTOM AND McCARTNEY LAKES
REHABILITATION AND ENHANCEMENT

POOL 11, MISSISSIPPI RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN

APPENDIX B
CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

SECTION 1 - PROJECT DESCRIPTION

LOCATION

The proposed project is located in Pool 11 at approximate Mississippi River miles 599 to 603, Grant County, Wisconsin. The site is located within the Upper Mississippi River National Wildlife and Fish Refuge (UMRNWFR), about 3.5 miles southeast of Cassville, Wisconsin. See plate 2 in the Detailed Project Report with Integrated Environmental Assessment (DPR/EA).

GENERAL DESCRIPTION

The proposed project involves restoring backwater aquatic habitat by hydraulic and mechanical dredging, including constructing an island and a partial closing structure at the entrance to a slough entering Bertom Lake. Hydraulic dredging of McCartney Lake will provide 34 acres of deepwater habitat for summer and winter fish refugia. After mechanically dredging the slough adjacent to Coalpit Slough, several different rock types and gradations will be used to diversify aquatic habitat. Construction of the partial closing structure across the slough entrance upstream from Coalpit Slough will deter the river bedload from entering the Bertom Lake complex and will serve as protection for the rock-lined channel immediately downstream.

Material hydraulically dredged from McCartney Lake will be placed in an in-water confined placement site which will break the lake fetch length in half. Material mechanically dredged will be placed on the right bank of the slough and spread to avoid creating a berm.

AUTHORITY AND PURPOSE

The authority for this action is provided by the 1985 Supplemental Appropriations Act (Public Law 99-88), and Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). Section 1103 is summarized in the DPR/EA.

The purpose of this project, under Section 1103, is "to ensure the coordinated development and enhancement of the Upper Mississippi River (UMR)." The project is the result of a planning effort undertaken by the State of Wisconsin, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers.

GENERAL DESCRIPTION OF DREDGED AND FILL MATERIAL

Materials to be dredged consist primarily of fine sediments accreted in backwater sloughs between UMR river miles 599 and 603. Typically these sediments are transported through normal fluvial processes and deposited in slackwater areas throughout the pooled portions of the UMR. Sediment samples were taken during September 1988, and analysis results are presented in Table B-1 - Results of Bulk Sediment Analyses and Table B-2 - Results of Elutriate and Ambient Water Analyses.

Sediment quality was evaluated using the 1977 U.S. EPA publication entitled Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments. No guidelines for Mississippi River sediment are available; however, the U.S. EPA publication provides a guide on sediment contaminant levels of concern. The U.S. EPA guidelines classified a sediment as being "nonpolluted," "moderately polluted," or "heavily polluted," depending on the concentration of selected parameters in the sediment. Table B-3 lists the parameters studied in the U.S. EPA publication and their classification scheme. At both the slough and McCartney Lake dredging sites, the approximate 400,000 cubic yards of fine sediments removed will be placed in the site as identified in "Description of the Proposed Discharge Sites." Approximately 160,000 cubic yards of sand will be used to create a ring berm forming the perimeter of the island.

Several different rock types and gradations will be used to line the seven sections of the slough channel. Rock typically used for lining or riprap is limestone and, as such, may be considered physically stable and chemically noncontaminating.

DESCRIPTION OF THE PROPOSED DISCHARGE SITES

The proposed discharge site for the mechanical dredging of the slough consists of the immediate bankline and a nominal strip into bottomland forest and willow shrub/sapling thickets (reference Section 9c, Natural Resource Effects, from the DPR/EA). Where forest vegetation does not reach the bank, canary grass and forbs border the slough. Elsewhere, the understory is dominated by nettle, poison ivy, and impatiens species.

TABLE B-1

Results of Bulk Sediment Analyses in Mg/Kg Dry Weight (Unless Stated Otherwise) from Samples Collected on 3 Feb 87 and 21 Sep 88

	LOCATION					
PARAMETER	BM-4	BM-5	ML-1	ML-2	ML-2(Dup)	ML-3
Arsenic	<1.0	2.0	1.5	1.4	1.4	.82
Barium	154 **	142 **	81 **	84 **	88 **	48 *
Cadmium	1.1	1.6	<.88	<.84	<.68	<.85
Chromium	21	25 *	13	12	12	7.1
Copper	13	17	9.8	9.4	9.2	4.4
Cyanide	<.01	<.01	<.18	<.18	<.18	<.18
Iron	-	-	12,000	9,900	11,000	9,300
Lead	18	23	24	23	24	3.5
Manganese	-	-	220	260	250	270
Mercury	.71	.52	.22	.20	.24	.13
Nickel	21 *	24 *	14	14	13	7.8
Selenium	-	-	<.88	<.84	<.68	<.85
Zinc	58	99 *	55	53	52	36
Ammonia Nitrogen	61	88 *	77 *	120 *	100 *	57
Kjeldahl Nitrogen	1,210 *	1,720 *	-	-	-	-
Nitrate Nitrogen	<2	<2	-	-	-	-
Oil and Grease	57	144	1,400 *	950	1,000 *	380
PCBs	<0.2	<0.2	<.16	<.16	<.16	<.16
BOD	540	860	-	-	-	-
COD	53,800 *	45,300 *	-	-	-	-
TOC (%)	1.3	1.9	1.0	1.0	.85	.44
Total Solids (%)	61.8	54.8	47	58	60	82
Tot. Vol. Solids (%)	5.4 *	5.4 *	7.3 *	4.9	5.2 *	1.5
Aldrin	<.005	<.005	<.008	<.008	<.008	<.008
Chlordane	<.025	<.025	<.08	<.08	<.08	<.08
DDD	<.01	<.01	<.016	<.016	<.016	<.016
DDE	<.005	<.005	<.016	<.016	<.016	<.016
DDT	<.01	<.01	<.016	<.016	<.016	<.016
Dieldrin	<.005	<.005	<.016	<.016	<.016	<.016
Endrin	<.01	<.01	<.016	<.016	<.016	<.016
Heptachlor	<.005	<.005	<.008	<.008	<.008	<.008
Heptachlor Epoxide	<.005	<.005	<.008	<.008	<.008	<.008
Lindane	<.005	<.005	<.008	<.008	<.008	<.008
Methoxychlor	<.01	<.01	<.08	<.08	<.08	<.08
Toxaphene	<.05	<.05	<.16	<.16	<.16	<.16

* Classified as "moderately polluted" according to U.S. EPA publication

** Classified as "heavily polluted" according to U.S. EPA publication

TABLE B-2

Results of Elutriate and Ambient Water Analyses in Mg/L

from Samples Collected on 21 September 1988

	LOCATION					WISCONSIN WATER QUALITY STANDARD	
	ELUTRIATE				AMBIENT WATER	ACUTE (PIPE)	CHRONIC (MIX. ZONE)
PARAMETER	ML-1	ML-2	ML-2(Dup.)	ML-3	ML-2		
Arsenic	<.003	<.003	<.003	<.003	<.003	0.3638	0.05
Barium	.06	.05	.05	.05	.05	--	--
Cadmium	<.005	<.005	<.005	<.005	<.005	0.0492*	0.0008*
Chromium	<.009	<.009	<.009	<.009	<.009 (+3)	2.749*	0.0794*
Copper	<.009	<.009	<.009	<.009	<.009	0.0258*	0.0179*
Lead	<.002	<.002	<.002	<.002	<.002	0.307*	0.0183*
Mercury	.0003	.0005	.0004	.0004	.0004	0.00153	0.000002
Nickel	<.025	<.025	<.025	<.025	<.025	1.625*	0.0984*
Selenium	<.005	<.005	<.005	<.005	<.005 (+4)	--	0.00707
Zinc	.01	<.008	<.008	<.008	.02	0.1538*	0.0738*
Ammonia Nitrogen	7.4	6.2	5.5	2.4	.14	--	0.04 (un-ionized)
Oil and Grease	16	12	40	21	8.2	--	--
Cyanide	<.005	<.005	<.005	<.005	<.005	--	0.0116 (free)
Iron	<.05	.07	<.05	.07	.63	--	--
Manganese	1.1	1.7	1.7	5.2	.20	--	--
PCBs	<.002	<.002	<.002	<.002	<.001	--	0.00049 ug/l
TOC	16	29	23	9.4	19	--	--
Total Solids	820	620	600	590	430	--	80 (total susp.)**
Total Volatile Solids	730	330	140	650	290		
Aldrin	<.0001	<.0001	<.0001	<.0001	<.00005	--	.00057 ug/l
Chlordane	<.001	<.001	<.001	<.001	<.0005	--	.0044 ug/l
DDD	<.0002	<.0002	<.0002	<.0002	<.0001	--	--
DDE	<.0002	<.0002	<.0002	<.0002	<.0001	--	--
DDT	<.0002	<.0004	<.0002	<.0002	<.0001	--	.00014 ug/l
Dieldrin	<.0002	<.0002	<.0002	<.0002	<.0001	--	.00057 ug/l
Endrin	<.0002	<.0002	<.0002	<.0002	<.0001	--	.069 ug/l
Heptachlor	<.0001	<.0001	<.0001	<.0001	<.00005	--	.0014 ug/l
Heptachlor Epoxide	<.0001	<.0001	<.0001	<.0001	<.00005	--	.3 ug/l
Lindane	<.0001	<.00005	<.0001	<.0001	<.00005	--	.013 ug/l
Methoxychlor	<.001	<.001	<.001	<.001	<.0005	--	--
Toxaphene	<.002	<.002	<.002	<.002	<.001	--	.0057 ug/l

* These values based on a hardness of 160 mg/l.
** This value is a guideline, not a standard.

TABLE B-3

U.S. EPA Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments in Mg/Kg Dry Weight

PARAMETER	NONPOLLUTED	MODERATELY POLLUTED	HEAVILY POLLUTED
Arsenic	<3	3-8	>8
Barium	<20	20-60	>60
Cadmium	*	*	>6
Chromium	<25	25-75	>75
Copper	<25	25-50	>50
Cyanide	<0.10	0.10-0.25	>0.25
Iron	<17,000	17,000-25,000	>25,000
Lead	<40	40-60	>60
Manganese	<300	300-500	>500
Mercury **	-	-	-
Nickel	<20	20-50	>50
Zinc	<90	90-200	>200
Ammonia	<75	75-200	>200
Kjeldahl Nitrogen	<1,000	1,000-2,000	>2,000
Oil and Grease	<1,000	1,000-2,000	>2,000
PCBs **	-	-	-
COD	<40,000	40,000-80,000	>80,000
Total Volatile *** Solids	<5	5-8	>8

* Lower limits not established for cadmium

** If the concentrations of mercury or total PCBs are greater than or equal to 1 mg/kg or 10 mg/kg, respectively, the sediment is classified as polluted

*** Total volatile solids is expressed as a percent

TABLE B-4

Results of Ambient Water Analyses from Samples Collected at Site M-1 from 10 June 1987 through 23 September 1987

PARAMETER	SAMPLING DATE 06/10	06/24	07/08	07/22	08/12	08/27	09/09	09/23
Time	1145	1015	1125	1130	1125	0915	1125	1140
Depth (m)	1.52	1.43	1.37	1.28	1.22	1.16	1.37	1.37
Secchi Disc Depth (m)	.46	.53	.56	.56	.53	.61	.71	.56
Water Temperature (°C)	23.3	27.8	26.7	28.3	25.6	17.8	21.7	16.7
pH	7.3	7.0	7.0	7.4	7.0	7.0	7.1	7.1
Conductivity at 25°C (micromhos/cm)	377	348	349	326	311	333	341	343
Dissolved Oxygen (mg/l)	6.5	4.1 *	4.4 *	7.0	7.8	7.0	6.1	7.7
Suspended Solids (mg/l)	24	13	23	18	17	15	11	12
Chlorophyll a (mg/m)	42	10	25	33	34	17	22	49
Chlorophyll b (mg/m)	<2	<2	4	2	2	<2	<1	<1
Chlorophyll c (mg/m)	9	<2	4	4	4	4	<1	3
Pheophytin a (mg/m)	20	7	11	13	8	5	3	5

* Less than the Wisconsin Fish and Aquatic Life Standard of 5 mg/l

The proposed discharge site for hydraulically dredged material is currently shallow, open water with depths varying from 3 to 5 feet over a mud bottom. Approximately 22 acres of McCartney Lake will be used for dredged material placement.

DESCRIPTION OF PLACEMENT METHOD

Mechanically excavated material from the slough will be sidecast on the bank and then spread to avoid creating a berm. Sidecasting will be performed in a manner which minimizes in-water disturbance to the dredged sediment.

Mechanically excavated material will be used to construct the berms for the in-water confined placement site, as shown on plate 3 of the DPR/EA. Hydraulically dredged material from McCartney Lake will be placed in the confined placement site.

Construction of the dredged material confined placement site will involve removal of overburden sediment along the alignment of sand dredging. This overburden will be placed in the approximate center of the proposed island. Removal of overburden sediment will be by mechanical dredging and sidecast to the center of the placement site/island. Dredging and sidecasting will be performed in a manner which minimizes in-water disturbance to dredged sediments.

Following overburden removal, mechanical dredging and sidecasting will be used to build up a sand ring around approximately 22 acres within McCartney Lake. Following completion of the sand ring, the site will be used for confined placement of all dredged fine material identified on plates 2 and 3 of the DPR/EA.

SECTION 2 - FACTUAL DETERMINATIONS

PHYSICAL SUBSTRATE DETERMINATIONS

Soil borings were taken during the summer of 1988, with results shown on plates 9 and 10 of the DPR/EA. The soils and aquatic substrates found throughout the project area are alluvial soils typical of the Midwest.

Throughout most of the project site, the bottom consists of fine, clayey mud. Sand substrates are found in Bertom Lake, where high flow events have deposited coarser sediments at the outfall of several meandered sloughs, with finer material carried farther down into McCartney Lake. The mud substrate likely represents a depositional layer occurring since impoundment of UMR Pool 11. This fine sediment layer overlies a sand layer that may represent the preimpoundment bottom.

WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATIONS

WATER

The proposed McCartney Lake dredging, as shown on plate 3, is intended to restore backwater aquatic habitat lost to sedimentation. Dredging will be performed to ensure a minimum maintained water depth of 6 feet with an area along the railroad tracks being dredged to a maintained depth of 10 feet. Aquatic habitat will be monitored and compared between the 6- and 10-foot cut areas, as currently proposed. The average depth of McCartney Lake is approximately 3.5 feet with a maximum depth of about 9 feet at its upper reaches. In general, water depth decreases with distance downstream.

Samples were collected for bulk sediment analysis in February 1987, and water and sediment samples were taken in September 1988 for bulk sediment and elutriate analyses. Water samples for ambient water analysis were collected from June to September 1987. The results of these analyses were compared to Wisconsin water quality standards. No violations of Wisconsin water quality standards are expected to occur as long as proper dredged material disposal management techniques are utilized. Sample sites are shown on plate 3 of the DPR/EA. The results are displayed in tables B-1, B-2, and B-4.

CURRENT PATTERNS AND CIRCULATION

Current patterns in the project area are seasonal and vary with river stages or discharges. During non-flood events, current patterns are typical of shallow, pond-type systems and meandered sloughs. A certain amount of circulation is achieved through wind patterns and flow exchange with adjacent waters. During flood events, flows are carried overland through the project area and current patterns follow those of the main channel.

Construction of the dredged material island in the middle of McCartney Lake will reduce wind fetch for a portion of the lower one-half of McCartney Lake. This construction is intended to reduce wave suspension of fine sediments, thereby reducing turbidity on the leeward side of the island. Turbidity reductions are anticipated to allow the establishment of aquatic vegetation in the island's leeward littoral zone.

Current patterns will be redirected around the island. Island orientation and shape has been planned to avoid creation of erosional hydraulic patterns where redirection of current occurs.

Implementation of the proposed project is anticipated to improve flow exchange between Bertom and McCartney Lakes and spring areas. Also, the proposed partial closing structure will help to deter the entrance of river bedload into the Bertom Lake complex. Floodwater will be diverted toward the river, but not prevented from entering the project area from Coalpit Slough.

NORMAL WATER LEVEL FLUCTUATIONS

Normal fluctuations occur as a result of discharge changes and the response rate of the lock and dam system. Ordinarily, daily fluctuations are limited to 0.5 foot over or under an established pool elevation at each dam. Seasonal fluctuations vary widely with weather conditions in the UMR watershed.

The proposed project will have no effect on normal river stages or flood heights.

SALINITY GRADIENTS

The UMR is an inland freshwater system; therefore, salinity was not considered.

ACTIONS TAKEN TO MINIMIZE IMPACTS

The use of chemically stable materials, dredged material confinement basin design, and physical stabilization of disposed material by revegetation are actions intended to reduce impacts to the riverine system. The project purpose is to regain habitats impacted by sedimentation in the riverine system.

SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS

Due to the isolation of most of the project area from high velocity currents, suspended particulates and turbidity elevations from dredging will likely be limited to the immediate location of the dredge in McCartney Lake.

The confinement basin for hydraulically dredged material placement will be approximately 22 acres in size, and, as currently proposed, will have a retention time of about 26 hours. Flows exiting the containment basin will pass through the sand ring berm and will be relatively free of suspended particulates.

As currently proposed, work in the slough will be performed using deck-mounted equipment. It is anticipated that temporary increases in turbidity will occur during the period of channel dredging and rock placement. Turbidity elevations will be limited to the slough and its confluence with Bertom Lake. Actual distances of turbidity effects will depend on Mississippi River background turbidity during the period of dredging. It is unlikely that turbidity increases will exceed those found during typical seasonal flood events in this portion of the river; therefore, increases in suspended particulates and turbidity which result from project activities are not considered to be significant.

CONTAMINANT DETERMINATIONS

No dredged material contaminants have been identified which require special handling or treatment beyond that currently proposed for the project.

Contaminants identified from elutriate and bulk sediment analysis are generally part of the modern riverine system and are commonly suspended, transported, and deposited through normal fluvial processes in the Mississippi River.

AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS

Review and consideration of 40 CFR, Section 230, Subparts D, E, F, and G involved analysis of the following effects:

A. Effects on Plankton.
B. Effects on Benthos.
C. Effects on Nekton.
D. Effects on Aquatic Food Web (refer to Section 230.31)
E. Effects on Special Aquatic Sites Found in Project Area or Disposal Site.
   (1) Sanctuaries and Refuges (refer to Section 230.40)
   (2) Wetlands (refer to Section 230.41)
   (3) Mud Flats (refer to Section 230.42)
   (4) Vegetated Shallows (refer to Section 230.43)
   (5) Coral Reefs (not found in Project Area)
   (6) Riffle and Pool Complexes (refer to Section 230.45) were not considered for this project.
F. Threatened and Endangered Species (refer to Section 230.30)
G. Other Wildlife (refer to Section 230.32)

The project's effects on A through E above are anticipated to be of overall benefit. The purpose of the project is to restore aquatic habitat lost to sedimentation. Dredging will recreate deep and shallow water habitat, resulting in increased diversity in plankton, benthos, and the aquatic food web in the project area. Nekton, primarily fish, will benefit from increased available habitats.

E(1) through (4) are found in the project area. The project site is part of the UMRNWFR. Refuge compatibility is a project planning requirement for actions taken on the UMRNWFR. The project was coordinated with UMRNWFR staff and has been found to be compatible with Refuge objectives. Reference the Compatibility Report found in Appendix A - Correspondence.

Corps wetland regulatory jurisdiction applies to the project site, as the three-point (soils, vegetation, and hydrology) wetland analysis reveals the entire project area to be a Mississippi River adjacent wetland.

In the project area, existing wetland types include palustrine forested (silver maple-elm association forest), emergent (cattail, arrowhead, and lotus vegetated shallows), and mudflats (shorelines and dryed shallow aquatic areas).

Direct impacts from dredged material placement involve covering about 22 acres of shallow open water with a containment berm and dredged material from McCartney Lake. About 3 acres of bankline vegetation will be covered with material from the mechanical dredging of the slough immediately upstream from Coalpit Slough. Hydraulically dredged sediments will settle in the containment area, and effluent water will return to the Mississippi via a weir and stoplog structure. A portion of effluent water is anticipated to flow through the sand ring berm. The containment basin/island has been designed to allow approximately 26 hours equivalent settling time. Endangered species for the project area include the bald eagle and the fat pocketbook pearly mussel. State-listed species, besides the preceding, are not anticipated to occur in the project area, unless as transients, and are not anticipated to be affected beyond disruption of travel patterns. Also reference Sections 3f and 9c of the DPR/EA for further discussion of endangered species. Due to its location, timing, and nature, the proposed project is anticipated to have no effect on either State or federally listed endangered species. This determination is supported by both the State of Wisconsin and the U.S. Fish and Wildlife Service.

Other wildlife in the project area includes both game and non-game species such as white-tailed deer, squirrel, waterfowl, numerous songbirds, small mammals, and furbearers. The proposed project is anticipated to contribute to overall habitat diversity in the project area, and thus will be of benefit to most species currently found in the project area.

Through the planning, coordination, and design process, wetland impacts were considered and minimized to the extent possible. The proposed project will include a partial closing structure which will serve to deflect a portion of direct sediment bedload which currently enters Bertom Lake. This is anticipated to reduce sediment input to the remaining wetland and open water areas.

PROPOSED PLACEMENT SITE DETERMINATIONS

Fine substrates in shallow backwater areas typically support a variety of invertebrate life, including mussel species such as three-ridge, papershells, and floaters. The area planned for island construction is currently subject to substantial wave action and resuspension of sediments. This has precluded the establishment of aquatic vegetation during normal seasonal low-flow periods. Also, elevated turbidity levels associated with sediment resuspension typically reduce the abundance and diversity of aquatic organisms, including fish. Therefore, because the proposed placement area does not display significant aquatic resource value, the conversion of aquatic habitat to terrestrial habitat at the placement site is considered to be of net overall benefit to the remaining aquatic habitat in McCartney Lake.

The top elevation of the containment levee will be 610 feet MSL and the levee height will vary from 7 to 11 feet from the bottom. The containment levee will be built using sand materials which underlie the clayey overburden materials in the area enclosed by the containment levee. The top 6 inches of the levee will be covered with the clayey overburden material to facilitate revegetation.

DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM

The primary purpose of this project is to restore aquatic habitat lost to sedimentation since construction of the lock and dam system (Nine-Foot Channel Project) on the UMR. The project is intended to provide deep aquatic habitat during critical seasonal conditions along with shallow spawning and brooding habitat. The construction of a partial closing structure is intended to reduce direct sediment input during flood events, and the creation of the dredged material island in McCartney Lake will reduce the wind fetch length by approximately one-half. The island will create a wind shadow which will reduce wave-induced sediment resuspension in a portion of McCartney Lake.

DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM

Areas which are dredged will serve as sediment traps during high flow periods and may reduce sediment input to adjacent downstream aquatic habitats.

SECTION 3 - FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

1. No significant adaptations of the guidelines were made relating to this evaluation.

2. Evaluation of Practicable Alternatives. Alternatives which were considered in addition to the proposed action were as follows:

A. No Federal Action. This alternative was not chosen due to nonresponse to Public Law 99-662.

B. Bertom Lake Dredging. This alternative was not selected due to the potential disturbance of the already well established migratory waterfowl habitat.

Dredging of the lake would open access to the lake and increase the game fish population, but both of these factors would result in a dramatic increase of fisherman and waterfowl disturbance in the refuge.

C. Dredged Material Placement at Upland Site. This alternative was dismissed due to the impracticality of pumping dredged material against a head of up to 200 feet. In addition, acquisition of construction easements would be required since this placement site is beyond the boundaries of Federal lands.

D. Proposed Project: Combined Plan. This alternative is discussed in Section 1 - Project Description.

3. Certification under Section 401 of the Clean Water Act was obtained from the State of Wisconsin, Department of Natural Resources, by letter dated February 21, 1989 (appendix A). The project is thus in compliance with the water quality requirements of the State of Wisconsin.

4. The project would not introduce toxic substances into nearby waters or result in appreciable increases in existing levels of toxic materials.

5. No significant impact to federally listed endangered species will result from this project. This determination is supported by a letter from the U.S. Fish and Wildlife Service, dated March 13, 1989 (appendix A).

6. The project is located along a freshwater inland river system. No marine sanctuaries are involved or would be affected.

7. No municipal or private water supplies would be affected. There will be no adverse impact to recreational fishing and no unique or special aquatic sites are located in the project location. No long-term adverse changes to the ecology of the river system will result from this action.

8. Project construction materials will be chemically and physically stable. No contamination of the river is anticipated.

Materials consist primarily of in situ sediments which are normal parts of the riverine environment. No significant levels of toxic materials were identified during sediment and water quality testing.

9. The placement of construction material into the water is necessary to reduce the sediment input into newly dredged areas and to serve as containment basin berms. No other practical alternatives have been identified. The proposed project is in compliance with the guidelines for Section 404(b)(1) of the Clean Water Act, as amended.

The proposed project will not significantly impact water quality or the integrity of the aquatic ecosystem. The proposed project is a backwater rehabilitation project intended to restore aquatic habitat.

12 June 89
Date

Neil A. Smart
Colonel, U.S. Army
District Engineer

ATTACHMENT TO APPENDIX B

WISCONSIN SUMMARY REPORTS

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT (R-3)

BERTOM AND McCARTNEY LAKES REHABILITATION AND ENHANCEMENT

POOL 11, MISSISSIPPI RIVER MILES 599 THROUGH 603
GRANT COUNTY, WISCONSIN

Attachment to Appendix B
Wisconsin Summary Reports

Pre-project monitoring at Bertom and McCartney Lakes was performed by Wisconsin Department of Natural Resources (WDNR) personnel in an effort to assess pre-construction conditions.

The results of this monitoring, as presented here, include two WDNR summary reports and the field data sheets from a mussel survey.

The first summary report describes the results from several limnological investigations: fish population studies were performed at four sites in each lake, water and fine sediment depths were measured along 11 McCartney Lake transects, current velocities were measured in both lakes and dissolved oxygen concentrations were determined at several sites in both lakes during winter months.

The second summary report describes the results from the monitoring of dissolved oxygen, temperature and light at several Upper Mississippi River backwater areas during the summer of 1987. Two sites at McCartney Lake were monitored as a part of this investigation.

Finally, a description of fish and mussel habitat improvements and the field data sheets from a mussel survey performed in August, 1987 are presented.

SUMMARY REPORT

Draft

David Lucchesi and Pamella Thiel

Project: Pre-project limnological investigation and fishery survey of Bertom and McCartney Lakes, Pool 11.

Period: December 1985 - February 1988

Objectives: To document winter dissolved oxygen problems and to assess fish populations in the Bertom and McCartney Lakes area prior to implementing a habitat rehabilitation and enhancement project.

INTRODUCTION

Bertom and McCartney Lakes constitute a 3,560 acre backwater complex located on the Wisconsin side of pool 11 approximately 3.5 miles southeast of Cassville, Wisconsin. Bertom and McCartney Lakes have historically provided a good sport fishery for largemouth bass, smallmouth bass, northern pike, and panfish. These lakes are especially popular among ice fishermen. In addition, large numbers of waterfowl utilize this backwater complex during annual migrations.

Sedimentation is rapidly destroying fish and wildlife habitat in Bertom and McCartney Lakes. Sedimentation and vegetation have already claimed 60 acres of the 125 acre Bertom Lake over the past 15-20 years. Recently, McCartney Lake has experienced some winterkill during winters of heavy snow cover. Sedimentation will continue to degrade habitat in these backwater lakes unless remedial action is taken.

The proposed project to rehabilitate this backwater area includes construction of a partial closing dam and dredging in the McCartney Lake area. Funding is 100% Federal since Bertom and McCartney Lakes are in the Upper Mississippi Fish and Wildlife Refuge. A partial closing dam would be constructed at the main channel entrance to Coalpit Slough and the banks would be tied into this structure with riprap. Rock substrate would be placed in the adjacent slough for fish and mussel habitat. These measures would reduce sedimentation rates and provide needed habitat for gamefish and mussels without reducing present flow rates into the backwaters.

Originally, six dredge sites were proposed for Bertom and McCartney Lakes. Four McCartney Lake dredge sites have been retained under the present project proposal (Figure 1). Dredging at these sites will increase depth and reduce stagnation. Thus, dredging will help to increase dissolved oxygen levels and stability of water temperatures as well as increase the amount of fish habitat in these areas. In addition, dredge spoils can be used to create islands or to add to present islands, which would enhance upland nesting and loafing opportunities, provide rock habitat for fish, reduce currents and wave action and improve water quality and vegetation.

This project was developed to provide information on the limnology and fish populations of this backwater area prior to implementing the proposed project. Data was collected on dissolved oxygen, temperature, depth, current, depth of fine sediment, and fish populations. These analyses will serve as baseline information from which future studies can be compared to in order to evaluate the proposed solution.

METHODS

Fish populations were sampled at 4 sites in sloughs near Bertom Lake and at 4 sites along the railroad tracks adjacent to McCartney Lake stations (Figure 2). McCartney Lake stations were sampled using 3 foot by 5 foot, 1-inch mesh fyke nets, while Bertom Lake stations were sampled with 3 foot diameter, 1.5-inch mesh, hoop nets. Each McCartney Lake station was divided into an upper and lower section, and one fyke net was fished in each section. Nets were set at McCartney Lake stations 1-4 on March 23, 1987 and fished for 3 24-hour periods. Nets were set at all stations on August 20, 1987 and were fished for 2 24-hour periods. All stations were sampled using a standard pulse DC electrofishing boat. Electrofishing was conducted after dark, and each station was fished for 5 minutes. McCartney Lake stations were electrofished on March 23, 1987. Both Bertom and McCartney Lake stations were electrofished on May 20-21, and August 17-18, 1987. Number and length were recorded for each species. Abbreviations used for common names of species are located in Table 1.

Fishery data were entered onto Lotus 123 database software. Lotus files were telecopied onto the State of Wisconsin's mainframe computing system and descriptive statistics were computed using SAS. In addition, proportional stock density (PSD) was used to indicate size structure within a population (Anderson 1980). PSD is defined as the percentage of stock that is of quality size:

$$PSD = \frac{\text{Number - quality size x 100}}{\text{Number - stock size x 100}}$$

In March 1987, water and fine sediment depths were measured along eleven transects on McCartney Lake (Figure 3). Points for measurement were located using a Micrologic ML-8000 Loran C Navigator. Water depths were measured using a rod with a plate on the end of it. Fine sediments were measured by pushing a length of conduit into the sediment until a hard layer was reached. Data were entered onto an IBM PC file, and lake depth contours were plotted using a Golden Software plotting program.

A Yellow Springs Instruments (YSI) 56 DO meter was used to measure dissolved oxygen concentrations through holes augered in the ice. Sites 1-3 (proposed dredge sites) were monitored at approximately two week intervals from December 11, 1985 to March 3, 1986 (Figure 4). Dissolved oxygen (DO) levels were recorded at 19 sites (Figure 4) on February 19, 1986. Further measurements of dissolved oxygen were made on February 15, 1988 at 31 sites (Figure 5). Water depth, ice depth

and current velocity were also measured at these sites. A March-McBirney Model 201D flow meter was used to measure current velocity.

RESULTS

Spring fish sampling:

The March 23, 1987 electrofishing of McCartney Lake stations 1-4 yielded only 53 fish with 10 species represented (Table 2). Bowfin (28.3%), bluegill (26.4%) and spotted sucker (24.5%) were most abundant.

The May 20-21, 1987 electrofishing of Bertom and McCartney Lakes stations 1-8 was hindered by extremely turbid conditions due to heavy rains during the two days prior to sampling. Thus, locating fish within the electrical field was often difficult. However, electrofishing did yield 250 fish representing 22 species (Table 3). Most abundant species in the sample were bluegill (35.2%), carp (26.8%), and golden shiner (8.8%). Both juvenile (young-of-the-year and yearling) and adult bluegill were sampled.

Fyke nets, set March 23, 1987, caught 532 fish representing 19 species (Table 4). Panfish dominated the sample with bluegill and black crappie comprising 43.0% and 24.2% of the total catch, respectively. Approximately 50% of the panfish sampled were of quality size (Table 3). Total catch was distributed relatively evenly between the four stations, but varied greatly between each of the overnight sets.

Summer fish sampling:

Electrofishing yielded 457 fish representing 31 species (Table 5). The five most abundant species in the sample were gizzard shad (17.3%), freshwater drum (15.3%), white bass (15.0%), bluegill (14.6%), and shorthead redhorse (10.5%). A large percentage of gizzard shad, white bass, and bluegill sampled were juveniles. Efficiency of electrofishing gear was reduced at several McCartney Lake stations due to mats of Lemna spp. and Wolfia spp., which concealed shocked fish from the view of netters.

Fyke nets caught 319 fish with 26 species represented. Bluegill comprised over a third of the total catch (Table 6). Other panfish sampled included black crappie (8.2%), pumpkinseed (5.4%), yellow perch (5.3%), and green sunfish (4.7%). All sizes of panfish were sampled. Seven fish, including two bowfin, were found dead in the nets. This was probably a result of extremely low levels of dissolved oxygen. Average maximum and minimum daily dissolved oxygen levels of 3.8 mg/l and 0.8 mg/l were recorded during the fishery survey period (Schellhaass and Sullivan 1988).

Water depth and current:

Depth contours and fine sediment depths are plotted in Figures 6 and 7, respectively. Average depth of McCartney Lake is approximately 3.5 feet, and a maximum depth of about 8 feet is obtained at its upper reaches. Average depth of fine materials is about 1.5 feet. However, fine materials have accumulated to a depth of over 5 feet in several areas (Figure 7). In general, water depth decreases and depth of fines increases as you move downstream.

Bertom and McCartney Lakes receive a measureable current from the main channel through Coalpit Slough (Table 8). Current velocities up to 1.1 feet/second were recorded in Bertom Lake. Velocities in McCartney Lake were substantially less (> 0.2 ft./sec.) than Bertom Lake. Areas proposed for dredging had low current velocities or were stagnant.

Winter dissolved oxygen concentrations:

The 1988 winter monitoring found low DO values in stagnant areas (Figure 5, sites H-P) and relatively high DOs in areas containing a current. Dissolved oxygen levels decreased substantially over the winter (Table 9). Higher levels of dissolved oxygen measured in 1986 were probably due to relatively mild conditions that winter (Table 10).

DISCUSSION

Results indicate that rapid rates of sedimentation pose a definite threat to Bertom and McCartney Lakes. Almost 50% of the total surface water area in Bertom Lake has been lost to sedimentation and vegetation. With low water conditions in 1988, many shallow areas where heavy deposition has occured are exposed, and terrestrial vegetation is becoming firmly established. Fine sediment accumulations in remaining areas are relatively deep. Further reduction in the depth of Bertom and McCartney Lakes will result in increases in the already high summer water temperatures.

Sedimentation has also stagnated several backwater areas. Schellhaass and Sullivan (1988) found that 90% of their hourly dissolved oxygen measurements for one of the proposed dredge sites were below Wisconsin's water quality standard of 5.0 mg/l. Winter monitoring also demonstrated low DO concentrations for these proposed dredge sites.

Dissolved oxygen concentrations near groundwater inputs were especially low (Schellhaass and Sullivan 1988). The addition of groundwater in these areas moderates water temperatures, which often attracts fish. If trapped in these areas, fish may suffocate and fish kills can occur.

U.S. Army Corp of Engineers, Rock Island District (1987) suggested

that dredging in Bertom and McCartney Lakes would not result in unacceptable levels of metal concentrations or other parameters. However, PCBs should be measured at a lower detection level (John Sullivan, personal communication). One parameter of concern is ammonium nitrate concentration, which may violate Wisconsin standards if dredging occured. The adverse impacts of ammonium nitrate may be reduced if dredging is conducted when water temperatures are cold and flows are high.

Thirty-six species of fish were sampled in this backwater area. Panfish usually comprised at least one-third of the total sample. Many quality size panfish as well as gamefish were taken during this survey. Inspite of poor dissolved oxygen concentrations, panfish and gamefish were relatively abundant at stations 1-4 (proposed dredge sites). However, the proportion of panfish in the total catch in these areas decreased from spring to summer sampling periods. This decline may directly reflect the extremely low summer DO concentrations.

CONCLUSIONS

Bertom and McCartney Lakes presently support fishable populations of gamefish and panfish. However, sedimentation and vegetation are rapidly reducing the amount and quality of aquatic habitat available to fish and wildlife. A closing structure at the main channel opening to Coalpit Slough would reduce the amount of sediment entering this backwater complex. Riprap along the banks would reduce erosion, and thus, also reduce deposition of sediment in lentic backwaters. Addition of riprap and rock substrate in the slough adjacent to Coalpit Slough would provide quality habitat for gamefish and mussels. This habitat type is rapidly vanishing from other areas of the Upper Mississippi River.

Sedimentation over the past 20 years has helped to produce problems with low dissolved oxygen concentrations during both winter and summer. Dredging in stagnated areas would introduce flow, improve DO concentrations, and stabilize water temperatures. This will improve the year-round inhabitability of these areas for game fish and panfish as well as reduce the chance of severe winterkills.

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Schellhaass, S. and J. Sullivan. 1988. Monitoring of dissolved oxygen, temperature and light in selected backwaters of the Upper Mississippi River, Wisconsin Department of Natural Resources, unpublished report, LaCrosse, WI.

U. S. Army Corps of Engineers. 1987. Results of bulk sediment and field analyses performed on samples collected from Bertom and McCartney Lakes on 3 February 1987. U. S. Army Corps of Engineers, Rock Island District, Water Quality and Sedimentation Section Personnel, unpublished report, Rock Island, IL.

Table 1. Abbreviations for common names of fishes surveyed on Bertom and McCartney Lakes.

COMMON NAMES	ABBREVIATIONS
Northern Pike	No. Pike
Grass Pickerel	Gr. Pickerel
Largemouth Bass	LMB
White Bass	Wh. Bass
Bluegill	Bluegill
Pumpkinseed	Pumpkinseed
BluegillxPumpkinseed	Bgill.xPseed.
Green Sunfish	Gr. Sunfish
Black Crappie	Bl. Crappie
White Crappie	Wh. Crappie
Walleye	Walleye
Sauger	Sauger
Yellow Perch	Yel. Perch
Rockbass	Rockbass
Warmouth	Warmouth
Yellow Bullhead	Yel. Blhd.
Black Bullhead	Blk. Blhd.
Brown Bullhead	Br. Blhd.
Flathead Catfish	Flthd. Catfish
Longnose Gar	Ln. Gar
Shortnose Gar	Sn. Gar
Bowfin	Bowfin
Gizzard Shad	Giz. Shad
Carp	Carp
Common Shiner	Common Shiner
Golden Shiner	Gold. Shin.
Spottail Shiner	Sp. T. Shin.
Emerald Shiner	Emld. Shin.
Quillback	Quillback
Highfin Carpsucker	Hf. Carpskr.
Spotted Sucker	Spot. Skr.
Smallmouth Buffalo	Sm. Buffalo
Golden Redhorse	Gold. Rhrs.
Shorthead Redhorse	Sthd. Rhrs.
Freshwater Drum	F. W. Drum
Pirate Perch	Pirate Perch
Brook Silverside	Brook Slvrsde

Table 2. Descriptive statistics for electrofishing fishery data from McCartney Lake, March 23, 1987.

Species	Number	Size Range (inches)	Average Size (inches)	Standard Deviation	Number Stock	Number Stock	PSD
No. Pike	2	23.2-30.0	26.2	3.8	2	2	100
LMB	4	8.5-16.5	13.6	3.6	4	3	75
Bluegill	14	4.3-7.8	6.0	3.5	14	9	64
Warmouth	1	4.8	4.8	---	--	--	--
Yel. Perch	1	5.6	5.6	---	0	0	0
Yel. Blhd.	1	13.0	13.0	---	--	--	--
Br. Blhd.	1	9.0	9.0	---	--	--	--
Bowfin	15	13.2-26.0	20.5	3.8	--	--	--
Spot. Skr.	13	6.7-17.6	12.8	4.2	--	--	--
Gold. Rhrs.	1	16.7	16.7	---	--	--	--

Table 3. Descriptive statistics for fyke net fishery data for McCartney Lake, March 24-26, 1987.

Species	Number	Size Range (inches)	Average Size (inches)	Standard Deviation	Number Stock	Number Quality	PSD
No. Pike	16	7.5-33.0	21.1	5.9	15	9	44
LMB	11	5.8-15.3	10.2	2.6	9	4	60
Bluegill	230	2.0-9.0	6.1	1.3	228	134	58
Pumpkinseed	1	5.9	5.9	---	--	--	--
Bl. Crappie	129	2.0-13.1	8.0	2.3	121	64	50
Wh. Crappie	15	6.2-12.7	10.6	2.0	15	13	87
Warmouth	6	4.0-7.7	5.4	1.3	--	--	--
Yel. Blhd.	9	10.0-14.0	11.4	1.3	--	--	--
Blk. Blhd.	3	11.4-15.0	12.7	1.6	--	--	--
Br. Blhd.	1	11.5	11.5	---	--	--	--
Ch. Catfish	1	10.7	10.7	---	--	--	--
Ln. Gar	3	9.1-13.5	11.8	1.9	--	--	--
Sn. Gar	3	21.4-24.5	23.2	1.3	--	--	--
Bowfin	24	7.3-29.0	22.0	3.9	--	--	--
Carp	3	15.0-25.0	20.2	4.1	3	2	66
Hf. Carpskr.	1	19.9	19.9	---	--	--	--
Common Shin.	3	5.2-6.5	5.9	0.5	--	--	--
Spot. Skr.	70	8.3-19.0	16.1	1.7	--	--	--
Sthd. Rhrs.	3	16.2-19.0	17.9	1.2	--	--	--

Table 4. Descriptive statistics for electrofishing fishery data from Bertom and McCartney Lakes, May 20-21, 1987.

Species	Number	Size Range (inches)	Average Size (inches)	Standard Deviation	Number Stock	Number Quality	PSD
No. Pike	1	17.1	17.1	---	0	1	0
LMB	9	3.9-17.6	10.2	3.1	8	2	25
Bluegill	88	1.6-8.4	4.2	2.4	41	33	80
Pumpkinseed	1	7.2	7.2	---	1	1	100
Bl. Crappie	1	5.6	5.6	---	1	0	0
Rockbass	3	5.8-7.2	6.7	0.6	3	1	33
Warmouth	2	1.8-5.6	3.7	1.9	--	--	--
Yel. Perch	3	4.3-6.5	5.7	1.0	2	0	0
Ch. Catfish	2	7.1-12.1	9.6	2.5	--	--	--
Flthd. Catfish	2	6.9-8.2	7.6	0.6	--	--	--
Ln. Gar	1	25.3	25.3	---	--	--	--
Sn. Gar	8	21.3-26.1	23.9	1.9	--	--	--
Bowfin	15	21.7-29.9	24.3	2.3	--	--	--
Giz. Shad	6	5.7-12.5	8.2	2.5	2	1	50
Carp	67	15.2-27.3	19.9	3.0	67	66	99
Gold. Shin.	22	2.5-5.5	3.5	0.8	--	--	--
Emld. Shin.	1	2.3	2.3	---	--	--	--
Spot. Skr.	1	15.4	15.4	---	--	--	--
Gold. Rhrs.	1	18.9	18.9	---	--	--	--
Sthd. Rhrs.	12	6.5-18.3	14.2	3.9	--	--	--
Quillback	1	17.8	17.8	---	--	--	--
Fw. Drum	3	12.9-19.2	16.9	2.8	--	--	--

Table 5. Descriptive statistics for electrofishing fishery data from Bertom and McCartney Lakes, August 17-18, 1987.

Species	Number	Size Range (inches)	Average Size (inches)	Standard Deviation	Number Stock	Number Quality	PSD
No. Pike	3	13.3-22.4	16.6	5.0	2	1	50
Gr. Pickerel	3	6.0-6.5	6.3	0.3	--	--	--
LMB	9	2.8-12.8	6.7	4.1	4	2	50
Wh. Bass	69	2.8-6.0	4.9	0.6	1	0	0
Gr. Sunfish	5	1.8-5.0	3.2	1.2	--	--	--
Bluegill	67	1.1-7.5	2.9	1.5	25	5	20
Bl. Crappie	3	6.1-10.2	8.0	2.1	3	1	33
Wh. Crappie	3	2.9-6.5	4.9	1.8	2	0	0
Rockbass	5	4.5-7.5	6.3	1.6	5	3	60
Walleye	5	7.3-19.0	12.6	5.2	3	2	66
Sauger	1	13.8	13.8	---	1	1	100
Yel. Perch	7	2.6-8.7	3.6	2.3	1	1	100
Ch. Catfish	5	7.9-25.4	16.2	6.9	--	--	--
Flthd. Catfish	3	10.8-15.7	13.8	2.6	--	--	--
Ln. Gar	1	12.9	12.9	---	--	--	--
Sn. Gar	2	21.8-23.2	22.5	1.0	--	--	--
Bowfin	2	24.2-28.3	26.3	2.9	--	--	--
Giz. Shad	79	2.8-10.4	5.5	1.8	9	0	0
Carp	43	6.6-25.5	18.8	4.7	38	36	95
Gold. Shin.	2	3.0-3.9	3.5	0.6	--	--	--
Emld. Shin.	3	2.0-2.2	2.1	0.1	--	--	--
Common Shin.	1	2.0	2.0	---	--	--	--
Sptfn. Shin.	3	2.0-2.3	2.2	0.2	--	--	--
Hf. Carpskr.	7	4.2-19.6	8.6	6.7	--	--	--
Sm. Buffalo	1	20.5	20.5	---	--	--	--
Spot. Skr.	1	12.6	12.6	---	--	--	--
Gold. Rhrs.	4	9.7-14.8	12.3	2.1	--	--	--
Sthd. Rdhs.	48	10.3-18.3	14.9	2.5	--	--	--
Pirate Perch	1	3.9	3.9	---	--	--	--
Brook Slvrsde.	1	2.2	2.2	---	--	--	--
Fw. Drum	70	2.6-14.5	4.4	2.2	--	--	--

Table 6. Descriptive statistics for fyke net fishery data from Bertom and McCartney Lakes, August 20-21.

Species	Number	Size Range (inches)	Average Size (inches)	Standard Deviation	Number Stock	Number Quality	PSD
No. Pike	21	9.0-36.0	20.7	7.0	19	8	42
Gr. Pickerel	1	8.3	8.3	---	--	--	--
LMB	1	12.3	12.3	---	1	1	100
Wh. Bass	6	4.8-16.5	7.6	4.7	2	2	100
Bluegill	107	2.3-8.4	5.2	1.6	96	36	37
Pumpkinseed	18	3.2-4.4	3.7	0.4	18	0	0
Gr. Sunfish	15	2.7-6.0	4.0	1.0	--	--	--
Bl. Crappie	26	2.8-11.7	7.7	2.5	22	16	73
Wh. Crappie	3	7.1-9.3	8.5	1.2	3	2	66
BgillxPseed	2	4.5	4.5	---	--	--	--
Yel. Perch	17	4.1-8.8	7.6	1.2	16	9	56
Bl. Blhd.	1	11.0	11.0	---	--	--	--
Yel Blhd.	2	13.0-14.0	13.5	0.7	--	--	--
Br. Blhd.	3	13.4-15.2	14.5	0.9	--	--	--
Ch. Catfish	1	15.7	15.7	---	--	--	--
Flthd. Catfish	1	15.9	15.9	---	--	--	--
Ln. Gar	2	14.9-33.7	24.3	13.3	--	--	--
Sn. Gar	11	16.9-25.7	23.2	2.6	--	--	--
Bowfin	6	22.5-29.6	25.0	2.5	--	--	--
Giz. Shad	14	4.0-6.3	5.0	0.7	0	0	0
Carp	3	2.9-22.8	14.3	10.3	2	2	100
Gold. Shin.	4	5.7-7.3	6.2	0.8	--	--	--
Hf. Carpskr.	6	5.9-21.2	16.5	5.5	--	--	--
Spot. Skr.	22	5.7-17.8	15.2	3.2	--	--	--
Sthd. Rhrs.	15	10.6-16.3	13.7	1.8	--	--	--
Fw. Drum	11	4.0-27.0	16.7	8.5	--	--	--

Table 7. Frequency of species in the total catch for each sampling period and gear type. (Expressed in percent)

	Electrofishing			Fyke nets	
Species	Spring[1]	Spring[2]	Summer	Spring	Summer
No. Pike	3.6	0.4	0.6	3.0	6.5
LMB	7.2	3.6	1.8	2.0	0.3
Wh. Bass	0.0	0.0	15.0	0.0	1.8
Bluegill	26.4	35.2	14.6	43.0	33.5
Pumpkinseed	0.0	0.4	0.0	0.2	5.4
Gr. Sunfish	0.0	0.0	0.0	1.0	4.7
Bl. Crappie	0.0	0.4	0.6	24.2	8.2
Wh. Crappie	0.0	0.0	0.6	2.7	0.9
Warmouth	1.8	0.8	0.0	1.1	0.0
Walleye	0.0	0.0	1.0	0.0	0.0
Yel. Perch	1.8	1.2	1.5	0.0	5.3
Rockbass	0.0	1.2	1.0	0.0	0.0
Yel. Blhd.	1.8	0.0	0.0	1.7	0.6
Blk. Blhd.	1.8	0.0	0.0	0.6	0.3
Br. Blhd.	1.8	0.0	0.0	0.2	0.9
Flthd. Catfish	0.0	0.8	0.6	0.0	0.3
Ch. Catfish	0.0	0.8	1.0	0.2	0.3
Ln. Gar	0.0	0.4	0.2	0.6	0.6
Sn. Gar	0.0	3.2	0.4	0.6	3.4
Bowfin	28.3	6.0	0.4	4.4	1.2
Giz. Shad	0.0	2.4	17.3	0.0	4.4
Gold. Shin.	0.0	8.8	0.4	0.0	1.2
Emld. Shin.	0.0	0.4	0.6	0.0	0.0
Common Shin.	0.0	0.0	0.2	0.6	0.0
Carp	0.0	26.8	9.4	0.6	0.9
Quillback	0.0	0.4	0.0	0.0	0.0
Hf. Carpskr.	0.0	0.0	1.5	0.2	1.8
Spot. Skr.	24.5	0.4	0.2	13.0	6.8
Gold. Rhrs.	1.0	0.4	0.8	0.0	0.0
Sthd. Rhrs.	0.0	4.8	10.5	0.0	4.7
F. W. Drum	0.0	1.2	15.3	0.0	3.4
Other	0.0	0.0	4.5	0.1	2.6
Total Number in sample	53	250	457	532	319

[1] electrofishing conducted at McCartney Lake Sts. (1-4), March 23, 1988.

[2] electrofishing conducted at McCartney and Bertom Lake Sts. (1-8), May 20-21, 1988.

Table 8. Water depth (ft), ice depth (ft), current velocity (ft/sec) and dissolved oxygen (mg/l) measurements collected from Bertom and McCartney Lakes on February 15, 1988. Measurements of dissolved oxygen were made just beneath the ice (Top), just above the bottom (Bot.) and at midpoint between top and bottom (Mid.).

Site	Water Depth	Ice Depth	Current velocity	Dissolved Oxygen Top	Mid.	Bot.
A	4.5	0.4	0.4	---	12.0	---
B	---	0.4	1.0	---	12.0	---
C	2.8	0.8	0.7	---	12.1	---
D	---	---	1.1	---	---	---
E	6.0	0.7	0.5	---	12.0	---
F	---	---	1.0	---	---	---
G	---	---	0.8	---	---	---
H	3.0	1.2	---	1.3	---	0.9
I	3.1	1.2	---	1.4	---	0.2
J	2.0	1.2	---	3.4	---	1.7
K	2.8	1.1	---	1.4	---	0.8
L	2.4	1.0	---	2.0	---	0.5
M	3.0	---	---	2.3	---	0.5
N	0.5	---	---	---	2.5	---
O	2.7	---	---	1.3	---	0.8
P	---	---	---	---	---	---
Q	4.1	1.2	0.2	10.7	---	9.6
R	3.5	1.2	0.2	11.2	---	10.6
S	3.7	1.3	0.1	9.6	---	8.0
T	2.0	1.2	---	0.7	---	0.7
U	0.3	---	---	---	---	---
V	2.0	1.4	---	5.0	---	2.7
W	2.5	1.3	---	0.9	---	0.4
X	1.5	1.0	---	---	6.4	---
Y	---	---	---	---	7.6	---
Z	1.9	1.3	---	---	1.6	---
AA	1.7	1.2	---	---	1.0	---
BB	1.8	1.2	---	---	8.3	---
CC	2.8	1.2	---	9.6	---	5.5
DD	1.2	1.1	---	---	0.6	---
EE	2.7	0.4	---	8.0	6.0	2.5
FF	2.7	1.2	0.0	10.1	---	3.9
GG	---	0.9	0.0	---	5.4	---
HH	1.8	1.2	---	---	5.2	---
II	2.5	1.5	---	4.9	---	3.2
JJ	---	1.3	0.2	---	---	---
KK	1.7	1.4	---	---	11.4	---
LL	3.0	1.3	0.1	---	---	---

Table 9. Dissolved oxygen (mg/l) measurements for McCartney Lake monitoring sites (1-3) collected from December 11, 1985 to March 3, 1986.

Site	Depth	Dec. 11	Dec. 20	Jan. 1	Jan. 10	Jan. 28	Feb. 6	March 3
1	1'	8.6	ice	ice	ice	ice	ice	ice
	2'	8.6	7.7	7.2	5.2	4.7	4.7	4.9
	3'	8.6	7.7	7.2	5.0	3.5	3.9	4.6
	4'	8.4	7.6	7.2	4.8	3.1	3.3	4.3
			7.4	7.0	4.8	3.0	2.9	4.0
2	1'	9.2	ice	ice	ice	ice	ice	ice
	2'	9.0	7.8	7.4	6.7	6.1	4.7	4.6
	3'	9.0	7.7	7.3	6.5	5.2	4.2	4.4
	4'	8.9	7.7	7.2	6.2	4.7	4.0	4.0
	5'		7.6	7.0	6.0	4.1	3.2	3.9
3	1'		ice	ice		ice	ice	
	2'		8.0	7.6		8.1	4.9	
	3'		8.0	7.6		7.5	4.6	
	4'		7.8	7.5		7.0	4.0	
	5'		7.7	7.4		6.4	3.7	
	6'		7.5	7.2		5.9	3.4	

Table 10. Dissolved oxygen (mg/l) measurements for Bertom and McCartney Lakes monitoring sites (4-19) collected on February 19, 1986.

	Station Number															
Depth	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	ice		15.2	12.0	12.0	12.2	ice	ice	10.4	ice	ice	ice	11.6	2.0	ice	11.0
2			15.6	12.2	11.8	12.2	10.0	11.2	10.2	11.6	11.2	11.6	11.6	2.1	0.4	10.9
3			15.8	12.2	11.6		9.8	11.0	7.7	11.6	11.2	11.6	11.6		0.4	0.4
4			16.2	12.2	11.2		2.0				11.0	11.6	11.6			10.0
5			16.8	12.2	11.0						2.1	11.8				
6			16.8	12.2												
7				12.2												
8				12.2												
9				12.2												
10				12.2												

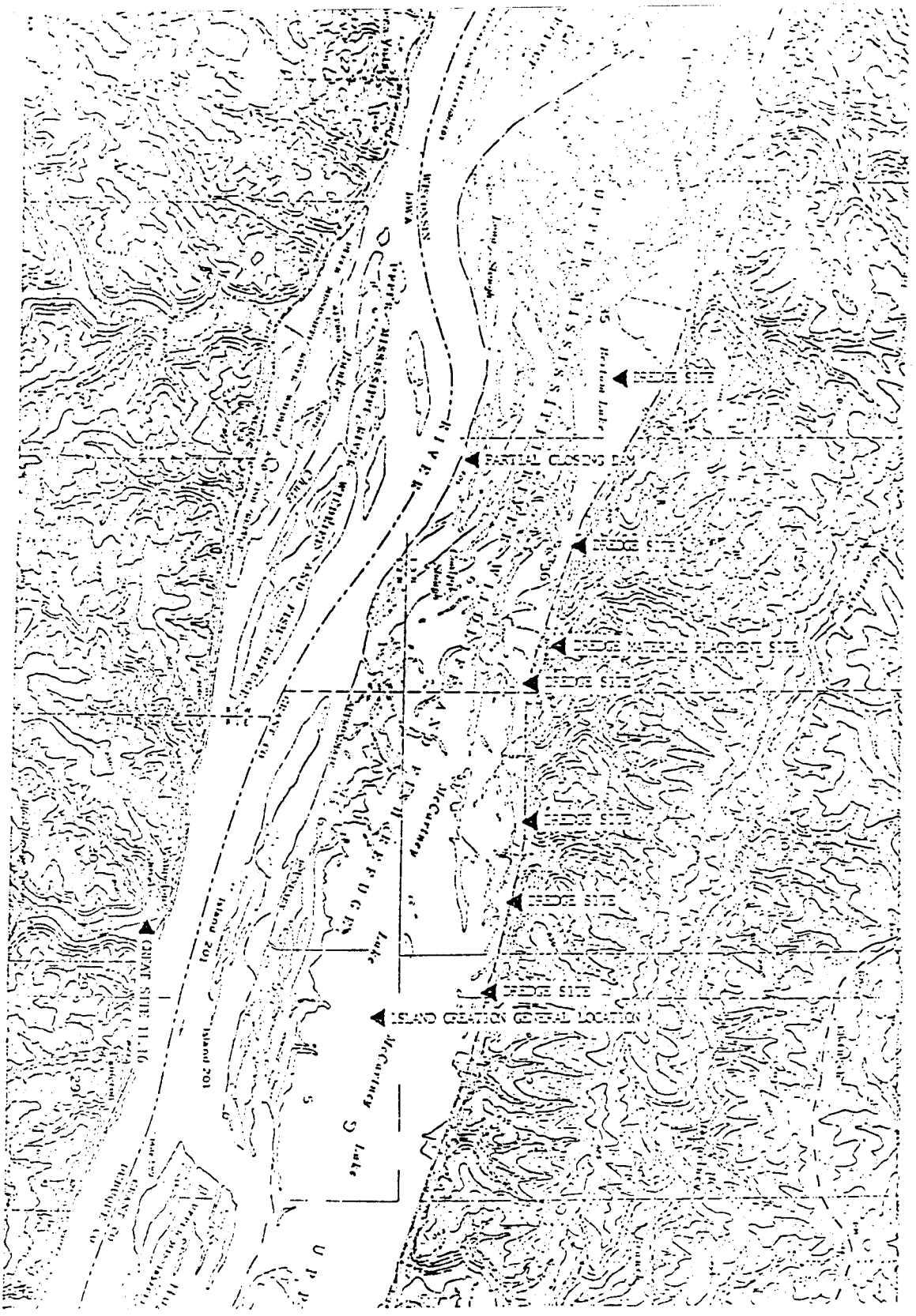


Figure 1. Map of Bertom and McCartney Lakes showing location of the partial closing structure and dredge sites suggested in the original proposal. Only McCartney Lake sites have been retained for dredging under the present proposal.

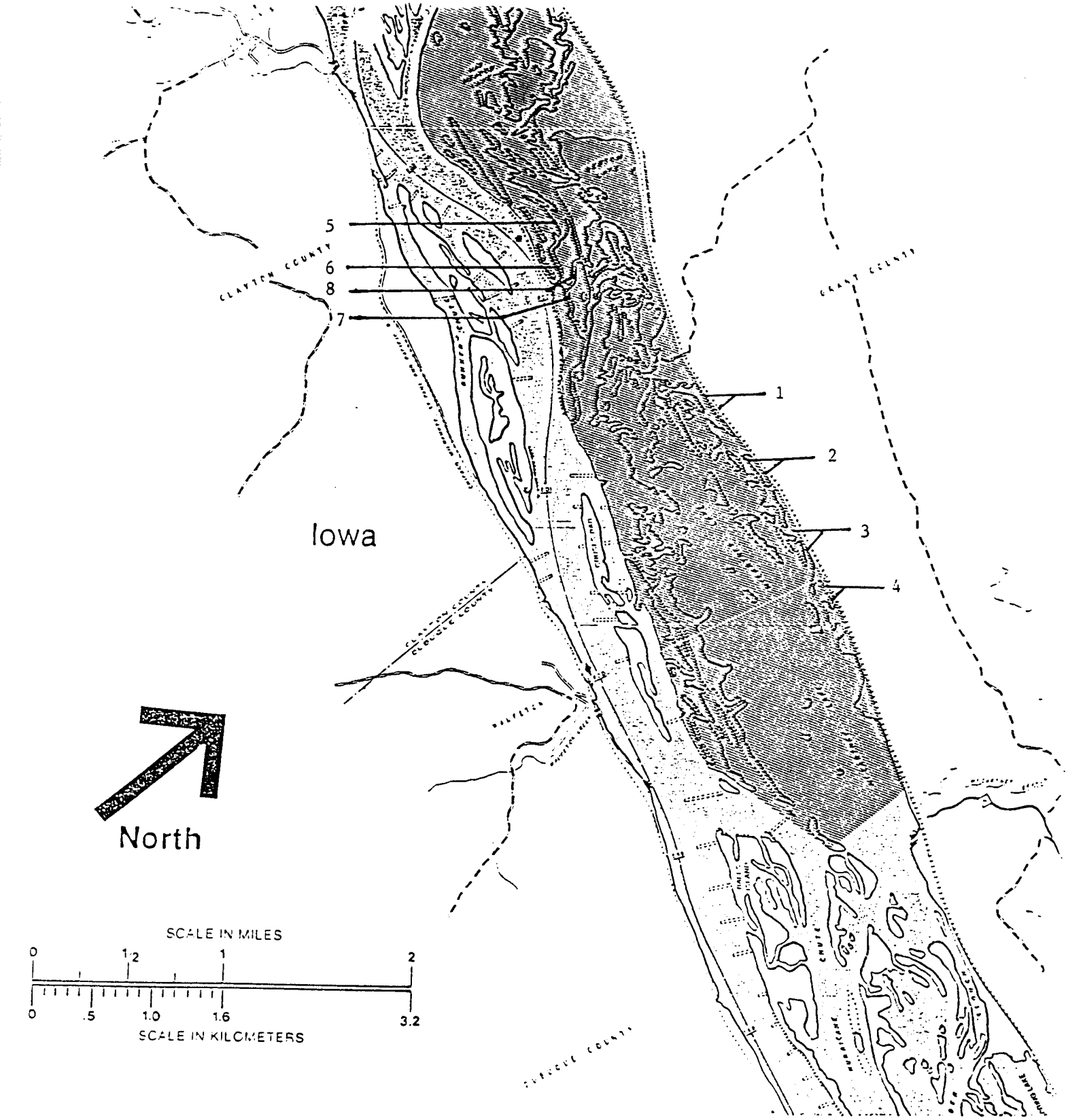


Figure 2. Map of Bertom and McCartney Lakes showing inventory stations 1-8.

Figure 3. Approximate location of transects used for measuring water depths in McCartney Lake. One inch equals approximately 1225 ft.

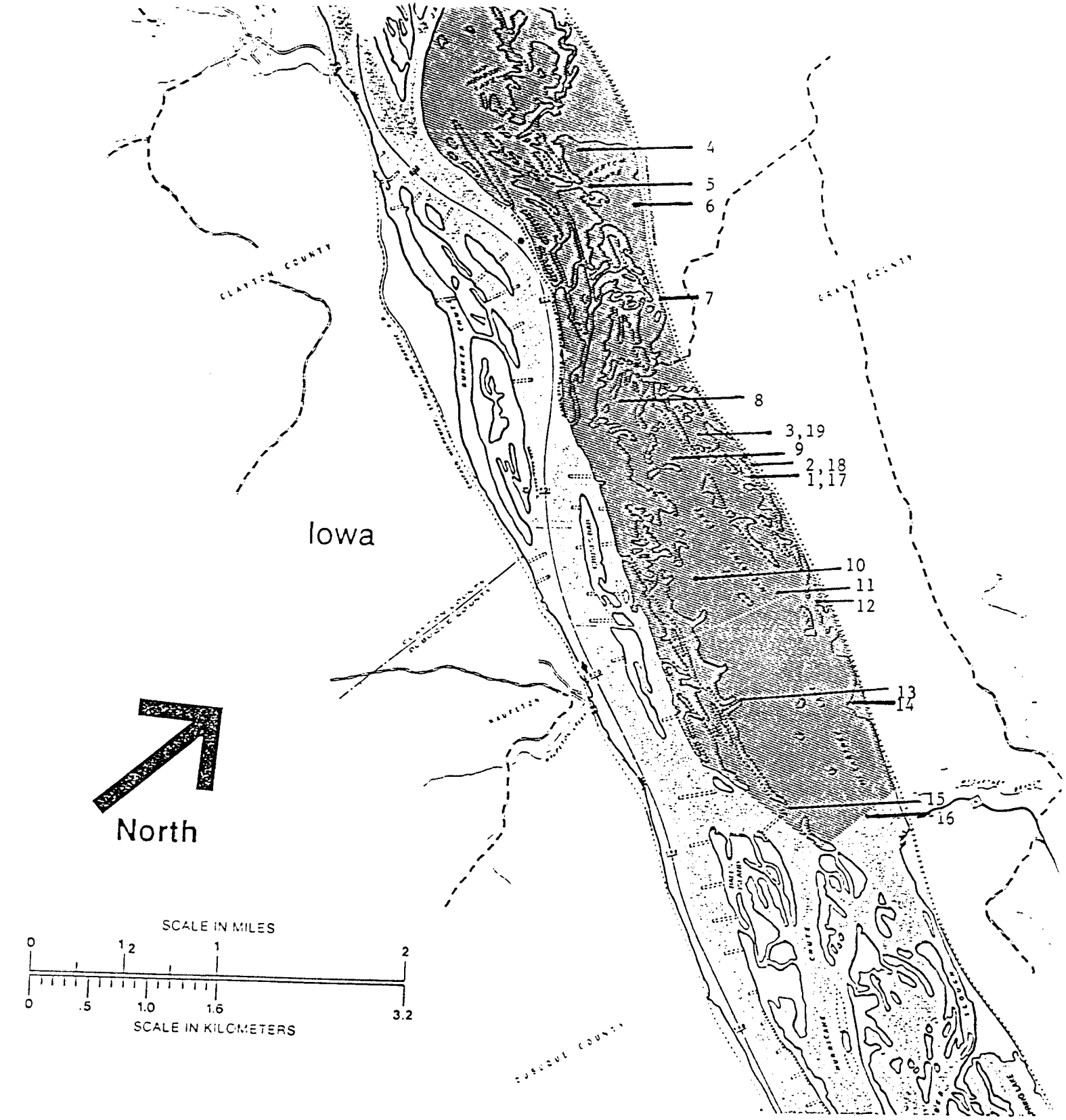


Figure 4. Map of Bertom and McCartney Lakes showing sites used for winter 1985-86 dissolved oxygen monitoring.

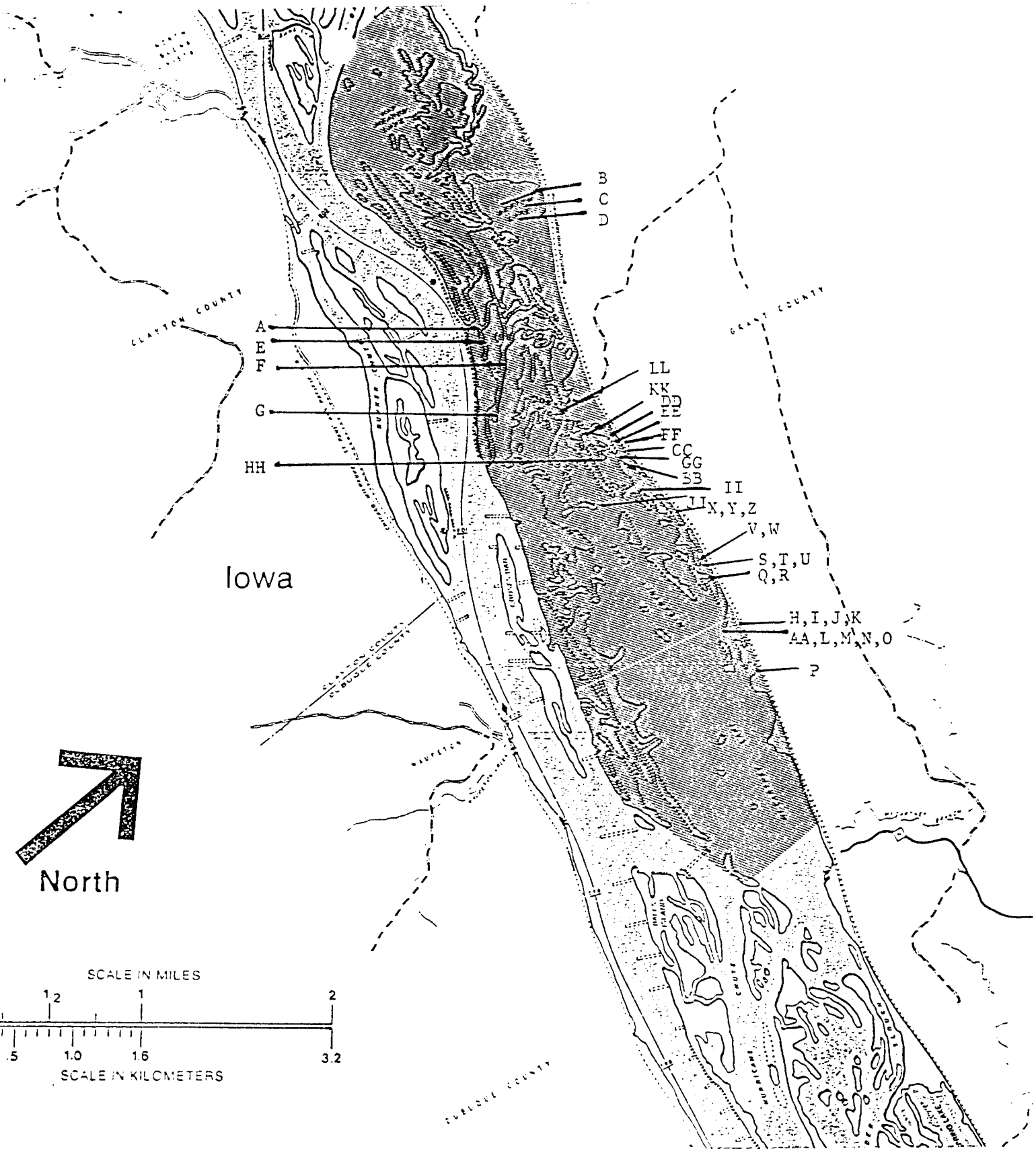


Figure 5. Map of Bertom and McCartney Lakes showing sites used in the February 15, 1988 dissolved oxygen monitoring.

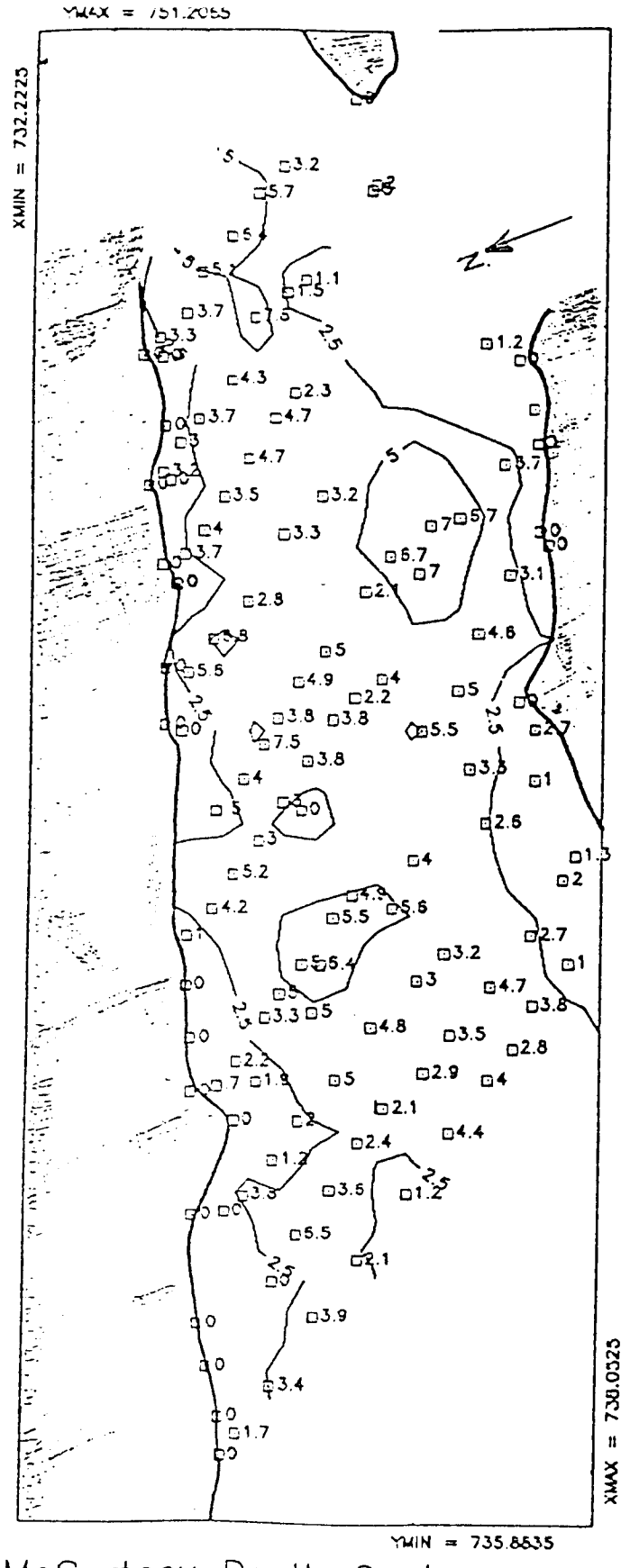
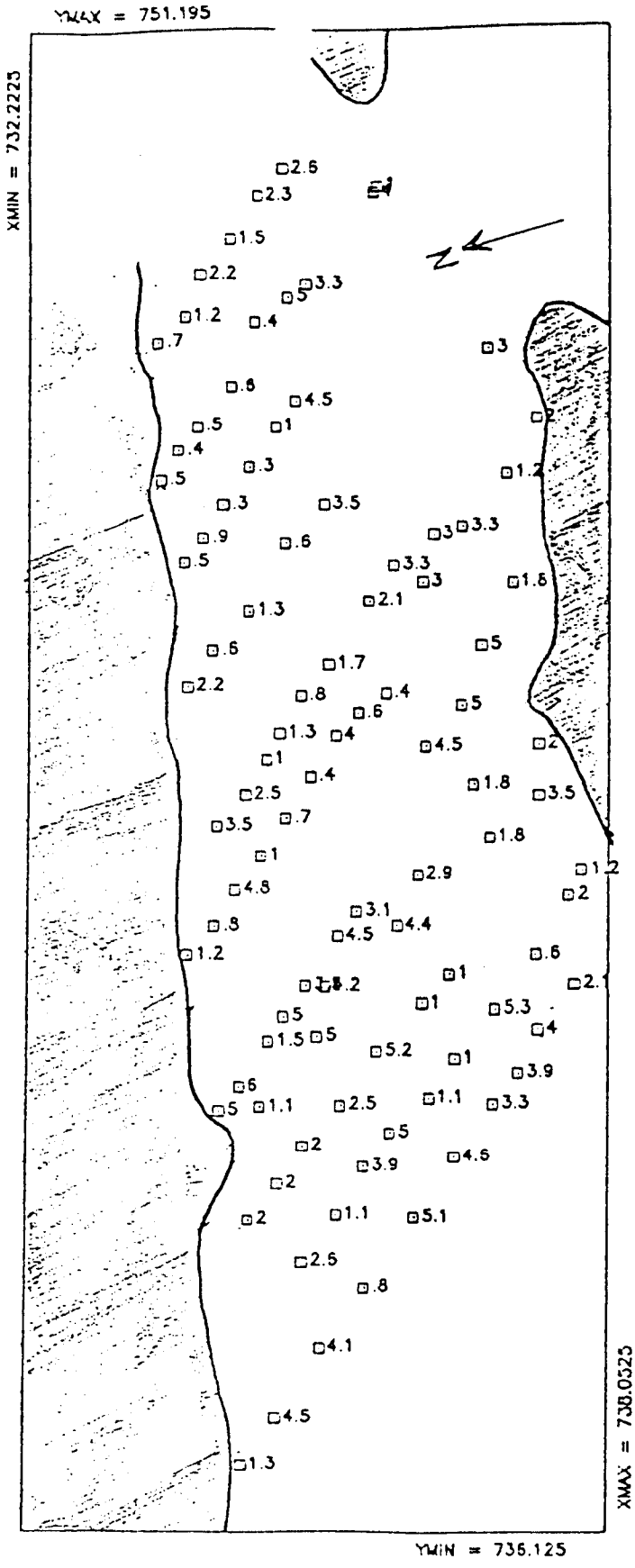


Figure 6. Computer drawn plot of McCartney Lake depth contours. Numbers next to the squares represent depth in feet. Elevation of Pool 11 during time of measurement was 602.5 feet. Contour Interval - 2.5 feet.



McCartney Soft Sediment Depths

Figure 7. Location and depth of soft sediment depth measurements made in McCartney Lake. The number next to the square is soft sediment depth in feet. Depth was determined by pushing a rod into the sediment until a hard layer was hit or the rod could no longer be pushed.

FISH AND MUSSEL HABITAT

This aspect of the Bertom Mc Cartney HREP is designed to enhance the fish and mussel habitat of the slough adjacent to Coal Pit Slough. Channel catfish, walleye, and smallmouth bass are the target fish species.

The channel design has a minimum bottom width of 50 feet with a slopes of 1V to 2H. The minimum bottom depth is 8 feet $\pm$ 1 foot or an elevation of 595 $\pm$ 1 foot. Where mechanical dredging occurs, the spoil should be placed on the right descending bank. The material should be flattened out so a berm is not formed. The project area is 1500 feet long and is divided into seven discrete sections. The first section just behind the underwater rock entrance structure is 300 feet long, followed by six 200-foot sections.

The features of the project include: limestone and non-limestone rock of sizes varying from 4-36 inch diameter; LUNKER fish habitat structures; sewer pipe ranging in size from 6 to 1 foot; and rock piles.

Each section has different sized rock (see map) with the largest rock at the channel end of the slough. The rock size in section A should be the size of rock used at Ackerman's Cut, which we believe was 36 inches. If the Ackerman rock was different than 36 inches, we will have to make the appropriate changes. Both the bottom and the sides of the slough will be rocked. In sections where the size of rock is smaller than normal riprap, the banks should be stabilized with normal size riprap. Where appropriate, the substrate should be lined with a bed of rock before the larger gravel is placed to prevent erosion.

LUNKER structures will provide spawning, resting, hiding and feeding habitat. Each of the four LUNKER structures will be 20 feet long. A top and side view is attached. A special feature of these LUNKER structures will be a tray of pea gravel that will provide spawning habitat. WDNR will provide assistance in constructing the LUNKERS. A cost estimate for the material of four structures is $2,500.

A 6-foot sewer pipe will be placed close to shore in Section B and G in existing deep water. The weight of a 6-foot pipe is approximately 1100 lbs. Branches will be placed in the ends for added cover. Sections of pipe 4 - 1 foot will be placed in Section D. Some will be tied to the bank as necessary. WDNR will obtain the sewer pipe free of charge.

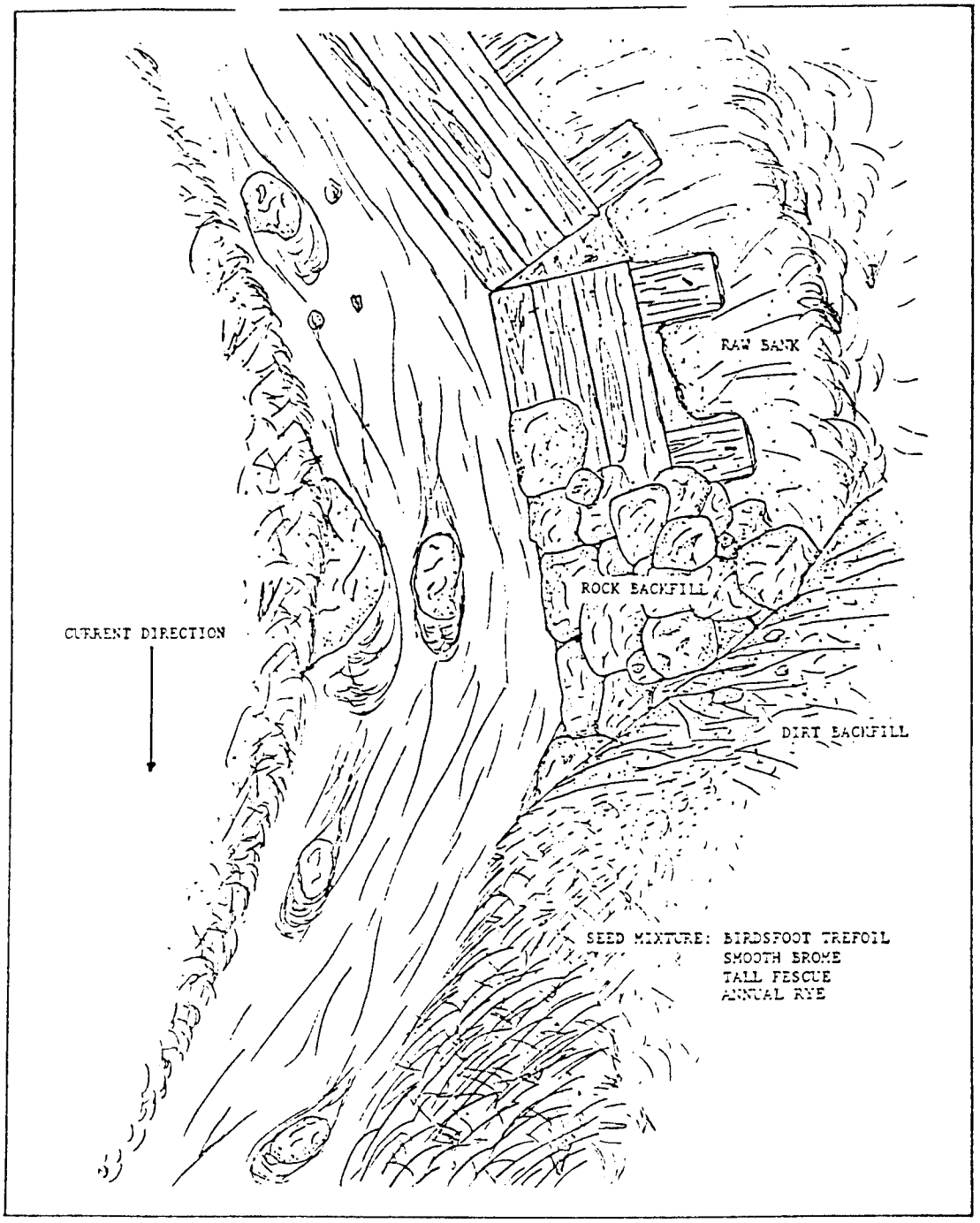
The rock piles located in Section D and possibly in other sections will provide cover and a break from the current.

The existing habitat in the slough lacks productive, stable substrata and overhead cover. The above project features will provide this for mussels, the target fish species, as well as other fish.

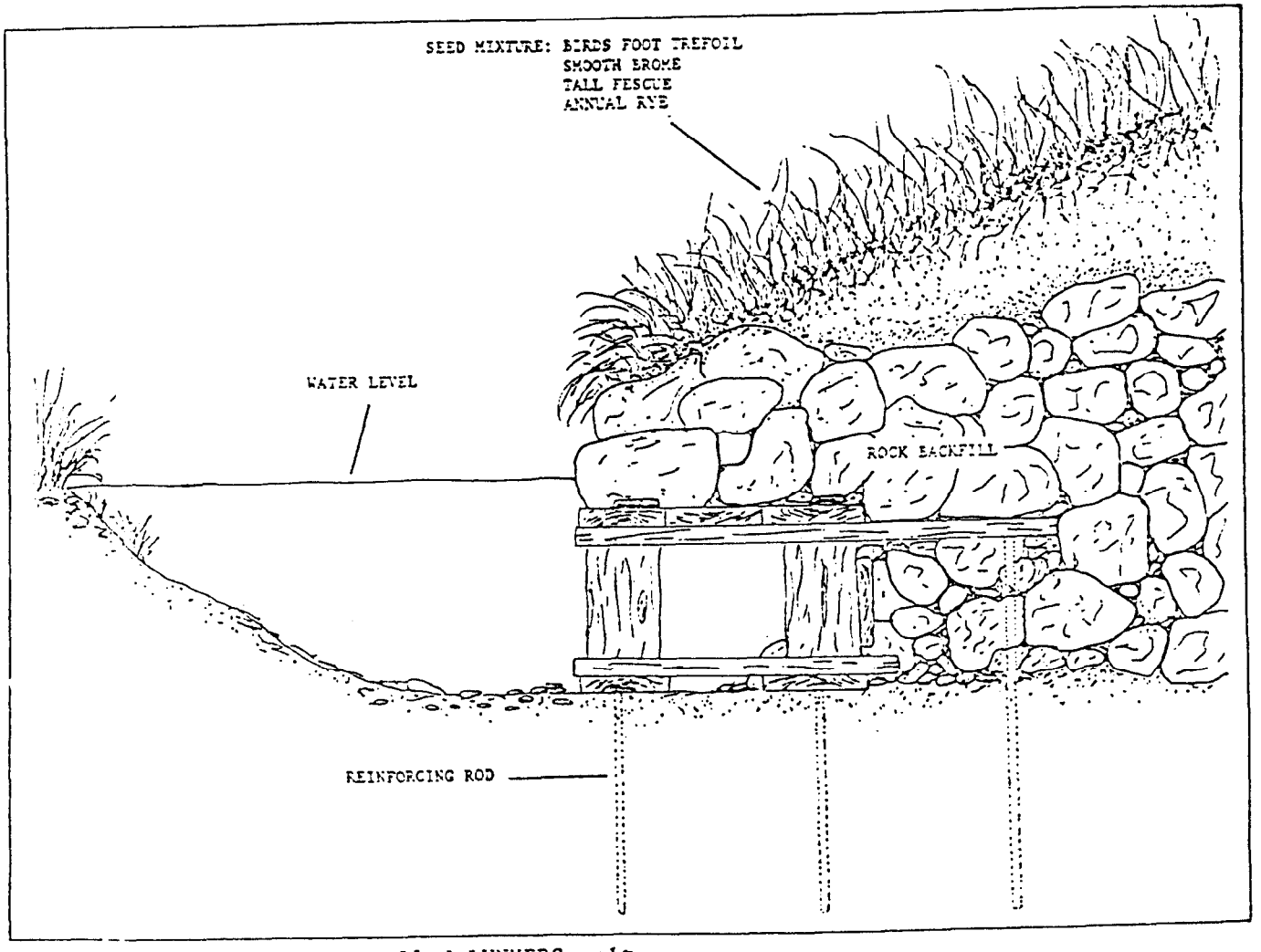
PT:jd

Table 1. Number of mussels collected by brail in the Coalpit Slough - Bertom Lake Area on August 8, 1987 (Total number of juveniles:adults)

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Maple Leaf Quadrula quadrula	(0:1)											
Hickorynut Obovaria olivaria		(0:1)										
Fragile Papershell Leptoden fragilis			(0:1)		(1:0)	(2:0)	(1:0)	(2:0)		(1:0)		(2:0)
Deartoe/Fawnfoot Truncilla sp			(4:0)		(3:0)		(1:0)	(3:0)	(15:0)	(1:0)	(49:0)	(31:0)
Pocketbook Lampsilis ventricosa					(1:1)		(1:0)			(0:1)		
Lilliput Carunculina parva					(4:0)		(14:0)	(1:0)	(1:0)	(3:0)	(54:0)	(80:0)
Pink Papershell Proptera laevissima					(2:0)	(1:0)	(2:0)	(4:0)	(1:0)	(2:0)	(1:0)	(5:0)
Wartyback Quadrula nodulatc									(0:1)			
Pink Heelsplitter Proptera alata												(1:0)
Unidentifiable							(1:0)				(3:0)	(3:0)
Total	(0:1)	(0:1)	(4:1)	(0:0)	(11:1)	(3:0)	(20:0)	(10:0)	(17:1)	(7:1)	(107:0)	(122:0)



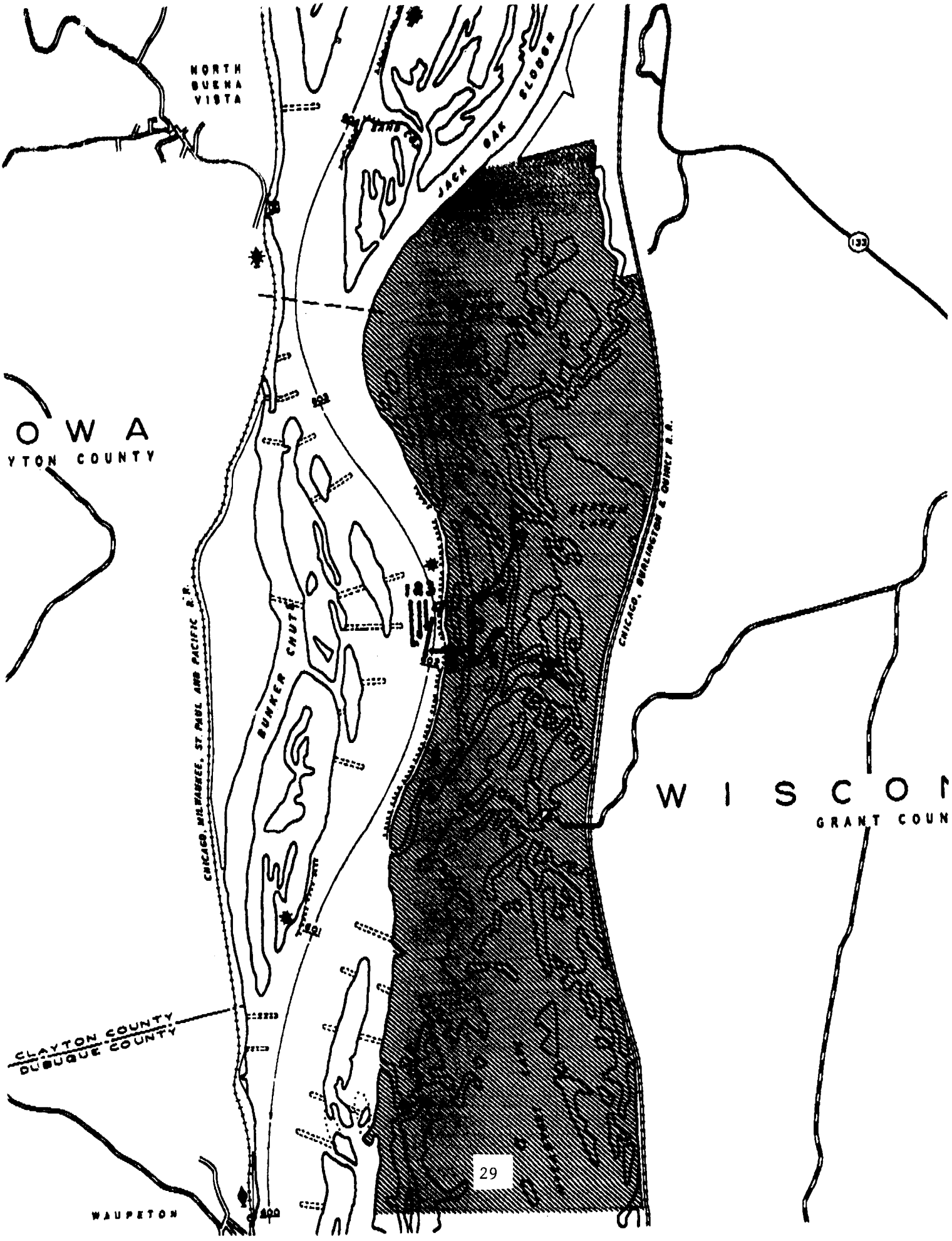
Top View, installed LUNKERS unit.



Side View, installed LUNKERS unit.

Table 1 Number of mussels collected by brail in the Coalpit Slough - Bertom Lake Area on August 8, 1987
(Total number of juveniles:adults)

Species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Maple Leaf Quadrula quadrula	(0:1)											
Hickorynut Obovaria olivaria		(0:1)										
Pragile Papershell Leptoden fragilis			(0:1)		(1:0)	(2:0)	(1:0)	(2:0)		(1:0)		(2:0)
Deartoe/Fawnfoot Truncilla sp			(4:0)		(3:0)		(1:0)	(3:0)	(15:0)	(1:0)	(49:0)	(31:0)
Pocketbook Lampsilis ventricosa					(1:1)		(1:0)			(0:1)		
Lilliput Carunculina parva					(4:0)		(14:0)	(1:0)	(1:0)	(3:0)	(54:0)	(80:0)
Pink Papershell Proptera laevissima					(2:0)	(1:0)	(2:0)	(4:0)	(1:0)	(2:0)	(1:0)	(5:0)
Wartyback Quadrula nodulata									(0:1)			
Pink Heelsplitter Proptera alata												(1:0)
Unidentifiable							(1:0)				(3:0)	(3:0)
Total	(0:1)	(0:1)	(4:1)	(0:0)	(11:1)	(3:0)	(20:0)	(10:0)	(17:1)	(7:1)	(107:0)	(122:0)


NORTH BUENA VISTA
JACK OAK SLOUGH
O W A
YTON COUNTY
CHICAGO, MILWAUKEE, ST. PAUL AND PACIFIC R.R.
BUNKER CHUTE
CHICAGO, BURLINGTON & QUINCY R.R.
W I S C O N
GRANT COUN
CLAYTON COUNTY
DUBUQUE COUNTY
WAUPETON

SUMMARY REPORT

Scott Schellhaass and John Sullivan

PROJECT: Monitoring of dissolved oxygen, temperature and light in selected backwaters of the Upper Mississippi River (UMR).

PERIOD: June - August, 1987

OBJECTIVES:

1. To provide baseline data on summer dissolved oxygen levels, temperature and light measurements in backwater areas of the Upper Mississippi River.

2. To establish pre-construction water quality conditions for planned or proposed Habitat Rehabilitation and Enhancement Program (HREP) projects under the UMR Environmental Management Program.

INTRODUCTION

Dissolved oxygen (DO) and temperature were monitored on a continuous basis in a number of Mississippi River backwater areas during the summer of 1987. Monitoring periods were approximately a week in duration. The following six backwater areas were monitored: Mc Cartney Lake, Pool 11; Cold Springs, Pool 9; Blackhawk Park, Pool 9; French Lake, Pool 8, Lake Onalaska near Rosebud Island, Pool 7 and Long Lake, Pool 7. The Blackhawk Park site is in the construction phase of HREP; the McCartney Lake and Lake Onalaska projects are in the design phase, and the remaining three projects have high priorities for HREP funding in the near future.

Common water quality or hydraulic problems in these backwater areas include siltation, decreasing water depths, reduced flow and circulation and the development of stagnant conditions with periodic DO problems. These factors are contributing to a loss of valuable fish habitat. Increased plant growth in these shallow water habitats, in the absence of freshwater input, cause wide swings in daily summer DO levels as a result of photosynthetic and respiratory processes. The allochthonous production of organic material contributes to reduced water depths and sediment oxygen demand when plant remains decay. The sediment oxygen demand is of particular concern in the winter months when primary productivity is low and re-aeration is restricted due to ice cover.

The collection of summer water quality data helps establish the magnitude of serious water quality problems, especially low DO conditions. This information supplements past winter water quality monitoring studies and physical measurements of depth, light penetration, current velocity and water circulation (Wisconsin

Department of Natural Resources, 1987). These studies provide initial data for the engineering and design of habitat rehabilitation alternatives.

METHODS

DO and temperature measurements were recorded with either a Yellow Springs Instruments (YSI) 56 DO monitor or a YSI 57 DO meter connected to a Licor LI-1000 data logger. A YSI automatic stirring device was used with both DO probes. An additional YSI thermistor was occasionally used with the data logger to record temperature as well as DO. Surface and subsurface light readings were made with a Li-Cor LI-190SA quantum sensor and a LI-192SA underwater quantum sensor. These sensors measure light in the photosynthetically active radiation (PAR) spectrum of 400 to 700 nm. Light readings were recorded directly with the Li-Cor LI-1000 data logger.

DO meters were calibrated using the air calibration technique (Wisconsin Department of Natural Resources, 1983). The calibration procedure was performed before field use and at the end of the monitoring period to document final instrument drift. During field use the probes were mounted on a stake and positioned 1 to 2 ft below the water surface. The probes were orientated so the stirrer was above the DO probe membrane.

DO routinely exceeded 100% saturation in a number of backwater areas monitored. Measurement of maximum DO levels in supersaturated conditions may be inaccurate using normal calibration procedures. Analysis of data collected using a YSI meter indicated an underestimation of DO levels in warm water (>25° C) that were highly saturated with oxygen (>180%). This problem was encountered at French Lake during the monitoring period of 20-24 July 1987. The line representing DO values on the monitor flattened out during the time of day when DO and temperature were greatest. Maximum DO values measured during those times were likely greater than indicated. A recommended method to measure maximum DO values under these conditions is to calibrate meters to read one-half the air calibration level and multiply the resulting meter values by 2 (YSI, 1986).

Results and Discussion

Lake Onalaska - Pool 7

The sampling site in Lake Onalaska was located near a small island East of Rosebud Island (Figure 1). The surrounding area was shallow with dense growths of emergent and submergent aquatic vegetation. The water was clear and the lake bottom easily seen in small open areas. A small channel through the vegetation was kept open most of the summer by boat traffic. The DO/temperature monitor was placed on the island. The probe was placed in about 2 ft of water at a depth of approximately 1 ft and located 90 ft east of the island. The surface light sensor was mounted on a stake just north of the small island in an unshaded but secluded area. The monitoring extended from 18 June - 25 June 1987.

The difference between the daily minimum and maximum water temperatures varied from 2 to 7.3° C with an average of 3.6° C (Table 1). The greatest difference occurred on 22 June, a sunny day following two cloudy days. This also corresponded to the period with the greatest difference in minimum and maximum DO levels. The day with the least temperature difference was 20 June which appeared to be a mostly cloudy day.

Results of the monitoring efforts showed there was a wide fluctuation between daily minimum and maximum DO levels with an average difference of 9.5 mg/l (Figure 7). Minimum DO levels usually occurred during the early morning hours from 0430-0800. Maximum DO values occurred during early evening hours 1830-1930 hours. The wide shifts in DO is attributed to large amount of live plant material providing high daytime DO levels by photosynthesis and low night time DO values through respiration. Fifty-eight percent of the hourly DO levels were less than Wisconsin's water quality standard of 5 mg/l.

Daily light measurements varied between 16.0 to 53.9 mol/m^2 during the 7-day monitoring period. These measurements indicate the amount of radiation received by the system and is dependent on atmospheric conditions, latitude, elevation and time of year. Maximum PAR for a clear summer day for this latitude is approximately 60 mol/m^2 based on information provided by Biggs (1985).

Blackhawk Park - Pool 9

DO, temperature and light were monitored at Blackhawk Park, Pool 9 (Figure 2) from 29 June to 6 July, 1987. The monitoring site at Blackhawk Park was a shallow backwater area and contained fewer submerged macrophytes compared to other sites monitored in 1987. Floating duckweeds (Lemna sp. and Woffia sp.) were found in dense mats at the site. South winds caused the floating plant material to accumulate around the monitoring site. This surface plant mat may have restricted submergent plant growth due to light shading. The probe was placed in approximately 2.5 feet of water at a depth of one ft. The surface light meter was placed on a stake in an adjacent marsh area.

Daily water temperatures in the Blackhawk area ranged from a high of 27.5° C to a low of 22.0° C (Figure 7). Daily maximum temperatures averaged 27.0° C and minimum daily temperatures averaged 22.9° C (Table 1). The difference between the daily maximum and minimum temperatures averaged 4.4° C.

DO values fluctuated from 1.4 to a high of 8.4 mg/l (Figure 7). The average daily maximum and minimum DO levels were 7.4 and 2.6 mg/l, respectively (Table 1). The difference between daily DO maximums and minimums averaged 4.9 mg/l. Fifty-two percent of the dissolved oxygen values were below Wisconsin's water quality standard of 5 mg/l. Only five readings exceeded 100% saturation. This differed from other backwater areas monitored in the summer of 1987 which had greater

fluctuations in DO and routinely exhibited daily supersaturated conditions. The reduced submerged plant biomass found at Blackhawk Park was probably responsible for lower photosynthetic activity within the water column.

Daily light readings at Blackhawk Park ranged from 41.8 to 60.9 mol/m^2. Maximum DO values for the monitoring period occurred during those days when the area received the greatest amount of light.

French Lake - Pool 8

The sampling site at French Lake, Pool 8 was a shallow backwater area below the dike of Lock and Dam 7 (Figure 3). Water in the area appeared turbid and few aquatic macrophytes were present. Occasional fluctuations in water level exposed shoreline areas to periodic drying and wetting. Monitoring activity occurred from 20 July-24 July 1987.

Probe placement at this site was in approximately 2 ft of water at a depth of 1 ft below the surface. During the monitoring period surface light measurements were made at the WDNR Area Office located several miles from the site. Lack of a suitable open area in the immediate vicinity of French Lake made this necessary.

Daily temperatures at French Lake during the monitoring period ranged from an average maximum of 32.8° C to an average minimum (Table 1) of 26.3° C(Table 1). The daily average maximums were a few degrees higher than experienced at other similar backwater areas monitored. Air temperature during this particular monitoring period was quite warm with daily highs near 32° C and night time lows remaining above 21° C. The area is shallow and somewhat secluded from adjacent channels. This provides for rapid heating and poor circulation with cooler waters.

Maximum daily DO averaged 10.5 mg/l while minimum daily DO averaged 1.7 mg/l. These swings in DO were similar to other backwater areas monitored. Forty seven percent of the DO values fell below Wisconsin's water quality standard of 5 mg/l.

Daily radiation measurements during the monitoring period ranged from 48.8 to 52.8 mol/m^2 and were indicative of mostly clear sunny days.

Long Lake - Pool 7

Monitoring of DO and temperature at Long Lake Pool 7 occurred from 28 July to 3 August 1987. The monitoring site at Long Lake was located approximately 0.2 miles south of the boat ramp near the west shore (Figure 4). The site was located between the lake inlet and outlet. Water enters Long Lake from Mud Lake at the southern end and discharges to the Mississippi River at the outlet on the western side of Long Lake. Aquatic macrophytes were found along the perimeter of the lake but absent in the center. The monitoring probe was placed in approximately 3 ft of water, 16 in. below the surface.

Differences between the daily maximum and minimum water temperature varied from 1.0 to 3.2° C and averaged 2.5° C during the monitoring period. The daily maximum temperature averaged 28.7 and daily minimum averaged 26.8° C (Table 1).

DO values remained consistently low and did not fluctuate as much as those at other backwater areas monitored. Extremes ranged from a maximum of 6.8 mg/l to a minimum of 0.0 mg/l (Figure 7). Daily fluctuations averaged 3.0 mg/l. Eighty seven percent of the DO readings were below the Wisconsin water quality standard of 5 mg/l. Fyke netting activities during the same period in this area showed fish to be congregating on the north end of the lake. Black crappie (Pomoxis nigromaculatus) appeared to leave the area (Engel 1988). Fish that were present seemed to be restricted to oxygenated surface waters. Water below two feet were generally devoid of oxygen. An example DO, temperature profile near the continuous monitoring station is illustrated in Figure 8.

Inlet water from Mud Lake was essentially anoxic (<0.2 mg/l) and warm (28° C). Some dead fish were observed in the narrow channel leading into Long Lake. Mud Lake is a shallow backwater lake with dense stands of submergent vegetation. The lake receives little freshwater inflow. The development of stagnant conditions in such lakes is common in Mississippi River backwater areas. A heavy rainstorm (5 in) received on 27 July may have partially flushed out Mud Lake and contributed to water quality problems observed in Long Lake.

Cold Springs - Pool 9

The area at Cold Springs, Pool 9, was monitored at two different locations (Figure 5) from 6 August to 12 August 1987. One monitoring site was located in the northern portion of Cold Springs. This site was shallow with dense growths of aquatic macrophytes. Unlike other sites monitored, vegetation in this area had little periphyton. Additionally, during the monitoring period, the probe remained clean rather than being colonized by periphyton. Water was extremely clear and bottom features easily distinguished when not obscured by vegetation.

Water temperatures at Cold Springs were moderate. No extreme highs or lows were noted (Figure 9). The widest temperature fluctuation recorded for a full day was 2.8° C. Daytime air temperatures during the monitoring period ranged from 26° C to 32° C. Nighttime air temperatures were between 15° C to 21° C.

Dissolved oxygen values remained fairly high. The average daily maximum DO value was 15.7 mg/l (Table 1). The average daily minimums reached ranged from 3.6 to 7.4 mg/l with an average of 4.8 mg/l. A total of ten readings (7%) were below the Wisconsin water quality standard of 5 mg/l. Considering the monitoring was in a shallow backwater with large accumulations of macrophytes and soft organic sediments, this number is surprisingly low. The reason for this response was not established.

The second site monitored near Cold Springs was in a side channel west of the railroad tracks. This site was characteristic of a riverine habitat with noticeable current (0.20 ft/sec) and more turbid conditions. Aquatic macrophytes were absent. The monitoring probe was placed in approximately 3 ft of water 2 ft below the surface.

Water temperatures in the channel remained stable with no large fluctuations. Daily maximum and minimum temperatures averaged 26.1° C and 24.7° C, respectively. The greatest difference between a daily maximum and minimum temperature was 1.5° C.

DO values also remained fairly constant at the side channel with daily maximum DO values averaging 7.8 mg/l and daily minimum averaging 5.8 mg/l (Table 1). Three of the hourly values (2%) went below the Wisconsin water quality standard of 5 mg/l. All three were morning values of 4.8 mg/l.

The river side channel showed less fluctuations in temperature and DO than the adjacent Cold Springs backwater area (Figure 9). This was expected since the current velocity at the side channel site was sufficient to prevent temperature stratification. Water circulation in the flowing side channel distributed oxygenated water and heat throughout the water column which dampened diel changes.

Mc Cartney - Pool 11

The backwater area at McCartney Lake, Pool 11 was monitored at two sites (Figure 6) from 13 August to 20 August 1987. Site 1 was located in a small shallow bay adjacent to the railroad tracks. The area had extremely dense growths of aquatic macrophytes, a thick layer of soft organic sediment, and an input of groundwater influencing local temperature and chemical characteristics. Measurements made near the groundwater input at a depth of 3 ft showed DO to be 0.2 mg/l, temperature 19.0° C and conductivity 460 umho/cm. At 0.2 ft, DO was 16.5 mg/l, temperature 25.0° C and conductivity 350 umho/cm. The groundwater entered this area along the eastern shore.

The continuous monitoring probe at Site 1 was placed in approximately 3 ft of water at a depth of one ft near the west side of the bay. Temperature and DO were monitored at this site.

Water temperatures at Site 1 declined during the monitoring period (Figure 9). A difference of 1.7° C was found between the average maximum and the average minimum values (Table 1). The maximum recorded temperature during the monitoring period was 25.9° C. The minimum recorded temperature was 19.2° C. Daily maximum and minimum temperatures averaged 23.9 and 21.9° C, respectively.

A full week of DO readings was not obtained at Site 1. The DO line on the strip chart had a number of offset marks and was not a continuous line (Figure 9). These portions of data have been deleted. In addition, a black precipitate was found on the outside of the probe, and a white precipitate formed on the inside. The cause of these precipitates is unknown. It may be related to unique mineral

concentrations from groundwater inflows.

Daily DO values remained consistently low with an average daily maximum of 3.8 mg/l and an average daily minimum of 0.8 mg/l (Table 1). Ninety percent of the hourly DO data were less than Wisconsin's water quality standard of 5 mg/l. The large quantities of plant material combined with soft organic sediments probably exerted a high oxygen demand on the area. Furthermore, the area is narrow and shaded by bottomland hardwoods and bluffs providing less chance for direct sunlight to reach the water surface and may limit photosynthetic activity.

Site 2 at McCartney Lake was near a 9 ft deep channel, with noticeable flow. Water was turbid and well mixed. Aquatic vegetation was restricted to the edges of the channel and was not found in the channel itself. DO surface and subsurface light were measured at this site. The DO probe was located approximately one ft below the water surface in 3.5 ft of water. The subsurface light cell was in 7 ft of water 5.75 ft below the surface. DO trends reflected those of the monitoring effort in the side channel at Cold Springs (Figure 9). Daily maximum DO values averaged 7.5 mg/l and minimum values 5.3 mg/l, with an average daily difference of 2.6 mg/l (Table 1). Seven readings (4.2%) did not meet the State's water quality standard of 5 mg/l. These values occurred during the second day of monitoring which appeared to be extremely overcast, based on surface radiation measurements. The low surface radiation received that day (15.6 mol/m^2) likely limited photosynthetic production of oxygen.

Daily extinction coefficients and daily average compensation depths were calculated for Site 2. Daily values obtained between 1000 and 1400 hours were used in these calculations. The average compensation depth was 3.3 ft (1.0m), (Table 1). The compensation depth showed a slight declining trend during the monitoring period ranging from 3.7 to 3.1 ft (1.12 to 0.96 m). Colonization by plant and animal communities on the light sensor may have caused partial shading of the sensor and given increasingly lower light readings. A large number of caddisfly larvae were found on the equipment when it was retrieved. A slight increase in turbidity associated with increasing flow could produce the same results. Fluctuations in water levels would also effect readings.

Conclusions

Summer monitoring of Mississippi River backwater areas gives an indication of some of the daily fluctuations of environmental conditions. Ideally longer periods of monitoring at more than one point should be done to better assess the large backwater areas and reduce the chance of localized conditions distorting the results.

The following areas monitored had at least 50% of the readings below the Wisconsin water quality standard of 5 mg/l; Lake Onalaska near Rosebud Island, Blackhawk Park, French Lake, Long Lake and Site 1 at Mc Cartney Lake. Other sites monitored showed less severe oxygen depletion problems but exhibited problems common to all, such as

sedimentation and siltation of previously open water areas and increased aquatic plant populations.

Continuous water quality monitoring of selected backwater areas during the summer should continue to further document water quality problems, to identify corrective solutions and to evaluate rehabilitation efforts.

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Yellow Springs Instrument Co., Inc., 1986. YSI Model 56 dissolved oxygen monitor instruction manual. Scientific Division, Yellow Springs, Ohio. 25 p.

Table 1. Summary of dissolved oxygen, temperature and light data collected during continous monitoring surveys on the Upper Mississippi River in the summer of 1987. Data represent averages and standard deviations (in paraenthesis).

Parameter	Rosebud Island Pool 7 19 - 25 Jun	Long Lake Pool 7 28 Jul - 3 Aug	French Lake Pool 8 20 - 24 Jul	Blackhawk Park Pool 9 29 Jun - 6 Jul	Coldsprings Pool 9 6 - 12 Aug (North)	Coldsprings Pool 9 6 - 12 Aug (Side Channel)	McCartney Pool 11 13 - 20 Aug (Site 1)	McCartney Pool 11 13 - 20 Aug (Site 2)
Dissolved Oxygen Mg/L								
Daily Maximum	10.2 (2.4)	4.8 (1.6)	10.5 (0.1)	7.4 (0.5)	15.7 (1.7)	7.8 (1.3)	4.1 (2.4)	7.5 (0.3)
Daily Minimum	0.4 (0.4)	1.1 (0.8)	1.7 (0.5)	2.6 (0.7)	4.8 (1.3)	5.8 (1.3)	0.8 (0.6)	5.3 (0.3)
Daily Max - Min	9.5 (2.5)	3.4 (1.1)	9.1 (0.1)	4.9 (0.8)	10.5 (2.7)	2.4 (0.9)	3.8 (2.5)	2.6 (0.6)
No. Hourly Values	168	143	93	166	142	144	106	166
% Obs. below 5 Mg/L	58	87	47	52	7	2	89.6	4.2
Calibration Error[B]	+0.1	-1.5[E]	-0.3	+0.0	+0.5	-0.5	-0.1	-0.5
Water Temperature Deg C								
Daily Maximum	26.7 (1.9)	28.7 (1.7)	32.8 (0.4)	27.0 (0.4)	25.7 (0.4)	26.1 (0.5)	23.9 (1.3)	NA
Daily Minimum	22.9 (1.3)	26.8 (1.1)	26.3 (1.0)	22.9 (0.6)	23.6 (0.3)	24.7 (0.5)	21.9 (1.8)	NA
Daily Max - Min	3.6 (1.9)	2.5 (0.8)	5.7 (0.5)	4.4 (0.6)	2.32 (0.3)	1.3 (0.2)	1.7 (0.6)	NA
No of Hourly Values	168	143	93	166	142	144	106	NA
Light Data								
Daily Surface PAR (mol/m^2)[A]	38.4 (14.4)	NA	51.2 (1.7)	53.0 (7.4)	NA	NA	NA	32.8 (9.2)
Light Extinction (1/m)	NA	2.5[C] (0.04)	3.27 (0.06)	NA	NA	1.69 (0.06)	NA	4.7 (0.5)[D]
1% Compensation Depth (m)	NA	1.8[C] (0.03)	1.41 (0.02)	NA	NA	2.73 (0.10)	NA	1.0 (0.1)[D]

[A] - Light measured in the photosynthetically active (PAR) portion of the spectrum, 400 to 700 nm. The averages are for full days of monitoring.
[B] - Difference in instrument reading compared to 100% saturated value at the end of the day.
[C] - Light measurements made with ten second logging period near monitoring site.
[D] - Averages calculated from daily monitoring during 1000 to 1400 hrs. from Aug 16 - 19.
[E] - At time of calibration check a hole was found in the membrane.

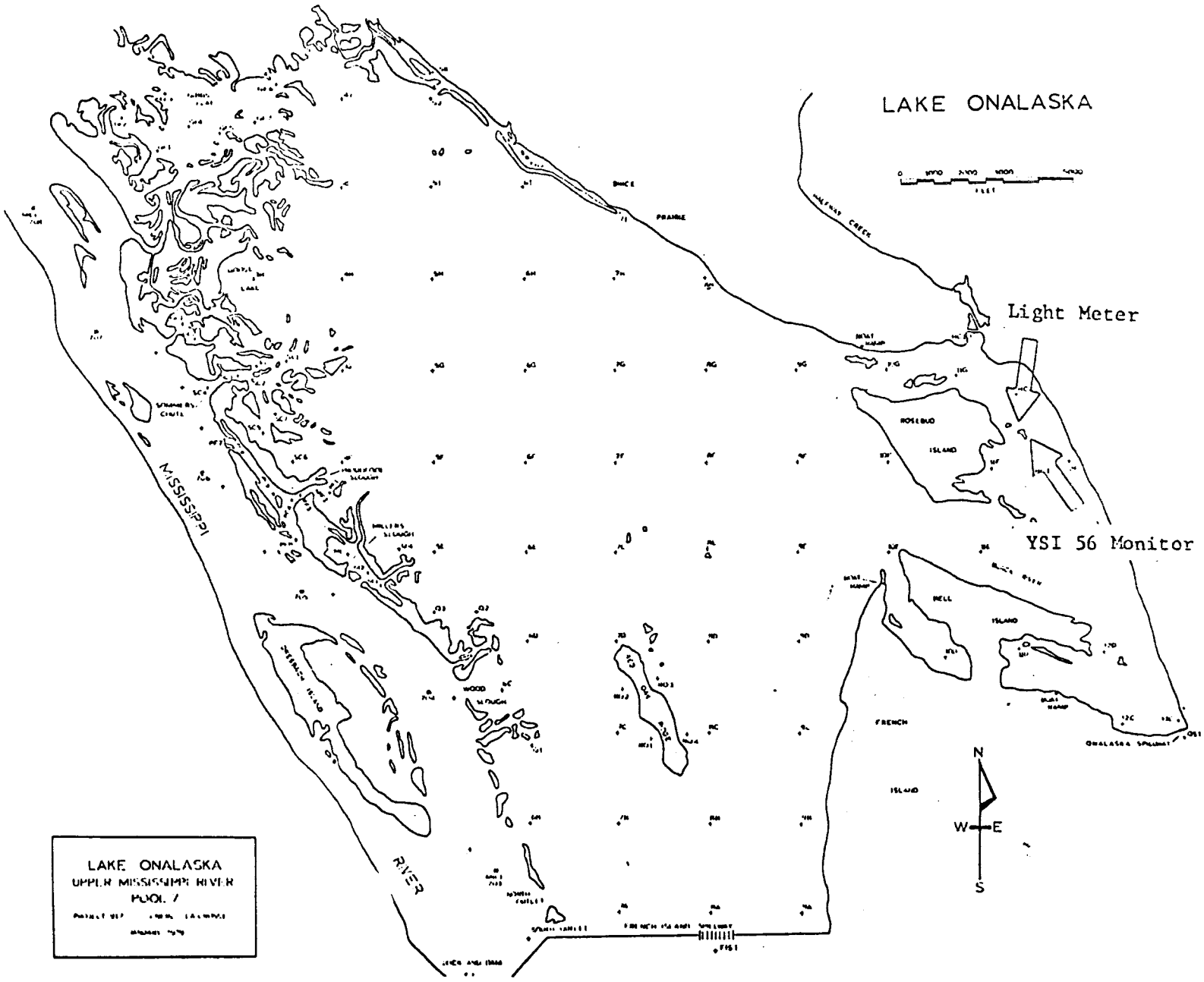


Figure 1. Lake Onalaska, Navigation Pool 7 and the location of the monitoring sites used, 18 June - 25 June 1987.

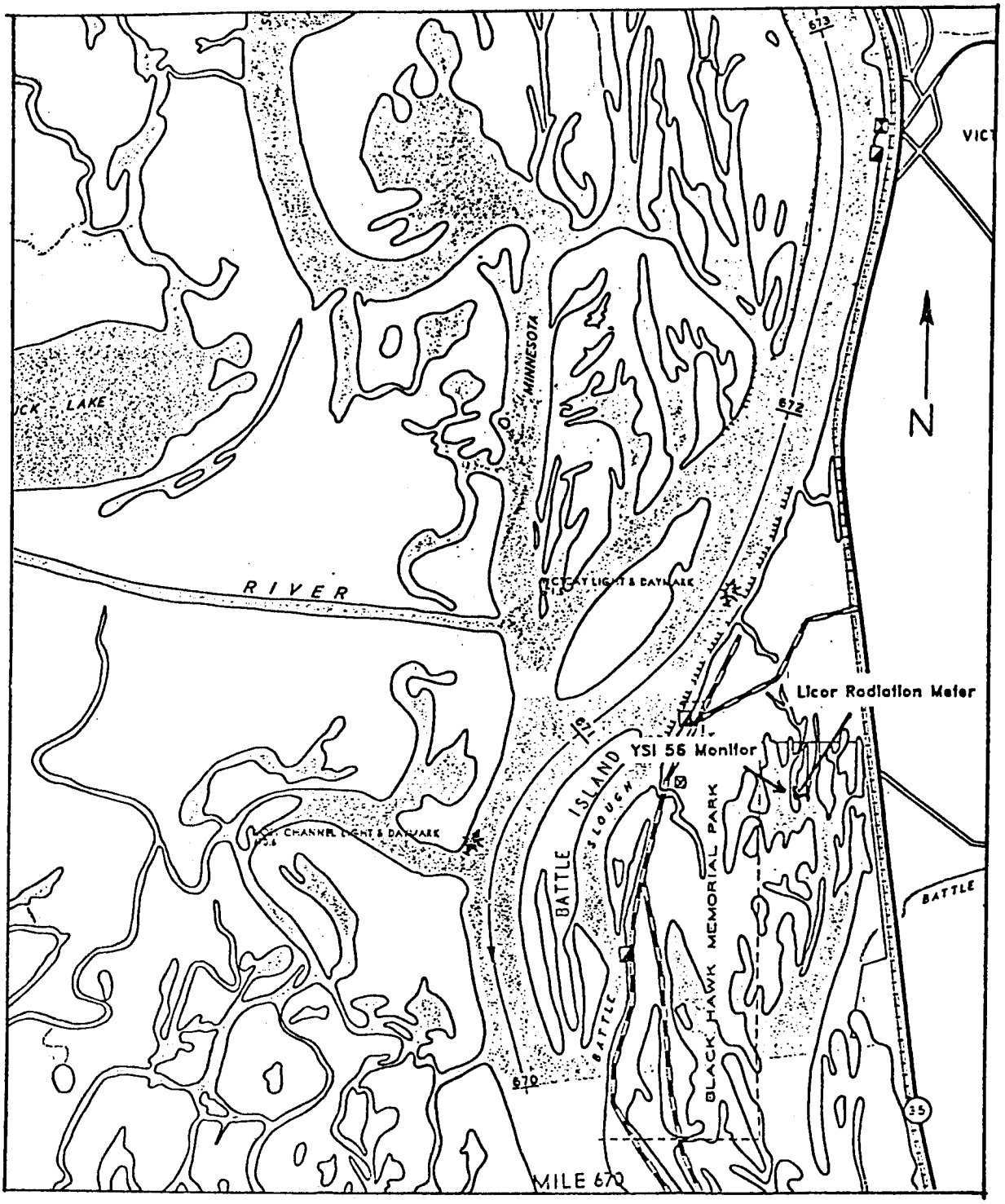


Figure 2. Map of Blackhawk Park, Navigation Pool 9 showing the location of sampling sites used 29 June - 6 July 1987.

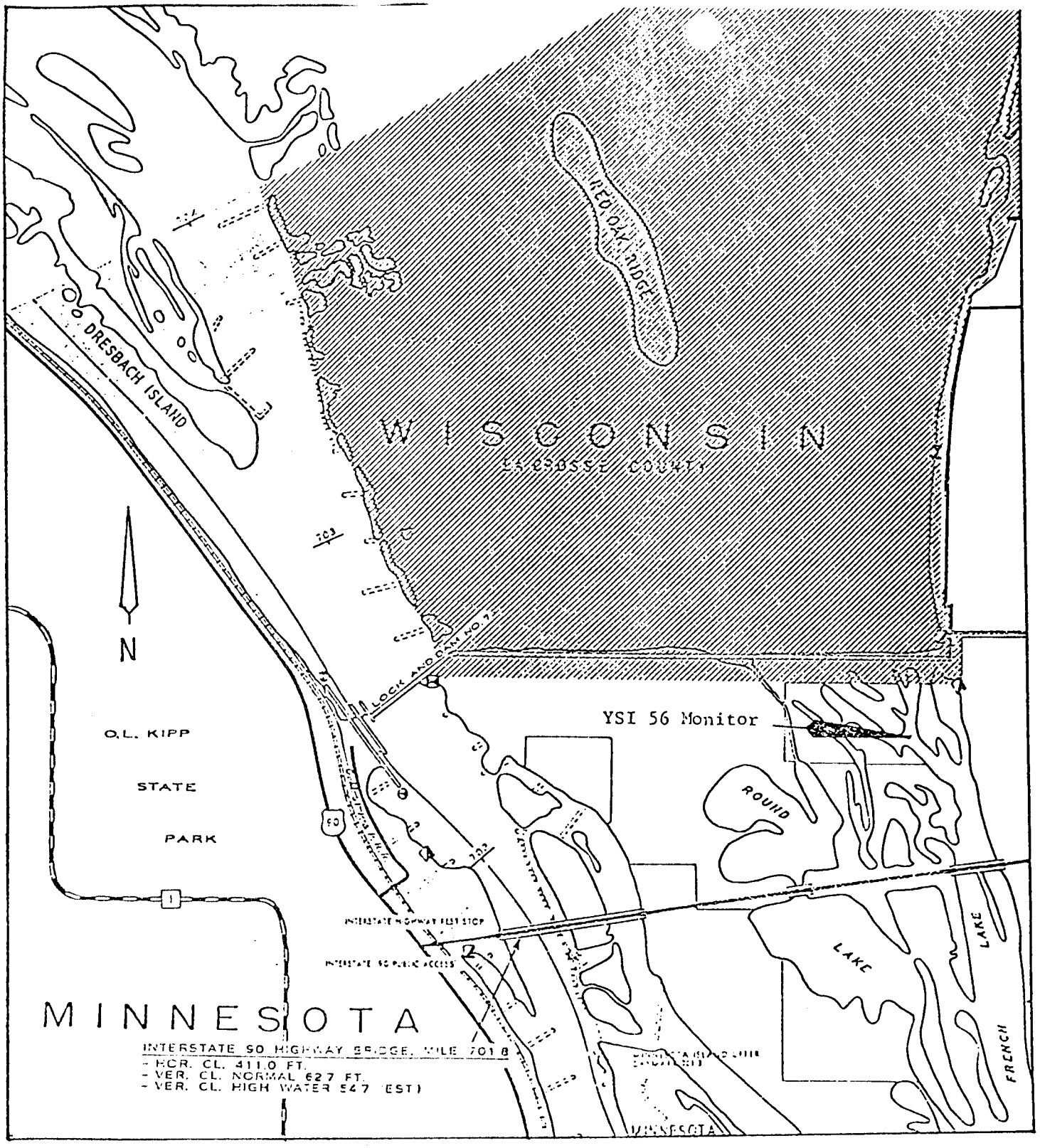


Figure 3. Location of monitoring site used at French Lake, Navigation Pool 8, 20 July - 24 July 1987.

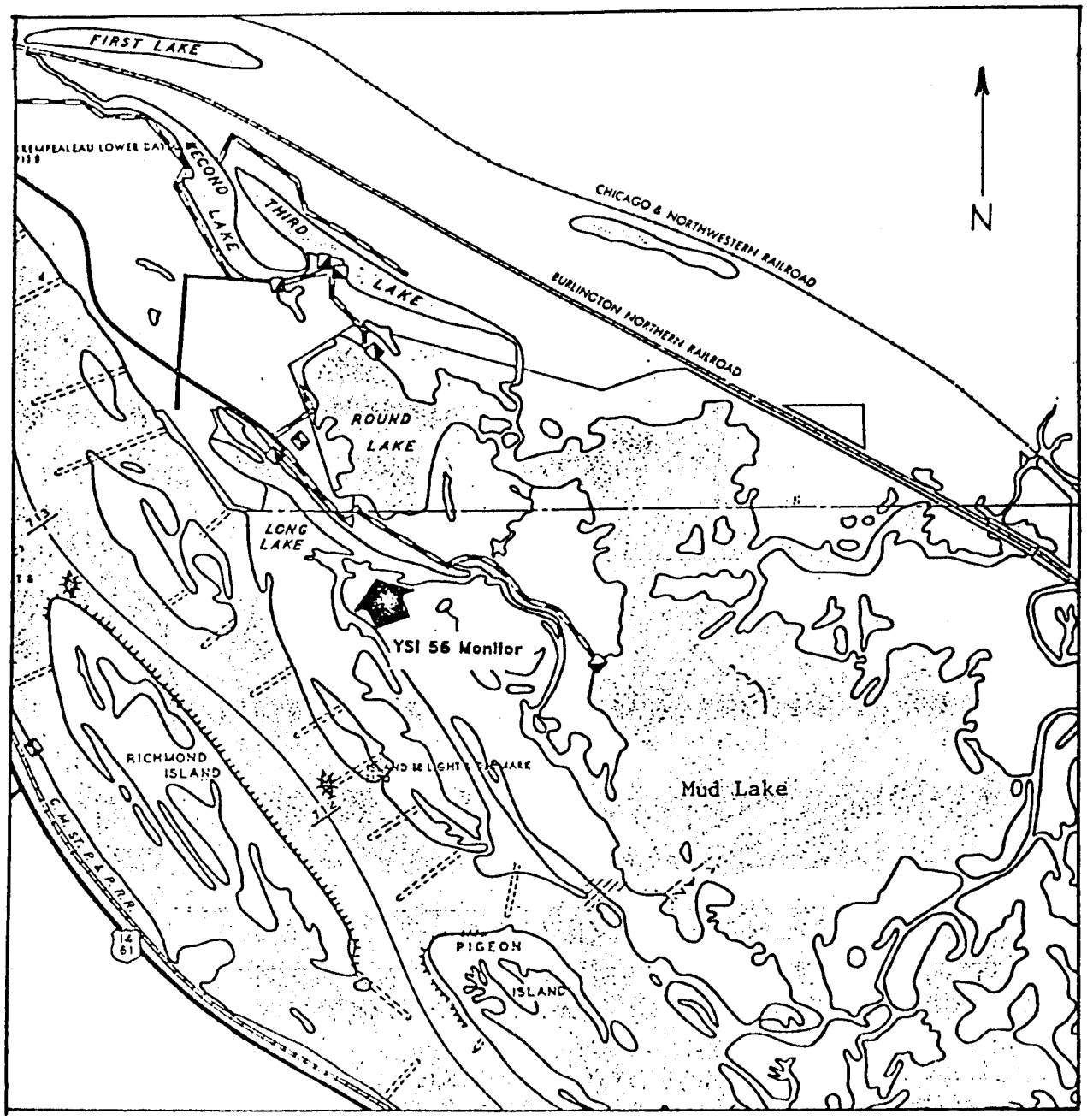


Figure 4. Location of monitoring sites used at Long Lake, Navigation Pool 7, from 28 July - 3 Aug 1987.

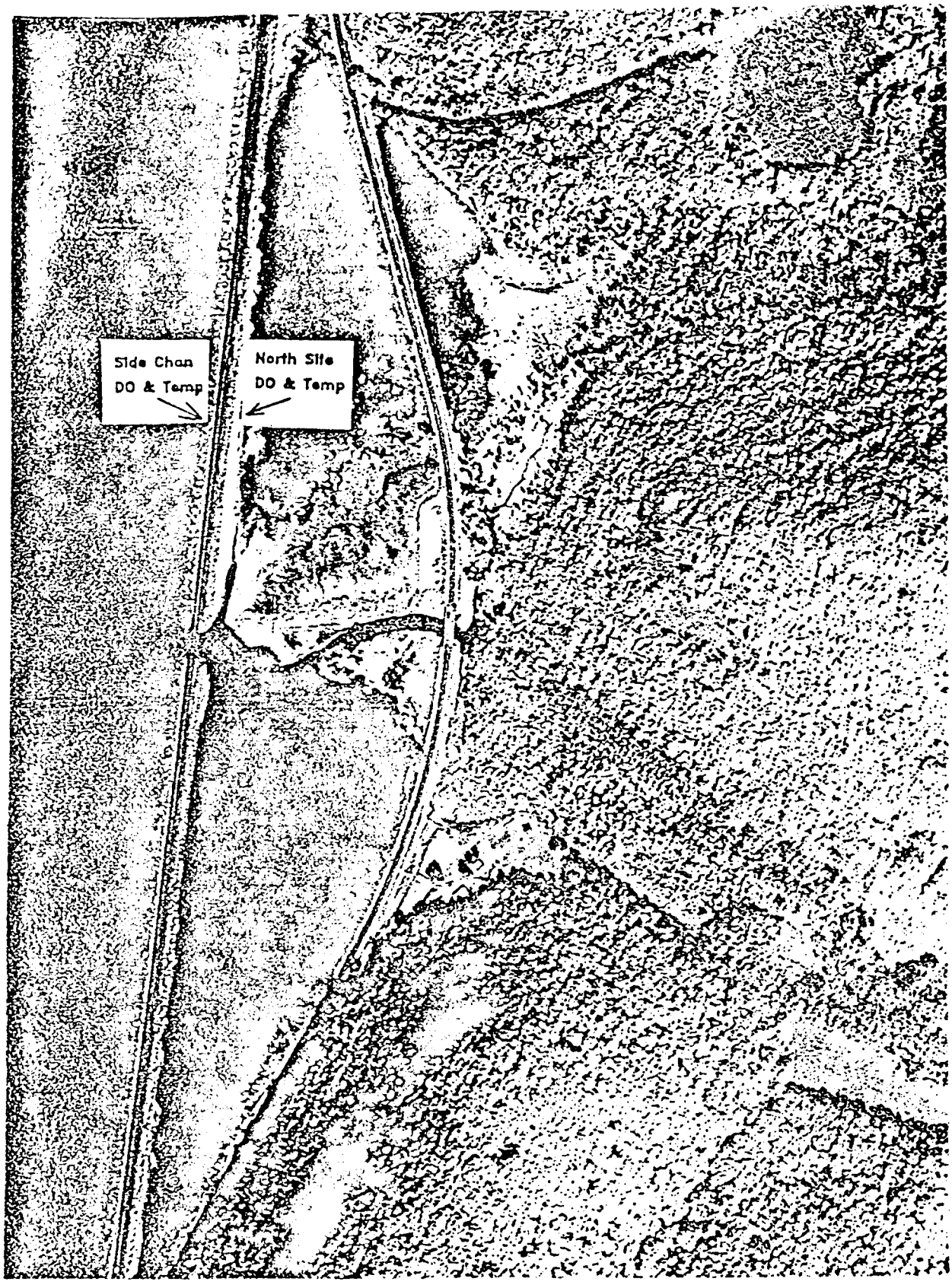


Figure 5. The location of monitoring sites used at Cold Springs, Navigation Pool 9, from 5 Aug - 12 Aug 1987.

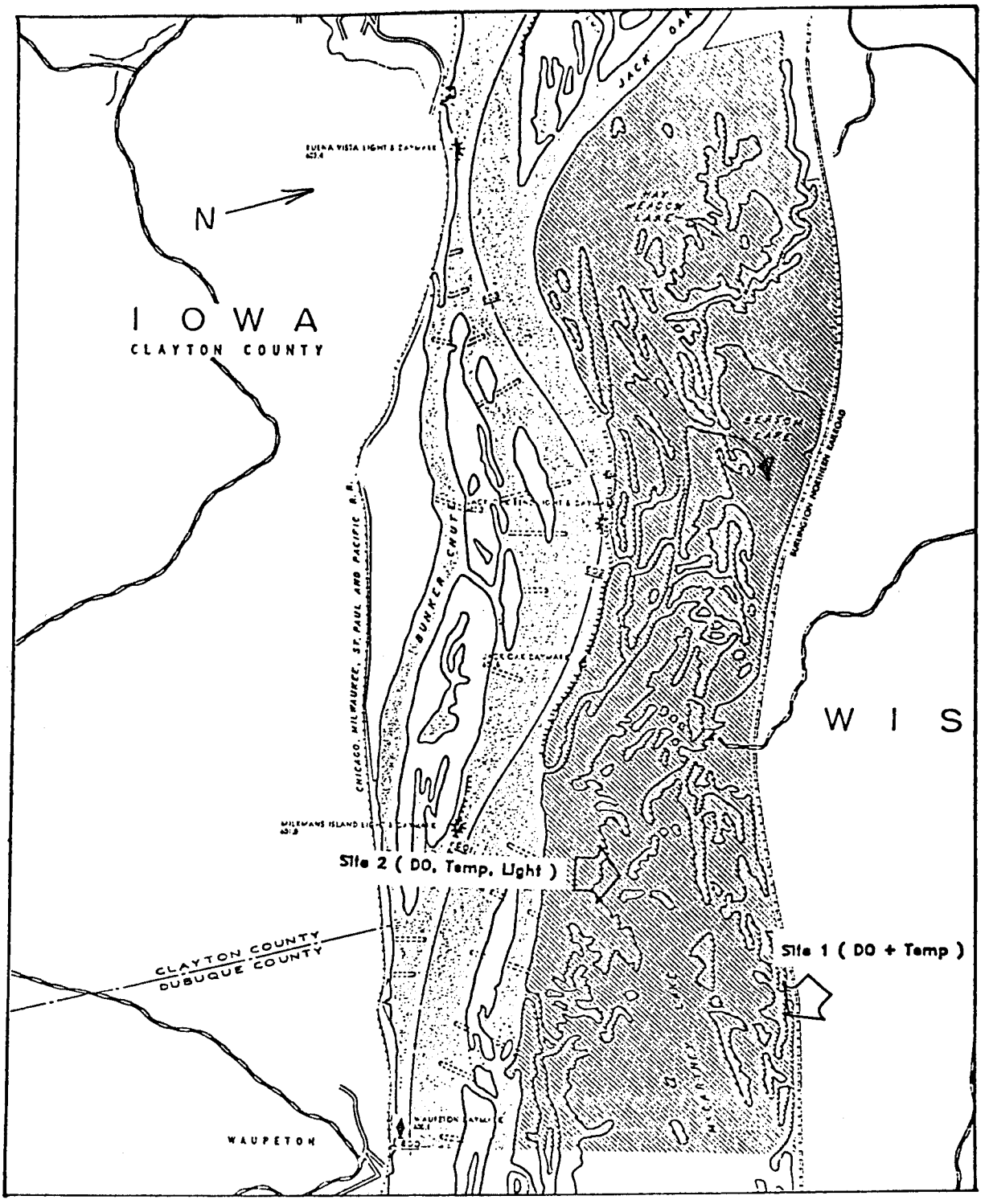


Figure 6. Map of McCartney Lake, Navigation Pool 11 showing the location of sampling sites used from 13 Aug - 20 Aug 1987.

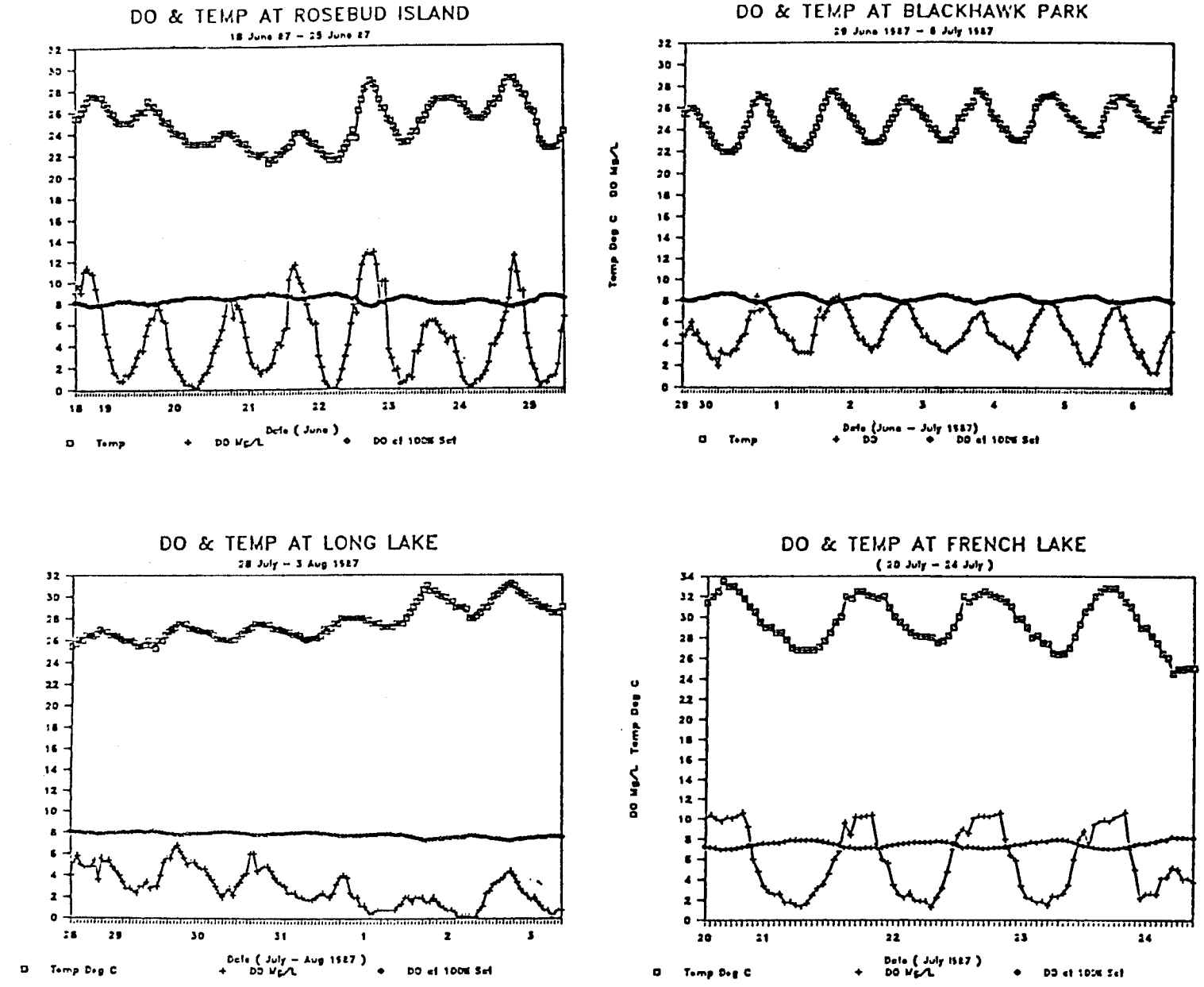


Figure 7. Graphs of temperature and dissolved oxygen data collected during the summer of 1987 at four Mississippi River backwater areas. Rosebud Island - Navigation Pool 7, Blackhawk Park - Navigation Pool 9, French Lake - Navigation Pool 8, Long Lake - Navigation Pool 7.

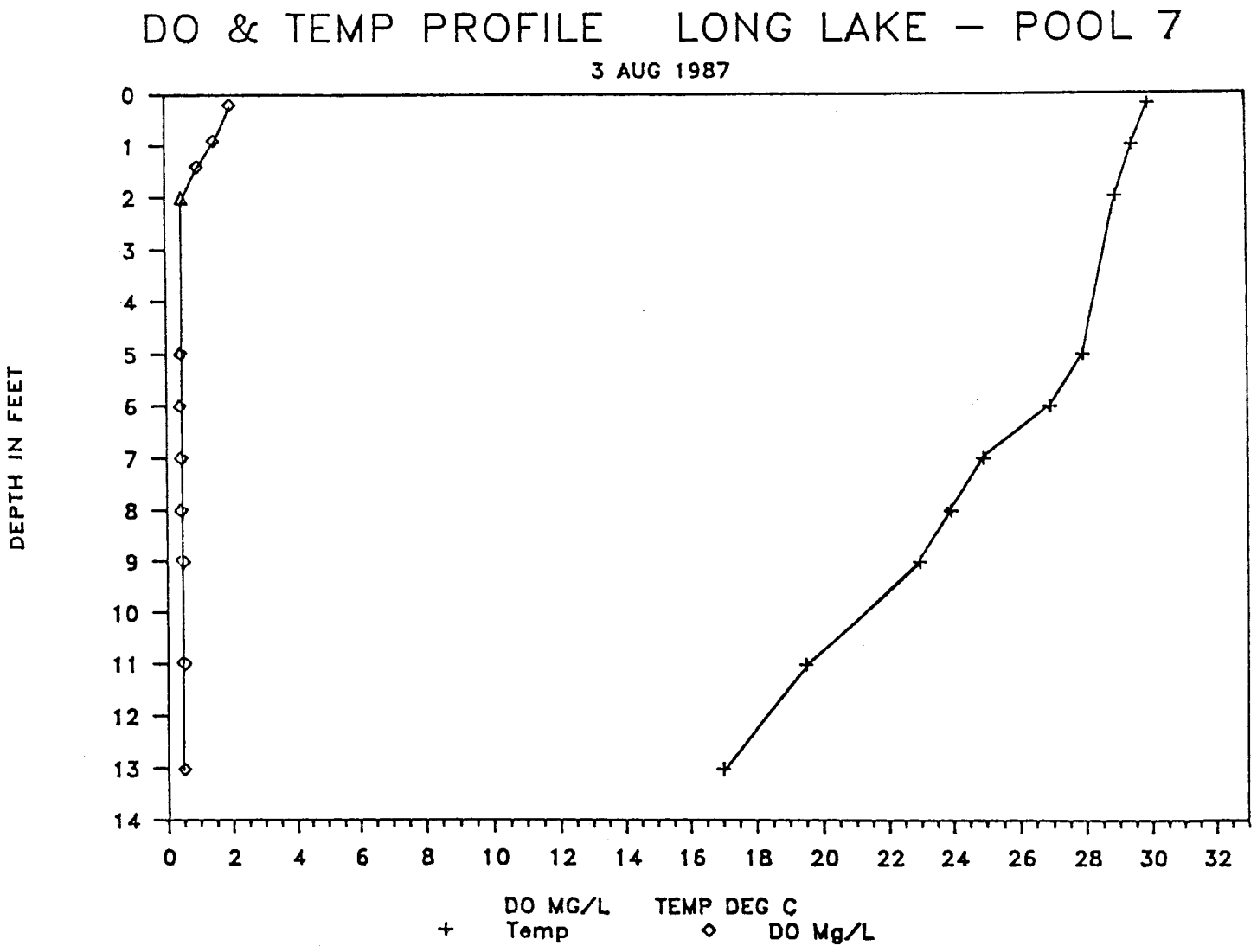
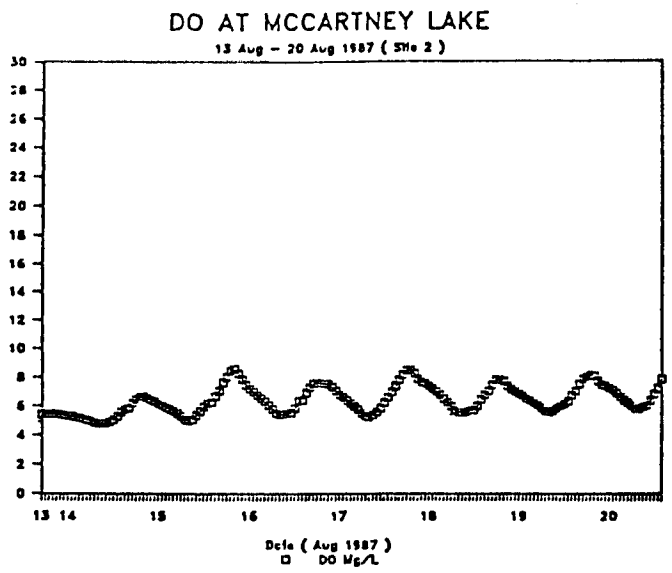
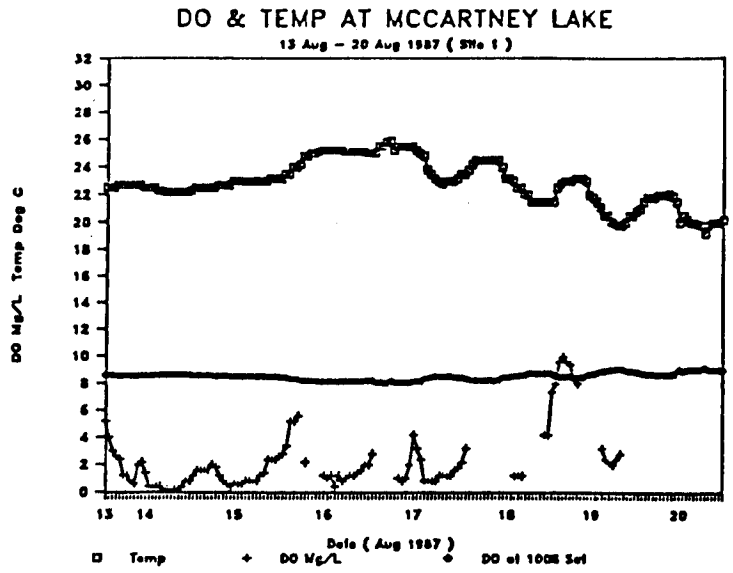
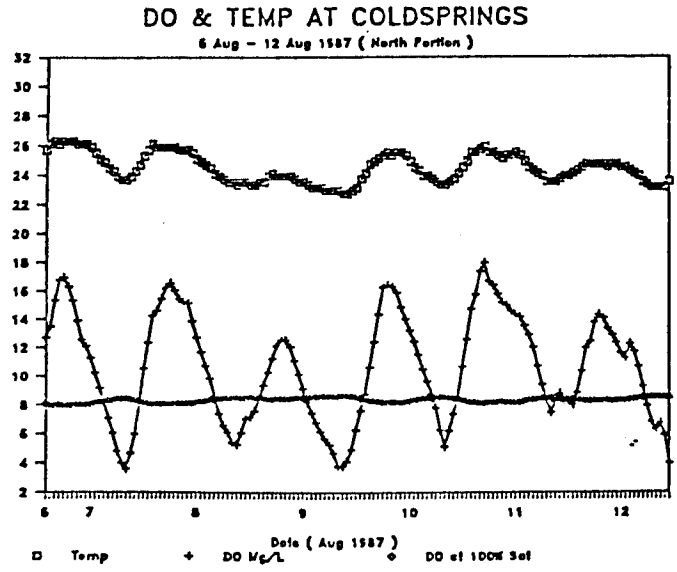


Figure 8. A profile of temperature and dissolved oxygen taken at Long Lake, Navigation Pool 7 on Aug 1987.







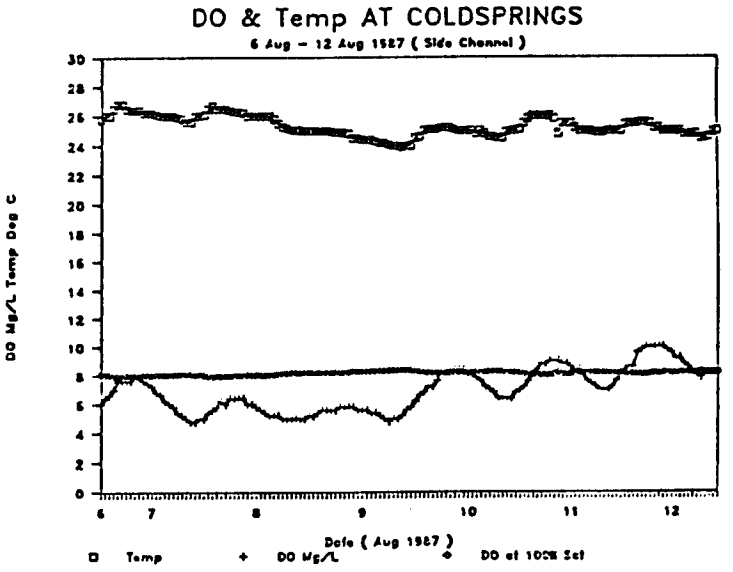


Figure 9. Graphs of temperature and dissolved oxygen data collected during the summer of 1987 at two Mississippi River backwater areas. Data was collected at two locations at each site. McCartney Lake - Navigation Pool 11 and Cold Springs - Navigation Pool 9.

AGREEMENT FOR OPERATION, MAINTENANCE, AND REHABILITATION

APPENDIX C

MEMORANDUM OF AGREEMENT
BETWEEN
THE UNITED STATES FISH AND WILDLIFE SERVICE
AND
THE DEPARTMENT OF THE ARMY
FOR
ENHANCING FISH AND WILDLIFE RESOURCES
OF THE
UPPER MISSISSIPPI RIVER SYSTEM
AT BERTOM AND McCARTNEY LAKES, WISCONSIN

I. PURPOSE

The purpose of this Memorandum of Agreement (MOA) is to establish the relationships, arrangements, and general procedures under which the U.S. Fish and Wildlife Service (FWS) and the Department of the Army (DA) will operate in constructing, operating, maintaining, repairing, and rehabilitating the Bertom and McCartney Lakes, WI, separable element of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP).

II. BACKGROUND

Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, authorizes construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. Under conditions of Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, all construction costs of those fish and wildlife features on Bertom and McCartney Lakes are 100 percent Federal, and all operation, maintenance, repair, and rehabilitation costs are to be cost shared, 75 percent Federal and 25 percent non-Federal.

III. GENERAL SCOPE

The project to be accomplished pursuant to this MOA shall consist of creating 250 acre-feet of deep aquatic habitat, creating 6 acres of rock substrate aquatic habitat, and providing a wind sheltered area for aquatic bed establishment at Bertom and McCartney Lakes.

IV. RESPONSIBILITIES

A. DA is responsible for:

1. Construction: Construction of the project which consists of creating 250 acre-feet of deep aquatic habitat, creating 6 acres of rock substrate aquatic habitat, and providing a wind sheltered area for aquatic bed establishment at Bertom and McCartney Lakes.

2. Major Rehabilitation: Any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements identified in the Definite Project Report and that is needed as a result of specific storm or flood events.

3. Construction Management: Subject to and using funds appropriated by the Congress of the United States, DA will construct the Bertom and McCartney Lakes Fish and Wildlife Enhancement Project as described in the Definite Project Report, "Bertom and McCartney Lakes Rehabilitation and Enhancement," dated June 1989, applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The FWS will be afforded the opportunity to review and comment on all modifications and change orders prior to the issuance to the contractor of a Notice to Proceed. If DA encounters potential delays related to construction of the project, DA will promptly notify FWS of such delays.

4. Maintenance of Records: DA will keep books, records, documents, and other evidence pertaining to costs and expenses incurred in connection with construction of the project to the extent and in such detail as will properly reflect total costs. DA shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the project and resolution of all relevant claims arising therefrom, and shall make available at its offices at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the FWS.

B. FWS is responsible for:

1. Operation, Maintenance, and Repair: Upon completion of construction as determined by the District Engineer, Rock Island, the FWS shall accept the project and shall operate, maintain, and repair the project as defined in the Definite Project Report entitled "Bertom and McCartney Lakes Rehabilitation and Enhancement," dated June 1989, in accordance with Section 906(e) of the Water Resources Development Act, Public Law 99-662.

2. Non-Federal Responsibilities: In accordance with Section 906(e) of the Water Resources Development Act, Public Law 99-662, the FWS shall obtain 25 percent of all costs associated with the operation and maintenance of the project from the Wisconsin Department of Natural Resources.

V. MODIFICATION AND TERMINATION

This MOA may be modified or terminated at any time by mutual agreement of the parties. Any such modification or termination must be in writing. Unless otherwise modified or terminated, this MOA shall remain in effect for a period of no more than 50 years after initiation of construction of the project.

VI. REPRESENTATIVES

The following individuals or their designated representatives shall have authority to act under this MOA for their respective parties:

FWS: Regional Director
U.S. Fish and Wildlife Services
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

DA: District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

VII. EFFECTIVE DATE OF MOA

This MOA shall become effective when signed by the appropriate representatives of both parties.

THE DEPARTMENT OF THE ARMY

BY: _____
JOHN R. BROWN
Colonel
U.S. Army Engineer District,
Rock Island
Corps of Engineers

DATE: _____

THE U.S. FISH AND WILDLIFE SERVICE

BY: _____
JAMES C. GRITMAN
Regional Director
U.S. Fish and Wildlife
Service

DATE: _____

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FEDERAL BUILDING, FORT SNELLING
TWIN CITIES, MINNESOTA 55111

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
FWS/ARW

MAY 2_ 1989

Colonel Neil A. Smart
District Engineer
U. S. Army Engineering District, Rock Island
ATTN: Planning Division
Clock Tower Building
Post Office Box 2004
Rock Island, Illinois 61204-2004

Dear Colonel Smart:

This letter responds to your notice dated April 11, 1989, for written comments on the Draft Definite Project Report with Integrated Environmental Assessment for the Bertom and McCartney Lakes Rehabilitation and Enhancement Project.

Overall the project seems to reflect the cooperating status of the U. S. Fish and Wildlife Service (Service) and the Army Corps of Engineers (Corps) in designing a project that should enhance fishery resources without adverse impact on migratory bird habitat; that in fact there will also be some migratory bird habitat gain from this project. We note further that the project report seems to address refuge concerns contained in the February 16, 1989 letter although there are some inconsistencies within the report and between the report and the Agreement for Operation, Maintenance, and Rehabilitation. The refuge letter dated January 17, 1989, raised concerns that seem to have been avoided in the report. Some of these concerns can be addressed during construction design and planning, and we support this report with the understanding that refuge concerns will be resolved before this project goes to contract.

Summary page 3 regarding qualitative and quantitative measurements includes monitoring activities by the Service to which we have not agreed. The summary also seems inconsistent with the division of responsibilities in tables 12-1, 12-2, and 12-3. We will accept the division listed in the tables wherein the Service performs qualitative observations and the Corps conducts the quantitative measuring.

Endangered species consideration, specifically bald eagle, is addressed several times in the report (e.g., pp. 9, 23, 24). Only in the paragraph about "Other species of concern" is reference made to the nearby active bald eagle nest as reported in the refuge letter of January 17 and its attached map and the Coordination Act Report (p. A-17). Elsewhere the report states there are no records of eagle nests in the project area. In fact, an eagle nest was located in McCartney Lake in the southeastern part of project, and the eagles

have relocated that nest a short distance downstream but still in the project area. Construction activities must be phased to avoid disturbing nesting eagles, mitigation to be arranged with the refuge.

The Service will assure that operation and maintenance requirements of the project as defined in the Definite Project Report will be accomplished in accordance with Section 906 (e) of the Water Resources Development Act of 1986. We desire to reiterate our position to assume responsibility for appropriate operation and maintenance costs but not for rehabilitation costs. The agreement in Appendix C is a correct statement of the responsibilities and we will sign the agreement when you send it to us. The refuge will be issuing the right-of-entry permit for construction purposes at the appropriate time.

You have elected to prepare a joint finding of no significant impact which is an appropriate method of documenting the decision for this cooperating agency project. At completion of the public comment period for the definite project report, if no substantive changes are made, we will sign the joint finding when you send it to us.

We anticipate that any unresolved matters will be resolved between the refuge and your staff during construction planning and we appreciate the cooperation that makes this kind of project possible.

Sincerely,

James C. Gritman

James C. Gritman
Regional Director

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny, Secretary
Box 7921
Madison, Wisconsin 53707
TELEFAX NO. 608-267-3579
TDD NO. 608-267-6897

May 26, 1989 1660-1

Colonel Neil A. Smart
District Engineer
U.S. Army Corps of Engineers
Rock Island District
Post Office Box 2004
Rock Island, IL 61204-2004

Dear Colonel Smart:

The Wisconsin Department of Natural Resources supports the Environmental Management Program Bertom and McCartney Lakes Project in Pool 11 of the Mississippi River.

Upon completion and final acceptance of the project by the Corps of Engineers and the Fish and Wildlife Service, the Department agrees to cooperate with the Fish and Wildlife Service to assure that operation, maintenance, and any mutually agreed upon rehabilitation as described in the Definite Project Report, will be accomplished in accordance with Section 906(e) of the Water Resources Development Act of 1986.

Sincerely,

C.D. Besadny
Secretary

cc: Brigadier General Theodore Vander Els
James Gritman
James Lissack-WD
Terry Moe-La Crosse

APPENDIX D

DISTRIBUTION LIST

DISTRIBUTION LIST
FOR
DEFINITE PROJECT REPORT
WITH ENVIRONMENTAL ASSESSMENT AND
SECTION 404(b)(1) EVALUATION
BERTOM AND McCARTNEY LAKES REHABILITATION AND ENHANCEMENT
POOL 11, MISSISSIPPI RIVER MILES 599-603
GRANT COUNTY, WISCONSIN 1/

Messrs. Chuck Davis and Leroy Sowl
U.S. Fish and Wildlife Service
1830 Second Avenue
Rock Island, Illinois 61201

Mr. Keith Beseke (5)
Upper Mississippi River National
Wildlife & Fish Refuge
51 East 4th Street
Winona, Minnesota 55987

Mr. Kevin Szcodronski
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, Iowa 50319-0034

Mr. Bill Donels
Illinois Department of Conservation
Lincoln Tower Plaza
524 South Second Street
Springfield, Illinois 62706

Mr. Chuck Gibbons, ARW/FM
U.S. Fish and Wildlife Service, Region 3
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

Ms. Holly Stoerker
Upper Mississippi River Basin Association
415 Hamm Building
408 St. Peter Street
St. Paul, Minnesota 55111

Ms. Gail Carmody
Upper Mississippi River Conservation Commission
U.S. Fish and Wildlife Service
1830 Second Avenue
Rock Island, Illinois 61201

Mr. Norm Stucky
Missouri Department of Conservation
P.O. Box 180
Jefferson City, Missouri 65102-0180

Dr. David Kennedy
Wisconsin Department of Natural Resources
3550 Mormon Coulee Drive, Room 108
LaCrosse, Wisconsin 54601

Mr. Valdus J. Adamkus
Administrator
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Jim Harrison
Minnesota and Wisconsin Boundary Area Commission
619 Second Street
Hudson, Wisconsin 54016

Mr. David U. Sallen
Attorney at Law
707½ Avenue G
Fort Madison, Iowa 52627

Division Engineer
U.S. Army Engineer Division, North Central
ATTN: Planning Division (Tom Hempfling) (27)
539 South Clark Street
Chicago, Illinois 60605-1592

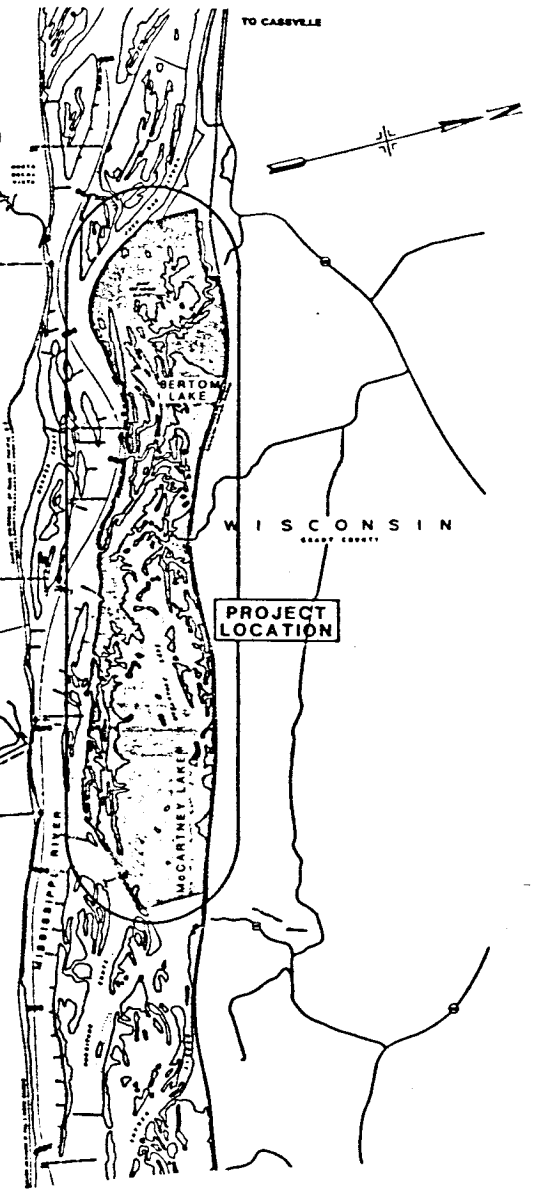
District Engineer
U.S. Army Engineer District, St. Paul
ATTN: Planning Division (Chuck Workman)
1421 USPO and Custom House
180 East Kellogg Boulevard
St. Paul, Minnesota 55101-1479

District Engineer
U.S. Army Engineer District, St. Louis
ATTN: Planning Division (Ben Hawickhorst)
210 Tucker Boulevard North
St. Louis, Missouri 63101-1986

District Engineer
U.S. Army Engineer District, Rock Island
Clock Tower Building - P.O. Box 2004
Rock Island, Illinois 61204-2004

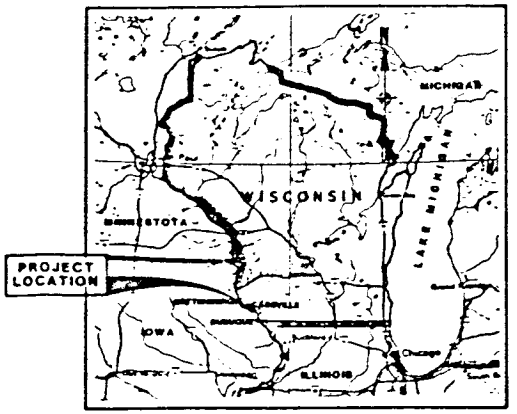
ATTN:		
	CENCR-DE	CENCR-PD (2)
	CENCR-RE	CENCR-PD-E
	CENCR-ED	CENCR-PD-R
	CENCR-ED-D	CENCR-OD
	CENCR-ED-DG (3)	CENCR-OD-M
	CENCR-ED-G	CENCR-OD-MC
	CENCR-ED-H	CENCR-OD-R
	CENCR-ED-HH	CENCR-CD
	CENCR-ED-HQ	CENCR-IM-C (3)
	CENCR-PA	

1/ All addressees receive one copy of the document except where noted in parentheses.



LOCATION MAP

SCALE IN MILES



VICINITY MAP

Revisions			
Symbol	Descriptions	Date	Approved

U.S. ARMY ENGINEER DISTRICT
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ROCK ISLAND, ILLINOIS

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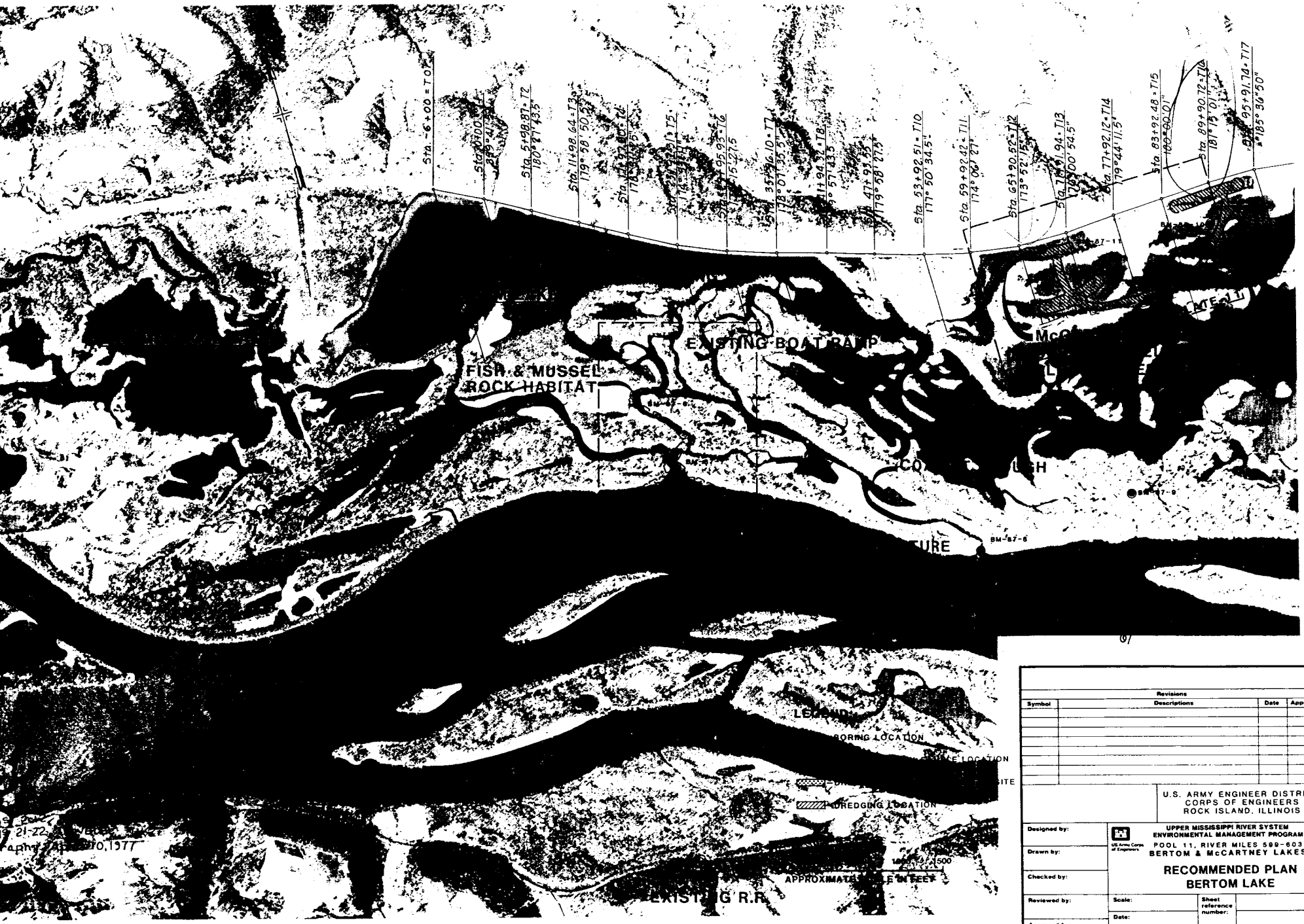
Drawn by:
Checked by:
Reviewed by:
Approved by:

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 598-603
BERTOM & McCARTNEY LAKES

LOCATION MAP

Scale: AS SHOWN
Datum:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 1



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UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 598-603
BERTOM & McCARTNEY LAKES

RECOMMENDED PLAN
BERTOM LAKE

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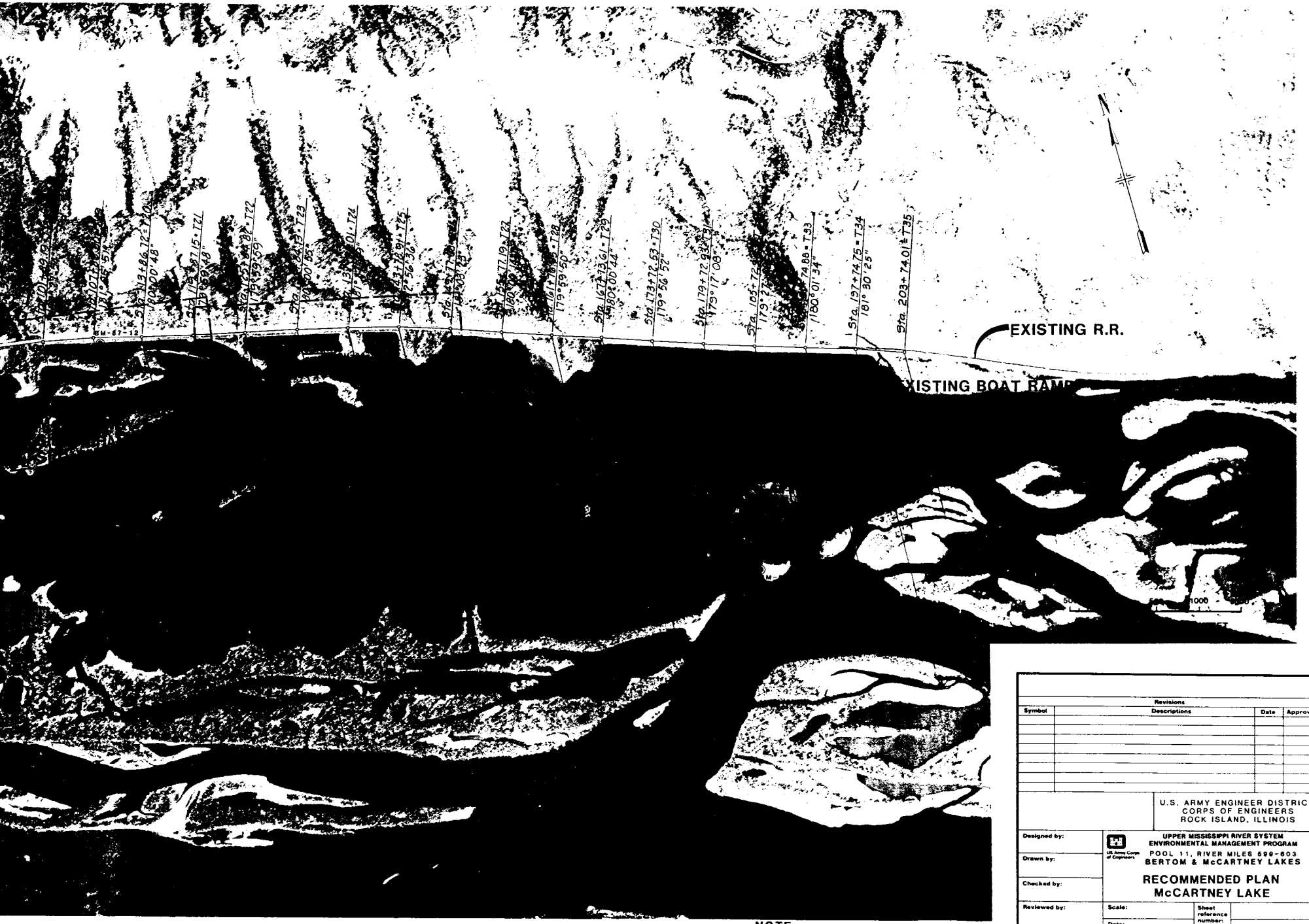
Sheet reference number:
Sheet __ of __

PLATE 2



NOTE: FOR LEGEND, SEE PLATE 2

Revisions			
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ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

RECOMMENDED PLAN
McCARTNEY LAKE

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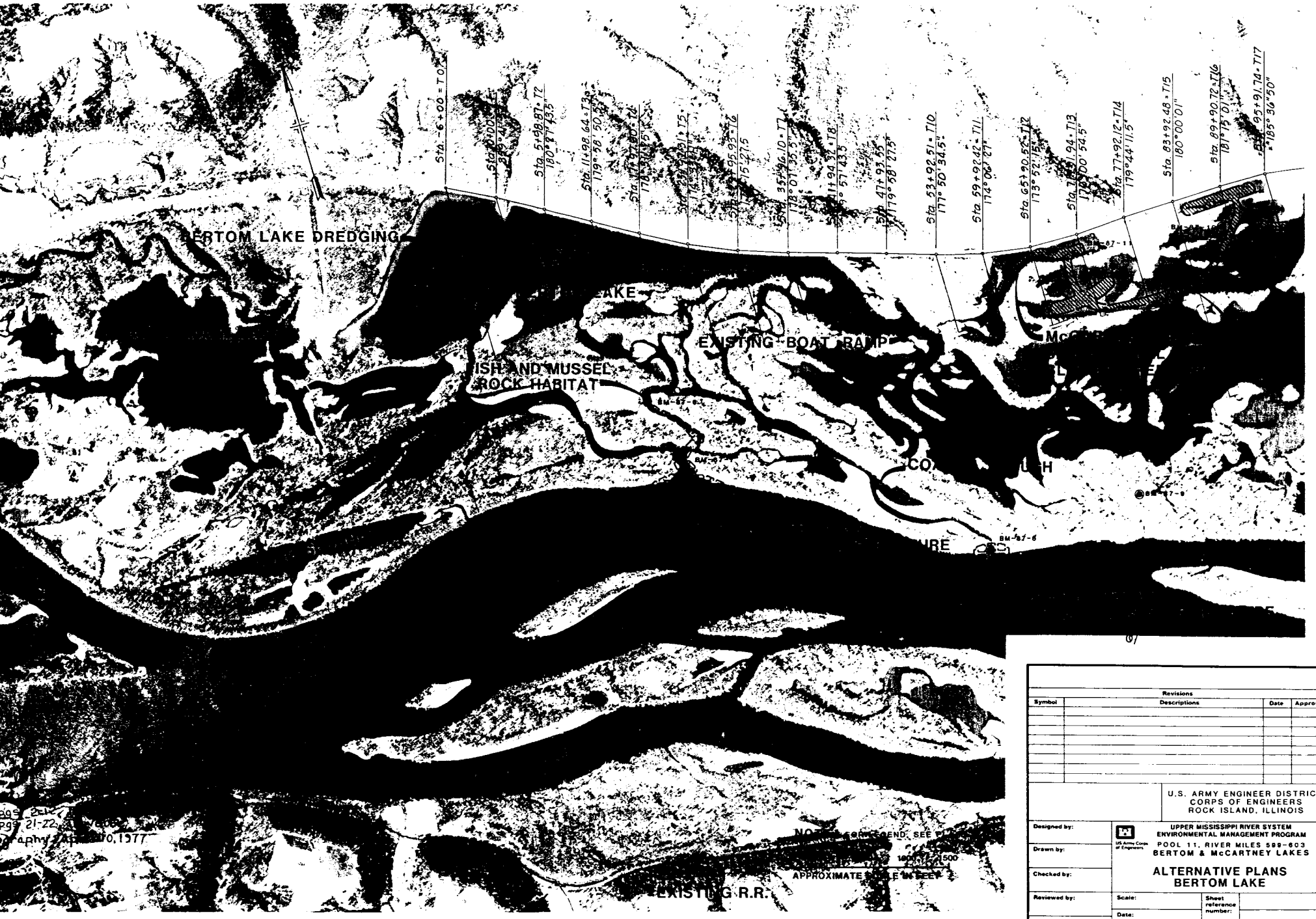
PLATE 3



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US Army Corps of Engineers

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 589-603
BERTOM & McCARTNEY LAKES

ALTERNATIVE PLANS
BERTOM LAKE

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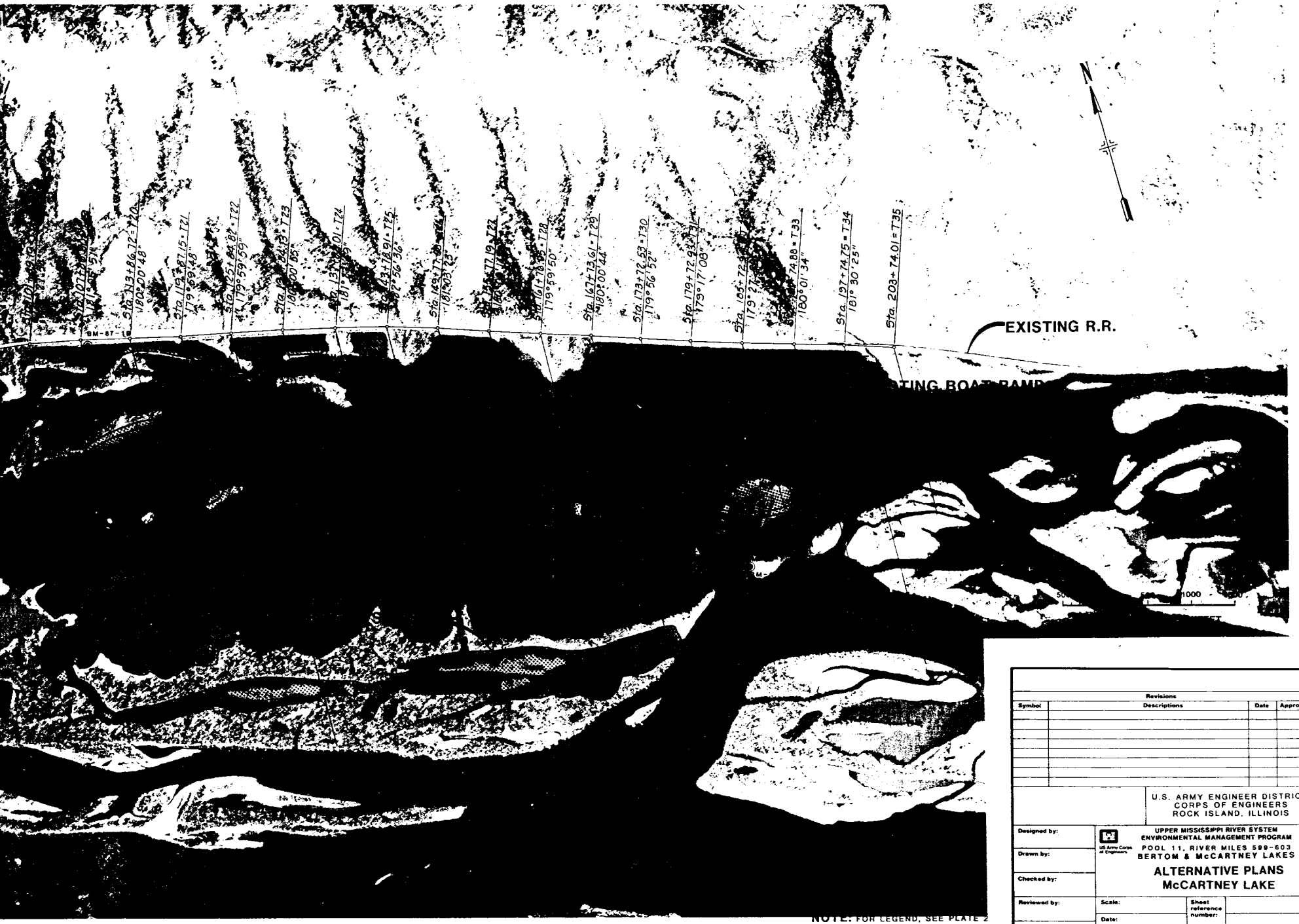
PLATE 4



NOTE: FOR LEGEND, SEE PLATE 2

Revisions			
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ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

ALTERNATIVE PLANS
McCARTNEY LAKE

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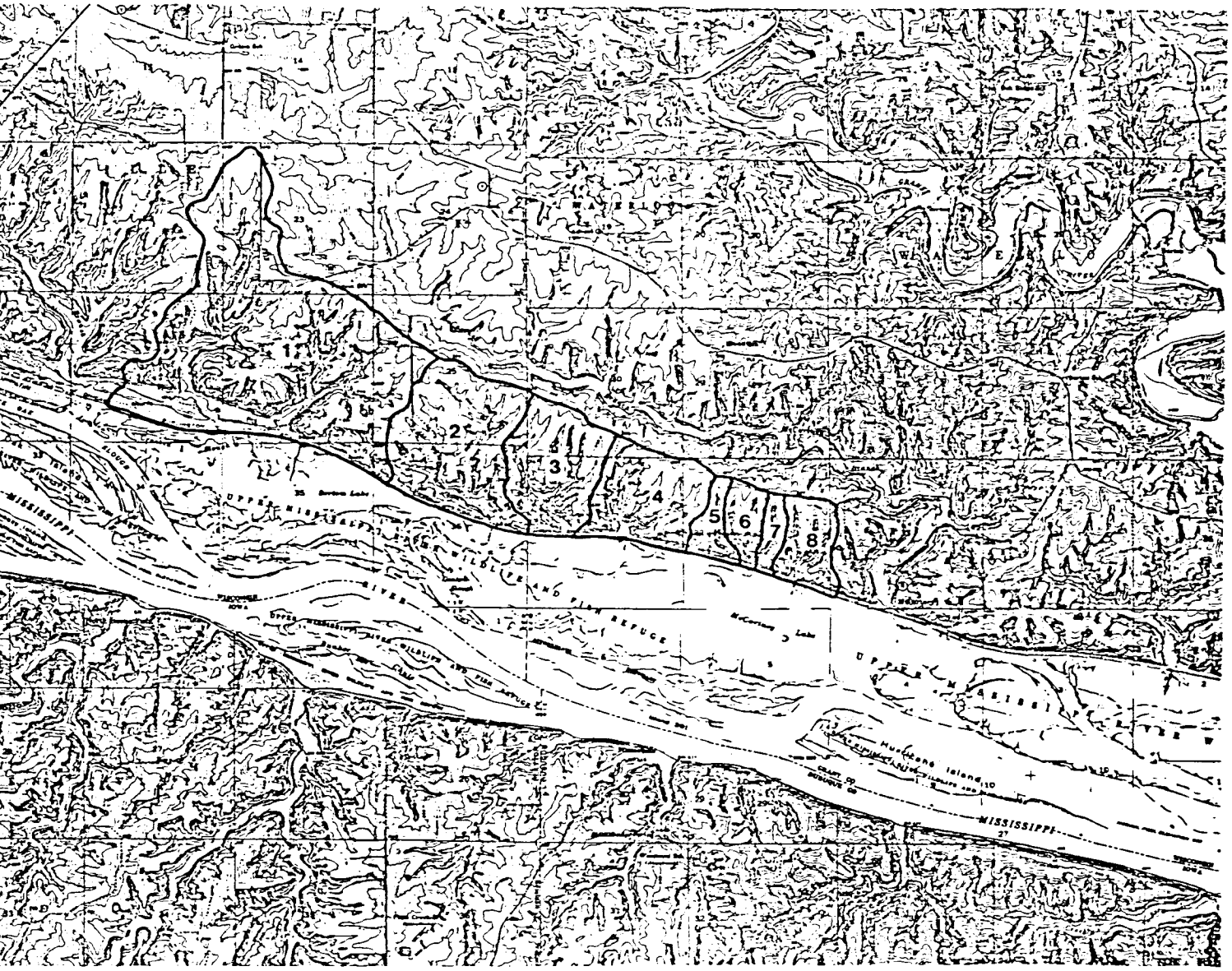
PLATE 5



ADJACENT WATERSHEDS

AREA NUMBER	TOTAL AREA (AC)	TOTAL DELIVERED SEDIMENT YIELD AC-FT/YEAR
1	1,468	1.89
2	484	0.72
3	319	0.52
4	292	0.48
5	74	0.15
6	82	0.16
7	52	0.11
8	146	0.26

Symbol	Revisions Description	Date	Approved

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UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 609-603
BERTOM & McCARTNEY LAKES

ADJACENT WATERSHEDS

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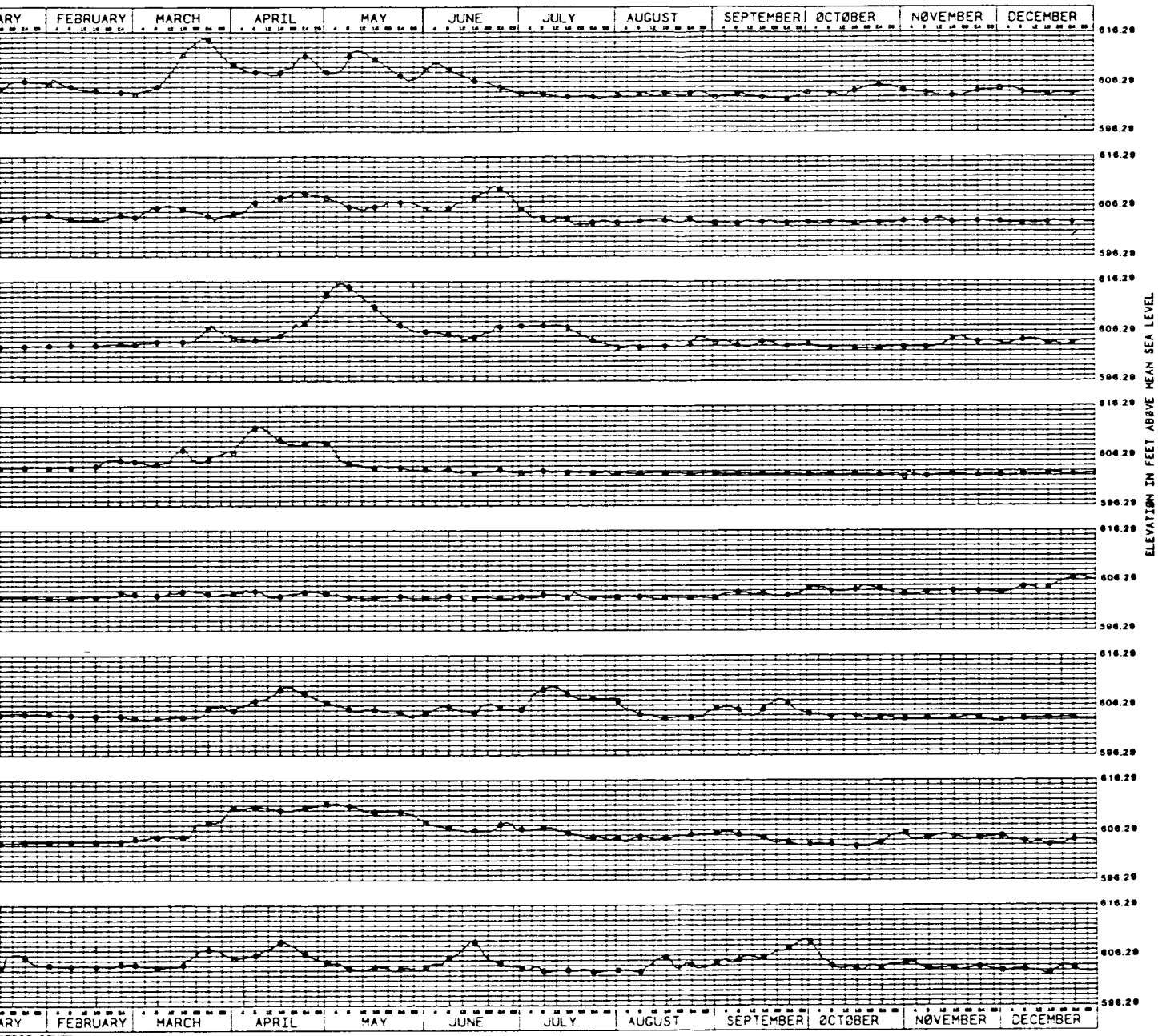
Drawn by
Checked by
Recommended by
Approved by

Number
Date
Drawing Code
Sheet reference numbers
Sheet _ of _

PLATE 5



FLOOD PROFILES

YEAR EVENT	PROJECT SITE RIVER MILE 600 ELEVATION	RIVER MILE 606.3 ELEVATION
2	607.5	—
5	610.0	613.5
10	611.5	615.0
50	614.6	618.1
100	615.8	619.3

SIPPI RIVER

NØTE-

HYDRØGRAPH -
CASSVILLE . WISCØNSIN RIVER MILE 606.3

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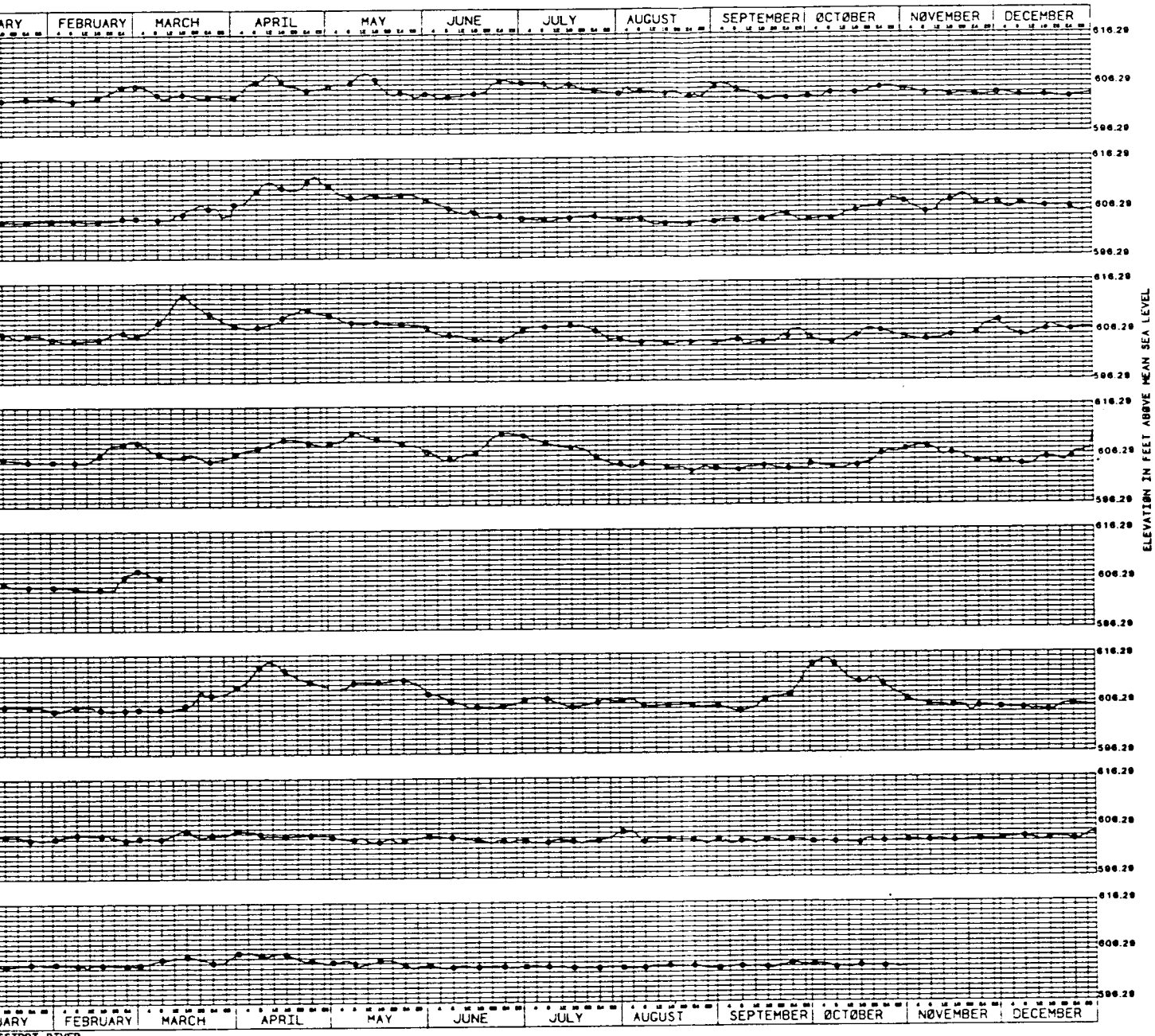
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 600-603
BERTOM & McCARTNEY LAKES

HYDRAULIC DATA 1

PLATE 7



HYDRØGRAPH
- CASSVILLE . WISCØNSIN RIVER MILE 606.3

NØTE-

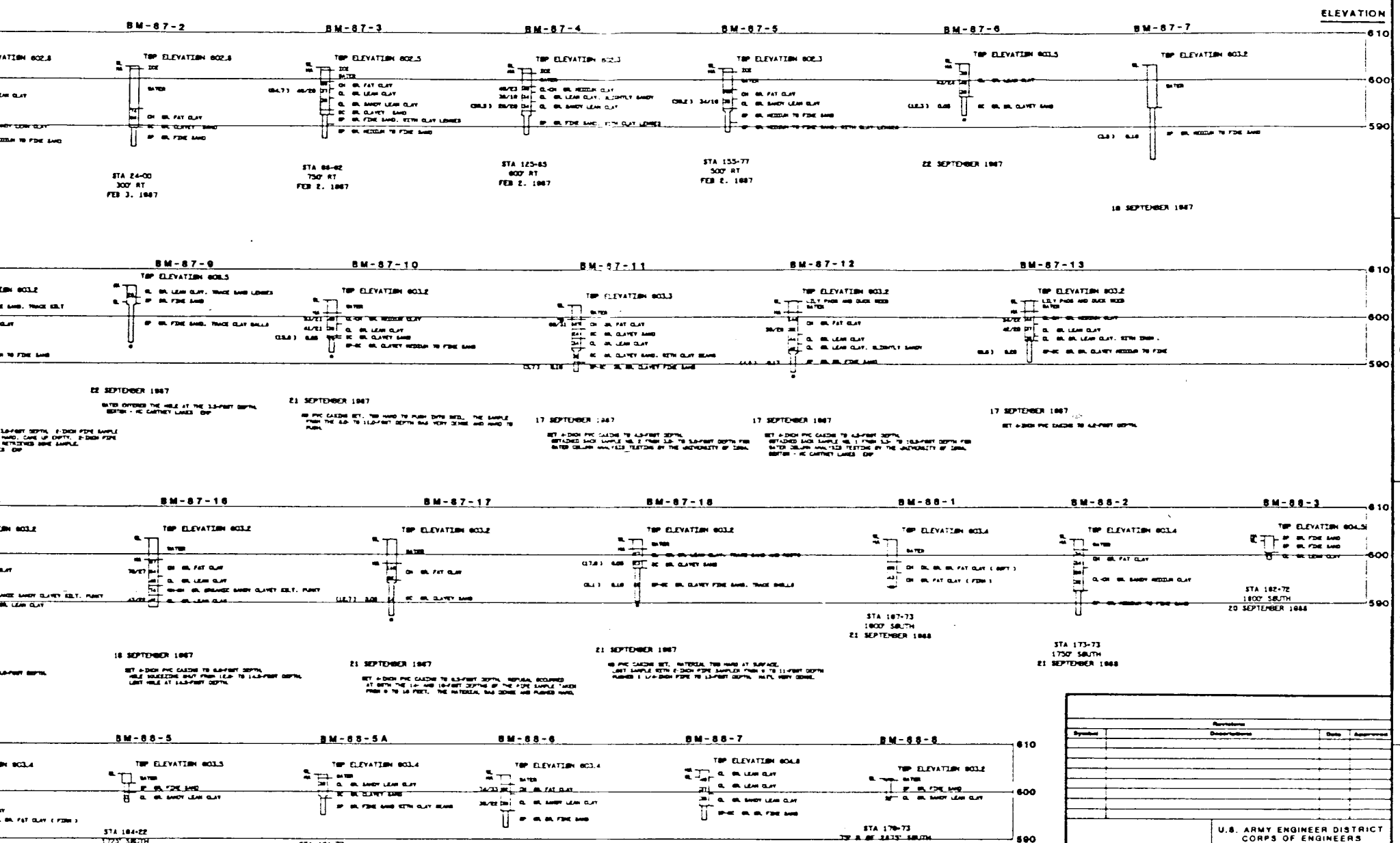
NOTE: FOR FLOOD PROFILES, SEE PLATE 7

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

HYDRAULIC DATA II

PLATE 8



NOTE: FOR LEGEND, SEE PLATE 10

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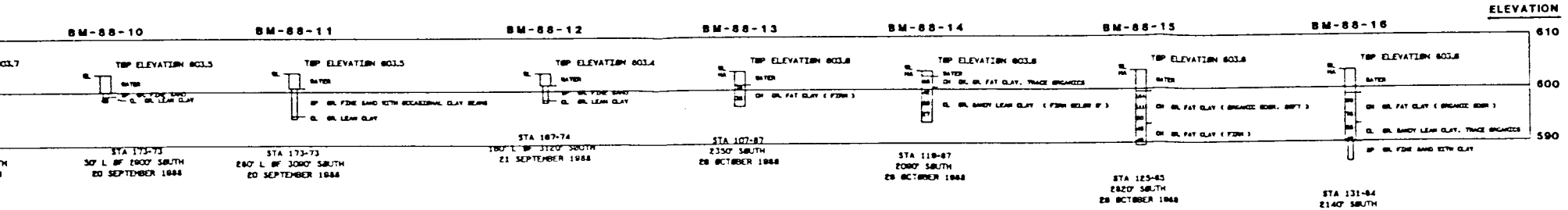
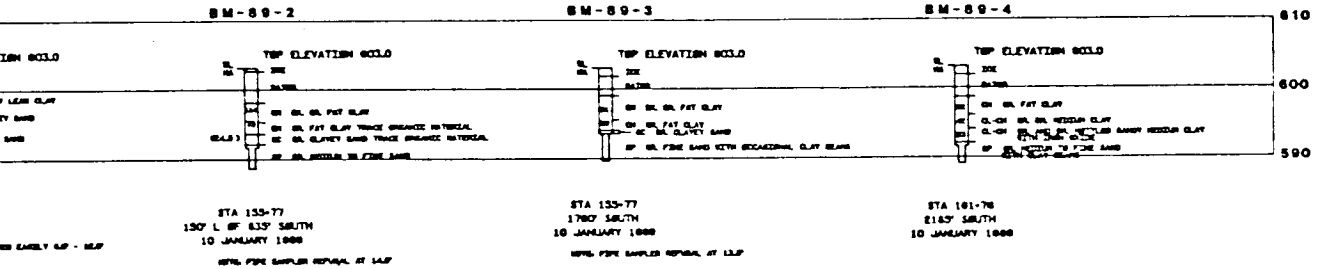
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 600-603
BERTOM & McCARTNEY LAKES

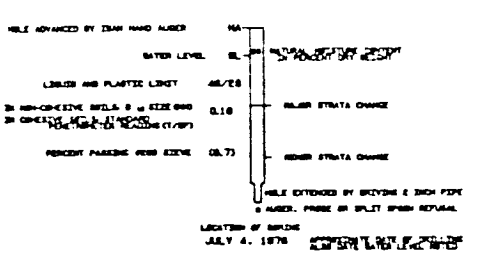
BORING LOGS

PLATE 9





LEGEND



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U.S. ARMY ENGINEER DISTRICT
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UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 580-603
BERTOM & McCARTNEY LAKES

BORING LOGS

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Date:
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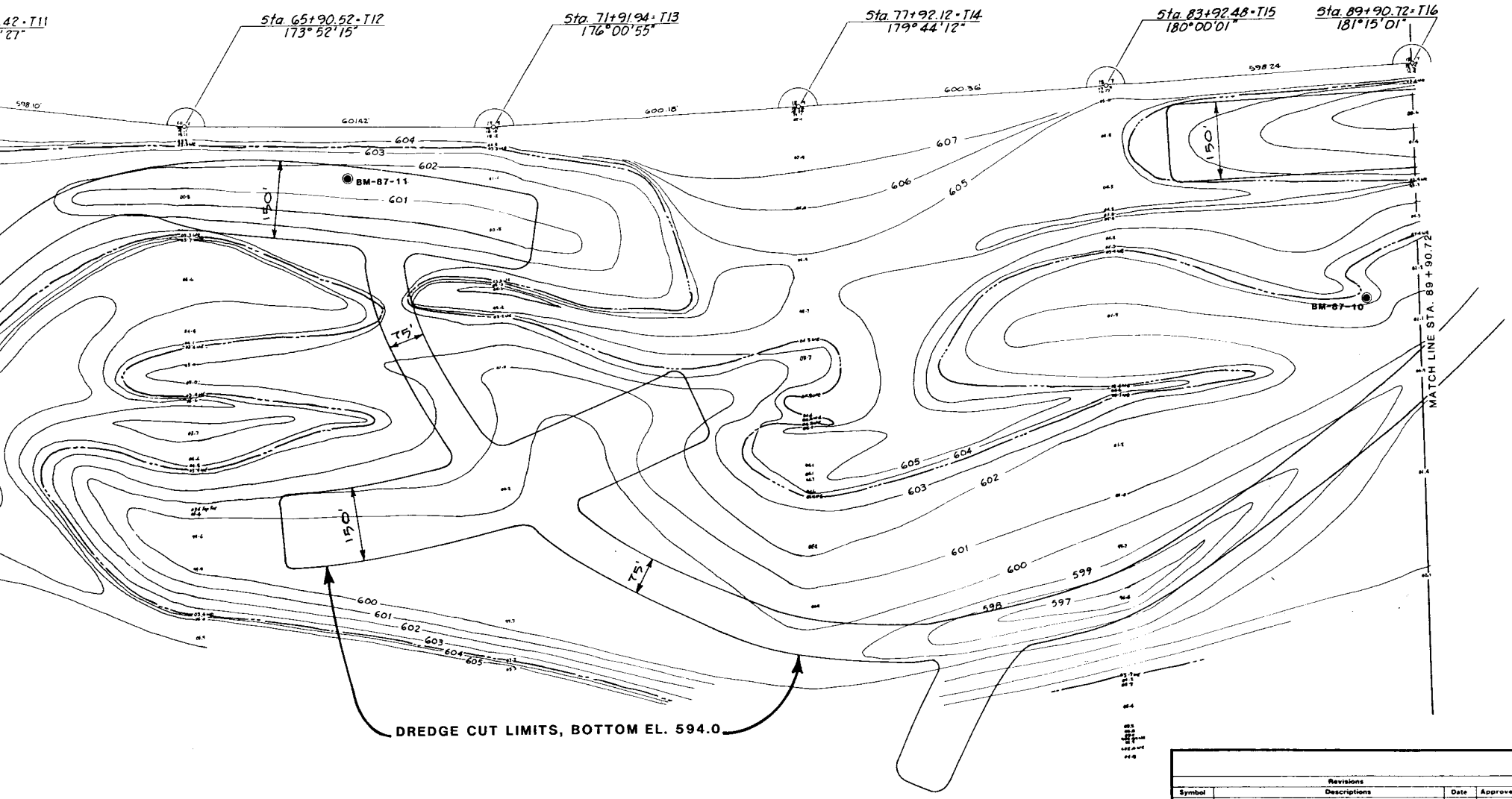
PLATE 10



SCALE: 1"=100.0'

0' 100' 200' 300'

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UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

DREDGING PLAN I

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Date:	
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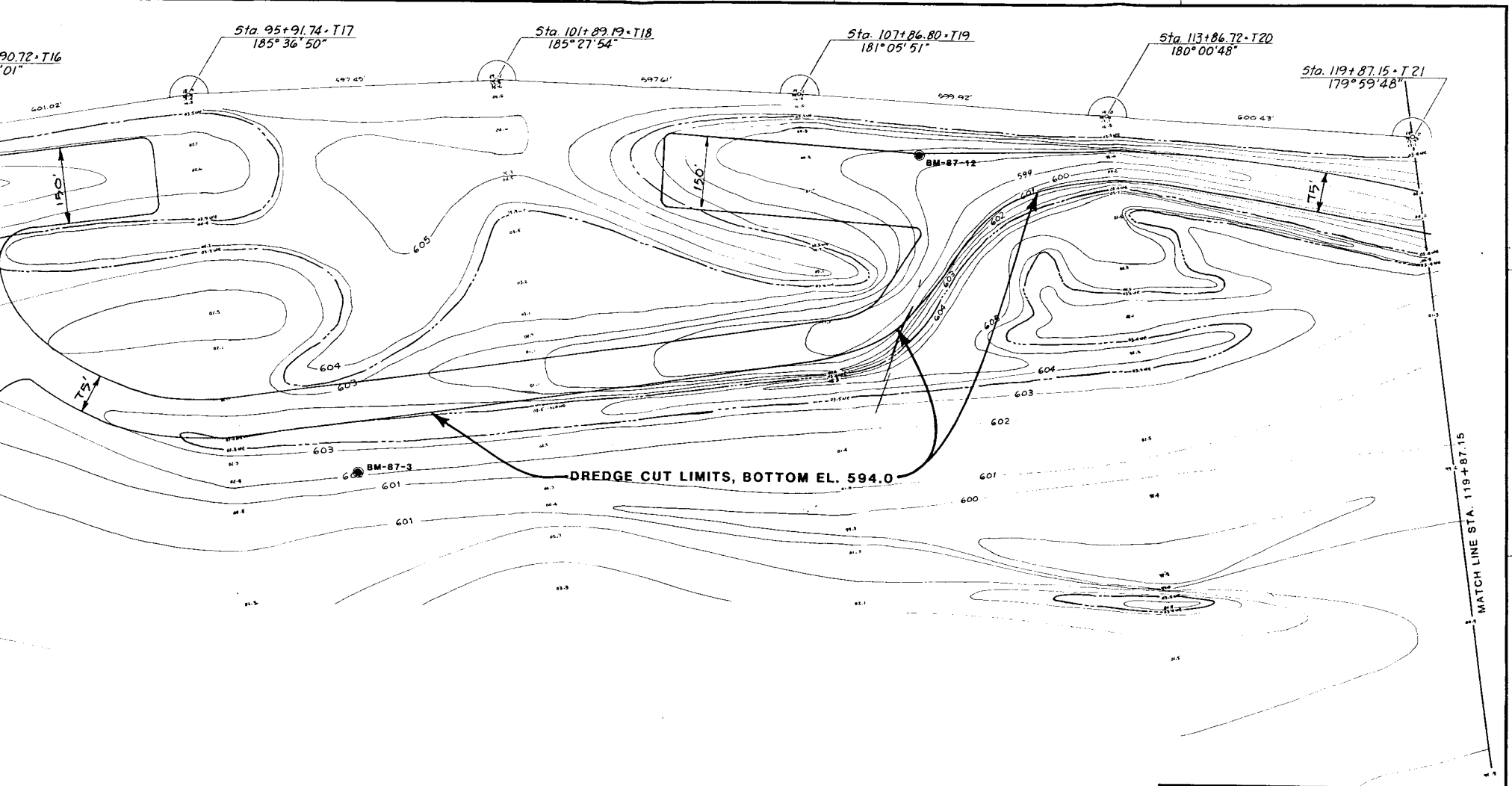
Sheet reference number:	
Sheet _ _ of _	

gs. G-8 Traverse
gs. 29-30 "X" Sections
pgs. 2-5 "X" Sections
pgs. 19-20 "X" Section

PLATE 11



SCALE: 1"=100.0'

0' 100' 200' 300'

8-9, Traverse
5-12, "X" Sections

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ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

DREDGING PLAN II

Scale: As shown
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Sheet reference number:
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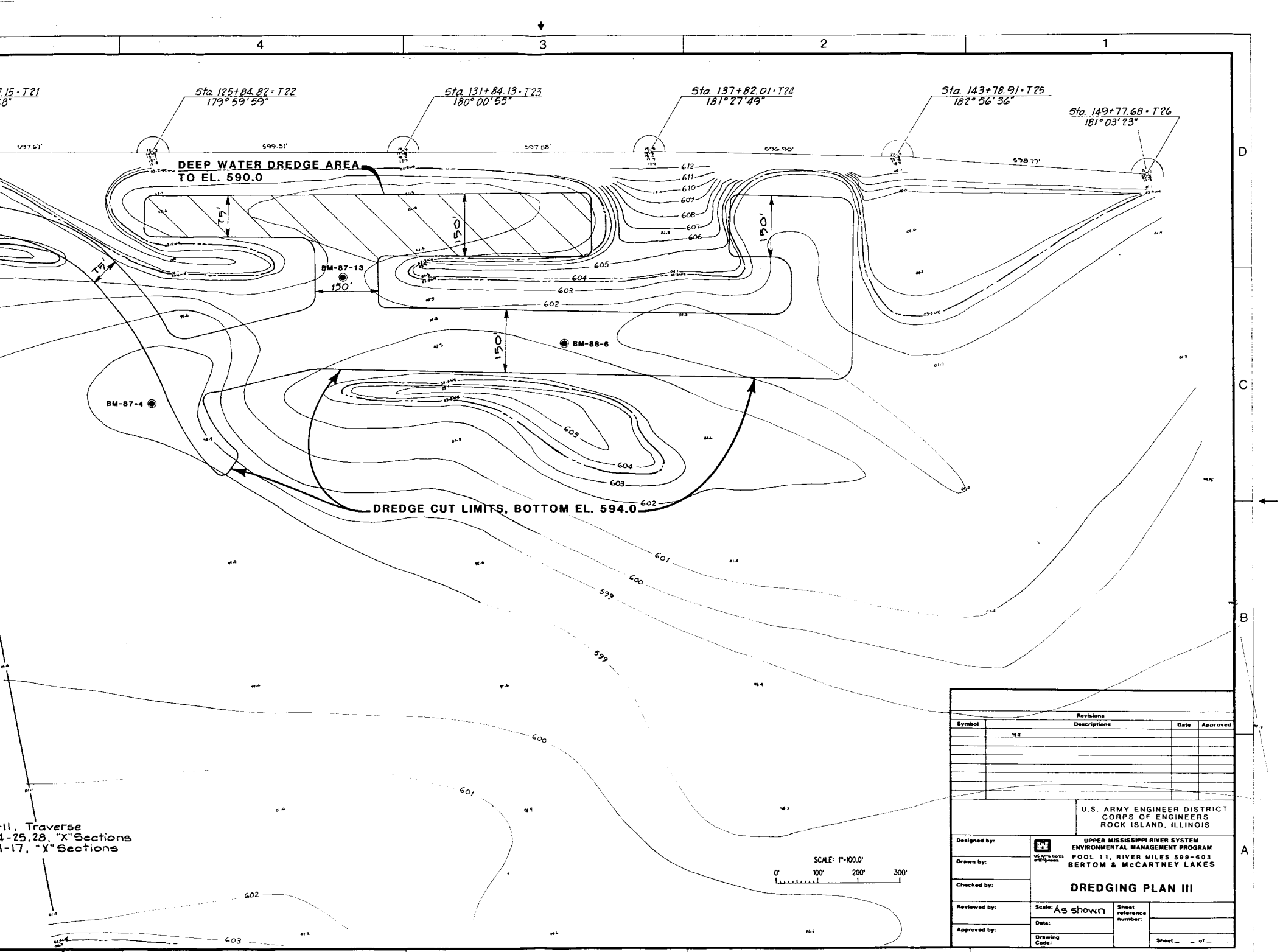
PLATE 12



-11, Traverse
4-25.28, "X" Sections
1-17, "X" Sections

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UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

DREDGING PLAN III

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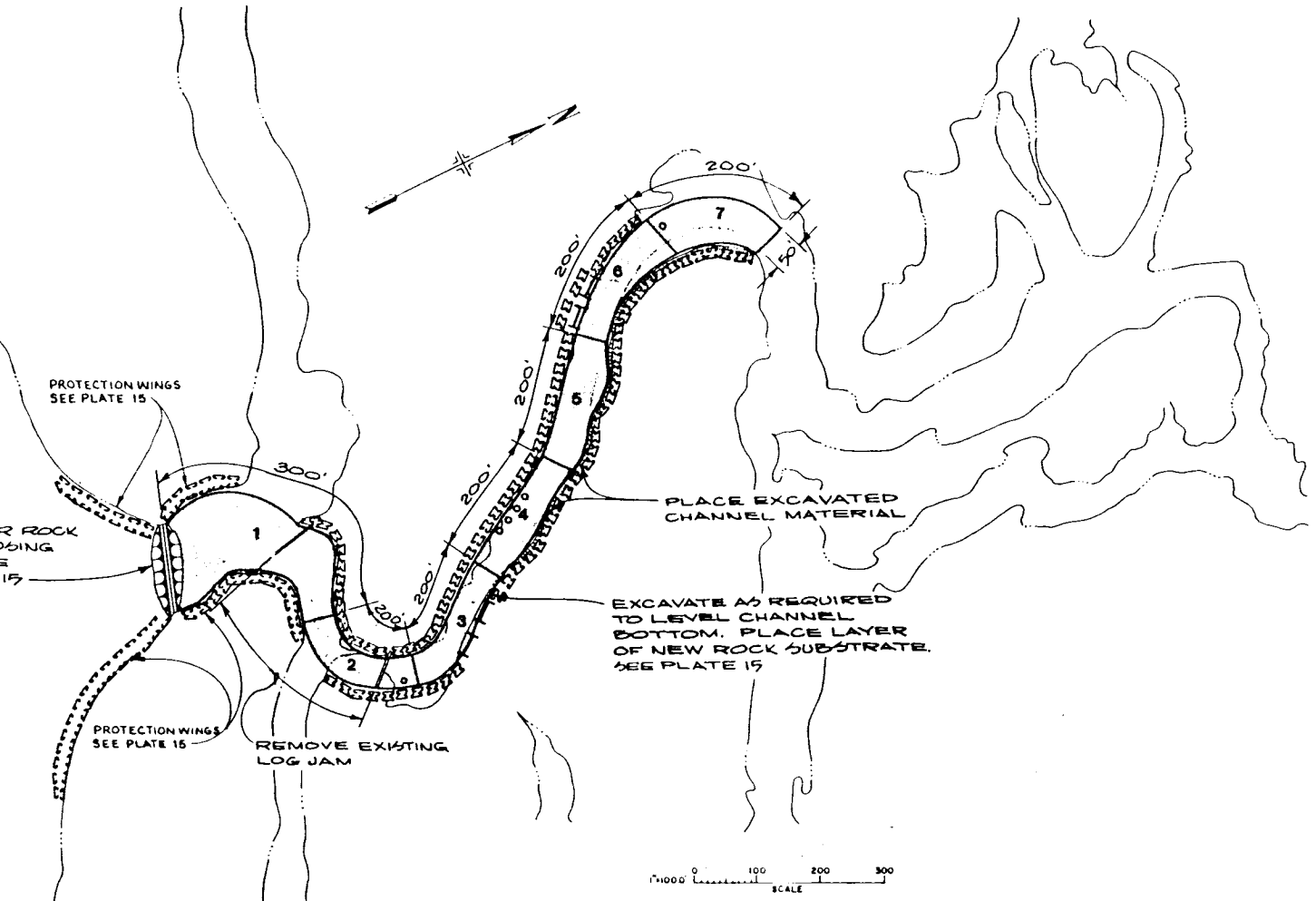
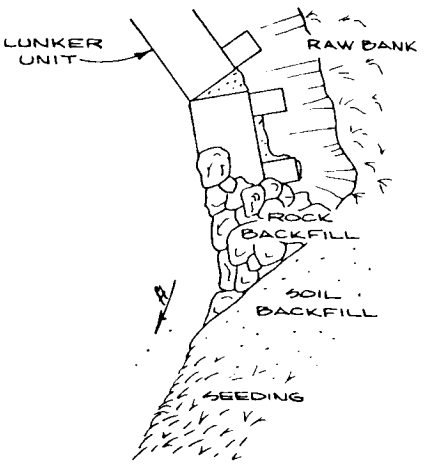
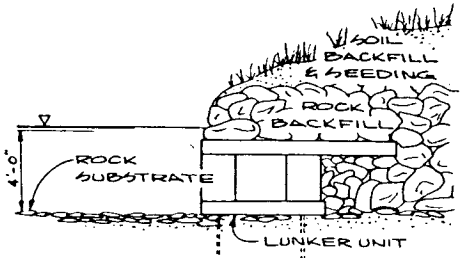
PLATE 13





PLAN VIEW
LUNKERS
NO SCALE



TYPICAL SECTION
LUNKERS
NO SCALE

LEGEND:

- ROCK CHANNEL BOTTOM
- 2 — CHANNEL SECTION WITH GRADATION 2
- o — INSTALL REINFORCED CONCRETE PIPE
- H — INSTALL LUNKERS UNIT

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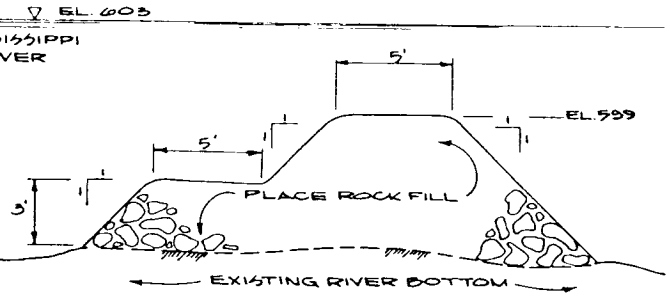
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

FISH & MUSSEL HABITAT PLAN

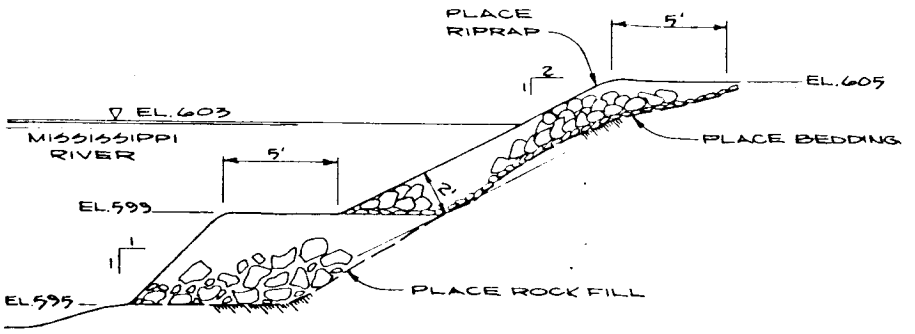
Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 14



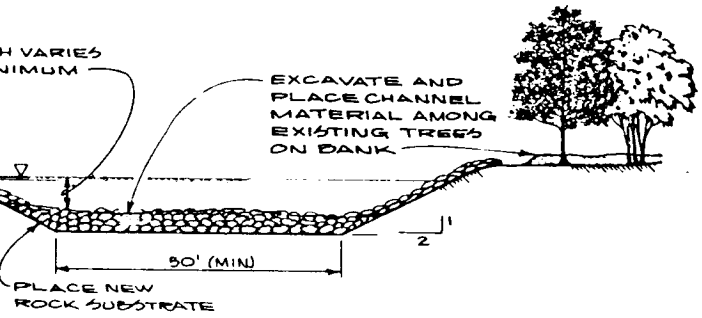
UNDER WATER ROCK PARTIAL CLOSING STRUCTURE

TYPICAL SECTION

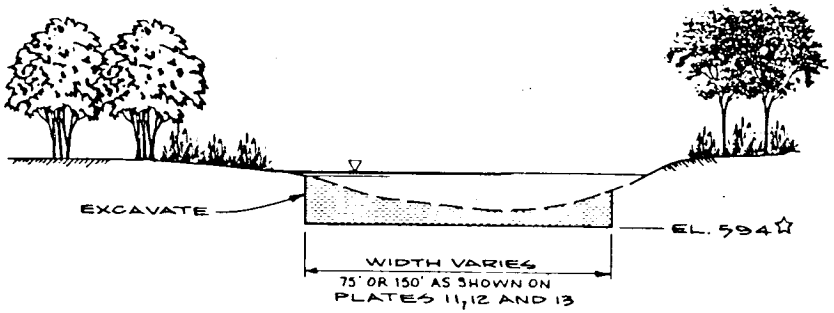


RIPRAP PROTECTION WINGS

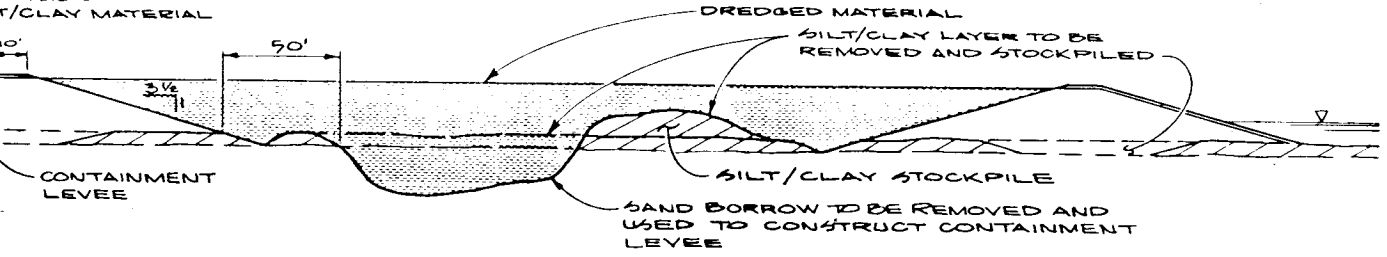
TYPICAL SECTION



FISH AND MUSSEL HABITAT



SIDE CHANNEL AND SLOUGH DREDGING



DREDGED MATERIAL PLACEMENT SITE

☆EXCEPT IN DEEP DREDGE AREAS AS SHOWN ON PLATE 13

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POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SECTIONS

Scale: NONE
Date:
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Sheet reference number:
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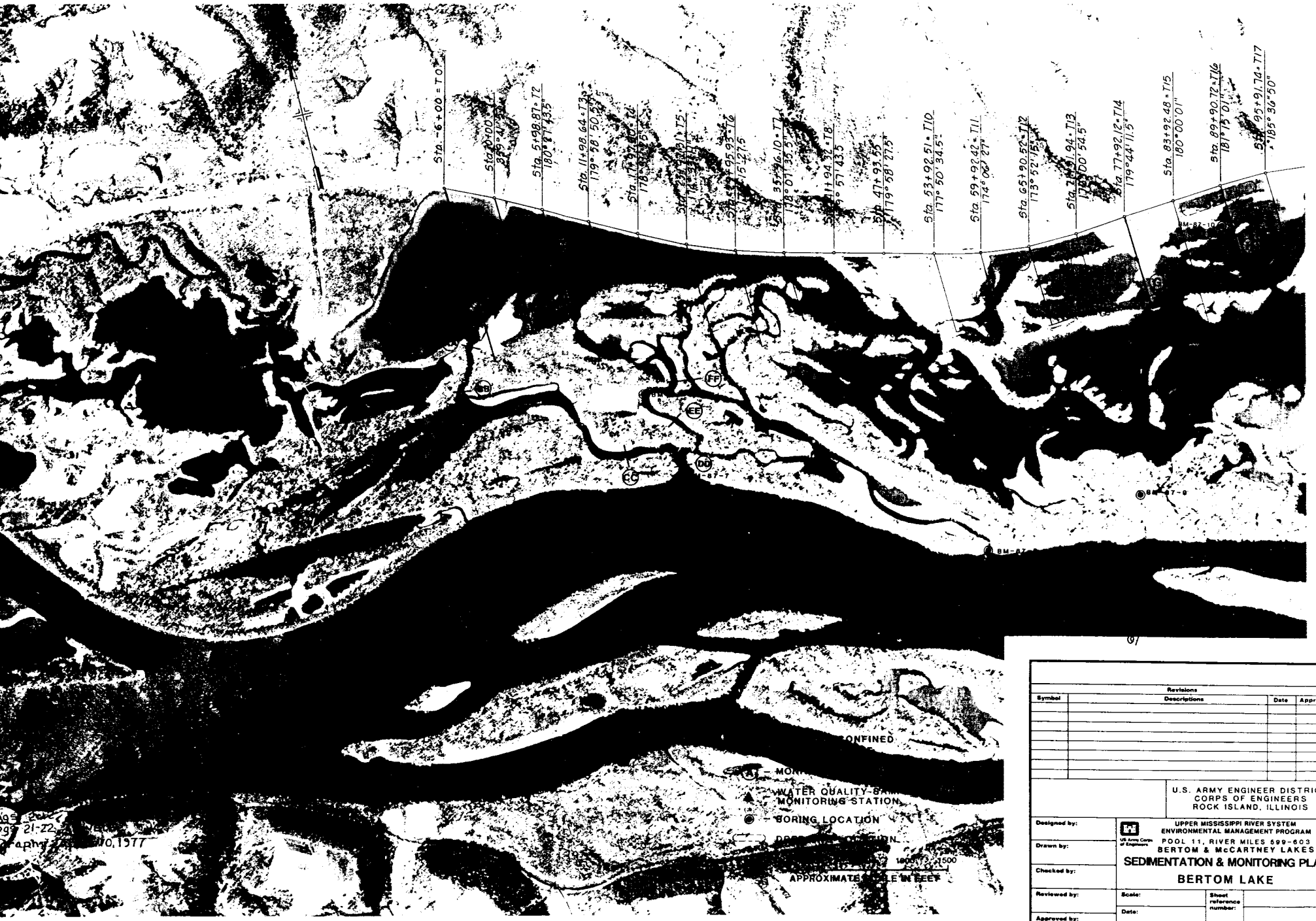
PLATE 15



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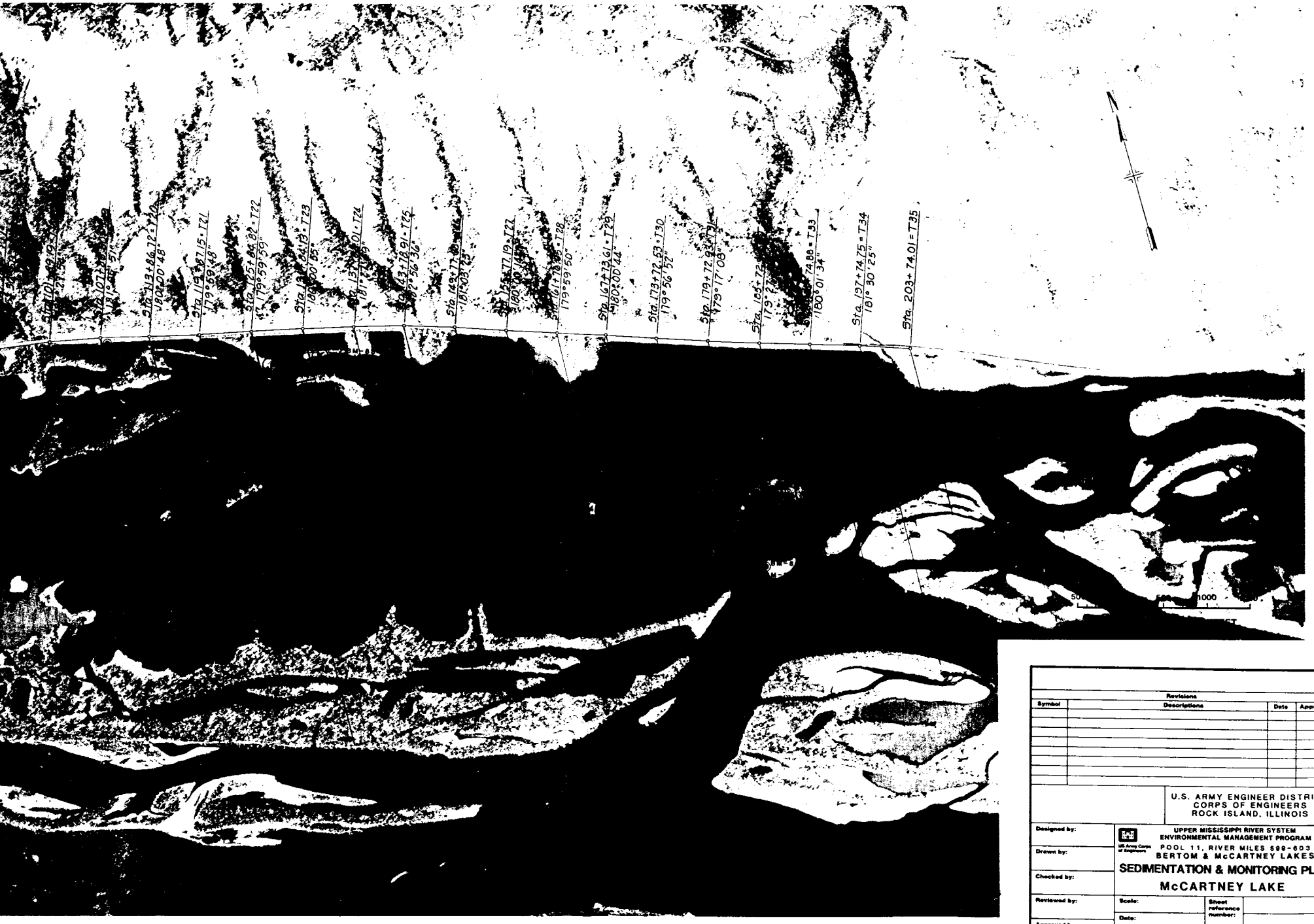
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SEDIMENTATION & MONITORING PLAN
BERTOM LAKE

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet _ _ of _

PLATE 16



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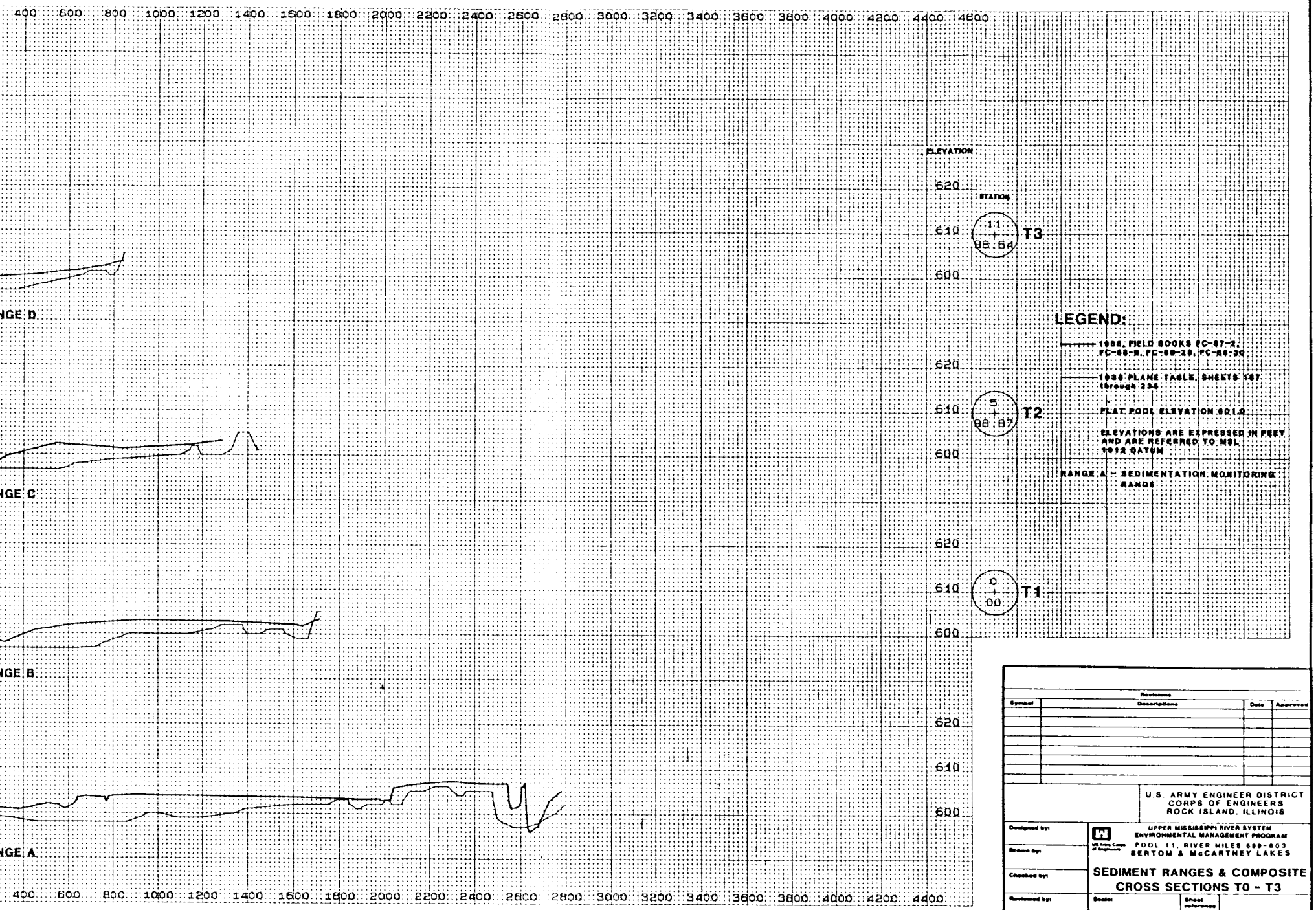
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SEDIMENTATION & MONITORING PLAN
McCARTNEY LAKE

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet __ of __

PLATE 17



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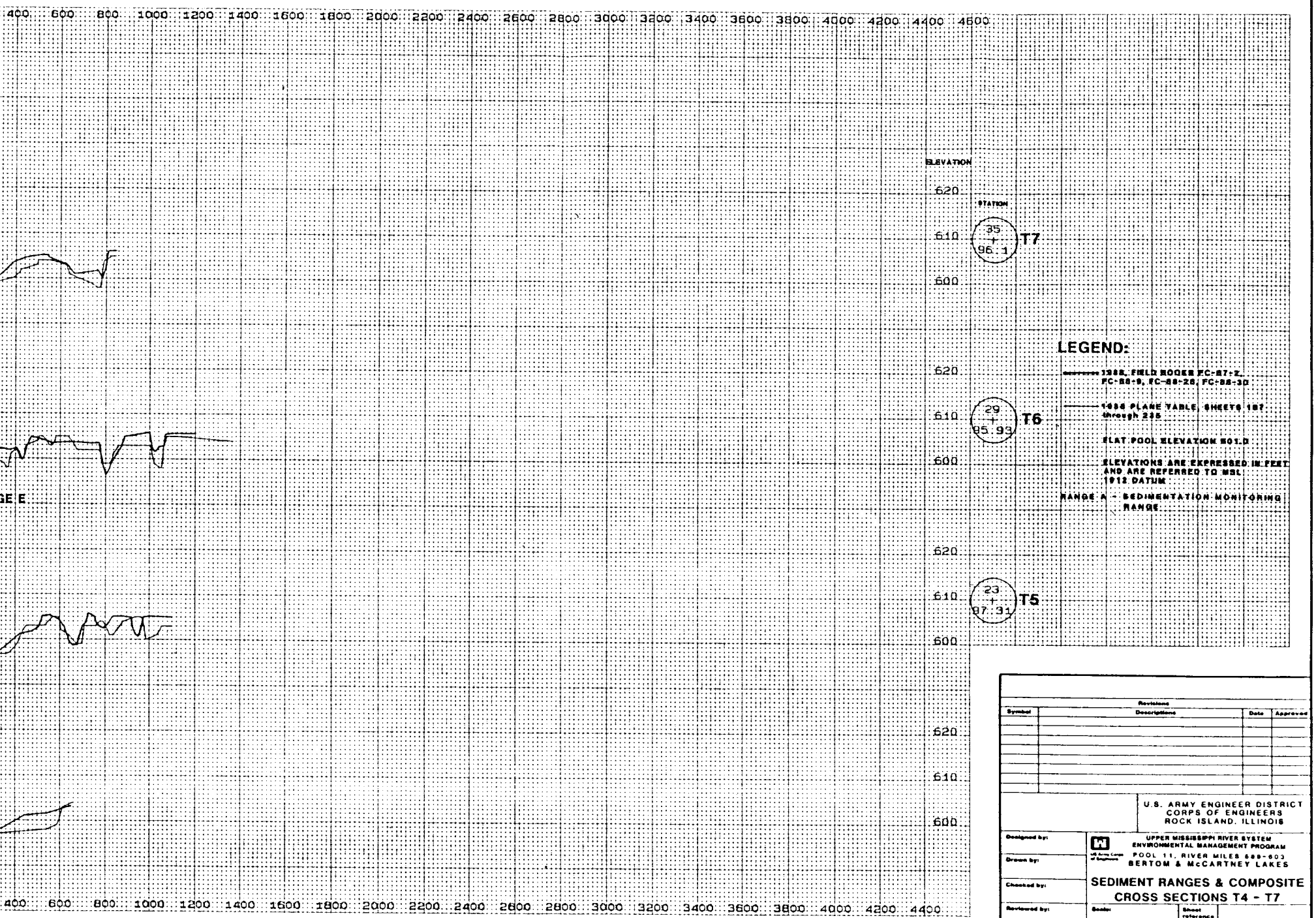
POOL 11, RIVER MILES 600-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS TO - T3

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet _ _ of _

PLATE 18



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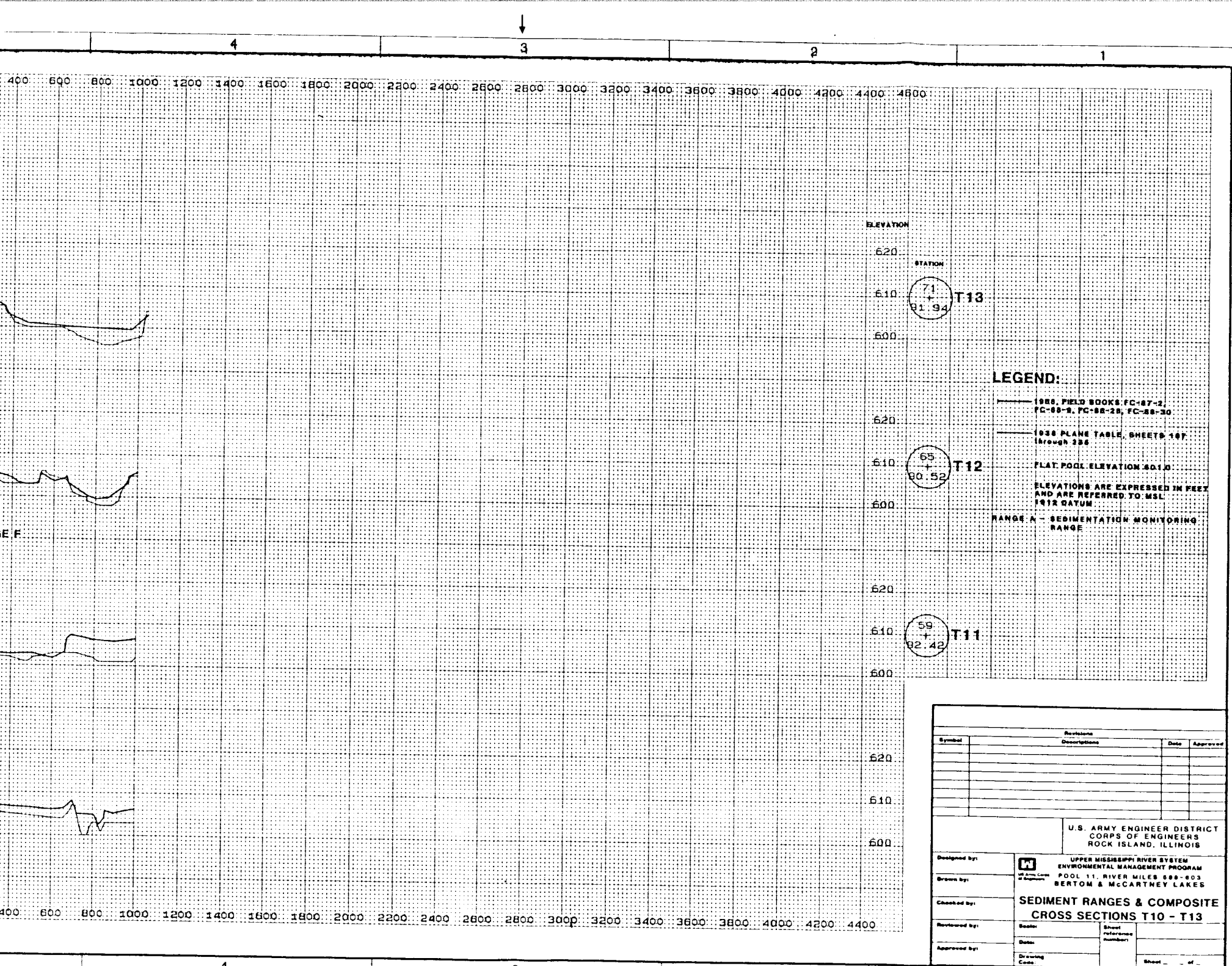
POOL 11, RIVER MILES 588-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T4 - T7

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 19



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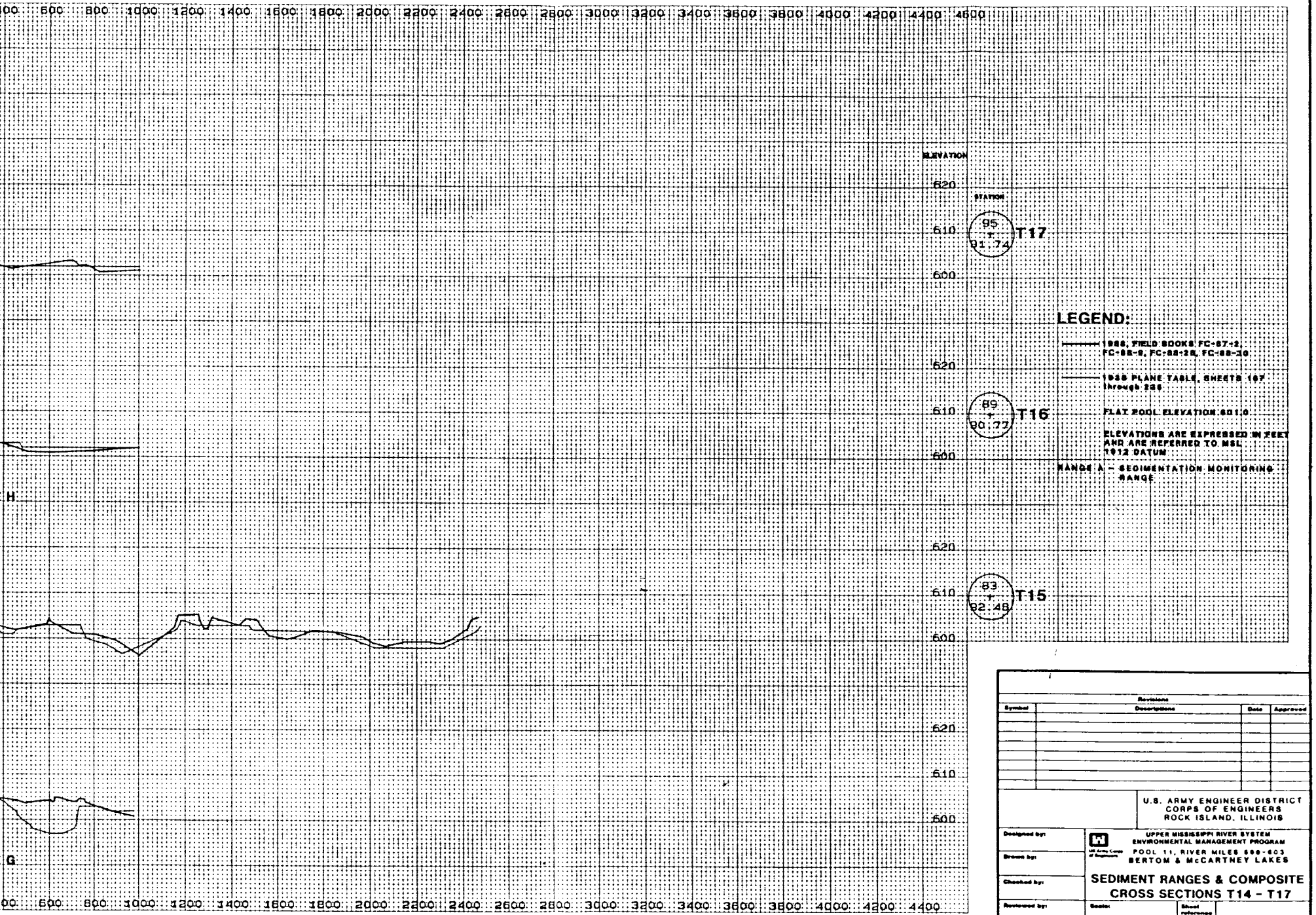
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T10 - T13

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 20



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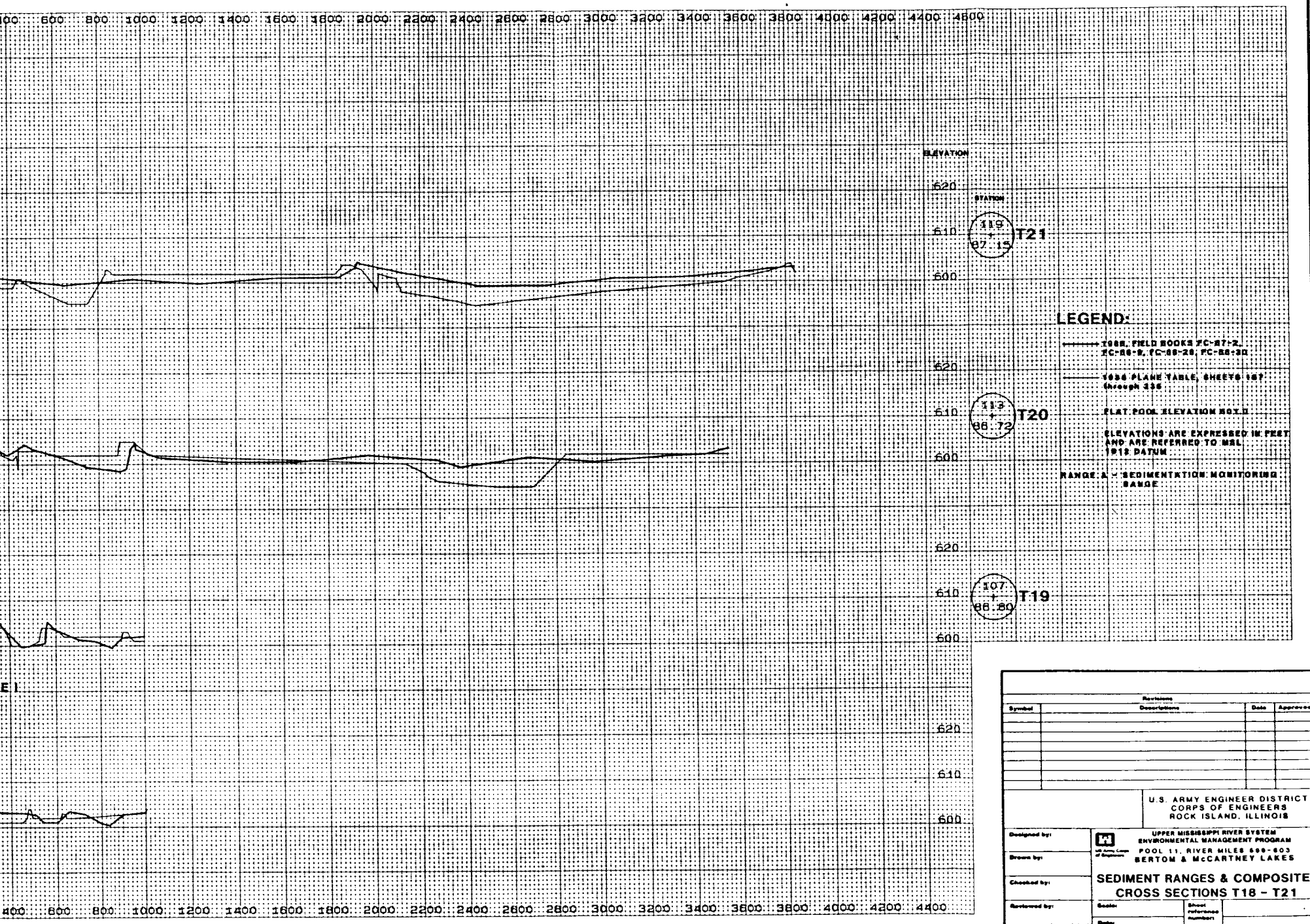
POOL 11, RIVER MILES 598-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T14 - T17

Scales:
Date:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 21



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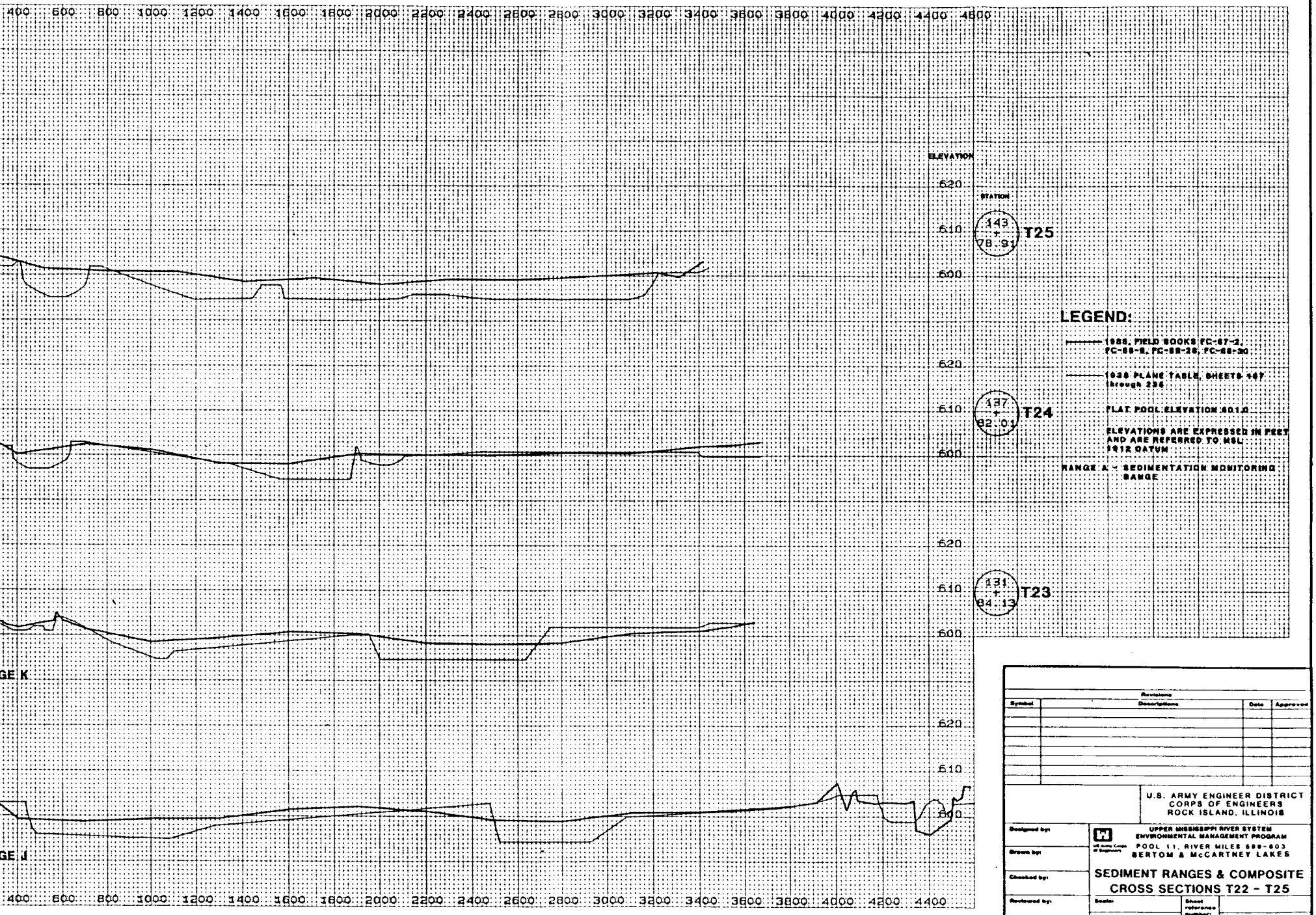
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T18 - T21

Scales:
Date:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 22



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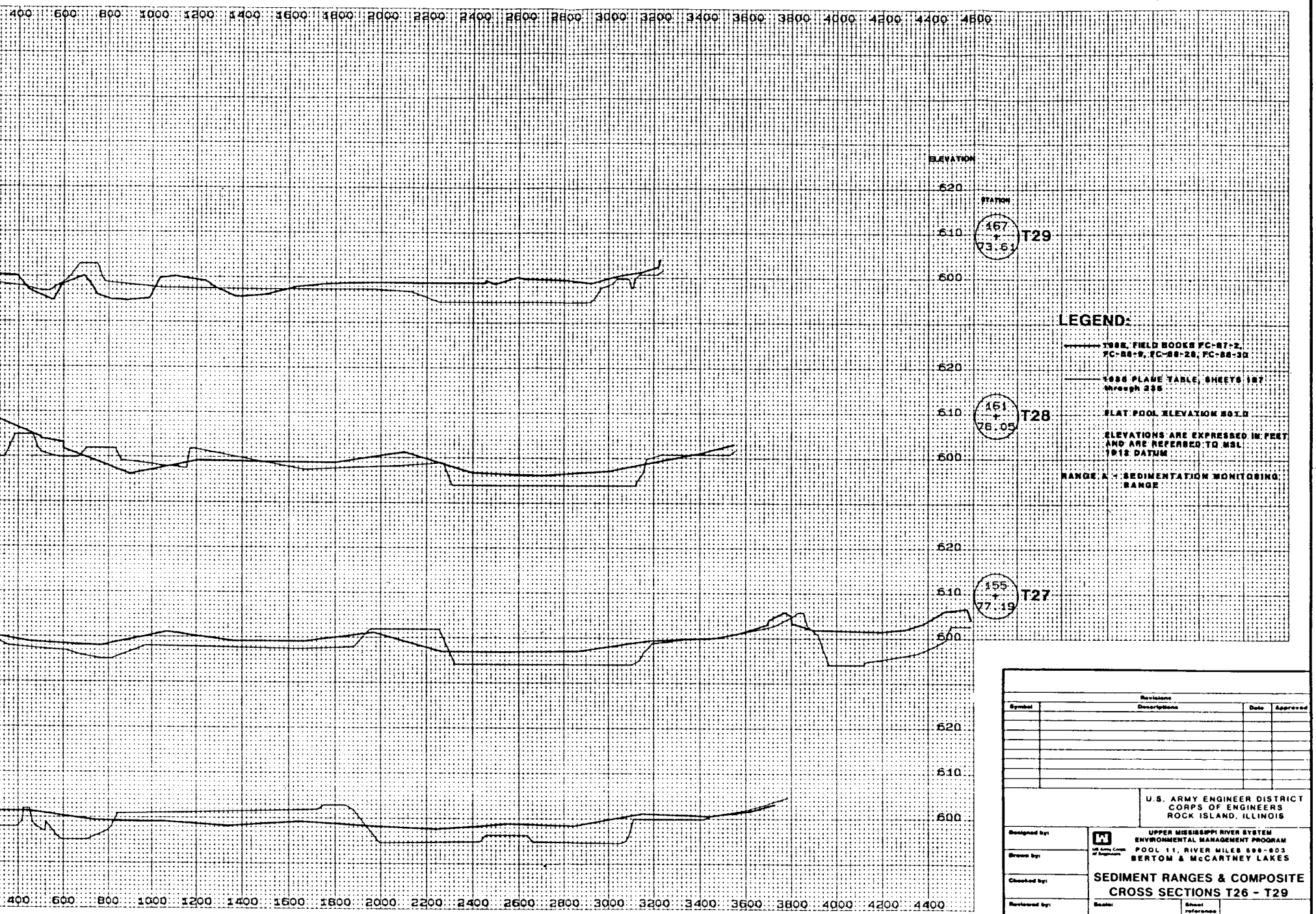
POOL 11, RIVER MILES 699-703
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T22 - T25

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet ___ of ___

PLATE 23



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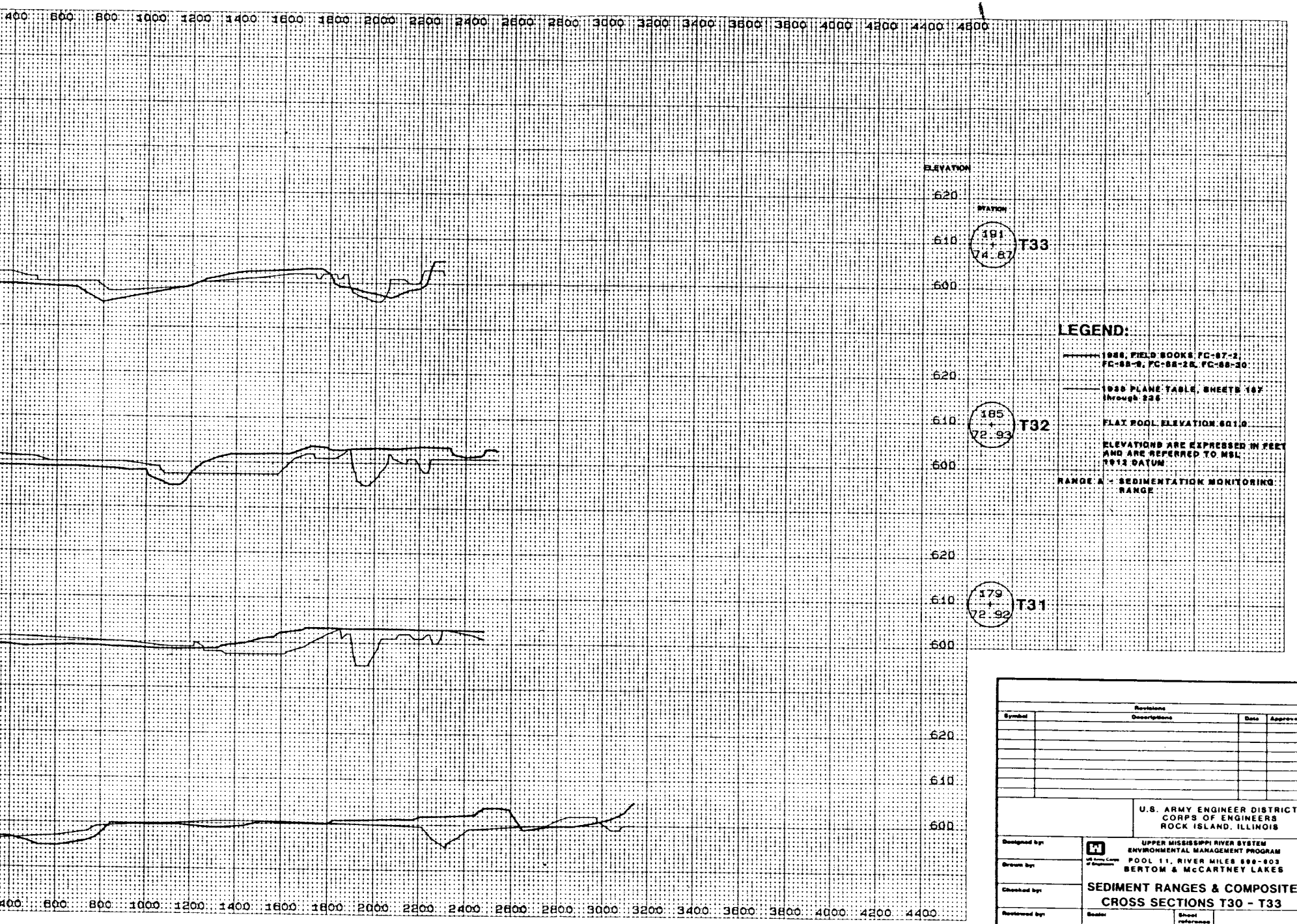
POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T26 - T29

Scales:
Date:
Drawing Code:
Sheet reference number:
Sheet _ _ of _

PLATE 24



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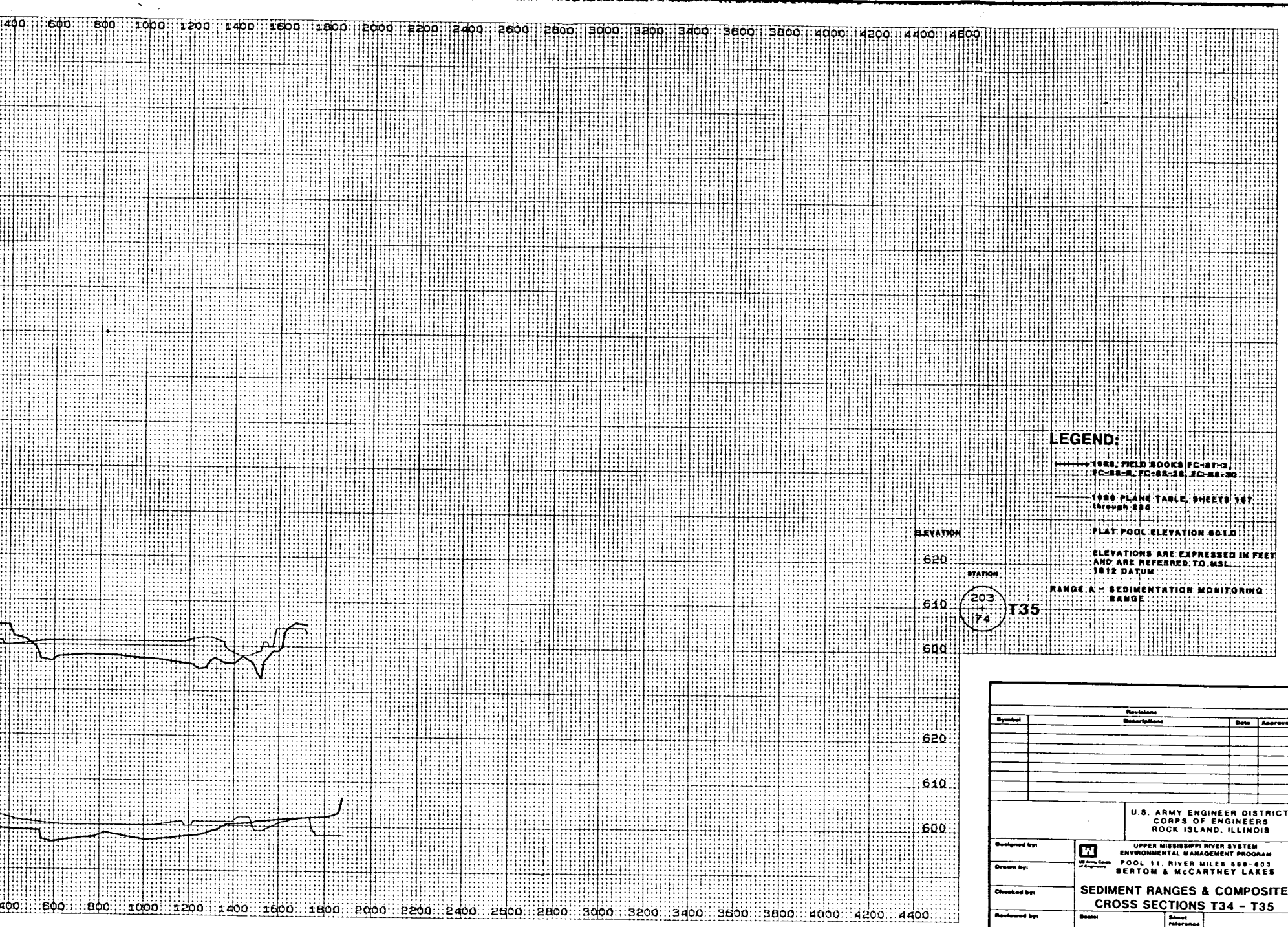
POOL 11, RIVER MILES 590-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T30 - T33

Scales
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 25



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POOL 11, RIVER MILES 599-603
BERTOM & McCARTNEY LAKES

SEDIMENT RANGES & COMPOSITE CROSS SECTIONS T34 - T35

Scale:
Date:
Drawing Code:
Sheet reference number:
Sheet _ of _

PLATE 26