UPPER MISSISSIPPI RIVER SYTEM-
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT (SL-7)
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

CALHOUN POINT

HABITAT
REHABILITATION AND ENHANCEMENT
PROJECT

MAIN REPORT
AND APPENDICES

POOL 26
ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS

FINAL

JUNE 1996

US Army Corps
of Engineers
St. Louis District
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1

FINAL

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM- DEFINITE PROJECT REPORT (SL-7) WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

CALHOUN POINT HABITAT REHABILITATION AND ENHANCEMENT PROJECT

POOL 26, ILLINOIS AND MISSISSIPPI RIVERS CALHOUN COUNTY, ILLINOIS

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June 1996

EXECUTIVE SUMMARY

2

The Calhoun Point Habitat Rehabilitation and Enhancement Project (HREP) is located in Calhoun County, Illinois, at the confluence of the Illinois and Mississippi Rivers. This 2,157-acre area consists of bottomland forest (1,379 acres), open water and emergent wetlands (466 acres), scattered agricultural fields (269 acres), and 43 acres of developed lands.

The majority of the Calhoun Point site is under Federal ownership. All but 100 acres of the Federal lands were acquired about 50 years ago by the Corps, and were later designated as General Plan lands. The General Plan, dated March 1961, was approved jointly by the Assistant Secretary of the Army, the Secretary of the Interior and the Illinois Department of Natural Resources (IDNR, formerly the Illinois Department of Conservation); and as prescribed in a Cooperative Agreement, dated February 1963, between the Department of the Army and the Department of the Interior. IDNR has responsibility for day-to-day management of the area under the terms of a cooperative agreement with the USFWS. Current management is directed at providing waterfowl habitat, and preserving the bottomland hardwood ecosystem. Ongoing management practices rely heavily on pumping in the spring, to dewater areas for growing waterfowl foods, and on recharging these areas in the fall to make the food available to waterfowl.

Sedimentation and water level fluctuations are major threats to the habitat of the Calhoun Point area. The open water areas at Calhoun Point receive substantial sediment input from the flood waters of both the Illinois and Mississippi Rivers. The existing overall deposition rate is estimated to be .5 inches per year, and is expected to average .3 inches per year over the next 50 years, resulting in a one-third reduction in open water area. Thus, this deposition has and will result in a direct loss of fish and waterfowl habitat acreage over time. It also results in decreased water depth, leaving fish without suitable refuge from temperature extremes during the winter period, and it obstructs fish access between the river and interior lakes. To some extent, sediment also contributes to a soft bottom substrate, which is not conducive to good plant anchorage.

The project area is also affected by fluctuations in river stage. Water elevations can fluctuate by a number of feet above normal pool stage (419.5 NGVD), and for extended periods of time. These fluctuations can impact the growth of wetland plants, and the availability of these plants as a food source for waterfowl.

Other site problems include: (a) the tendency for the slough and old meander scar areas in the vicinity of Squaw Island to dry out and become of less value to wood duck reproduction, (b) woody vegetation that occupies a considerable portion of the site's interior that could otherwise be available for waterfowl food production, and (c) approximately one-half of the site's mast trees were killed by the 1993 flood.

Because of its importance in providing habitat for waterfowl, fish and other species, the involved agencies were interested in restoring the resources and management potential of this site. To guide the planning effort, major goals and associated objectives were developed by an interagency study team:

GOALS	OBJECTIVES
Restore wetlands habitat diversity lost to sedimentation	Reduce sediment deposition to a level comparable to that which occurred prior to Pool 26 impoundment
Restore spawning and overwintering habitat for fish	Restore deep water areas within site interior that were once used for fish overwintering, and reestablish fish access between the river and interior lakes
Restore dabbling duck feeding habitat	Improve protection of moist-soil plant production areas from river flooding during the growing season Expand acreage of moist-soil plant production area Provide an invertebrate food source during spring migration period Provide independent water control between interior lakes and between the lakes and the river Increase acreage of mast-producing trees
Restore wood duck brood rearing habitat	Prevent summer dry out conditions in sloughs Improve meander scars to provide additional breeding habitat opportunities
Restore habitat for Canada geese at goose field area	Improve ability to hold water to make available residual crops
Restore forested wetlands habitat diversity for a broad spectrum of wildlife species	Increase mast-producing trees

Two major alternative plans were considered: Alternative A, the No Federal Action Plan, and Alternative B, the Wetlands Protection--Closed System Plan. These plans were a composite of one or more of the following 16 measures (and 61 alternative measure options) that were identified and evaluated. Alternative B was selected as a cost efficient configuration among many millions of alternative plan combinations analyzed via incremental cost analysis.

1. No Action
2. UMRS Watershed Erosion Control
3. Navigation Pool Water Level Manipulation
4. Regular Maintenance Dredging
5. Selective Deepwater Dredging
6. Vegetative Filter Strips
7. Riverside Berm
8. Meander Scar Improvement

9. Water Control Structures
10. Vanes
11. Clearing Shoreline Woody Vegetation
4 12. Interior Levees
13. Pumps
14. Forest Management Plan
15. Dredge Material Disposal into Backwaters
16. Farmlands Dedication to Wetlands

The plan formulation process showed that Alternative B was not only cost efficient, but it was the best plan from the perspective of overall completeness, effectiveness, and acceptability. Accordingly, Alternative B was selected as the proposed project, the basic components of which are described below (FIGURE ES-1 provides a visual display of the project plan, and TABLE ES-1 provides a more detailed summary of the project features and benefits):

1. A riverside berm to reduce sediment input to the site, and to serve as an integral component of the berm-gate-pump water control system. A portion of the trees cleared for the site will be placed as fish and wildlife habitat structures. Some of the borrow area used for berm construction will be configured as non-forested wetlands.

2. Selective deepwater dredging at Pohlman Slough to provide a deepwater fish refuge, and a water intake location for pumping operations at the goose fields.

3. Exterior gravity drain structures at three locations (Pohlman Slough, Chickahominy Lake, and Squaw Island Slough) for water control. The Pohlman Slough and Chickahominy Lake structures are open-topped and include stop-logs to accommodate fish access.

4. Pumps at Silver Lake, Chickahominy Lake, Squaw Island Slough, and the Goose Fields area included for use when water control via gravity drains is no longer feasible. The Silver Lake pump station includes a fish screen to prevent fish entrainment.

5. Interior stop-log structures at three locations (between Chickahominy and Silver Lakes, between Chickahominy and Royal Lakes, and between Royal Lake and Pohlman Slough) used to subdivide the site's interior into independently managed units.

6. Woody vegetation control (using herbicide) at selected locations to increase the total acreage available for moist-soil plant production.

7. Interior levees (along with associated stop-log units) to expand the crop acreage available for fall innundation at the goose fields area.

8. Implementation of a forest management plan to increase mast trees as a historically important component of the Calhoun Point forest habitat.

Habitat enhancement from the project would be anticipated to result in a net gain of 586 Wildlife Average Annual Habitat Units (AAHUs), and 129 Aquatic AAHUs. The project is designed to provide habitat benefits for approximately 50 years.

A Project Performance Evaluation Plan (including physical and chemical analyses) that complies with the scope and methodologies used for other HREPs, and the Upper Mississippi River System-Long Term Resource Monitoring Program (UMRS-LTRM), has been developed. Pre-construction and post-construction monitoring will be implemented at a total cost to the EMP of $45,360.

IDNR, through a separate agreement with the USFWS, is the local sponsor for the Calhoun Point area. The USFWS Regional Director, and the St. Louis

District Commander, will sign a Memorandum of Agreement (MOA) for restoring fish and wildlife habitat resources at Calhoun Point, addressing the specific relationships, arrangements, and general procedures under which the USFWS and Department of the Army will participate in constructing, operating, maintaining, repairing and rehabilitating the project. 5

The sponsor will accomplish its work in accordance with Section 906(e) and Section 1103(e), as amended, of the 1986 Water Resources Development Act. A manual will be developed during the construction phase of the project which will more specifically define the operation, maintenance and rehabilitation responsibilities.

The total fully funded project cost is estimated to be $6,961,000. Project construction is scheduled to be completed in September 2002. All project features are located on Federally owned lands. The cost of construction features on Federal lands would be a 100 percent Federal cost. The annualized operation and maintenance cost of the project is incurred 100 percent by the agency managing the site (i.e. by the Illinois Department of Natural Resources).

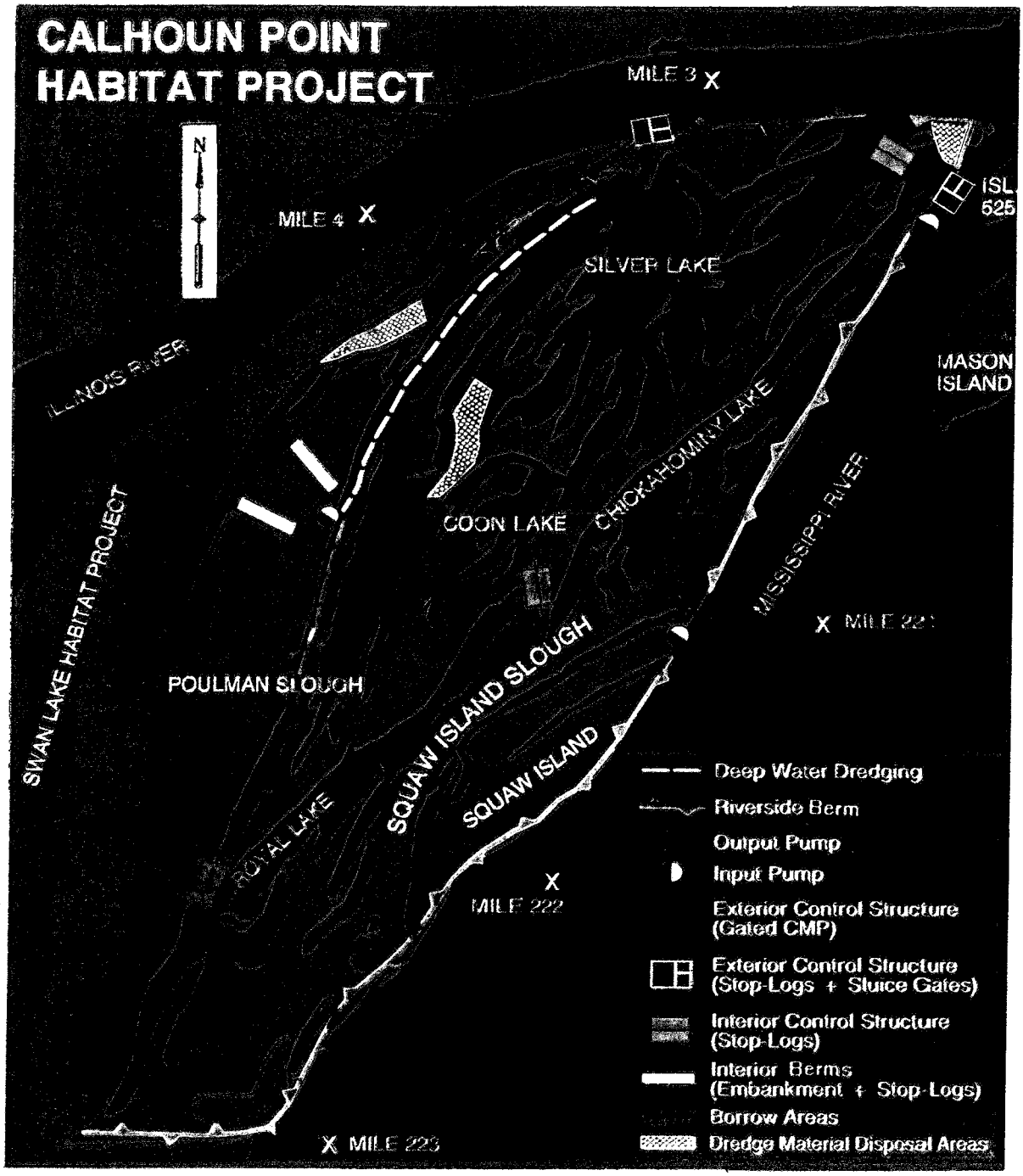
CALHOUN POINT
HABITAT PROJECT
N
MILE 3 X
MILE 4 X
SILVER LAKE
ISL
525
MASON
ISLAND
ILLINOIS RIVER
CHICKAHOMINY LAKE
COON LAKE
MISSISSIPPI RIVER
SWAN LAKE HABITAT PROJECT
X MILE 221
POULMAN SLOUGH
SQUAW ISLAND SLOUGH
SQUAW ISLAND
ROYAL LAKE
X
MILE 222
X MILE 223
Deep Water Dredging
Riverside Berm
Output Pump
Input Pump
Exterior Control Structure
(Gated CMP)
Exterior Control Structure
(Stop-Logs + Sluice Gates)
Interior Control Structure
(Stop-Logs)
Interior Berms
(Embankment + Stop-Logs)
Borrow Areas
Dredge Material Disposal Areas

FIGURE ES-1

TABLE ES-1
PLAN B - MAJOR PROJECT FEATURES DESCRIPTION AND HABITAT BENEFITS

Major Project Features	Description	Habitat Benefits/Remarks
Riverside Berm	Feature is in 3 segments totaling 30,100'and extends from high ground south of the Brussels Ferry crossing then along the Calhoun Point perimeter to the juncture of the Royal Landing access road with the County Road. This low profile berm (average height 3'-6' includes a 8,600' Il. R. segment with crown elevation 424 NGVD, a Mississippi R. segment between R.M. 219.5 and 223 totally 18,500', and a 3,000' segment adjacent to the Royal Landing access road at crown elev. 426 NGVD. Portions of the cleared timber will be used as fish & wildlife habitat structures (i.e. submerged tree tops & brush piles).	Reduces river sediment input to site by 67 percent. Flood events during growing season reduced from present 1 in 2 years to 1 in 5 years. Provides net change of +156 AAHUs for wildlife, and -18 AAHUs for fish. Additional (unquantified) benefits accrue from low cost placement of trees as habitat structures.
Selective Deepwater Dredging	Feature consists of hydraulicly dredging a 10,200' long channel, 50' wide, thru Pohlman Slough (87,000 CY). Depth of cut would range from 5' to 7' below normal pool elevation. Material placed in cropland locations as shown in FIGURE ES-1.	Creates deepwater habitat for fish. Provides net change of +49 AAHUs for fish.
Exterior Water Control Facilities (includes gates & pumps)	Feature consists of water control devices at 4 different locations along the riverside berm:	
	Pohlman Slough facility consists of a 22'5" wide open channel structure with combination sluice gates and stop-logs.	Facility can be used to limit sediment input to the site, while still affording fish access during much of the year. Provides a net gain of +50 AAHUs for fish, and +2 AAHUs for wildlife.
	Silver Lake facility consists of a single 48,000 GPM output pump, and includes a fish screen device.	Facility used to discharge water from the Silver/Chickahominy/Royal Lakes area for summer drawdown of moist-soil plant units. Provides a net increase of +13 AAHUs for wildlife. Screen device will reduce fish mortality due to entrainment.

TABLE ES-1 (Continued)

Major Project Features	Description	Habitat Benefits/Remarks
Exterior Water Control Facilities (includes gates & pumps)	Chickahominy L. facility is similar to Pohlman Slough facility, except additionally it has a 48,000 GPM input pump.	Facility regulates water levels at Silver/Chickahominy/Royal Lakes via gravity drainage methods, and as the sole source of pumped exterior water to the site. Facility provides for some fish access. Provides a net increase of +26 AAHUs for wildlife, and +36 AAHUs for fish.
	Squaw Island facility consists of one 42" gated CMP, and a 5,000 GPM pump.	Facility serves to provide water manipulation for green tree area management, and alternatively for wood duck brood rearing. Provides a net increase of +46 AAHUs for wildlife.
Interior Water Control Facilities	Feature consists of three 8' wide stop-log units. The units are located between Chickahominy & Silver Lakes, between Chickahominy & Royal Lakes, and between Royal Lake and Pohlman Slough.	The units allow for the independent water level control of Silver/Chickahominy/Royal Lakes, and for some fish movement between lake compartments. Provides a net increase of +19 AAHUs for wildlife, and +12 AAHUs for fish.
Clearing Shoreline Woody Vegetation	Feature consists of the removal of young woody vegetation (using an herbicide) to the extent of 10% of site's total terrestrial habitat acres.	Measure serves to increase the total site acreage available for moist-soil plant production. Provides a net increase of +189 AAHUs for wildlife.
Interior Berms (Including pump)	Feature consists of earthen embankment placed across two goose fields topographical depressions--crown elevation 426 NGVD. Each berm also includes a 3' wide stop-log unit. A single 5,000 GPM pump feeds the two areas. Portion of project borrow to be taken from goose fields area as a wetlands enhancement.	Measure serves to expand available crop acreage at the goose fields available for innundation during the fall migration season, while providing for adequate growing season crop drainage. Provides a net +29 AAHUs for wildlife.
Forest Management Plan	Feature consists of mast tree plantings on 25 acres of dredge material disposal area, 90 acres of existing crop fields, and 115 acres of mast-producing forest killed by the 1993 flood.	Measure serves to reestablish historical presence of mast trees as an important component of the Calhoun Point forest habitat. Provides a net +106 AAHUs for wildlife.

TABLE ES-1 (Continued)

Major Project Features	Description	Habitat Benefits/Remarks
Exterior Water Control Facilities (includes gates & pumps)	Chickahominy L. facility is similar to Pohlman Slough facility, except additionally it has a 48,000 GPM input pump.	Facility regulates water levels at Silver/Chickahominy/Royal Lakes via gravity drainage methods, and as the sole source of pumped exterior water to the site. Facility provides for some fish access. Provides a net increase of +26 AAHUs for wildlife, and +36 AAHUs for fish.
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Interior Levees (Including pump)	Feature consists of earthen embankment placed across two goose fields topographical depressions--crown elevation 426 NGVD. Each levee also includes a 3' wide stop-log unit. A single 5,000 GPM pump feeds the two areas. Portion of project borrow to be taken from goose fields area as a wetlands enhancement.	Measure serves to expand available crop acreage at the goose fields available for innundation during the fall migration season, while providing for adequate growing season crop drainage. Provides a net +29 AAHUs for wildlife.
Forest Management Plan	Feature consists of mast tree plantings on 25 acres of dredge material disposal area, 90 acres of existing crop fields, and 115 acres of mast-producing forest killed by the 1993 flood.	Measure serves to reestablish historical presence of mast trees as an important component of the Calhoun Point forest habitat. Provides a net +106 AAHUs for wildlife.

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9 UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
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CALHOUN POINT
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 26, ILLINOIS AND MISSISSIPPI RIVERS, CALHOUN COUNTY, ILLINOIS

TABLE OF CONTENTS

Section		Page
1.	**INTRODUCTION**	1
	a. Purpose	1
	b. Authority	1
	c. Project Selection Process	2
	d. Scope of Study	3
	e. Coordination	3
2.	**EXISTING ENVIRONMENTAL CONDITIONS AND FUTURE WITHOUT**	4
	a. Location	4
	b. Hydrology/Hydraulics	4
	c. Physiography-Topography	4
	d. Water Quality	10
	e. Air Quality	10
	f. Noise	10
	g. Prime Farmland	10
	h. Terrestrial and Aquatic Habitats	10
	i. Waterfowl	14
	j. Fish	16
	k. Other Biota	17
	l. Historic Properties	18
	m. Recreation	18
	n. Aesthetics	19
	o. Economic and Social Resources	19
3.	**RESOURCE PROBLEMS AND OPPORTUNITIES**	20
	a. Water Levels	20
	b. Flooding	20
	c. Sedimentation	20
4.	**PROJECT GOALS/OBJECTIVES**	21
5.	**ALTERNATIVES**	21
	a. Criteria	21
	b. Measures Available	21
	c. Measures Evaluated	31
	d. Plans Developed	63
	e. Plans Evaluated	63
6.	**SELECTED PLAN WITH DETAILED DESCRIPTION**	67
	a. Plan Components	67
	b. Design Considerations	72
	c. Construction Considerations	73
	d. Operation, Maintenance, and Rehabilitation	74
	e. Project Performance Evaluation Monitoring Plan	76
	f. Real Estate Requirements	81
	g. Cost Estimates	81
	h. Construction Schedule	84

TABLE OF CONTENTS (Continued)

Section		Page
7.	**ENVIRONMENTAL EFFECTS OF THE SELECTED PLAN**	88
	a. Natural Resource Effects	88
	b. Economic and Social Impacts	98
	c. Relationship of the Proposed Project to Land-Use Plans	98
	d. Adverse Effects Which Cannot Be Avoided	98
	e. Short-Term Use Versus Long-Term Productivity	98
	f. Irreversible or Irretrievable Resource Commitments	98
	g. Compliance With Environmental Quality Statutes	99
	h. Cumulative Impacts	99
8.	**FEDERALLY ENDANGERED SPECIES**	102
9.	**IMPLEMENTATION RESPONSIBILITIES AND VIEWS**	103
	a. U.S. Corps of Engineers	103
	b. U.S. Fish and Wildlife Service	103
	c. Illinois Department of Natural Resources	103
10.	**COMPARISON: DPR SELECTED PLAN VERSUS ORIGINAL FACT SHEET CONCEPT**	106
11.	**COORDINATION, PUBLIC VIEWS, AND COMMENTS**	110
12.	**CONCLUSIONS**	124
13.	**RECOMMENDATIONS**	125
14.	**LITERATURE CITED**	126
15.	**LIST OF PREPARERS**	128
16.	**FINDING OF NO SIGNIFICANT IMPACT**	128

TABLE OF CONTENTS (Continued)

11

LIST OF TABLES

Number	Title	Page
2.1	Number of Flood Events at or Above Various River Elevations for Period of Record	7
2.2	River Stage at Grafton VS Percent River Sediment Input	9
2.3	Estimated Present and Future Sedimentation Rate and Water Depth Changes	11
2.4	Comparison of Off-Channel Open Water Habitat in the Illinois and Mississippi Rivers Valleys by Pool	13
4.1	Project Goals, Objectives, Measures	22
5.1	Description and Design Requirements for Study Measures	26
5.2	Cost Analysis Increments	32
5.3	Measures Relationship to Project Goals/Objectives	35
5.4	Measures Evaluation Summary	39
5.5	Measures Effectiveness	41
5.6	Plan Relationships to Project Goals/Objectives	61
5.7	Plans Evaluation Summary	62
6.1	Components of the Selected Plan	68
6.2	Monitoring and Performance Evaluation Matrix	77
6.3	Post-Construction Project Performance Evaluation	78
6.4	Project Cost Estimate Summary--Base Year Dollars	82
6.5	Project Cost Estimate--Fully Funded Dollars	83
6.6	Estimate of Annual Operation and Maintenance Costs	85
6.7	Estimate of Performance Evaluation Monitoring Costs	86
6.8	Project Implementation Schedule	87
7.1	Calhoun Point HREP Environmental Impact Assessment Matrix	89
7.2	Compliance of the Selected Plan with WRC--Designated Environmental Statutes	100
9.1	District Environmental Commitments for the Recommended Plan	104

TABLE OF CONTENTS (Continued)

12

LIST OF TABLES

Number	Title	Page
11.1	Summary of Draft DPR Comments and St. Louis District Responses	111
15.1	Definite Project Report--Environmental Assessment Preparers	130
15.2	Definite Project Report--Agency Contributors	133

13

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

Number	Title	Page
2.1	Existing Features of Calhoun Point	5
2.2	Stage Hydrograph at Illinois/Mississippi River Confluence--Calendar Year 1978	6
2.3	Topography of Calhoun Point	8
4.1	Calhoun Point--Functional Management Units	25
5.1	Berm System Options	46
5.2	Closed System Berm Alignment Options	48
5.3	Selective Deepwater Dredging--Alternative Locations	51
5.4	Meander Scar Improvement--Excavation and Ditch Alternatives	51
5.5	Exterior Water Control Structures--Alternative Locations	51
5.6	Interior Water Control Structures--Alternative Locations	51
5.7	Interior Levees--Alternative Locations	56
5.8	Pumps--Alternative Locations	56
5.9	Green Tree Area	57
5.10	Forest Management Plan	59
5.11	Calhoun Point--Unit Incremental Costs for Wildlife Habitat Units	65
5.12	Calhoun Point--Average Annual Costs Per Unit of Output for Wildlife Habitat Units	65
5.13	Calhoun Point--Unit Incremental Costs for Aquatic Habitat Units	66
5.14	Calhoun Point--Average Annual Costs Per Unit of Output for Aquatic Habitat Units	66

TABLE OF CONTENTS (Continued)

LIST OF PLATES

Number	Title
1	Project Location, Drawing Index and Vicinity Map (1 of 1)
2	General Site Plan (1 of 2)
3	General Site Plan (2 of 2)
4	Levee Profile (1 of 3)
5	Levee Profile (2 of 3)
6	Levee Profile (3 of 3)
7	Channel Profiles (1 of 2)
8	Channel Profiles (2 of 2)
9	Miscellaneous Sections and Details (1 of 1)
10	Plan and Sections - Site 1 (1 of 6)
11	Plan and Sections - Site 2 (2 of 6)
12	Plan and Sections - Site 3 (3 of 6)
13	Plan and Sections - Sites 4 and 7 (4 of 6)
14	Plan and Sections - Sites 6, 9, 10, and 11 (5 of 6)
15	Fish Screen Structure - Site 2 (6 of 6)
16	Boring Locations - Geotechnical (1 of 7)
17	Boring Locations - Geotechnical (2 of 7)
18	Illinois River Boring Logs (3 of 7)
19	Mississippi River Boring Logs (4 of 7)
20	Mississippi River Boring Logs (5 of 7)
21	Interior River Boring Logs (6 of 7)
22	Borrow Boring Logs (7 of 7)
23	Grafton, Illinois Stage Hydrographs (1 of 2)
24	Grafton, Illinois Stage Hydrographs (2 of 2)

15

TABLE OF CONTENTS (Continued)

LIST OF APPENDICES

DPR-A	Letters of Intent and Project Agreements
DPR-B	Correspondence Pertaining to Draft DPR
DPR-C	Clean Water Act Compliance Documentation
DPR-D	Distribution List
DPR-E	Hydrology and Hydraulics
DPR-F	Geotechnical Considerations
DPR-G	Cultural Resources Documentation
DPR-H	Fish and Wildlife Coordination Act Documentation
DPR-I	Endangered Species Documentation
DPR-J	Project Habitat Quantification
DPR-K	Incremental Cost Analysis
DPR-L	Performance Evaluation Monitoring - Physical, Chemical Sampling Locations
DPR-M	Farmland Protection Policy Act Documentation
DPR-N	Tentative Site Water Regulation Plan
DPR-O	Real Estate Letter Report
DPR-P	Detailed Project Costs Estimate
DPR-Q	Biological Data
DPR-R	Cumulative Impacts Assessment

REPORT ACRONYMS

AAHU	Average Annual Habitat Unit
AHAG	Aquatic Habitat Appraisal Guide
CM	Construction Management
CMP	Corrugated Metal Pipe
DPR	Definite Project Report
EA	Environmental Assessment
EMP	Environmental Management Program
EMTC	Environmental Management Technical Center
GIS	Geographic Information System
GPM	Gallons Per Minute
HEC	Hydrologic Engineering Center
HREP	Habitat Rehabilitation and Enhancement Project
IDNR	Illinois Department of Natural Resources (formerly Department of Conservation)
IEPA	Illinois Environmental Protection Agency
INHS	Illinois Natural History Survey
LTRM	Long Term Resources Management
MOA	Memorandum of Agreement
MTNWR	Mark Twain National Wildlife Refuge
NAWMP	North American Waterfowl Management Plan
NERC	National Ecology Research Center
O&M	Operations and Maintenance
PE&D	Preconstruction Engineering and Design
PCA	Project Cooperative Agreement
SHPO	State Historic Preservation Officer
SLD	St. Louis District
UMRBA	Upper Mississippi River Basin Association
UMRBC	Upper Mississippi River Basin Commission
UMRS	Upper Mississippi River System
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USSCS	U.S. Soil and Conservation Service
WHAG	Wildlife Habitat Appraisal Guide

17

FINAL

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1. INTRODUCTION.

a. Purpose. The purpose of this Definite Project Report (DPR) is to present a detailed proposal for the rehabilitation and enhancement of wetlands at Calhoun Point. 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. The Environmental Assessment (EA) for the project is integrated with the DPR.

b. Authority. Public Law (PL) 95-502 authorized the construction of a new dam and 1,200-foot lock at Alton, Illinois, and directed the Upper Mississippi River Basin Commission to prepare a Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Upper Mississippi River Basin Commission (UMRBC) completed the Master Plan report and submitted it to Congress on 1 January 1982. The report recommended an environmental management program that included construction of habitat rehabilitation and enhancement projects.

The 1985 Supplemental Appropriations Bill (PL 99-88), signed into law by President Reagan on 15 August 1985, provided initial authorization and appropriations for that environmental management program. A more comprehensive authorization was later provided by Section 1103 of the Water Resources Development Act of 1986 (PL 99-662). 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 . . .

c. Project Selection Process.

(1) Eligibility Criteria. The Master Plan, completed by the UMRBC in 1981, served as the basis for recommendations (including the UMRS-EMP) subsequently enacted into law by the Water Resources Development Act of 1986. A design memorandum (or implementation document) did not exist at the time of enactment of Section 1103. Therefore, the North Central Division, U.S. Army Corps of Engineers, completed a "General Plan" for implementation of the UMRS-EMP in January 1986. The USFWS, Region 3, and the five affected states (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) participated in the development of that plan 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. 18

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 resulted in the following conclusions:

(a) 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...."

(b) 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.

(2) Selection Process. In the past, projects have been nominated and ranked for inclusion in the St. Louis District's habitat projects program by the respective state conservation agencies, and the USFWS, based on agency management objectives. Calhoun Point was listed by the state as third in priority after the Stump Lake and Batchtown HREP projects.

d. Scope of Study. The geographical scope of the study is limited to the Calhoun Point area. The project features considered would involve primarily Federal, but also some private lands. Various field surveys were conducted during the study, these included topographic, hydrographic, soils (borings), habitat, and sediment and water quality.

e. Coordination. The level of interest in recent years for developing and implementing a Calhoun Point habitat restoration plan has been substantial. For a while, it was unclear whether the District would pursue site restoration under the UMRS-EMP, or under the Corps' Operation and Maintenance (O&M) program. Because of the level of interest, and due to study program implementation uncertainties, a number of recent efforts have transpired in an attempt to develop a site restoration plan.

In 1989, the District's Planning Division assisted IDNR in preparing a fact sheet for the inclusion of Calhoun Point as an EMP project. During the same year the District's Riverlands Management Office prepared two different concept plans for potential inclusion in the O&M program.

In February 1991 a workshop was convened to seek broader input into the development of a concept plan. The workshop was sponsored by the District's Riverlands Office and the USFWS (Region 3), in cooperation with IDNR. Attendees included staff members from the Service, the Corps, the Department, the Natural Resources Conservation Service (NRCS), the Gaylord Memorial Laboratory, and the University of Missouri--Columbia. The workshop took a look at current resource management objectives, resource problems, and potential habitat improvement measures for Calhoun. The workshop meeting was facilitated and documented by staff of the USFWS's National Ecology Research Center (NERC).

In July 1991, IDNR took the NERC report one step further. It developed a specific structural plan based on concensus agreements between the Department's fish and wildlife biologists.

By mid 1992, a decision was made that Calhoun Point would be pursued, not as an O&M project, but as an EMP project. Major planning meetings since that time occurred in July 1992 (NERC to EMP transition meeting), December 1992 (review meeting for preliminary design increments), February 1993 (field trip meeting), June 1993 (aquatic analysis meeting), and February 1994 (wildlife analysis meeting).

The interagency study team for the Calhoun Point HREP was comprised of many of the same individuals that participated in the earlier O&M planning efforts. Because of this, much of the prior documentation, especially that of the NERC report, has been incorporated into the planning process for the HREP DPR.

2. EXISTING ENVIRONMENTAL CONDITIONS AND FUTURE WITHOUT.

The following section presents information on the existing environment in the project area. Where relevant, a discussion is included on the environmental conditions if no project action is taken (i.e., the future without condition). 20

a. Location. The Calhoun Point HREP is located in Calhoun County, Illinois, at the confluence of the Illinois and Mississippi Rivers (FIGURE 2.1). The 2,157-acre area consists of bottomland forest (1,379 acres), open water and emergent wetlands (466 acres), scattered agricultural fields (269 acres), and 43 acres of developed land. The majority of the Calhoun Point site is under Federal ownership. All but 100 acres of the Federal lands were acquired about 50 years ago by the Corps, and were later designated as General Plan lands. The General Plan, dated March 1961, was approved jointly by the Assistant Secretary of the Army, the Secretary of the Interior and IDNR; and as prescribed in a Cooperative Agreement, dated February 1963, between the Department of the Army and the Department of the Interior. IDNR has responsibility for the day-to-day management of the area under the terms of a cooperative agreement with the USFWS. Current management is directed primarily at providing waterfowl habitat, and preserving the bottomland forest ecosystem. Ongoing management practices rely heavily on pumping to (1) dewater areas in the spring to allow for the growing of waterfowl foods, and (2) recharging these areas in the fall to make food available for waterfowl.

b. Hydrology/Hydraulics. Closure of the gates at old Lock and Dam 26 in June 1938 increased the average river stage at Calhoun Point by 8.5 feet (Nelson, Redmond, and Sparks, 1994). Yeager (1949) noted that summer stages increased by about 3 feet, and maximum stages were reduced from about 10 feet above average stage to about 7 feet. At the present time, river pool stages at Calhoun Point are controlled by the operation of the new Melvin Price Locks and Dam on the Mississippi River near Alton, Illinois. Except during floods, Pool 26 is regulated between 418 and 420 NGVD with an average pool stage of 419.5 NGVD. At normal pool, existing open water areas on Calhoun Point have an average depth of 1-2 feet, and maximum water depths do not exceed 4 feet. Low man-made and natural levees are present in places along the Illinois and Mississippi River shorelines, but flooding of the point is still common. Flooding often deposits large quantities of sediment on Calhoun Point. By the summer of 1939, Pool 26 inundated about 600 acres of Calhoun Point, leaving about 1,600 acres above pool. Sedimentation since 1938 has reduced the open-water and emergent wetland area of the point from 600 acres to about 466 acres.

To illustrate the water level fluctuations over the course of a typical year, FIGURE 2.2 provides a stage-hydrograph based on the year 1978. Flood events above 421 NGVD occur approximately three times annually, and about one year out of two during the growing season. Flooding at Calhoun Point may actually be somewhat more frequent than indicated by the Grafton gauge data. The Illinois River, which may flood more frequently and for a longer time than the Mississippi, could have localized effects on the project area that are not reflected by the gauge at Grafton. TABLE 2.1 indicates the seasonal occurrence of flood events at Grafton.

c. Physiography-Topography. Calhoun Point lies in the floodplain of the lower Illinois and upper Mississippi Rivers and consists of alluvial material. The floodplain area is relatively flat, with elevations ranging from about 419.5 up to 430 feet NGVD (National Geodetic Vertical Datum), but much of the area is below 424 NGVD (FIGURE 2.3).

When the Illinois and Mississippi Rivers flood, silt is deposited on Calhoun Point. As TABLE 2.2 indicates, most of the deposition takes place as a result of the more frequent lower stage flood events. In 1990, when the area was flooded 5 different times, between 2 and 3 inches of silt had to be removed from parking areas. It is thought that the Illinois River floods more

21

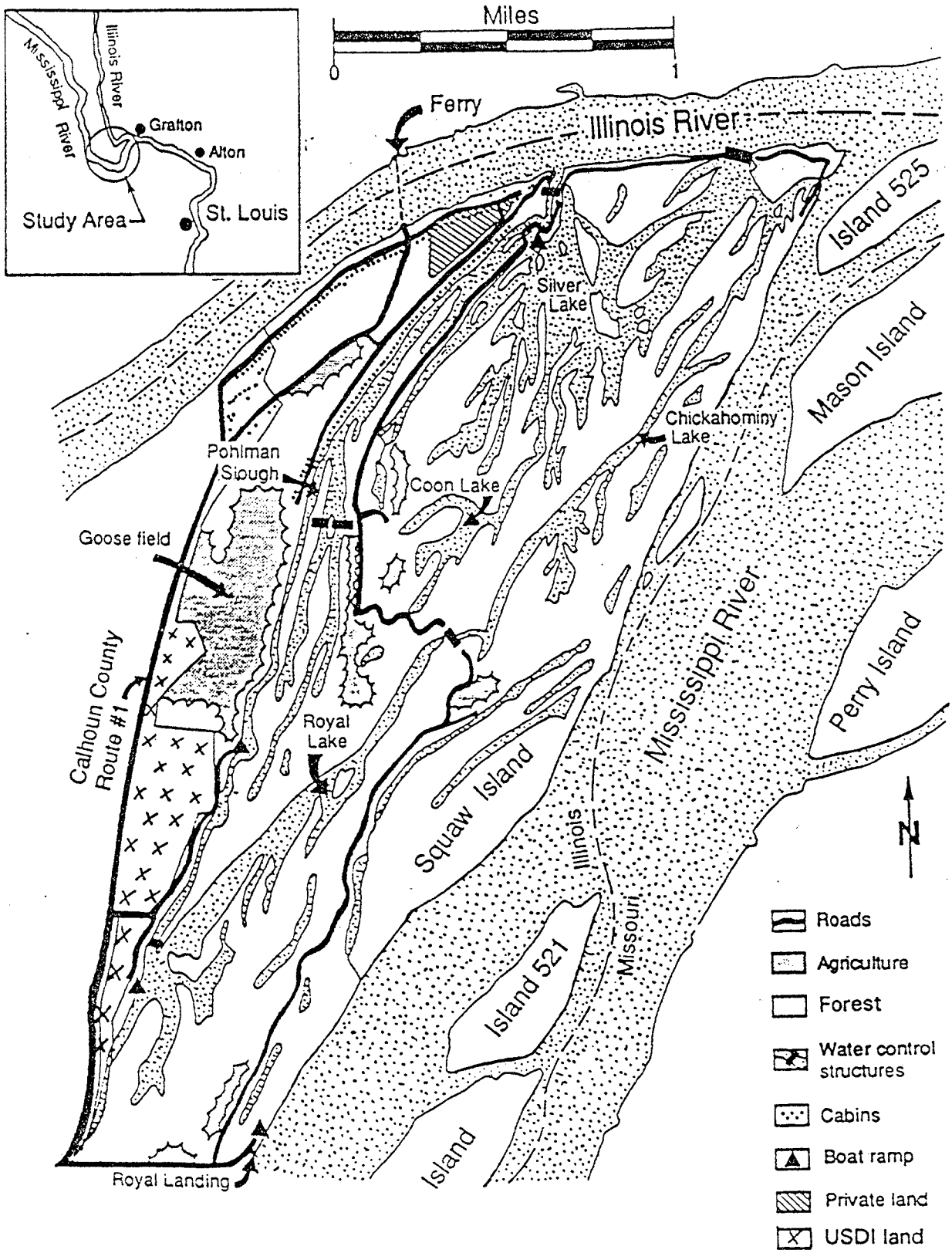


FIGURE 2.1. EXISTING FEATURES OF CALHOUN POINT

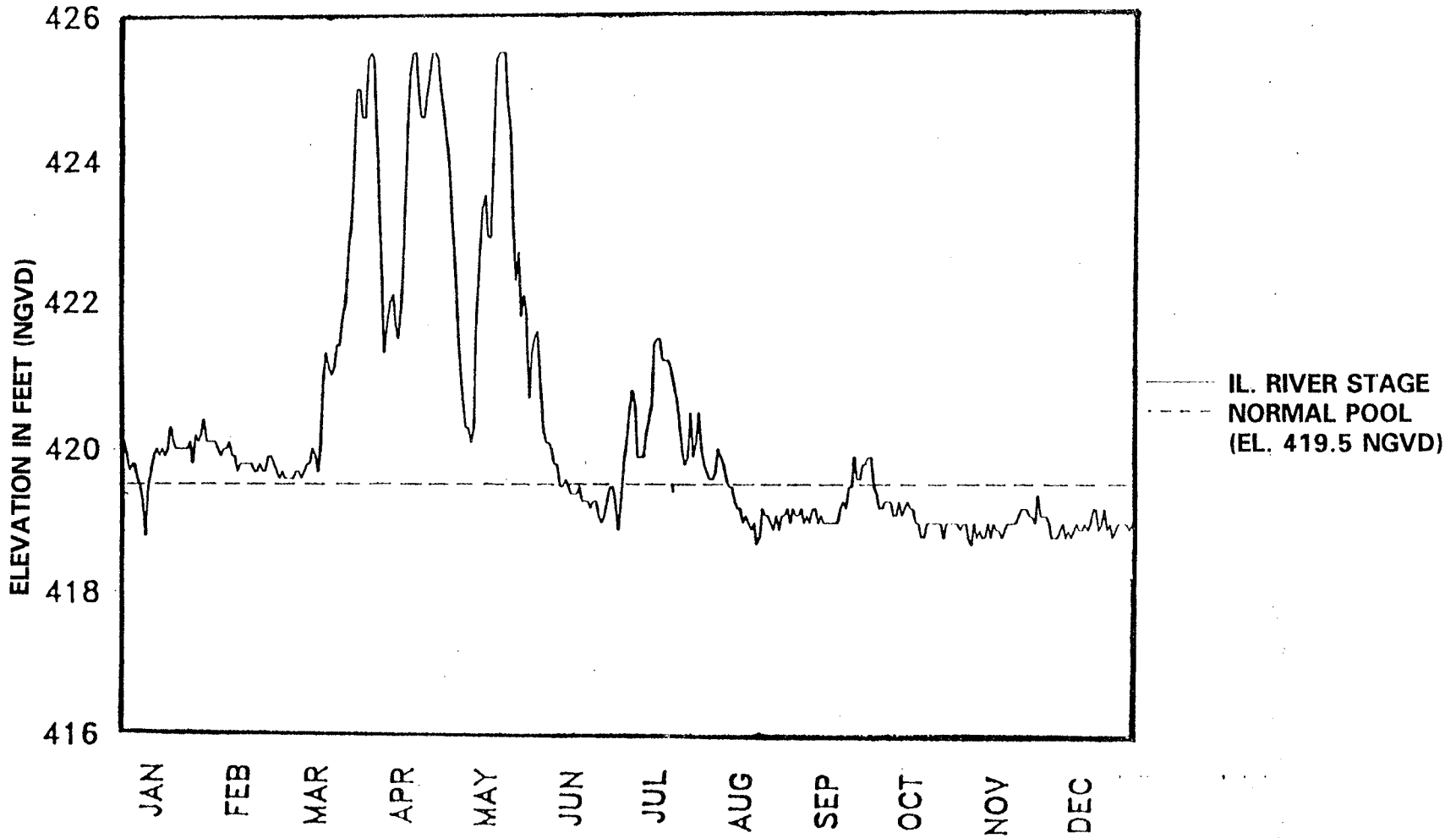


FIGURE 2.2. STAGE HYDROGRAPH AT ILLINOIS/
MISSISSIPPI RIVER CONFLUENCE--
CALENDAR YEAR 1978

TABLE 2.1

23 NUMBER OF FLOOD EVENTS AT OR ABOVE VARIOUS RIVER ELEVATIONS FOR PERIOD OF RECORD 1972-1991 (20 YEARS)

Elevation (NGVD)	Number of Flood Events				
	Total	Spring Season	Summer Season	Fall Season	Winter Season
430	6	4	0	1	1
429	7	5	0	1	1
428	8	5	1	1	1
427	10	6	1	2	1
426	13	9	1	2	1
425	20	14	3	2	1
424	25	17	4	2	2
423	31	18	6	2	5
422	43	23	7	3	10
421	54	24	12	5	13

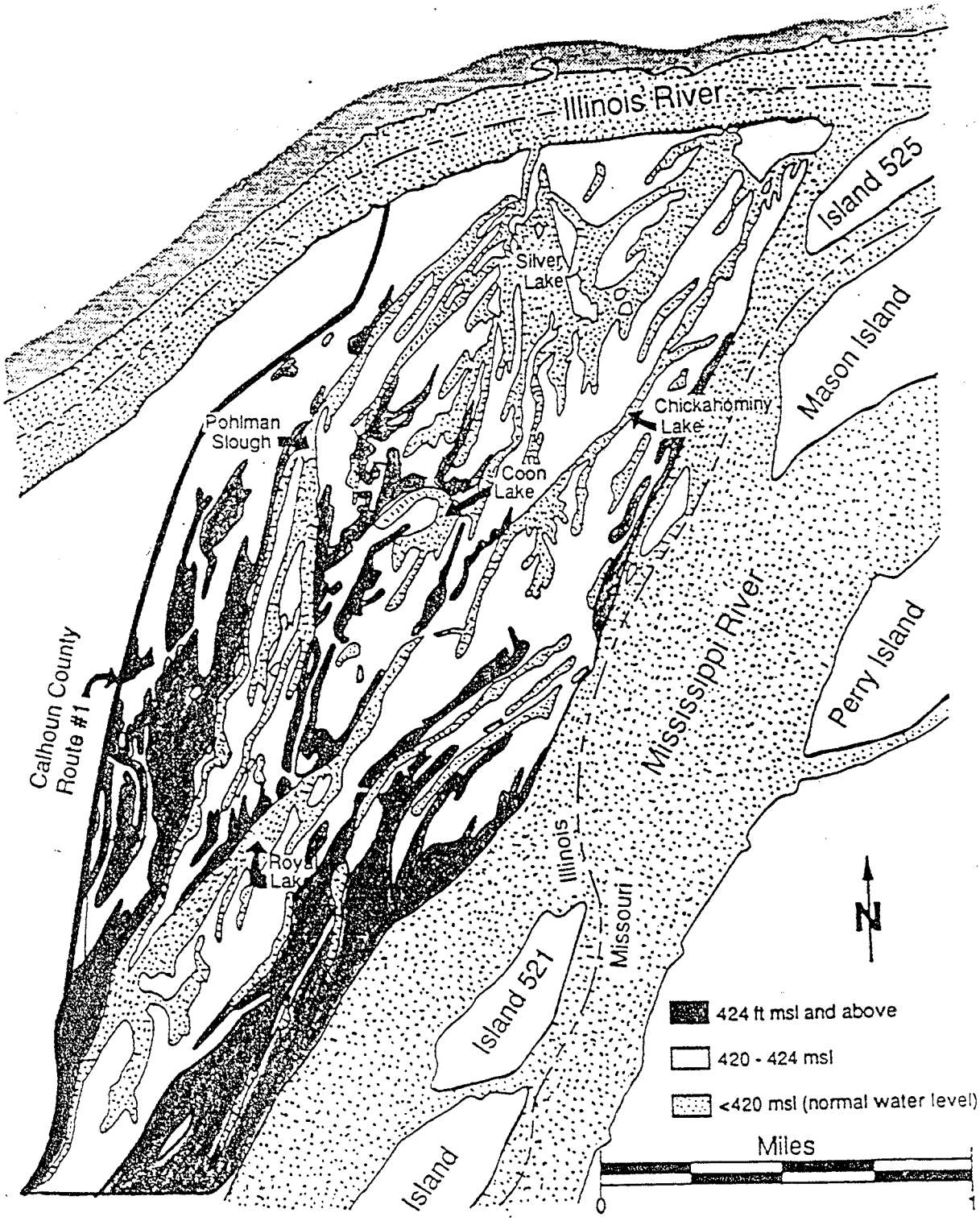


FIGURE 2.3. TOPOGRAPHY OF CALHOUN POINT

TABLE 2.2

RIVER STAGE AT GRAFTON VS PERCENT RIVER SEDIMENT INPUT
(Mississippi River Mile 218.0)

Elevation (NGVD) (a)	Percent Time at or Above (b)	No. Flood Days Per Year (c) [365 x (b)] / 100	Percent River Sediment (d) [(c) x 100] / 51
430	0.6	2	4
429	0.9	3	6
428	1.3	5	10
427	1.7	6	12
426	2.6	10	20
425	3.5	13	25
424	4.7	17	33
423	5.9	22	43
422	7.7	28	55
421	9.8	36	71
420	14.0	51	100
419	61.7	225	
418	100.0	365	

1/ A water surface elevation at or above 420 NGVD is assumed to start sediment input into site, and it is assumes no active control of water levels into the area during the spring. Thus, 51 flooding days per year at or above elevation 420 NGVD delivers a 100 percent maximal sediment load to the Calhoun Point site.

often, for longer time periods, and deposits perhaps 60-70 percent of the silt load on Calhoun Point. Because the area is at the hinge point of the navigation pool, it is a depositional area and receives very little scouring from the Mississippi River. The silt problem, along with recent droughts, has caused aggradation and loss of several depressions or sloughs. 26

TABLE 2.3 provides an estimation of the changes in sedimentation rate and water depth at Calhoun Point over the period 1900-2045. During the pre-impoundment period (1903-1940), the river's natural backwater creation/extinction process was still operative. During this period the average rate of sedimentation in the open water areas was about 0.2 inches/year, and the average water depth was about 4.5 feet. In the post-impoundment phase between 1940 and the present, the navigation pool slackwater effect and increases in UMRS upland crop production, caused the sedimentation rate to increase to .5 inches/year. Average water depth during this period was about 4 feet. Between the present and the year 2045, the sedimentation rate in the absence of a project is anticipated to average about .3 inches/year with an average water depth of about one foot.

In TABLE 2.3 it has been assumed that the recent trend of increasing sedimentation rate, and the concomitant rapid decrease of water depth, has or will soon reach a peak. Accordingly, future changes in sedimentation should be primarily a function of changing water depth (i.e., with the sedimentation rate decreasing as water depth decreases). The interior lakes' existing projected life span is 90 years.

d. Water Quality. Currently, Calhoun Point open water areas have moderate water clarity. Because the Point's waters are shallow, its water temperatures are unstable. Winter water temperatures in Calhoun Point are estimated to vary greatly from about 0 to 10° C (Sheehan et al., 1990). Dissolved oxygen levels in the interior waters are low, since water depths are shallow and water temperatures are high during the summer. Unstable temperatures and low dissolved oxygen levels are expected to continue to be a problem in the future without a project.

e. Air Quality. There are no major sources of pollutant emissions in the vicinity of the project area. Most of the air pollutants in the area consist of suspended particles from agricultural activities and navigation operations. Calhoun County is not included in any nonattainment area in Illinois that does not meet Federal and state air quality standards (IEPA, 1994). The existing air quality conditions are expected to continue into the future, if the project is not implemented.

f. Noise. The major sources of noise in the project area result from the diesel power plants of tows passing along the Illinois and Mississippi Rivers, and from occasional motorboats on the interior lakes. No significant changes in noise levels are expected in a future without a project.

g. Prime Farmland. The project area includes 269 acres of agricultural fields that are row cropped annually. Some of this area is considered prime farmland.

h. Terrestrial and Aquatic Habitats. The principal habitats within the project area are bottomland forest, open-water and emergent wetlands, and cropland. TABLE J-9 in APPENDIX DPR-J presents the area of each habitat type for existing and future-without conditions.

(1) Bottomland forest. Over 60 percent of the project area consists of bottomland forest (1,379 acres). This habitat type corresponds with the palustrine broad-leaved deciduous forest of Cowardin et al. (1979). For purposes of the project, bottomland forest was subdivided into three types: "low" bottomland forest, "high" bottomland forest, and woody encroachment. Woody encroachment (229 acres) occurs at the transition from aquatic to terrestrial habitat, and consists of trees such as willow and

27

TABLE 2.3

ESTIMATED PRESENT AND FUTURE
SEDIMENTATION RATE AND WATER DEPTH CHANGES
(1900 - 2045)

Period	Average Water Depth (Inches) 1/	Average Sedimentation Rate (Inches/Year)
Pre-Impoundment (1900 - 1940)	54	.2
Past Post-Impoundment (1940 - 1995)	46	.5
Future Post-Impoundment (1995 - 2045)	11	.3

1/ All water depths are relative to a water surface elevation of 419.5 NGVD.

silver maple that have become established on recently deposited sediment. "Low" bottomland forest (920 acres) occupies elevations from about 420 to 424 feet NGVD, and consists mainly of soft mast species such as silver maple, green ash, box elder, elm, and hackberry. Elevations above 424 feet NGVD support "high" bottomland forest (230 acres), which consists mainly of hard mast species like pin oak, bur oak, and pecan. Cottonwood, sycamore, and persimmon are also relatively common within "low" and "high" forest. In terms of waterfowl, bottomland forest is used mainly by wood ducks for nesting and feeding. 28

Logging on Calhoun Point has not occurred since the area was acquired by the Federal government in the 1930's. Forest statistics from 1817 and 1992 are available for dominant and minor tree species within Calhoun Point and vicinity (see APPENDIX DPR-Q). Prior to the flood of 1993, about 15 to 20 percent of bottomland forest consisted of hard mast species, mainly pin oak. The flood of 1993, which inundated the entire project area for much of the growing season, has impacted the forest resource, but no inventory has been conducted to quantitatively assess these impacts. At Grafton, when the flood crested at a point 22.4 feet above normal pool (442 feet NGVD), the forest at Calhoun Point was in water from 12 to 22 feet deep.

It appears that overall tree mortality is about 40 to 50 percent, but it varies within the project area. Mortality appears to be highest at the lowest elevations surrounding the interior lakes, but it is also high on some of the interior ridges. All species have been affected to one degree or another, but hackberry, box elder, elm, and pin oak appear to have experienced the highest mortality. Most of the forest floor is now blanketed with a thick cover of silver maple seedlings. The effects of the flood of 1993 have not been fully manifested yet, as numerous trees are in the process of dying even though they leafed out in 1994 and 1995. A couple more years will need to pass before the full effects are evident.

Tree species diversity has declined because of the 1993 flood. With 40 to 50 percent of the forest now dead, it is estimated that at least one hundred years will pass before the forest grows back to a form similar to that which existed prior to the flood of 1993. In the interim, tree species diversity is expected to continue to decline without any project. Silver maple is expected to become much more common than it is already. It is expected that hard mast or heavy-seeded species will take longer to recover than light-seeded or soft mast species. Vines are expected to overgrow areas open to sunlight and suppress the growth of any seedlings colonizing these areas. It is estimated that about 40 years will pass before this blanket of vines disappears and is replaced by new trees. Meanwhile, the value of the forest as a resource to wildlife will diminish significantly without a project.

(2) Open-water wetland. The interior lakes include 242 acres of open-water wetland. Water depths range from about one to four feet, with an average depth of about two feet. This habitat type consists mainly of shallow open water with an unconsolidated bottom (limnetic subsystem), and some lacustrine wetland with aquatic bed (littoral subsystem) (Cowardin et al., 1979). Establishment or maintenance of rooted submergent vegetation in open-water wetlands is often prevented by a combination of high turbidity and a soft lake bottom. All kinds of waterfowl may use open-water wetland as sanctuary or resting habitat, and fish-eating diving ducks may use these areas for feeding, as well as those that eat invertebrates. TABLE 2.4 indicates that the pool surrounding Calhoun Point (pool 26 on the Mississippi River, the Alton pool on the Illinois River) has proportionally far less off-channel open water habitat than in other reaches of either river.

Without a project, it was assumed that over the next 50 years, or about one-third of the open-water wetland would fill in with sediment and change to woody encroachment, with 157 acres remaining (TABLE J-9 in APPENDIX DPR-J).

(3) Emergent wetland. The interior lakes also consist of

TABLE 2.4

29 COMPARISON OF OFF-CHANNEL OPEN WATER HABITAT
IN THE ILLINOIS AND UPPER MISSISSIPPI RIVER VALLEYS BY POOL 1/

Pool	Total River Miles	Deepwater Habitat 1/ Acres 2/	Deepwater Habitat 1/ Acres Per River Mile
Illinois River			
Alton	80	4,496	56
LaGrange	80	16,185	202
Peoria	70	16,339	233
Starved Rock	15	1,505	100
Marseilles	25	2,586	103
Upper Mississippi River			
Pools 2-10	233	105,737	454
11-13	92	40,389	439
14-19	159	43,538	274
20-25	122	16,558	136
26	40	5,098	128

1/ Off-channel water is here defined as including side channel, river lakes and ponds, and sloughs

2/ Data sources = Illinois River habitat acres from Illinois Natural History Survey (1985, based on interpretation of aerial photography taken in 1978-1980; Miss. River acres from CE (1977) and CE (1988).

emergent wetland (183 acres), or palustrine emergent wetland (Cowardin et al., 1979). This habitat type is shallower than open-water wetland, and supports rooted plants that extend above the water's surface. This vegetation is often used by dabbling ducks. This habitat type generally corresponds with the moist soil units created and managed by IDNR for the production of natural vegetation for wildlife. Water levels in these moist soil units are manipulated to encourage vegetation development, with the units subsequently flooded in the fall to make the food available to waterfowl. 30

Fifty years in the future without any project, it was assumed that sedimentation would cause one-third of the emergent wetland to become converted to woody encroachment, with 128 acres remaining (TABLE J-9 in APPENDIX DPR-J).

(4) Cropland. Agricultural fields comprise 269 acres of the project area. Management for snow geese and ducks occurs on 74 acres of cropland owned by the USFWS. Soybeans, winter wheat, and corn are planted under annual cooperative farming agreements with the Service. In exchange for the soybean harvest, the "leasee" plants wheat and corn solely as food for waterfowl and other wildlife. The IDNR manages a 123-acre tract of cropland called the "goose field" for Canada geese. IDNR floods about 9 acres of this area with shallow water each fall to attract migrating geese. The USFWS does not currently impound shallow water within its goose management area. Management for wildlife in general occurs on 72 acres of cropland in eight separate tracts.

In 50 years without any project, it was assumed, for habitat analysis purposes, that cropland acreage and management practices would remain the same (TABLE J-9 in APPENDIX DPR-J).

(5) Other habitat. A fifth but minor type of habitat exists within the project area - old oxbow and meander scar habitat (41 acres). It consists of isolated depressions within the bottomland forest that represent remnants of old channels or sloughs. Water often ponds within these depressions, and little or no woody vegetation grows on the bottom. By summertime, some of these depressions are usually dry, but some retain standing water year-round.

Fifty years from now without any project, it was assumed that the quantity of this habitat type would increase by 13 acres to 54 acres, due to sedimentation of Squaw Slough, and conversion of this area from open water wetland to old oxbow and meander scar habitat (TABLE J-9 in APPENDIX DPR-J).

i. Waterfowl.

(1) General. The Calhoun Point area is part of the Mississippi flyway, a major flight corridor for millions of migrating waterfowl. Calhoun Point, in combination with nearby locations such as Stump Lake, Swan Lake and Batchtown, forms an important link in a chain of waterfowl areas, extending from the northern breeding grounds to the Gulf Coast. At Calhoun, migrating waterfowl find food, water and rest areas necessary for survival.

Although no waterfowl census data are available for Calhoun Point, data from 1967-1989 are available for Stump and Swan Lakes, just upriver from Calhoun Point on either side of the Illinois River (see APPENDIX DPR-Q). Twenty species of waterfowl, consisting of dabbling ducks (8 species), diving ducks (7 species), mergansers (3 species), and geese (2 species), are known to use these two areas. Dabbling ducks are most common at both areas.

At Stump Lake, where moist-soil management predominates, dabblers make up 96 percent of fall-migrating waterfowl, divers 1 percent, and geese 3 percent. The most common dabbling ducks are wigeon (32 percent), mallard (31 percent), green-winged teal (10 percent), and gadwall (6 percent). At Swan Lake, most

of which is open to the river and not actively managed for waterfowl, dabblers represent 81 percent, divers 8 percent, and geese 11 percent. The most common dabblers are mallard (58 percent), wigeon (9 percent), and pintail (6 percent). At Calhoun Point, waterfowl use most likely resembles that of Stump Lake.

Surveys of North American duck populations since the mid-1950s show long-term trends. Populations levels were high in the mid to late 1950s, fell dramatically by the early 1960s, rose back up to mid 1950 levels by 1970, declined to 1960s levels in the late 1980s, and are on the rise since 1990 (USFWS and CWS, 1994). On a more regional scale, a report on the management and status of waterfowl in Illinois by Havera (1985) is the most comprehensive and relatively recent work on waterfowl and their habitats in the lower Illinois River. That report, based on aerial waterfowl surveys between 1948 and 1985, documents declines for a number of duck species, including mallards, scaup, and canvasback Contributory to this decline has been the degradation of wetlands by sedimentation and water pollution. This degradation has affected the abundance of aquatic plants, and other natural waterfowl foods such as fingernail clams (Sphaeriidae) (Mills et al., 1966; Bellrose et al., 1979; Sparks, 1984; Havera, 1985). Unfortunately, Calhoun Point is a graphic example of the ongoing loss of waterfowl habitat due to sedimentation. By the year 2045, the lake will have lost one-third of its existing habitat acres.

Calhoun Point lies within a region designated as an area of major concern by North American Waterfowl Management Plan (NAWMP). The aim of the NAWMP is to ensure the preservation of enough high quality waterfowl habitat to sustain nationwide waterfowl populations at levels for a fall flight of more than 100 million ducks (i.e., the 1970 level). For the mallard duck, the goal is to return to 1970-1979 population levels (or approximately 15 million birds in the fall flight). With regard to migration habitat, the Corps is in a unique position to contribute to this goal. Corps owned river lands within the St. Louis District (such as Calhoun Point) provide some of the best, and in many cases, the only opportunities for waterfowl. The USFWS, IDNR, the Corps and others, recognizing this, are working in partnership to improve the site's habitat conditions for waterfowl.

(2) Wood Ducks. Three types of habitat are necessary for successful wood duck production. Pre-breeding habitat, which generally consists of shallowly flooded (<18 inches of water) scrub-shrub or timber, is required in late February and early March for courtship and pair formation. Egg laying and nesting requires suitable nesting cavities and an adequate food source. Nesting cavities are usually provided by mature bottomland timber (e.g., cottonwood, silver maple, sycamore). During egg laying and nesting, females require substantial protein, which is best provided by invertebrates produced in flooded leaf litter. Leaves of oak and maple are most productive in this regard, but leaf litter from other species can also provide the necessary substrate for invertebrates. Brood habitat consists of shallowly flooded areas with emergent cover to provide protection from predators. Various aquatic plants and invertebrates produced on aquatic vegetation are important in the diet of young wood ducks.

Active management for wood ducks at Calhoun Point consists largely of a nest box program (60-70 boxes). However, utilization of these boxes is low, probably perhaps because natural cavities are present in sufficient numbers. While no brood surveys have been conducted on the point, some banding has been done, and agency biologists believe that the breeding population is good, indicating that Calhoun Point does provide habitats valuable to wood ducks. The greatest use is thought to occur around the southwestern end of Chickahominy Lake.

(3) Dabbling Ducks. Greatest use of Calhoun Point and other wetlands in the vicinity by dabbling ducks occurs during fall and early winter. The most common species during this period are wood ducks, mallards, teal, gadwall, and widgeon, with various combinations of species present at

various times. Wood ducks, for example, usually migrate out of the area by mid-November. The primary habitat requirements of dabbling ducks during fall and early winter are food and shallow-water areas that provide sanctuary. Seeds of flooded annual plants and invertebrates produced in flooded vegetation and litter are the most important dietary items. Diversity of dabbling duck species in any year depends on food production and water levels. 32

Depending on water conditions (i.e., amount and timing of flooding, ice), dabbling ducks also use Calhoun Point in late winter and early spring. In general, waterfowl require high-energy foods (e.g. mast, waste grains such as corn) during colder weather and high-protein foods (e.g., invertebrates) in spring as they migrate and prepare for nesting. During the spring migration, however, more extensive natural flooding usually makes food more readily available than in the fall, and the importance of producing these foods on a management area such as Calhoun Point must be evaluated in the context of their availability on surrounding lands.

At Calhoun Point, most foods for fall and early winter are produced through moist-soil management. Silver Lake, Chickahominy Lake, and sometimes Royal Lake are dewatered by pumping as early as river levels allow in the spring or summer (usually late June and early July). Pumping is required because lake and river levels tend to equilibrate, and at normal river stage (about 419.5 NGVD) there is very little exposed shoreline around the lakes. Native annual seed-producing plants are allowed to germinate and grow on the exposed lake bottoms. If drawdown occurs too late for native vegetation to produce a good seed crop by fall, Japanese millet, which will produce a seed crop in about 60 days, is aerially seeded on the lake bottoms. In fall, lakes are refilled by seepage and pumping, usually to about 14-18 inches above river level, to allow access by hunters and to make food resources available to migrating waterfowl.

There is presently no green-tree reservoir management (i.e., intentional flooding of bottomland forest during the nongrowing season) at Calhoun Point. However, natural spring flooding of bottomland timber occurs regularly in the spring, and waterfowl use is highest when natural flooding coincides with the spring migration. Natural flooding also makes some waste grain in the agricultural fields available to migrating ducks.

(4) Diving Ducks. Calhoun Point was probably never an important area for diving ducks. Some submerged aquatic vegetation, which is a major food source for diving ducks, was present historically. However, floods in the early 1970's eliminated submerged aquatics from the point. Small stands were noted in the late 1980's, but periodic flooding and sediment deposition have prevented their permanent reestablishment. These problems, combined with the fact that Swan Lake (located just to the northwest of the point) is being enhanced and managed for diving ducks, has led agency biologists to conclude that diving ducks should not be a prime consideration at Calhoun Point, although some incidental use will likely continue.

(5) Canada Geese. The habitat requirements of Canada geese in fall and early winter are similar to those of dabbling ducks, with the exception that geese will also make extensive use of green browse. Thus, geese undoubtedly benefit from moist-soil management for dabbling ducks. Specific management for geese is focused on the large agricultural area known locally as the Goose Field (FIGURE 2.1). This area provides sheet water in the swales and food in the form of residual crops. Some thought has recently been given to enhancing the ability to retain sheet water in the swales by installing water control structures. Some goose production also occurs on the point, but an early hunting season has hampered efforts to establish a resident flock of Giant Canada geese by subjecting local birds to harvest.

j. Fish. In their natural state, areas such as Calhoun Point provide a variety of resources for both riverine and resident fishes. Primary among these are spring spawning habitat and over-wintering habitat for both young-

of-the-year and adult fish.

For spawning, many fish species prefer quiet backwaters that are accessible from a river. Substrate is also a consideration; some species prefer submerged aquatic vegetation, whereas others require firm sand or gravel. The flooded forest floor can also provide important spawning habitat for some species. In the future, if a project is not constructed, it is expected that sedimentation will continue to reduce the usefulness of the area as a spawning and nursery area.

Quiet backwaters also provide important over-wintering habitat, because they offer shelter from the current and perhaps because water temperatures are somewhat higher than in the main channel. To escape the cooler temperatures of winter and flowing conditions, river fishes often take refuge in backwater areas. Such habitats lack water currents and, if of sufficient depth, can maintain temperatures in excess of 5° C (Sheehan et al. 1990). However, Sheehan et al. (1990: 22) suggest that a backwater must be deep enough to resist both complete freezing, as well as oxygen depletion. The configuration of backwaters should also be such that they are not frequently inundated by the colder river waters during high water periods. In addition, they recommend that backwater areas provide a diversity of habitats (above 0° C) in order to optimally benefit over wintering fish, especially small juveniles. Although shallow and cold, backwaters in the lower Illinois River are still heavily used by river fishes during winter when compared with sites further up river (based on collections by Sheehan et al., 1990). Sheehan et al. (1990: 20) attributed the intense use as a result of the paucity of deeper backwater areas in the area of the Illinois and Mississippi Rivers' confluence.

Fish are thought to be adapted to respond to declining water temperatures and rising water levels as cues for fall movement into backwaters. While the exact timing of this movement is unknown, it is thought to occur in November and December. However, river levels at Calhoun Point are typically low during this time period. It is thus critical that backwaters be open to the river if they are to provide over-wintering habitat for riverine fish. Information being collected at Swan Lake may help to identify more precisely the time when movement occurs. In the backwaters, variable water depths ranging up to at least 9 feet are desirable. Cover (e.g. fallen trees) is also required, but can often be provided artificially (e.g., with brush piles). Because the lake is shallow, the water temperatures are unstable and often extreme, very cold in the winter and warm in the summer, further risking the survival of both resident and river fish using the backwater.

Fishery management at Calhoun Point is limited. Management consists primarily of trying to retain water in Pohlman Slough throughout the year. A water control structure between the slough and Royal Lake ensures that the slough is not affected by drawdowns for moist-soil management. In addition, pumping to refill moist-soil management areas is done from the Mississippi River, rather than from Pohlman Slough. Restocking of fish in water bodies on Calhoun Point occurs through frequent, natural flooding of the rivers.

Increased sedimentation and water turbidity, combined with the disappearance of benthic diversity and aquatic vegetation, have greatly reduced the importance of the Illinois River as a sport and commercial fishery (Havera and Bellrose, 1985). Aggradation has reduced the size and number of off-channel water habitat areas (such as those at Calhoun Point) available to fish for spawning and rearing. Without any project, it was assumed that 35 percent of open water and emergent wetlands within Calhoun Point would be converted from aquatic habitat to woody encroachment by sedimentation (APPENDIX DPR-J).

k. Other Biota. Calhoun Point is an integral component of the river ecosystem, providing environmental conditions affecting the productivity and diversity of a wide spectrum of biota. In addition to waterfowl, other migratory birds using the area include herons, egrets, bitterns, and rails.

Many species of songbirds use the extensive forest, brush and edge habitats. Neotropical migratory land birds nesting in bottomland forest at Calhoun Point probably include 10 to 15 species, based on known nesting species at Stump Lake, about 5 miles northwest of the project area (IDNR, 1986; Wuestenfeld, 1991). The northern parula warbler and prothonotary warbler, which need relatively large tracts of bottomland forest for breeding, apparently nest at Calhoun Point. Many other animals, including fish, amphibians, reptiles and mammals also utilize the area. A heron rookery is found on the small island located just off the tip of Calhoun Point. 34

A number of Federal- or State-listed threatened species are known or suspected to use Calhoun Point. Salt meadow grass, a State-listed species, is found in the vicinity of Royal Landing. The western sand darter, double-crested cormorant, black-crowned night heron, red shouldered hawk, northern harrier, osprey, river otter, and bobcat either use the area now or were present historically. A discussion of Federally endangered species is described in Appendix DPR-I of this report.

It is a goal of the USFWS, the Corps, and the state, to protect, improve, and manage the river environments for a diversity of fish and wildlife species for the continued enjoyment and benefit of the public.

l. Historic Properties. The cultural history of the land surrounding the confluence of the Illinois and Mississippi Rivers is long and complex, spanning at least 11,000 years. Archaeological investigations conducted by IDNR (Tankersley, 1991), and the U.S. Army Corps of Engineers (Lopinot, 1992), identified a total of 5 archaeological sites within the proposed project area.

A significant portion of the project area was not surveyed for the presence of archaeological remains following an inspection of mid-nineteenth century U.S. government channel maps and early nineteenth century General Land Office survey records. This analysis suggested that only the "Goose Field" and "Marshall Landing" proposed borrow site portions of the project area were stable land masses prior to the late nineteenth/early twentieth centuries. The balance of the project area consisted of shallow marsh and wetland areas, at or near the elevation of the river channels. Historically, such areas have not been suitable for long-term human occupation.

Agricultural practices of the twentieth century have resulted in the deposition of up to one meter of sediment on these low-lying areas. Recent archaeological investigations at the Mortland Island and Napoleon Hollow sites on the lower Illinois River have documented such twentieth century sedimentation rates. Any nineteenth century (or earlier) land surfaces located within such low-lying areas are presently buried more than one meter below the present-day ground surface. Given the depth of recent sediment, and the low probability of occupation within such contexts, these areas were not surveyed for the presence of archaeological remains.

m. Recreation. Recreation is an important part of IDNR's management program at Calhoun Point, with waterfowl hunting as the dominant aspect. Despite the degraded nature of the fishery habitat, considerable recreational fishing also occurs, especially in spring. In addition, the entire area managed by the Department is open to hunting for upland game (e.g., deer, turkey, doves, other small game).

Duck hunting occurs from 40-50 blind sites allocated by the Department on a 3-year rotating basis. Participants are selected from a pool of applicants by random drawing. In the fall, the Department attempts to ensure that water is deep enough to allow boat access for blind construction and hunting. Hunting is prohibited from the blinds after 3:30 p.m. each day; the lakes thus also provide some sanctuary for ducks. In addition, there are three pit blinds for goose hunting near the Goose Field. This is viewed as an important recreational opportunity, because the goose season is currently 70 days in length, whereas the duck season is only 30 days. Some incidental harvest of

geese also occurs from the duck blinds.

Management for fishing opportunity consists largely of providing access for fishermen. Boat ramps at Royal Landing, Silver Lake, Pohlman Slough, and Royal Lake provide access both to the rivers and to the interior of the point. Other facilities (e.g. parking lots, toilets) are associated with these ramps. In addition, some mowing is done to provide access for bank fishermen.

n. Aesthetics. The aesthetics of Calhoun Point could be considered typical of riparian forest/backwater areas along the lower Illinois River. If no project is built, the size and quality of the backwater habitat will continue to decline at a rapid rate, due to sedimentation. Thus, the aesthetic value associated with the presence of a mix of forest and water areas will also decline. The flood of 1993 has killed 40 to 50 percent of the trees within the project area. Numerous forest clearings of various sizes are now in the process of being created as dead trees fall over.

o. Economic and Social Resources. The project area is located in rural Calhoun County, about 10 miles northwest by air from the fringe of the St. Louis metropolitan area, or about 25 miles by air from downtown St. Louis. The closest town is Grafton, Illinois (population 918 in 1990 census), about two miles downriver at the mouth of the Illinois River. In Calhoun County, agriculture is the dominant industry (SCS, 1989), with the principal crops being corn, soybeans, wheat, and apple and peach orchards. Livestock production centers on hogs and cattle. There were a number of cabin lease sites within the project area. Twenty-three cabin leases [13 inactive leases, 10 active leases (3 with cabins and 7 without cabins)] are located on private lands tract C-19A. This 23 acre tract is located along the bank of the Illinois River (near Brussels Ferry crossing) and Pohlman Slough. Tract C-19A has three landowners. Seven cabin leases are on Federal lands adjacent to the Illinois River shoreline near the Brussels Ferry crossing. Eighty-six cabin leases are on federal lands in the vicinity of Pohlman Slough. Many of the project area's cabins were destroyed by the Flood of 1993.

3. RESOURCE PROBLEMS AND OPPORTUNITIES.

Management options and habitat conditions at Calhoun Point are constrained by the Mississippi and Illinois Rivers. Specific river influences include the rise in average water level due to Mississippi River navigation pool impoundment, frequent over-bank flooding, and sedimentation. 36

a. Water Levels. Construction and operation of the Pool 26 Locks and Dam caused the inundation of approximately 600 acres of Calhoun Point, and raised the average summer water level about 3 feet. Effects of increased water levels on forested wetland varied by tree species and duration of flooding (Yeager, 1949). In permanently flooded timber, water depths sufficient to cover the root collar resulted in complete tree mortality after 8 years. Mortality rate varied by species, with pin oak most susceptible to flooding and white ash most resistant. After 8 years of flooding, much of the dead timber had fallen, and conversion to cattail marsh had begun. In areas where the water table was raised to the ground surface, harmful effects were clearly discernible but mortality was less severe. Higher water levels precluded reproduction by many forest species, and resulted in relatively monotypic, dense stands of silver maple. On land above the water table, only pin oak showed significant mortality. These changes in tree species composition have greatly reduced bottomland forest diversity and reduced the production of mast (e.g., acorns) used by nesting wood ducks and wintering dabbling ducks.

The increase in water level has also affected the ability to produce moist-soil plants for migrating dabbling ducks around the periphery of existing lakes. At normal river stage (i.e. 419.5 feet NGVD), there is very little exposed margin around the lakes. The lakes must therefore be dewatered using pumps to expose a large enough area for moist-soil production. Because the lakes are typically below river stage, water tends to seep back in during the summer and refill lakes in 30 to 60 days. In very wet years, lakes cannot be dewatered until late and the remaining growing season is too short for development of most native moist-soil plants. In such cases, Japanese millet is aerially seeded because it produces a consistent seed crop and reaches sufficient height to prevent overtopping by fall flooding. In the fall, water is typically pumped into the lakes to flood moist-soil plants. It is difficult, however, to maintain flooding throughout the fall because river levels are generally below lake levels and water percolates out of the lakes in 10-20 days.

b. Flooding. Floods, particularly those occurring in summer (i.e. June 15 to September 15), impact resources used by a variety of wildlife species. Floods as short as a few days can kill some moist-soil vegetation if the plants are overtopped. Floods can destroy agricultural crops used by geese, dabbling ducks, and other wildlife. Prolonged floods can kill newly established tree seedlings and very severe floods, such as the 1993 flood, can cause significant mortality among mature trees as well.

c. Sedimentation. Silt deposited in lakes inhibits the reestablishment of submerged aquatic vegetation and allows the encroachment of woody vegetation, which reduces the capability to produce moist-soil plants for dabbling ducks. The siltation problem, along with recent droughts, has caused aggradation and loss of several depressions or sloughs that previously provided wood duck brood habitat. In other forested areas, silt deposits are preventing successful establishment of mast-producing trees. Over time, repeated sediment deposition can kill large trees such as those used by bald eagles for perching and loafing. Silt deposition also eliminates the firm substrates and clear water required by spawning sunfishes and contributes to the isolation of backwaters, thus limiting fish movement from the backwaters to and from the rivers. Fish movement has also been restricted by water control structures.

An opportunity exists to construct measures which could substantially restore the biological resources of the Calhoun Point project area.

4. PROJECT GOALS/OBJECTIVES.

37 To guide the planning effort, study goals and objectives were developed by the interagency study team as shown in TABLE 4.1. The table also shows the relationship of the various management units to the identified goals/objectives. FIGURE 4.1 shows the location of the management units. The NERC documentation provided much of the information needed for this effort.

5. ALTERNATIVES.

The approach to the formulation and evaluation of the project alternatives was as follows. First, general evaluation criteria were established. Second, various measures were identified to address the project's goals and objectives. Third, these measures were evaluated for their overall viability. Fourth, a habitat restoration plan was developed as a composite of the more viable alternative measures, and fifth, the resulting plans along with the no action plan were evaluated against the rating criteria.

a. Criteria. The four general criteria used in formulating and evaluating the project measures and plans were as follows:

(1) **Completeness.** The extent to which an alternative addresses all of the stated project objectives.

(2) **Effectiveness.** The extent to which an alternative alleviates the specified problems and achieves the specified opportunities.

(3) **Efficiency.** The extent to which an alternative is the most cost effective means of alleviating the specified problems and realizing the specified opportunities.

(4) **Acceptability.** The workability and viability of the alternative plan with respect to acceptance by the sponsoring agencies, and compatibility with existing laws, regulations, and public policies.

b. Measures Available. Alternative measures identified to meet the planning goals/objectives are described in detail below. Many of these features were identified previously at the NERC workshop. A summary description of each measure, and the design requirements established for each, is provided by TABLE 5.1.

(1) No Action. This measure would consist of no Federal funds being provided to meet the project purposes.

(2) UMRS Watershed Erosion Control. This measure calls for a major reduction in uplands soil erosion within the UMRS watershed in order to achieve a reduction in sediments reaching UMRS backwaters, including those backwaters at Calhoun Point. NRCS has developed curves relating soil erosion rates to land use cover types. It is well known that farmland areas and stream and bed erosion are the source of much of the sediment delivered to the river system. This sediment is transported to the river during periods of heavy rainfall and heavy surface water runoff. Such periods correlate well with periods of river flooding. Major flooding in the St. Louis region generally occurs during the late spring and early summer time frame.

(3) Navigation Pool Water Level Manipulation. This measure calls for the Corps to modify its water level management procedures at Mel Price Locks and Dam. The change would be made to better accommodate fish and waterfowl habitat requirements within Pool 26, including the area of Calhoun Point.

(4) Regular Maintenance Dredging. This measure would consist of major backwater excavations as the sole means of restoring areas damaged by past sedimentation.

TABLE 4.1

PROJECT GOALS, OBJECTIVES, AND MEASURES

Goals	Objectives	Potential Restoration Measure(s)	Potentially Applicable Management Units						
			A	B	C	D	E	F	G
Restore wetlands habitat diversity lost due to sedimentation	Reduce sediment deposition to a level comparable to that which occurred prior to Pool 26 impoundment	Riversire Berm	X	X	X	X	X	X	X
		Regular Maintenance Dredging	X	X	X	X	X	X	X
		Selective Deepwater Dredging		X				X	
		Watershed Erosion Control (UMRS)	X	X	X	X	X	X	X
		Vegetative Filter Strips (Warm Season Grasses)	X						
		Navigation Pool Water Level Manipulation		X	X	X	X	X	X
		Meander Scar Improvements			X		X	X	
Restore spawning and over-wintering habitat for riverine fishes	Restore deepwater areas within site interior that were once used for fish overwintering, and reestablish interior lakes	Selective Deepwater Dredging		X				X	
		Exterior Water Control Structure (open-top with stop-logs)		X	X	X	X	X	X
		Sediment Deflection Vanes		X	X	X	X	X	X
		Riverside Dike/Berm (via tree tops placement)		X					

TABLE 4.1

Goals	Objectives	Potential Restoration Measure(s)	Potentially Applicable Management Units						
			A	B	C	D	E	F	G
Restore dabbling duck feeding habitat	Improve protection of moist-soil plant areas from river flooding during the growing season	Riverside Dike/Berm		X	X	X	X	X	X
	Expand acreage of moist-soil plant production area	Clearing Shoreline Woody Vegetation			X	X	X	X	X
		Dredge Material Disposal into Backwaters		X	X	X		X	x
	Provide independent water control between interior lakes and between lakes and the river	Interior Levees		X					
		Water Control Structures (Int. & Ext.)			X	X	X	X	X
		Pumps (Int. & Ext.)			X	X	X	X	X
		Selective Deepwater Dredging			X	X	X	X	X
	Reestablishment of mast-producing trees	Forest Management Plan (Mast Tree Plantings)		X	X	X	X	X	X
	Provide an invertebrate food source during spring migration period	Water Control Structure (Ext.)						X	

TABLE 4.1 (Ctd)

Goals	Objectives	Potential Restoration Measure(s)	Potentially Applicable Management Units						
			A	B	C	D	E	F	G
Restore wood duck brood rearing habitat	Prevent summer dry out conditions in slough area	Selective Deepwater Dredging, Pumping						X	
	Improve existing meander scars to provide additional breeding habitat opportunities	Meander Scar Improvements			X		X	X	
Restore habitat for Canada geese at goose field area	Improve ability to hold water to make available residual crops	Interior Levees	X						
		Pump (Int.)	X						
Restore forested wetlands habitat diversity for a broad spectrum of wildlife species	Increase mast-producing trees	Forest Management Plan (Mast Tree Plantings)	X	X	X	X	X	X	X
		Riverside Dike/Berm (Including brush piles placement)		X	X	X	X	X	X

A Goose Fields Unit

B Pohlman Slough Unit

C Royal Lake--South End Unit

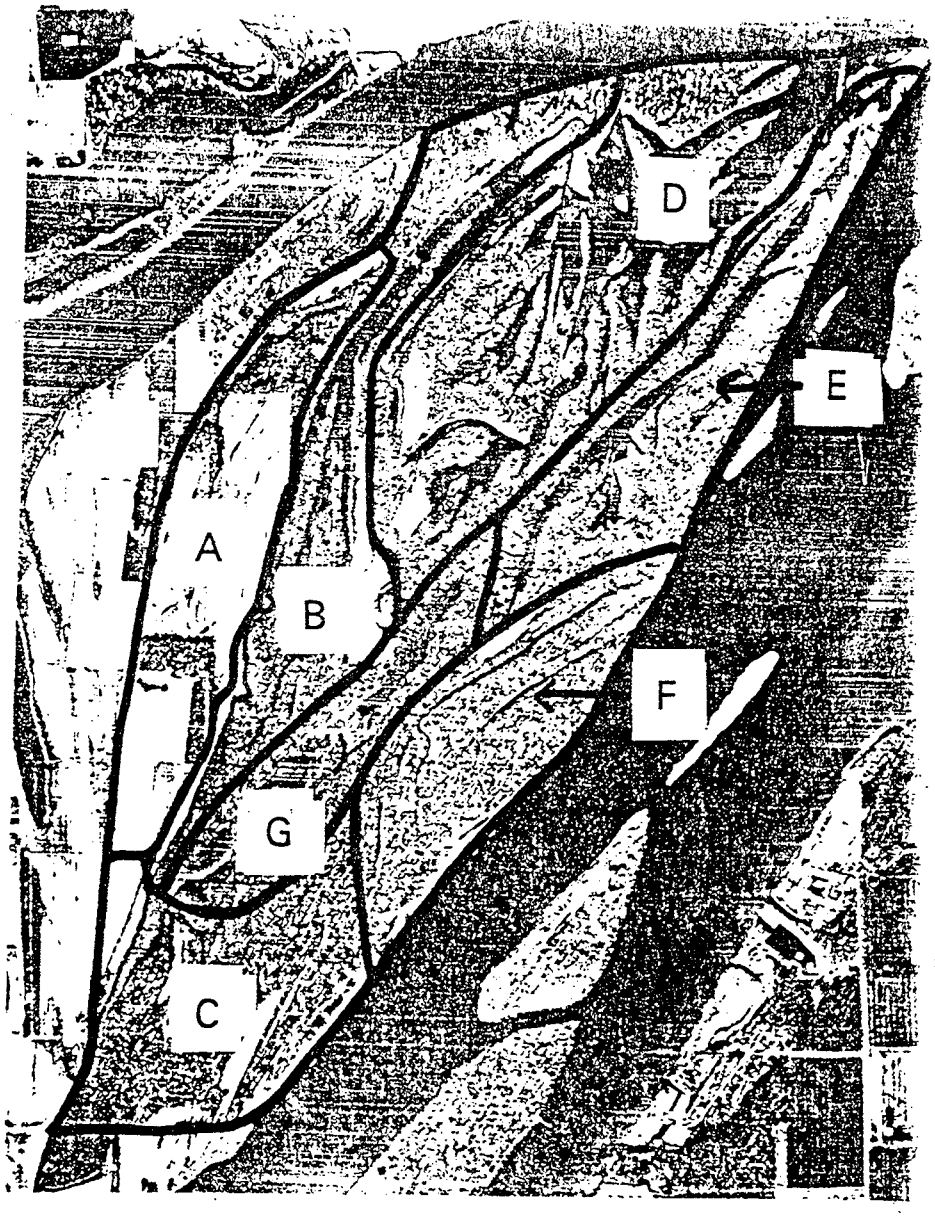
D Silver Lake Unit

E Chickahominy Lake Unit

F Squaw Island Unit

G Royal Lake--North End Unit

41



A Goose Fields Unit

B Pohlman Slough Unit

C Royal Lake--South End Unit

D Silver Lake Unit

E Chickahominy Lake Unit

F Squaw Island Unit

G Royal Lake --North End Unit

FIGURE 4.1. CALHOUN POINT--FUNCTIONAL MANAGEMENT UNITS

TABLE 5.1

DESCRIPTION AND DESIGN REQUIREMENTS FOR STUDY MEASURES

Design	Description	Design Requirements
1. No Action	No federal funds provided to meet project purposes	* Not applicable
2. UMRS Watershed Erosion Control	Major reduction in uplands soil erosion within UMRS watershed	* No specific design criteria have been developed
3. Navigation Pool Water Level Manipulation	Modification of water level management procedures at Mel Price Locks and Dam to benefit fish and wildlife	* No specific design criteria have been developed
4. Regular Maintenance Dredging	Periodic dredging during life of project	* Must maintain existing water depths of interior wetlands over the life of the project
5. Selective Deepwater Dredging	Deepening of existing shallow water areas to facilitate dewatering, improve access for management, and provide refuge for fish during drawdown.	* Must result in areas with water depths between 5' and 7' at normal pool. * Must use a cost-effective method of disposal (considering both the excavation and disposal of the material). * Must utilize procedures acceptable for meeting Clean Water Act requirements.
6. Vegetative Filter Strips	Placement of warm-season grasses as a buffer against sheet erosion effects in goose field wetlands area.	* No specific design criteria have been developed
7. Riverside Dike/Berm	Placement of a berm embankment as a physical barrier between the Illinois and Mississippi Rivers and the site's interior.	* Must substantially reduce (by about 70%), the amount of river sediment reaching backwaters. * Must protect moist-soil areas from flooding between 15 June and 15 September in 8 out of 10 years. * Must not result in increased flooding at Grafton. * Must not increase upstream flooding to a level unacceptable to IDOT. * Must not severely impact flood storage capacity. * Must have a berm crown sufficiently wide to accommodate one-way vehicle movement. * Must utilize unsalvageable cleared trees as habitat structures.

TABLE 5.1 (Ctd)

Design	Description	Design Requirements
7. Riverside Dike/Berm (Ctd)		* Must take borrow material from non-forested areas. * Must reduce influx of cold water to the site's interior during the winter and spring seasons. * Must minimize impacts to wintering bald eagles. * Must have stable berm slopes. * Must configure dike/berm borrow areas to function as post-construction wetlands units. * Must resist the potential for erosion and scour when berm is overtopped. * Must provide sufficient water intake capability during a major flood event to ensure that the site's interior can be backflooded to within 1-foot of the berm crown prior to the overtopping of unprotected sections of berm.
8. Meander Scars	Deepening of existing meander scars	* Must leave disposal material in a relatively stable condition (i.e. not likely to wash back into the meander scar. * Should be done in a manner that minimizes damage to adjacent habitat.
9. Water Control Structures	Placement of gates for maintaing specified water levels within individual management units, while also providing for fish passage at selected locations	* Gates must be sized to help ensure that lake water from a major interior storm event can be removed within 10 days time from moist-soil unit areas. * Unit must be open-topped in locations where fish passage is desired. * Gates must be easy to use and time efficient to operate.

TABLE 5.1 (Ctd)

Design	Description	Design Requirements
9. Water Control Structures (Ctd)		* Gates must have safeguards against vandalism. * Any culvert drains should be sized and placed to maximize flow capacity. * For maximum utility, drains must be capable of moving water bidirectionally. * Erosion protection must be provided at pipe entrance and exit. * Control structure design should be flexible enough to capture any future major shifts in state fish and wildlife management emphasis. * A means for determining need to adjust water levels must be provided.
10. Vanes	Placement of steel pilings to deflect sediment away from exterior water control structures, thus reducing need for maintenance dredging to keep control structures operational	* Must be a more cost-effective means of sediment control than that provided by using maintenance dredging alone. * Must be a stable structure under extreme flood conditions. * Must be engineeringly feasible, i.e. there must be sufficient flows to make the structures perform as desired.
11. Clearing Shoreline Woody Vegetation	Removal of invading woody species (willow/silver maple) from areas designated for moist-soil plant production	* Must be accomplished by using the most cost-effective and biologically sound method available.
12. Interior Berms	Placement of earthen embankment across topographical depressions at goose fields to better retain water and crop food availability in the fall.	* Must have stable berm slopes. * Must provide adequate drainage during crop growing season.
13. Pumps	Placement of pumps to assist in water level control when gravity drain flow capability is no longer feasible	* Pumps must be capable of raising and maintaining their respective management units at 1-foot over normal pool for up to 3 months during certain seasons. * Pumps must be able to cause a near complete drawdown of the unit for an extended period of time during any years designated for bottom consolidation.

TABLE 5.1 (Ctd)

Design	Description	Design Requirements
13. Pumps (Ctd)		* Pumps must be able to discharge a 2-year, 24-hour interior storm event within a 20-day time period. * Where feasible, fish screens should be incorporated into the project design.
14. Forest Management Plan	Entails planting of mast trees on dredge disposal areas, in crop field areas, and in forested areas.	* Plantings must occur at a sufficiently high elevation to ensure seedling survival. * Seedlings need to be cared for during early growth period (protected from wildlife damage, insects, disease and watered as necessary). * Must not remove any existing mast trees. * Must minimize the removal of trees of potential use to Federally endangered wildlife species (i.e. bald eagle perch trees, Indiana bat maternity trees). * Confine and raise dredge material to an elevation that will help ensure mast tree seedling survival. * Disposal areas must meet Clean Water Act requirements. * Includes more than one strategy to tree planting.
15. Dredged Material Disposal Into Selected Backwaters	Reduce depth of certain interior lake areas to better optimize available moist-soil plant production area.	* Must result in areas with water depths ranging from 0.5' to 1.5' deep when fall innundated. * Must use procedures acceptable for meeting Clean Water Act requirements.
16. Farmlands Dedication to Wetlands	Removal of existing lands from crop production to serve as wetlands	* No design criteria developed.

(5) Riverside Berm. This measure would consist of a low profile embankment structure to reduce the movement of flood waters and sediments from the river to the site's interior. Such a structure would still be over-topped on occassion; however, silt deposition would be greatly reduced, since (1) most of the sediment load is carried in the lower portion of the water column, and (2) the bulk of the sediment enters Calhoun Point during the more frequent lower elevation flood events. Most of the plant damaging floods occur during the summer season and are at relatively low flood stages. 46

(6) Selective Deepwater Dredging. This measure would consist of limited deepwater dredging at selected locations at Calhoun Point. This measure would be used in combination with the berm feature.

(7) Vegetative Filter Strips. This measure would reduce sheet erosion in the area surrounding the goose fields. These erosion buffers would consist of strips of warm-season grasses.

(8) Meander Scar Improvements. This measure entails the excavation of the small meander scar areas located north and south of Squaw Island. The deepened areas would serve as brood habitat for wood ducks, while the spoil deposits would provide elevated drier sites for the placement of mast-producing trees. Optionally, these areas could be connected via ditches to Squaw Island slough and thereby be placed under the same water control regieme as the slough.

(9) Water Control Structures. This measure involves the placement of gate and pump structures to help maintain desired water levels within the project area. In additon, stop-log structures would be included at riverside berm gate locations where fish access between the river and interior backwaters is considered critical. Water levels would be monitored with staff gauges located riverside and lakeside of each water control unit.

(10) Sediment Deflection Vanes. These structures would be placed riverside and immediately upstream of selected exterior water control structures. The intent of the vanes would be to create small eddies sufficient to reduce sediment accumulation at the water control structures, and thereby reduce maintenance dredging costs.

(11) Clearing Shoreline Woody Vegetation. This measure would entail the selective removal of woody vegetation from low lying areas within certain management units. This vegetation removal would further expand moist-soil plant production areas for waterfowl. The emphasis on clearing would be in areas of less desirable woody vegetation (primarily willows, and younger-aged silver maples and cottonwoods). Woody vegetation control could be accomplished by mechanical or chemical methods.

(12) Interior Levees. This measure entails the placement of small earthen embankment structures across swales at the goose field site. This feature would serve to hold water (sheet water and/or pumped water) during a fall-flooded condition.

(13) Pumps. Pumps would ensure that the desired water levels for unit management are achieved, inspite of conditions not favorable for water transfer via gated gravity drains. Depending on location and need, a given pump could be either a fixed unit or a portable unit.

(14) Forest Management Plan. This measure entails the development of a resource management plan for forest habitat restoration. Tree plantings, the primary restoration technique, would focus on the placement of pin oak, or

other mast producing tree species tolerant of hydric soil conditions. The plantings could occur on higher ground such as dredged material disposal areas, crop field areas, or forested areas.

47 (15) Dredge Material Disposal into Backwaters. This measure involves the deposition of dredged material in sloughs to create shallow areas suitable as moist-soil units.

(16) Farmlands Dedication to Wetlands. In response to its review of the draft DPR/EA, the Sierra Club suggested as a habitat restoration measure, the large scale conversion of existing farmlands into wetlands habitat.

c. Measures Evaluated. This section provides an evaluation of the available project measures. The measures were evaluated in a two-step process. First, they were screened for gross viability, and then, if warranted, they were subjected to incremental cost analysis. A description of the measure increments established for the incremental analysis is provided by TABLE 5.2.

TABLE 5.3 displays the extent to which each measure addresses each of the planning goals/objectives. TABLE 5.4 provides a judgemental summary of the extent to which the various management measures meet the four planning criteria (i.e. completeness--effectiveness--efficiency--acceptability). A more detailed depiction of measure effectiveness is presented via TABLE 5.5. The results of the measures evaluation is more fully described in the paragraphs below.

(1) No Action. This measure was not found to be viable. It would do nothing to address the stated planning objectives.

(2) UMRS Watershed Erosion Control. This measure was not found to be viable. Calhoun Point does not have a local watershed affecting its sediment input (as is the case with Swan Lake), and so no local watershed erosion control measure was proposed.

We estimate that Calhoun Point receives approximately 0.5 inches of sediment each year. It is difficult to imagine a hillside sediment control program more intensive per square mile than that program being implemented at Swan Lake. That program yields in combination with the Conservation Reserves Program (CRP), a projected future 50-year sediment reduction potential of about 50 percent. Thus, if the same intensity of hillside control were to be applied throughout the UMR basin (assuming, as a working assumption, a basin-wide uniform erosion rate per unit area), a 50 percent reduction in sediment delivery to the river's wetlands might be anticipated. This would reduce the sediment load to the river's wetlands to about 0.25 inches per year at Calhoun Point. Extrapolating from the costs per unit area at Swan Lake to that of the entire UMRS would result in a sediment control program in the billions of dollars. The District considers such a cost to be exorbitant, and at 0.25 inches of accumulation per year, the added sediment protection afforded by a levee might still be worth considering. The UMRS Master Plan had previously recommended a system-wide sediment control component for the EMP. However, that component was never approved by Congress for funding. Thus, the likelihood of implementing a watershed erosion control measure would seen to be low. For the above reasons, the measure was not investigated further.

(3) Navigation Pool Water Level Manipulation. This measure was not found to be viable. In 1994, in cooperation with the Missouri Department of Conservation (MDOC), the District undertook an experiment to determine the viability of pool manipulation for environmental goals. MDOC gave the District a set of goals to aim for if the proper flow conditions were available. The only rule was that we maintain navigation depths (as Congressionally mandated) in the pool at all times. The 1994 flow conditions

TABLE 5.2

COST ANALYSIS INCREMENTS

MEASURE	INCREMENT	INCREMENT DESCRIPTION	REFERENCE FIGURE
A. Riverside Berm	A1	Crown elev. 422 NGVD, berm riverside of private lands and Squaw Island sites	FIG. 5.2, see Option A2
	A2	" 424 NGVD, "	
	A3	" 426 NGVD, "	
	A4	" 428 NGVD, "	
	A5	Crown elev. 422 NGVD, berm landside of private lands and Squaw Island sites	FIG. 5.2, see Option A6
	A6	" 424 NGVD, "	
	A7	" 426 NGVD, "	
	A8	" 428 NGVD, "	
	A9	Crown elev. 422 NGVD, berm riverside of private lands, landside of Squaw Island site	FIG. 5.2, see Option A10
	A10	" 424 NGVD, "	
	A11	" 426 NGVD, "	
	A12	" 428 NGVD, "	
	A13	Crown elev. 422 NGVD, berm landside of private lands, riverside of Squaw Island site	FIG. 5.2, see Option A14
	A14	" 424 NGVD, "	
	A15	" 426 NGVD, "	
	A16	" 428 NGVD, "	
B. Exterior Water Control/ Fish Passage Structure at Pohlman Slough	B1	Open top structure near Brussels Ferry crossing, 16' stop-log compart. with grate, 1-42" drain, and associated ditch excavation	FIG. 5.5, see location 1
	B2	Open top structure at slough historic entrance, "	FIG. 5.5, see location 2
	B3	Open top strucutre near Royal Landing, "	FIG. 5.5, see location 5
C. Exterior Water Control/ Fish Passage Structure at Squaw Island	C1	For wood duck production, open top struct at Squaw Isl., 16'stop-log compart., with grate, 1-42" drain and assoc. ditch excavation	FIG. 5.5, see location 4
	C2	For wood duck production, closed top struct. at Squaw Isl., "	FIG. 5.5, see location 4
	C1(R)	For green tree management, open top struct. at Squaw Isl., "	FIG. 5.5, see location 4
	C2(R)	For green tree management, close top struct. at Squaw Isl., "	FIG. 5.5, see location 4
D. Exterior Water Control/ Fish Passage Structure at Chickahominy/Silver Lakes	D1	Open top struct. near Isl. 525, 16' stop-log compart. with grate, 1-42" drain & assoc. ditch excav.	FIG. 5.5, see location 3
	D2	Close top struct., "	

TABLE 5.2

MEASURE	INCREMENT	INCREMENT DESCRIPTION	REFERENCE FIGURE
E. Interior Water Control Structure Between Chickahominy/Silver Lakes	E1	Includes 8' wide stop-log structure	FIG. 5.6, see location 1
	E2	Includes 1-42" gated culvert	FIG. 5.6, see location 1
F. Interior Water Control Structure Between Chickahominy/Royal Lakes	F1	Includes 8' wide stop-log structure	FIG. 5.6, see location 2
	F2	Includes 1-42" gated culvert	FIG. 5.6, see location 2
H. Pumping for Chickahominy/Silver L.	H1	1-fixed input pump & 1 fixed output pump that meets minimal pumping requirements (48,000 GPM), and portable motor	FIG. 5.7, see input location 2 & output location 4
	H2	1-portable pump and motor input/output that meets minimal pumping requirements,	FIG. 5.7, locations 2 & 4
I. Pumping for Squaw Island	I1	1-fixed input pump, meets minimum pumping requirements (5,000 GPM), with portable motor, for wood duck production	FIG. 5.7, see location 3
	I2	1-portable input pump, meets minimum requirements, with portable motor, for wood duck production	FIG. 5.7, see location 3
	I1(R)	1-fixed input pump, meets minimum requirements, with portable motor, for green tree management	FIG. 5.7, see location 3
	I2(R)	1-portable input pump, meets minimum requirements, with portable motor, for green tree management	FIG. 5.7, see location 3
J. Pumping for Goose Field	J1	1-portable input pump, meets minimum requirements (5,000 GPM), with portable motor	FIG. 5.7, see location 1
K. Deepwater Dredging at Squaw Island	K1	10% slough length, cut 6' deep & 50' wide, using hydraulic dredging	FIG. 5.3 for location
	K2	40% slough length, " "	"
	K3	10% slough length, " using clamshell dredging	"
	K4	40% slough length, " "	"
	K5	10% slough length, " using dragline dredging	"
	K6	40% slough length, " "	"

TABLE 5.2

MEASURE	INCREMENT	INCREMENT DESCRIPTION	REFERENCE FIGURE
L. Deepwater Dredging at Pohlman Slough	L1	10% slough length, cut 6' deep & 50' wide, using hydraulic dredging	FIG. 5.3 for location
	L2	40% slough length, " "	"
	L3	10% slough length, " using clamshell dredging	"
	L4	40% slough length, " "	"
	L5	10% slough length, " using dragline dredging	"
	L6	40% slough length, " "	"
M. Meander Scar Excavation	M1	Excavate Squaw Island vicinity meander scars to a depth of 3' and width of 50', via bulldozer	FIG. 5.4 for locations
	M2	" , via blasting	"
	M3	M1 increment, plus interconnecting ditches between meander scars	"
	M4	M2 increment, "	"
P. Interior Levees at Goose Field	P1	Levee placed above west side depression at goose field area	
	P2	Levee placed above east side depression at goose field area	
	P3	P1 + P2	
Q. Clearing Shoreline Woody Vegetation	Q1	Removal (willows/maples), equivalent to 2% of site's terrestrial habitat, 34 acres	
	Q2	" 5% " , 84 acres	
	Q3	" 10% " , 169 acres	
R. Forest Management Plan	R1	Mast tree plantings on dredge disposal areas	
	R2	Mast tree plantings in crop field areas	
	R3	R1 + R2	

TABLE 5.3

MEASURES RELATIONSHIPS TO PROJECT GOALS/OBJECTIVES

Measure	Restore Wetlands Habitat Diversity	Restore Fish Habitat	Restore Dabbling Duck Feeding Habitat					
	Reduce Sediment Deposition	Increase Deep Water Areas, Reestablish Fish Access	Flood Protect Food Plots	Increase Moist-Soil Plant Acreage	Provide Independent Water Control	Increase Mast Trees Acreage	Provide Invertebrate Food Source	Subtotal
1. No Action	1	1	1	1	1	1	1	7
2. UMRS Watershed Erosion Control	2	1	1	2	1	1	1	9
3. Navigation Pool Water Level Manipulation	1	2	2	1	1	1	2	11
4. Regular Maint. Dredging	3	3	1	2	1	2	1	14
5. Selective Deepwater Dredging	3	3	1	2	1	2	1	14
6. Vegetative Filter Strips	2	1	1	1	1	1	1	8
7. Riverside Dike/Berm	3	1	3	2	1	2	1	15
8. Meander Scar Improvements	3	1	1	3	1	1	1	11
9. Water Control Structures	1	3 (Access Only)	2	2	2	2	2	14
10. Vanes	2	2 (Access Only)	1	1	1	1	1	9

TABLE 5.3 (Ctd)

Measure	Restore Wetlands Habitat Diversity	Restore Fish Habitat	Restore Dabbling Duck Feeding Habitat					
	Reduce Sediment Deposition	Increase Deep Water Areas, Reestablish Fish Access	Flood Protect Food Plots	Increase Moist-Soil Plant Acreage	Provide Independent Water Control	Increase Mast Trees Acreage	Provide Invertebrate Food Source	Subtotal
11. Clearing Shoreline Woody Vegetation	1	1	1	3	1	1	1	9
12. Interior Levees	1	1	1	1	1	1	1	7
13. Pumps	1	1	2	2	3	1	3	13
14. Forest Management Plan	1	1	1	1	1	3	1	9
15. Dredge Material Disposal into Backwaters	1	1	1	3	1	1	1	9
16. Farmland Dedication to Wetlands	1	1	1	1	1	1	1	7

TABLE 5.3 (Ctd)

Measure	Restore Wood Duck Rearing Habitat		Restore Canada Goose Feeding Habitat	Restore Forest Habitat	Subtotal	Total & Rank
	Reduce Dry Out Conditions	Improve Meander Scars	Improve Fall Watering of Crop Fields	Increase Mast Trees		
1. No Action	1	1	1	1	4	11 - L
2. UMRS Watershed Erosion Control	1	1	1	1	4	13 - L
3. Navigation Pool Water Level Manipulation	2	1	1	1	5	16 - M
4. Regular Maint. Dredging	3	2	1	2	8	22 - H
5. Selective Deepwater Dredging	2	3	1	2	8	22 - H
6. Vegetative Filter Strips	1	1	1	1	4	12 - L
7. Dike/Berm	1	2	1	2	6	21 - H
8. Meander Scar Improvements	1	2	1	1	5	16 - M
9. Water Control Structures	2	2	1	1	6	20 - H
10. Vanes	1	1	1	1	4	13 - L
11. Clearing Shoreline Woody Vegetation	1	2	1	1	5	14 - M

TABLE 5.3 (Ctd)

Measure	Restore Wood Duck Rearing Habitat		Restore Canada Goose Feeding Habitat	Restore Forest Habitat	Subtotal	Total & Rank
	Reduce Dry Out Conditions	Improve Meander Scars	Improve Fall Watering of Crop Fields	Increase Mast Trees		
12. Interior Levees	1	1	3	1	6	13 - L
13. Pumps	2	1	3	1	7	20 - H
14. Forest Management Plan	1	1	1	3	6	15 - M
15. Dredge Material Disposal into Backwaters	1	1	1	1	4	13 - L
16. Farmlands Dedication to Wetlands	1	1	1	1	4	11 - L

1 = Measure makes little or no contribution to meeting stated project objective
2 = " some contribution "
3 = " major contribution "

Ratings: Low ≥ 11 but < 14
Moderate ≥ 14 but < 20
High ≥ 20

TABLE 5.4

MEASURES EVALUATION SUMMARY

Measure	Criteria				Total	Rank
	Completeness 1/	Effectiveness 2/	Efficiency 3/	Acceptability		
1. No Action	1	1	1	1	4	L
2. UMRS Watershed Erosion Control	1	2	1	1	5	L
3. Navigation Pool Water Level Manipulation	2	1	2	1	6	L
4. Regular Maint. Dredging	3	1	1	1	6	L
5. Selective Deepwater Dredging	3	2	1-2	2	8-9	M
6. Vegetative Filter Strips	1	1	3	3	8	M
7. Riverside Dike/Berm	3	3	3	3	12	H
8. Meander Scar Improvements	2	2	1	2	7	M
9. Water Control Structures	3	3	2	3	11	H
10. Vanes	1	1	1	2	5	L
11. Clearing Shoreline Woody Vegetation	2	3	3	3	11	H
12. Interior Levees	1	3	2	3	9	M
13. Pumps	3	3	3	3	12	

TABLE 5.4 (Continued).

Measure	Criteria				Total	Rank
	Completeness 1/	Effectiveness 2/	Efficiency 3/	Acceptability		
14. Forest Management Plan	2	2	3	3	10	H
15. Dredge Material Disposal into Backwaters	1	1	3	1	6	L
16. Farmlands Dedication to Wetlands	1	1	1	1	4	L

1/ Values correspond to the ratings of TABLE 5.3
2/ Values correspond to the ratings of TABLE 5.4
3/ Based on relative actual or likely $/AAHU value
Assumes: Low > $900/AAHU
Moderate ≥ $400/AAHU but ≤ $900/AAHU
High < $400/AAHU

Table 5.5 Rankings: 1 = Low (<6)
2 = Moderate (≥7 but <10)
3 = High (≥10)

TABLE 5.5

MEASURES EFFECTIVENESS

	Measure	Effectiveness Ratings			Ratings Rationale	
		Engineering	Biological	Overall	Engineering	Biological
1.	No Action	L	L	L	In the absence of structural features, engineering effectiveness is irrelevant.	The absence of structural features is a biologically ineffective solution.
2.	UMRS Watershed Erosion Control	M	M	M	Soil conservation practices have been in use for decades with proven effectiveness in reducing soil losses. However, cost issues aside, it is doubtful that a basin-wide watershed program would be as effective in addressing Calhoun Point sedimentation as would site-specific measures (such as the dike/berm and dredging).	With substantial sedimentation still occurring, a considerable loss of habitat acres would still continue.
3.	Navigation Pool Water Level Manipulation	L	M	L	Although modification of the Pool 26 operating plan would allow more flexibility for wildlife resources management, this measure is severely limited by other constraints (e.g. the need for conservation easements).	Pool 26 water level control would primarily serve navigation needs and would secondarily serve fish and wildlife needs. Accordingly, the biological effectiveness of this measure would be only moderate at best.
4.	Regular Maintenance Dredging	L	L	L	In the absence of a riverside barrier, Calhoun Point would tend to refill with sediment at a rapid rate. A number of redredgings would be needed during the life of the project. Insufficient disposal areas exist for long-term dredging.	Habitat acreage loss would continue at a rapid rate of loss. Due to the redredgings, the habitat would be frequently disturbed.
5.	Selective Deepwater Dredging	M	M	M	Used in conjuction with a riverside dike/berm barrier, the benefits of this measure would be felt for a longer period of time than that afforded by regular maintenance dredging.	Habitat disturbance due to redredging would be less frequent than with regular maintenance dredging.

TABLE 5.5 (Ctd)

Measure	Effectiveness Ratings			Ratings Rationale	
	Engineering	Biological	Overall	Engineering	Biological
6. Vegetative Filter Strips	L	L	L	This is a commonly applied and effective soil conservation practice. However, due to the gentle topography involved at the goose fields area, soils input to the water retention area is expected to be minimal and thus ineffective in this site-specific situation.	Measure would not significantly increase habitat value of goose fields area.
7. Riverside Dike/Berm	M	H	H	The structure should effectively exclude sediment from the more frequent lower stage flood events. For a 424 NGVD elevation structure, a 62 percent decrease in river sediment input, and 1 summer flood overtopping event in 5 years is anticipated.	There is evidence from other EMP and agency management areas that water control via berms is highly beneficial in improving wetlands habitat productivity. There is some evidence that the greater the separation that exists between backwater lakes and the river, the longer these wetland areas survive. The proposed structure would serve to better separate the Calhoun backwaters from the river.
8. Meander Scar Improvements	H	M	M	The excavation of these small wetland areas is engineeringly feasible using anyone of a number of methods. In combination with a riverside sediment barrier, this feature should alleviate the problem of shallow water depths. Ditching these areas over to Squaw Island Slough would effectively improve water control in the meander scar areas.	Increasing water depth and improving water control to the meander scars would yield a moderate improvement of brood habitat for wood ducks.

TABLE 5.5 (Ctd)

Measure	Effectiveness Ratings			Ratings Rationale	
	Engineering	Biological	Overall	Engineering	Biological
9. Water Control/Fish Passage Structures	H	H	H	From an engineering standpoint, gated culverts and pumps would be effective in controling water levels at the site. The construction of a stop-log structure to create an intermittent openning to the river is feasible.	Similar water management control efforts used in other areas along the river system have been successful in improving wetlands habitat conditions. The extent to which the stop-log openings will provide for adequate fish movement is unknown. Post-construction monitoring of a similar structure at Swan Lake will give a better indication of likely success.
10. Vanes	L	L	L	Vanes are unlikely to be effective due to water velocities along the Illinois River. Mississippi River exterior water control structures have sufficient water depth to render vanes of little value.	The precise method by which the exterior water control structures are kept sediment free, has no bearing on the magnitude of biological output.
11. Clearing Shoreline Woody Vegetation	H	H	H	In the past, IDNR has used chemicals for vegetation control with great effectiveness.	In the past, IDNR has obtained good moist-soil plant production in response to woody vegetation removal.
12. Interior Levees	H	H	H	The levee embankment and area soil types will effectively serve to retain water during the fall of the year. The stop-log unit should effectively discharge a heavy summer storm event within 2 days time.	The levees, as designed, will provide an effective means of increasing the availability of crop food plants to migrating waterfowl. The significant discharge rate will also help ensure the survival of crop plants following heavy summer storm events.
13. Pumps	H	H	H	From an engineering standpoint, pumps would be effective in controling water levels at the site.	Similar water management control efforts used in other areas along the river system have been successful in improving wetlands habitat conditions.

TABLE 5.5 (Ctd)

Measure	Effectiveness Ratings			Ratings Rationale	
	Engineering	Biological	Overall	Engineering	Biological
14. Forest Management Plan	H	M	M	The planting of trees, tree clearing, etc. is highly feasible from an engineering standpoint.	Bottomland forest planting practices continue to evolve and are moderately successful at this time. River stages, plant species selected, and weed control are among the factors that can influence the success of the plantings.
15. Dredge Material Disposal into Backwaters	L	M	L	Filling portions of the lake areas with dredge disposal material is physically doable. However, acquiring the needed permits to accomplish such an activity is infeasible.	The creation of additional shallow water habitat for moist-soil plant production would be effective in increasing food habitat for dabbling ducks. However, it would accelerate the demise of the areas wetlands habitat for fish and wildlife in general.
16. Farmlands Dedication to Wetlands	L	L	L	From an engineering standpoint, simply dedicating farmlands for wetlands use does not alter the water regieme that governs the existence of wetlands.	Land dedication per se doesn't in itself establish a wetlands associated biological community.

were such that we were able to draw the pool down more than 1-foot, thereby exposing vast acres around the perimeter of the pool to vegetative growth. This drawdown continued for more than 30 days. MDOC reports that the 1994 results exceeded their expectations.

61

However, pool regulation has its limitations:

* For waterfowl management, pool regulation does not approach the same degree of reliability attainable by a site-specific berm-gate-pump water control system. The 1994 pool manipulation benefits would not be achievable every year. In low flow years the Corps would be unable to draw the pool down whithout losing navigation depths. In high flow years it would be impossible to lower the pool, because the flow rates are such that high water levels are maintained naturally.

* Setting environmental objectives for pool manipulation is a major challenge. For example, from a fisheries standpoint, it may be more beneficial during the summer season to have the side channel water elevations near normal pool, rather than having them drawn down. As another example, recreational boaters may object to having a summer season drawdown.

* Pool regulation at the dams does not address the problem of sedimentation. Sedimentation was the major resource problem identified for Calhoun Point, and without a berm structure, there appears to be no cost-effective way of keeping out the sediments.

* Land acquisition may become an issue in the future if it is determined that there is value in manipulationg water elevations at levels higher than the present condition.

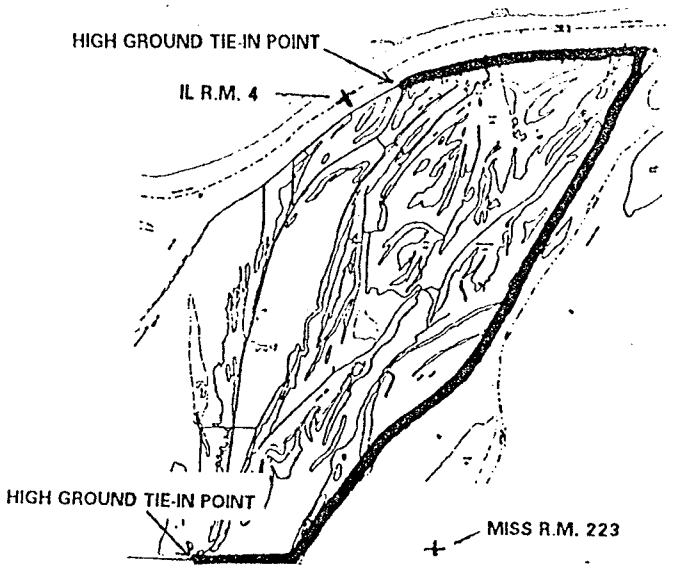
In summary, pool regulation does not address the problem of sedimentation, it provides a less reliable means of water control, and it potentially impacts upon other river uses. Furthermore, the Calhoun Point berm-gate-pump system is not incompatible with the concept of pool regulation. Both measures are useful habitat restoration techniques, and the two are not mutually exclusive.

(4) Regular Maintenance Dredging. This measure was not found to be viable. From an engineering standpoint, the measure does represent a complete response to the sedimentation objective, and it is a physically workable measure for controlling sedimentation. However, this measure is an inefficient solution to the sedimentation problem. For example, to dredge 300 acres of backwater habitat to a depth of 8 feet would cost over $6,000,000. Due to a continued high level of sediment input from floods, it is likely that additional dredgings would be required during the 50-year life of the project. Not only would regular maintenance dredging be expensive, but it would repeatedly disturb the areas fish and wildlife habitat. Considering the high acreage requirement for dredged material disposal areas, and the adverse impacts to wetlands, this measure would not be viewed favorably by the regulatory agencies.

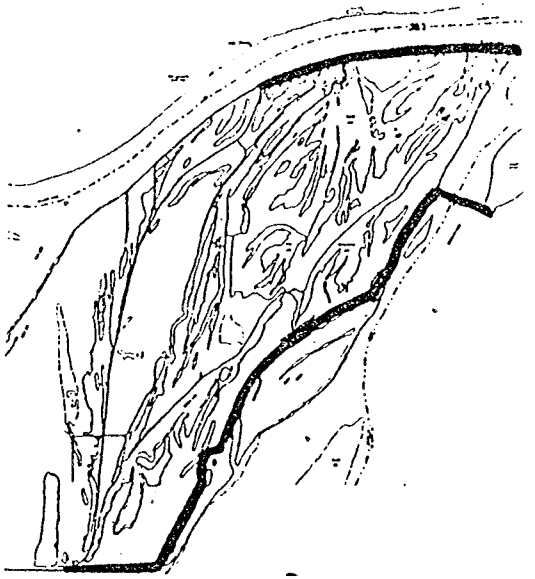
(5) Riverside Berm. This measure was found to be viable. The measure ranked relatively high in its ability to address the project's goals/objectives (TABLE 5.3). Most important, was its ability to address in a major way the need for sediment control and water control, conditions critical to achieving the desired output of many other potential project features.

Initially, four options for a berm system were considered: Option 1 was a closed system, consisting of a continuous riverside berm structure, extending from Illinois River Mile 4.0 to Mississippi River Mile 223.0 (FIGURE 5.1). A flank segment would tie the structure into high ground as an overlay to the existing road bed of the Royal Landing access road.

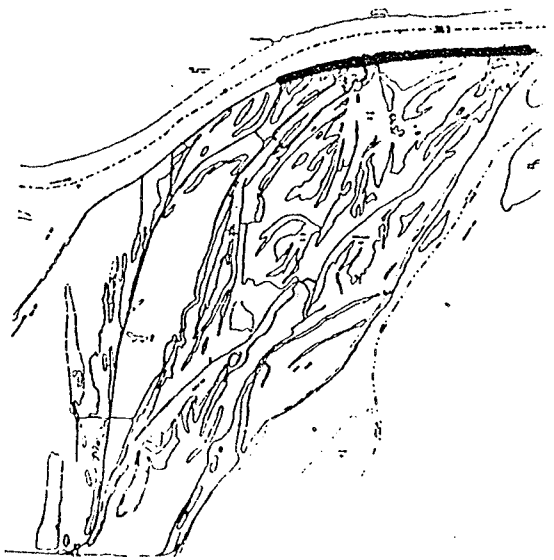
FIGURE 5.1. DIKE/LEVEE SYSTEM OPTIONS



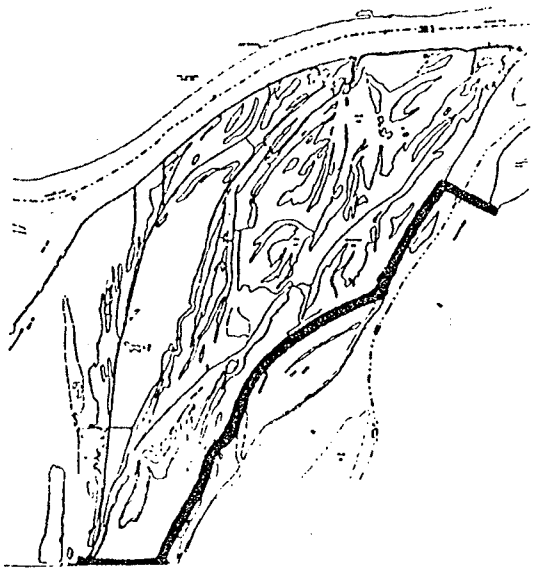
OPTION 1. CLOSED SYSTEM--CONTINUOUS STRUCTURE



OPTION 2. OPEN SYSTEM--MISS. R. & IL. R. SEGMENTS



OPTION 3. OPEN SYSTEM--IL. R. SEGMENT ONLY



OPTION 4. OPEN SYSTEM--MISS. R. SEGMENT ONLY

Options 2, 3 and 4 were all open system options (FIGURE 5.1). Option 2 would consist of two separate berm segments. One segment would be placed along the Illinois River side of Calhoun Point. Another segment would be placed along the Mississippi River side of the point interior to Squaw Island Chute. At
63 the upstream end, this segment would also tie into high ground at Royal Landing, and at the lower end would transition into a wing dike connecting to the upper end of Mason Island. This configuration would leave 5,000' of shoreline at the downstream terminus of the point unprotected in order that flood water can back into the point. Options 3 and 4 are similar to Option 2, except that Option 3 consists of only the Illinois River segment, and Option 4 consists of only the Mississippi River segment. The initial rationale for the open system was (1) to eliminate any local fears that the project would cause increased flood heights, (2) to eliminate the possibility of silt trapping in a closed system, and (3) to reduce the duration of flood water retention resulting from flood overtopping of a closed system, thus reducing the potential for mortality to seedling hardwoods.

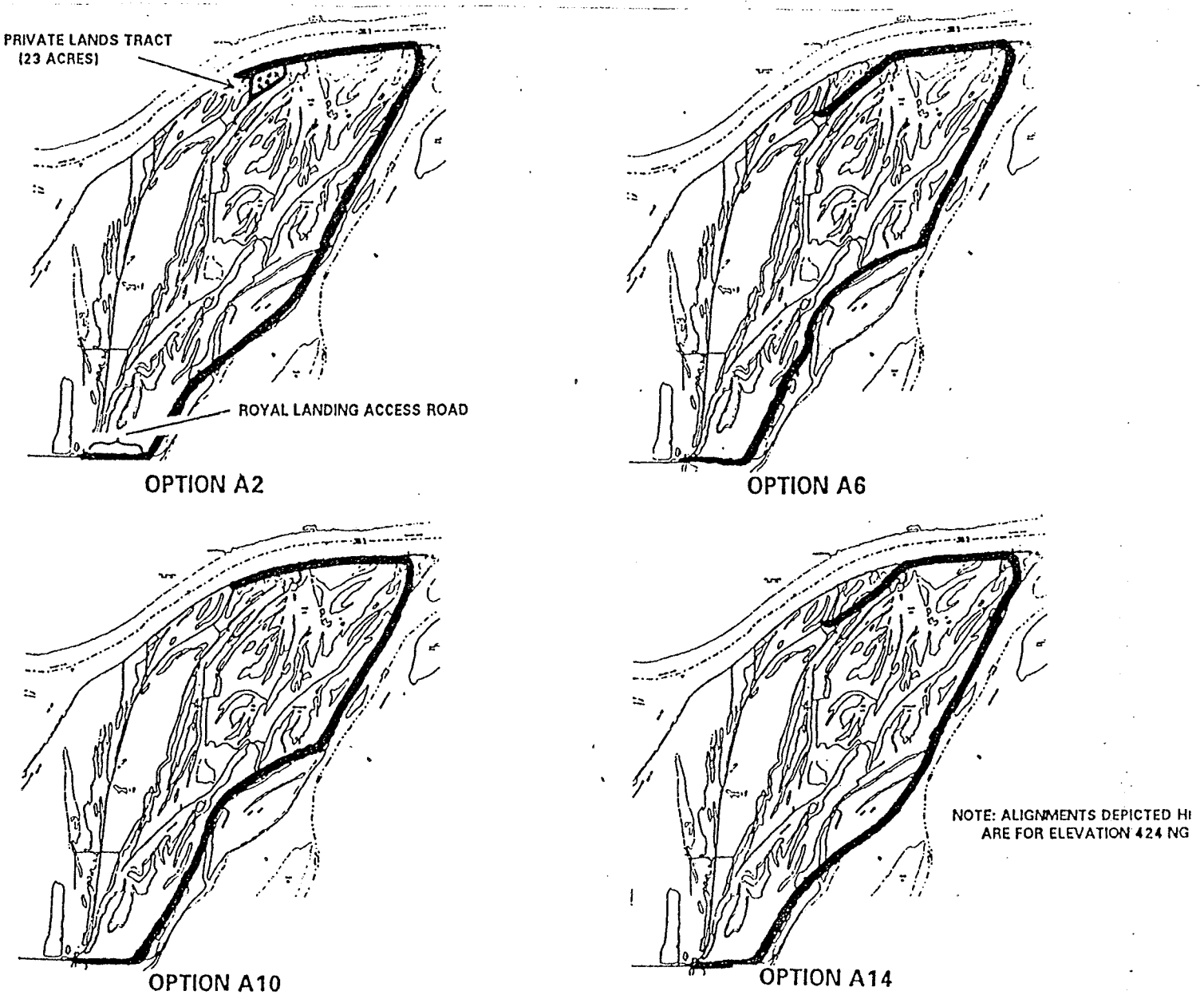
Options 3 and 4 were dropped, since the notion that leaving one side of Calhoun Point open to the river to permit flood events to scour and remove sediments from the site is not substantiated by river experience. The project area is at the hinge point of Pool 26, and is thus expected to be a major slackwater depositional area. Aerial photographs for the decades following river impoundment show a considerable net conversion of water to land habitat at Calhoun Point. At two other leveed HREP projects (Dresser Island and Clarksville Refuge) sediment accummulation from the 1993 flood appeared to be about one-half that found exterior to the berms. Thus, a major flood sediment trappage situation does not appear to exist. A closed system also benefits from the exclusion of the more frequest lower stage flood events that carries the majority of the sediment into the site. Seedling mortality would not likely be greatly affected by a closed system. The berm would exclude many flood events from covering tree seedlings, and the discharge of water from the site after a major (and perhaps long duration) flood event would be only a matter of days behind that discharge occuring under an open berm system.

Option 2 was also dropped. The estimated level of sediment reduction to the point would be only 45%, which is far less than the approximate 70% level of protection desired as a design requirement by the interagency planning team.

Only Option 1 was judged to be viable in terms of completeness and effectiveness. A closed system berm would have the capacity for reducing river sediment input to essentially any desired value, and it would have the capacity for reducing summer flood intrusions to almost zero. Option 1 also provided the conditions necessary to make viable the application of most other identified project measures.

To further evaluate Option 1, two basic variations in berm alignment were analyzed. The first variation consisted of routing the berm either riverside or landside of the 23 acre private lands inholding (located in the northwest corner of the project area). The second variation consisted of routing the berm either riverside or landside of Squaw Island. In all, four combinations of these two variations were evaluated (FIGURE 5.2). For purposes of comparability, berm elevation can be held constant (e.g. elevation 424 NGVD). On this basis, option A2 included riverside alignments at both locations, and Option A6 included landside alignments at both areas. Option A10 included a riverside alignment at the private lands tract, and a landside alignment at Squaw Island. Option A14 included a landside alignment at the private lands tract, and a riverside alignment at Squaw Island. On this basis, option A2 showed ($295/AAHU), A6 ($351/AAHU), A10 ($307/AAHU) and A14 ($308/AAHU). Option A2, the most acreage encompassing of the alternatives, was selected as the most cost-efficient option. However, after reviewing the Draft DPR, the Illinois Department of Natural Resources indicated that it was not interested in aquiring the private lands tract and therefore asked that the District pursue option A14.

FIGURE 5.2. CLOSED SYSTEM BERM ALIGNMENT OPTIONS



Four alternative berm elevation options, 422, 424, 426 and 428 NGVD, were evaluated by incremental analysis. For purposes of comparability, it can be assumed that the berm alignment is held constant. As an example, the more
65 expansive riverside berm alignment can be employed (designated as options A1, A2, A3 and A4. The difference in sediment reduction capacity for the four alignments was 45%, 67%, 80% and 90%, respectively. For the summer flood event frequency, it was 1 event in 3 years, 1 in 5 years, 1 in 20 years, and 1 in 20 years, respectively. The cost/WHAG output values ranged from $295/AAHU to $547/AAHU, with Option A2 at elevation 424 NGVD, proving to be the most cost-efficient alternative ($295/AAHA).

Based on its review of the draft DPR, the IDNR, the USFWS and others made the suggestion that the unsalvaged portion of the trees cleared for berm construction be placed as habitat structures. The District has concurred in this suggestion. To improve the fisheries habitat, 50 tree tops would be placed just off shore at Pohlman Slough (west shore only), and spaced one per 100 feet. These tree tops would not be cabled down since there would be sufficient tree buffer (Corps' regulatory office recommends a minimum 100' buffer) to ensure that the trees would not pose a threat to the navigation channel. Just landward of the berm, the remaining tree material would be placed as brush piles for wildlife. Each pile would be held down with the equivalent of at least three 1/2" cables with 4' soil anchors (e.g. metal screw type anchors). Work would be accomplished in 1,000' strips at a time.

An important design goal was the construction of a berm structure by the most cost-efficient means. However, unlike the Swan Lake HREP, where large segments of berm could be created using mechanically dredged lake sediments--no such opportunity exists at Calhoun Point. Accordingly, the structure would be constructed of truck-hauled borrow material. As a means of maximizing habitat value, the agencies recommended that borrow pits resulting from construction be configured as non-forested wetlands habitat. The agencies also requested that borrow material be removed from non-forested habitat areas (e.g. existing crop fields, or degraded moist-soil units) rather than from forested wetland areas. The District concurred in both recommendations, since little additional cost was anticipated.

Design and construction considerations were included to ensure adequate side slope stability for a berm ranging from 0-6 feet in height. A standard 1 on 3 side slope was judged appropriate for the earthen embankment. After final grading, the structures would be seeded and mulched for erosion control. In the case of the berm, the overflow zone would be armored with stone. Rock rip-rap would be placed along shoreline areas prone to river action (e.g. existing erosional areas, or areas with little adjacent tree buffer).

To accommodate O&M vehicles, a berm top road 10-feet wide would be needed. The berm would be topped with 6" road course.

Potential impacts to wintering bald eagles was a concern--in particular, the impact of construction related clearing on eagle perch trees. Eagles tend to utilize large, open branched trees within 20 feet of the waters edge. An interagency survey was made of the site's riparian tree corridor. From this survey, it was judged feasible to keep the berm structure at a distance greater than 20 feet along most sections of shoreline. In most areas a much greater buffer zone (over 100 feet) was possible. This buffer zone for eagles also has the advantage of further protecting the berm from shoreline erosion effects.

Another concern was that any proposed berm structure not reduce storage capacity during a major flood event, and that the structure be able to withstand the erosional forces of river overtopping. An engineering decision was made that this could best be accomplished by providing a stone covered overflow section. The structure would be placed at an elevation one foot

lower than the crest of the berm, and would be placed along the Mississippi River near the confluence. This arrangement would allow flood waters to non-erosively enter Calhoun Point, and would maintain the flood storage capacity of the point. 66

Potential berm induced flooding in the vicinity of Grafton, Illinois was an initial study concern. However, the District conducted an HEC analysis of a berm built to crest elevation 424 NGVD, and found no indication of adverse flooding impacts adjacent to, or upstream of, the project area. Most flood impactable structures at Grafton were destroyed by the Great Flood of 1993.

During its review of the draft DPR, the public expressed a concern that the berm structure not block existing private property culvert drainage across roads. The District has included a provision for small culvert drains with flap gates to remedy this problem.

(6) Selective Deepwater Dredging. This measure was found to be viable. Used in conjuction with the riverside berms, it would offset damages caused by sedimentation for a much longer period of time than that afforded by maintenance dredging alone. Biologically, this measure is more effective than maintenance dredging alone, since habitat disturbance from redredging would be less frequent. Selective deepwater dredging is acceptable to the agecies, and it is seen as the only viable measure for restoring lost water depths to the site's backwater fisheries habitat.

Two areas were considered for deepwater dredging, Pohlman Slough and Squaw Island Slough (FIGURE 5.3). Three methods of dredging were analyzed, mechanical dredging by clamshell, mechanical dredging by dragline, and hydraulic dredging. Using incremental cost analysis, it was found that on a cost per unit output basis, mechanical dredging is about the same whether it is accomplished by clamshell or dragline methods. In general, the cost of mechanical dredging was about 30% greater using mechanical methods over hydraulic dredging.

At Pohlman Slough, the most cost efficient dredging option was hydraulic dredging to a level of 10% of the total slough length. However, the cost/output of a 40% level of hydraulic dredging increases only 15% while the total fisheries benefits would increase 3-fold (from 16 to 49). Based on prior HREP habitat analyses, $662/AHAG AAHU is judged to be a fairly reasonable fisheries investment. On this basis, the more extensive level of Pohlman Slough dredging has been recommended. In response to agency comments on the draft DPR, the District modified the aerial extent of dredging to 75%, while increasing slightly the total volume of material dredged.

Dredging at Squaw Island was not found to be cost efficient and was not recommended for inclusion in the project plan. The values ranged from $2,032 (Option K2) to $3,035 (Option K4) per AHAG AAHU.

(7) Vegetative Filter Strips. This measure was not considered to be viable. Filter strips represent a commonly applied soil conservation practice, and are widely accepted among the agencies. However, due to the gentle topography involved at the goose field area, farmland soils input via sheet water flows into the goose fields area is likely to be very low. Thus, filter strips would have a minor impact on the sedimentation of these wetlands, and on the AAHU's. It is recommended that this feature be applied only at the discretion of the IDNR site manager during the O&M phase of the project.

(8) Meander Scar Improvements. This measure was not found to be feasible. The alternative excavation/blasting and ditched interconnection locations are shown in FIGURE 5.4. While engineeringly and biologically effective to implement, this feature was not cost-efficient. The excavation

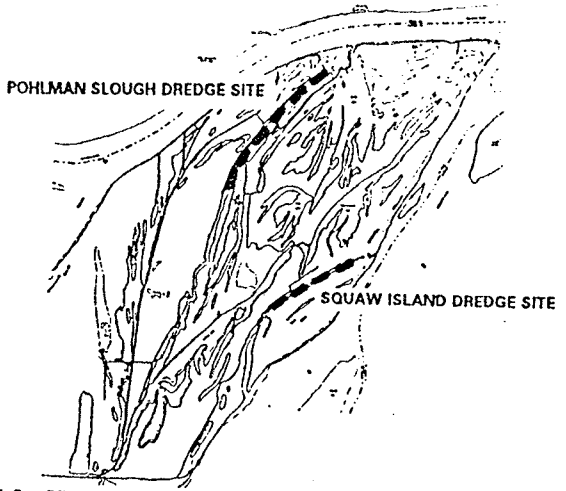


FIGURE 5.3. SELECTIVE DEEPWATER DREDGING--ALTERNATIVE LOCATIONS

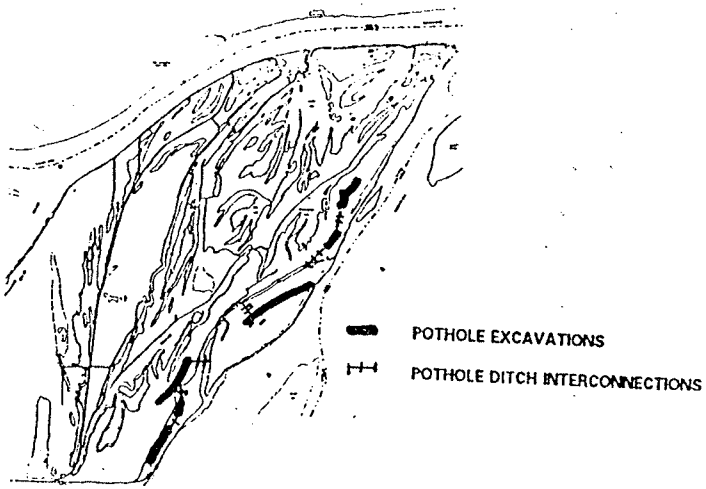


FIGURE 5.4. MEANDER SCAR IMPROVEMENT--EXCAVATION & DITCH ALTERNATIVES

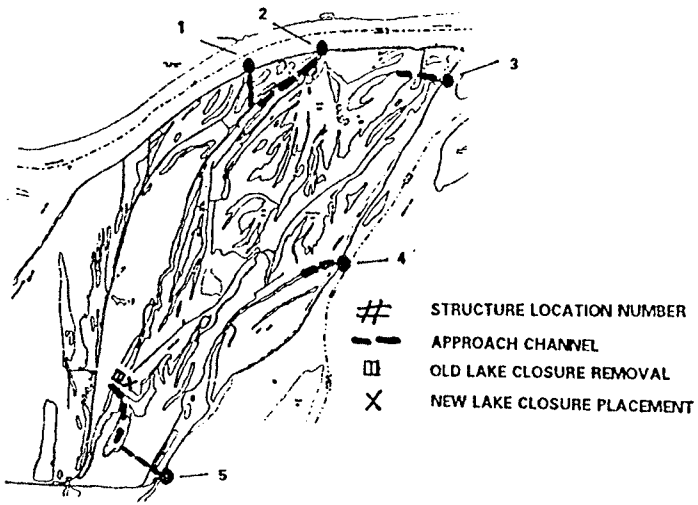


FIGURE 5.5. EXTERIOR WATER CONTROL STRUCTURES--ALTERNATIVE LOCATIONS

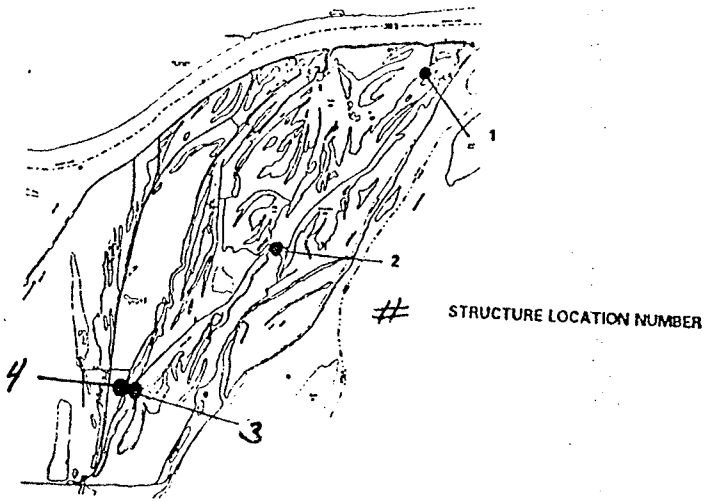


FIGURE 5.6. INTERIOR WATER CONTROL STRUCTURES--ALTERNATIVE LOCATIONS

method employed, bulldozing versus blasting, appeared to be of little consequence, both methods yielding an unacceptable $1,569/WHAG AAHU. Adding ditch interconnections between the potholes and Squaw Island Slough further aggravated the cost/output relationship by increasing it to about $4,220/AAHU. 68

(9) Water Control Structures (including fish passage).

a. Exterior Structures.

This measure was found to be viable. As reflected in TABLE 5.3 the measure was ranked high in its ability to address the project's goals and objectives. Water control structures in combination with berms and pumps would provide a complete water control system. As a component of this system, gated gravity drains would be engineeringly effective in regulating water levels at the site independent of river stages. This control would be instrumental in assuring reliable conditions for the production and availability of moist-soil plants and invertebrates as food sources for waterfowl. Where applied, a modified water control structure would also afford an effective means of fish ingress/egress at selected locations. The agencies considered exterior water control structures to be essential to the project. The agencies also considered the inclusion of a fish passage provision at Pohlman Slough to be critical, and a fish passage provision at other locations desirable if incremenetally justified.

It was agreed with the project sponsor that closed-top (gated CMP) structures would be used at riverside locations where only water control and not fish passage was determined to be incrementally justified. The more costly open-top structures (with combination stop-logs/sluice gates) would be used in locations where both water control and fish passage were incremetally justified. The preference for an open-top structure is based on a concern among fishery biologists that dark, closed-top structures could inhibit fish movement. Operationally, the sluice gates would be used for water level adjustments when water transfer via gravity is feasible. In addition, at times consistent with the state's management objectives, and when the river and lake levels are roughly equal, the stop-logs could be removed and the sluice gates left wide open to facilitate fish movement. Other alternative structures such as radial arm and roller gates were also considered. However, the foundation preparation and treatment (pilings) that would be required to ensure the stability and integrity of these structures made them several times more expensive than the selected sluice gated structure.

An evaluation was made for potential exterior water control structures at 5 different river locations (FIGURE 5.5). Locations 1, 2 and 5 were competing alternatives for the reestablishment of a Pohlman Lake connection to the river system. The potential location 1 structure would be at the Brussels Ferry landing area (Il R.M. 3.7) connected via a ditch cut to Pohlman Slough. The location 2 structure would be in the area of the historical connection between the Illinois River and Pohlman Slough (Il R.M. 3.1). Location 5 would be at Miss R.M. 222.9, with a ditch cut to Pohlman Slough via the South end of Royal Lake.

Initially, it was hoped that a location 5 entrance could be used to periodically create a flow of water thru Pohlman Slough to improve water quality (especially during the summer season), and that with some additional structural modifications, it might also be possible to reduce the need for water pumping (especially during the fall season) at the sites interior lakes. However, the IPT analysis indicated that location 5 would not be able to perform in this manner. The navigation pool is essentially flat during the summer and fall seasons of the year, and thus no useable water surface slope would exist at these times to create a flow situation. In terms of cost efficiency, location 5 was less optimal ($623/AHAG AAHU) than that for

locations 1 and 2 (both $520/AAHU).

69 Location 2, as an alternative, was considered preferable to location 1. Initially, it was thought that location 1 might have a lower O&M cost associated with it, presumably the result of a periodic sediment flushing action comming from the Brussels Ferry push boat operation. However, a review of hydrographic maps revealed no evidence that the river deposition pattern at this location was any different than that at location 2. Construction costs, including dredging, would be about the same for locations 1 and 2. Location 2 would require a long but shallow dredge cut, and location 1 would require a short but deep cut. A key and deciding difference between the two locations was that location 1 would adversely effect two areas of cabins along with their associated access roads.

In its review of the draft DPR, IDNR was concerned that easy access between the Illinois River and Pohlman Slough could turn the slough into a boat marina. Accordingly, the location 1 structure was modified to include a locking gate. IDNR will be able to open or close the gate as desired to regulate boat traffic.

The primary objective of the Squaw Island management unit is for waterfowl, with fisheries management as a secondary consideration. Two different waterfowl management operations were considered as a function of a location 3 water control structure. The unit could function (1) as a wood duck production area ensuring adequate slough water depths for late spring/early summer brood rearing (Options C1 (open-top structure) and C2 (close-top structure)), or (2) as a green tree area (See FIGURE 5.9) making invertebrates available to migrating waterfowl (Options C1(R) (open-top structure) and C2(R) (close-top structure)). By incremental cost analysis, it was determined that the placement of a structure for the sole purpose of wood duck management is not incrementally justified (Option C1, $15,694/WHAG AAHU; Option C2, $10,020/AAHU). The placement of a structure for either the sole purpose of creating a green tree area (Option C1(R), $654/AAHU; Option C2(R), $418/AAHU), or in combination with wood duck production (Option C1 + C1(R), $581/AAHU; Option C2 + C2(R), $401/AAHU) appears justified. However, since so few AAHUs are generated by an open-top structure, Option C1 alone, or Option C1 in combination with Option C1(R) were dropped. Accordingly, a closed-top structure (with a CMP gatewell) with operation geared towards both wood duck management (enhanced water levels within banks of slough during the April-May-June time period), and green tree management (water raised above floodplain area in November-December-January-February time period, and lowered during the March to October period) is recommended.

At location 4 (entrance to Chickahominy/Silver lakes), the fisheries benefits captured in addition to the waterfowl benefits make a combination stop-log/sluice gate structure (Option D1, at $516/combined WHAG and AHAG AAHU) a clear winner over that of a gated CMP (Option D2, at $1,439/AAHU). To be acceptable to the project sponsor, the gated structures were sized to discharge excess interior storm water within 10 days from moist-soil unit areas.

b. Interior Structures.

Initially, locations suggested for interior water control structures were locations 1 (between Silver and Chickahominy Lakes), 2 (between Royal and Chickahominy Lakes) and 3 (at tip of peninsula between Chickahominy Lake and Pohlman Slough) shown in FIGURE 5.6. The location 3 structure would be used only in a scenerio where south Royal lake is reconnected to Pohlman Slough. Since that reconnection prospect was dropped, the location 3 interior structure was likewise dropped.

Two types of interior structures were considered, stop-log units and

gated-culverts. The stop-log design has several advantages over that of the gated-culvert design. First, if constructed with a chamber width of at least 8 feet, the structure would allow for the periodic passage of IDNR maintenance craft. Second, the stop-log structure would allow for fish movement between the lake compartments. Third, the stop-log structures (Option E1 for location 1 at $234/combined WHAG and AHAG AAHU, and Option F1 for location 2 at $341/AAHU) were more cost efficient than the gated CMP structures (Option E2 for location 1 at $766/AAHU, and Option F2 for location 2 at $693/AAHU). For the above reasons, stop-log structure Options E1 and F1 were recommended. 70

Following its review of the draft DPR, IDNR recommended that a third interior structure (location 4) be placed at the south end of Pohlman Slough. Based on the following rationale provided by IDNR, the District agreed to include the location 4 structure.

* Structure (being open-topped) will allow for additional fish passage into the other lake compartments. Pohlman is the main year round source of fish at the Calhoun Point site.

* Structure provides an additional service access for IDNR boats.

* Structure cost is relatively low (< $50,000).

* Structure provides greater water level management control flexibility. It completes the system.

(10) Sediment Deflection Vanes. This measure was not found to be viable. Sediment deflection vanes were considered as a means of reducing riverside O&M dredging costs in the vicinity of the exterior water control structures. However, due to low water velocities along the lower Illinois River, it was felt that the use of such a structure would be ineffective. The entrances to exterior water control locations 3 and 4 have sufficient water depth to make the need for future dredging unlikely. To lessen the need for debris and sediment removal at location 2, it would be beneficial to extend the CMPs to the bankline.

(11) Clearing Shoreline Woody Vegetation. This measure was found to be viable. Used in conjuction with the berm-gate-pump water control system, this feature is by far the most cost efficient habitat improvement measure identified. With an aircraft delivered chemical application, the cost/output relationship would be only $8-14/WHAG AAHU regardless of the extent of application (i.e. 2%, 5% or 10% of the site's total terrestrial habitat acres). In the past, the Department has found the herbicide Rodeo to be very effective in killing undesirable woody vegetation to promote more desirable waterfowl food plants (volunteer or aerially seeded).

The District considered alternatives to herbicide application, including mechanical clearing, chainsawing, and hypohatcheting. Mechanical clearing would be effective because it would provide for the removal of stumps and root wads. Chainsawing would not be effective because one to two years after cutting, willows and silver maples would grow back from the stump to the same height, with more stems per plant than prior to cutting. The use of a hypohatchet, which is an axe-like tool that injects an herbicide into the tree, would be selective in that sapling-sized trees and seedlings could not be treated. We estimated the cost of mechanical clearing to be about 20 times higher than for herbicide application. Because mechanical clearing and herbicide are both effective, we further evaluated the least cost herbicide alternative.

Rodeo is registered with the U.S. EPA as appropriate for use in aquatic environments. This herbicide has been written into the final version of the

Section 404 evaluation report (APPENDIX DPR-C), and the state has had an opportunity to review this report in consideration of its Section 401 water quality certification (also in APPENDIX DPR-C). Rodeo would not be used in an
71 area near municipal water intakes. The nearest public water supply is at Grafton, IL. Grafton takes its water from a well, not directly from the river itself. The nearest downstream water intake is at Alton, IL. Human exposure to the direct spray will be prevented by prohibiting access to the site during spraying.

(12) Interior Levees. This measure was found to be viable. The intent at the goose area is to flood portions of the crop fields during the fall migration period. To accomplish this, two locations (FIGURE 5.7) were identified as topographically suitable for the placement of earthen water retention structures. However, to be effective, these structures must not impound water during the summer growing season, as it could result in crop damage. Accordingly, the design of each interior berm incorporated a small stop-log structure. During the growing season, the logs would be removed to allow for interior drainage, while in the fall the logs would be inserted to impound water. The stop-log structure opennings were sized to a width of 3', this width is sufficient to drain a heavy (10-hour) storm event within 2 days.

All of the project's concrete water control structures, would have a small manually operated gantry crane mounted for ease in placing and removing stop-logs.

Both locations yielded similar cost/output relationships, Option P1 at $434/AAHU and Option P2 at $608/AAHU. These values were sufficiently low that a combination of the two measures, Option P3 (at $446/AAHU) was recommended for implementation.

(13) Pumps. This measure was found to be viable. Pumps represent an integral component of the berm-gate-pump water control system. The use of pumps to water and dewater is known to be engineeringly and biologically effective in creating conditions conducive for the production and availability of waterfowl foods. Pumps were considered for three management unit locations: Chickahominy/Silver Lake, Squaw Island, and for the Goose Fields area (FIGURE 5.8).

Pumping at Chickahominy/Silver Lake would require two separate pumps, an input pump and an ouput pump. The need for two pumps, rather than a single reversible pump, is due to the areas' hydrographics. At Illinois R.M. 2.5, the water riverside of the berm is shallow, lakeside of the berm it is deep and expansive with the interior lakes tending to drain in that general direction. Therefore, this location is ideal for an output pump--discharging water from the lake to the river, but is less favorable for moving water from the river to the interior. By contrast, the area of Calhoun Point opposite Island 525, is deep riverside and shallow lakeside, making it better suited for an input pump.

IDNR's operational need at Chikahominy/Silver Lake is for the delivery of 3 feet of water in 10-days. This delivery rate is consistent with that used at other IDNR river management locations. The District's hydraulics computations indicate that a 48,000 GPM unit pump is required to achieve this degree of water transfer capability. Both fixed (Option H1 at $1,535/WHAG AAHU) and portable (Option H2 at $975/AAHU) type pumps were considered, but only a fixed pump (belt driven by a trailer mounted diesel motor) option was acceptable to the sponsor. This preference is because of the known reliability of this type of pump for large water volume transfer requirements.

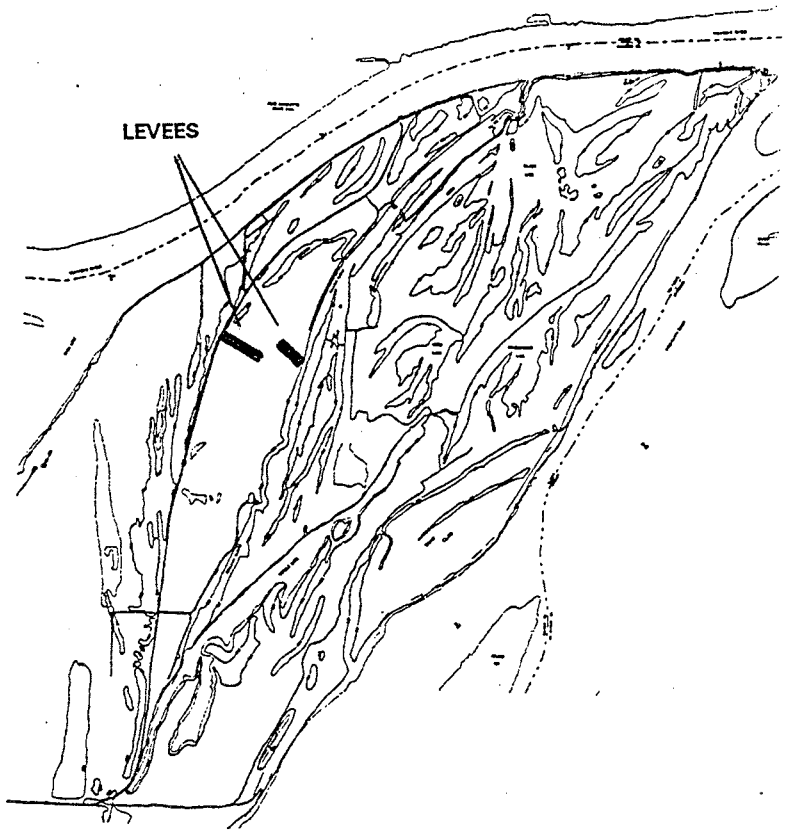


FIGURE 5.7. INTERIOR LEVEES--ALTERNATIVE LOCATIONS

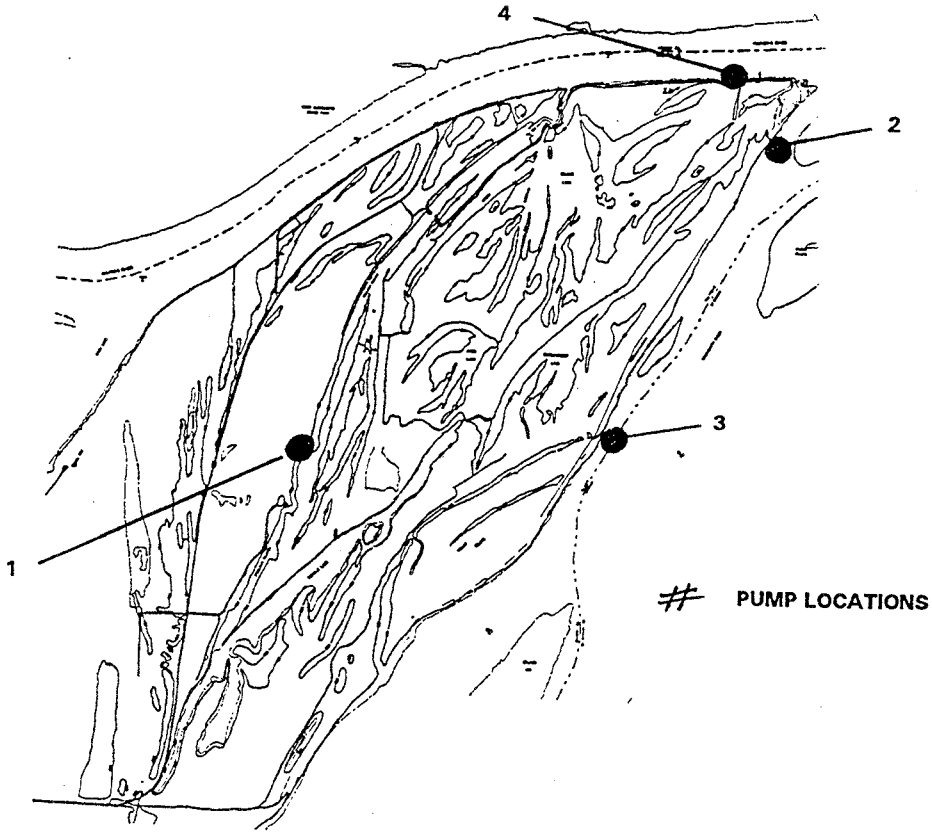


FIGURE 5.8. PUMPS--ALTERNATIVE LOCATIONS

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FIGURE 5.9. GREEN TREE AREA

Extent of proposed GTA denoted by hatching.

The maximal pumping need situation at Squaw Island is dictated by the recommendation to include green tree management. Under this scenario, water levels would be periodically raised to as high as 422.0 NGVD. The rate at which the area is filled would be less critical than it would be for the moist-soil units. Considering the prevailing soil types and soil depths, it was judged that a 5,000 GPM pump would sufficient for this site. The difference in the cost/ouput relationship for the fixed (Option I1(R) at $304/WHAG AAHU) and portable (Option I2(R) at $263/WHAG AAHU) pumps was not significantly different. Due to the relatively small amount of pumping required at this site, IDNR did not voice objections to using the less expensive trailer mounted portable pump with a diesel motor and 500 gallon fuel tank. Option I2(R) was recommended.

At the goose fields, water would be drawn from Pohlman Slough. The filling time is not critical, and considering soil depth and soil type, a 5,000 GPM pump was considered sufficient. The proposed pump site (the lower most end of the Pohlman Slough deepwater dredge cut) is readily accessible from existing roads. Due to the relatively small amount of pumping required at this site, IDNR did not voice objections to using a portable pump at this location. Therefore, we have opted to use the more cost-efficient portable pump (Option J1 at $362/AAHU).

After its review of the draft DPR, IDNR suggested that fish screens be included at the pump facilities to protect fish against entrainment. The District looked at the problem, and determined that from a design standpoint it was feasible to include a fish screen at Silver Lake's 48,000 GPM output pump site (See Final DPR PLATE 15 for screen design). The District believes that the screen mesh should not be less than 1.5" by 1.5", or else significant amounts of debris will collect, thus impeding water flow. Fish smaller than the 1.5 inch opening will pass through and into the pump.

No feasible design configuration was found for the 48,000 GPM input pump location near Chickahominy Lake. A screen would be too expensive at this location due to the large area required at the pump, and would be subject to high maintenance and damage from debris collection from the Mississippi River. Because this pump is drawing water from the river rather than the lake--it should pose less of a hazzard to younger fish. No specific design drawing has been developed for the 5,000 GPM pumps. During its pumping operation, the Department could screen an area by using stakes and a ring of hardware cloth.

(14) Forest Management Plan. This measure was found to be viable. Several options were considered. These included mast tree plantings on project dredge disposal areas (Option R1), mast tree plantings in crop field areas (Option R2), and a combination of both (Option R3). The cost per unit output was similar for all three options ($134-166/WHAG AAHU). In recognition of the fact that both R1 and R2 would be needed to offset forest damages incurred by the construction of the project (and thereby avoiding the need for project mitigation), Option R3 was recommended.

Subsequent to the incremental habitat analysis, the state provided an assessment of Calhoun Point mast tree mortality resulting from the Flood of 1993. Its estimate was that about 50 percent of the site's existing 230 acres of mast trees have been destroyed. In view of the low cost/AAHU for the forest management feature, and in recognition of the devastating impact of the flood--the mast tree plantings measure was further expanded to include 115 flood damaged acres. FIGURE 5.10 depicts the forest management plan concept.

The HSIs presented in the habitat evaluation for bottomland forest (Appendix J) are probably no longer valid for all evaluation species under each project condition (existing, future without project, and future with project). Habitat conditions were assessed prior to the 1993 flood. A survey of flood induced tree mortality in the vicinity of the project area (pool 26)

FIGURE 5.10. FOREST MANAGEMENT PLAN.

Reforestation of cropland and disposal areas (denoted by hatching).

Creation of forest clearings with mast tree plantings (specific locations to be determined later).

showed that about 37 percent of all trees and about 80 percent of all saplings have died (Yin et al., 1994). If existing conditions had been evaluated after the flood, about 11 of the 27 WHAG habitat variables applicable to bottomland forest probably would have been scored differently (in most cases only slightly differently). Without recalculating habitat suitability indices (HSIs), existing (postflood) habitat quality probably would be higher for the mallard and beaver, lower for the wood duck and prothonotary warbler, and about the same for the green-backed heron and northern parula. Likewise, some variables undoubtedly would have been rated differently for the future conditions, leading to HSI changes for at least some species. With or without the flood of 1993, the same habitat problems and opportunities would be evident. Had the assessment of habitat conditions taken the 1993 flood into account, the overall pattern of HSI changes, comparing the future-with project condition against the future-without, would be expected to be similar to that presented in Appendix J. Habitat quantity for the three project conditions would also be unlikely to change. Therefore, the justification of project features would not be significantly affected, especially for the forestry management measures. 76

(15) Dredge Material Disposal into Backwaters. This measure was not found to be viable. The concept of partially filling wetlands to increase shallow water feeding habitat for waterfowl was strongly opposed by the state. The state considered such a measure to be in conflict with the intent and purposes of the Clean Water Act. The measure was deleted without further analysis.

(16) Farmlands Dedication to Wetlands. This measure was found to have only limited applicability to the Calhoun Point study site.

Calhoun Point per se has very little farmland within its boundaries. A portion of the farmland that does exist (the goose fields area) has been targeted for wetlands restoration.

Farmlands dedication to wetlands use on a broader scale has some major difficulties. The purchase of large land tracts (at $1,000 to $2,500 per acre, and potentially from unwilling sellers) does not in itself contribute to improved habitat value. An acquired site would then need structural improvements to yield wetlands benefits. High real estate costs would make it difficult to achieve the "biggest habitat bang for the buck". Greater EMP program cost-efficiency is achieved by utilizing lands (the majority of which is non-agricultural) that have already been acquired, i.e. existing publicly owned lands. A farm tract the size of Calhoun Point would require $6 million to acquire and then additional millions for structural improvements to render a meaningful restoration project.

It has been suggested that the District should put the Calhoun HREP on hold until the Floodplain Management Assessment (FPMA) Study and an HREP cumulative impacts study has been completed. It should be noted that the intent of the FPMA is not to develop site-specific floodplain management recommendations. Its purpose is to evaluate a broad spectrum of potential management options ranging from total levee system removal to major increases in the height of the existing levees. Expansion of the EMP is one option that has been identified. It is too early to draw any conclusions about the future direction of floodplain management. Regardless of the eventual direction taken, the EMP is a valuable and necessary learning experience. The EMP will provide a "tool box" of field tested habitat restoration techniques applicable to any foreseeable future floodplain management setting.

In terms of cumulative impacts, the HREPs are limited in scope. The EMP is working only a fraction of the total habitat area of the UMRS (See Cumulative Effects APPENDIX DPR-R). If all planned program activities turn out to be a failure (and most evidence is to the contrary), it would not

TABLE 5.6

PLAN RELATIONSHIPS TO PROJECT GOALS/OBJECTIVES

Measure	Restore Wetlands Habitat Diversity	Restore Fish Habitat	Restore Dabbling Duck Feeding Habitat				
	Reduce Sediment Deposition	Increase Deep Water Areas, Reestablish Fish Access	Flood Protect Food Plots	Increase Moist-Soil Plant Acreage	Provide Independent Water Control	Increase Mast Trees Acreage	Provide Invertebrate Food Source
Plan A No Federal Action	N	N	N	N	N	N	N
Plan B Wetlands Protection System	Y	Y	Y	Y	Y	Y	Y

Measure	Restore Wood Duck Rearing Habitat		Restore Canada Goose Feeding Habitat	Restore Forest Habitat
	Reduce Dry Out Conditions	Improve Meander Scars	Improve Fall Watering of Crop Fields	Increase Mast Trees
Plan A No Federal Action	N	N	N	N
Plan B Wetlands Protection System	Y	N	Y	Y

N = Little or no contribution to planning objective; S = Some contribution to planning objective; Y = Important contribution to planning objective.

TABLE 5.7

PLANS EVALUATION SUMMARY

Plan	Criteria				Rank
	Completeness	Effectiveness	Efficiency	Acceptability	
Plan A No Federal Action	L	L	L	L	L
Plan B Wetlands Protection System	H	H	H	H	H

represent an irreversible, catastrophic adverse impact on the river's ecosystem.

79 d. Plans Developed. Two major plans were considered. These plans were formulated by combining one or more of the above described measures.

(1) Alternative A - No Federal Action. This plan consists of a single measure, the no action measure. Under this plan, no Federal funds would be provided to meet the project purposes.

(2) Alternative B - Wetlands Protection System. This plan is a composite of all measures surviving the measures evaluation. Each measure is included in its optimized configuration per the Section 5.C discussion. The measures are selective deepwater dredging, riverside dike/berm, exterior and interior water control structures, the clearing of shoreline vegetation, interior berms, pumps, and forest management plan.

e. Plans Evaluated.

TABLE 5.6 provides a summary comparison of the various plans in relationship to the project planning goals and objectives, and TABLE 5.7 provides an overall plan evaluation summary. Alternative A was rejected, since it would do nothing to address the stated planning objectives.

Alternative B was found to be fully responsive to the project objectives. It would restore habitat diversity lost to sedimentation by removing some of the prior sediment deposition, and by reducing the amount of future deposition. Fish spawning and overwintering habitat would be improve via the reestablishment of fish access between the river and the site's interior. Overwintering habitat would also be improved by the creation of deepwater refuges. Dabbling duck habitat would be improved by increasing areas available for waterfowl food sources by independent water control of the lake compartments, by the elimination of shoreline woody vegetation, by the reestablishment of mast trees, and by improved dewatering capability. Pumping capability at Squaw Island would help assure adequate water levels for wood duck brood rearing. Improved sheet water retention would restore habitat for the canada goose. Increased mast tree production would also help restore forested wetlands habitat diversity for many non-waterfowl wildlife species.

Based on the earlier measures evaluation, all measures included in Plan B were judged to be engineeringly and biologically effective.

Cost effectiveness analysis and incremental cost analysis have become required and helpful tools in the evaluation of environmental projects. The tool of cost effectiveness analysis enables planners to impose economic efficiency on the cost (production) side of the equation by assuring that a range of cost effective plans are identified. This economic tool can ensure that either a set level of environmental output is produced for the least cost possible, or that for a set level of expenditures, environmental output production is maximized. Although the cost analyses do not provide a discrete decision criterion (such as the maximization of net benefits in NED analysis), incremental cost analysis provides for the explicit comparison of the relevant changes in costs and outputs on which such decisions may be based (IWR Report #95-R-1, May 1995, "Evaluation of Environmental Investments Procedures Manual-Interim: Cost Effectiveness and Incremental Cost Analyses").

The process utilized is termed "Nine Easy Steps" and these steps are summarized below.

Plan Formulation Steps:

1. Display Outputs and Costs of Management Measures
2. Identify Management Measure Relationships

3. Add Costs and Outputs of Combinations

Cost Effectiveness Analysis Steps:
4. Identify "Production Inefficient" Solutions
5. Identify "Production Ineffective" Solutions

Incremental Cost Analysis Steps:
6. Calculate and Display Incremental Costs

Additional Analytical Steps to Assist in Scale Selection:
7. Calculate Change in Unit Cost from No-Action Plan to all other plans
8. Recalculate Change in Unit Cost from Last Selected Plan
9. Tabulate and Display Incremental Costs of Selected Plans

When completing the analysis, the District first analyzed the output and cost data on a wildlife habitat unit (WHAG) basis. Then, given the recommended level of WHAG output, similar steps were taken to analyze the project from the perspective of aquatic habitat (AHAG).

During the WHAG only analysis, the plan which had the lowest Average Annual Cost per WHAG was one that produced 369 WHAG units. Under normal circumstances, if the project could be reproduced elsewhere, for example if there were no limit of critical input resources (in this case, land available to support similar projects), the plan which produced the 369 units at the lowest Average Annual Cost per WHAG would probably be a good recommendation. However, this project could not be reproduced elsewhere. The project site was geographically limited and contained several unique features. The Incremental Cost Curve was utilized to determine the overall project scale. As mentioned, the smoothed Incremental Cost Curve revealed slight increases in unit incremental costs until 544 WHAG units at which point the unit incremental costs increased at a rapidly increasing rate.

To incorporate other important planning considerations such as implementability, effectiveness, and completeness, the plan which produced 546 WHAG units at an average annual cost of $157,100 was recommended by the study team. This plan, which produced 546 WHAG units, was included within the 109 plans which the analysis showed to be cost effective and efficient.

The WHAG efficient plan utilizing only the WHAG output as the significant factor resulted in a WHAG output of 546 units and an AHAG output output of -6 units at an annual cost of $157,100. The Recommended Plan also produced WHAG output of 546 units. However, it also produced an AHAG output of 129 units for a total average annual cost of $215,500. This plan is an efficient plan for producing the 129 units of AHAG output given the 546 units of recommended WHAG output. The Recommended Plan resulted in a net increase of 135 AHAG units (129 with the Recommended Plan versus -6 AHAG units with the WHAG Efficient Plan) for an incremental cost of $58,400. After analyzing all data, the Recommended Plan is economically efficient. The FIGURES 5.11 and 5.12 depict the WHAG incremental and average annual cost curves and FIGURES 5.13 and 5.14 depict the incremental and average annual cost curves for AHAG output given the recommended level of 546 WHAG output.

The local sponsor (IDNR), and the USFWS have found Plan B to be generally acceptable. For this reason, and for the other reasons stated above, Plan B has been designated the Selected Plan for the project.

81

FIGURE 5.11

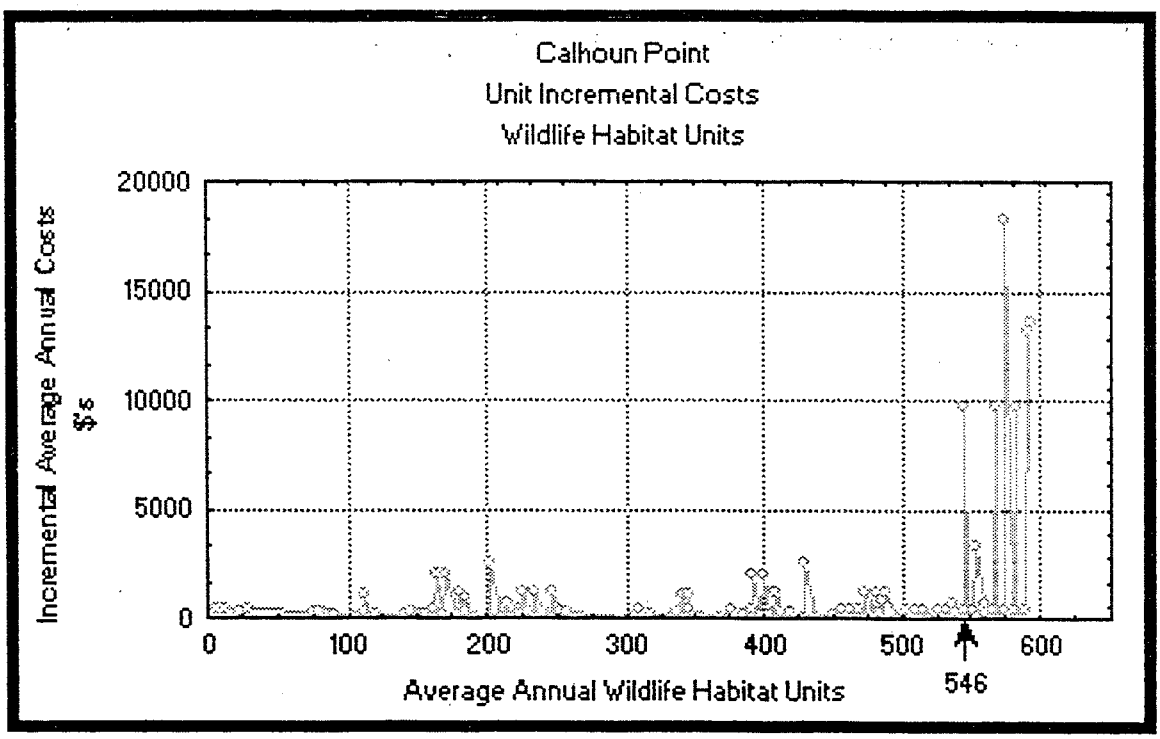


FIGURE 5.12

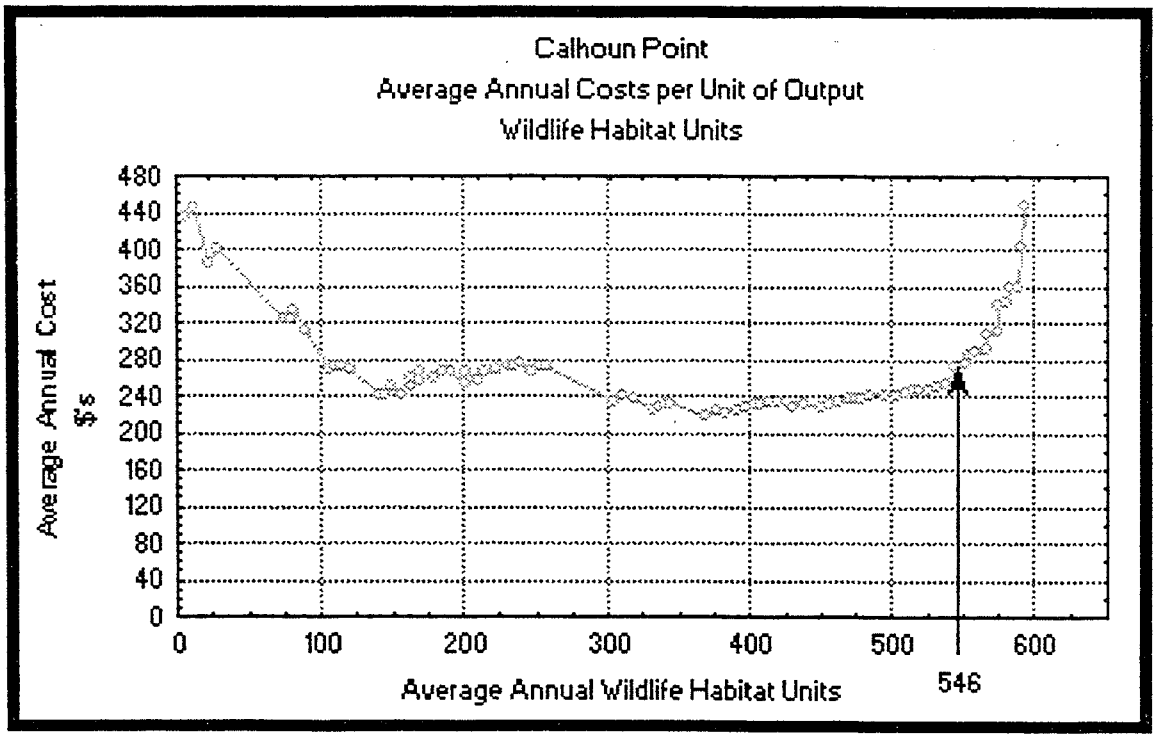


FIGURE 5.13

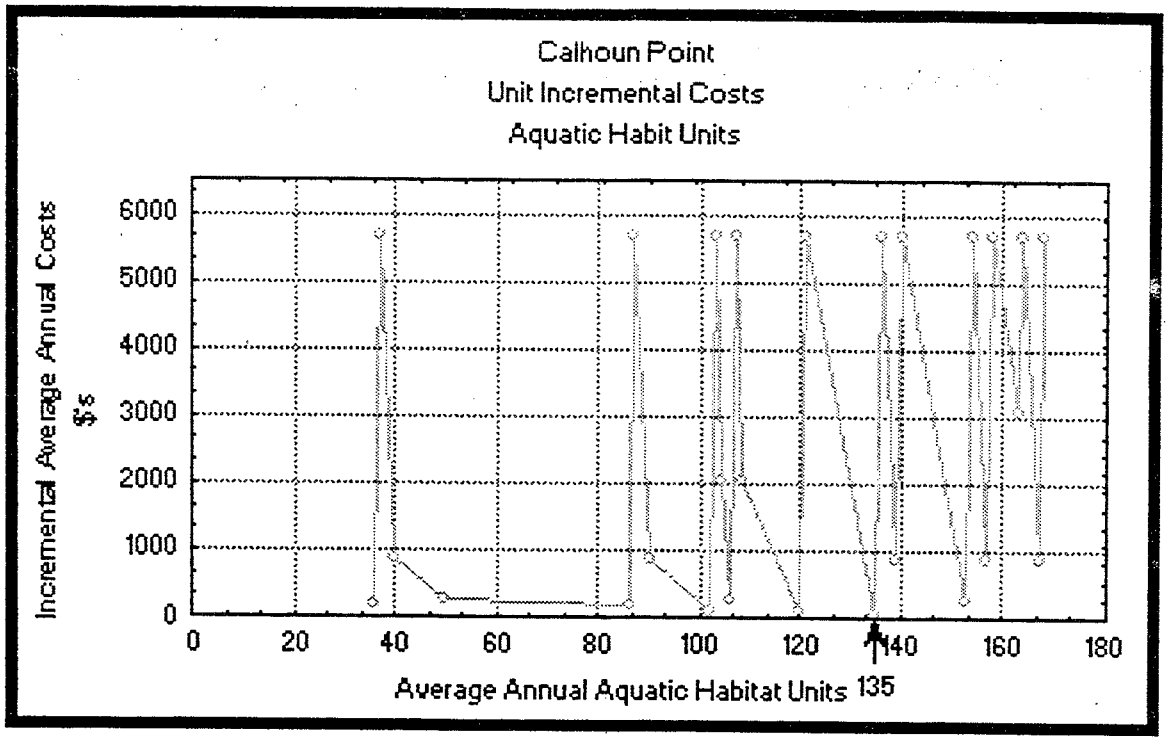
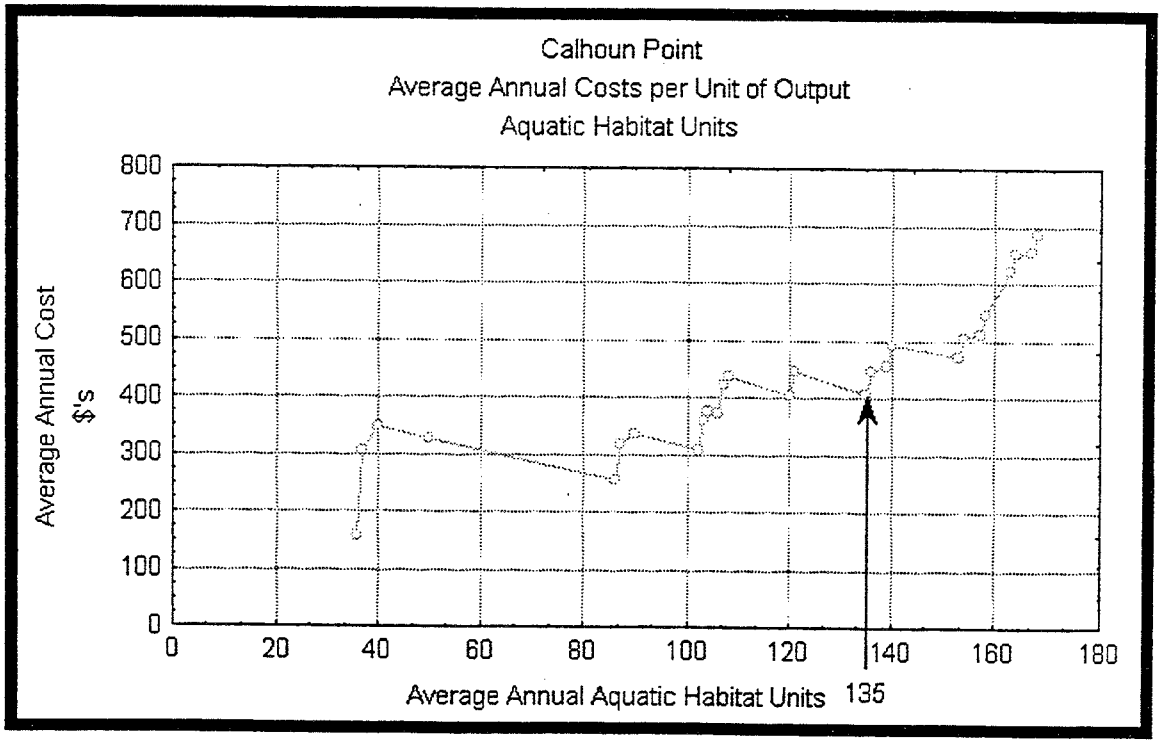


FIGURE 5.14



6. SELECTED PLAN WITH DETAILED DESCRIPTION.

a. Plan Components. The following is a general description of the Selected
83 Plan. Specific features of the plan are listed in TABLE 6.1 and are depicted in FIGURE ES-1 and Plates 2 thru 15.

(1) Riverside berm. To reduce sediment input to the site, and as a component of water level management, a berm would be constructed adjacent to the site's Illinois and Mississippi River shorelines. Sediment reduction would increase the longevity of the wetlands site, and water control would increase the production and availability of plant and invertebrate food sources to dabbling ducks.

Tree materials remaining after timber salvage will be placed as wildlife and fish habitat structures. Tree piles as wildlife habitat will be created in bottomland forest just land side of the riverside berm. The timber will be placed into piles spaced about 500 feet apart. Fifty tree tops from the proposed clearing for the berm will be placed into Pohlman Slough as fisheries habitat. Tree tops will be placed in the water just off-shore of the west bank of Pohlman Slough at 100 foot intervals for a total distance of 5,000 feet (down to about where the cabins end).

(2) Selective Deepwater Dredging. To increase wintering habitat for riverine fishes, and to serve as a source of water for the goose field pumping operations, 75 percent of Pohlman Slough would be dredged.

(3) Water Control Facilities (including Gates and Pumps).

Exterior Loations: To increase water level independency from the rivers, water control facilities (gates and/or pumps) would be placed at Pohlman Slough, Silver Lake, Chickahominy Lake, and Squaw Island. Water control at Squaw island would be used to improve wood duck brood rearing habitat and/or to provide a green tree management area. To permit fish access to the site, the control structures would be of the open-top variety at the Pohlman Slough and Chickahominy Lake locations.

Interior Locations. To achieve a degree of management independency between the lakes, interior water control facilities (stop-log units) would be placed between Chickahominy and Silver Lakes, and between Chickahominy and Royal Lakes, and between Royal Lake and Pohlman Slough. The open-top design of the interior structures would allow for periodic fish passage between the lakes, and would allow for the movement of O&M boats between the lake compartments.

(4) Clearing of Shoreline Woody Vegetation. To increase the total site acreage available for moist-soil plant production, shoreline woody vegetation would be removed in certain locations at the interior sloughs. The targeted acreage is 169 acres (10 percent of the site's total terrestrial habitat), but in actuality it probably will be less given the fact that about 50 percent of the trees within the site have died as a result of the 1993 flood.

(5) Interior Berms (and associated Stoplog Units and Pump). To improve the production and availability of food crops at the Goose fields area, improved fall innundation and summer drainage would be provided via the installation of two small earthen embankment structures and associated stop-log devices. A small pump unit would also be included as an aid to water control.

(6) Forest Management Plan. To reestablish the presence of mast trees as an important component of the Calhoun Point forest habitat, mast tree plantings would occur at dredge material disposal sites, in certain existing crop fields, and within bottomland forest where pin oaks have died as a result of the 1993 flood. A detailed description of the forest management plan

TABLE 6.1. COMPONENTS OF THE SELECTED PLAN 1/

1. RIVERSIDE BERM
   - Structure is in 3 segments totaling 30,100 feet. Below are features common to all 3 segments, and then those that are specific to each segment.

   a. General Features.
      - Earthen enbankment structure (from borrow material) with 1 on 3 side slopes.
      - Top of berm with 6-inch aggregate road course.
      - Crown width of completed structure is 10-foot (8-foot for road bedding).
      - Cleared trees (unsalvaged timber) placed as habitat structures:
        - 50 tree tops placed off west shore of Pohlman Slough, beginning at 200 foot intervals for 10,000 feet.
        - Remaining unsalvaged timber placed as brush piles landward of berm, spaced 500' apart.

   b. Specific Features.

      (1). Illinois River Segment
         - Segment lies between Il. R.M. 2.2 and 3.25, extending from high ground south of Brussel's Ferry along Pohlman Slough to the river confluence.
         - Crown elevation along entire berm segment is 424 NGVD (net grade).
         - C-stone riprap placed near Il. R.M. 2.5 for a distance of 1,800'
         - Height of segment varies from 1 to 5 feet (3' average)

      (2). Mississippi River Segement
         - Segment lies between Miss. R.M. 219.5 and 223 totaling 18,500 feet.
         - Structure slopes from crown elevation 426 NGVD (net grade) at Miss. R.M. 223 to crown elevation 424 NGVD at Miss. R.M. 219.
         - C-stone riprap placed near Miss. R.M. 220 for a distance of 1,800'
         - Height of segment varies from 1 to 6 feet (4' average)
         - Lower section between Miss. R.M. 220.3 and 219.9 (2,000 feet) serves as an overflow structure, and is protected by B-stone, top elevation 423.5 NGVD

      (3). Royal Landing Access Road Segment
         - Starting at Miss. R.M. 223, this 3,000' berm flank ties into high Royal Landing access road.
         - Crown elevation along the entire segment is 426 NGVD (net grade).
         - Height of segment varies from 0 to 2 feet (1' average)

2. SELECTIVE DEEPWATER DREDGING
   - Hydraulic dredging of 75% of Pohlman Slough (50' wide, 10,200' long, cut 2 to 4' deep)
   - See also item 3 approach channel dredgings described below

3. WATER CONTROL FACILITIES (INCLUDING GATES AND PUMPS)
   a. Exterior Locations

      (1) Pohlman Slough Facility
         - Unit consists of 22'5" wide open-top concrete channel. One-half of channel with stop-logs, the other half fitted with two 42" sluice gates.
         - 10,000 CY excavation for drainage approach channel.
         - Top of control unit covered with a steel grate for vehicle passage.
         - Elevation of 416 NGVD for stop-logs, and 418 for sluice gates
         - Water levels monitored with staff gauges located riverside and lakeside of water control unit.

TABLE 6.1 (Ctd)

(2) Silver Lake Facility
- 48,000 GPM output pump permanently mounted, with 407 HP portable diesel power plant, fueled from 1,000 gallon portable fuel tank.
- Pump intake elevation is 414 NGVD, with invert of 42" discharge pipe at elevation 420 NGVD.
- Fish screen included with 1.5" x 1.5" mesh

(3) Chickahominy Lake Facility
- Basic unit consists of 22'5" wide open-top concrete channel. One-half fitted with stop-logs, the other half with two 42" sluice gates.
- Top of unit covered with a steel grate for vehicle passage.
- Elevation of 416 NGVD for stop-logs, and 418 for sluice gates.
- Water levels monitored with staff gauges located riverside and lakeside of water control units.
- 48,000 GPM input pump permanently mounted, with 407 HP portable diesel plant, fueled from 1,000 gallon portable fuel tank.
- Pump intake elevation is 414 NGVD, with invert of 42" discharge pipe at elevation 422 NGVD.
- 12,600 CY excavation for drainage approach channel.

(4) Squaw Island Facility
- Unit consists on one 42" diameter CMP gravity drain with sluice gate.
- 5,000 GPM portable pump with portable drive unit, fueled from 500 gallon portable fuel tank (with fish screens placed at discetion of IDNR).
- 4,400 CY excavation for drainage approach channel.

b. Interior Structures

(1) Chickahominy/Silver Lake Facility
- 8' wide stoplog structure, without grate for vehicle passage.

(2) Chickahominy/Royal Lake Facility
- 8' wide stoplog structure, with grate for vehicle passage.
- 6,300 CY excavation for drainage approach channel.

(3) Royal Lake/Pohlman Slough Facility
- 8' wide stoplog structure, without grate for vehicle passage.

4. CLEARING SHORELINE WOODY VEGETATION.
- Removal of young willow/silver maple vegetation (using herbicide) to the extent of 10% of the site's total terrestrial habitat acres, or 169 acres.

5. INTERIOR LEVEES (AND ASSOCIATED STOPLOG UNITS)
- 3,200 CY of embankment placed strategically across two goose fields topographical depressions--crown elevation 426 NGVD.
- 3' wide stoplog structures (2), floor elevation 421 NGVD.
- 5,000 GPM portable pump and drive unit (with wire fish screen at discretion of IDNR).

6. FOREST MANAGEMENT PLAN
- Mast tree plantings (e.g. pin oaks) on 25 acres of dredge material disposal site.
- Mast tree plantings on 90 acres of existing crop fields.
- Mast tree plantings within 115 acres of forest killed by 1993 flood.

TABLE 6.1 (Ctd)

7. OTHER FEATURES

a. Borrow Areas

- Approximately 41 acres of Federally owned lands have been designated for use as borrow areas during project construction. To extent possible, these borrow areas will be placed and configured so as to enhance wetlands value.

b. Site Access Control Gates
- Access control gates would be placed at one point near the Pohlman Slough exterior water control structure, and the other across the levee road in the vicinity of the Royal Landing parking lot.

c. Dredge Disposal Sites
- 25,000 CY of embankment, 3' high, 25 acres.

follows. Planting will occur during spring (1 March - 15 April) and/or fall (1 October - 15 November).

87 (a) Reforestation of Cropland and Disposal Sites. One hundred fifteen (115) acres of cropland and disposal areas will be reforested. Of the 269 acres of cropland within the project area, 110 acres will be planted with mast trees to improve bottomland forest species abundance and diversity, and to improve wildlife habitat. The cropland to be planted consists of eight parcels (see FIGURE 5.10): the two dredge material disposal areas by Pohlman Slough (8 and 13 acres), two previously planted areas in which seedlings died due to the 1993 flood (5 acres by Pohlman Slough, 4 acres by Squaw Island), a small area along the Royal Landing access road (5 acres), a long skinny portion of a field next to Pohlman Slough (8 acres), and two large fields west of "Goose Field" and along the county road (67 acres). The 5-acre disposal area located at the tip of Calhoun Point will also be planted.

Tree planting at Calhoun Point will be done using an experimental approach wherever possible. Planting on "high" cropland (above 424 NGVD), which will affect about 80 acres including the disposal areas, will consist of a control (bare-root seedlings only), and two treatments (bare-root seedlings with tree shelters, and 2 gallon containerized seedlings). Seedlings will be on a 20 by 20 foot spacing. One large seedling will be planted for every four small seedlings. One tree shelter will be placed around every third small seedling. For areas below elevation 424 feet NGVD (about 30 acres), seedlings in 2-gallon containers will be planted on a 20 by 20 spacing.

In all areas to be planted, a ground cover of wheat, switchgrass, and redtop will be established first to minimize the potential for competition from woody invaders such as cottonwood and silver maple. The groundcover between the tree seedlings will be mowed annually, and herbicide will be applied twice a year to control undesirable herbaceous vegetation. Mowing and herbicide applications will occur each year for a period of six years following planting to ensure that tree seedlings have a good chance of survival.

Natural regeneration was determined to not be desirable for two reasons. The seed source of hard mast species, such as the oaks and pecan, is believed to have been much reduced because of the flood of 1993. Also, tree species such as silver maple and cottonwood would outcompete any natural recolonization by hard mast species. Tree species to be planted are native to Calhoun Point, and include pawpaw, river birch, pecan, shellbark hickory, sugarberry, hackberry, stiff dogwood, hawthorne, persimmon, water locust, honey locust, Kentucky coffee tree, bur oak, pin oak, and swamp white oak. All of these species will be planted in areas above 424 feet NGVD, whereas only river birch, persimmon, and water locust will be planted in areas below 424.

The three disposal areas will contain up to three feet of hydraulically dredged sediment. Lack of drainage within dredged material placement sites hindered reforestation efforts at the Rock Island District's Brown's Lake project in Jackson County, Iowa, where sediments measured 6 to 8 feet deep (USACE, 1993). Drainage was facilitated by construction of a drainage ditch through the site. A drainage ditch within each of the three disposal areas at Calhoun Point may be required.

(b) Tree Plantings within Existing Forest. Like reforestation of cropland, tree plantings in bottomland forest will also be experimental. One hundred and fifteen (115) acres of forest will be planted with 2-gallon containerized seedlings in areas predominated by pin oak that were killed by the flood of 1993. The total area of plantings was determined by multiplying the estimated area of bottomland forest supporting hard mast species (230 acres of "high" bottomland forest above elevation 424) by the estimated percent mortality of all trees within the project area (50 percent). Planting

of containerized seedlings in forest clearings will include a control (planting with herbicide application only) and one treatment (planting with mechanical clearing of small dead trees, establishment of groundcover, and herbicide application). These two conditions will each involve half of the forest area to be planted. 88

A typical area to be planted, including clearings, will vary in size from about 8 to 10 acres, and will be located above elevation 424 feet NGVD. There will be about 12 to 14 planting areas, scattered across the project area, and they are likely to be long and narrow, as dictated by local topography. The exact location of planting areas is not known yet, but will be determined prior to the plans and specifications stage.

Within half of the planting areas, small trees (8 inches diameter at breast height or smaller), vines, and brush will be mechanically cleared primarily to reduce shading, but also to make mechanical planting equipment more accessible. Larger trees will remain undisturbed to provide snag habitat and partial shade for seedlings to be planted. Each planting area will be sprayed with an herbicide to kill invading tree seedlings that could compete with seedlings to be planted. A groundcover of wheat, switchgrass, and redtop will be established within each clearing to further reduce the potential for competition from woody species like cottonwood and silver maple. However, it is expected that some individuals of woody invaders will survive to maturity, and this is desirable because they will complement the species to be planted.

Tree species to be planted are native to Calhoun Point, and include pawpaw, pecan, shellbark hickory, sugarberry, hackberry, stiff dogwood, hawthorne, persimmon, honey locust, Kentucky coffee tree, bur oak, pin oak, and swamp white oak. To maximize seedling survival, trees will be planted in areas that supported pin oaks prior to the 1993 flood. Material to be planted will consist of seedlings in 2-gallon containers, and they will be planted at least 15 feet apart and 20 feet from any forest edge.

The groundcover in between the tree seedlings will be mowed twice annually for the first three years. At about year ten or twelve, oak seedlings will be released from any shady conditions that would eventually lead to their mortality. Any overhanging canopy will be cleared to allow direct sunlight to reach the ground.

(7) Other Features. Two sites within the project area have been identified for borrow. Borrow activities have been designed to avoid or minimize impacts to higher elevations. Higher elevations offer the greatest protection from flooding and the best chances of seedling survival if these areas are ever reforested with mast tree species in the future. Earthen material taken from the borrow area in the goose field will come mostly from the lower elevations within this site (see PLATE 2), and most of the area above 424 feet NGVD will be avoided. The borrow area adjacent to the Royal Landing access road (see PLATE 3) consists entirely of high ground (426 feet NGVD and higher), and only one foot of earthen material will be removed from it. With regard to nonforested wetlands, about one foot of material will be removed from the goose field borrow area, which will provide a larger area to be artificially flooded in the fall to attract Canada geese.

b. Design Considerations.

(1) Structural/Mechanical/Electrical Considerations.

The design requirements established for each of the alternative project measures is provided by TABLE 5.1. The actual components of the Selected Plan are described in Section 6.a. above and in TABLE 6.1. The project has no electrical components.

The rationale for the structural/mechanical design decisions is included

in: Section 5.C.(5) for the dike/levee structure (including aspects of structure alignment, elevation, construction method, slope stability, erosion control, overflow zone, and vehicle passage); Section 5.C.(9).a for the exterior water control structures (including combination stop-log/sluice gate structure vs gated CMP structure, open-top vs closed-top structures, roller gate and radial arm strucutres, structure location, and boat access control gate); Section 5.C.(9).b. for the interior water control structures (locations, stop-log vs gated CMP type structures); interior levees (location, stop-log structures, gantry cranes), and pumps (locations, capacity, fish screens).

89

(2) Substrate Exploration Data. Drillers advanced 22 borings with a drill rig using auger and rotary methods. Where conditions prohibited access by the drill rig, 14 borings were made using a hand-held power auger. The exploration program revealed that the stratigraphy of both the Illinois and Mississippi River reaches consists of a layer of lean clays overlying a coarse grained substratum. The overburden is 41 to 78 feet thick and is underlain by bedrock. Specific data for these reaches, and the locations of the interior structrues and borrow pits are provided by APPENDIX DPR-F.

(3) Soils Testing Program. Atterberg limits were determined for all fine grained samples, the grain size distribution of all coarse grained samples, the moisture density curves for compacted borrow pit samples, and the unconfined compression strength of selected undisturbed and compacted samples. The field logs and results are provided in APPENDIX DPR-F.

(a) Earthen Embankment. No detailed slope stability analyses were performed. The embankments for this project would be constructed of semicompacted earthen materials obtained from the identified borrow pits. The embankments would be 4 to 6 feet high and would be required to hold back no more than 2-feet of differential head. Based on experience with two other similar EMP projects in the region, the shear strengths of the foundation and compacted clays are judged to be adequate to perform their desired function. Bearing capacity, settlement and lateral earth pressures analyses will be performed for the pump stations, gravity drains and other various water control structures during the Plans and Specifications phase of the project. The exploration and testing program provides all the information necessary to complete these detailed analyses.

(b) Underseepage. No detailed underseepage studies were performed for this project. The overlying blankets appear thick enough to prevent significant volumes of underseepage from entering the system at the design differential heads.

(4) Historic Properties. The proposed limits of the goose field borrow pit has been designed to avoid each of the five identified archaeological sites.

c. Construction Considerations.

(1) Water Control Facilities. The District will determine the construction dewatering requirements during the Plans and Specifications phase.

(2) Endangered Species. To avoid impacts to three Federally endangered and threatened species, the District will place special conditions on the contracted work, as found in the three following paragraphs enclosed in quotations. The contracting officer will ensure appropriate compliance.

(a) Wintering Bald Eagles. Most construction activities would likely take place outside of the winter months. In addition, consideration (in coordination with the USFWS) will be given during the preparation of Plans and Specifications to sequencing construction activities in a manner that will

will be included as part of the contract specifications. The special condition for the bald eagle states:

"No construction work or activity, located within 500 feet of any night roosts, will occur during the day or night while bald eagles are present during the winter and using the roosts. Such work will be postponed until the eagles leave the area. This includes but is not limited to tree clearing. Although no bald eagle nests now occur within the project area, if a nest is encountered, then a management plan will be developed and implemented in accordance with the U.S. Fish and Wildlife Service's recovery plan for the bald eagle." 90

(b) Indiana Bat. The special condition for the Indiana bat states: "The felling of trees greater than 9 inches diameter at breast height will be scheduled during September through April, which is outside the period May 1 - August 31, when Indiana bats are known to inhabit summer habitat. If for any reason clearing of trees greater than 9 inches diameter at breast height has to be carried out during the period May 1 - August 31, a site visit will be conducted first by a team of biologists to determine if any roost trees are among those proposed to be felled. The team will consist of representatives from the Illinois Department of Natural Resources, U. S. Fish and Wildlife Service, and St. Louis District. The District will enter into section 7 consultation with the U. S. Fish and Wildlife Service if removal of a roost tree during the period May 1 - August 31 is proposed."

(c) Decurrent False Aster. The special condition for the decurrent false aster states:

"Although the decurrent false aster is not known to occur within the project area, if it is encountered during the construction phase, then construction activity will cease immediately and the U.S. Fish and Wildlife Service will be notified."

(3) Waterfowl. Consideration will be given during the preparation of Plans and Specifications to sequencing construction activities in a way that minimizes the disruption of resting and feeding waterfowl during the fall and early winter period.

(4) Historic Properties. In the unlikely event that archaeological remains are inadvertently uncovered during the completion of the project, all construction activities in the immediate vicinity of the find shall be halted until a determination of the significance of such remains has been completed. Such evaluations shall include coordination and input from the State Historic Preservation Officer.

(5) Permits. A number of permits are required by the IEPA. Section 401 water quality certification has been granted and is included as part of APPENDIX DPR-C. A NPDES permit for storm water discharge will be obtained 48 hours in advance of the initiation of construction, as required by the IEPA. A request for a permit to burn trees in the open air at the site will be submitted to IEPA prior to construction. An IEPA aquatic pesticide permit shall be applied for prior to construction. permit has been requested from the IDNR (see APPENDIX DPR-B request), and will be obtained prior to the initiation of any project construction.

A waterways permit has been requested from the IDNR (see APPENDIX DPR-B request), and will be obtained prior to the initiation of any project construction.

d. Operation, Maintenance and Rehabilitation. The Operation, Maintenance and Rehabilitation responsibilities of the project sponsor, IDNR, are described below. Maintenance is defined as the repair and replacement associated with hydrologic events (including minor storm and flood events) that do not exceed

the level of design for the project. For Calhoun Point, this level of design has been designated as the top elevation of the berm structure (elevation 424 NGVD). (In the project area, river stages would remain at or below this level
91 more than 67 percent of the time.) Consequently, such operation and maintenance responsibilities shall include, but are not limited to, the following:

(1) The sponsor (including representation from the IDNR Division of Fisheries) shall prepare annual management plans which incorporate operational activities including water control and manipulation, plantings, day-to-day project observation, inspection, record keeping, visitor monitoring, vegetation control and planned maintenance activities. (The Plans shall be mutually agreed upon between the sponsors and the U.S. Army District Engineer in charge of the administration of the project, and may be amended as necessary.) A site regulation plan for water control is provided by APPENDIX DPR-N. This planning effort will give consideration to both waterfowl and fisheries benefits. This plan will undergo further coordination and refinement.

(2) The sponsor (including representation from the IDNR, Division of Fisheries) shall operate project features, such as the gates and pumps, to insure accomplishment of the Management Plan.

(3) The sponsor shall not collect any fees other than the state hunting and fishing game license and the state waterfowl blind draw fees. No fees may be charged for the ingress and egress of these areas for the purpose of hunting and fishing.

(4) The sponsor may use the project for the production of crops to provide food for wildlife, as permitted by current agreements regarding General Plan Lands.

(5) The sponsor shall provide all operation and maintenance of project features in accordance with manufacturer data and Corps of Engineers recommendations. (The Corps of Engineers will provide manufacturer O&M requirements for all manufactured components of the project, as well as "As Built" drawings and shop drawings for all facilities constructed, as soon as possible after construction is complete.)

(6) The sponsor will perform routine berm and closure maintenance, which includes mowing the berm (to 10 feet beyond the berm toe) once a year, in the fall; removal and/or control of unwanted vegetation from the berms; removal of all debris; some rock material repair, unwanted reshaping of the surface of the existing berm slopes to eliminate gullies, and/or shallow depressions resulting from the normal "peeling action" that occurs from overtopping and/or wave action; rodent control; inspection; and litter removal.

(7) The sponsor shall provide routine structural maintenance, which includes painting of metal items; removal of vegetation from expansion, contracting, and monolith joints; day-to-day inspection; sealing and caulking of various joints; vandalism obliteration; and road grading.

(8) The sponsor shall provide routine mechanical/electrical maintenance, which includes lubrication, oil changes, inspections of equipment, touch-up painting, testing of equipment, record-keeping, and vandalism repairs.

The Corps of Engineers will inspect the project at least annually to determine the status of operation and maintenance being performed by the sponsor. Representatives of the sponsor will be invited to attend. The inspection will follow procedures outlined in the latest issue of DIVR 1130-2-304 entitled "Project Operations - Maintenance by Local Interests." The report following this inspection will serve as a basis for the sponsor and/or Corps of Engineers (in the case of rehabilitation) to make required repairs and/or

changes to the Operation and Maintenance procedures. In addition, the Corps of Engineers may also make periodic inspections at various intervals for the purpose of determining compliance with the approved Annual Management Plan by the sponsor. 92

The Corps of Engineers and the sponsor will cost share 75/25 percent any mutually agreed to rehabilitation of this project. Rehabilitation shall be considered any reconstructive work needed in excess of estimated annual O&M as a result of specific storm or flood events which exceed the design event. For Calhoun Point, rehabilitation features consist of the following:

--- Interior drainage ditch dredging consisting of subsurface excavation of sediment deposited as a result of hydrologic events exceeding the design event and necessary for wildlife habitat and other environmental features of the original project design;

--- Riverside berm structure repair of damaged areas within the zone of riprap protection which requires the purchase of new riprap and/or bedding material, and;

--- Earthen embankment repair, including the obtaining, placement and compaction of suitable impervious material in the damaged areas. (Damaged areas extending less than four inches below the "as-designed" surface of the earthen embankment are considered routine berm maintenance.)

The proposed project is located on lands managed as a National Wildlife Refuge by the IDNR under a Cooperative Agreement with the USFWS. The USFWS Regional Director and the District Commander will sign a Memorandum of Agreement for Enhancing Fish and Wildlife Resources addressing the relationships, arrangements, and general procedures under which the USFWS and the Department of the Army will operate in constructing, operating, maintaining, and rehabilitating the project.

Upon completion of construction, an Operation and Maintenance Manual will be prepared and signed by both the USFWS and the District Commander. This manual will provide specific requirements for operation, maintenance, and rehabilitation of the project; as-built drawings; shop drawings; manufacturer's operation and maintenance manuals; and, specific procedures for project review and inspection, rehabilitation, abandonment, improvements or alteration.

The Corps of Engineers recognizes that this HREP project is experimental in nature and that its operation contains an inherent element of uncertainty. While the joint formulation of this project with the IDNR and USFWS has ensured that most problems have been addressed, the current state-of-the-art is going to leave some questions unanswered until project operation begins. This is one of the HREP program's strengths - the fact that there is latitude to try things which are new and untested. In the same vein, if the operation of the project as set forth in the DPR proves unworkable, the St. Louis District will work with the sponsors to correct the problem through structural alteration of the project, or to modify the management approach. The project's Operation and Maintenance Manual will also provide for the worst case as follows: "... upon mutual agreement by the parties involved, and when costs of operation, maintenance, repair and rehabilitation are substantially in excess of the DPR's estimates, the project shall be abandoned."

e. Project Performance Evaluation Monitoring Plan. The purpose of this section is to summarize the performance evaluation aspects of the project. The principal types, purposes, and responsibilities of project evaluation are presented in TABLE 6.2. The plan for post-construction qualitative field observations and quantitative measurements are presented in TABLE 6.3. To the extent possible, methods will be standardized with the methods used for other

TABLE 6.2

MONITORING AND PERFORMANCE EVALUATION MATRIX

Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
Sedimentation Problem	System-wide problem definition. Evaluates	USFWS	USFWS (EMTC)	LTRM	Leads into pre-project monitoring; defines desired conditions for plan formulation.
Pre-project Monitoring	Identifies and defines problems at HREP site. Established need for proposed project features.	Sponsor	Sponsor	Sponsor	Attempts to begin defining baseline. See DPR Sections 2 and 3.
Baseline Monitoring	Establishes baselines for performance evaluation.	Corps	Field station or sponsor thru Cooperative Agreements or	LTRM	Appendix DPR-L shows the locations of and sites for physical/chemical data collection.
Data Collection for Design	Includes identification of project objectives, design of project, and development of performance evaluation plan.	Corps	Corps	HREP	Comes after the fact sheet. This data aids in defining the baseline. See DPR Sections 4-7 and 13.
Construction Monitoring	Assesses construction impacts; assures permit conditions are met.	Corps	Corps	HREP	Environmental protection specifications to be included in construction contract documents. Inter-agency field inspections will be accomplished during project construction phase.
Performance Evaluation Monitoring	Determines success of project as related to objectives.	Corps (Quantitative) (field observations).	Field station or sponsor thru sponsor Cooperative Agreement, sponsor thru O&M, of Corps.	LTRM	Comes after construction phase of project. See DPR Section 13.
Analysis of Biological Responses to Projects	Determine critical impact levels, cause-effect relationships, and effect on long-term losses of significant habitat.	USFWS	USFWS (EMTC)	LTRM	Problem Analysis and Trend Analysis studies of habitat projects.
	Demonstration success or failure of habitat	Corps	Corps/USFWS/ (EMTC)/Others	LTRM	Biological Response Study results from Swan Lake HREP will be reviewed for possible implications on likely success of similar features at Calhoun Point.

TABLE 6.3

ANNUAL POST-CONSTRUCTION
PROJECT PERFORMANCE EVALUATION

Goals	Objectives	Unit of Measure 2/	Enhancement Feature	Field Observation	Quantification Procedure	Quantification Intervals
Restore habitat diversity	Reduce sediment deposition	Inches of sediment deposition over 50-year project life	Riverside berm, Selective deepwater dredging	Evidence of recent sediment deposition	Perform survey cross-sections for lake sedimentation using same locations as previous site surveys ('92, '93)	First year post-construction, last year of program
Restore fish habitat	Increase deep water areas, reestablish fish access	Acres of water >7' deep	Selective deepwater dredging	N/A	Determine functional acres achieved	First year post-construction
		Weeks of fish access allowed	Water control structures	Note time periods gates left open	Sponsor provides data on periods gates were left open each year	Continuous until end of program
Restore dabbling duck feeding habitat	Flood protect food plots	Number of crop damaging flood events	Riverside berm	Evidence on plant survival	Sponsor provides data on periods of crop failure, examination of stage hydrographs vs berm height	Continuous until end of program
	Increase moist-soil plant acreage	Acres of plants	Clearing shoreline woody vegetation	General observations on change in aerial extent of plant cover	Determine change in habitat acres	Accomplished at same intervals as the WHAG/AHAG analyses
	Independent lake management	Number of units		Observations on success of differential plant production between the mangement units	Note number of functional units	Continuous until end of program

TABLE 6.3

Goals	Objectives	Unit of Measure 2/	Enhancement Feature	Field Observation	Quantification Procedure	Quantification Intervals
Restore dabbling duck feeding habitat	Reestablish mast trees	Acres planted	Forest management plan	N/A	Determine acres of trees planted	First year
		Percent tree survival	Forest management plan	Field notes on the general magnitude of plan survival	Determine percentage of trees surviving	Continuous until end of program
	Improve dewatering capability	Percentage of growing season water elevation can be held at or below 418 NGVD	Selective deepwater dredging, pumps	General statements regarding present vs past capability to drawdown site	Comparison of before and after project percent of growing season water elevation held below 418 NGVD	Continuous until end of program
	Create green tree area	Acres managed to elevation 422 NGVD	Water control structure (Ext.)	Maintain periodic records showing water elevation relative to 422 NGVD, include qualitative description of waterfowl response to area	Review sponsor water level management records	Continuous until end of program
Restore wood duck rearing habitat	Prevent dry out conditions	Number of brood rearing seasons without total dry out	Pump	Sponsor records of pump use, water levels, total dry outs in slough	Review sponsor water management data	Continuous
	Lake bottom reconsolidation	Percentage of time water elevation can be held at or below 416 NGVD during any designated drawdown period	Riverside berm, pumps	Stage duration curve developed for lake interior. Input data taken from staff gauges	Review sponsor water management data	Continuous during perior of drawdown

TABLE 6.3

Goals	Objectives	Unit of Measure 2/	Enhancement Feature	Field Observation	Quantification Procedure	Quantification Intervals
Restore wood duck rearing habitat	Reduce turbidity	NTU's during growing	Riverside berm	General notes on apparent water quality improvement	Routine parameter included in LTRM water quality monitoring	Quarterly sampling
	Improve potholes	N/A	No viable features found	N/A	N/A	N/A
Restore Canada Goose feeding habitat	Improve flooding of crop areas	Acres flooded during fall	Interior levees	Maintain water elev. records on the goose fields area	Plot sponsor water elevation records	Continuous for each fall innundated
Restore forest habitat	Reestablish mast trees	Acres planted	Forest management plan	N/A	Determine acres of trees planted	First year
	Increase under-story/groundcover	HSI change attributable to cover increased cover	Riverside berm	N/A	Use WHAG to determine HSI change	First year post-construction and last year of program

HREPs, and with the Upper Mississippi River System - Long-Term Resource Management program, in general.

97 The plan will also include annual monitoring of seedling survival until the end of the EMP-HREP program in 2002 (about 2-3 years of data). Data will be collected to determine if statistically significant differences in percent survival exist between planting conditions within cropland and forest. The most cost effective planting method will also be identified.

f. Real Estate Requirements.

(1) General. All lands needed for project construction are under Federal ownership. They were acquired about 50 years ago by the Corps, and were later designated as General Plan lands. The General Plan, dated March 1961, was approved jointly by the Assistant Secretary of the Army, the Secretary of the Interior and the IDNR; and as prescribed in a Cooperative Agreement, dated February 1963, between the Department of the Army and the Department of the Interior.

The principal objective of this General Plan is to provide optimum habitat for wildlife species. Secondarily, the General Plan lands provide water-related recreation opportunities such as sport fishing, waterfowl hunting and trapping. The Calhoun Point portion of these lands is managed by IDNR in accordance with said plan.

Initially, the Corps' need to regulate river stages for navigation represented an enhancement to the value of the site's fish and wildlife habitat. However, in recent decades, sedimentation has severely impacted this resource. Restoring these habitats via the HREP would provide spawning and rearing habitat for fish, feeding and resting habitat for waterfowl, breeding habitat for wood ducks, and life support to a variety of forested wetland wildlife species. Thus, the proposed restoration is consistent with the provisions of the General Plan.

(2) Operation, Maintenance And Rehabilitation Agreement. The USFWS and IDNR will assure that operation and maintenance (including repair and replacement) will be accomplished in accordance with Section 906 (e). The sponsor's total estimated annual operation and maintenance cost for the project is $42,916. An Operation, Maintenance and Rehabilitation Agreement will be developed during the construction phase of the project which will more specifically define the operation and maintenance requirements for the lake area. In addition, the operation and maintenance agreement documentation for the hillside program will be finalized and signed.

This final DPR (APPENDIX DPR-A) provides the following:

1. A letter from IDNR indicating support for the project, and a statement that the agency will cooperate with USFWS to assure the O&M is accomplished as described in the DPR;

2. A draft OM&R Agreement between the District Commander, St. Louis District and the Regional Director, USFWS;

g. Cost Estimates.

(1) Construction. An estimate of the initial construction costs is presented in TABLE 6.4 (base year dollars) and TABLE 6.5 (fully funded dollars). A more detailed breakdown of base year costs is provided by APPENDIX DPR-P. Project costs were optimized through careful consideration of construction costs versus the environmental benefits of each potential project feature. This process included consideration of berm alignment, height, and construction method; type, number and placement of gated water control structures and pumps, the location and extent of deepwater dredging, the

TABLE 6.4

PROJECT COST ESTIMATE SUMMARY--
BASE YEAR DOLLARS

98

Cost Account No.	Description of Item	Estimated Cost
01.-.-.-	Lands and Damages	$ 18,000
02._._._	Relocations	7,500
06._._._	Fish and Wildlife Facilities	3,031,700
30._._._	Planning, Engineering and Design	1,015,000
31._._._	Construction Management	512,600
	Other*	678,600
	Subtotal	5,263,300
	Contingencies	654,000
	TOTAL PROJECT COST (Base Year Dollars)	$5,917,300

* Field Office Overhead, Mob, and Haul Road; Home Office Overhead; Profit, and Bond.

TABLE 6.5

PROJECT COST ESTIMATE--
FULLY FUNDED DOLLARS

Cost Category		Total Study Costs								
		All Years	Thru FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02
Base Year Dollars	HL	1,720,000	574,000	16,000	0	0	0	360,000	460,000	310,000
	O	4,197,000	0	0	0	0	0	0	2,193,000	2,004,000
	T	5,917,000	574,000	16,000	0	0	0	360,000	2,653,000	2,314,000
Inflation Factors 1/	HL	--	0	0	1.042	1.086	1.131	1.179	1.228	1.280
	O	--	0	0	1.027	1.055	1.083	1.112	1.132	1.156
Fully Funded Estimate	HL	2,043,000	574,000	16,000	0	0	0	437,000	600,000	416,000
	O	4,918,000	0	0	0	0	0	0	2,548,000	2,370,000
	T	6,205,432	574,000	16,000	0	0	0	437,000	3,148,000	2,786,000
Federal Cost Share	HL	2,043,000	574,000	16,000	0	0	0	437,000	600,000	416,000
	O	4,918,000	0	0	0	0	0	0	2,548,000	2,370,000
	T	6,961,000	574,000	16,000	0	0	0	437,000	3,148,000	2,786,000
Local Cost Share	HL	0	0	0	0	0	0	0	0	0
	O	0	0	0	0	0	0	0	0	0
	T	0	0	0	0	0	0	0	0	0

HL = Hired Labor Costs
O = Other Costs
T = Total Costs

1/ Inflation Factors as of April 1996
* Base Year Dollars as of October 1995 price level

(1) Construction. An estimate of the initial construction costs is presented in TABLE 6.4 (base year dollars) and TABLE 6.5 (fully funded dollars). A more detailed breakdown of base year costs is provided by APPENDIX DPR-P. Project costs were optimized through careful consideration of construction costs versus the environmental benefits of each potential project feature. This process included consideration of dike/levee alignment, height, and construction method; type, number and placement of gated water control structures and pumps, the location and extent of deepwater dredging, the extent of shoreline woody vegetation clearings, the extent of mast tree plantings, the number of interior levees at the goose fields area, the presence or absence of pothole excavations and interconnecting ditches. The total project construction cost differs only slightly from that indicated in the original project fact sheet. The reason the difference is that the original cost estimate was based on very preliminary information. The present estimate was developed using current designs and quantity take-offs, recent bid abstracts for projects in the area, detailed cost estimates and estimator judgement. The price level for this estimate is October 1994. The costs estimate was accomplished using the Micro-Computer Aided Cost Engineering System (MCACES). The MCACES details 80 percent of the total construction costs (including labor, materials and supplies, and applies an appropriate contingency to each line item cost).

100

(2) Operation, Maintenance and Rehabilitation. A detailed estimate of operation, maintenance, and rehabilitation costs is presented in TABLE 6.6. These quantities and costs may change during final design. Site operation will involve the regulation of gates and pumps. Maintenance costs are here defined as those costs of repair and replacement associated with hydrologic events that do not exceed the level of design for the project. On this basis, the principal maintenance features of the project consist of pump repair, pump replacement, gatewell maintenance, gate repair and cleaning, gate replacement, structures inspection/reporting, road resurfacing, and a portion of the rip-rap repair, and embankment repair. Rehabilitation is here defined as reconstructive work needed in excess of estimated annual O&M as a result of specific storm or flood events. For the Calhoun Point project, rehabilitation features consist of interior ditch redredging, and a portion of the rip-rap and embankment repairs.

Dredging is expected to be minimal, consisting of redredging the drainage ditch system perhaps once in 25 years.

Since the USFWS has entered into a cooperative management agreement with the state of Illinois, the state will continue to be responsible for the operation and maintenance of that area in accordance with the cooperative agreement.

(3) Performance Evaluation Monitoring Plan. TABLE 6.7 provides an estimate of costs related to the project's performance evaluation monitoring.

h. Construction Schedule. TABLE 6.8 presents a schedule of project completion steps.

TABLE 6.6

ESTIMATE OF ANNUAL OPERATING AND MAINTENANCE COSTS
(OCTOBER 1994 PRICE LEVELS) 1/, 2/, 3/

NOTES:
1. Mow once per year for 6 years, Apply herbicide twice a year for 6 years.
2. Mow twice for first 3 years, release seedings for once a year.

Item	Interval				Average Annualized Cost				
	Years	Quantity	Unit	U.Cost ($)	Operation ($)	Maintenace ($)	Annualized Cost ($)	Replacement ($)	Annualized Cost ($)
48,000 GPM Pump Operation (Fuel) CHICKAHOMINY	Annual	360	Hours	5	1,800				1800
48,000 GPM Pump Operation (Fuel) SILVER	Annual	120	Hours	5	600				600
5,000 GPM Pump Operation (Fuel) SQUAW ISLAND	Annual	384	Hours	2	768				768
5,000 GPM Pump Operation (Fuel) GOOSE FIELD	Annual	120	Hours	2	240				240
48,000 GPM Pump Operation (Labor) CHICKAHOMINY	Annual	120	Hours	18	2,160				2160
48,000 GPM Pump Operation (Labor) SILVER	Annual	40	Hours	18	720				720
48,000 GPM Pump Operation (Maint.) CHICKAHOMINY	3					5000			1535
48,000 GPM Pump Operation (Maint.) SILVER	3					5000			1535
5,000 GPM Pump Operation (Labor) SQUAW ISLAND	Annual	128	Hours	18	2,304				2304
5,000 GPM Pump Operation (Labor) GOOSE FIELD	Annual	40	Hours	18	720				720
5,000 GPM Pump Operation (Maint.) SQUAW ISLAND	3					3000			921
5,000 GPM Pump Operation (Maint.) GOOSE FIELD	3					3000			921
48,000 GPM Pump (Replacement) CHICKAHOMINY	25							200,000	2388
48,000 GPM Pump (Replacement) SILVER	25							200,000	2388
5,000 GPM Pump (Replacement) SQUAW ISLAND	25							64,000	764
5,000 GPM Pump (Replacement) GOOSE FIELD	25							64,000	764
Gauge Maintenace	5					6000			1012
Gauge Replacement	25							24,000	286
Control Structure Repair (Cleaning)	5					2000			337
Control Structure Operation	Annual	100	Hours	18	1,800				1800
Gates Replacement	25							32,000	382
Ditch Redredging	25							250,000	2984
Riprap Repair	5					37,500			6327
Embakment Repair	5					22,500			3796
Gatewell Maintenace	5					3,000			506
Tree Planted Cropland (Maint.) See Note 1	For 6 Yrs.					13,200			4988
Tree Planted Forest Clearigs (Maint.) See Note 2	For 3 Yrs.					25,300			5330
Road Resurfacing	5					20,000			3374
TOTALS					**$11,112**	**$145,500**		**$834,000**	**$51,650**

1/ Maintenance costs are defined as those costs of repair and replacement associated events (including minor storm and flood events) that do not exceed the level of design for the project. For example at Calhoun Point, this level of design has been designated as the top elevation of the dike levee structure. In the project reach of reveres, river stages would remain at or below the top of these structures about 95 percent of the time. On this basis, at least some rock material and earthen dike/levee material is expected to be lost during minor flood events and from ice damages.

2/ Consistent with other UMRS-EMP projects, no estimates of rehabilitation cost are provided in this table. Any costs presented would be based on so little historical data as to be highly unreliable and misleading. Any mutually agreed rehabilitation work would be cost shared (75 percent Federal, 25 percent non-Federal). Rehabilitation is here defined as a reconstruction work needed in excess of estimated annual O&M, as a result of specific storm or flood events. For the Calhoun Point project, elevations above 424 NGVD occur less than 5 percent of the time. Any interior ditch filling is expected to occur this time period. Also during this period, most of the dike/levee damages are expected from currents overtopping the structures.

3/ Annualization based on an 8.0 percent interest rate, and 50-year project life.

TABLE 6.7

ESTIMATE OF PERFORMANCE
EVALUATION MONITORING COSTS
(OCTOBER 1994 PRICE LEVELS) 1/

Item	Monitoring Years	Unit	Quantity Per Year	Unit Cost ($)	Total Cost Per Year ($)	Total Monitoring Cost 3/ ($)
Lake Sediment Survey	1	X-Sections, 4,000' ea	4	4,000	16,000	16,000
Water Control Analysis	1-2	Days	2	560	1,120	2,240
Habitat Analysis						
WHAG/AHAG	1	Days	5	560	2,800	2,800
Cover Type Survey	1	Days	2	560	1,120	1,120
Water Quality Readings	1-2	Collections	4 (Quarterly)	1,800 2/	7,200	14,400
Tree Plantings Analysis	1-2	% Survival	5	560	2,800	5,600
Waterfowl Counts	1-2	1	Survey	3,000	3,000	6,000
				TOTAL COST	$34,040	$45,360

1/ Per current guidance, the cost of performance evaluation monitoring will be charged to the UMRS-EMP LTRMP account.

2/ Includes $800 for labor, $1,000 for laboratory analysis work.

3/ Assumes no monitoring funds available beyond the year 2002.

TABLE 6.8

PROJECT IMPLEMENTATION SCHEDULE

103

Requirements	Scheduled Date 1/
Submission of Draft Definite Project Report (DPR) to Corps of Engineers, Lower Mississippi Valley Division, North Central Division, agencies, and public for review	Oct 94
Submit final DPR to North Central Division	Sep 95
North Central Division submission of final report to Chief of Engineers	Nov 95
Receive plans and specifications funds	Nov 99
Obtain construction approval by Assistant Secretary of the Army (Civil Works)	Apr 96
Submit final plans and specifications to Lower Mississippi Valley Division for review and approval, and to participating agencies for review	Aug 00
Obtain approval of the plans and specifications	Sep 00
Advertise contract (Start Contract 1)	Oct 00
Complete construction (Complete Contract 3)	Sep 02

1/ Schedule execution could be impacted by public and agency opinion during the review of the Final DPR, as well as the availability of funds.

7. ENVIRONMENTAL EFFECTS OF THE SELECTED PLAN.

The following section presents a discussion of the environmental impacts of the Selected Plan. TABLE 7.1 is an environmental assessment matrix which summarizes the analysis. 104

a. Natural Resource Effects.

(1) Physiography-Topography. The project will permanently alter the topography of a portion of the Calhoun Point area. Construction of the berm will raise existing ground elevations an average of about 3 feet over a narrow band along the Illinois and Mississippi Rivers. Local topography will also be raised about three feet at the dredged material disposal sites. Removal of borrow from cropland will lower existing ground elevations by about one foot. The berm will reduce overall sedimentation rates within the project area by 67 percent, and the life span of interior aquatic areas will be increased.

(2) Hydrology/Hydraulics. The hydrologic connection between Pohlman Slough and the Illinois River will be improved by the removal of an existing sediment plug by dredging. The riverside berm will prevent minor flood events from entering the project area, provided that exterior water control structures are kept closed. The berm will be overtopped by larger flood events, with recurrence intervals of about once in 3 years or greater. Water control structures placed between Chickahominy and Royal Lakes, between Chickahominy and Silver Lakes, and between Royal Lake and Pohlman Slough will allow for more independent water control management in these units. A green tree reservoir enveloping up to 100 acres of bottomland forest at Squaw Island will be created seasonally nearly every year. Water level regulation within the project area will be improved by the riverside berm, and exterior and interior water control structures and pumps.

The proposed berm would keep the more frequent flood events away from the cabin sites. However, more significant events could take a couple of days longer to drain from the area compared to the pre-project condition (since culverts represent a smaller drainage opening than does an open floodplain). This short delay is not expected to result in a major impact to cabins useage. The management of the waterfowl areas would not significantly impact upon the ground water elevations at the cabin lease areas. Pohlman Slough (normally held at river stage, and open to the river via open culverts) would intercept seepage from the waterfowl areas and divert it to the river.

Any lands immediately upstream of the project in the vicinity of Royal Landing and with an elevation less than or equal to 426.0 feet NGVD would realize insignificant induced flooding effects from the construction of the berm, and only for the 2-year flood event. For floods higher than the 2-year flood, even the proposed berms would be inundated by floodwater. In addition, lands west of Calhoun County highway #1 would not be affected by the project since the road is above the elevation of the berm. The whole Calhoun Point project would be inundated before water would overtop the road. Therefore, any sand deposited by the floodwaters would not be caused by the proposed berms since they would no longer be effective once overtopped.

The District has modified the project concept plan to account for the existing drainage pattern. Corrective actions, such as the placement of small culverts with flap gates are now depicted in the project site plan.

(3) Water Quality. Except for short-term localized increases in turbidity, project construction should result in little impact to the project area's overall water quality. Interior aquatic areas deepened by dredging (particularly Pohlman Slough) will tend to have more stable winter temperatures, and perhaps higher dissolved oxygen levels. During warmer months of the year, these same areas will tend to be relatively cool and less affected by high air temperatures.

TABLE 7.1

CALHOUN POINT HREP
ENVIRONMENTAL IMPACT ASSESSMENT MATRIX

Parameter	Magnitude of Net Impact						
	Increasing Beneficial Impact			No Appreciable Impact	Increasing Adverse Impact		
	Major	Moderate	Minor		Minor	Moderate	Major
A. Social Effects							
1. Noise Levels					X		
2. Aesthetic Values			X				
3. Recreational Opportunities			X				
4. Public Health and Safety				X			
5. Transportation				X			
6. Community Cohesion				X			
7. Community Growth/Development				X			
8. Business/Relocations				X			
9. Controversy				X			
B. Economic Effects							
1. Property Values				X			
2. Tax Revenues				X			
3. Public Facilities/Services				X			
4. Regional Growth				X			
5. Employment				X			
6. Business Activity				X			
7. Farmland/Food Supply				X			
8. Commercial Navigation				X			
9. Energy Needs and Resources				X			
10. Flooding Effects				X			
C. Natural Resource Effects							
1. Air Quality					X		
2. Terrestrial Habitat				X			
3. Wetlands	X						
4. Aquatic Habitat	X						
5. Habitat Diversity and Interspersion	X						
6. Biological Productivity			X				
7. Surface Water Quality				X			
8. Water Supply				X			
9. Groundwater				X			
10. Soils				X			
D. Historic Properties				X			

Samples of sediment to be dredged were analyzed for agricultural chemicals and metals, and results indicated no detection of either parameter. The disturbance of sediments during dredging should not release any toxic metals or organics to the water column. Hydraulically dredged material from Pohlman Slough and other interior lakes will be placed in ring berm containment areas. Return water from the disposal areas will be kept isolated from the Illinois and Mississippi Rivers, and will be routed back to an interior lake. These disposal areas will be located in existing crop field areas and will be subsequently planted to mast trees. 106

The riverside berm and interior levee embankments will be seeded and mulched immediately after final grading to reduce erosion potential.

An evaluation of the project using the Section 404(b)(1) guidelines of the Clean Water Act has been prepared and is included in APPENDIX DPR-C. APPENDIX DPR-C includes the State's Section 401 water quality certification (with conditions) for the project.

(4) Herbicide Effects. The relative safety of using herbicide to kill woody vegetation encroaching into the moist-soil management units ("lakes") at Calhoun Point was discussed only briefly in the draft report. In this final report, a more in depth discussion is presented here in this new section. Effects on all aspects of the environment, including people, are included in this one section, rather than scattered in multiple sections throughout Section 7.

The herbicide to be used will be currently registered with the U.S. Environmental Protection Agency (USEPA) as applicable for use in "aquatic" environments. Aquatic herbicides have been developed to be used within or adjacent to all kinds of aquatic sites, such as lakes, ponds, rivers, streams, reservoirs, ditches, or canals. With all the open waterbodies at Calhoun Point, an herbicide with an aquatic label is appropriate.

There are about one dozen herbicides labelled for aquatic use, but only a few of these are effective in controlling woody vegetation. The 1995 Illinois Agricultural Pest Management Handbook lists glyphosate and 2,4-D as effective in killing woody emergent plants such as willow. Some commercial products with active ingredients that consist of these two chemicals are Rodeo and SEE 2,4-D, respectively. The Illinois Department of Agriculture requires that these and many other herbicide products be applied by a state-certified applicator.

Rodeo has been applied aerially on a number of occasions by IDNR at some of its moist-soil management areas along the lower Illinois River to effectively control encroaching woody vegetation. It is a systemic herbicide for emerged grasses, broadleaf weeds, brush, and trees growing in and around water. For effective treatment, it should be applied in fall just before leaf drop, and it must come into contact with plant tissues. Submersed plants or those with most of their foliage underwater are not controlled. Glyphosate and 2,4-D interfere with natural plant growth processes, which leads to the plant's death.

The half-life of glyphosate in soil has been reported to range from 1 to 174 days, for 2,4-D from 7 to 16 days. In water the half-life of glyphosate ranges from 12 days to 10 weeks, for 2,4-D from 1 to several weeks under oxygenated conditions. Both of these chemicals adhere tightly to soil, where microbes are primarily responsible for their breakdown. Half-lives in water decrease with increasing levels of nutrients, sediment load, and dissolved organic carbon. Because glyphosate adheres so well to most soils, very little is carried away from the application site by surface runoff. Despite its short half-life in soil and water, 2,4-D has been detected in groundwater and surface water in the U.S. at various locations.

The environmental effects of a one-time (acute) exposure of glyphosate

or 2,4-D at dosage levels much higher than recommended for vegetation control have been studied in laboratory settings for a variety of animals. These herbicides are slightly toxic to the mallard, quail, pheasant, and pigeon. For fish, toxic effects of glyphosate are very slight, but some formulations of 2,4-D are very toxic whereas others are less so. For example, bluegill, trout, and carp have exhibited very little toxicity to Rodeo. Studies of the potential for glyphosate and 2,4-D to bioaccumulate in animal tissues indicate a low potential for aquatic invertebrates and fish. In summary, Rodeo and SEE 2,4-D offer little potential to harm aquatic organisms when used according to directions on their labels.

There is little potential for dissolved oxygen levels in interior sloughs at Calhoun Point to be depleted by decomposing vegetation killed by herbicide treatment (leaves from sprayed trees and herbaceous plants under and adjacent to these trees). Moist-soil management units (all interior sloughs but Pohlman) will still be in the draw-down stage (lowered water levels) when herbicide is scheduled to be applied. Some of the vegetation killed by herbicide treatment is expected to become inundated when recharging of these areas occurs. However, water temperatures should be appreciably lower than those typical of mid-summer, when the potential for oxygen depletion is greatest.

Both Rodeo and SEE 2,4-D are labelled as harmful to people if swallowed or absorbed through the skin. Contact with the eyes or skin is to be avoided, as it may cause irritation. Skin absorption of SEE 2,4-D may cause nausea, muscle weakness, and fall in blood pressure. Both products are not to be applied within one-half mile upstream of any public water intake. There are no such water intakes in the vicinity of Calhoun Point (Grafton's water supply comes from two wells). The potential for accidental exposure of people at Calhoun Point with herbicide via aerial spraying is low. Although there are about 6 cabins located within the project area that could be in use during late summer/early fall, they are located along the west and north edges of Pohlman Slough, where spraying is not proposed. Also, use of Calhoun Point by the visiting public is relatively low. Signs will be posted advising the visiting public to keep out of areas scheduled for spraying. Likewise, spraying will be scheduled on weekdays rather than weekends when expected use is lower.

References for the above information are Agrolinz (1989), EXTOXNET (1993, 1994), Ferree (1995), and Monsanto (1992).

(5) Air Quality. Project construction will generate exhaust fumes from heavy equipment, and smoke from open air burning of cleared vegetation. Additional short-term impacts to air quality are expected from the off site mining, hauling, and placement of crushed stone for riprap and the berm overflow structure. Contractors will be required to submit an environmental protection plan to include protection methods and procedures providing for air pollution prevention. Overall, no long-term impacts are expected.

(6) Noise. Construction activities will include the use of heavy equipment and chainsaws, which will result in periodic increases in noise levels in the general vicinity of the project area. No long-term impacts to noise are expected.

(7) Prime Farmland. Of the 269 acres of agricultural land within the project area, 75 acres will be affected by the project. The 23 acres of agricultural land that will be used to construct dredged material disposal sites will be reforested with seedlings of various mast tree species. Likewise, an additional 90 acres of agricultural land will also be planted to reestablish bottomland forest. Twenty-six acres of the goose field will be used for borrow; up to one foot of earthen material will be removed.

Some prime farmland will be adversely impacted by construction of the riverside berm and dredged material disposal areas, and creation of borrow

areas. About 78 acres of prime and unique farmland and 2 acres of statewide and local important farmland will undergo an apparent conversion to nonagricultural use because of these three activities. The project has been coordinated with the Natural Resource Conservation Service (formerly the Soil Conservation Service) and the Illinois Department of Agriculture with respect to impacts on prime farmland (see APPENDIX DPR-M). These agencies have evaluated the project's effect on farmland using the Land Evaluation and Site Assessment (LESA) system. 108

The LESA system includes a land evaluation, which assesses productivity of soils at a project area, and a site assessment, which evaluates all factors other than soils that can determine the viability of a site for agricultural or non-agricultural use. The recommended project scored 73 of 100 maximum points for the land evaluation, and 68 of 200 maximum points for the site assessment, for a combined total of 141 of 300 possible points. The higher the total score, the greater the likelihood that a particular area should remain as farmland. According to the Illinois LESA system, site-specific projects receiving a total score of 175 or fewer points receive a low rating for protection, and an evaluation of different alternatives is not necessary. Those with a score from 176 to 225 points receive a moderate rating for protection, and require the consideration of at least one build alternative. An alternative site should be used when more than 225 points are scored. Because the recommended plan scored 141 points, no further project sites were evaluated to minimize impacts to farmland.

(8) Terrestrial and Aquatic Habitats. Project construction activities will affect the four major habitat types within the project area. A total of 56 acres of wetland will be directly impacted by the project.

(a) Bottomland forest. Of the 1,379 acres of bottomland forest in the project area, 51 acres of bottomland forest will be cleared for the construction of the berm structure and represents a permanent loss of habitat and the wildlife which it supports. Of these 51 acres, it is estimated that "low" bottomland forest (without hard mast species) constitutes 36 acres, and "high" bottomland forest (with hard mast species) 15 acres. Of the cleared acres, about 35 acres will consist of the berm itself, and the remainder will consist of a 10-foot wide grassy strip maintained at the toe of each side of the berm. Tree piles will be created using timber cleared from these 51 acres. They will be located on the land side of the berm and will be spaced about 500 feet apart.

About 5 acres of nonforested wetland at the tip of Calhoun Point, which was forested in the past but since disturbed by tree clearing and construction of a short segment of berm, will be used as a disposal area for material dredged from Silver and Chickahominy Lakes to construct a water approach control channel.

Secondary effects of the riverside berm include a less frequent flooding regime for areas below the elevation of 423.5 feet NGVD (elevation of crown of overflow structure), or within "low" bottomland forest. (See TABLE 2.2). The forest's response to this hydrological change is expected to include a shift to a somewhat drier groundcover and understory. The anticipated change in tree species composition in areas below 423.5 feet NGVD is the inclusion of a few "additional" species a little less tolerant of flooding. These "additional" species are already present at the higher elevations. With the protection of the berm, some individuals would become established within the lower areas. This expected increase in overall forest tree species diversity would be a beneficial impact. Forest above the elevation of the overflow structure is not expected to change due to the effect of the berm.

Green tree reservoir management, or the shallow flooding of living trees during the dormant season, will be introduced as a new management technique within the project area. Fall and spring migrating dabbling ducks are the target of this management technique, which provides shallow water habitat for

feeding on hard mast, such as acorns, and invertebrates found on the inundated forest floor. Resident wood ducks also use the reservoir for feeding. Beginning in the fall, water will be pumped into the Squaw Island management area up to the elevation of 422 feet NGVD to create a reservoir encompassing the 18-acre Squaw Slough and about 100 acres of adjacent "low" bottomland forest. The reservoir will be maintained through the winter, and will be drained by early spring when trees begin to break dormancy. Adverse impacts of green tree reservoir management include a slow shift in species composition of bottomland forest to more water-tolerant species (Fredrickson, 1979), and impairment of regeneration and survival of pin oak trees (Heitmeyer et al., 1989). To minimize adverse impacts, IDNR will not maintain a constant flooding regime from year to year, but will vary the duration, depth, and timing of flooding to imitate more natural conditions. Green tree reservoir management is not expected to cause tree mortality, but a slight shift toward a wetter plant community is anticipated. A decrease in pin oak regeneration and survival is not expected because this species is generally found within the project area at elevations above 424 feet NGVD.

109

The loss of 51 acres of bottomland forest to berm construction and 5 acres of previously forested wetland to disposal of dredged material will be offset by the reestablishment of bottomland forest on 25 acres of dredged material disposal sites and 90 acres of cropland. Seedlings of native tree species will be planted on these 110 acres of cropland, and in 115 acres of bottomland forest where many pin oaks died as a result of the 1993 flood. About half of these 115 acres will be selectively cleared prior to planting in an effort to experimentally evaluate different tree planting methods. Species to be planted include pawpaw, river birch, pecan, shellbark hickory, sugarberry, hackberry, stiff dogwood, hawthorne, persimmon, water locust, honey locust, Kentucky coffee tree, bur oak, pin oak, and swamp white oak.

Direct impacts to existing woody encroachment located along the perimeter of the interior lakes includes the killing of up to 169 acres of this 229-acre habitat type through the aerial spraying of herbicide on these silver maples and willows. This will occur within the moist-soil management area (Silver, Chickahominy, and Royal Lake units) to increase the area of moist-soil plant production by up to 169 acres. The herbicide will cause the leaves to fall off the trees and allow sunlight to reach the ground, thereby promoting the growth of waterfowl food plants. The flood of 1993 probably has killed some of the trees targeted for spraying. The extent of flood mortality among these trees will be assessed prior to the preparation of plans and specifications for this project. The riverside berm will also indirectly impact this habitat type by reducing the amount of woody encroachment resulting from the conversion of open water and emergent wetlands through sedimentation over the next 50 years, which was assumed to be 127 acres without a riverside berm, and 42 acres with the 424 berm (TABLES J-9 and J-10).

(b) Open water wetland. Deepwater dredging in Pohlman Slough will involve the removal of sediment from about 75 percent of its length. An area 50 feet wide by 9,500 long (11 acres) will be deepened. The depth of dredging will alternate every 1,000 feet between two and four feet, thus providing alternating average water depths of five and seven feet. An additional 4 acres of open water wetland will be dredged to create a drainage approach channel to each of four water control structures. Fifty tree tops will be placed along the west side of Pohlman Slough over a distance of 5,000 feet.

About one acre of this habitat type will be directly impacted by construction of water control structures, including temporary coffer dams. Indirect impacts include an estimated 67 percent reduction in riverborne sediment deposited within this habitat type over the next 50 years as a result of the riverside berm, thereby prolonging the life of this aquatic resource. The habitat analysis in APPENDIX DPR-J (see TABLES J-9 and J-10) assumed that with the 424 feet NGVD riverside berm, only 11 percent of this 242-acre habitat type would be converted to woody encroachment through sedimentation, whereas without any riverside berm, 35 percent of open-water wetland would be

lost to sedimentation.

(c) Emergent wetland. The existing 183 acres of emergent wetland in the project area will increase by 169 acres to 352 acres. Aerial spraying of all 169 acres of existing woody encroachment around the perimeter of the moist-soil management area (Silver, Chickahominy, and Royal Lakes) with herbicide will kill the young silver maples and willows, leading to the conversion of this type of vegetation to emergent wetland. Construction of the riverside berm at 424 feet NGVD will protect emergent wetland from conversion to woody vegetation through sedimentation. It was assumed that without a project, 55 acres would be lost, but with the 424 berm, only 18 acres would be lost (TABLES J-9 and J-10). 110

(d) Cropland. Shallow water habitat established annually in the Goose Field during fall and winter to attract Canada geese for feeding will benefit from the project. Construction of the interior levees within the Goose Field will increase the area of ponded water from 9 acres to about 29 acres. Likewise, removal of borrow from a 26-acre area of cropland within the Goose Field will lower ground elevations by about one foot, and provide about 5 additional acres, for a total of about 34 acres of ponded goose habitat. Trees will be planted on 110 acres of the 269 acres of existing crop land, including 23 acres of dredge material disposal areas.

(9) Waterfowl. Dabbling ducks, Canada geese, and wood ducks are the focus of benefits to waterfowl.

(a) Moist soil management area. Habitat conditions within Silver, Chickahominy, and Royal Lakes will improve by reducing sediment input from the river, by reducing water level fluctuations within the management area, by increasing the area of moist soil plant production, and by providing the capability for semi-independent management of individual units within the area. These improvements will provide benefits to fall- and spring-migrating dabbling ducks, Canada geese, and wood ducks, as well as resident geese and wood ducks.

The berm embankment will substantially reduce the input of sediment to the waterfowl management area. This reduction in sedimentation will slow down the ongoing water to land conversion process that results in a quantitative loss of habitat. Sediment reduction will promote food plant production by reducing the build-up of the soft lake bottom that inhibits plant anchorage, and by reducing the quantity of material contributing to high turbidity levels and indirectly reduced plant photosynthesis.

The berm embankment, in combination with the exterior water control structures (i.e., gates and pumps), will reduce water level fluctuations during the growing season. Moist-soil plant production areas will benefit the most from this water control, since the plants in these areas are fairly intolerant of flooding during the growing season. While the low profile berm provided by the project would not eliminate all adverse flood intrusions from the lake, it would reduce the frequency of such events to about 1 in 5 years. The production of aquatic and marsh plants would also benefit from water control. Past research (Bellrose et al., 1979) suggests that the more lakes are separated from the river, the more extensive their aquatic and marsh plant beds.

However, past research also suggests that controlling water level fluctuations alone will not guarantee increased aquatic and marsh plant production. Bellrose et al. (1979) indicates that increases in water turbidity and bottom softness stemming from sedimentation are also key factors controlling plant production in the river lakes. In this regard, the berm and water control structures will provide the option of reducing turbidity by permitting the interior lake units to be periodically drawn down. With a drawdown, bottom solidification is possible.

The provision for pumps will ensure that water depths can be manipulated to make the food produced available to waterfowl at the time and in the amounts needed.

111

The killing of young willow and silver maple trees on 169 acres along the perimeter of the waterfowl management area by herbicide spraying will nearly double the 183 existing acres of emergent wetlands used for moist soil plant production. Elimination of the shading provided by this encroaching woody vegetation will create conditions favorable for the establishment of native moist soil plants.

Semi-independent water management will be possible with the addition of water control structures between Silver and Chickahominy Lakes and Chickahominy and Royal Lakes (with creation of a drainage channel between the latter). The timing of drawdowns could vary from one unit to another, with Silver Lake being the earliest, Chickahominy Lake later, and Royal Lake the last. The scheduling of drawdowns from early (late winter) to midseason (spring) to late (early summer) targets food resources to different groups of birds, i.e. early migrating waterfowl such as mallards and pintails, late migrating waterfowl such as shovelers and teal, and waterfowl broods (Fredrickson, 1991). Fredrickson (1991) recommends that timing of drawdowns vary from year to year in order to maximize productivity.

(b) Goose Field. Habitat conditions for fall-migrating Canada geese will improve by increasing the area of shallowly flooded cropland within the Goose Field from 9 acres to about 34 acres.

(c) Green tree reservoir management - Squaw Island. Fall- and spring-migrating dabbling ducks and wood ducks, as well as resident wood ducks, will receive habitat benefits from the introduction of green tree reservoir management at Squaw Island. The flooded bottomland forest in late winter and early spring will provide not only feeding habitat for spring-migrating dabbling ducks, but pre-breeding habitat for resident wood ducks. Once trees break dormancy in the spring, the reservoir will be drained from the flooded timber, but water can be left within Squaw Slough to provide brood habitat for resident wood ducks.

The habitat analysis for the entire project indicates an anticipated net +586 AAHUs gain for wildlife (including the gains for the mallard, Canada goose, and wood duck).

(10) Fishes. Construction of the berm system will reduce free movement of fishes between Calhoun Point and the rivers. The interior water control structures would also affect the movement patterns of fishes within the sloughs. It is assumed that any negative impacts to fishes will be insignificant relative to the benefits of the project. Fish will at times be able to move between the lake compartments when the stop-logs are removed. Pohlman Slough via its open-top exterior water control structure and its approach channel will be open to the river during critical times of the year, and the utility of the lake as fish habitat is expected to be greatly increased. Our assumption can be better assessed once the Swan Lake monitoring study to determine the effects of fish passage structures on the movement of fish has been completed. The 50 tree tops placed along the west side of Pohlman Slough will provide much needed fish cover where little currently exists.

Construction of a riverside berm embankment would reduce the rate of sedimentation. Therefore, the expected life span of the interior sloughs would be significantly increased.

Silver, Chickahominy, and Royal Lakes would be managed for fish to the extent compatible with that areas primary objective of moist-soil plant production. The precise manner in which the lake compartments will be managed may be fine tuned after the results of the Swan Lake biological response

monitoring study has been completed. The inclusion of an open-top exterior water control structure at this location will help keep future options open for balancing the needs of the waterfowl and fisheries resources of the site.

Approximately 16 acres of aquatic habitat will be deepened by hydraulic dredging operations at Calhoun Point for the Pohlman Slough fish refuge habitat, and the approach channels. About 75 percent, or 10,200 feet, of the length of Pohlman Slough will be deepened. These newly created deepwater areas will provide both resident populations of fishes, as well as river fishes, shelter from harsh or extreme temperatures. Deepwater areas are characterized by a more stable water temperature regime. The riverside berm will also reduce the influx of colder river water into the interior. 112

Overall, the aquatic habitat diversity of the interior lakes, particularly Pohlman Slough, will be increased by the project. Dredging will add deep water areas. Increased plant production in the area will also improve the site's habitat.

If needed, portions of the project area may be periodically dried to resolidify the lake bottom. If this occurs, it is expected that some fish will be trapped and die as the water levels are lowered. However, the solidification will ultimately promote increased plant growth, and fish will once again have access to a reflooded lake. When reflooded, these areas will also provide rich sources of fish prey in the form of aquatic invertebrates. The vegetation will also provide diverse habitat for fish spawning and rearing. Thus, the project is expected to increase the overall productivity of aquatic species in the lake complex.

The potential for fish impingements will exist at the output pump at Silver Lake. While water is being pumped from Silver Lake into the Illinois River, fish smaller than the 1.5-inch opening in the fish screen will be able to pass through the mesh and into the pump. The District believes that the screen mesh should not be less than 1.5-inch by 1.5-inch, or else significant amounts of debris will collect, thus impeding water flow. The mesh screen will be positioned far enough away from the pump so that entrainment of fish will not be a problem. No feasible design configuration was found for the 48,000 GPM input pump location near Chickahominy Lake. Because this pump is less of a hazzard to younger fish. No specific design drawing has been developed for the 5,000 GPM pumps. During its pumping operation, the Department could screen an area by using stakes and a ring of hardware cloth.

The habitat analysis for the project indicates an anticipated net +129 AAHUs gain for fish.

(11) Other Biota. An improved Calhoun Point will contribute to an overall increase in the productivity and diversity of the riverine ecosystem. In addition to waterfowl and slackwater fish, an array of wetland dependent species will benefit, including migratory shorebirds, resident herons and egrets, a variety of frogs, snakes, turtles and skinks, and mammals like raccoon, mink, and muskrat. Turkey and white-tailed deer are expected to benefit also. The tree piles will provide cover to a wide variety of game and nongame wildlife, such as rabbits, turkey, raccoons, opossums, and song birds.

Fragmentation will affect the project area's 1,379 acres of bottomland forest to a slight degree. About 51 acres of forest will be cleared in a relatively narrow band (average width 75 feet) parallel to the river for construction of the 5.5 mile riverside berm. About 60 acres of forest will remain between the river's edge and the berm. Robbins et al. (1989) found that gaps in forests of middle Atlantic states created by power-line and road corridors had to be at least 100 meters (330 feet) wide before they acted as barriers to movement by forest interior breeding birds. Judging by this criterion, the berm clearing will not create a discontinuity in forest habitat in terms of bird movements. However, the clearing can be expected to be used by nest predators as access to songbird nests. The brown-headed cowbird is attracted to forest edge habitat, and parasitizes the nests of many forest interior breeding birds by laying its eggs in their nests at the expense of

the other species' young. Therefore, the clearing is expected to lead to an increase in nest predation to some degree. Reforestation of the seven tracts of cropland and disposal areas totalling 110 acres will close in forest gaps over time to make the forest habitat more continuous.

113

With the inclusion of measures to avoid impacts to the bald eagle and Indiana bat, the proposed project is unlikely to adversely affect any Federally threatened or endangered species (see Appendices DPR-H and -I for details). The population of salt meadow grass, a state-endangered species, will not be disturbed by construction of the riverside berm, and will lie riverside of that structure's alinement. The heron rookery on Island 525, which includes nests of the state-endangered great egret, will remain undisturbed also. The project is not expected to adversely affect other state listed birds, such as the little blue heron, black-crowned night heron, and osprey.

(12) Historic Properties. The limits of the designated borrow pits have been designed to avoid the five identified archaeological sites. In the unlikely event that archaeological remains are inadvertently uncovered at this and other locations during completion of the project, all construction activities in the immediate vicinity of the find will halt until a determination of site significance has been completed. Using this mechanism, and in coordination with the State Historic Preservation Officer, the District concludes that the effect of the undertaking would not be adverse.

(13) Recreation. Access from the Illinois River to Pohlman Slough will be closely controlled by IDNR via a lockable gate attached to the water control structure. Access from the Mississippi River into Chickahominy Lake will be intermittent, depending on the water regulation needs for waterfowl management. The existing land-based access to the Pohlman Slough and Royal Lake areas will not be altered by the project. The entry road and parking lot serving the Silver Lake boat ramp area will be modified only slightly.

(14) Aesthetics. Aesthetic or visual impacts include changes in the amount of forest within the project area, and the construction of structures in a semi-natural setting. Forest vegetation will be lost during the construction process. First, a 51-acre clearing (5.5 mile long, 75-foot wide) parallel to the Illinois and Mississippi Rivers will be created. It will be set back from the riverbank, but should be visible from the river.

Second, 170 acres of young willows and silver maples located around the perimeter of waterbodies located in the interior of the project area will be killed by the aerial application of herbicide. These interior lakes and sloughs are generally shielded from view from vantage points on the Illinois and Mississippi Rivers because of intervening trees located along the riverbank. Parts of some sloughs, such as Pohlman and North Royal Lakes, can be seen from the county road bounding the west side of the project area. From the vantage point of the interior sloughs, the trees killed by herbicide will be directly visible. Most of them are expected to fall to the ground within several years. It is likely that some trees killed by the 1993 flood are in those areas proposed to be cleared for berm construction, and sprayed with herbicide. In light of the fact that 550 to 700 acres (40 to 50 percent) of the project area's 1,379 acres of forest were killed by the flood of 1993, resulting in the eventual creation of numerous forest openings of various sizes, the effect of eliminating 220 acres of trees by herbicide application and mechanical clearing would have a minor adverse effect on aesthetics.

Forest will also be gained because of the project. There will be a long-term conversion of 110 acres of cropland to bottomland forest as seedlings grow into trees. This will have a minor beneficial effect on aesthetics. Visually prominent project features that are permanent include the riverside berm and tree piles. The tree piles will be constructed in the forest adjacent to the area cleared for the berm. The berm is low (average height about 3-4 feet), and will be planted with grassy vegetation. Riprap stone will be placed along the riverside sideslope of the berm for a distance of

1,800 feet on both the Illinois and Mississippi Rivers. The berm and tree piles will not be very visible from the river, but the riprap will be. Such stone is a relatively common sight along the banks of the Mississippi River.

114

Construction activities would have a short-term impact on the aesthetic value of the area. The project will increase the aesthetics values associated with viewing fish and wildlife, since the habitat supporting these populations will improve. Thus, there should be a net benefit to the overall aesthetic quality of the site.

b. Economic and Social Impacts. The proposed project is expected to have minimal or no impacts with respect to the following socioeconomic categories: aesthetic values, transportation, public health and safety, community cohesion, community growth and development, business or home relocations, land use, property values, tax revenues, regional growth, employment, business activity, food supply, navigation, flooding effects, or energy sources.

One hundred and ten acres of cropland will be taken out of production and planted with bottomland forest species. There are two agreements with private landowners to plant and harvest soy beans on federal and state areas in exchange for winter wheat and corn, which will be terminated.

The current cabin leases will be amended to reduce the lease area. The cabin sites, that will be reduced will require a reappraisal to estimate the value of the leasehold interest. Based on the limited engineering data available to date, it is not anticipated that this project will adversely effect the use and enjoyment of the leased areas by their respective tenants. However, if the project does unexpectedly and substantially affect the cabin sites to a point that renders them useless for the present purpose, the leases will be terminated. The District does not plan to expend funds performing detailed studies to determine if the project adversely affects the cabin sites.

The existing usage of the Royal Landing access road will not be affected by the project. The project berm alignment will be altered so that it will be placed adjacent to, rather than on top of, the existing Royal Landing access road. The access gate that was depicted in the draft DPR, PLATE 3, has been deleted.

c. Relationship of the Proposed Project to Land-Use Plans. The present land use of the project area, as provided for in the Corps' Master Plan, is for the management of fish and wildlife with special emphasis on migratory waterfowl. This project is compatible with the intended fish and wildlife use purposes of the Master Plan. It is also compatible with the management goals and objectives of both the USFWS and the IDNR.

d. Adverse Effects Which Cannot Be Avoided. The clearing of about 51 acres of bottomland forest during construction is unavoidable. However, tree clearing will be held to the absolute minimum needed for placement of the berm. In some places this will be as little as the width of a road. About one acre of aquatic habitat will be lost as a result of the placement of water control structures. Forty-one acres of existing farmland will be used for borrow material.

e. Short-Term Use Versus Long-Term Productivity. The proposed project would improve both the short- and long-term productivity of fish and waterfowl habitat. The project would provide reliable long-term feeding and reproductive habitat for waterfowl, and long-term spawning, rearing, and wintering habitat for fish.

f. Irreversible or Irretrievable Resource Commitments. Aside from the commitment of funds, labor and construction materials, there would be no permanent loss of natural resources, except for the loss of habitat (51 acres of forested wetlands, and 6 acres of nonforested wetlands) necessary for the installation of project features.

g. Compliance With Environmental Quality Statutes. The selected plan was subjected to a review of its degree of compliance with applicable environmental guidelines. The proposed action was found to be in partial or full compliance with applicable guidelines, as indicated in TABLE 7.2. Full compliance will be achieved as noted.

115

h. Cumulative Impacts.

APPENDIX DPR-R provides the District's cumulative impacts assessment. The following summarizes the findings of that appendix:

All EMP--HREPs are monitored before and after construction to determine if the project goals and objectives are met. Goals and objectives are often stated in terms of anticipated improvements to habitat conditions. Monitoring evidence to date suggests that HREPs are achieving their site-specific environmental objectives.

The HREPs can be characterized as demonstration projects, and collectively they are limited in scope. The program is working only a fraction of the total habitat area of the UMRS. If all planned program activities turn out to be a failure (and there is no evidence to indicate that this will be the case), it would not represent an irreversible, catastrophic adverse impact on the river's ecosystem.

The 15-year HREPs program can be viewed as a precursor to future large scale habitat alteration attempts on the river system. If the program is funded by Congress beyond the 15-year authorized limit, then a systemic strategy to UMRS habitat restoration is needed. This would include an evaluation of UMRS habitat needs, objectives, measures, and plans. Such a systemic assessment would also serve as a long-term cumulative impact assessment.

At present, whether the current HREPs do or do not represent a perfect system-wide balancing of resource needs, is not highly critical. This is due to the small impact of these projects on the system at large. This issue will become more critical if major UMRS habitat project installations are authorized following the close of the current HREP demonstration program.

Overall, the Calhoun project yields substantial beneficial environmental effects, and no obvious adverse cumulative effects.

The results of the District's habitat analyses reflect net positive gains in fisheries habitat value for the Calhoun Point, Stump Lake, and Swan Lake projects. Taken together, they generate a total net beneficial impact of +829 average AAHUs.

The District has taken into account the cumulative impacts of the three HREP projects on upstream water surface profiles (APPENDIX DPR-E). The HEC-2 analysis was performed on the Illinois River and the Mississippi River for

TABLE 7.2

COMPLIANCE OF THE SELECTED PLAN WITH WRC - DESIGNATED ENVIRONMENTAL STATUTES

Guidance	Degree of Compliance
Federal Statutes	
Archaeological and Historical Preservation Act, as amended, 16 U.S.C. 469, et seq.	FC
Clean Air Act, as amended, 42 U.S.C. 7401, et seq.	FC
Clean Water Act, as amended, 33 U.S.C. 1251, et seq.	FC[1]
Endangered Species Act, as amended, 16 U.S.C. 1531, et seq.	FC
Farmland Protection Policy Act, 7 U.S.C. 4201, et seq.	FC
Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601, et seq.	NA
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq.	FC
Land and Water Conservation Fund Act, as amended, 16 U.S.C. 4601, et seq.	NA
National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq.	FC
National Historic Preservation Act, as amended, 16 U.S.C. 470a, et seq.	FC
Rivers and Harbors Act, 33 U.S.C. 401, et seq.	FC
Executive Orders, Memorandum, etc.	
Flood Plain Management, E.O. 11988	FC
Protection of Wetlands, E.O. 11990	FC
Analysis of Impacts on Prime and Unique Farmlands, CEQ Memorandum, August 11, 1980	FC

FC = Full Compliance - meets all requirements of the statute for the current stage of planning.
PC = Partial Compliance - does not meet some of the requirements that are normally met in the current stage of planning.
NA = Not Applicable - statute/order does not apply to project as planned.

State Section 401 Water Quality Certification has been granted. However, due to changes in construction implementation priorities (Calhoun now 4 years from a construction start), the potential for regulatory process changes, Plans and Specifications design changes, and budgetary constraints -- closure on the District's Clean Water Act documentation process will be deferred until the year 2001.

conditions with and without the low levees for floods ranging from a 2-year to a 500-year recurrence interval. No significant increases in water surface elevations were determined.

117

8. FEDERALLY ENDANGERED SPECIES.

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested from the USFWS a listing of Federally threatened or endangered species that could be present in the project area. The USFWS responded with a list of three Federally listed species, the bald eagle, Indiana bat, and decurrent false aster, and two Federally candidate proposed species, the lake sturgeon and the spectacle case mussel. The District then prepared an Endangered Species Biological Assessment for these five species. This assessment is provided as APPENDIX DPR-I. 118

Based on the assessment, it is the St. Louis District's perspective that the habitat restoration of Calhoun Point, in conjunction with certain measures to avoid conflicts with the bald eagle, Indiana bat, and decurrent false aster, would have no effect on Federally endangered species or their critical habitat. In addition, the District's perspective is that the project is unlikely to adversely affect either of the two candidate proposed species. The USFWS in its Final Fish and Wildlife Coordination Act report, dated 10 May 1995 (APPENDIX DPR-H), concurs with these conclusions.

9. IMPLEMENTATION RESPONSIBILITIES AND VIEWS.

a. U.S. Corps of Engineers. The St. Louis Corps District, is responsible for stewardship management at Calhoun Point. The St. Louis District is also responsible for the preparation and submission of the DPR; programs funds; finalizes the Plans and Specifications; completes all National Environmental Policy Act requirements; advertises and awards a construction contract; performs construction contract supervision and administration. TABLE 9.1 provides a listing of environmental committments that have been made by the District as part of the recommended project plan. The District is also responsible for the gathering of quantitative measurements for the project's performance evaluation monitoring.

b. U.S. Fish and Wildlife Service. The USFWS is responsible for fish and wildlife planning coordination, and reviewing the District's endangered species determination. The planning coordination includes consideration of problem identification, the evaluation of planning assumptions, and the analysis of physical and chemical responses.

In its Draft and Final Fish and Wildlife Coordination Act reports, the Ecological Services Suboffice--Marion, Il. generally concurs with the planned project features, and indicates that the project will have no effect on Federally listed threatened or endangered species.

The views of the USFWS on implementation responsibilities, as understood by the North Central Division, are contained in the Fourth Annual Addendum, III.A.1 page 9. In the future, the USFWS will ensure that all lake related O&M activities are conducted in a manner compatible with refuge objectives and management strategies, and will ensure that the O&M is performed in accordance with Section 906 (e) of the Water Resources Development Act of 1986 and the Operation, Maintenance and Rehabilitation Agreement.

c. Illinois Department of Natural Resources. IDNR has participated in the identification and definition of problems, needs, opportunities, measures, plans, and monitoring at the Calhoun Point HREP site. IDNR is prepared to serve (through the USFWS) as the non-Federal sponsor (contributing a 100 percent cost-share for O&M), and will cooperate with the USFWS to assure that O&M activities, as described in the DPR, and any mutually agreed upon rehabilitation, will be accomplished in accordance with the Water Resources Development Act. In addition, the Department will provide field observations for the project site (via the annual management report for Cooperative Agreement Lands) for the project's performance evaluation monitoring.

TABLE 9.1

ENVIRONMENTAL COMMITMENTS FOR THE RECOMMENDED PLAN--CALHOUN POINT HREP

Applicable Resource	Concern	Commitment	Location in DPR
High ground elevations	Preserve existing high elevations for potential future reforestation	Loss of high elevations within borrow areas will be avoided/minimized: 1. Removal of borrow from the goose field site will be generally confined to elevations below 424 NGVD. 2. Removal of borrow from the cropland site adjacent to the Royal Landing access road will be limited to one foot in depth.	Plates 2, 3
Backwater slough	Improve fisheries habitat	Fifty tree tops will be placed into Pohlman Slough along the west bank over a distance of 5,000 feet, beginning at the north end, at a spacing of 100 feet apart.	Section 6.a., Plate 2
Bottomland forest	Improve wildlife habitat	Tree piles will be constructed using trees cleared from the berm right-of-way; piles will be placed along the landside toe of the berm, anchored, and spaced about 500-700 feet apart.	Section 6.a.
	Minimize width of tree clearing right-of-way	Width of clearing right-of-way will vary depending upon location but will not exceed 75 feet.	Plates 4,5,6,8
	Increase quantity/quality of forest	1. Mast tree seedlings will be planted on 90 acres of cropland and 25 acres of disposal areas. 2. Mast tree seedlings will be planted within 115 acres of forest.	Section 6.a., Figure 5.10
Threatened and endangered species	Avoid harm to plants/animals or their habitat	Special conditions to avoid adverse impacts to the bald eagle, Indiana bat, and decurrent false aster will be observed.	Section 6.c.(2)(a)

121

Private landowners and cabin lessees within project area, and visiting public	Avoid exposure to aerial application of herbicide	1. Notify landowners and lessees by mail of scheduled aerial spraying (in autumn just before leaf drop). 2. Post signs at project area notifying visiting public that area will be closed during spraying. 3. Conduct aerial spraying on a weekday when air is calm.	Section 7.a.(3?)
Aquatic resources	Minimize/avoid impacts to water quality	1. Implement erosion control measures according to IEPA requirements. 2. Conduct hydraulic dredging activities according to IEPA requirements. 3. Operate and maintain disposal areas for hydraulically dredged material according to IEPA requirements. 4. Conduct aerial spraying of herbicide according to IEPA requirements.	See IEPA permit requirements, Section 6.c.(5)

10. COMPARISON: DPR SELECTED PLAN VERSUS ORIGINAL FACT SHEET CONCEPT.

a. Location. The original fact sheet defined the project area as including 2,300 acres. The acreage has been corrected to 2,157 acres. 122

b. Resource Problem. The original fact sheet is fairly accurate; however, the non-forested habitat acreage has been corrected from 450 to 466 acres. The new fact sheet expands the discussion of site problems to reflect the impacts of water level fluctuations, 1993 flood damages to trees, woody vegetation encroachment, and the loss of a water connection between the river and the site's interior lakes.

c. Proposed Project. The fact sheet anticipated well the features of the selected project plan. The description lacks primarily in specificity. Items not anticipated were the shoreline woody vegetation removal and forest management plan measures.

d. Proposed Outputs. The fact sheet paragraph lacks only in specificity.

e. Financial Data. The general design costs (now estimated at $561,000) are less ($129,000 less) than that anticipated by the original fact sheet ($690,000). This is due to the fact that the design work was done in-house, and that the preliminary planning phase work was reduced by the earlier coordination accomplished by the District's Riverlands Office. The current detailed base year project cost estimate of $5,917,300 is slightly more ($567,300) than the base year cost of $5,350,000 anticipated by the original fact sheet. The reason for this difference is that the more recent project cost estimate is based on additional project plan refinement, and a more detailed level of cost estimation.

ORIGINAL FACT SHEET

CELMS-PM-M 1 March 1991

Name of Project. Upper Mississippi River System--Environmental Management Program (UMRS-EMP), Calhoun Point Habitat Rehabilitation Project

123

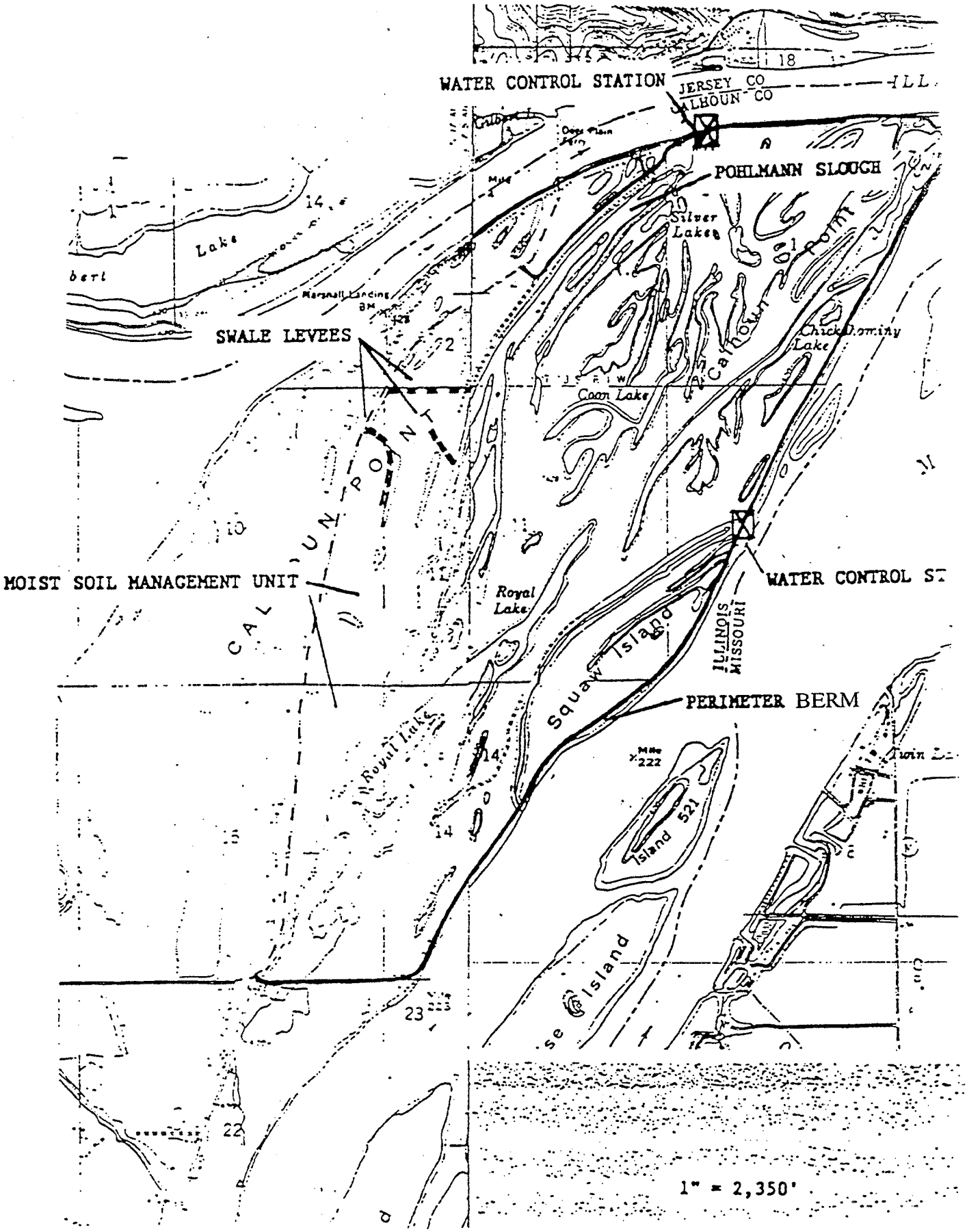
Location. Calhoun Point Fish and Wildlife Management Area consists of about 2,300 acres, and is located at the confluence of the Mississippi (river mile 221) and Illinois Rivers.

Resource Problem. Prior to Lock & Dam 26, Calhoun Point was characterized by numerous wooded ridges, flats, and wet-weather sloughs, several small lakes, small marshes, and the margins of two rivers. When the gates of Lock & Dam 26 were closed (1938) hundreds of acres of bottomland and timberland were inundated. The flooding improved certain habitat conditions for waterfowl and drastically reduced habitat for land animals. Sedimentation, due to the expansion of bottomland and terrace agricultural tillage occurred in the 50's and 60's, followed by a series of high water events during the 1970's, resulted in the reduction of the water surface acreage from 600 acres to 450 acres. Sedimentation has severely impacted deep water habitat. This management area is a prime site for migrating waterfowl and a prime feeding area for herons from two nearby rookeries.

Project. The proposed project would: (1) provide a low elevation perimeter levee to substantially reduce sediment deposits from the more frequent flood events and (2) provide low elevation interior levees, connecting ditches, swale blockages, selected deep water dredgings, and gated water control structures to form four independent management units: a riverine fish unit, two wildlife units, and a combination fish and wildlife management unit.

Project Outputs. Rehabilitating and enhancing these wetland and aquatic habitats would provide breeding, nesting, and feeding habitats for many forms of waterfowl, mammals, and reptiles, and would furnish productive spawning and nursery areas for riverine fishes.

Financial Data. Costs for general design are estimated at $690,000, and construction costs are estimated at $5,350,000. Annual OM&R costs are estimated at $12,000. Because the project is located on lands managed by the Illinois Department of Conservation under a Cooperative Agreement with the U.S. Fish and Wildlife Service, implementation costs are 100 percent Federal. Costs for OM&R would be 75 percent Federal/25 percent non-Federal. The non-Federal sponsor would be the Illinois Department of Conservation.


WATER CONTROL STATION
JERSEY CO
CALHOUN CO
ILL.
POHLMANN SLOUGH
Silver Lake
Calhoun Point
Chickdominy Lake
Coon Lake
SWALE LEVEES
CALHOUN POINT
MOIST SOIL MANAGEMENT UNIT
Royal Lake
Squaw Island
ILLINOIS
MISSOURI
WATER CONTROL ST
PERIMETER BERM
Island 521
Twin La
1" = 2,350'

REVISED FACT SHEET

CELMS-PM-M 7 September 1995

125 NAME OF PROJECT: Upper Mississippi River system--Environmental Management Program (UMRS-EMP), Calhoun Point Habitat Rehabilitation and Enhancement Project (HREP)

LOCATION: The Calhoun Point HREP is located in Calhoun County, Illinois, at the confluence of the Illinois and Mississippi Rivers. This 2,157 acre site consists of 466 acres of non-forested wetland habitat, 1,379 acres of forested habitat, 269 acres of crop fields, and 43 acres of developed lands.

RESOURCE PROBLEM: The open water areas at the point receive substantial sediment input from the flood waters of both the Illinois and Mississippi Rivers. The existing overall deposition rate is approximately .5 inches per year, and is expected to average .3 inches per year over the next 50 years, resulting in a one-third reduction in open water habitat acreage. Water elevations fluctuate greatly, and for extended periods of time. These fluctuations can impact the growth and availability of waterfowl food plants. Other problems include (1) a tendency for Squaw Island vicinity meander scars to dry out, and thus limit their utility to wood duck reproduction, (2) woody vegetation encroachment that reduces the available moist-soil plant production acres, and (3) a 50 percent mortality of mast trees from the 1993 flood.

PROJECT: The project includes, (1) a riverside berm, to serve in reducing sediment input to the site and as an integral component of the berm/gate/pump water control system, (2) selective deepwater dredging at Pohlman Slough to serve as deepwater wintering habitat for riverine fishes, and as a pump water intake location, (3) three exterior gravity drain structures for regulating water levels independent of river stage, with two of the structures also serving to provide for fish access, (4) three interior stop-log structures to subdivide the site's interior lakes into independently managed units, (5) four pumps for enhanced water control, (6) woody vegetation clearing at selected shoreline locations to increase the total site acreage available for moist-soil plant production, (7) interior levees (along with associated stop-log units) to expand the crop acreage at the goose fields available for inundation during the fall migration season, and (8) implementation of a forest management plan as a basis for reestablishing the presence of mast trees as a historically important component of the Calhoun Point forest habitat.

PROJECT OUTPUTS: The proposed project will eliminate approximately 67 percent of future sediment deposition into the site's interior, and flood events during the growing season would be reduced from the present 1 event in 2 years to 1 event in 5 years. Fish access would be available to Pohlman Slough on nearly a year round basis. The total net change in average annual habitat units would be +586 AAHUs for wildlife, and +129 AAHUs for fish. Restoring this site would provide feeding, resting and breeding habitat for waterfowl, improved habitat for many forest dwelling species, and productive spawning and nursery areas for riverine fishes.

FINANCIAL DATA: The total estimated base year cost of this project is $5,917,300 (or $6,961,000 fully funded). The estimated annual operations and maintenance cost is $51,650. All of the project features are on Corps of Engineers-owned General Plan lands. These lands are "managed as a national wildlife refuge" by the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources under a Cooperative Agreement with the U.S. Fish and Wildlife Service and the Corps of Engineers. Under Section 906 (e) of the 1986 WRDA, implementation costs are 100 percent Federal. Annual operation and maintenance requirements will be satisfied through agreement with the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources.

11. COORDINATION, PUBLIC VIEWS, AND COMMENTS.

The agencies (federal, state and local), organizations and individuals receiving the Definite Project Report and Environmental Assessment are listed in APPENDIX DPR-D. 126

Numerous joint field reconnaissance trips and study meetings were conducted by representatives of the St. Louis District, USFWS, and IDNR. Representation from the USFWS included refuge, ecological services, fisheries assistance, and Environmental Management Technical Center personnel. Representation from IDNR included personnel from the land management, planning and fisheries divisions. In addition, coordination has also involved the IEPA, IDOA, USEPA, Corps' Waterways Experiment Station, INHS, and Partners for Wetlands. Section 1.e. of this main report provides additional details of study coordination.

Coordination was also carried out as a result of public and agency review of the Draft DPR/Environmental Assessment/Draft Finding of No Significant Impact. During the 30-day public review period, a public workshop was held. The general public was notified via news releases, and public notices sent via mail and postings at key public facilities. The meeting for the Calhoun Point HREP was held January 10, 1995 at the Mark Twain National Wildlife Refuge, Swan Lake Visitors Center, Brussels, IL. The meeting was an informal workshop held between 3 PM and 8 PM. Forty-one people signed in for the public meeting--about twice the number that attended the nearby Swan Lake HREP public meeting. The workshop consisted of the study manager providing a conceptual overview of the project, followed by a questions and answers session from the public. District and interagency planning team members were available to provide technical clarifications and answer specific questions as needed. Plan drawings, enlarged USGS contour maps and photographic enlargements were available to depict the project area. Comment sheets were made available to the public for making written comments. The more significant verbal comments made at the meeting were written down by Corps staff during the course of the meeting.

Forty-four letters of comment were received from the public during the project review period. The St. Louis District's detailed responses to specific comments from the public meeting and public letters is provided by APPENDIX DPR-B. A summary of these comments/responses is provided by TABLE 11.1.

The letter comments to the draft DPR/EA represent somewhat of an enigma. Typically, the Corps sees a high degree of similarity between comments received at a public meeting, and those comments received by letter. Except for those comments made by Mr. Bensman (Palisades Chapter of the Sierra Club), the tone of the public meeting was not so much philosophical (i.e. whether or not the project itself is worthwhile) as it was project feature specific (e.g. remove access gate to Royal Landing). On the other hand, the tone of the written comments were less feature specific and more philosophical. Since many of the letters received (27 of 44 letters) expressed opposition to the project, the public's attitude towards the project was of key concern.

The District sought to determine how representative these objections were of general public opinion. That is, were these letters more a reflection of an organized mailing campaign, or were they truly independent letters from the public that just happened to arrive at similar conclusions about the project. The District evaluated this issue from a number of different angles: (1) analysis of the content of the letters, (2) analysis of the letter mailing points of origin, (3) analysis of a sampling of opposition letters via a telephone survey, and (4) review of the February 1995 Palisades Chapter Newsletter.

Based on the above analysis, the District concluded that it is highly likely that there was an organized mailing campaign. This campaign tended to

127

TABLE 11.1

SUMMARY OF DRAFT DPR COMMENTS AND ST. LOUIS DISTRICT RESPONSES

Comment	Response
Public Meeting Comments/Responses	
1. Concerned about project damages to cabin site roads & the poor present condition of the roads.	Damages due to construction will be repaired. Otherwise, existing road problems are outside EMP study authority.
2. Pohlman Slough dredging should extend to boat ramp area, and disposal accomplished in a way that is not destructive.	Dredging will extend to boat ramp, and will be accomplished in an environmentally sound manner.
3. Concerned about recreational boat access between Pohlman Slough and the Illinois River.	The design of the stop-log unit would allow for boat passage. However, IDNR has indicated that it will control the amount of boat access via a security gate.
4. Project purpose appears to be a more benefical one than the commentor originally thought.	Comment noted.
5. Concerned about effects of placing project berm on top of Royal Landing access road, including road use restrictions, & road width for 2-way traffic.	Berm alignment shifted to run adjacent to, not on top of road. Entrance gate to access road has been deleted.
6. Berm alignment would impact existing road culverts.	Concept plan has been modified to account for existing drainage pattern.
7. Concerned that project will induce hydrological effects on cabin sites at Pohlman Slough.	Smaller floods are deflected by the berm. Major floods take a couple of days longer to drain away. Pohlman Slough intercepts waterfowl management related rises in water levels. Leases to be modified or terminated if unanticipated adverse conditions occur.
8. Water control structures need safeguards against vandalism.	District will incorporate vandal proofing measures into project design.
9. Concerned about upstream effects of project on farm properties.	Lowland areas upstream and south of county road < or = 426 elev. would realize insignificant effects from the project & only for 2-year flood. Floods above 426 elev. = no project effect. Lowland areas north of county road = no project effect. Sand deposition exterior to the berms would not be influenced by the project.

TABLE 11.1 (Ctd)

Comment	Response
Public Meeting Comments/Responses (Continued)	
10. The Chickahominy Lake boat ramp & parking lot are not needed.	District agrees--these features are now deleted.
11. Clarification requested on future road jurisdictions (Royal Landing access road, Illinois River shore road).	Royal Landing road no longer impacted by project proposal, & road maintenance to continue under county jurisdiction. Future maintenance of Illinois shore road under IDNR control via county permit.
12. Will Corps provide a fact sheet documenting the public meeting findings.	No. Instead, this final DPR (with its public involvement analysis) will be distributed to everyone that attended the public meeting or mailed a letter to the District.
13. Concerned about project's effects on Illinois shore cabins.	Cabins on federal lease will have leases modified.
14. Concerned about impacts of project tree planting on lands farmed (on crop-share basis) for USFWS.	Future use of these lands is dictated by USFWS wildlife management plan. The project plan is consistent with the USFWS master plan which in the future will de-emphasize farming and emphasize native plants production.
15. Construction labor force should be drawn from the county.	County firms may bid on contract work, but no law states that the work force must come from the county.
16. Project sediment control effectiveness is questioned, i.e. deflected sediment will fill in downstream wetlands.	UMRS is a regulated river system with high sediment input load from farming. Net future trend is extinction, not creation of wetlands. The Calhoun Point project carves out of this depositional system a wetlands acreage that would otherwise be lost.
17. Recommend the dedication of existing farmlands to wetlands habitat.	Biggest "habitat bang for the buck" is in using existing publicly owned, not privately owned lands for EMP HREPs. Little farm land exists on public lands, as is the case with Calhoun Point.
18. The swath of tree cutting for berm construction is too great.	District's goal is to keep tree clearing to minimum required for berm placement.
19. Request that a formal public meeting be held for this project.	A less formal meeting format was selected to better enhance publics understanding of the project. For cost-efficiency, the DPR/EA and regulatory review process was combined.

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Excluding Mr. Ettinger Letter)	
1. Opposed to clearing forested wetlands.	Clearing a small acreage of forested wetlands at Calhoun Point is a necessary trade-off for achieving considerable long-term non-forested wetlands habitat gains. Proposed mast-tree plantings more than offset berm related tree losses.
2. Opposed to the building of berms.	Sedimentation is the number one resource problem on the UMRS. Berms represent a cost-efficient means of sediment control. UMRS watershed level sediment control is exorbitant in cost with limited effectiveness on an HREP site-specific basis.
3. Opposed to raising roads.	Royal Landing access road will not be raised as part of the berm system as previously proposed.
4. Proposed clearing of existing trees and habitat is unnecessary.	See District response to letter comment # 1.
5. Proposed work represents an unnecessary impact on eagles.	The project will have no effect on this species or its critical habitat (see APP DPR-I).
6. Proposed work is in violation endangered species laws.	All endangered species compliance documentation required by law has been completed (see APP DPR-I).
7. Report fails to consider endangered bats.	See APP DPR-I for Indiana bat discussion.
8. Proposed work will benefit hunters, not wildlife.	Primary purpose of project is habitat restoration, not recreation. However, some recreational benefits may result as a by-product of habitat improvement.
9. Opposed to spending tax dollars on the project to destroy forested wetlands.	Comment noted. See District responses to other relevant comments.
10. Opposed to destroying scarce existing natural forested wetlands, & its wildlife support value.	Non-forested, rather than forested wetlands, is the habitat resource at a premium on the UMRS. Low habitat value trees along the berm path will be replaced with higher habitat value hard mast bearing trees. See also response to letter comment #1.
11. Proposed dredging of sloughs as fish over wintering habitat is supported.	Comment noted. Deepwater overwintering areas are in short supply on the UMRS.

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Continued)	
12. Recommend contractor be allowed to sell cleared timber.	District agrees. The dollar value of this timber will be credited in the government cost estimate.
13. Recommend limbs from tree clearing be placed in strategicly placed piles as wildlife habitat.	District agrees. A portion of post-timber salvage tree material will be placed in piles.
14. Recommend stumps from tree clearing be placed in slough dredge cut area as fish habitat.	District agrees. Fifty tree tops to be placed along Pohlman Slough shore.
15. Proposed project is accepatable for waterfowl management.	Comment noted. Sedimentation, water & woody vegetation control will greatly improve the area's management capability for waterfowl.
16. Proposed project is somewhat insufficient for maximum fish habitat.	Comment acknowledged. We realize that individual perceptions of what is a sufficient level of habitat improvements will differ. The District has relied heavily on the interagency planning team in trying to arrive at a reasonable balance.
17. The EMP is mitigation for the Mel Price Locks and Dam project.	The EMP is not mitigation for Mel Price. Mitigation for site-specific impacts was implemented separate from the EMP. System-wide mitigation has yet to be determined in the navigation Plan of Study.
18. Wetlands should be restored on nearby farm fields on public lands.	Calhoun Point has very little farmland within its boundaries. A portion of this area is targeted for restoration as part of this HREP.
19. Opposed to Calhoun Point project.	Comment noted. Note District responses to other comments.
20. Opposed to closing Royal Landing access road for berm construction.	Berm alignment has been moved off of the road. The existing usage of the road will not be affected by the project.
21. Proposed access gate at upper end of Royal Landing road will prevent public access to property and/or boat ramp.	The previously proposed access gate has been deleted.
22. Royal Landing access road needs to be better maintained.	Future maintenance of the road will continue under the jurisdiction of the county.
23. Project effects on existing Royal Landing road culvert drainage needs to be considered.	Concept plan has been modified to take into account existing drainage pattern.

TABLE 11.1 (Ctd)

131

Comment	Response
Public Letter Comments/Responses (Continued)	
24. Corps river dredging operations are impacting upon Royal Landing boat ramp.	The present problem at the boat ramp is not dredging, but the fact that the channel is shifting away from Royal Landing.
25. Proposed project doesn't sound like a rehabilitation project.	District disagrees. Project addresses a multitude of identified habitat degradation problems.
26. Stump Lake project should be stopped.	District disagrees. The project was developed in coordination with an interagency planning team and the public. Project is anticipated to perform as designed.
27. Project will be nullified by what will probably become future federal policy with reference to resource interests balancing.	Proposed HREP is not inconsistent with any known present or future objectives to balance resource interests.
28. IDNR emphasis on waterfowl management has hurt fishing at Calhoun Point. Plan needs greater fisheries emphasis.	Fisheries considerations have been a major project consideration. These features include: fish passage units, deep water dredging, tree tops placement and fish screens.
29. Amount of dredging is insufficient as proposed for Pohlman Slough & other lakes.	Due to its high cost, deepwater dredging must be applied sparingly. The amount of dredging applied to Calhoun is in accordance with our interagency planning effort.
30. Need to restrict outboard motor horsepower to 6 HP.	Setting HP restrictions is not a function of the EMP, but rather the state. Under IDNR criteria, Calhoun Point does not qualify for HP restrictions.
31. Keep lake water levels at a high level until such time as extensive deepwater dredgings have been accomplished in the lakes.	Management costs would be too high for for the minor improvement in water depths achievable via pumps.
32. Opposed to summer drawdowns for waterfowl food production--its bad for fish and fishing.	Pohlman Slough will be managed for fish & doesn't involve a drawdown. Drawdowns in other locations are consistent with the goals & objectives as defined by the interagency study team.
33. Calhoun Point and other area HREPs are supported.	Comment noted. The project has not received major objections from the public at large, and it is well supported at the federal & state congressional level.

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Continued)	
34. Opposed to spending tax dollars on this project.	Comment noted. The reader is refered to the District's responses to other comments.
35. Opposed to taking land, that if not preserved will some day be destroyed.	Comment is unclear. No condemnation of lands has been proposed as part of the project.
36. The law dictates that wetlands must be protected from destruction.	Calhoun Point has been developed in full compliance with the applicable environmental statutes. The focus of the entire study is too rectify the problem of wetlands habitat destruction.
37. Corps needs to reconsider the adverse effects the project would have on wildlife as required by law.	The District has carefully considered the effects of the project on both target species (species of primary management focus) and non-target wildlife species.
38. Artificial berms have a negative effect on flood damage.	This is not true for low profile berms such as that proposed for Calhoun. These berms are overtopped by larger (potentially damaging) flood events.
39. Wetlands/bottomlands protection is important from an aesthetic or ethical standpoint.	Project will have short-term negative impacts on aesthetics during construction. Project induced wetlands longevity will improve long-term aesthetics of the area.
40. Project monies should be re-directed to river wetlands restoration.	Comment is unclear. Monies are being directed to river wetlands restoration via the proposed Calhoun Point project.
41. Construction related forest & wetlands damages are unmitigated.	Not true. Project forest management measure more than offsets construction related damages.
42. Corps/IDNR refused to protect valuable mast trees during Stump Lake construction & gave them to contractor at no cost.	One hundred percent avoidance of mast trees was never a goal. A small acreage of trees had to be removed to place a berm. The interagency team felt that this short-term loss was an acceptable trade-off to achieve long-term wetlands habitat gains.
43. Why are mast trees being destroyed at Stump & millions spent planting trees at Calhoun.	See response to letter comment # 42. The cost of tree planting at Calhoun is not millions, rather it is $250,000.
44. Range of alternatives studied is insufficient.	District disagrees. Fifteen measures & 61 measure options were combined to consider millions of different alternative plan configurations.

TABLE 11.1 (Ctd)

133

Comment	Response
Public Letter Comments/Responses (Continued)	
45. Stopping sediment from entering the rivers should have been explored as an alternative.	This alternative was explored. However, the "UMRS Watershed Erosion Control" measure was not found to be a viable alternative.
46. District established 4 screening criteria to eliminate potential measures from consideration as alternatives.	The District disagrees. The measures are alternatives. The only question is how much analysis is done on a given alternative. Only those measures that appeared to be viable at a gross level of analysis were carried forward for a more detailed level of analysis.
47. District didn't consider a measure for converting farmland on public lands into deepwater habitat.	The cost of doing this would be exorbitant--atleast $83,000/AAHU.
48. Disagree with rationale for deleting UMRS watershed erosion control measure. It was done at adjacent Swan Lake HREP.	A system-wide watershed erosion control program would cost billions of dollars, and would be of questionable effectiveness on a site-specific basis. Unlike Swan Lake, Calhoun Point doesn't have an adjacent local watershed affecting the site.
49. Claim that UMRS watershed erosion control is an exorbitant cost is disputed.	See District response to letter comment # 48.
50. An alternative of not using poisonous herbicides should have been considered.	The District also examined mechanical clearing, chainsawing, and hypohatcheting. Herbicides were determined to be environmentally safe, and the most cost-effective method of vegetation control.
51. Corps has concealed what herbicides it will spray.	Rodeo is the selected herbicide.
52. Herbicide induced deforestation will have significant environmental effects.	The District disagrees. Herbicide will not be used near a water supply, and human exposure to the direct spray will be prevented.
53. Suggest planting mast trees without clearing, e.g. in flood tree die-off areas or in farm fields.	The plan has been revised. An experimental planting design includes 1/2 trees planted in selectively cleared areas, and 1/2 trees planted in uncleared areas.
54. Forest clearing for clear cuts & berms will adversely impact forest species.	No clear cuts are proposed for tree plantings--only selective clearing of dead trees less than 9" DBH.

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Continued)	
55. District should prepare an EIS on the grounds of significant cumulative effects.	See APP DPR-R. Calhoun Point project yields substantial beneficial environmental effects, and no obvious adverse cumulative effects. Accordingly, an EIS is not warrented.
56. Corps illegally authorized USFWS to destroy wetlands to convert a road to a berm at Gilbert Lake.	Subject activity was not illegal. Work was within discretionary limits of a permit for wetlands enhancement.
57. The Corps has not prepared an EIS for the EMP, of which Calhoun Point is a part.	We do not believe that a programatic EIS is necessary. Program scale is limited and the outputs are environmentally beneficial.
58. An EIS is required for federal agencies intending to use herbicides in forest management.	The appropriate environmental compliance documentation for Calhoun is an EA, not an EIS. The EA describes the effects of herbicides.
59. The EA does not address the cumulative, systemic, or indirect effects of this proposal.	See APP DPR-R.
60. Quality of Corps EA analysis is inadequate in its discussion of herbicides, neotropical birds, biodiversity, benefits of flooding, Indiana bats, greehouse effects, and wildlife protection.	These subjects are all addressed in the revised Section 7 analysis of the final DPR/EA.
61. There are practical alternatives to discharging dredge material into wetlands.	Disposal area at tip of Calhoun is being used because there are no practical alternatives. The other disposal areas are too far away from this location to be used.
62. The public meeting held by the District was inadequate. Another meeting should be held.	The District strongly disagrees. The location, time, duration, notification, and content of the public meeting were adequate (See APP DPR-B for more detail). There has been no widespread outcry by the public for another meeting.
63. Siera Club is attempting to stop the Calhoun Point and other EMP projects.	The District doesn't wish to speculate of the Club's motives. However, it does appear that the views of the Illinois chapter come closer to representing the organizations views and are more conciliatory than those views expressed by the local chapter.

TABLE 11.1 (Ctd)

135

Comment	Response
Public Letter Comments/Responses (Continued)	
64. Opposed to converting farm fields to mast trees. Instead low value forest trees should be removed and then planted to mast trees.	In light of the fact that agriculture dominates the surrounding landscape, we do not believe that reforestation of the 110 of the 269 cropland acres is excessive.
65. Question need for replacing trees lost due to project construction.	Corps policy requires that project induced losses to bottomland hardwood forest be fully mitigated.
66. Mast tree stand creation at Batchtown Refuge was a failure.	Batchtown tree planting efforts were impacted by the '93 flood, an extreme event. We don't feel that this rare event should deter attempts to improve forest habitat at Calhoun.
67. Support spending tax dollars on Calhoun Project.	Comment noted.
68. Project will improve habitat.	District agrees. Project provides net gain of 586 wildlife AAHUs, and 129 fish AAHUs.
69. Support not dredging Squaw Island and increasing dredging in Pohlman Slough.	The District agrees. Pohlman slough dredging now extends to boat ramp area.
70. Tops of cleared trees should be placed in slough to improve fish habitat.	See District response to letter comment # 14.
71. A stop-log type of water control structure should be placed between Royal Lake & Pohlman Slough.	District agrees. The structure is now included in the site plan.
72. Proposed parking lot and boat ramp on Chickahominy Slough is not needed.	District agrees. These features have been deleted from the project plan.
73. The two finger sloughs on southeast side of Pohlman Slough should have improved earth dikes and water control structures.	District will not improve or replace these structures as it would represent deferred maintenance of existing state O&M responsibilities.
74. Brush piles should be created during construction as habitat.	See District response to letter comment # 13.
75. Berms not needed to control sedimentation. Periodic droughts will take care of the problem.	Periodic drying already occurs at Calhoun site, but the net deposition rate continues at about 0.5"/year. A sediment deflection berm is still needed.

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Continued)	
76. Corps should mimic natural river flow to meet environmental goals.	Our experience has been, that increasing flow to river backwaters decreases rather than increases backwater longevity.
77. Calhoun Point will die in a few short years from siltation without the proposed project.	The long-term trend at Calhoun is one of deposition. This process will be nearly complete, not in a few years, but in decades.

136

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Mr. Ettinger letter)	
1. DPR/EA not in compliance with NEPA in terms of alternatives & cumulative impacts.	District disagrees. See District responses to public meeting comment 17, and public letter comments 44, 45, 47, 50, 55, and 61.
2. Environmental impact of spraying herbicides has been inadequately considered.	District disagrees. See District responses to public letter comments 50, 52, and 58.
3. Report doesn't adequately consider measures to achieve project goals without building a berm.	District disagrees. Rationale is provided in subsequent responses to comments more specific in focus.
4. Report doesn't address cumulative impacts from this & other HREPs.	See District's response to public letter comment 55. Also, HEC-2 analysis showed no significant increases in water surface elevations from floods ranging from 2-year to 500-year recurrence interval.
5. UMRS watershed erosion control measure not adequately addressed.	See District's responses to public letter comments 48 and 49.
6. Navigation pool water level manipulation was either not adequately explored, or was dismissed for invalid reasons.	Pool regulation does not address the problem of sedimentation, it provides a less reliable means of water control, and it potentially impacts on other river uses. A Calhoun point berm-gate-pump system approach is not incompatible with the concept of pool regulation (by the way the District has been experimenting with pool regulation). Both measures are useful tools for future habitat restoration.
7. Regular maintenance dredging was either not adequately explored, or was dismissed for invalid reasons.	Maintenance dredging is not a cost-efficient measure for controling sedimentation. This measure provides no control over potentially damaging summer flood events on moist-soils plant production. A berm not only excludes sediment, but controls summer flood intrusion as well.
8. Riverside berm selection is questioned.	See response to comment 7 above. Also, leveed area will increase success of mast trees production by providing drier site conditions.
9. Selective deepwater dredging measure should be combined with maintenance dredging.	These measures were never meant to be combinable. Maintenance dredging is the huge cost of doing business without a berm, and selective dredging the lower cost of doing business with a berm.

TABLE 11.1 (Ctd)

Comment	Response
Public Letter Comments/Responses (Continued)	
10. Calhoun Point is in good ecological condition.	Not true. Non-forest wetland acres at Calhoun have declined from 600 to 450 acres since construction of locks & dams system. This acreage will decline to 300 acres within the next 50 years. The wetlands creation process of a free flowing river system is gone. Wetlands are being extinguished, but not created.
11. Tree cutting for berms will increase wave action on interior lakes.	Not true. There would still be a considerable tree buffer remaining between the berm path & the backwaters.
12. Swan Lake will aggravate river flooding and increase river sedimentation.	District disagrees. Hydraulics analysis shows no significant effect on the flooding pattern. Swan Lake will reduce sedimentation at that site. If we don't act now, and in the face of long-term UMRS wetlands extinction, discussions on how best to save these wetlands will be irrelevant.
13. Corps has rushed ahead to build berms without regard to ecosystem effects.	Not true. The project's planning has been a thoroughly coordinated scientific effort.

magnify certain issues in a manner not indicative of the concerns of the public at large. In this regard, the comments received from the public meeting were probably more reflective of the public's true concerns.

139 The Palisades Chapter mailing campaign appears to have triggered a cluster of letters (8 letters) from waterfowl interests; in particular, Migratory Waterfowl Hunters, Inc. Two common points in these letters were: (1) support for the project, and (2) a belief that the Sierra Club (Jim Bensman) is trying to stop the project.

Perhaps a better indication of the positions of the Sierra Club, as an organization, is revealed in the Illinois Chapter's (Mr. Ettinger) letter of January 23, 1995. In this ATTACHMENT B-1, the District has provided responses to Mr. Ettinger's comments and TABLE 11.1 includes a comment/response summary.

In conclusion, the District has carefully reviewed each of the public letters of comment. These comments do not reflect a broad public outcry for the termination of the Calhoun point project. However, at an organizations level, philosophical differences do exist on the direction and intent of the Calhoun Point HREP and even the EMP in general. The District views these differences and the discussions they generate as constructive. To be truly successful, the EMP program must continually reassess where it has been, and where it is going. The program must stay fluid, not static. There is no "best way" to accomplish habitat restoration. Different agencies and sectors of the public perceive habitat restoration and management needs in different ways. Within the public realm, we can anticipate differences of opinion from hunters, fishermen, bird watchers, wildlife photographers, naturalists, and non-resource users. Within the agencies and the academic community we can anticipate differences of opinion between fisheries biologists, wildlife biologists, waterfowl biologists, ecologists, botanists, foresters, endangered species specialists, wetlands specialists, water quality specialists, sedimentologists, hydrologists, etc. It's not that one group is clearly right and the other is clearly wrong, each contributes a uniquely different and important perspective on habitat restoration.

Part of the challenge for the District, and the EMP, is to accomplish habitat restoration in a manner that gives consideration to the many differing resource viewpoints. To achieve a reasonable amalgamation of thought, the District established an interagency planning team for each of the HREPs. To the extent possible, and within existing mandates, it has been the consensus opinion of this team that has driven the direction of the HREPs. This consensus has been reached after consideration of overall river resources needs, and of the views of various resource interest groups.

It is important to recognize that the HREPs within the EMP are of very limited scale, and the projects are intended to be of a demonstration nature. The EMP is a tool to be used towards river habitat restoration. It is recognized that our view of "the big picture" for the EMP will continue to change over time. Before there is a major application of the habitat restoration tools acquired during the EMP, there will need to be a comprehensive system-wide assessment of resource needs, objectives, measures and plans. It is appropriate that organizations such as the Sierra Club and Migratory Waterfowl Hunter's Inc. be a part of that future process.

The District received a number of congressional letters of support for the project (See APPENDIX DPR-B). Letters at the federal level were received from Congressmen Durbin and Costello. Letters at the state level were received from Senators Bowles and Demuzio and Representative Davis.

Agency letters received included letters from IDNR (project sponsor) and the USFWS. These letters and the District's detailed responses are provided by APPENDIX DPR-B. The District concurred in the Department's suggestions for (1) the use of cleared timber as fish cover, (2) alteration of dredging at Pohlman Slough, (3) placement of a stop-log structure between Royal Lake and

Pohlman Slough, (4) placement of fish screens, (5) alteration of Pohlman Slough exterior water control structure relative to boat passage, (6) deletion of Chickahominy Lake parking lot and boat ramp, and (7) creation of brush piles as wildlife habitat. The Department's suggested replacement of existing water control structures in finger sloughs of Pohlman Slough was rejected on the basis that it was deferred maintenance. 140

The USFWS has provided comments in a letter (see APPENDIX DPR-H), which constitutes its final Fish and Wildlife Coordination Act Report as compliance with Subsection 2(b) of the Fish and Wildlife Coordination Act, and Section 7 consultation requirements of the Endangered Species Act of 1973, as amended. The Service concurs with the APPENDIX DPR-I (biological assessment) that the project will have no effect on Federally listed threatened or endangered species. The District agrees with the Service's recommendations for modifying Pohlman Slough dredging, and the placement of cleared trees as fish and wildlife habitat structures. The District diagreed with the Service's recommendations for meander scar improvements, Pohlman Slough finger lakes water control structure replacements, and a proposed second public meeting.

The District thanks every one for providing comments. Modifications to the project have been made as a result of these comments. In the years to come, we look forward to working with the various organizations and the general public to strive to achieve a balanced vision for habitat restoration on the UMRS.

12. CONCLUSIONS.

Sedimentation and water level fluctuations, have hampered past habitat management efforts at the Calhoun Point HREP site. Sedimentation is causing a rapid conversion of aquatic habitat to terrestrial habitat with a resulting long-term quantitative loss of fish and waterfowl habitat. Sediment plug formation has reduced fish access between the river and the site's interior. Fluctuating water levels at the site have impacted the productivity of the site via effects on the production and availability of waterfowl food sources.

Calhoun Point has been recommended to the Corps of Engineers, St. Louis District, by the Fish and Wildlife Service and the Illinois Department of Conservation for priority inclusion in the UMRS-EMP.

The proposed project with its berm structure would eliminate approximately 67 percent of future river sediment deposition into the site's interior. This sediment reduction would enhance both the longevity and productivity of Calhoun Point as fish and wildlife habitat. The selective deepwater dredging at Pohlman Slough to provide a deepwater fish refuge, and a water intake location for pumping operations at the goose fields. The berm embankment, in combination with the gated water control structures (both interior and exterior) and pumps, would provide a significant degree of control over water levels. This control will enable a greater productivity and availability of plant and invertebrate food sources for migrating ducks. Cover for fish is expected to increase in response to water control. The interior berms (along with the associated stop-log units) would expand the crop acreage available for fall inundation at the goose fields area. Water control will provide the opportunity (if needed) to solidify the lake bottom, and this should increase plant production. Woody vegetation removal will expand the acreage available for moist-soil plant production. The mast-tree plantings will offset damages to the forested wetlands habitat incurred by the 1993 flood and any tree losses resulting from the installation of the projects other features.

13. RECOMMENDATIONS.

141 I have weighed the accomplishments to be obtained by implementing this habitat rehabilitation and enhancement project versus the costs, and have also considered the scope and the special locational factors associated with the project. In my judgment, implementing the proposed project would entail a justified expenditure of Federal funds.

I recommend that the Secretary of the Army, under the provisions of Public Law 99-662, approve this project for habitat rehabilitation and enhancement at Calhoun Point in Calhoun County, Illinois. A Letter of Intent has been furnished by the Illinois Department of Natural Resources. The total estimated fully funded cost of this project is $6,961,000. Of this amount, I request that $480,000 (fully funded) be allocated so that Plans and Specifications phase work can be initiated as soon as possible.

Thomas C. Suermann
Colonel, U.S. Army
District Engineer

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143

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15. LIST OF PREPARERS.

The Corps staff members primarily responsible for preparing this document are listed in TABLE 15.1, and TABLE 15.2 provides a listing of the primary agency contributors. 144

16. FINDING OF NO SIGNIFICANT IMPACT

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

CALHOUN POINT HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

(1) I have reviewed and evaluated the documents concerning the proposed rehabilitation and enhancement of Calhoun Point.

The purpose of the project is to rehabilitate and enhance wetland habitat at Calhoun Point for both migratory waterfowl and fish. This is to be done by reducing sediment deposition from river flooding, by controlling interior water levels, by shoreline woody vegetation control and by forest management. The project would be funded under the provisions of Public Law 99-662.

(2) Prior to my decision, I evaluated other pertinent data and information which addresses the various practicable alternatives. As part of that evaluation, I considered:

a. the "No Action" alternative,

b. the proposed or recommended plan, referred to as the "Wetlands Protection" alternative, and

c. various alternative component features leading to the recommended plan (e.g., various dike and levee heights and alignments, various water control structures, etc.).

(3) These alternatives have been studied, and major findings of this investigation include the following:

a. The "No Action" alternative was evaluated but subsequently rejected. This alternative would do nothing to address study objectives relating to the habitat restoration goals of improved: wetlands habitat diversity, dabbling duck feeding habitat, wood duck brood rearing habitat, goose field habitat, and forested habitat improvement.

b. The "Wetlands Protection" alternative was found to be fully responsive to the project objectives, and was designated as the Selected Plan. Most importantly, it would greatly reduce the sedimentation rate, it would restore (in varying degrees) fish access to the interior, and it would provide deep water overwintering habitat for fish. It would increase the protection of moist-soil plants during the summer growing season from damaging flood waters, it would expand moist-soil areas via shoreline woody vegetation removal, and it would allow for independent water control of the moist-soil management units. It would improve forest habitat by providing mast-tree plantings. It would help prevent slough dry out conditions in spring to improve wood duck brood rearing habitat, it would make available invertebrates as a food source to migrating waterfowl during the fall, it would make shallow water available for residual crops at the goose field area. Specific options considered in detail included: selective deepwater dredging, riverside dike/levee, meander scar improvements, water control structures, clearing of woody vegetation, interior pumps, and forest management plan.

(4) The possible consequences of the recommended plan have been studied for physical, environmental, cultural, social and economic effects. Major conclusions of this study are as follows:

a. The construction of the project represents a permanent change in the topographic and hydrographic conditions of the Calhoun Point area. These changes are necessary for water and sediment control.

145 b. The project is in compliance with the requirements of the Clean Water Act Section 404(b)(1) guidelines. State water quality certification under Section 401 has been issued with special conditions. The proposed project would likely have minimal adverse impacts on water quality.

c. No project effects are expected on upstream river elevations during floods. No impacts are expected to occur to nearby Grafton, Il. Any project induced bank erosion is expected to be minimal.

d. There would be a major benefit to waterfowl and fishes. The project would result in an estimated net gain of +546 wildlife average annual habitat units (AAHUs) and +129 AAHU's for fish. To make these wetland benefits possible, a total of 51 acres of forested wetland would have to be cleared as part of project construction. This loss will be more than offset by the effects of the forest habitat management plan that calls for mast-tree plantings on 230 acres of the site.

e. A professional archaeologist would monitor construction activities for the presence of archaeological remains. If such remains are found, construction will be postponed until an archaeological investigation is conducted.

f. Fishing and hunting at Calhoun Point are expected to improve as a result of project habitat improvements.

g. It is anticipated that the proposed action will have little or no adverse impact on air quality, noise, socioeconomic resources and aesthetics.

h. A loss of 78 acres of prime farmland will occur as a result of the project.

i. No Federally listed endangered species will be adversely affected by the proposed action.

(5) Based on my analysis and evaluation of the alternative courses of action presented in the Environmental Assessment, I have determined that the restoration of Calhoun Point will not have significant adverse effects on the human environment, but will have important beneficial effects on specific fish and wildlife resources. Therefore, no Environmental Impact Statement will be prepared prior to proceeding with this action.

September 14, 1995
Date

Thomas C. Suermann
Thomas Suermann
Colonel, U.S. Army
District Engineer

TABLE 15.1

CALHOUN POINT
DEFINITE PROJECT REPORT/
ENVIRONMENTAL ASSESSMENT PREPARERS

Name	Expertise/Discipline	Study Role	Experience
Richard Astrack	District GIS Coordinator	GIS consultation with EMTC	5 yrs Hydraulics, SLD; 21 yrs Planning, SLD
Steele Beller	Real Estate Specialist	Real Estate Requirements	10 yrs Real Estate, Private 7 yrs Real Estate, State of Mo. 6 yrs Real Estate, SLD
L. Bienkowski	Civil Engineering Technician	Civil Design Drawings	21 yrs Civil Engineering Technical, SLD
John Cannon	Natural Resources Ranger	Preliminary Planning	2 yrs Resource Management, Tulsa District 14 yrs Resource Management, SLD
Pat Conroy	Geotechnical Engineer	Soils Exploration & Testing, Geotechnical Design	16 yrs Geotechnical Design, SLD
Sharon Cotner	Project Manager	EMP Program Management	9 yrs Study Management, SLD; 6 yrs Project Management, SLD
Ron Dieckmann	Hydraulic Engineering	Hydrology & Hydraulics Design	22 yrs Hydraulics, SLD
Sandor Dombi	Civil Engineer	Preliminary & Detailed Cost Estimation	20 yrs Cost Design, SLD; 5 yrs Cost Estimation, SLD
Stan Ebersohl	Civil Engineer	Preliminary Planning	23 yrs Civil/Environmental/ Engineering, SLD
Dan Erickson	Assist. Riverlands Area	Preliminary Planning	6 yrs Resource Management, Memphis District 13 yrs Resource Management, SLD

TABLE 15.1 (Ctd)

Name	Expertise/Discipline	Study Role	Experience
Dave Gates	Study Manager	Study Management, Plan Formulation	10 yrs Wildlife Biology, SLD; 6 yrs Study Management, SLD
Tim George	Ecologist	Wildlife/Fisheries/Ecological Analyses, Environmental Compliance, Plan Formulation	14 yrs Wildlife Biology/ Ecology, SLD
Harry Hamell	Real Estate Specialist	Real Estate Analysis	10 yrs Real Estate Appraisal, SLD
John Helfrich	Mechanical Engineering Technician	Civil Design Drawings	28 yrs Mechanical Engineering Technical, SLD
Joe Kellett	Project Manager	Project Management	5 yrs Hydraulics Designer, SLD; 9 yrs Resident Construction Engineer, SLD; 2 yr Project Management
David Leake	EMP Planning Coordinator	Plan Formulation	21 yrs Study Management, SLD; 1 yr Structural Design, SLD; 2 yrs Construction Contract Mgmt, SLD
Gary Lee	Civil Engineering/Design	Preliminary Planning	5 yrs Construction Management, SLD; 2 yrs Facilities Engineering, SLD; 3 yrs Civil/Structural Design, SLD
Jim Lynch	Natural Resources Specialist	Preliminary Planning	8 yr Park Ranger, SLD 5 yrs Natural Res. Spec., SLD
Patrick McGinnis	Riverlands Area Manager	Preliminary Planning	4 yrs Regulatory, SLD 14 yrs Resource Management, SLD
Bob Mesko	Cartographer	Mapping/Surveying	29 yrs Mapping/Surveying, SLD
Roger Myhre	Hydrologist/Limnologist	Water/Sediment Quality Analysis	18 yrs Water Quality and Environment Quality Analysis, SLD

TABLE 15.1 (Ctd)

Name	Expertise/Discipline	Study Role	Experience
Leo Nico	Fisheries Biologist/Ecologist	Fisheries Analysis	7 yrs fisheries biology, SLD, Ph.D
F. Terry Norris	Archaeologist	Archaeology/Historic Sites Evaluation	18 yrs Archaeologist, SLD, Ph.D Candidate
John Poullain	Civil Engineer	Civil Design Quantification	33 yrs Civil Engineering, SLD
Don Sweeney	Economist	Incremental Cost Analysis, Project Formulation	17 yrs Economist, SLD, Ph.D
Jennifer Watkins	Economist	Incremental Cost Analysis, Project Formulation	5 yrs Real Estate Appraiser, SLD; 2 yr Economics, SLD

149

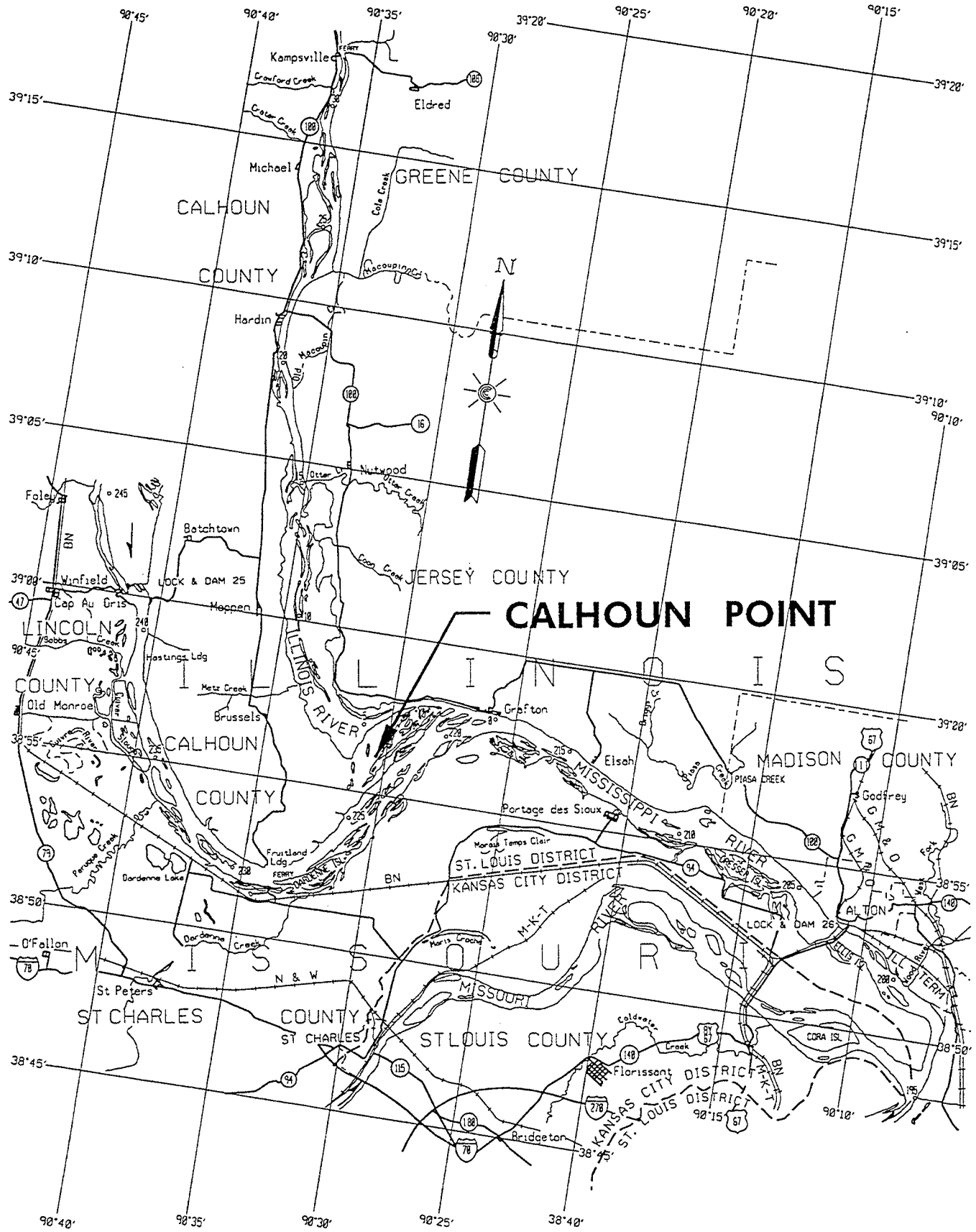
TABLE 15.2

DEFINITE PROJECT REPORT
AGENCY CONTRIBUTORS

Name	Agency	Role
Butch Atwood	IDNR, Greenville, IL	Fisheries Biologist
Neil Booth	IDNR, MRF&WMA, Grafton, IL	Site Superintendent
Chris Borden	USSCS--SCD, Hardin, IL	District Conservationist
Michael Bornstein	USFWS, MTNWR	Refuge EMP Coordinator
Joyce Collins	USFWS, Marion, IL	Ecological Services
Fred Cronin	INHS, LTRMP Field Sta., Mel Price	Biologist
Bill Donels	IDNR, Springfield, IL	State EMP Coordinator
K. L. Drews	USFWS, MTNWR, Brussels District	District Manager
Dave Harper	IDNR-Region IV, Alton, IL	District Wildlife Biologist
Marvin Hubble	IDNR, Springfield, IL	State EMP Coordinator
Tom Groutage	USFWS, Marion, IL	Ecological Services
John Ingram	WES, Vicksburg, MS	Wetlands Restoration
Doug Johnson	USFWS, Twin Cities, MN	Engineering Technician
Murray Laubahn	U of Mo--Gaylord Lab., Puxico, MO	Senior Research Technician
Deck Major	IDNR-Region IV, Alton, IL	Regional Wildlife Administrator
Rob Maher	INHS, LTRMP Field Sta., Mel Price	Biologist
Jim Mattsson	USFWS, MTNWR	Assist Regional Refuge Biologist
Rick Messinger	IDNR-Region IV, Alton, IL	Resource Manager
Patti Meyers	USFWS, MTNWR, Brussels District	District Manager
Jerry Olmsted	USFWS, MTNWR, Brussels District	Fisheries Biologist
Mark Phipps	IDNR, Pittsfield, IL	Natural Heritage Biologist
Kim Postlewait	IDNR, MRF&WMA, Grafton, IL	Site Assistant Superintendent
Martha Sheppard	USSCS, Hardin, IL	District Conservationist
Bob Stratton	USFWS, MTNWR, Quincy, IL	Refuge Management
Chuck Surprenant	USFWS, Carterville, IL	Fisheries Assistance
Chuck Theiling	INHS, LTRMP Field Sta, Mel Price	Team Leader
Tom Wilson	IDNR, Carrollton, IL	Forester
Bruce Yurdin	IEPA, Springfield, IL	State EMP Coordinator

ATTACHMENT 1

PLATES



PROJECT LOCATION

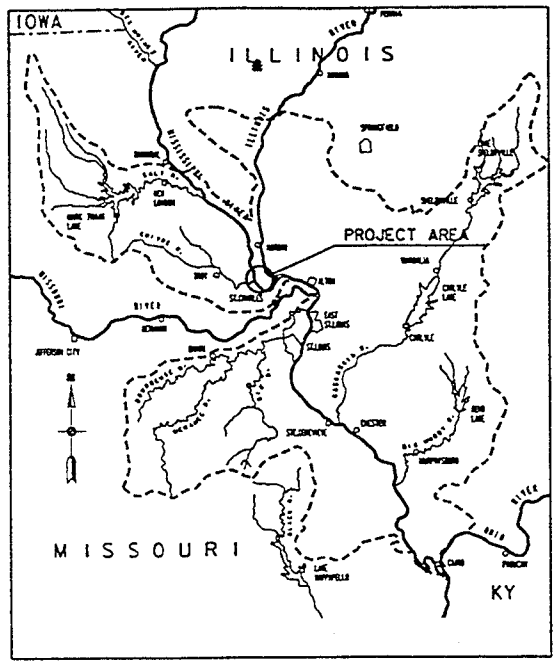
APPROX. SCALE IN MILES

LEGEND

District Boundary — —

DRAWING INDEX

PLATE NO.	SHEET	TITLE
1	1 OF 1	PROJECT LOCATION, DRAWING INDEX, AND VICINITY MAP
2	1 OF 2	GENERAL SITE PLAN
3	2 OF 2	GENERAL SITE PLAN
4	1 OF 3	BERM PROFILE
5	2 OF 3	BERM PROFILE
6	3 OF 3	BERM PROFILE
7	1 OF 1	CHANNEL PROFILES
8	2 OF 2	CHANNEL PROFILES
9	1 OF 1	MISC. SECTIONS AND DETAILS AND CHANNEL PROFILES
10	1 OF 6	PLAN AND SECTIONS - SITE 1
11	2 OF 6	PLAN AND SECTION - SITE 2
12	3 OF 6	PLAN AND SECTIONS - SITE 3
13	4 OF 6	PLANS AND SECTIONS - SITES 4 AND 7
14	5 OF 5	PLANS AND SECTIONS SITES 6, 9, 10, AND 11
15	6 OF 6	FISH SCREEN STRUCTURE - SITE 2
16	1 OF 7	BORING LOCATIONS - GEOTECHNICAL
17	2 OF 7	BORING LOCATIONS - GEOTECHNICAL
18	3 OF 7	ILLINOIS RIVER BORINGS - GEOTECHNICAL BORING LOGS
19	4 OF 7	MISSISSIPPI RIVER BORINGS - GEOTECHNICAL BORING LOGS
20	5 OF 7	MISSISSIPPI RIVER BORINGS - GEOTECHNICAL BORING LOGS
21	6 OF 7	INTERIOR RIVER BORINGS - GEOTECHNICAL BORING LOGS
22	7 OF 7	BORROW BORINGS - GEOTECHNICAL BORING LOGS
23	1 OF 2	GRAFTON, ILLINOIS STAGE HYDROGRAPHS
24	2 OF 2	GRAFTON, ILLINOIS STAGE HYDROGRAPHS



VICINITY MAP

APPROX. SCALE IN MILES

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: A. BIENKOWSKI
CHECKED BY: J. W. POULAIN
DATE: AUGUST 1995

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION

APPROVED: BOBBY R. HUCHEY, CHIEF, DESIGN BRANCH

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
PROJECT LOCATION, DRAWING INDEX AND VICINITY MAP

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 1

DESIGN FILE: ***DESIGN*FILE*SPECIFICATION*** | PLOT DATE: ****DATE-TIME****

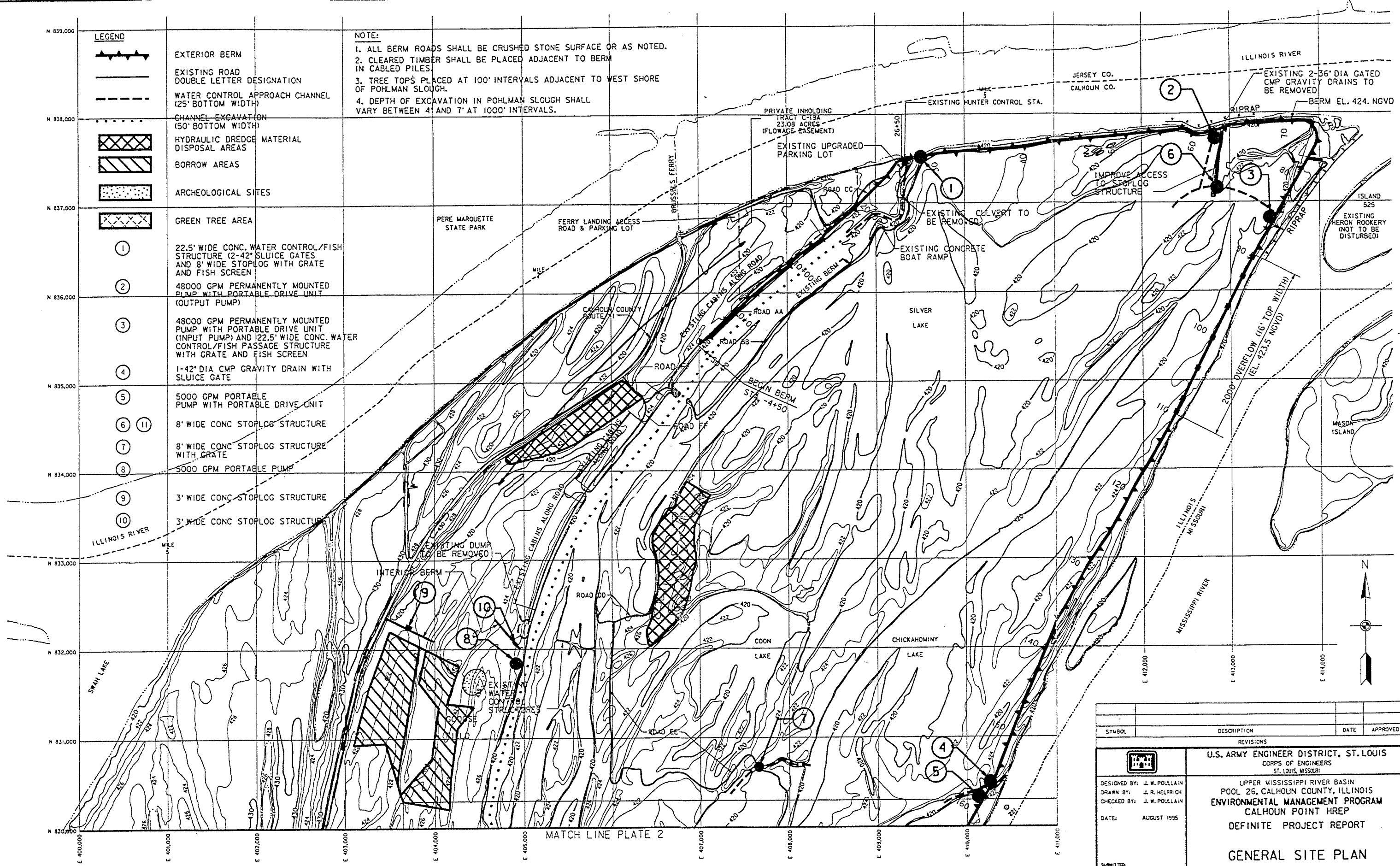
PLOT SCALE: 4:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 1 OF 1

LEGEND

- EXTERIOR BERM
- EXISTING ROAD DOUBLE LETTER DESIGNATION
- WATER CONTROL APPROACH CHANNEL (25' BOTTOM WIDTH)
- CHANNEL EXCAVATION (50' BOTTOM WIDTH)
- HYDRAULIC DREDGE MATERIAL DISPOSAL AREAS
- BORROW AREAS
- ARCHEOLOGICAL SITES
- GREEN TREE AREA
- (1) 22.5' WIDE CONC. WATER CONTROL/FISH STRUCTURE (2-42' SLUICE GATES AND 8' WIDE STOPLOG WITH GRATE AND FISH SCREEN
- (2) 48000 GPM PERMANENTLY MOUNTED PUMP WITH PORTABLE DRIVE UNIT (OUTPUT PUMP)
- (3) 48000 GPM PERMANENTLY MOUNTED PUMP WITH PORTABLE DRIVE UNIT (INPUT PUMP) AND 22.5' WIDE CONC. WATER CONTROL/FISH PASSAGE STRUCTURE WITH GRATE AND FISH SCREEN
- (4) 1-42' DIA CMP GRAVITY DRAIN WITH SLUICE GATE
- (5) 5000 GPM PORTABLE PUMP WITH PORTABLE DRIVE UNIT
- (6) (11) 8' WIDE CONC STOPLOG STRUCTURE
- (7) 8' WIDE CONC STOPLOG STRUCTURE WITH GRATE
- (8) 5000 GPM PORTABLE PUMP
- (9) 3' WIDE CONC STOPLOG STRUCTURE
- (10) 3' WIDE CONC STOPLOG STRUCTURE

NOTE:

1. ALL BERM ROADS SHALL BE CRUSHED STONE SURFACE OR AS NOTED.
2. CLEARED TIMBER SHALL BE PLACED ADJACENT TO BERM IN CABLED PILES.
3. TREE TOPS PLACED AT 100' INTERVALS ADJACENT TO WEST SHORE OF POHLMAN SLOUGH.
4. DEPTH OF EXCAVATION IN POHLMAN SLOUGH SHALL VARY BETWEEN 4' AND 7' AT 1000' INTERVALS.



SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: J. R. HELFRICH
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

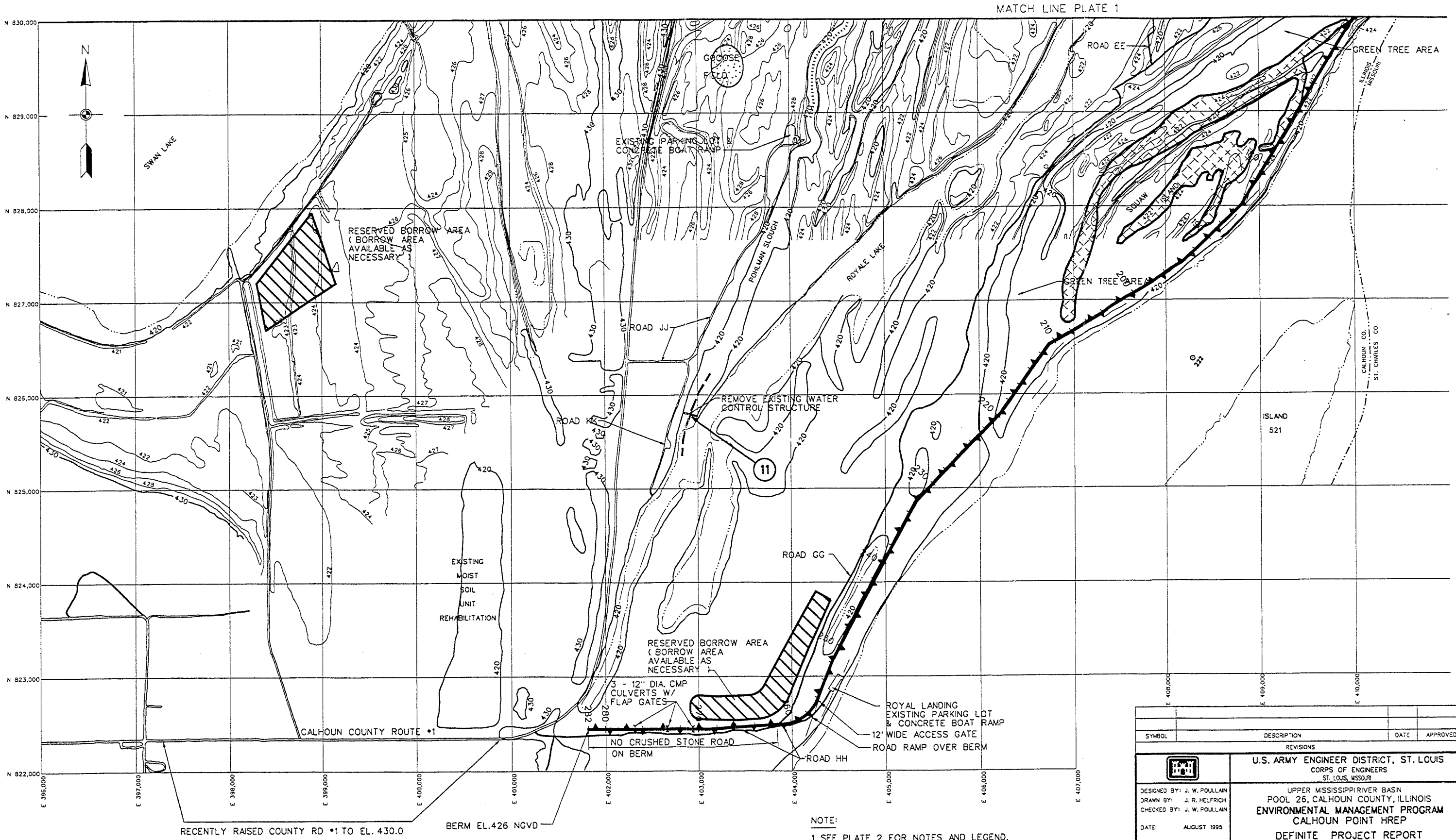
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

GENERAL SITE PLAN

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION
APPROVED: BOBBY R. HUGHEY, CHIEF, DESIGN BRANCH

SIZE: D | DWG. CODE: DACW 43 | DRAWING NO.: PLATE 2

DESIGN FILE: ***DESIGN*FILE*SPECIFICATION*** | PLOT DATE: ***DATE-TIME***
PLOT SCALE: 500:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 1 OF 2



NOTE:

1. SEE PLATE 2 FOR NOTES AND LEGEND.

SCALE: 1" = 500'

500' 0 500'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
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CHECKED BY: J. W. POULLAIN
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UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

GENERAL SITE PLAN

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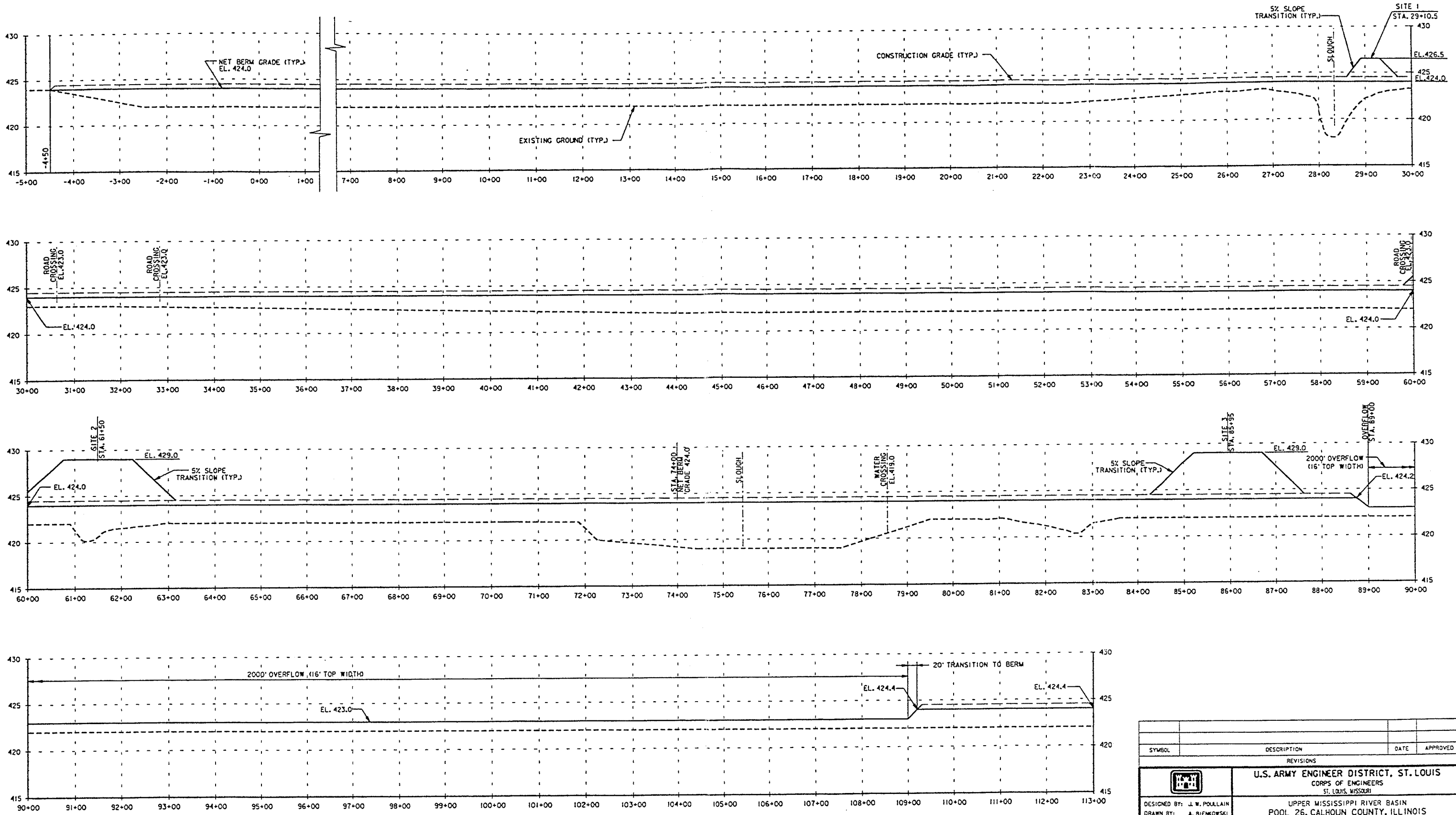
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION
APPROVED: BOBBY R. HUCHEY, CHIEF, DESIGN BRANCH

SIZE: D | DWG. CODE: DACW 43 | DRAWING NO.: PLATE 3

DESIGN FILE: ###DESIGN#FILE#SPECIFICATION#####DATE-TIME$$$$
PLOT SCALE: 500:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 2 OF 2



BERM PROFILE

SCALE: 1" = 100' HORIZ.
100' 0 100'

SCALE: 1" = 5' VERT.
5' 0 5'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: A. BIENKOWSKI
CHECKED BY: J. W. POULLAIN
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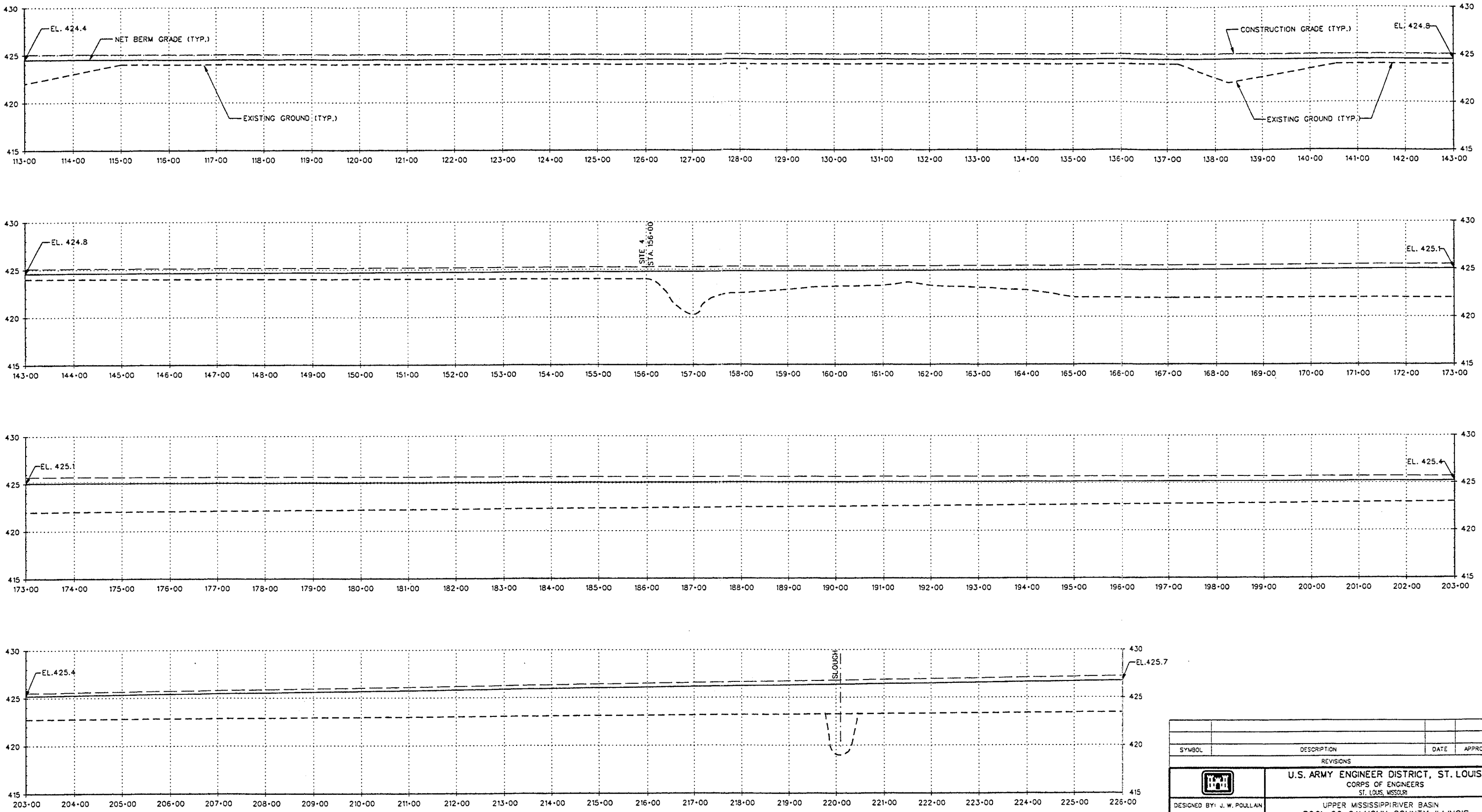
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

BERM PROFILE

SUBMITTED: JOHN R. POULLAIN, DESIGN ENGINEER
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION
APPROVED: BOBBY R. HUCHEY, CHIEF, DESIGN BRANCH

SIZE	DWG. CODE	DRAWING NO.
0	DACW 43	PLATE 4

DESIGN FILE: ###DESIGN#FILE#SPECIFICATION### | PLOT DATE: ###DATE-TIME###
PLOT SCALE: 100 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 1 OF 3



BERM PROFILE

SCALE: 1" = 100' HORIZ.

100' 0 100'

SCALE: 1" = 5' VERT.

5' 0 5'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

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CHECKED BY: J. W. POULLAIN
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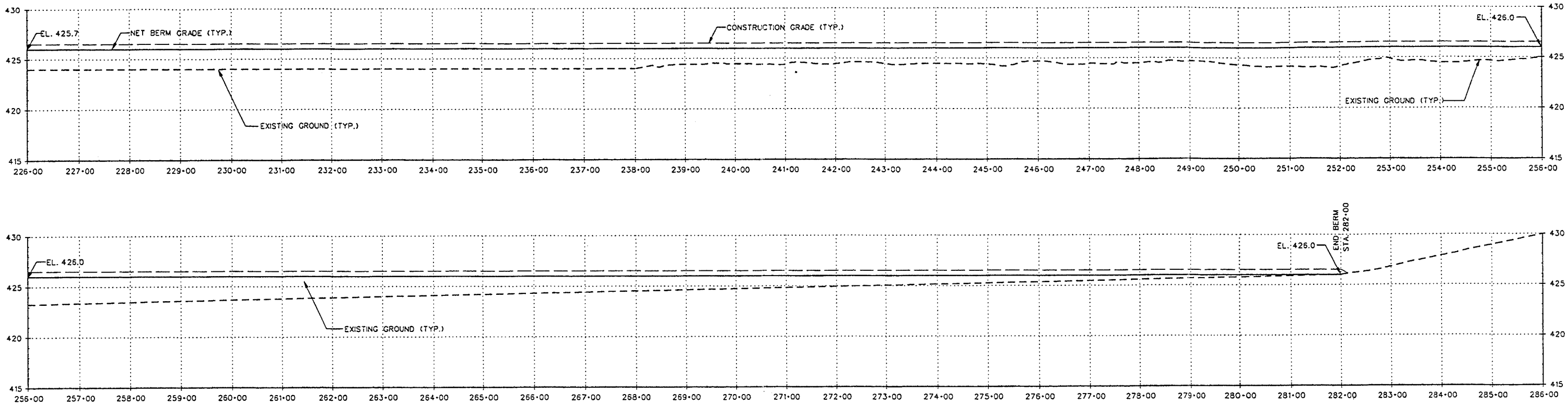
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
BERM PROFILE

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION
APPROVED: BOBBY R. HUGHEY, CHIEF, DESIGN BRANCH

SIZE: D | DWG. CODE: DACW 43 | DRAWING NO.: PLATE 5

DESIGN FILE: ***DESIGN*FILE*SPECIFICATION***** [illegible] DATE-TIME$$$$

PLOT SCALE: 100 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 2 OF 3



BERM PROFILE

SCALE: 1" = 100' HORIZ.

100' 0 100'

SCALE: 1" = 5' VERT.

5' 0 5'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: A. BIENKOWSKI
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

BERM PROFILE

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

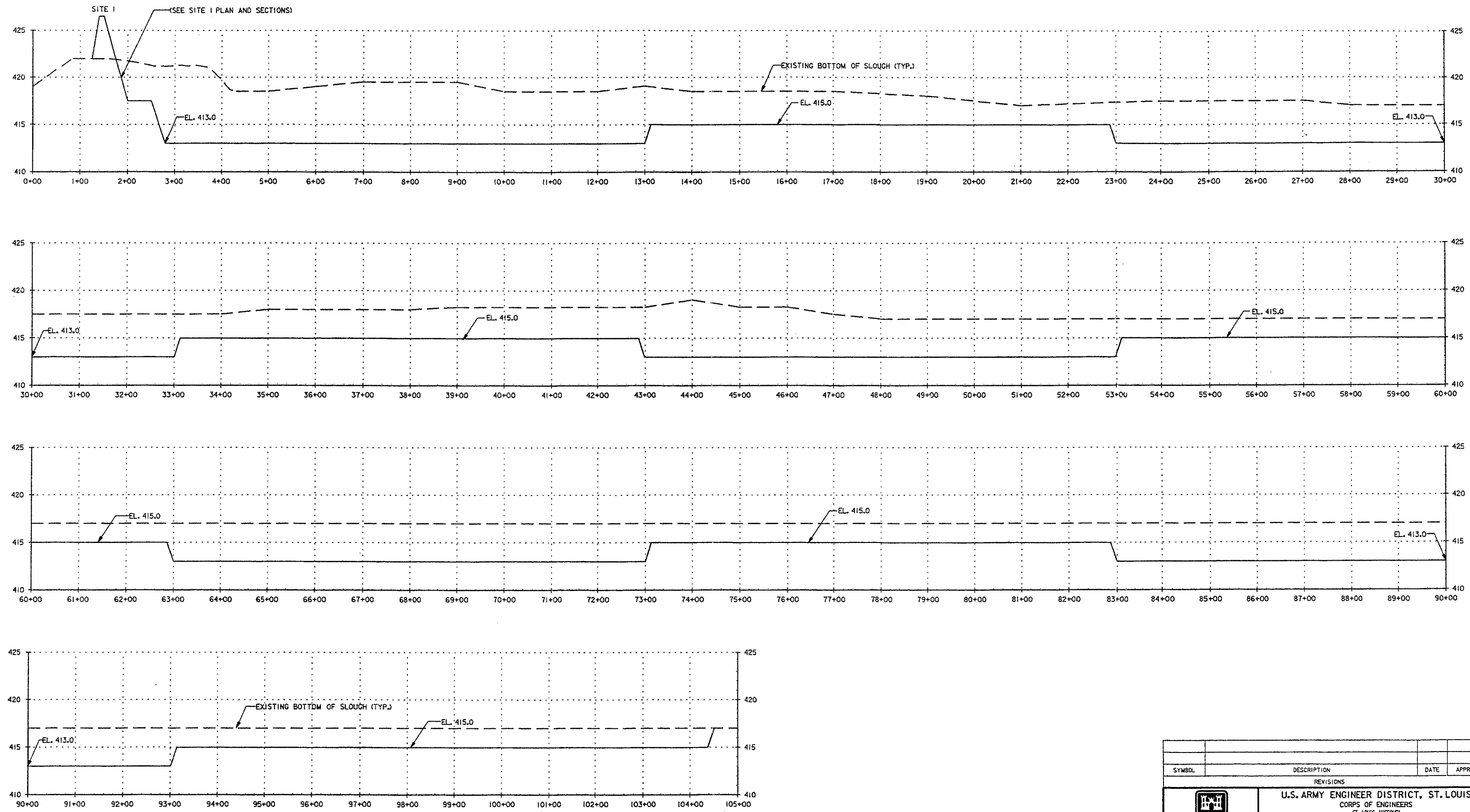
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION

APPROVED: BOBBY R. HUCHEY, CHIEF, DESIGN BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 6

DESIGN FILE: ***DESIGN*FILE*SPECIFICATION*****DATE-TIME$$$$

PLOT SCALE: 100 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 3 OF 3



POHLMAN SLOUGH
CHANNEL PROFILE

SCALE: 1" = 100' HORIZ.
100' 0 100'

SCALE: 1" = 5' VERT.
10' 0 10'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: A. BIENKOWSKI
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

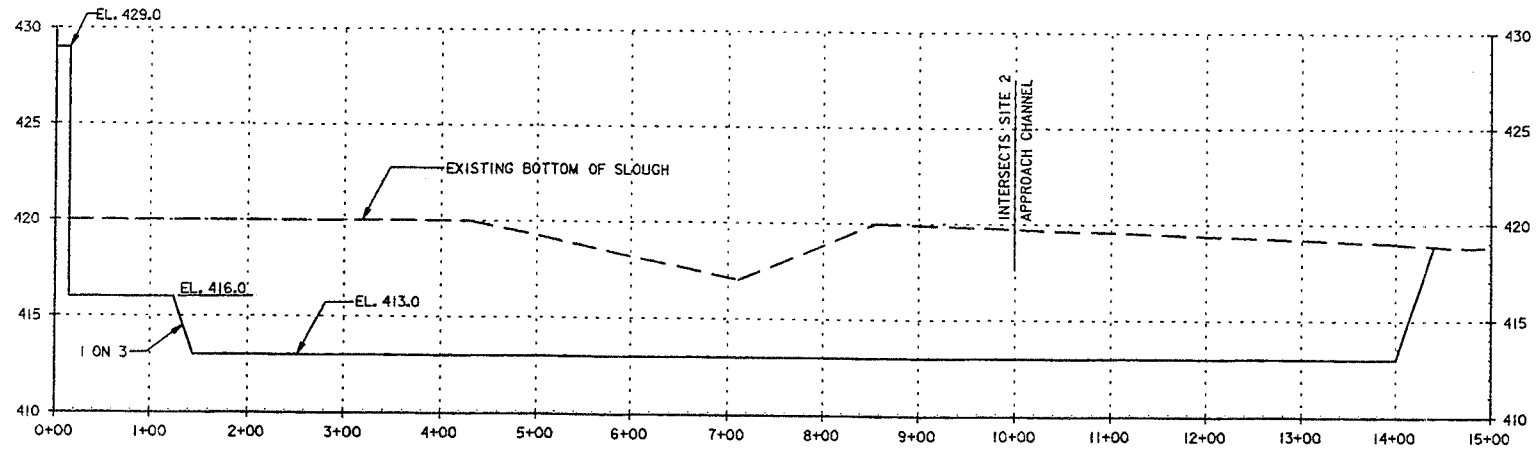
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION

APPROVED: BOBBY R. HUGHEY, CHIEF, DESIGN BRANCH

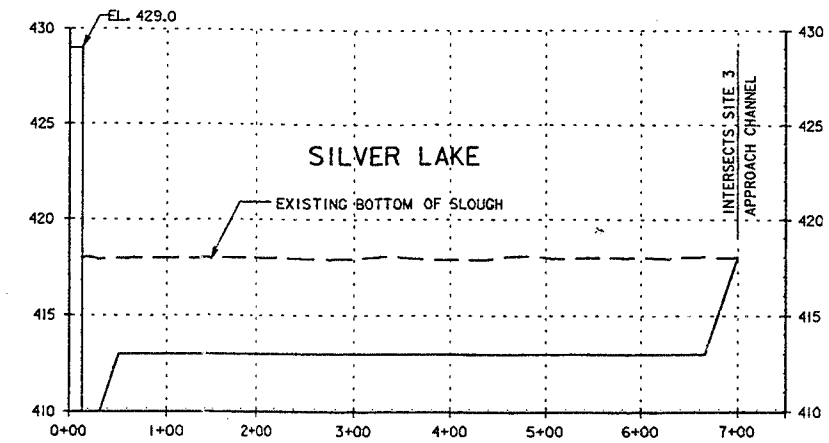
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
CHANNEL PROFILES

SIZE: D | DWG. CODE: DACW 43 | DRAWING NO.: PLATE 7

DESIGN FILE: /n/upermess/calhoun/chpmmdr1.bak | PLOT DATE: 10-AUG-1995 08:14
PLOT SCALE: 100 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 1 OF 2



SITE 3 - APPROACH CHANNEL



SITE 2 - APPROACH CHANNEL

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: A. BIENKOWSKI
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

SUBMITTED:
JOHN W. POULLAIN
DESIGN ENGINEER

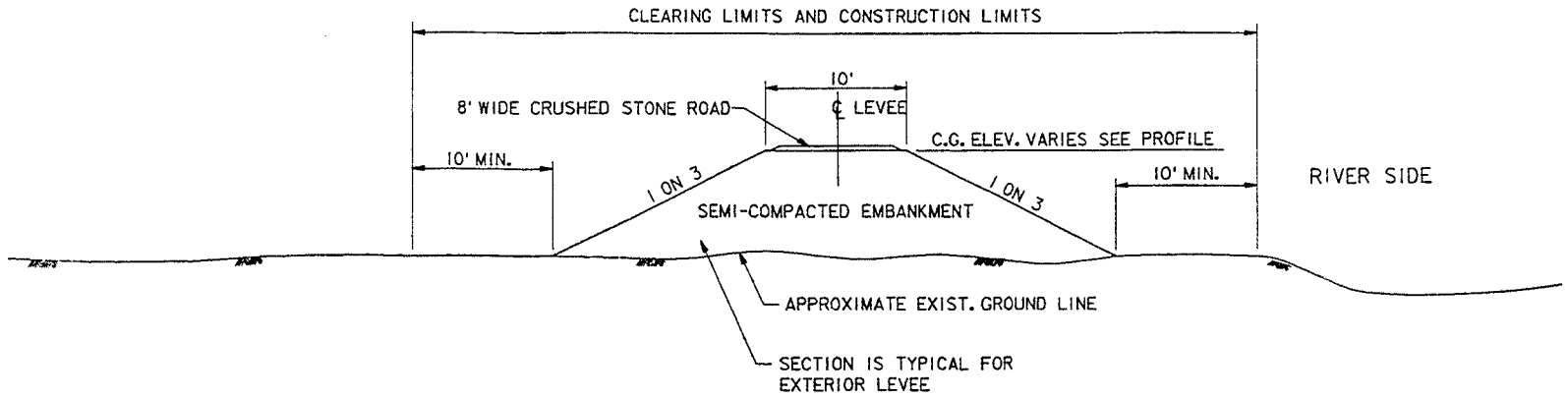
SUBMITTED:
MICHAEL R. RECTOR
CHIEF, CIVIL ENGINEERING SECTION

APPROVED:
BOBBY R. HUGHEY

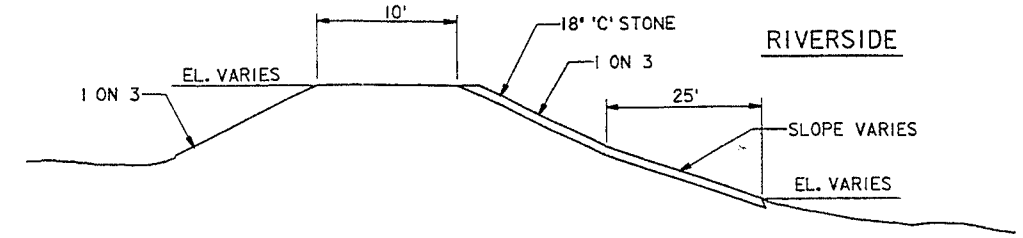
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
CHANNEL PROFILES

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 8

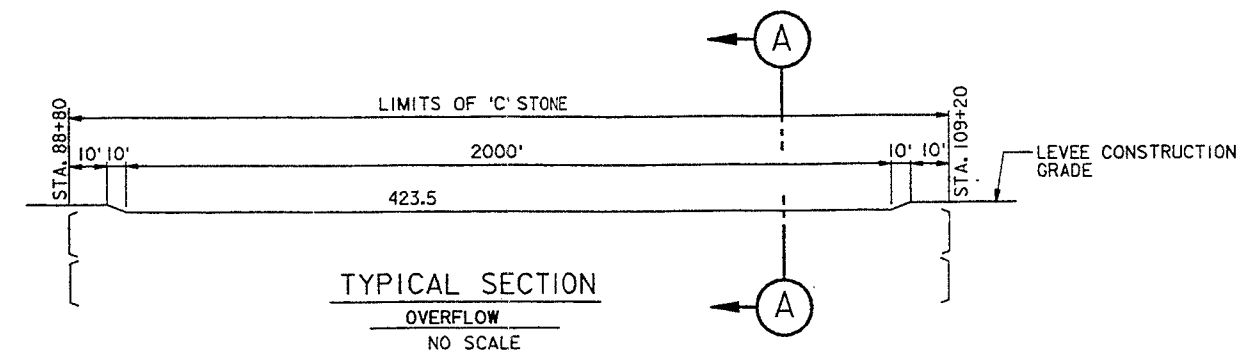
DESIGN FILE: /n/upermss/calhoun/chpmmd-2.bak | PLOT DATE: 10-AUG-1995 08:20



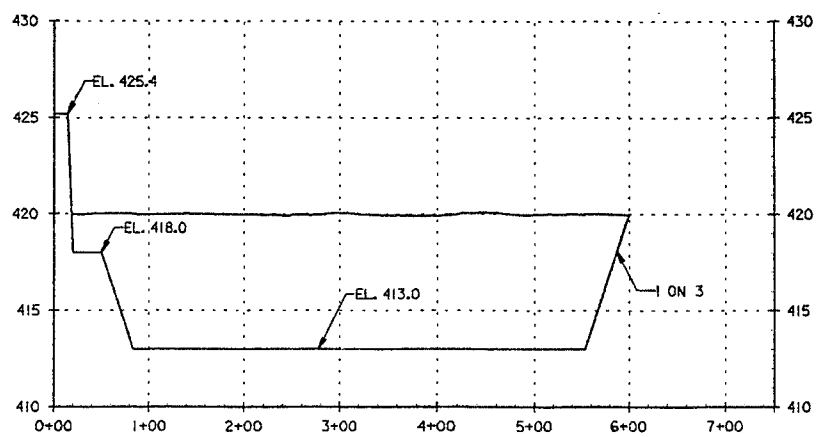
TYPICAL SECTION
EARTHEN LEVEE
NO SCALE



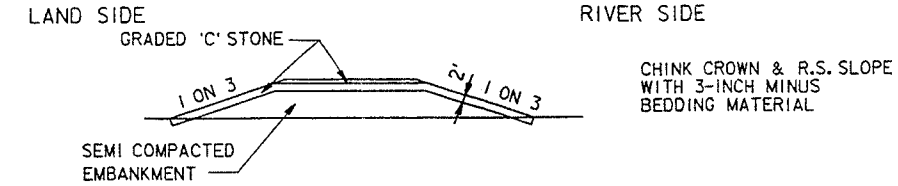
RIPRAP DETAIL
NO SCALE



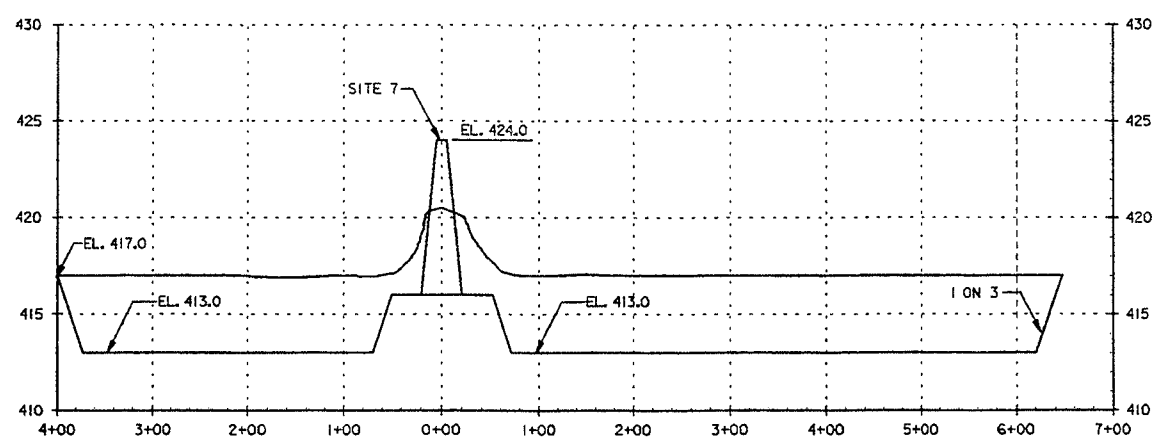
TYPICAL SECTION
OVERFLOW
NO SCALE



SITE 4 - APPROACH CHANNEL



SECTION A-A
NO SCALE



ROYALE LAKE - CHICKAHOMINY LAKE

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. W. POULLAIN
DRAWN BY: A. BIENKOWSKI
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

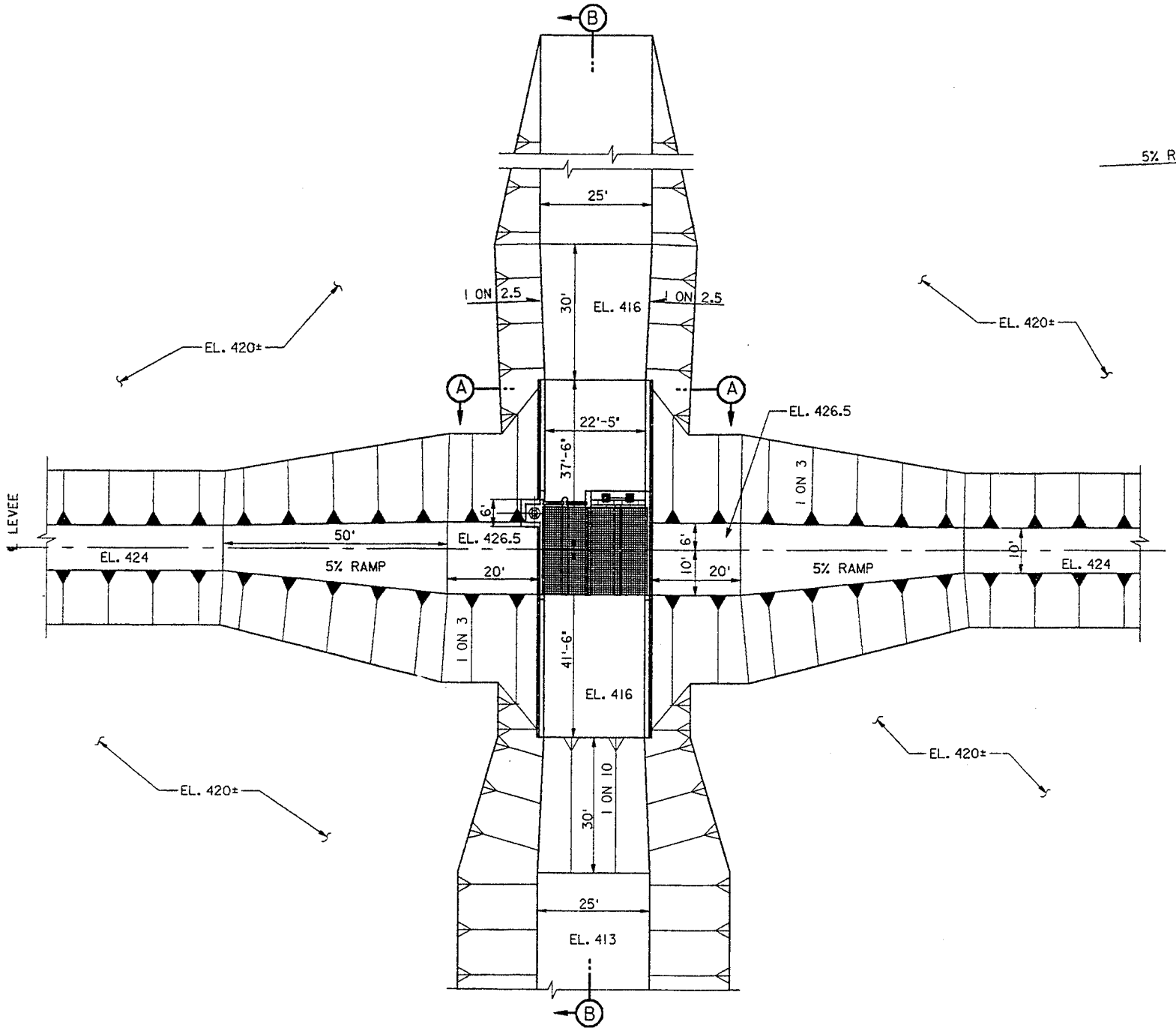
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

MISCELLANEOUS DETAILS, SECTIONS AND CHANNEL PROFILES

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL ENGINEERING SECTION
APPROVED: BOBBY R. HUSHEY, CHIEF, DESIGN BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 9

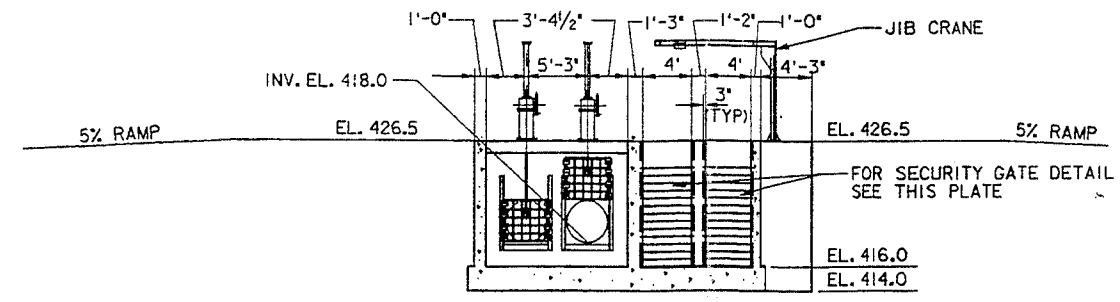
DESIGN FILE: /n/upermiss/calhoun/ohpmmisc.bak | PLOT DATE: 10-AUG-1995 13:06
PLOT SCALE: 100 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 3 OF 3



PLAN - SITE 1

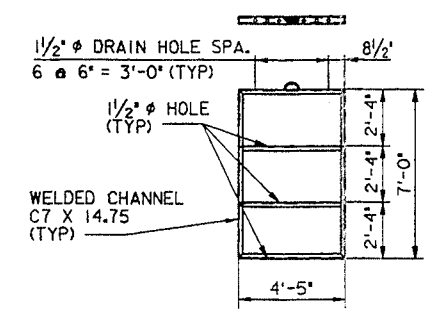
SCALE: $\frac{1}{16}$" = 1'-0"

12" 0 10' 20' 30'



SECTION A-A

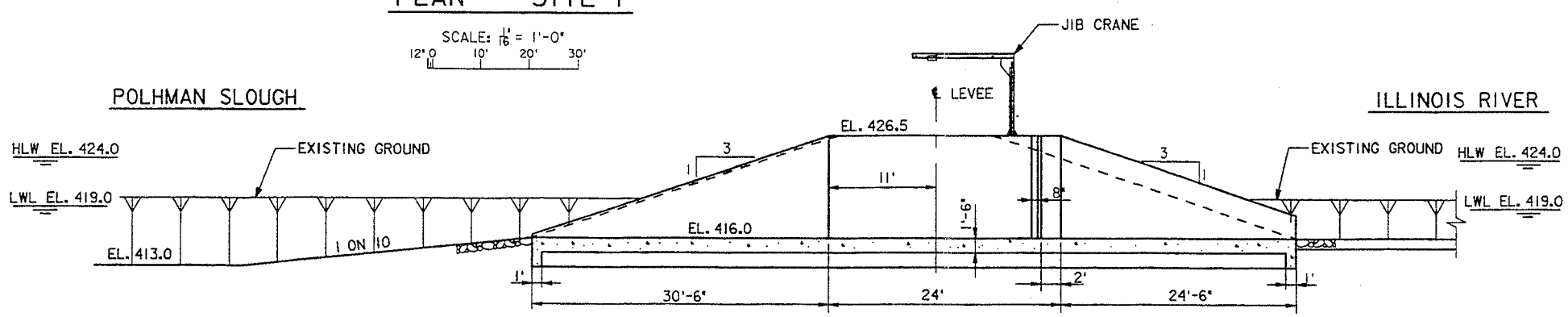
SCALE: $\frac{1}{8}$" = 1'-0"



SECURITY GATE

SCALE: $\frac{1}{4}$" = 1'-0"

12" 0 5'



SECTION B-B

SCALE: $\frac{1}{8}$" = 1'-0"

12" 0 5' 10' 15'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. R. HELFRICH
DRAWN BY: J. R. HELFRICH
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
PLAN AND SECTIONS
SITE 1

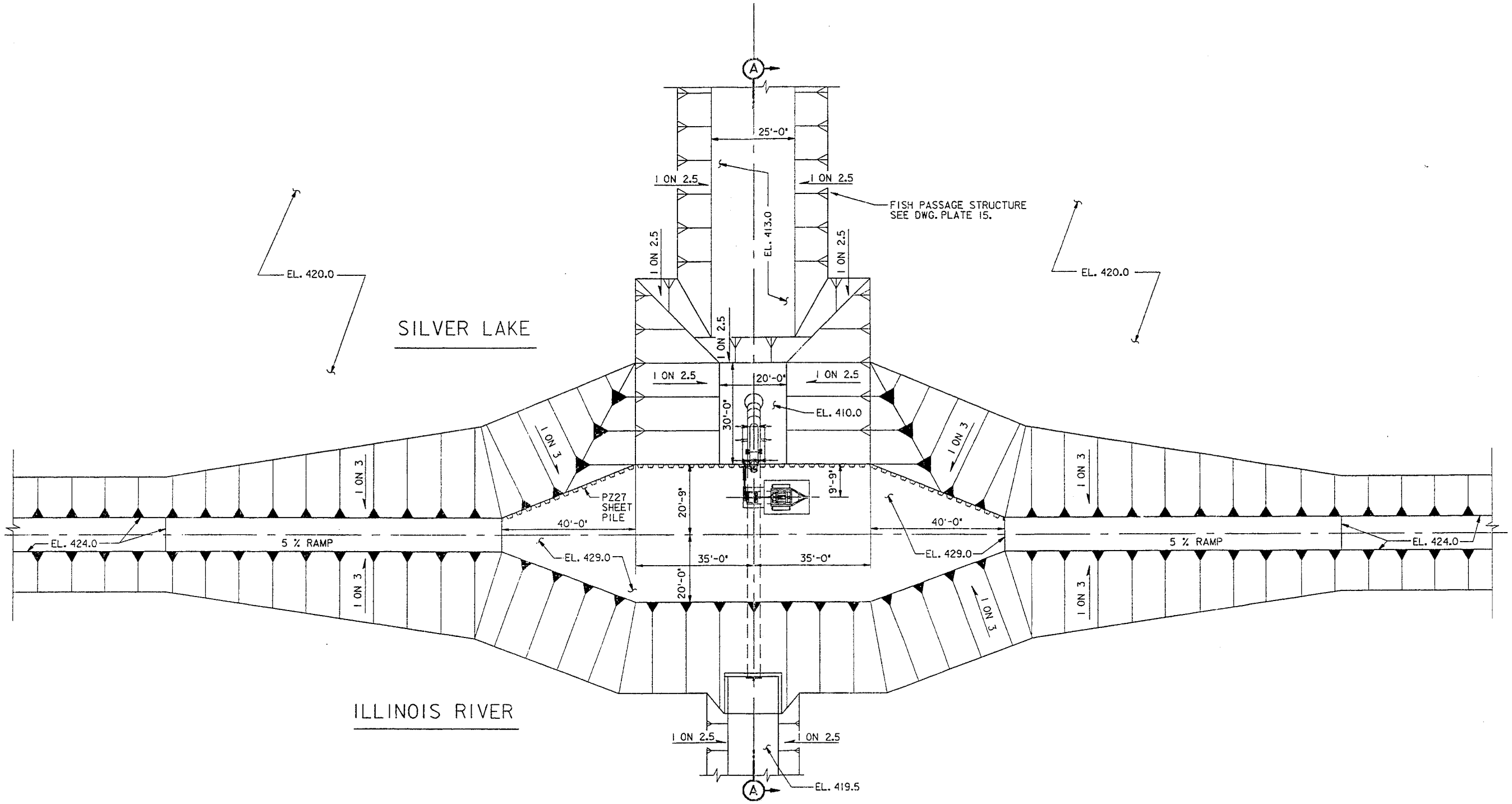
SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL&SPECIFICATIONS SECTION

APPROVED: BOBBY R. MUCHEY

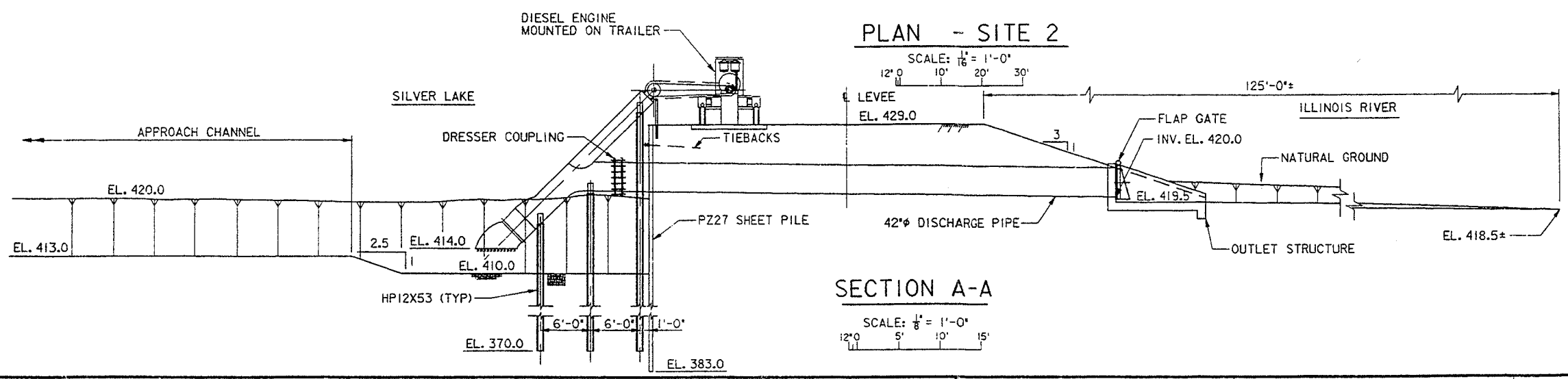
SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 10

DESIGN FILE: /n/upermss/calhoun/ohpems2e.bak | PLOT DATE: 10-AUG-1995 13:07



PLAN - SITE 2

SCALE: 1/16" = 1'-0"



SECTION A-A

SCALE: 1/8" = 1'-0"

SYMBOL	DESCRIPTION	DATE	APPROVED
	REVISIONS		

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. R. HELFRICH
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DATE: AUGUST 1995

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL/SPECIFICATIONS SECTION

APPROVED: BOBBY R. HUCHEY, CHIEF, DESIGN BRANCH

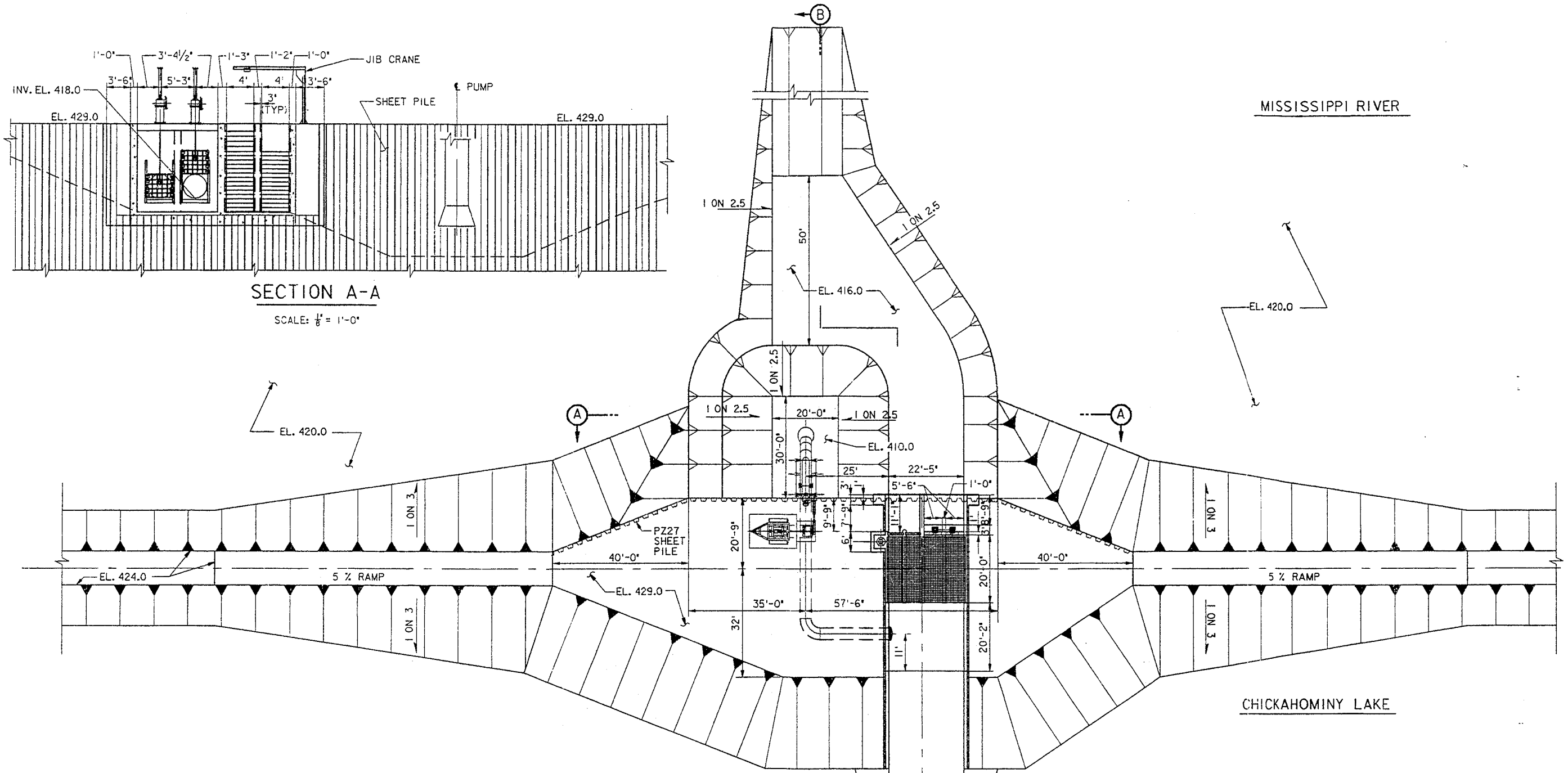
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
PLAN AND SECTION
SITE 2

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 11

DESIGN FILE: m:\upper-miss\calhoun\chpnme2b.dgn | PLOT DATE: 01-AUG-1995 06:02
PLOT SCALE: 16:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 2 OF 6

SECTION A-A

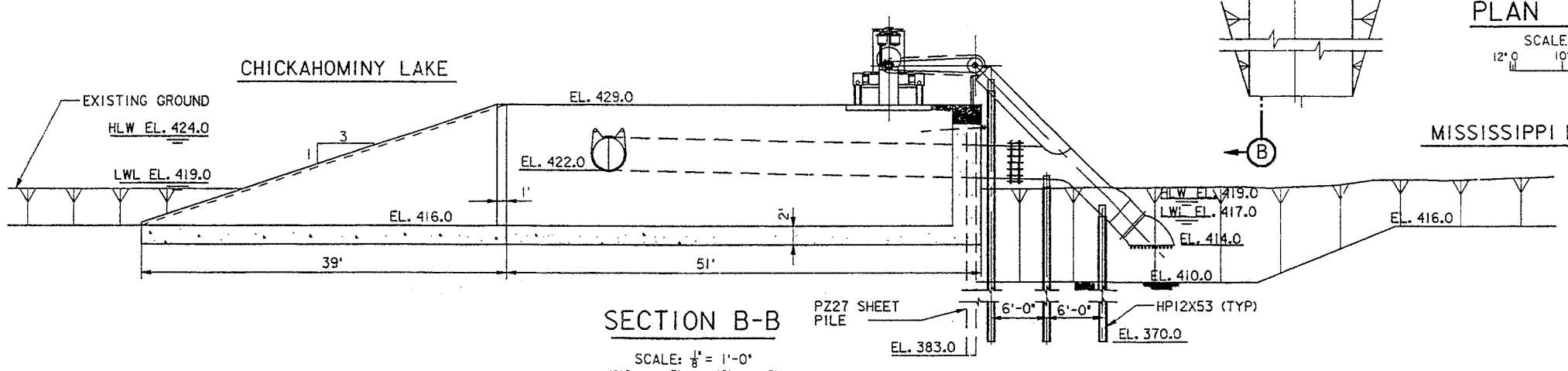
SCALE: 1/8" = 1'-0"



PLAN - SITE 3

SCALE: 1/16" = 1'-0"

12" 0 10' 20' 30'



SECTION B-B

SCALE: 1/8" = 1'-0"

12" 0 5' 10' 15'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. R. HELFRICH
DRAWN BY: J. R. HELFRICH
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

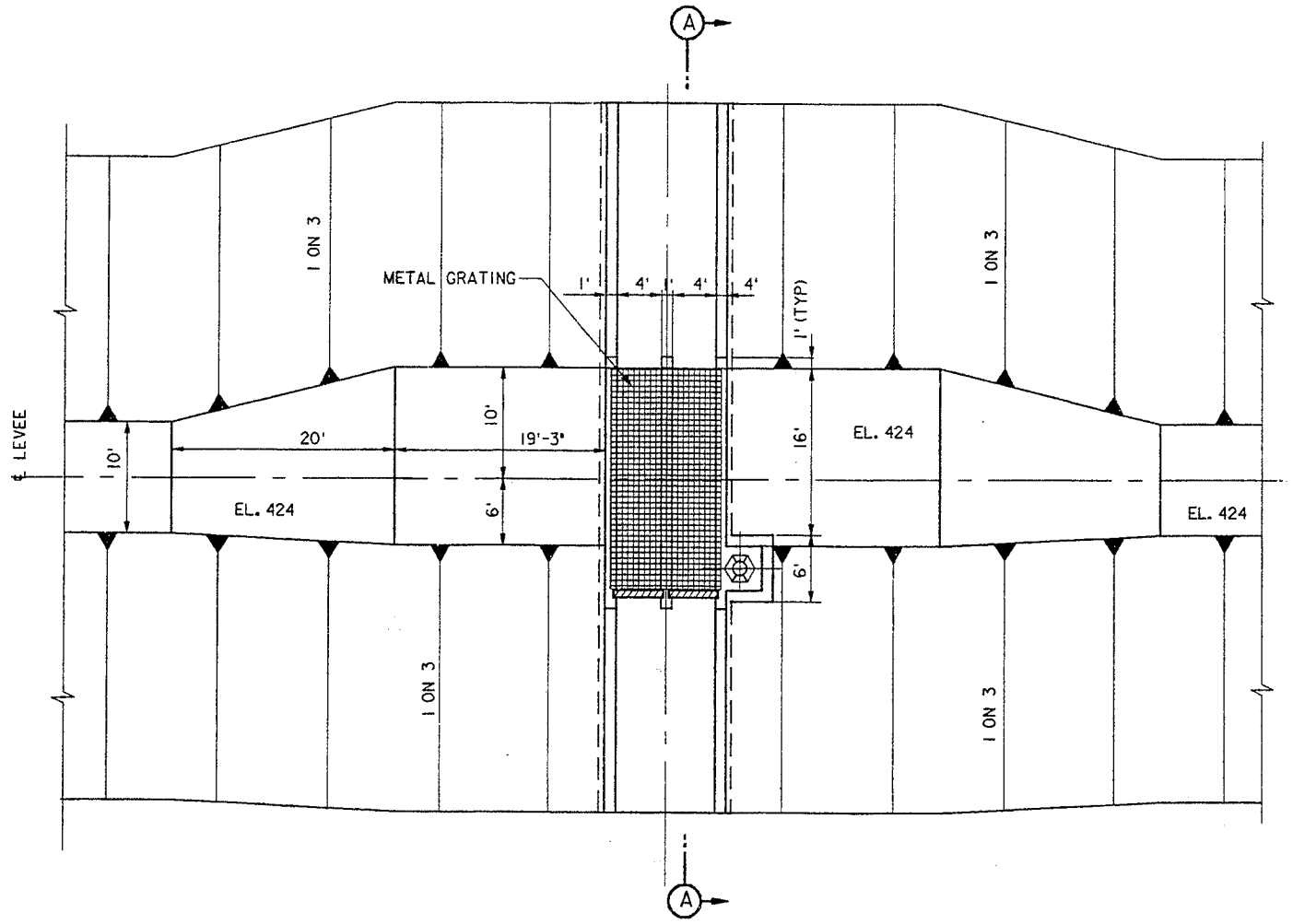
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

PLAN AND SECTIONS SITE 3

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL/SPECIFICATIONS SECTION
APPROVED: BOBBY R. HUGHEY, CHIEF, DESIGN BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 12

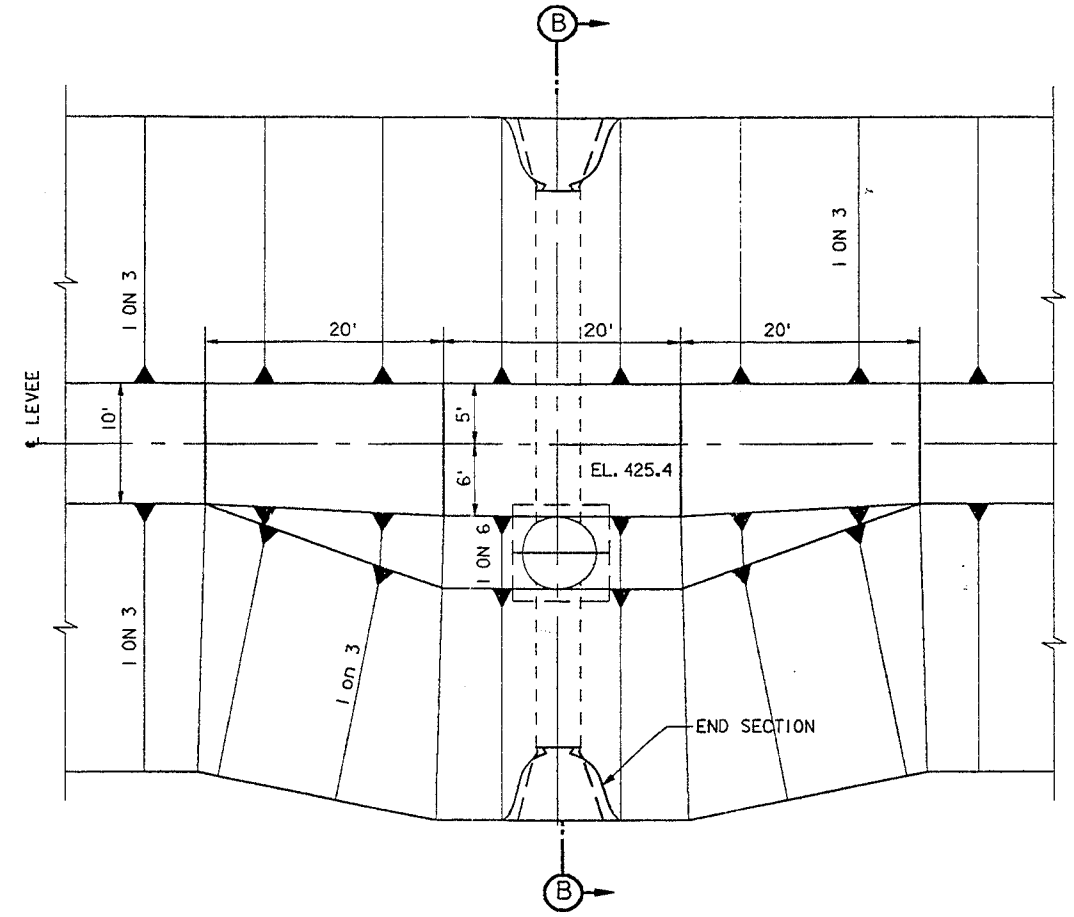
DESIGN FILE: n:\upermsss\calhoun\chpmss2d.dgn | PLOT DATE: 01-AUG-1995 06:04
PLOT SCALE: 16:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 3 OF 6



PLAN - SITE 7

SCALE: $\frac{1}{8}$" = 1'-0"

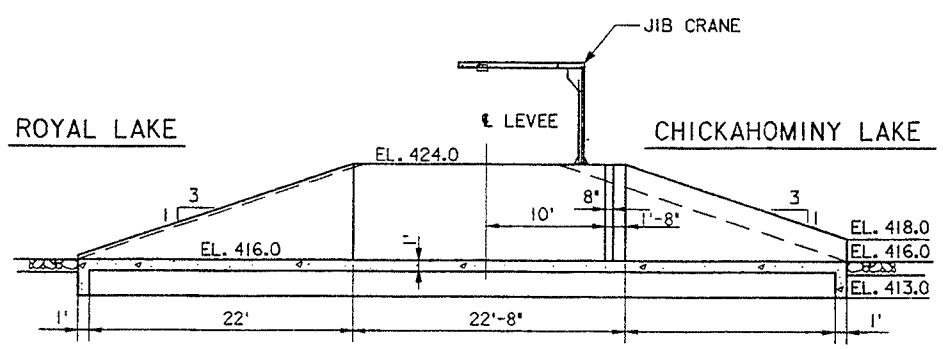
12"0 5' 10' 15'



PLAN - SITE 4

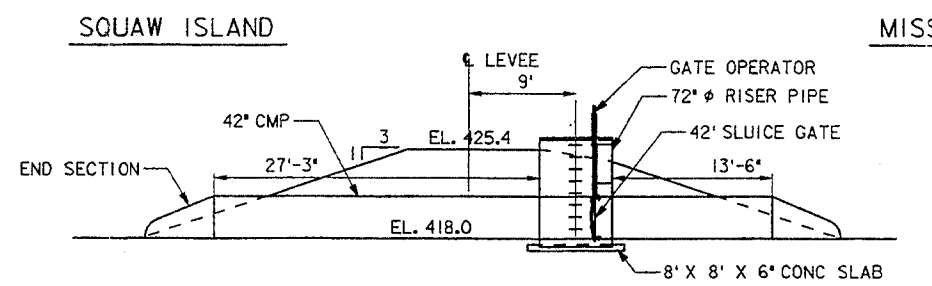
SCALE: $\frac{1}{8}$" = 1'-0"

12"0 5' 10' 15'



SECTION A-A

SCALE: $\frac{1}{8}$" = 1'-0"



SECTION B-B

SCALE: $\frac{1}{8}$" = 1'-0"

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. R. HELFRICH
DRAWN BY: J. R. HELFRICH
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

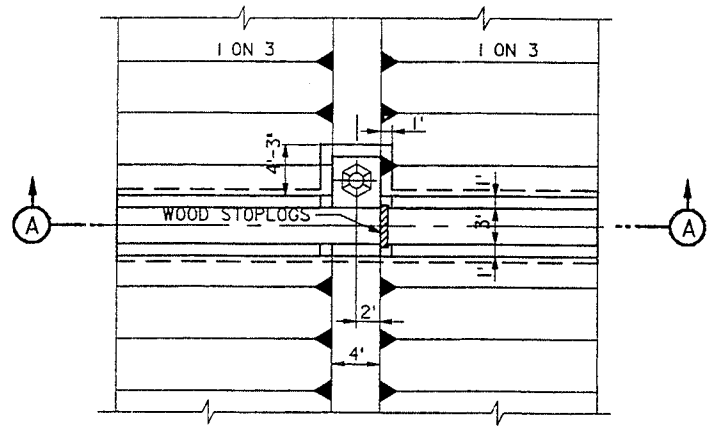
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL/SPECIFICATIONS SECTION

APPROVED: BOBBY R. HUGHEY, CHIEF, DESIGN BRANCH

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
PLANS AND SECTIONS
SITES 4 AND 7

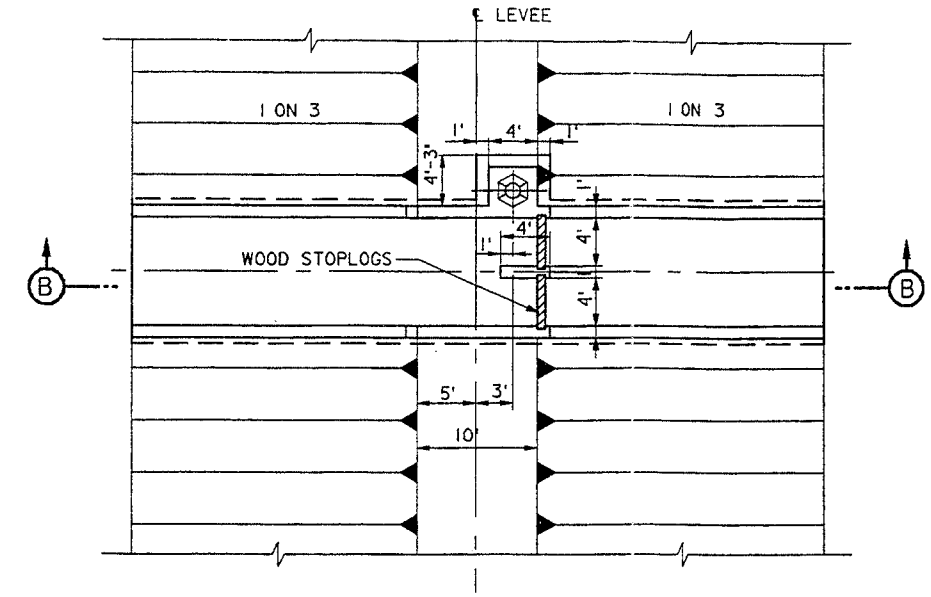
SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 13

DESIGN FILE: n:\upermuss\calhoun\chpmms2c.dgn | PLOT DATE: 01-AUG-1995 06:03
PLOT SCALE: 8:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 4 OF 6



PLAN - SITES 9 AND 10

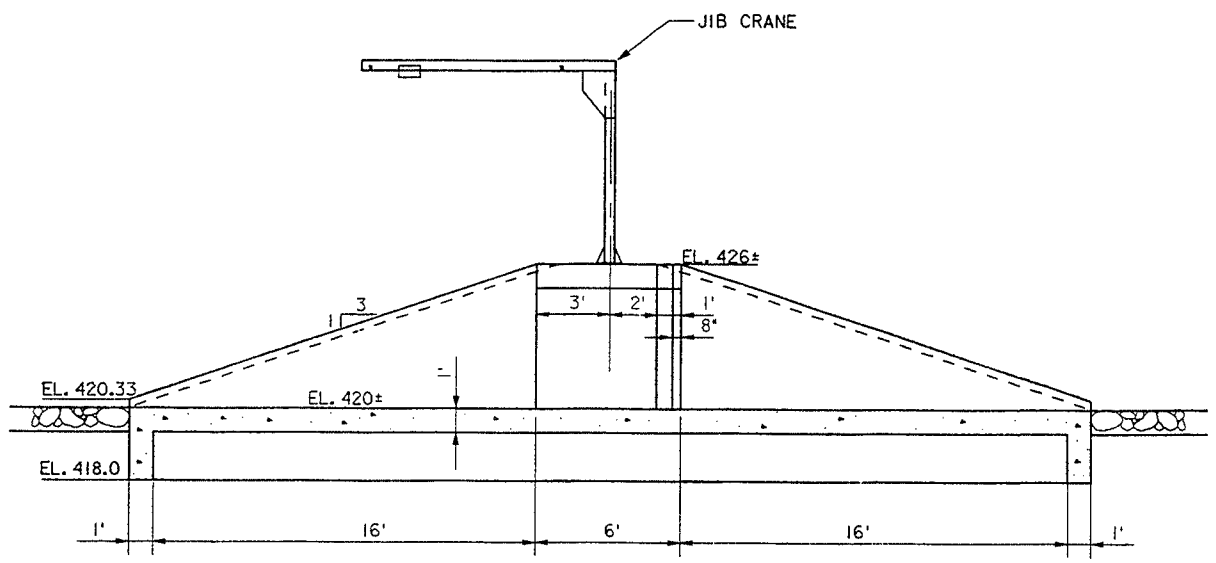
SCALE: $\frac{1}{8}$" = 1'-0"



PLAN - SITE 6 AND 11

SCALE: $\frac{1}{8}$" = 1'-0"

12" 0 5' 10' 15'



SECTION A-A

SCALE: $\frac{1}{4}$" = 1'-0"

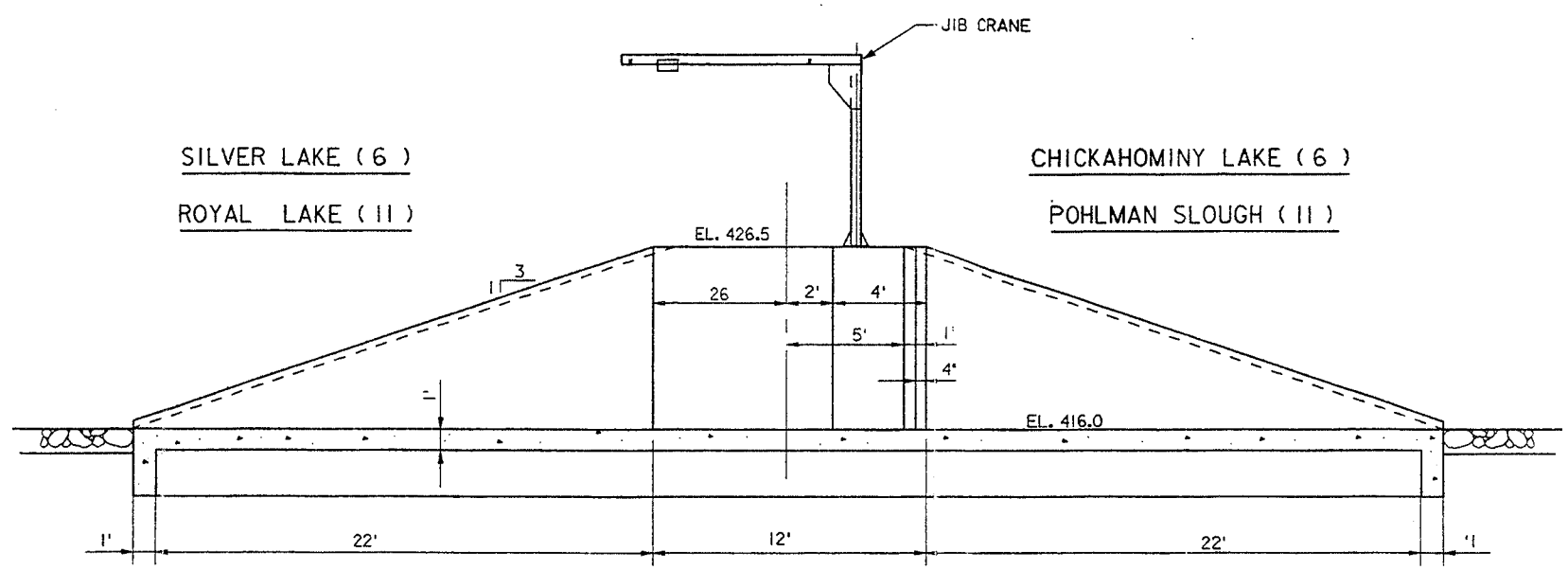
12" 0 5'

SILVER LAKE (6)

ROYAL LAKE (11)

CHICKAHOMINY LAKE (6)

POHLMAN SLOUGH (11)



SECTION B-B

SCALE: $\frac{1}{4}$" = 1'-0"

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. R. HELFRICH
DRAWN BY: J. R. HELFRICH
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

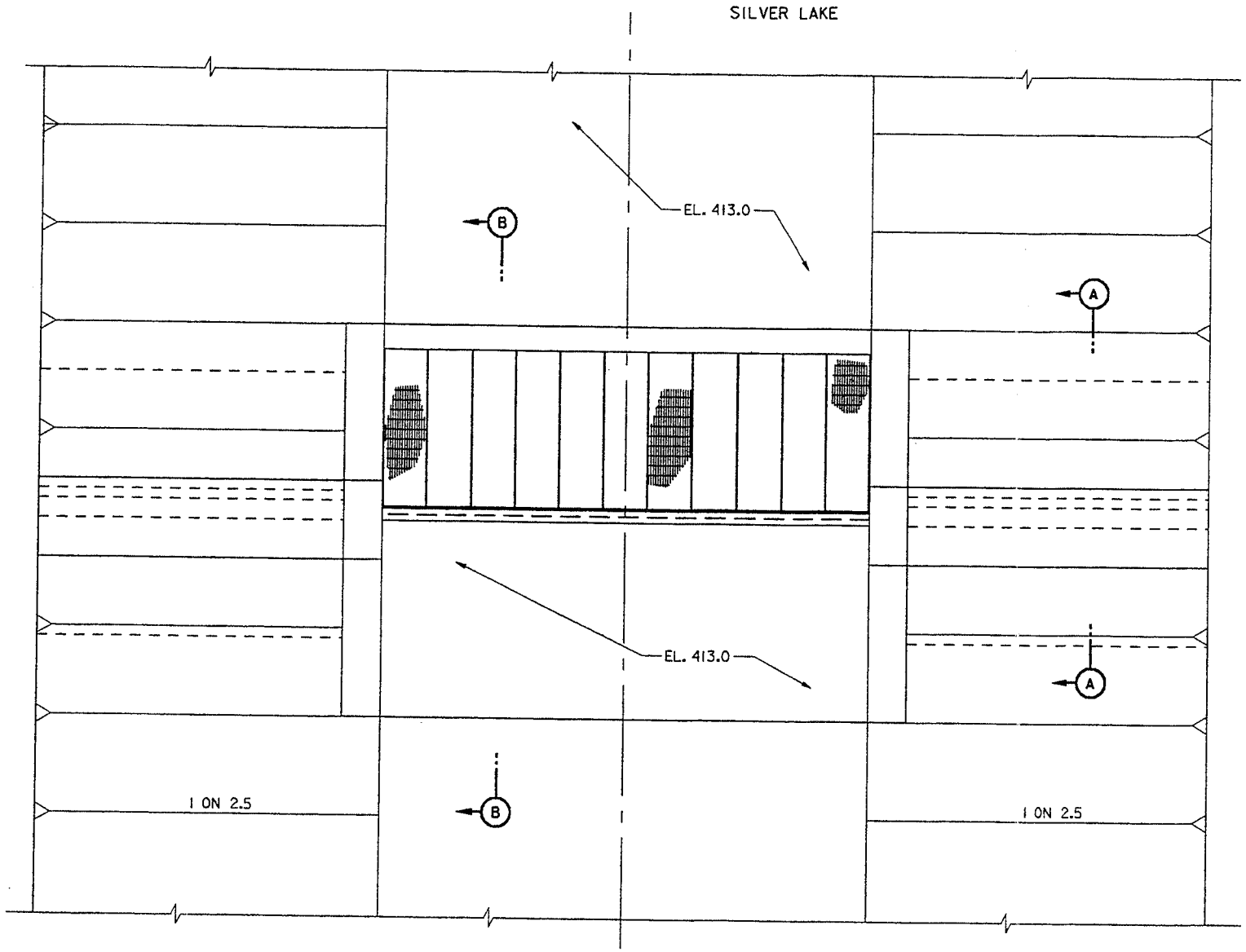
SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL/SPECIFICATIONS SECTION

APPROVED: BOBBY R. HUGHEY, CHIEF, DESIGN BRANCH

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
PLANS AND SECTIONS
SITES 6, 9, 10 AND 11

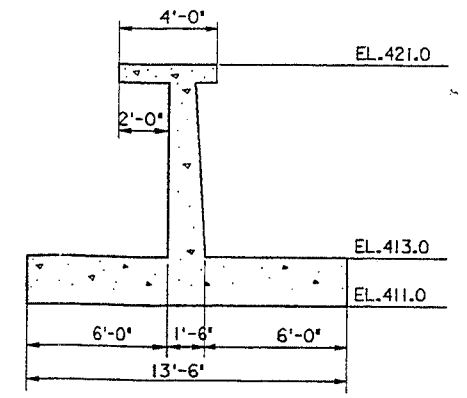
SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 14

DESIGN FILE: n:\upermsss\calhoun\chpmms2a.dgn | PLOT DATE: 01-AUG-1995 06:02
PLOT SCALE: 8:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 5 OF 6



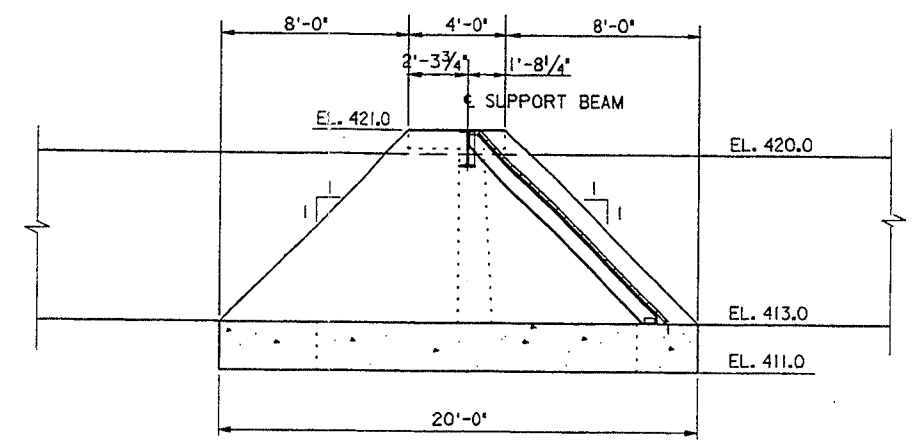
PLAN - FISH SCREEN

SCALE: $\frac{1}{4}$" = 1'-0"



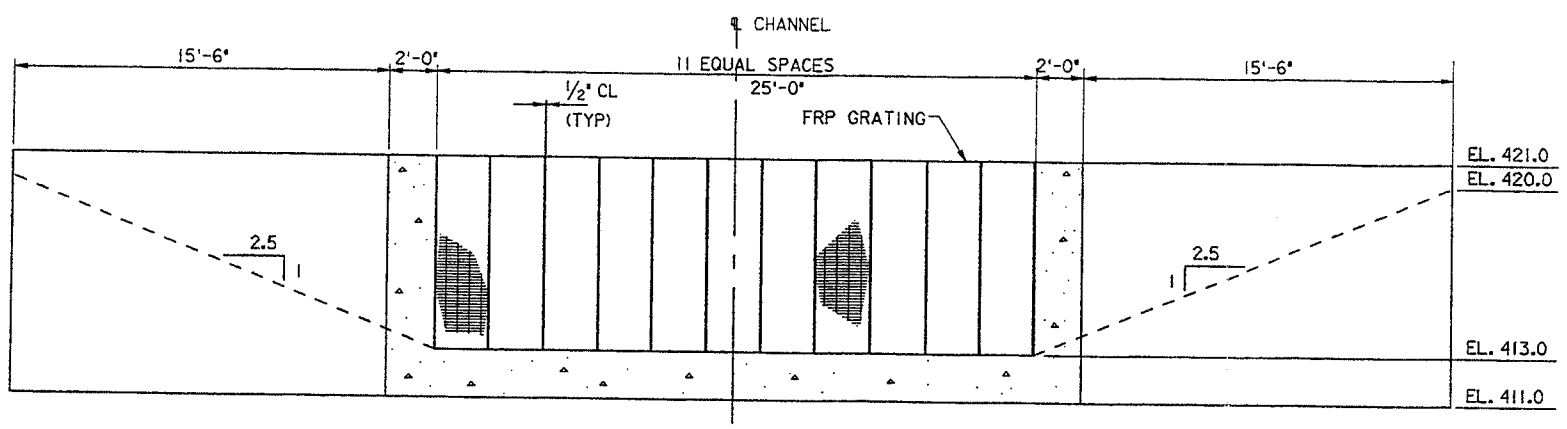
SECTION A-A

SCALE: $\frac{1}{4}$" = 1'-0"



SECTION B-B

SCALE: $\frac{1}{4}$" = 1'-0"



ELEVATION

SCALE: $\frac{1}{4}$" = 1'-0"

12" 0 5'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: J. R. HELFRICH
DRAWN BY: J. R. HELFRICH
CHECKED BY: J. W. POULLAIN
DATE: AUGUST 1995

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

FISH SCREEN STRUCTURE
SITE 2

SUBMITTED: JOHN W. POULLAIN, DESIGN ENGINEER

SUBMITTED: MICHAEL R. RECTOR, CHIEF, CIVIL/SPECIFICATIONS SECTION

APPROVED:

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 15

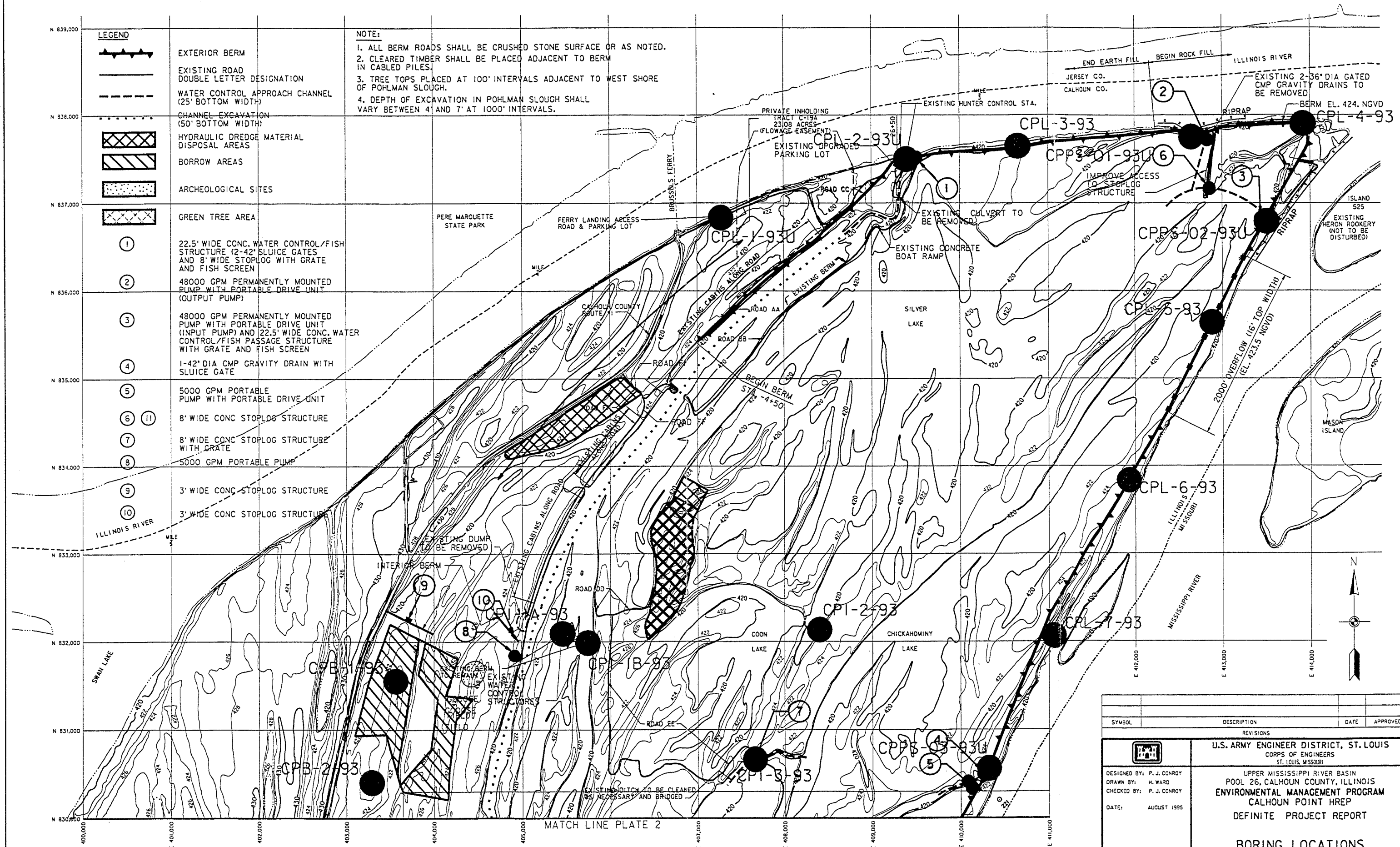
DESIGN FILE: /n/upermiss/calhoun/obpmsfsl.bak | PLOT DATE: 10-AUG-1995 13:09

LEGEND

- EXTERIOR BERM
- EXISTING ROAD DOUBLE LETTER DESIGNATION
- WATER CONTROL APPROACH CHANNEL (25' BOTTOM WIDTH)
- CHANNEL EXCAVATION (50' BOTTOM WIDTH)
- HYDRAULIC DREDGE MATERIAL DISPOSAL AREAS
- BORROW AREAS
- ARCHEOLOGICAL SITES
- GREEN TREE AREA
- (1) 22.5' WIDE CONC. WATER CONTROL/FISH STRUCTURE (2-42' SLUICE GATES AND 8' WIDE STOPLOG WITH GRATE AND FISH SCREEN
- (2) 48000 GPM PERMANENTLY MOUNTED PUMP WITH PORTABLE DRIVE UNIT (OUTPUT PUMP)
- (3) 48000 GPM PERMANENTLY MOUNTED PUMP WITH PORTABLE DRIVE UNIT (INPUT PUMP) AND 22.5' WIDE CONC. WATER CONTROL/FISH PASSAGE STRUCTURE WITH GRATE AND FISH SCREEN
- (4) 1-42' DIA CMP GRAVITY DRAIN WITH SLUICE GATE
- (5) 5000 GPM PORTABLE PUMP WITH PORTABLE DRIVE UNIT
- (6) (11) 8' WIDE CONC STOPLOG STRUCTURE
- (7) 8' WIDE CONC STOPLOG STRUCTURE WITH GRATE
- (8) 5000 GPM PORTABLE PUMP
- (9) 3' WIDE CONC STOPLOG STRUCTURE
- (10) 3' WIDE CONC STOPLOG STRUCTURE

NOTE:

1. ALL BERM ROADS SHALL BE CRUSHED STONE SURFACE OR AS NOTED.
2. CLEARED TIMBER SHALL BE PLACED ADJACENT TO BERM IN CABLED PILES.
3. TREE TOPS PLACED AT 100' INTERVALS ADJACENT TO WEST SHORE OF POHLMAN SLOUGH.
4. DEPTH OF EXCAVATION IN POHLMAN SLOUGH SHALL VARY BETWEEN 4' AND 7' AT 1000' INTERVALS.



SCALE: 1" = 500'
500' 0 500'

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

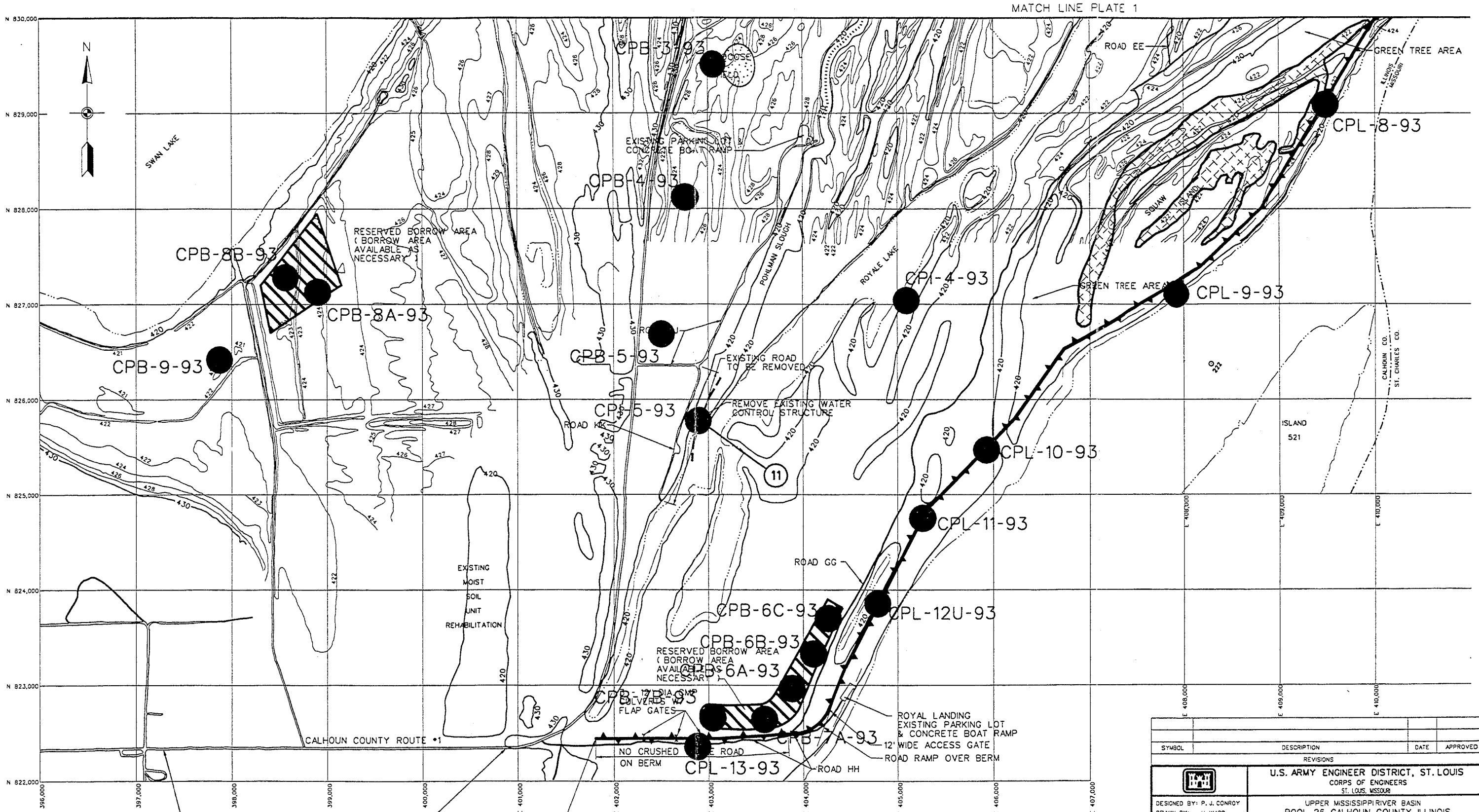
SUBMITTED: PATRICK J. CONROY, DESIGN ENGINEER
SUBMITTED: JOSEPH L. SCHMONE, CHIEF, FOUNDATION SECTION
APPROVED: GEORGE J. POSTOL, CHIEF, GEOTECHNICAL BRANCH

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

BORING LOCATIONS
GEOTECHNICAL

SIZE: D | DWG. CODE: DACW 43 | DRAWING NO.: PLATE 16

DESIGN FILE: ***DESIGN*FILE*SPECIFICATION*** | PLOT DATE: ***DATE-TIME****
PLOT SCALE: 500 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 1 OF 7



NOTE:

1. SEE PLATE 2 FOR NOTES AND LEGEND.

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

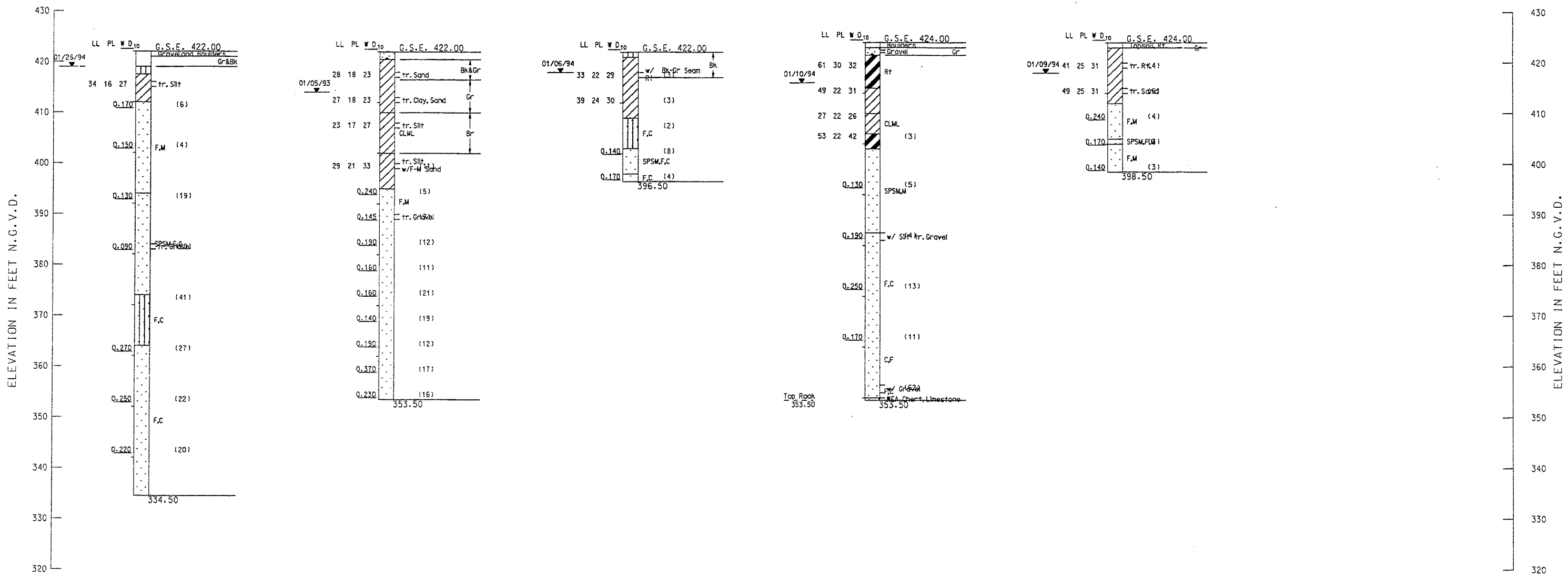
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

BORING LOCATIONS
GEOTECHNICAL

SUBMITTED: PATRICK J. CONROY, DESIGN ENGINEER
SUBMITTED: JOSEPH L. SCHWENK, CHIEF, FOUNDATION SECTION
APPROVED: GEORGE J. POSTOL, CHIEF, GEOTECHNICAL BRANCH

SIZE: D | DWG. CODE: DACW 43 | DRAWING NO.: PLATE 17

DESIGN FILE: ***DESIGN*FILE*SPECIFICATION*****DATE-TIME$$$$
PLOT SCALE: 500 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 2 OF 7



SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

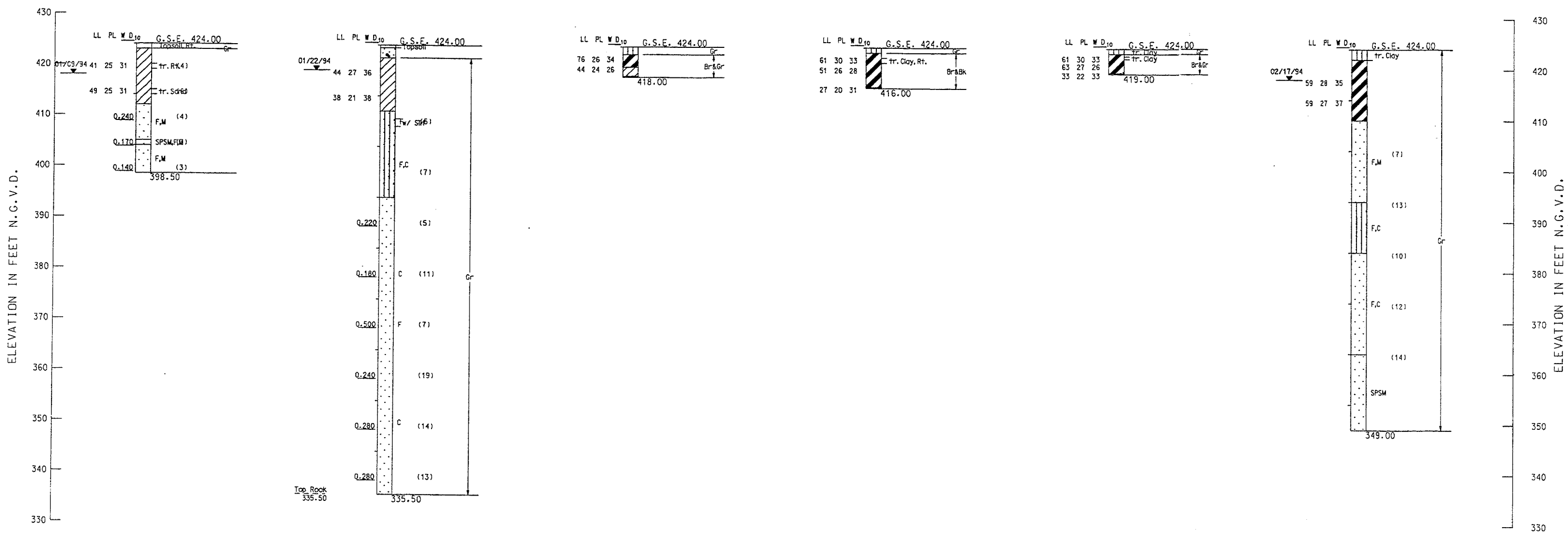
DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
ILLINOIS RIVER BORINGS
GEOTECHNICAL
BORING LOGS

SUBMITTED: PATRICK J. CONROY, DESIGN ENGINEER
SUBMITTED: JOSEPH L. SCHWENK, CHIEF, FOUNDATION SECTION
APPROVED: GEORGE J. POSTOL, CHIEF, GEOTECHNICAL BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 18

DESIGN FILE: /n/upermiss/calhoun/ohpgeob7.bak | PLOT DATE: 10-AUG-1995 13:11
PLOT SCALE: 10 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 3 OF 7



SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

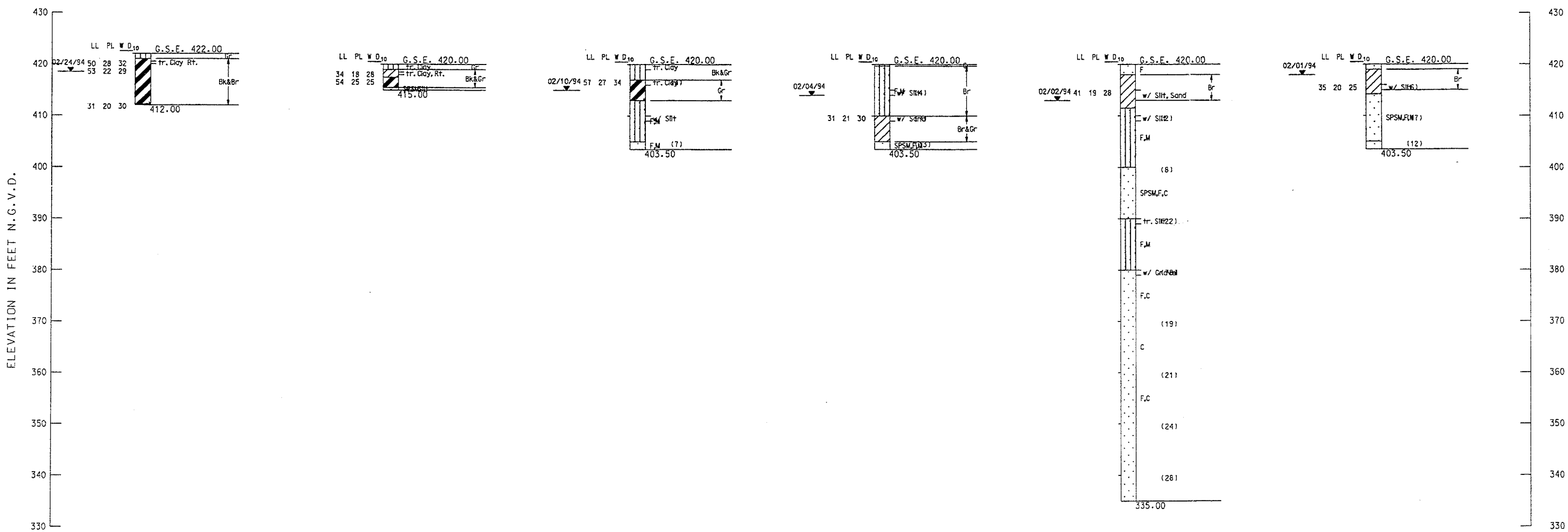
SUBMITTED: PATRICK J. CONROY, DESIGN ENGINEER
SUBMITTED: JOSEPH L. SCHWENK, CHIEF, FOUNDATION SECTION
APPROVED: GEORGE J. POSTOL, CHIEF, GEOTECHNICAL BRANCH

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

MISSISSIPPI RIVER BORINGS
GEOTECHNICAL BORINGS

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 19

DESIGN FILE: /n/upermiss/calhoun/chpgeob5.bak | PLOT DATE: 10-AUG-1995 15:12
PLOT SCALE: 10 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 4 OF 7



SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

MISSISSIPPI RIVER BORINGS GEOTECHNICAL BORING LOGS

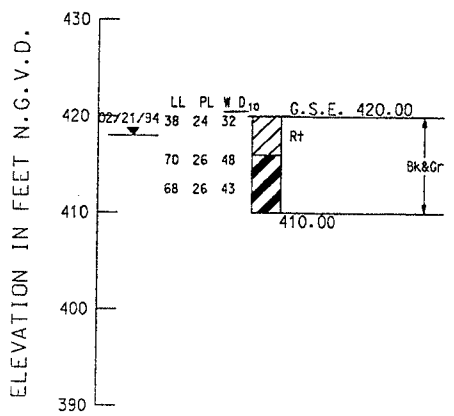
SUBMITTED: PATRICK J. CONROY, DESIGN ENGINEER
SUBMITTED: JOSEPH L. SCHWENK, CHIEF, FOUNDATION SECTION
APPROVED: GEORGE J. POSTOL, CHIEF, GEOTECHNICAL BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 20

DESIGN FILE: /n/upermiss/calhoun/ohpgeob6.bak | PLOT DATE: 10-AUG-1995 13:12
PLOT SCALE: 10 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 5 OF 7

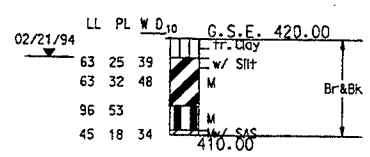
CPI-01A-93
Exist. WC Structure No. 3
O/S

21 FEB 94



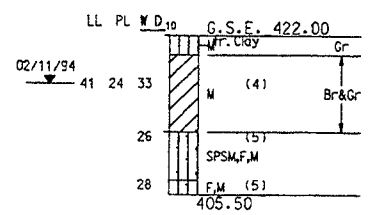
CPI-01B-93
Exist. WC Structure No. 3
O/S

21 FEB 94



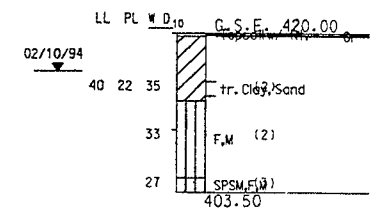
CPI-02-93
Proposed WC Structure
O/S

11 FEB 94



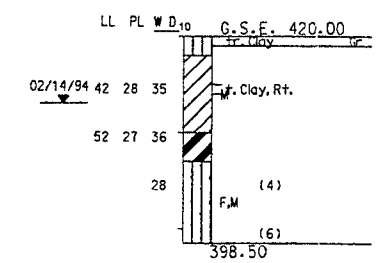
CPI-03-93
Exist. WC Structure No. 4
O/S

10 FEB 94



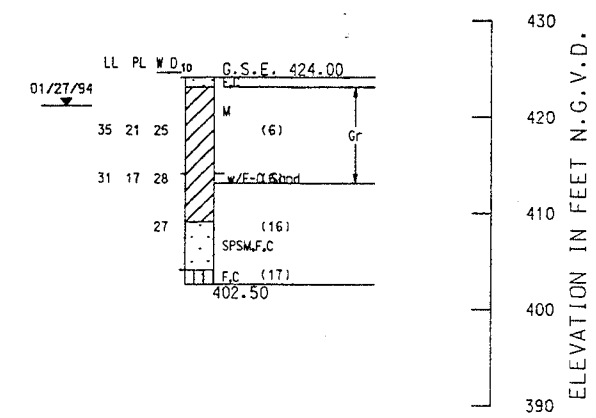
CPI-04-93
Proposed WC Structure
O/S

14 FEB 94



CPI-05-93
Exist. WC Structure No. 1
O/S

27 JAN 94



SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

SUBMITTED:
PATRICK J. CONROY
DESIGN ENGINEER

SUBMITTED:
JOSEPH L. SCHWENK
CHIEF, FOUNDATION SECTION

APPROVED:
GEORGE J. POSTOL

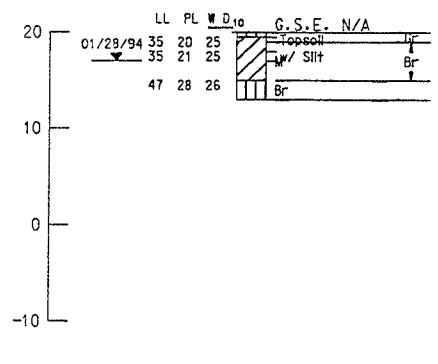
UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
INTERIOR RIVER BORINGS
GEOTECHNICAL
BORING LOGS

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 21

DESIGN FILE: /n/upermsa/calhoun/chpgeob4.bak
PLOT DATE: 10-AUG-1995 13:13

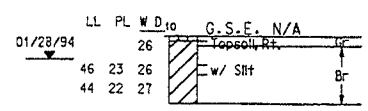
CPB-01-93
Sta.
O/S

28 JAN 94



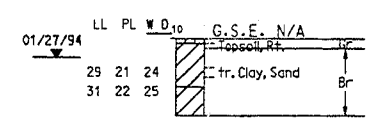
CPB-02-93
Sta.
O/S

28 JAN 94



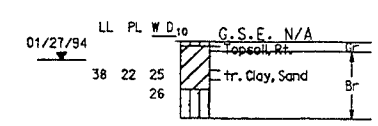
CPB-03-93
Sta.
O/S

27 JAN 94



CPB-04-93
Sta.
O/S

27 JAN 94



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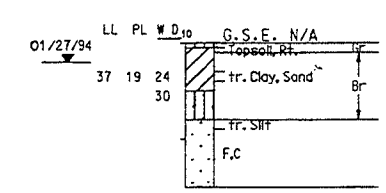

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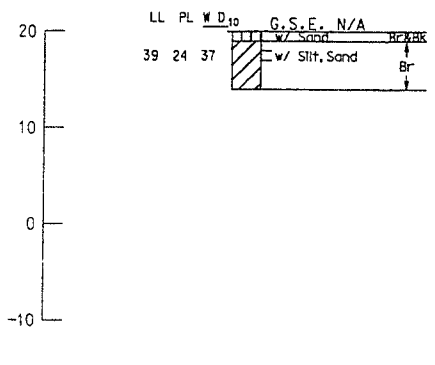

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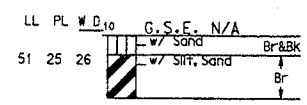

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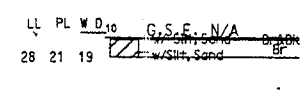

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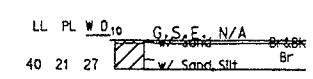

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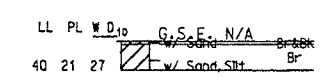

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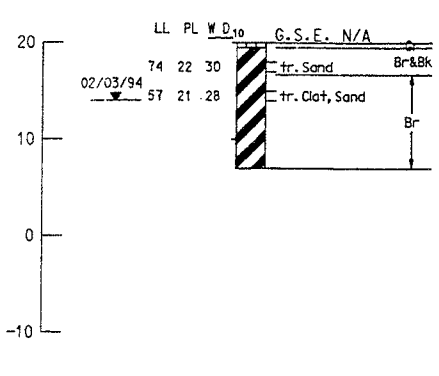
3 FEB 94



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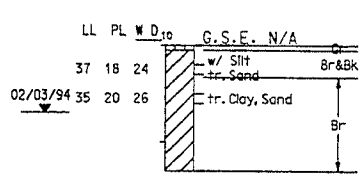

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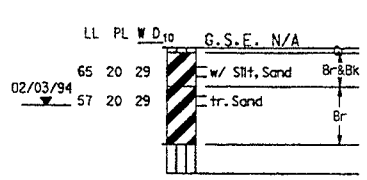

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SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

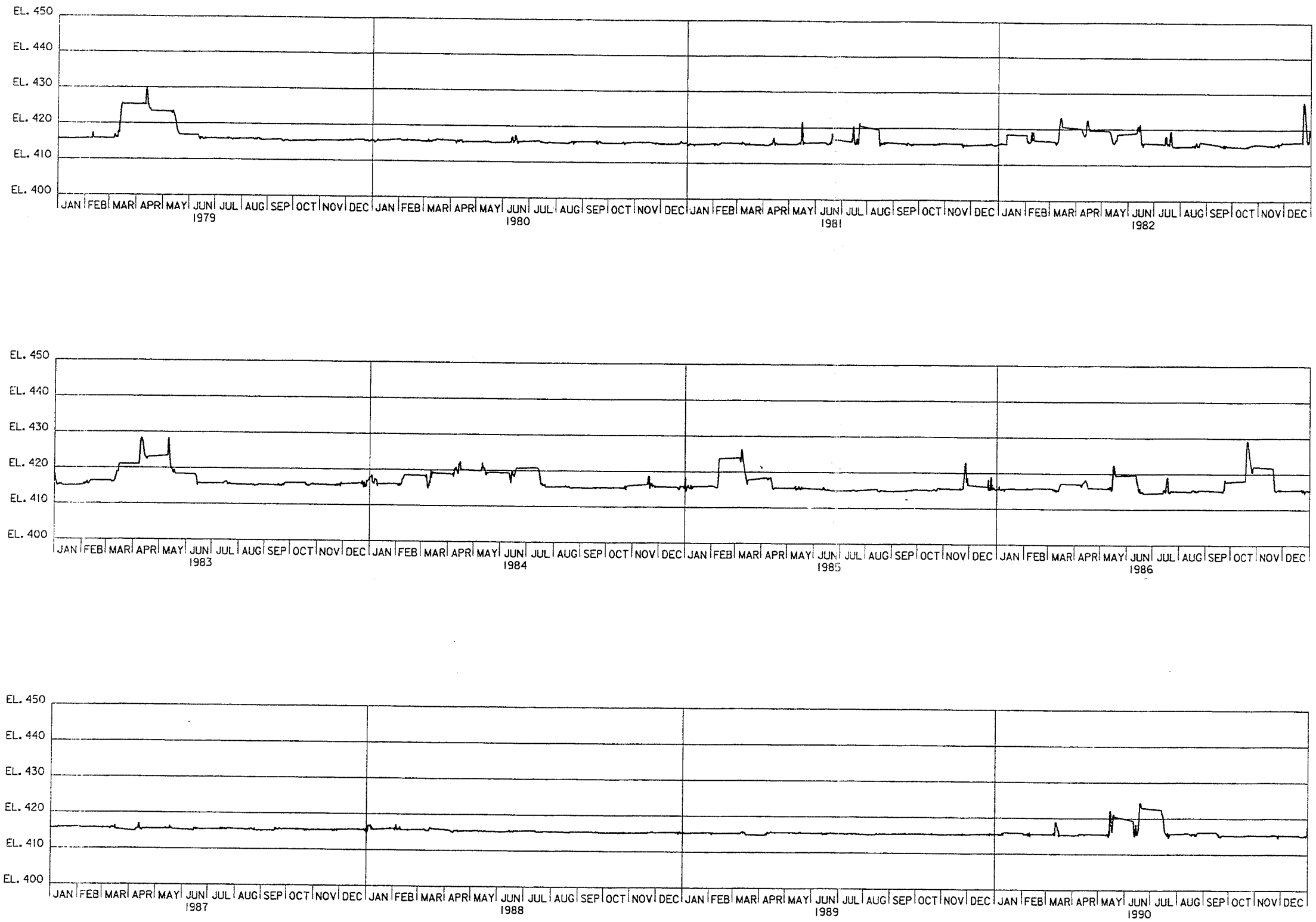
DESIGNED BY: P. J. CONROY
DRAWN BY: H. WARD
CHECKED BY: P. J. CONROY
DATE: AUGUST 1995

SUBMITTED: PATRICK J. CONROY, DESIGN ENGINEER
SUBMITTED: JOSEPH L. SCHWENK, CHIEF, FOUNDATION SECTION
APPROVED: GEORGE J. POSTOL, CHIEF, GEOTECHNICAL BRANCH

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT
BORROW BORINGS
GEOTECHNICAL
BORING LOGS

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 22

DESIGN FILE: /r/upermiss/calhoun/ohpgeob3.bak | PLOT DATE: 10-AUG-1995 13:14
PLOT SCALE: 10 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 7 OF 7



LEGEND:

——— PERIOD OF RECORD 1979 - 1993

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: R. J. DIECKMANN
DRAWN BY: J. R. HELFRICH
CHECKED BY: R. J. DIECKMANN
DATE: AUGUST 1995

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

GRAFTON, ILLINOIS
STAGE HYDROGRAPH

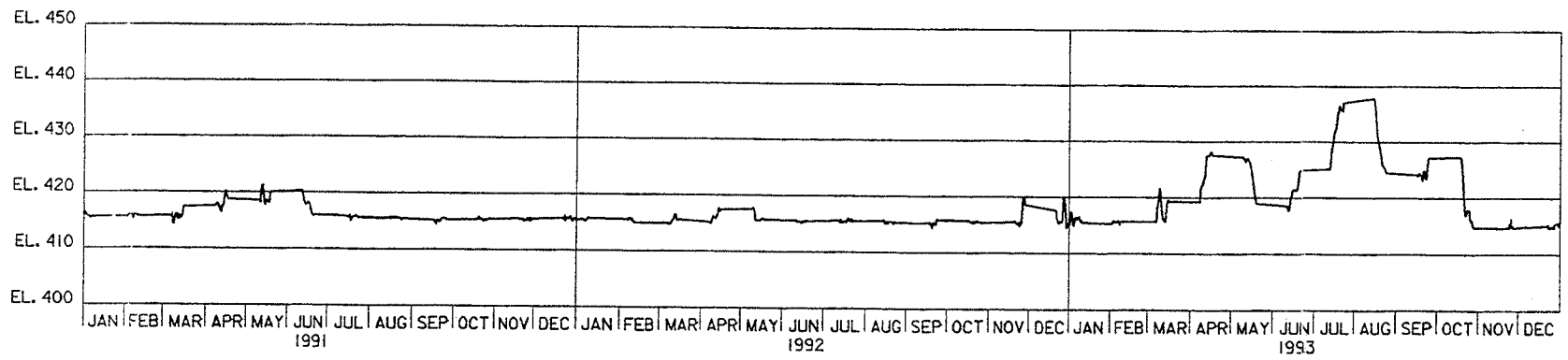
SUBMITTED:
RONALD J. DIECKMANN
DESIGN ENGINEER

SUBMITTED:
GARY R. DYHOUSE
CHIEF, HYDROLOGIC ENGINEERING SECTION

APPROVED:
JAMES T. LOVELACE
CHIEF, HYDROLOGIC & HYDRAULICS BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 23

DESIGN FILE: /n/upermiss/calhoun/ohpmhgr1.bak | PLOT DATE: 10-AUG-1995 13:28
PLOT SCALE: 1:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 1 OF 2



LEGEND:

——— PERIOD OF RECORD 1979 - 1993

SYMBOL	DESCRIPTION	DATE	APPROVED

REVISIONS

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DESIGNED BY: R. J. DIECKMANN
DRAWN BY: J. R. HELFRICH
CHECKED BY: R. J. DIECKMANN
DATE: AUGUST 1995

SUBMITTED:
RONALD J. DIECKMANN
DESIGN ENGINEER

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HREP
DEFINITE PROJECT REPORT

GRAFTON, ILLINOIS
STAGE HYDROGRAPH

SUBMITTED:
GARY R. DYHOUSE
CHIEF, HYDROLOGIC ENGINEERING SECTION

APPROVED:
JAMES T. LOVELADE
CHIEF, HYDROLOGIC & HYDRAULICS BRANCH

SIZE	DWG. CODE	DRAWING NO.
D	DACW 43	PLATE 24

DESIGN FILE: /n/upermiss/calhoun/chpnhgr2.bak | PLOT DATE: 10-AUG-1995 13:27
PLOT SCALE: 12:1 | SOL. NO. DACW43-94-B-X | FILE NO. | SHEET 2 OF 2

ATTACHMENT 2

APPENDICES

FINAL

DEFINITE PROJECT REPORT (SL-7)

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM
CALHOUN POINT HABITAT AND REHABILITATION PROJECT
POOL 26, ILLINOIS RIVER, CALHOUN COUNTY, ILLINOIS

APPENDICES

APPENDIX	DESCRIPTION
DPR-A	Letters of Intent and Project Agreement
DPR-B	Correspondence Pertaining to Draft DPR
DPR-C	Clean Water Act Compliance Documentation
DPR-D	Distribution List
DPR-E	Hydrology and Hydraulics
DPR-F	Geotechnical Considerations
DPR-G	Cultural Resources Documentation
DPR-H	Fish and Wildlife Coordination Act Documentation
DPR-I	Endangered Species Documentation
DPR-J	Project Habitat Quantification
DPR-K	Incremental Cost Analysis
DPR-L	Performance Evaluation Monitoring--Physical, Chemical Sampling Locations
DPR-M	Farmland Protection Policy Act Documentation
DPR-N	Tentative Site Water Regulation Plan
DPR-O	Real Estate Letter Report
DPR-P	Detailed Project Costs Estimate
DPR-Q	Biological Data
DPR-R	Cumulative Impacts Assessment

APPENDIX DPR-A

LETTERS OF INTENT AND PROJECT AGREEMENTS

FOREWARD

APPENDIX DPR-A provides (1) a draft Memorandum of Agreement (MOA) between the St. Louis District and the U.S. Fish and Wildlife Service ; (2) a sponsor (IDNR) letter of intent to accomplish the project's O&M activities and to aquire certain lands for the project, in accordance with the provisions of the 1986 Water Resources Development Act; and (3) a draft Project Cooperative Agreement (PCA) between the St. Louis Corps District and IDNR.

DRAFT
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
CALHOUN POINT, ILLINOIS

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 (USFWS) and the Department of the Army (DOA) will operate in constructing, operating, maintaining, repairing, and rehabilitating the Calhoun Point separable element of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP).

II. BACKGROUND

a. The project lands of the Calhoun Point area are managed under a General Plan, dated March 1961, that was approved jointly by the Assistant Secretary of the Army, the Secretary of the Interior, and the Illinois Department of Conservation; and as prescribed in a Cooperative Agreement, dated February 1963, between the Department of the Army and the Department of the Interior.

b. 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 for the Calhoun Point Project are 100 percent Federal and pursuant to Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580, all costs of operation and maintenance for the Calhoun Point project area are 100 percent Non-Federal.

III. GENERAL SCOPE

The project to be accomplished pursuant to this MOA shall consist of: 155

1. A riverside dike/levee to reduce sediment input to the site, and to serve as an integral component of the levee-gatepump water control system.

2. Selective deepwater dredging at Pohlman Slough to provide a deepwater fish refuge, and a water intake location for pumping operations at the goose fields.

3. Exterior gravity drain structures at three locations (Pohlman Slough, Chickahominy Lake, and Squaw Island Slough) for regulating interior water levels independent of river stage. The Pohlman Slough and Chickahominy Lake structures are open-topped and include stop-logs to accommodate fish access.

4. Interior stop-log structures at two locations (between Chickahominy and Silver Lakes, and between Chickahominy and Royal Lakes) used to subdivide the moist-soil area into independently managed lake units.

5. Woody vegetation clearing at selected locations to increase the total acreage devoted to moist-soil plant production.

6. Interior levees (along with associated stop-log units) to expand the crop acreage available for fall inundation at the goose fields area.

7. Implementation of a forest management plan as a basis for increasing mast trees as a historically important component of the Calhoun Point forest habitat.

IV. RESPONSIBILITIES

a. DOA is responsible for:

1. Construction. Construction of the project which consists of constructing the aforementioned project features.

2. Major Rehabilitation. 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.

3. Construction Management. Subject to and using funds appropriated by the Congress of the United States, [and in accordance with Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662,] DOA will construct the Calhoun Point Project as described in the definite project report,

"Calhoun Point Habitat Rehabilitation and Enhancement Project," dated October 1994, applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The USFWS 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 DOA encounters potential delays related to construction of the project, DOA will promptly notify USFWS of such delays.

4. Maintenance of Records. The DOA 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. The DOA 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 USFWS.

a. FWS Responsibilities: Upon completion of construction as determined by the District Engineer, St. Louis, the USFWS shall accept the project as part of the Mark Twain National Wildlife Refuge.

b. Non-Federal Responsibilities: In accordance with Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580, 100 percent of all costs associated with the operation, maintenance, and repair of the Calhoun Point Project will be borne by the Illinois Department of Conservation.

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 Service
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

DOA: District Engineer
U.S. Army Engineer District, St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-2833

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: _____
(signature)

THOMAS C. SUERMANN
Colonel, Corps of Engineers
St. Louis District

DATE: _____

THE U.S. FISH AND WILDLIFE SERVICE

BY: _____
(signature)

WILLIAM F. HARTWIG
Regional Director
U.S. Fish and Wildlife Service

DATE: _____

ILLINOIS
DEPARTMENT OF
NATURAL RESOURCES

524 South Second Street, Springfield 62701-1787

Jim Edgar, Governor ● Brent Manning, Director

April 11, 1996

Colonel Thomas Suermann
District Engineer
St. Louis District
Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Suermann:

Members of my staff have worked closely with the St. Louis District, Corps of Engineers and the U.S. Fish and Wildlife Service in preparation of the Definite Project Report for the Upper Mississippi River System Environmental Management Program, Calhoun Point Habitat Rehabilitation Project. The project includes improvements to the Calhoun Point Area that our Department manages under a cooperative agreement with the Service.

It is our understanding that the project includes a riverside dike/levee which has been redesigned so that the terminal portion ties into high ground on federal levees just outside of the privately owned tract C-19A, selective deepwater dredging at Pohlman Slough, three exterior water control structures, pumps, woody vegetation clearing, interior levees with associated water control structures, and various tree plantings. It is also our understanding that the total estimated cost for the Calhoun Point project is approximately $7.0 million. The estimated operation and maintenance cost of the project is approximately $50,000 and will be incurred 100 percent by the Department as the agency managing the site. We are confident that construction of this project will result in a significant increase in both the quantity and quality of fish and wildlife habitat in the Calhoun Point area.

The Department is willing to serve as the non-federal sponsor for the Calhoun Point Area and intends to cooperate with the U.S. Fish and Wildlife Service to assure that operation and maintenance activities, as described in the Definite Project Report and any mutually agreed upon rehabilitation, will be accomplished in accordance with Section 906(e) of the Water Resources Development Act of 1986.

Effective July 1, 1995, the Illinois Department of Natural Resources was created through the consolidation of the Illinois Department of Conservation, Department of Mines and Minerals, Abandoned Mined Lands Reclamation Council, the Department of Transportation's Division of Water Resources, and the Illinois State Museum and Scientific Surveys from the Illinois Department of Energy and Natural Resources.

[printed on recycled and recyclable paper]

We look forward to continued coordination with the St. Louis District during the preparation of the Plans and Specifications, and to a construction start on this project at the earliest possible date. Please do not hesitate to contact Mr. Marvin Hubbell at the above address to further discuss this matter.

Sincerely,

Brent Manning

Brent Manning
Director

cc: Kirby Cottrell
Jerry Beverlin
Tom Flattery
Jim Garner
Marvin Hubbell

APPENDIX DPR-B

CORRESPONDENCE PERTAINING TO DRAFT DPR

FOREWORD

APPENDIX DPR-B provides the comments received from the public (verbal and written) on the draft DPR. The appendix also provides, as appropriate, the District's responses to those comments.

APPENDIX DPR-B

CORRESPONDENCE PERTAINING TO DRAFT DPR

SECTION	DESCRIPTION
1	Public Meeting Comments/Responses
2	Public Letter Comments/Responses
	ATTACHMENT B-1. District Responses
	ATTACHMENT B-2. Public Comments--Excluding Mr. Ettinger Letter
	ATTACHMENT B-3. Mr. Ettinger Letter of Comment
3	Congressional Letters of Support
4	Agency Letters of Comment & District Responses

APPENDIX DPR-B

SECTION 1

Public Meeting Comments/Responses

APPENDIX DPR-B

SECTION 1

Public Meeting Comments/Responses

A. Meeting Location/Time. The meeting for the Calhoun Point HREP was held January 10, 1995 at the Mark Twain National Wildlife Refuge, Swan Lake Visitors Center, Brussels, IL. The meeting was as an informal workshop held between 3:00 PM and 8:00 PM.

B. Meeting Notification. The general public was notified via news releases, and public notices sent via mail and postings at key public facilities. Additionally, all of the sites cabin lease holders were notified of the meeting.

C. Meeting Format. The workshop consisted of the study manager providing a conceptual overview of the project, followed by a questions and answers session from the public. District and interagency planning team members were available to provide technical clarifications and answer specific questions as needed. Plan drawings, enlarged USGS contour maps and photographic enlargements were available to depict the project area. Comment sheets were made available to the public for making written comments. The more significant verbal comments made at the meeting were written down by Corps staff during the course of the meeting.

D. Meeting Representatives. Corps employees in attendance were: John Cannon (Construction-Operations--Natural Resources Management), Ron Dieckmann (Engineering Div.--Hydraulics), Dave Gates (Planning Div.--Plan Formulation), Dave Leake (Planning Div.--Plan Formulation), Tim Nelson (Real Estate Div.--Appraisal), and John Poullain (Engineering Div.--Design). Mike Bornstein, EMP Coordinator for the USFWS, Mark Twain National Wildlife Refuge was in attendance. IDNR was represented by Neil Booth, site superintendent of the Mississippi River Fish and Wildlife Management Area, and Dave Harper, Region IV District Wildlife Biologist.

E. Meeting Attendees. Forty-one people signed in for the public meeting (TABLE B-1). Each individual's name, organization, and address is provided below. The turn out for the meeting was about twice the number that attended the nearby Swan Lake HREP public meeting.

F. Meeting Issues. Issues raised as a result of the public meeting, and the District's perspective regarding each of those issues, are described below.

TABLE B-1. MEETING ATTENDEES

NAME	ORGANIZATION	ADDRESS
Attendee	Brandon Subdivision	2319 Timber Ridge St. Jacob, IL 62281
Attendee		Box 33 Brussels, IL 62013
Attendee		Brussels, IL 62013
Attendee		Rural Route 1 Box 94 Golden Eagle, IL 62036
Augustine, Dan		P.O. Box 101 Brussels, IL 62013
Bensman, Jim	Sierra Club	117 N. Shamrock St. Apt 1 East Alton, Il 62024-1149
Broska, Daniel	Cabin Owner-Pohlman	8606 Colonial Acres Troy, IL
Clark, Henry	Cabin Owner	
Clark, William	Cabin Owner-Private Land	2024 Alton Ave Madison IL 62060
Cullen, Edward	Lot 49, Deer Plain	57 Woodland Drive Collinsville, Il 62234
DeWall, Steve	Sierra Club	521 Albers Lane Bethalto, IL 62010
Dolea, Bob	Illinois Rural Electric Co.	212 S. Main St. Winchester, IL 62694
Droste, Dorothy	Cabin Owner-@ #12 Old Ferry Road	931 Northdale Drive Alton, IL 62002
Droste, Paul	Cabin Owner-@ #12 Old Ferry Road	931 Northdale Drive Alton, IL 62002

TABLE B-1. Continued

NAME	ORGANIZATION	ADDRESS
Dyer, Barbara	Cabin Owner	10444 Durness St. Louis, MO 63137
Eberlin, Kevin		HCR Box 147 Brussels, IL 62013
Edelman, Ken	Lot #92 Deer Plain	53 Spring Valley Estate Route 1 Grafton, IL 62037
Fontschneider, Leonard		Box 117 Brussels, IL 62013
Graham	Land Owner	502 Portland Collinsville, IL 62234
Herter, Emil	Farmer	Box 73 Golden Eagle, IL 62036
Kinder, Fred		Rural Route 1 Box 149 Golden Eagle, IL 62036
Meadows, David	Cabin Owner	100 Peila Collinsville, IL 62234
McPheeters, Jack	Land Owner Lincoln Co.	Route 1 Old Monroe, MO 63369
Navarre, Michael	Land Owner above project	Box 143 Brussels, IL 62013
Neckick, Doug		Box 95 Golden Eagle, IL 62036
Nolte, August	Chairman Calhoun Co. Planning Commission	Rural Route 1 Box 116 Golden Eagle, IL 62036
Nolte, John		Route 1 Box 115 Golden Eagle, Il 62036

TABLE B-1. Continued

NAME	ORGANIZATION	ADDRESS
Pohlman, Glenn		HCR Box 1 E Brussels, IL 62013
Pohlman, Larry		HCR Box 104 B Brussels, IL 62013
Rose, John		Box 106 Brussels, IL 62013
Rose, Leonard		HCR Box 103 A Brussels, IL 62013
Rose, Mary		HCR Box 106 Brussels, IL 62013
Rose, Thomas		HCR Box 106 Brussels, IL 62013
Skelton, W.	Land Owner	1031 Villa Ridge Collinsville, IL 62234
Stafford, Donald	Jersey County Board	Box 197, Route 1 Dow, IL 62022
Stafford, Robert		Route 1 Box 181-B Grafton, IL 62037
Ternaprovich, Dale	Federal Lease User	618 St. Clair Ave. Belleville, IL 62220-2318
Toppmeyer, Jerome	Land Owner	Box 113 Brussels, IL 62013

1. ROAD UPGRADE TO CABIN SITES

167 Public Comment: Mr. Dan Augustine indicated that he had been a resident of Pohlman Slough since 1980 with Federal cabin leases at lots #80 & 81. He wanted to know how residents like himself could get someone to grade the road to the cabin sites. Dan Broska, a cabin owner at Pohlman Slough, asked if the roads in front of and leading to his cabin would be repaired after project construction.

District Response: Any damages to cabin access roads resulting from the construction of the habitat restoration project will be repaired as part of the project. However, the Upper Mississippi River System--Environmental Management Program (UMRS-EMP), under which the Habitat Rehabilitation Enhancement Projects are being constructed, does not allow for the expenditure of project dollars on site improvements unrelated to habitat restoration needs. Therefore, improvements to existing road deficiencies will not be included as part of the Calhoun Point habitat project.

2. POHLMAN SLOUGH DREDGING

Public Comment: Mr. Dan Broska asked if the proposed Pohlman Slough dredging will extend to the Pohlman Slough boat ramp area. One Lincoln County, Mo. woman indicated that she does not like the dredging of river bottoms. She said the Corps has damaged everything except the ducks, but the average river hunters don't see ducks normally. The Corps is just trying to save its own jobs.

District Response: The dredging, as now proposed, will extend to the boat ramp area.

The proposed dredging at Calhoun Point is being accomplished in an environmentally sound manner. The disposal sites are in unforested locations of the project area. The material deposited will be placed to a depth no greater than three feet. The resulting higher/drier terrain will be suitable for the planting and subsequent growth of mast-producing trees.

3. RECREATIONAL BOAT ACCESS

Public Comment: Mr. Broska indicated that he thought it would be advantageous if small boats used for fishing and hunting could travel from Pohlman Slough to the Illinois River.

District Response: The stop-logs to the Pohlman Slough water control structure will be removed much of the year to permit fish movement between the river and slough. This will allow water levels within the slough to change with river stage.

There would be sufficient room for small recreational craft to pass thru that structure during normal river stages. However, IDNR has indicated that it does not want Pohlman Slough to turn into a boat marina. Accordingly, a gate would be installed at the water control unit to better regulate the boat traffic between the slough and the river. 168

4. PROJECT PURPOSE

Public Comment: Mr. Steve DeWall indicated that he came to the meeting thinking he would hate the plan--that is just represented another duck pond for hunters. But after listening to the presentation he was no longer sure that was the sole purpose of the project. He thought that the statement that "no new wetlands are being created, and the ones that we have must be protected" sounds like a valid point. He also indicated that the planting of mast trees at the site is a good idea. He doesn't like single species management, but feels that if this project could help other wildlife species as well, that would be good. He likes the idea of leaving the shoreline cottonwoods for eagle use. He asked if there were any additional data on project impacts to non-waterfowl species.

District Response: Its important to note that the primary purpose of the Calhoun Point project is habitat restoration, and not recreation. However, increased recreational benefits are likely to result as a by-product of habitat improvement. Improved habitat will result in population increases in both fish and wildlife, both game and non-game species. Comments relative to wetlands protection from sedimentation, mast tree plantings, and cottonwood avoidance are noted. Additional impacts data regarding non-waterfowl species is included in the habitat quantification appendix of this final DPR.

5. ROYAL LANDING ACCESS ROAD USE

Public Comment: Mr. Michael Navarre, a landowner west of the access road indicated that he is concerned that the proposed project berm and access road would be one and the same. He uses the existing road to access his property. He said this county road is kept open on a year round basis. He said he would not want any obstructions to the road that would impact access to his property. Other commentors expressed concern that the proposed 10-foot wide berm/road crown would be insufficient to pass two way traffic as does the present road. There was also concern about the proposed placement of an access gate at the intersection of the landing access road with Calhoun County Route 1.

District Response: The existing usage of the Royal Landing access road will not be affected by the project. The project berm alignment has been changed. It will now be placed adjacent

to, rather than on top of, the existing Royal Landing access road. The access gate depicted in the draft DPR, PLATE 3, has been deleted.

169

6. DISRUPPTION OF EXISTING DRAINAGE PATTERN

Public Comment: Concern was expressed that the proposed berm alignment would impact on at least two existing road locations outfitted with culverts to drain certain property locations.

District Response: The District has modified the project concept plan to better account for the existing drainage pattern. Corrective actions, such as culvert replacements, flap gates, ditches, etc., are now depicted in the site plan plates of this final DPR.

7. PROJECT INDUCED HYROLOGICAL EFFECTS ON CABIN SITES

Public Comment: There was some concern expressed that the project might induce changes in water elevations (including ground water elevations) in the vicinity of Pohlman Slough cabin lease sites (86 cabin leases). For example, the potential influence of maintaining water levels one foot above normal pool elevation during the waterfowl migration.

District Response: The proposed berm would keep the more frequent flood events (those below elevation 424 NGVD) away from the cabins. However, events over elevation 424 NGVD could take a couple of days longer to drain from the area compared to the pre-project condition (since culverts represent a smaller opening than does an open floodplain). This short delay is not expected to result in a major impact to cabins useage. The management of the waterfowl areas would not significantly impact upon the ground water elevations at the lease areas. Pohlman Slough (normally held at river stage and open to the river via open culverts) would intercept seepage from the waterfowl areas and divert it to the river.

8. WATER CONTROL STRUCTURE VANDALISM SAFEGUARDS

Public Comment: It was pointed out that gated water control structures are very prone to vandalism, and it was recommended that the project include appropriate safeguards against such activity.

District Response: Comment noted. The District will incorporate vandal proofing measures into the final DPR concept design for the project.

9. IMPACTS TO FARM PROPERTIES

Public Comment: Concern was expressed regarding the potential for project induced flooding effects on farm properties in the vicinity of the Royal Landing access road. The potential for road washout was a point specifically mentioned. Mr. Jerome Toppmeyer, who works 400 acres of farmland near the project site, said he is afraid new berms will hurt his crops. He said the berms will be putting water across the road and out into his fields. Even though a mile and a half from the river, he says he still has sand left over from the flood of 1993. Mr. Vince Tepen, Calhoun County Board Chairman, said he was not concerned about the impacts of the project on roads provided they don't flood anyone's farmland. 170

District Response: Any lands immediately upstream of the project in the vicinity of Royal Landing and with an elevation less than or equal to 426.0 feet NGVD would realize insignificant induced flooding effects from the construction of the berm and only for the 2-year flood. For floods higher than the 2-year flood even the proposed berms would be inundated by floodwater. In addition, lands west of Calhoun County highway #1 would not be affected by the project since the road is above the elevation of the berm. The whole Calhoun Point project would be inundated before water would overtop the road. Therefore, any sand deposited by the floodwaters would not be caused by the proposed berms since they would no longer be effective once overtopped.

10. CHICKAHOMINY LAKE BOAT RAMP/PARKING LOT

Public Comment: The functional need for a Chickahominy Lake boat ramp and parking lot was questioned since public access to that area will be highly restricted.

District Response: Consistent with your comment, and with IDNR concurence, the subject facility has been deleted.

11. ROAD JURISDICTIONS

Public Comment: Questions were raised regarding the present and future road jurisdictions in areas affected by the proposed project, namely the Royal Landing access road and the cabin sites access road along the Illinois River shore.

District Response: The berm alignment has been changed such that it will run adjacent to, rather than on top of, the Royal Landing access road. Accordingly, access road jurisdiction is no longer a relevant issue at that site location.

The roadway along the Illinois River shore is not affected by the project due to a berm realignment that now bypasses the 23 acre private lands tract. The county will maintainn the Illinois shore road as it has done in the past.

12. POST-PUBLIC MEETING FACT SHEET

171 Public Comment: A question was raised as to whether or not the Corps would be providing a fact sheet, or brochure, as a follow up to the public meeting. The purpose of this fact sheet being to summarize the public's meeting comments and the actions taken by the Corps in response to those comments.

District Response: Initially, the District thought it would prepare a fact sheet reflecting the public meeting comments and District's perspectives regarding those concerns. However, after additional thought, the District decided that it would be more informative if the public's comments (both written and verbal) and the agencies comments were addressed together, and provided to the public meeting attendees (and all others on the DPR mailing list, see APPENDIX D) as part of the final DPR.

13. IMPACTS OF PROJECT ON ILLINOIS RIVER SHORE CABIN SITES

Public Comment: Several people inquired about the potential impacts of the project on the Illinois River shore cabin properties.

District Response: The berm has been realigned to tie in to high ground just south of the 23 acre private lands tract. Therefore, there will be no impacts to the Illinois shore road or its cabins.

14. IMPACTS OF PROJECT ON USFWS OWNED CROPLANDS

Public Comment: Mr. Jerome Toppmeyer, and his brother, indicated that they presently earn a living by farming lands owned by the USFWS. These same lands were at one time owned by their grandfather, and were subsequently taken by the USFWS. These individuals strongly object to the project's proposed use of these crop lands for mast trees planting, since they say it would impact on their farming operation, and their ability to make a living. Furthermore, they doubt that these lands would be viable for mast tree plantings, since the next large flood would destroy the trees.

District Response: The USFWS indicates that the farm lands in question were not taken from their original landowners, rather these lands were aquired from willing sellers. The use of these lands is now dictated by the needs of the USFWS in implementing its wildlife management master plan for the site.

At times, the master plan may call for no farming (as was the case in 1993), other times it may involve certain specified types of plantings (e.g. strip plantings, crop rotation, etc.) of benefit to wildlife populations. If the USFWS needs work done in an area they will contract via a cooperative farm agreement with

local farmers. This agreement is not under a leasing arrangement, but rather is on a crop share basis.

172

The floodplain habitat management philosophy of the USFWS is changing. In the future, it is likely that farming will be deemphasized, and native plants (i.e. native grasses or floodplain trees) production emphasized. Consistent with this changing philosopy, the Brussels District is planning to remove some of its Calhoun Point farm fields from crop production. Exactly which fields and to what extent they will be planted in mast trees will be determined at a later date, when a more detailed USFWS forest management plan is developed. The general area affected by potential HREP mast tree plannings is shown in draft DPR FIGURE 5.10 and potentially affects 67 of 219 acres presently farmed on USFWS property.

15. CONSTRUCTION CONTRACT SOURCE

Public Comment: A number of comments focused on the source of labor for any construction contracts for the project. There was a strong interest in having the contract work awarded within Calhoun County to draw on local labor. One individual contended that government contracting that does not employ Calhoun County residents would be in violation of the federal procurement law.

District Response: There is no specific law that requires that the source of labor for a federal work contract be drawn exclusively from the county in which it occurs. The bidding for a Corps construction contract is highly competitive, and firms eligible to bid on a given contract are drawn from a broad area (unconfined by the specific county in which the construction project is to occur).

At times, a particular project may be targeted as a small business set aside [The Small Business Act, 15 USC 637(a)]. If the Calhoun HREP was selected for a set aside, any firms within the county that are certified under the 8A program would be eligible to bid.

Under the affirmative action program, there are provisions (recommended percentage target goals) for hiring local labor. However, this provision is not targeting counties per se, it is targeting minorities and females.

16. PROJECT EFFECTIVENESS

Public Comment: A philosophical issue was raised by Mr. Jim Bensman regarding the effectiveness of the project in sedimentation control. In other words, if you protect Calhoun Point from sediment input, doesn't the sediment just move downstream and fill in some other wetland area?

173 District Response: The study manager, Dave Gates, gave his personal perspective on this issue. He indicated that in the future (say 100 years hence), Upper Mississippi River habitat is likely to consist of a navigation channel and a forested floodplain, with very little non-forested habitat remaining. This will result from the continued slackwater habitat condition created by the system of locks and dams and the continued substantial soils release from the upper Mississippi River watershed to the river. Contrary to a free flowing river system, in which wetlands are created as well as extinquished, we have a regulated river system that extinguishes, but doesn't create wetlands. The trend on the UMRS is a net loss of the river backwaters that are so critical to fish spawning/rearing/wintering, and waterfowl resting and feeding. If no action is taken, upper Mississippi River backwater habitats will be lost. With Calhoun Point style HREPs, the rate of the wetlands degradation process will be reduced. What we keep as wetlands in the future may well depend on what we carve out of the system today.

17. CROPLAND CONVERSION TO WETLANDS

Public Comment: Mr. Bensman suggested that the Corps implement as an alternative habitat restoration approach, the large scale conversion of existing farmlands back into wetlands habitat. He feels that this should constitute a third project alternative.

District Response: The Calhoun Point project has very little farmland area within its boundaries. Farm ground that is available is presently managed as wildlife habitat. Some of this acreage has been targeted by the project as feeding habitat for geese. It should be noted that a portion of the goose fields area is to be used as a borrow area for the project berm. This will lower the surface elevations of the area and better optimize the area for food production with subsequent water retention. In addition, the project will reforest 40 percent of the project area's existing cropland.

18. REQUIRED WIDTH OF BERM PATH

Public Comment: Mr. Bensman asked why it takes such a wide swath of tree cutting to construct a berm. He specifically mentioned the Stump Lake and Dresser Island project sites.

District Response: It is the District's goal to hold tree clearing to the absolute minimum required for structure placement. Clearing provides a surface area for the habitat structure itself, and provides enough space to allow construction equipment to move and operate, and in some situations it provides an area for obtaining borrow material.

At Dresser Island, 72 acres of forest were cleared to enable long-term wetlands habitat gains. Thirty-five of the 72 acres were directly impacted by the placement of the berm structure, and represent a permanent loss of forested habitat. The remaining 37 acres were related to the creation of borrow areas for the berm. Some of the more shallow borrow areas will revert back to forest by natural succession; however, much of the area will remain as non-forested wetlands habitat. The District does not view such a shift to a non-forested wetlands habitat type as negative, to the contrary non-forested wetland, and not bottomland forest habitat, is at a premium in the UMRS. It is the non-forested wetlands on the UMRS that provide many of the critical life requisites for waterfowl and fish populations. Due to sedimentation, the future of non-forested wetlands habitat on the UMRS looks bleak. Without active intervention to protect and create non-forested habitat areas on the system, in the near future the system will consist almost solely of a rather monotypic low quality forested wetlands habitat. 174

A review of field data for Stump Lake indicates that the width of the existing cleared area exceeded the 180 foot width (specified in the DPR and EA) in three places. Some of this alignment corridor has been impacted by historic encroachments which have impacted vegetation on public land. This factor may leave the impression of a wider corridor than was actually cleared by the contractor. The data also shows that the average width for clearing accomplished to date is 123.6 feet. An analysis of projected clearing results in an average width of 120.1 feet - which compares favorably with the project average width of 120 feet mentioned in the EA.

Much of the tree clearing for EMP structures is in areas of low quality forest habitat. To a large extent this is by design. At Calhoun the planning team walked every foot of the proposed berm path to examine the type of trees present. Additionally, and to the extent practicable, the berm was aligned away from the bank of the river to avoid potential impacts to wintering bald eagles.

19. REQUEST FOR FORMAL PUBLIC MEETING

Public Comment: Mr. Bensman expressed the opinion that the District should hold a formal public meeting with the District Engineer present. He believes this is especially important for regulatory compliance.

District Response: Consistent with the District's public meetings for other HREPs, the District Engineer was not asked to attend the Calhoun Point public meeting. However, the District Engineer has been fully informed of the concerns raised at the public meeting, as well as the concerns raised as a result of written comments received during the draft DPR review period. The District selected a less formal (one-on-one) meeting format

to better maximize the publics understanding of the project, and to encourage a freer flow of comments. It is the District's opinion that the meeting achieved this intended purpose.

There is considerable emphasis these days on conducting government in a more time and cost efficient manner. To that end, the District elected to combine its DPR/EA and regulatory compliance public review process. All correspondence from the public review (verbal and written comments) have been furnished to the District's regulatory office, as well as IDNR, IEPA, and IDOT.

APPENDIX DPR-B

SECTION 2

Public Letter Comments/Responses

APPENDIX DPR-B

SECTION 2

ATTACHMENT B-1

District Responses

178

APPENDIX DPR-B

SECTION 2

ATTACHMENT B-1

District Responses

INTRODUCTION

ATTACHMENT B-1 provides the District's responses to the public's letter comments. The comment letters are provided by two attachments. ATTACHMENT B-2 provides all public letter comments, exclusive of Mr. Ettinger's (Illinois Chapter, Sierra Club) letter, while ATTACHMENT B-3 provides Mr. Ettinger's comments.

The focus of the Calhoun Point DPR, and the letter response section, is on Calhoun Point. Some of the comments received refer to sites additional to Calhoun (e.g. Swan Lake, Stump Lake, Gilbert Lake, or EMP projects in general). As appropriate, these other locations are given consideration as part of the District's Cumulative Impacts Assessment (see APPENDIX DPR-R). Only limited discussion of these other locations is made in APPENDIX DPR-B of the report. It should also be noted, that the District and the USFWS have responded to many of the other locations issues via separate correspondence.

The District reviewed each of the ATTACHMENTS B-2 and B-3 letters received, and assigned identification codes to each letter comment. Different letters that made the same specific comment were assigned the same identification code (a letter or a number). The District's responses to the letter comments are keyed to the comment identification code. The number of times a comment was made, is indicated parenthetically following each of the comment summary descriptions in the section below. This procedure allows the reader to become familiar with the issues raised by the public, without the need to wade thru similar letter responses.

DISTRICT RESPONSES TO PUBLIC LETTER COMMENTS (EXCLUDING MR. ETTINGER LETTER)

1. OPPOSED TO CLEARING OF FORESTED WETLANDS (17).

A Missouri conservationist once said " sometimes you have to crack an egg to make an omlette". Most projects entail tradeoffs. The tradeoff at Calhoun Point is the clearing of a relatively small acreage of forested wetlands in order to achieve

considerable long-term wetlands habitat gains. The project will eliminate about 67% of future sediment deposition into Calhoun Point's interior, and flood events during the growing season would be reduced from the present 1 event in 2 years to 1 event in 5 years. The District's forest management measure includes the planting of mast trees. This tree planting not only offsets the loss of trees related to project construction, but goes a long ways to offsetting the loss of mast trees in the project area that resulted from the 1993 flood. 179

2. OPPOSED TO THE BUILDING OF LEVEES (14).

Sedimentation is the number one resource problem affecting the backwater habitats of the UMRS. The problem intensifies in the downstream direction, with the St. Louis District being hit harder than the Rock Island and St. Paul Districts.

Levees act as a physical barrier to the movement of sediment-laden river waters into interior wetland areas. The higher the levee, the greater the amount of sediment reduction. However, there is greater cost-efficiency in building lower elevation structures. This is due to several factors. First, sediments are more concentrated in the lower portion of the water column. With each additional foot of levee elevation, there is proportionally less and less sediment to be deflected. Second, the frequency of lower elevation flood events (i.e. those below 424 NGVD), is far greater than that for higher elevation flood events. Third, the cost of additional increments of levee height is not additive--it is exponential. Thus, the biggest bang for the buck is in building lower elevation levees.

It has been suggested that watershed level erosion control would be a better alternative than levees for sediment control. Unlike the Swan Lake HREP area, Calhoun Point is not directly impacted by local hillside runoff, and therefore no local watershed erosion control measure was proposed. The site is affected by river sediments originating from the overall UMRS watershed. However, due to the exorbitant costs associated with a UMRS watershed level erosion control program, and the questionable effectiveness of such a program for offsetting site-specific wetlands sedimentation problems, the District did not consider this to be a viable option.

We estimate that Calhoun Point receives approximately 0.5 inches of sediment each year. It is difficult to imagine a hillside sediment control program more intensive per square mile than that program presently being implemented at the Swan Lake HREP. That program yields, in combination with the Conservation Reserves Program (CRP), a projected future 50-year sediment reduction potential of about 50 percent. Thus, if the same intensity of hillside control were to be applied throughout the UMR basin (assuming, as a working assumption, a basin-wide uniform erosion rate per unit area), a 50 percent reduction in sediment delivery to the river's wetlands might be anticipated.

This would reduce the sediment load to the river's wetlands to about 0.25 inches per year at Calhoun Point. Extrapolating from
180 the costs per unit area at Swan Lake to that of the entire UMRS would result in a sediment control program in the billions of dollars. The District considers such a cost exorbitant. At 0.25 inches of accumulation per year, the added sediment protection afforded by a berm might still make it a viable option.

3. OPPOSED TO THE RAISING OF ROADS (1).

It is unclear whether this comment is an objection to the raising of the Royal Landing access road per se, or whether it is an objection to the raising of the road as a component of the project's berm system.

The alignment of the berm segment between Royal Landing and Calhoun County Route 1 has shifted. It now runs adjacent to the eastside of the access road. If the comment pertains more to the road's function as a berm system component--the reader is refered to the District's comment 2 response.

4. PROPOSED CLEARING OF EXISTING TREES AND HABITAT IS UNNECESSARY (2).

The District disagrees. Berm construction is the most econmomical way to deal with the problem of sedimentation at Calhoun Point. To construct a berm, some trees (on about 4 percent of the site acres considering berm area only, or about 16 percent considering berm plus herbicide affected area) must be cleared. This represents an unavoidable, but necessary, short-term loss if significant long-term wetlands habitat gains are to be achieved. Tree clearing will be kept to the minimum necessary for berm placement. In some places this will be as little as the width of a road.

5. PROPOSED WORK REPRESENTS AN UNNECESSARY IMPACT ON EAGLES (2).

The reader is refered to the APPENDIX DPR-I Endangered Species Act Documentation. The District, in its Endangered Species: Biological Assessment, concluded that the project, in conjunction with the described measures to avoid impacts to the bald eagle, will have no effect on this species or its critical habitat. The USFWS in its Final Fish and Wildlife Coordination Act Report concured in this conclusion.

6. PROPOSED WORK IS IN VIOLATION OF ENDANGERED SPECIES LAWS (2).

The reader is refered to APPENDIX DPR-I. All endangered species compliance documentation required by law has been completed for this project.

7. REPORT FAILS TO CONSIDER ENDANGERED BATS (1).

The reader is refered to APPENDIX DPR-I. The Indiana bat was a species listed for the project area by the USFWS. The District addressed the Indiana bat in its Endangered Species Biological Assessment, and the USFWS concured in the District's finding of no effect (see USFWS Final Coordination Act Report, APPENDIX DPR-H). 181

8. PROPOSED WORK WILL BENEFIT WATERFOWL HUNTERS, BUT NOT WILDLIFE (14).

It is important to note that the primary purpose of the Calhoun Point project is habitat restoration, and not recreation. However, increased recreational benefits are likely to result as a by-product of habitat improvement. Improved habitat is expected to result in population increases in both fish and wildlife, both game and non-game species.

9. OPPOSED TO SPENDING TAX DOLLARS ON THE PROJECT (TO DESTROY FORESTED WETLANDS) (15).

Comment noted. Please note District responses to other relevant comments.

10. OPPOSED TO DESTROYING SCARCE EXISTING NATURAL FORESTED WETLANDS, AND ITS SUPPORT VALUE AS IMPORTANT WILDLIFE HABITAT (13).

Non-forested rather than forested wetlands is the habitat resource at a premium on the UMRS. The future health of the river's fish and wildlife resources is more closely associated with the presence of backwater habitats, than it is to an ever expanding acreage of willows and silver maples. If we don't take actions to disrupt the sedimentation process (by means such as the construction of berms), the river's non-forested wetlands will be lost.

The forest trees found along the path of the Calhoun Point berm alignment are far from scarce. This area consists primarily of young- to middle-aged ubiquitous silver maples, willows and cottonwoods. This forest cover has only low to moderate wildlife habitat value. The forest management measure will replace this cleared vegetation with higher wildlife value mast bearing trees.

11. SUPPORT PROPOSED DREDGING OF SLOUGHS AS FISH OVER WINTERING HABITAT (1).

Comment noted. Deepwater areas for overwintering fish are becoming scarce on the UMRS. The dredged areas of Pohlman Slough will provide a much needed deepwater habitat resource. The water control structure will help deflect river sediments away from the interior during the spring. This will increase the longevity of

this deepwater habitat, while at the same time the water control unit will permit fish access during the non-flood periods of the
182 year.

12. RECOMMEND CONTRACTOR BE ALLOWED TO SELL CLEARED TIMBER (1).

The District agrees. The contractor will be allowed to remove the salvagable timber from the site. The dollar value of this timber will be documented and credited in the government cost estimate.

13. RECOMMEND TREE LIMBS FROM CLEARING BE PLACED IN STRATEGICLY PLACED PILES AS WILDLIFE HABITAT (1).

The District agrees. After the timber salvage operation, most of the tree material remaining from site clearing will be placed in piles as wildlife habitat.

14. RECOMMEND TREE STUMPS FROM CLEARING BE PLACED IN SLOUGH DREDGE CUT AREA AS FISH HABITAT (1).

The District agrees. Approximately 50 tree tops will be placed just off shore at Pohlman Slough (spaced at one tree top per 100 feet).

15. PROPOSED PROJECT IS ACCEPTABLE FOR WATERFOWL MANAGEMENT (1).

Comment noted. The project is expected to greatly improve the management capability of the area for migratory waterfowl. These improvements will result from a reduction in sediment, the ability to control interior water levels independent of the river, and from the removal of invading woody vegetation.

16. PROPOSED PROJECT IS SOMEWHAT INSUFFICIENT FOR MAXIMUM FISH HABITAT (1).

It is assumed that this comment relates to the perception that the placement of tree material into the slough would improve its habitat value. The District agrees with this comment, and it will place approximately 50 tree tops just off shore at Pohlman Slough.

17. THE EMP IS MITIGATION FOR THE MEL PRICE LOCKS AND DAM REPLACEMENT PROJECT (4).

The EMP is not mitigation for the Mel Price Locks and Dam replacement project. Mitigation for the site-specific impacts of the Mel Price project has been implemented separate from the EMP, and mitigation for systemic effects has yet to be determined. The need for systemic mitigation will be determined as a component part of the ongoing UMRS navigation plan of study.

18. A BETTER PROJECT ALTERNATIVE WOULD BE TO RESTORE WETLANDS ON NEARBY FARM FIELDS ON PUBLIC LANDS. THE DISTRICT DID NOT

CONSIDER SUCH AN ALTERNATIVE (13).

The Calhoun Point project has very little farmland area within its boundaries. The farm ground that is available is presently being managed as wildlife habitat. Some of this acreage has been targeted by the project as feeding habitat for geese. It should be noted that a portion of the goose fields area is to be used as a borrow area for the project berm. This will lower the surface elevations of the area and better optimize the area for food production with subsequent water retention. The project will reforest 40 percent of the project area's cropland. 183

19. OPPOSED TO CALHOUN POINT PROJECT. PROJECT SHOULD BE STOPPED (12).

Comment noted. Please note District responses to other comments.

20. OPPOSED TO ANY CLOSING OF THE ROYAL LANDING ACCESS ROAD FOR BERM CONSTRUCTION (1).

The existing usage of the Royal Landing access road will not be affected by the project. The project berm alignment will be altered so that it will be placed adjacent to, rather than on top of, the existing Royal Landing access road. The access gate depicted in the Draft DPR, PLATE 3, has been deleted.

21. PROPOSED ACCESS GATE AT UPPER END OF ROYAL LANDING ROAD WILL PREVENT PUBLIC ACCESS TO PROPERTY AND/OR BOAT RAMP (1).

The access gate depicted in the Draft DPR, PLATE 3, has been deleted.

22. ROYAL LANDING ACCESS ROAD NEEDS TO BE BETTER MAINTAINED (1).

The new berm alignment does not involve the use of the access road, and therefore there will be no project associated maintenance of the road as part of a project berm. The road will be maintained by the county as it has been in the past.

23. PROJECT EFFECTS ON EXISTING ROYAL LANDING ACCESS ROAD CULVERT DRAINAGE NEEDS TO BE CONSIDERED (1).

The District has looked at the drainage situation. Provisions (culverts and flap gates) are now included to correct for this deficiency.

24. CORPS RIVER DREDGING OPERATIONS ARE IMPACTING UPON THE ROYAL LANDING BOAT RAMP (1).

The District did at one time discharge material in the vicinity of the boat ramp area. This practice was subsequently stopped. However, this is not the present problem in this area.

The problem is that the river channel is shifting away from Royal Landing, and in fact, we have had to reposition the navigation channel markers in that area.

184

25. PROPOSED PROJECT DOESN'T SOUND LIKE A REHABILITATION PROJECT (2).

The District does not concur in this opinion. The site has been degraded by sedimentation (acreage loss, lost water depth, lost fish access due to sediment plugs), fluctuating water levels, woody vegetation encroachment, and flood-induced mast trees dieoff. The proposed features of the Calhoun Point project contribute greatly to the correction of these problems.

26. STUMP LAKE PROJECT SHOULD BE STOPPED (1).

The District strongly disagrees. The project was designed in close coordination with an interagency team of experts and with the public. The project is currently in a construction status, and the District anticipates that the completed project will perform as designed.

27. PROJECT WILL BE NULLIFIED BY WHAT WILL PROBABLY BECOME FUTURE FEDERAL POLICY WITH REFERENCE TO RESOURCE INTERESTS BALANCING (1).

The District sees no inconsistencies between the proposed Calhoun Point habitat project and present or future objectives to balance resource interests. The reader is refered to the summary discussion at the end of ATTACHMENT B-1.

28. IDOC EMPHASIS ON WATERFOWL MANAGEMENT HAS HURT FISHING AT CALHOUN POINT, NEED GREATER FISHERIES EMPHASIS IN PROJECT PLAN (1).

Fisheries considerations have been a major consideration in the development of the Calhoun Point project. These features include: fish passage structures, deep water dredging, and the placement of tree tops. We have tried to include fisheries improvements to the extent that they are cost-effective and consistent with the project goals and objectives defined by the interagency planning team. The issue of how much fish versus how much wildlife emphasis there should be built into a project can be a difficult issue. Both the St. Louis District and the IDNR believe that this balance has been achieved at Calhoun Point. It is important to note, that the project's design is fairly flexible. The same features could be used to alter the management of the area consistent with any future changes in state resource management policy.

29. AMOUNT OF DREDGING IS INSUFFICIENT AS PROPOSED FOR POHLMAN

SLOUGH AND/OR OTHER CALHOUN POINT LAKES (1).

Dredging is a very expensive management tool. A million dollars buys only 25 acres of dredge cut to a depth of 5 feet. From a cost-efficiency standpoint, the placement of a berm to prevent future deposits of sediment is a better bargain than is extensive deepwater dredging to remove sediments already deposited. Accordingly, the District is forced to use deepwater dredging very sparingly. Additional dredging at Pohlman Slough could not be justified from a monetary standpoint. Additional dredging at Silver, Chickahominy, and Royal Lakes would not be consistent with the objectives for this area as laid out by the interagency planning team. 185

30. RESTRICT OUTBOARD HORSEPOWER TO 6 HP (1).

The restriction of motor horsepower is not a function of the EMP. IDNR establishes criteria governing horsepower limitations on the state's rivers and lakes. Calhoun Point does not qualify under the restriction code for a horsepower limit. Please notify the Department's policy and administrative rules section for any further discussion on this subject.

31. KEEP LAKE WATER LEVELS AT A HIGH LEVEL UNTIL SUCH TIME AS EXTENSIVE DEEPWATER DREDGINGS HAVE BEEN ACCOMPLISHED IN THE LAKES (1).

Fish need fairly deep water (about 7-8' in depth) to provide suitable over wintering habitat conditions. The proposed project will, over a limited area, provide such deepwater conditions. At this present time, Pohlman Slough fluctuates via seepage with changes in river elevation. With the use of a pump the water level could be raised perhaps one additional foot above river stage. This minor increase would be achieved at a considerable dollar cost, and would not likely be sufficient to measurably improve over wintering habitat conditions.

32. OPPOSED TO SUMMER DRAWDOWNS FOR WATERFOWL FOOD PRODUCTION--ITS BAD FOR FISH AND FISHING (1).

The future site management for Pohlman Slough does not require a periodic drawndown for waterfowl food production. Summer drawdowns at Silver, Chickahominy and Royal Lakes are consistent with the present management goals and objectives as defined by the interagency planning team. We realize that not everyone will be in agreement with the degree of emphasis placed on the fish and wildlife resources at Calhoun Point. However, the interagency team has tried to take into account the many differing public opinions to strike a reasonable resource balance. If a future change in management emphasis should occur, the project features, as designed, will be able to accomodate such change (i.e. the project has built-in functional flexibility). The reader is refered to the summary discussion on resource balancing at the end of ATTACHMENT B-1.

186

33. SUPPORT THE CALHOUN POINT PROJECT, OR CALHOUN AND OTHER AREA EMP PROJECTS (13).

Comment noted. The public at large does not have major objections to the project. The project has received considerable Congressional support at both the Federal (Representative Durbin, Representative Costello) and state (Representative Davis, Senator Bowles, Senator Demuzio) levels.

From the public review, it is clear that the various organizations and agencies have diverse philosophical perspectives on what constitutes a worthwhile project. Using the interagency planning team, the District has attempted to blend these differing perspectives into a project that provides a balanced product with respect to both site-specific and systemwide habitat needs.

34. OPPOSED TO SPENDING TAX DOLLARS ON THIS PROJECT (5).

Comment noted. The reader is refered to the District's responses to the other comments.

35. OPPOSED TO TAKING LAND, THAT IF NOT PRESERVED WILL SOME DAY BE DESTROYED (1).

The meaning of this comment is unclear. Calhoun Point does not involve the taking of land. The entire site is in public ownership.

36. THE LAW DICTATES THAT WETLANDS MUST BE PROTECTED FROM DESTRUCTION (1).

The Calhoun Point project has been developed in full compliance with the applicable environmental statutes.

The very nature of the Calhoun Point project is to rectify the problem of habitat destruction. It has been the intent of the project to address the destructive forces of sedimentation (with effects on backwater acreage and water depth), plugged backwater entrances (that prevent fish access), water level fluctuations (that reduce wetlands plant production), woody vegetation encroachment (that reduces the acreage available for non-forested wetlands), and flood-induced mast trees die-offs (that reduce the habitat quality of the existing forested wetlands).

37. CORPS NEEDS TO RECONSIDER THE ADVERSE EFFECTS THE PROJECT WOULD HAVE ON WILDLIFE AS REQUIRED BY LAW (1).

The District has carefully considered the effects of a project on both target species (species that are the primary focus of the site's management) and non-target species (species that are not the primary focus of the site's management). A quantification of these effects is provided by APPENDIX DPR-J. 187

38. ARTIFICAL BERMS HAVE A NEGATIVE EFFECT ON FLOOD DAMAGE REDUCTION (1).

While this statement may be true in the case of certain large farm berms, it is not true relative to low profile sediment deflection berms--such as the one proposed for Calhoun Point. While the berm will prevent minor flood events from entering Calhoun, it will be overtopped by larger (potentially damaging) flood events. For more detailed information on berm hydraulic effects--see Hydrology and Hydraulics APPENDIX DPR-E.

39. WETLANDS/BOTTOMLANDS PROTECTION IS IMPORTANT FROM AN AESTHETIC OR ETHICAL STANDPOINT (1).

The proposed Calhoun Point project would have a short-term negative impact on aesthetic quality during the construction period. However, the project would enhance the long-term aesthetics of the project area, by improving the habitat that supports the wildlife species viewed by the public.

Historically, the magnitude wetlands habitat loss in the State of Illinois, and in the country at large, has been enormous. How we deal with wetlands is certainly a matter of ethics. It is the District's perspective that the Calhoun Point project is an important demonstration of federal and state committment to remedy the loss of wetlands.

40. PROJECT MONIES SHOULD BE REDIRECTED TO RIVER WETLANDS RESTORATION (2).

The meaning of this comment is unclear. Monies are being directed to river wetlands restoration via the proposed Calhoun Point project.

41. CONSTRUCTION RELATED FOREST AND WETLANDS DAMAGES ARE UNMITIGATED (1).

Not true. The project includes a forest management measure. This measure more than offsets construction related forest loss. The project activities result in a clearing of 220 acres (51 acres cleared for a berm, 169 acres cleared with herbicide), and a planting of 225 acres (110 acres planted in cropland and disposal areas, 115 acres planted in forest). For more detail, see the Project Habitat Quantification APPENDIX DPR-J.

42. CORPS/IDOC REFUSED TO PROTECT VALUABLE WILDLIFE MAST PRODUCING TREES DURING STUMP LAKE CONSTRUCTION AND GAVE THEM TO

THE CONTRACTOR AT NO COST (2).

188 To place a berm, a certain amount of clearing must take place. The interagency planning team saw the short-term loss of these trees as an acceptable tradeoff for the long-term wetlands gains to be achieved from the resulting project. One hundred percent avoidance of hard mast producing trees was never a goal. An IDOC forest inventory of the Stump Lake area indicated that the trees in the vicinity of the exterior berm consisted mostly of non hard mast producing trees (i.e. silver maple, hackbery and elm). Hard mast species present were pecan and bur oak, but they were exceedingly uncommon.

At Stump Lake, the total value of commercially saleable timber from the clearing operation was in the range of $10-15,000. This takes into account the decreased value of some trees due to flood-induced mortality. It is estimated that the value of pecan and bur oak did not exceed $600 and $1,000, respectively. While it was an oversight that these values were not credited in the government cost estimate, it is unlikely that their incorporation into the estimate would have changed the contract amount since this contract was awarded as a negotiated small and disadvantaged business (set aside) contract. Nevertheless, in the future, such salvage values will be better documented and reflected in the government estimate.

43. WHY ARE MAST TREES BEING DESTROYED AT STUMP AND MILLIONS SPENT PLANTING TREES AT CALHOUN (1).

In regard to the portion of the comment refering to mast trees destruction, the reader is refered to the District's response to comment 42.

As for the millions being spent to plant trees at Calhoun Point--this is an erroneous statement. The total cost of forest management plan is $275,000, and for the tree plantings per se, it is $257,000.

44. RANGE OF ALTERNATIVES STUDIED IS INSUFFICIENT (1).

The District strongly disagrees. A vast number of alternatives were generated by the interagency planning team. In all there were 15 distinctly different alternative measures formulated. These were further broken down into 61 alternative options. An incremental cost analysis used these options to consider millions of different plan configurations to help arrive at the most cost efficient wetlands protection configuration.

45. STOPPING SEDIMENT FROM ENTERING THE RIVERS SHOULD HAVE BEEN EXPLORED AS AN ALTERNATIVE (1).

This alternative was explored. Alternative measure #2 on page 21 of the Draft DPR is "UMRS Watershed Erosion Control". The measure was found to be not viable for the reasons stated

on page 31 of the Draft DPR.

46. DISTRICT ESTABLISHED FOUR CRITERIA (COMPLETENESS, EFFECTIVENESS, EFFICIENCY AND ACCEPTABILITY) TO ELIMINATE POTENTIAL MEASURES FROM CONSIDERATION AS ALTERNATIVES. THIS VIOLATES NEPA (1). 189

The District did not refuse to consider alternatives. The interagency team proposed various alternative measures, and then evaluated them using the four criteria. On this basis, certain alternatives were determined to be more viable than others. Only the more viable measures were carried forward for more detailed consideration. We understand that you may not agree with our assessment, but that in itself does not negate the evaluation. We have given additional consideration to the alternative measures in view of your stated objections. However, we believe that our original determinations are still valid.

47. DISTRICT DID NOT CONSIDER A MEASURE FOR CONVERTING FARM LAND ON PUBLIC LANDS INTO DEEP WATER HABITAT (1).

The Calhoun Point project has very little farmland area within its boundaries. Farm ground that is available is being managed as wildlife habitat. Some of this acreage has been targeted by the project as feeding habitat for geese. It should be noted that a portion of the goose fields area is to be used as a borrow area for the project levee. This will lower the surface elevations of the area and better optimize the area for food production with subsequent water retention.

There are major reasons why the suggestion of converting existing farm ground into deepwater habitat was never included (not even in a first round list of alternative measures). Dredging is very expensive. Farmland generally sits at least several feet above the prevailing river stage. Thus, a minimum of 3 feet of earth would need to be removed to reach river elevation, and then another 7 feet of dredge cut to create a deep water situation. At this rate one could create approximately 12 acres of deepwater habitat at a cost of $1,000,000. Assuming each acre yielded a maximum of 1 Average Annual Habitat Unit (AAHU) per acre, then the dollar cost per AAHU would be over $83,000. We have not seen the EMP approve any aquatic habitat features with a cost per unit output relationship exceeding $5,000/AAHU.

48. DISAGREE WITH RATIONALE FOR DELETING UMRS WATERSHED EROSION CONTROL MEASURE. THE SEDIMENT REDUCTION EFFECTS WOULD BE BENEFICIAL, AND AT ADJACENT SWAN LAKE PROJECT IT WAS INCLUDED IN THE PROJECT (1).

The following paragraph is provided as an expanded explanation as to why watershed erosion control is not an effective means for dealing with the sedimentation problem at Calhoun Point.

We estimate that Calhoun Point receives approximately 0.5 inches of sediment each year. It is difficult to imagine a hillside sediment control program more intensive per square mile
190 than that program presently being implemented at Swan Lake. That program yields in combination with the Conservation Reserves Program (CRP), a projected future 50-year sediment reduction potential of about 50 percent. Thus, if the same intensity of hillside control were to be applied throughout the UMR basin (assuming, as a working assumption, a basin-wide uniform erosion rate per unit area), a 50 percent reduction in sediment delivery to the river's wetlands might be anticipated. This would reduce the sediment load to the river's wetlands to about 0.25 inches per year at Calhoun Point. Extrapolating from the costs per unit area at Swan Lake to that of the entire UMRS would result in a sediment control program in the billions of dollars. The District considers this cost exorbitant, and at 0.25 inches of accumulation per year, the added sediment protection afforded by adding a levee in addition, might still be a viable option.

The Swan Lake and Calhoun Point projects are not comparable in regard to the issue of local watershed erosion control. Swan Lake has a 30 square mile local watershed draining into the site. Calhoun Point doesn't have a local watershed drainage problem. The situation was such at Swan that the application of hillside sediment traps was a major contribution to the reduction of lake sediment. Watershed drainage affecting Calhoun comes from the UMRS at large. The difficulties of addressing systemic level sedimentation were described in the preceding paragraph.

49. CLAIM THAT UMRS WATERSHED EROSION CONTROL IS AN EXORBITANT COST IS DISPUTED (1).

See District's response to comment 48.

50. AN ALTERNATIVE OF NOT USING POISONOUS HERBICIDES SHOULD HAVE BEEN CONSIDERED (1).

The District did examine alternatives to herbicide application, including mechanical clearing, chainsawing, and hypohatcheting. Mechanical clearing would be effective because it would provide for the removal of stumps and root wads. Chainsawing would not be effective because one to two years after cutting, willows and silver maples would grow back from the stump to the same height, with more stems per plant than prior to cutting. The use of a hypohatchet, which is an axe-like tool that injects an herbicide into the tree, would be selective in that sapling-sized trees and seedlings could not be treated. We estimated the cost of mechanical clearing to be about $2,000 per acre, whereas for herbicide application it is about $110 per acre. Because mechanical clearing and herbicide are both effective, we evaluated the least cost alternative. We will place this information in section 5, subpart c. (measures evaluated).

51. CORPS HAS CONCEALED WHAT HERBICIDES IT WILL SPRAY (1).

Rodeo is the selected herbicide. This herbicide is registered with the U.S. EPA as appropriate for use in aquatic environments. This herbicide will be written into the final version of the Section 404 evaluation report (APPENDIX DPR-C). The state has had an opportunity to review this report in consideration of its Section 401 water quality certification (also in APPENDIX DPR-C). 191

52. HERBICIDE INDUCED DEFORESTATION WILL HAVE SIGNIFICANT ENVIRONMENTAL EFFECTS (1).

The District disagrees. We have taken suitable action to safegard against potential adverse effects from the spraying. For example, we don't see a potential for reduced oxygen levels in adjacent areas from leaf fall. The Rodeo will not be used in an area near a municipal water intake. The nearest public water supply is at Grafton, IL. Grafton takes its water from a well, not directly from the river itself. The nearest downstream water intake is at Alton, IL. Human exposure to the direct spray will be prevented by prohibiting access to the site during spraying. For further discussion on herbicide effects, see revised write-up of DPR Section 7.

53. SUGGEST PLANTING MAST TREES WITHOUT CLEARING, E.G. IN FLOOD TREE DIE-OFF AREAS OR IN FARM FIELDS (1).

The tree planting plan has been revised. Now, one-half of the in-forest planting areas will be selectively cleared, and one-half will not. This split approach is part of an experimental planting design. The farm fields to be planted are already cleared.

54. FOREST CLEARING FOR CLEAR CUTS AND BERMS WILL ADVERSELY IMPACT FOREST SPECIES (1).

There are no clear cuts proposed for mast tree plantings in forests. The clearing will be selective, only is only dead trees less than 9" DBH will be removed. With regard to forest clearing for berms--see District response to Comment #1.

55. DISTRICT SHOULD PREPARE AN EIS ON THE GROUNDS OF SIGNIFICANT CUMULATIVE ENVIRONMENTAL EFFECTS (1).

APPENDIX DPR-R provides the District's cummulative impacts assessment. The following summarizes the findings of that Appendix:

All EMP--HREPs are monitored before and after construction to determine if the project goals and objectives are met. Goals

and objectives are often stated in terms of anticipated improvements to habitat conditions. Monitoring evidence to date suggests that HREPs are achieving their site-specific
192 environmental objectives.

The HREPs can be characterized as demonstration projects, and collectively they are limited in scope. The program is working only a fraction of the total habitat area of the UMRS. If all planned program activities turn out to be a failure (and there is no evidence to indicate that this will be the case), it would not represent an irreversible, catastrophic adverse impact on the river's ecosystem.

The 15-year HREPs program can be viewed as a precursor to future large scale habitat alteration attempts on the river system. If the program is funded by Congress beyond the 15-year authorized limit, then a systemic strategy to UMRS habitat restoration is needed. This would include an evaluation of UMRS habitat needs, objectives, measures, and plans. Such a systemic assessment would also serve as a long-term cumulative impact assessment.

At present, whether the current HREPs do or do not represent a perfect system-wide balancing of resource needs, is not critical. This is due to the small impact of these projects on the system at large. This issue will become more critical if major UMRS habitat project installations are authorized following the close of the current HREP demonstration program.

Overall, the Calhoun project yields significant beneficial environmental effects, and no obvious adverse cumulative effects. Accordingly, the District does not believe that an EIS is warrented.

56. CORPS ILLEGALLY AUTHORIZED USFWS TO DESTROY WETLANDS TO CONVERT A ROAD TO A LEVEE AT GILBERT LAKE (1).

The subject activity was not illegal. The work was performed within the discretionary limits of the permit conditions for wetlands enhancement. This fact was also noted to Mr. Bensman in a letter from the District Engineer dated February 10, 1995.

57. THE CORPS HAS NOT PREPARED AN EIS FOR THE EMP PROGRAM, OF WHICH CALHOUN POINT IS A PART (1).

For reasons reflected in the District's comment response #55, we do not believe that a programatic EIS is a critical need at this time. To date, the program's outputs have been a net benefit to the environment, and collectively the HREPs do not constitute a major change to the UMRS environment.

58. AN EIS IS REQUIRED FOR FEDERAL AGENCIES INTENDING TO USE

HERBICIDES IN FOREST MANAGEMENT (1).

The appropriate environmental compliance documentation for the Calhoun Point project is an EA, not an EIS. The effects of herbicides are fully described in Section 7 of the EA. 193

59. THE EA DOES NOT ADDRESS THE CUMULATIVE, SYSTEMIC, OR INDIRECT EFFECTS OF THIS PROPOSAL (1).

See APPENDIX DPR-R. This appendix describes the cumulative effects of the project, including systemic and indirect effects.

60. QUALITY OF CORPS EA ANALYSIS IS INADEQUATE IN ITS DISCUSSION OF HERBICIDES, NEOTROPICAL MIGRANTS, BIODIVERSITY, BENEFITS OF FLOODING, INDIANA BATS, GREENHOUSE EFFECT, AND WILDLIFE PROTECTION (1).

Herbicides. See Section 7 revision to discussion of herbicides.

Neotropical Migrants. The following information will be placed in Sections 2 and 7 of the final report. Neotropical migratory land birds nesting in bottomland forest at Calhoun Point probably include 10 to 15 species, based on known nesting species at Stump Lake, about 5 miles northwest of the project area (IDOC, 1986; Wuestenfeld, 1991). The northern parula warbler and prothonotary warbler, which need relatively large tracts of bottomland forest for breeding, apparently nest at Calhoun Point.

Fragmentation will affect the project area's 1,379 acres of bottomland forest to a slight degree. About 51 acres of forest will be cleared in a relatively narrow band (average width 75 feet) parallel to the river for construction of the 5.5 mile riverside berm. About 60 acres of forest will remain between the river's edge and the berm. Robbins et al. (1989) found that gaps in forests of middle Atlantic states created by power-line and road corridors had to be at least 100 meters (330 feet) wide before they acted as barriers to movement by forest interior breeding birds. Judging by this criterion, the berm clearing will not create a discontinuity in forest habitat in terms of bird movements. However, the clearing can be expected to be used by nest predators as access to songbird nests. The brown-headed cowbird is attracted to forest edge habitat, and parasitizes the nests of many forest interior breeding birds by laying its eggs in their nests at the expense of the other species' young. Therefore, the clearing is expected to lead to an increase in nest predation to some degree. Reforestation of the seven tracts of cropland and disposal areas totalling 110 acres will close in forest gaps over time to make the forest habitat more continuous.

Biodiversity. Biodiversity will improve in response to the improved habitat diversity resulting from the project. Improved habitat diversity is provided by such things as: (1) the berm's influence of increasing non-forested wetlands longevity, (2) site compartmentalization via the interior water control structures, and (3) the improved water regiemes provided by the berm and water control structure.

194

Indiana Bats. See APPENDIX DPR-I, Endangered Species Documentation for a discussion on the Indiana Bat.

Greenhouse Effect. Most all cleared trees will be used as wildlife habitat as opposed to buring with its consequent release of carbon dioxide into the atmosphere.

Wildlife Protection. Endangered species protection is discussed in APPENDIX DPR-I. No agency has ever identified a need to impose restrictions on construction activities to protect waterfowl.

61. THERE ARE PRACTICAL ALTERNATIVES TO DISCHARGING DREDGE MATERIAL INTO WETLANDS (1).

The 5-acre disposal area at the tip of Calhoun Point is a wetland because there are no practical alternatives. The disposal area is necessary because it is not possible to pump hydraulicaly dredged sediment from the tip of Calhoun Point through disposal pipes to either of the other two disposal areas--they are too far away (about 6,000 feet). The site of the 5-acre disposal site has been disturbed in the past. There is a portion of an old levee-like mound of earth that will serve as part of the containment berm. The 5-acre site will be planted with mast trees.

62. THE PUBLIC MEETING HELD BY THE DISTRICT WAS INADEQUATE. ANOTHER MEETING SHOULD BE HELD. IT WAS INADEQUATE IN TERMS OF LOCATION, TIME, DURATION, NOTIFICATION, CONTENT, AND FOIA REQUEST (1).

A. Location. The Calhoun Point public meeting was held at a reasonable location. The meeting was held at the same location as the Swan Lake project. The Calhoun Point and Swan Lake HREPs are adjacent to each other in Calhoun County. The USFWS refuge office provided a logical meeting location right in the immediate vicinity of both project areas. No complaints were received from the public (including the Pallisades Chapter) regarding the location of the Swan Lake public meeting. No other complaints were received from the public regarding the location of the Calhoun Point public meeting.

B. Time. It was unfortunate that the ferry crossing had closed down just prior to the scheduled meeting. However, this

was more of an inconvience rather than a barrier to attendance. The site could still be accessed via the Bridge at Hardin, IL. The District received no other complaints regarding the timing of the meeting, and in fact, the meeting was well attended. 195
Attendace at the Calhoun Point meeting was twice the number of people that showed up for the Swan Lake public meeting.

C. Duration. The meeting may have ended at 8 PM, but it was 5 hours long, starting at 3 PM. The termination of the meeting was driven more by the frequency of questions being asked than by a designated meeting completion time. The majority of the meeting attendees showed up for the meeting before 6 PM. No other complaints were received regarding the duration of the meeting.

D. Notification. A notification of the public meeting was initially made at the time of the Draft DPR mailing. That notification was made on December 12, 1994, or 29 days prior to the public meeting. A second notification, was made on December 20, 1994, or 21 days prior to the scheduled public meeting. This was more than ample time for the public to become familiar with the content of the Draft DPR prior to attending the public meeting. No other complaints were received regarding public notification. Mr. Bensman's copy of the Draft DPR was mailed to the most current address we had on file. It is important that Mr. Bensman keep the District informed of his current address. While the Public Notice may not have been sent directly to all those so desired by Mr. Bensman, the notification was provided to Mr. Bensman and was released to the news media and to the local post offices for public display.

E. Content. The District has not concealed any proposal to use herbicides or any other piece of information pertaining to the Calhoun Point project. The use of herbicides as a means of chemically controlling undesirable woody vegetation encroachment is mentioned in the DPR/EA. It appears that Mr. Bensman attaches far more significance to this item than does the District. The herbicide to be used will be Rodeo. This herbicide is one recognized by the USEPA and IEPA as environmentally safe, when used as directed. The IDNR routinely uses herbicides to control woody vegetation in its river management areas (See District response to IDNR letter dated March 17, 1995 for more detail). Herbicide use for woody vegetation control is not a new management procedure being proposed by the Corps.

F. Freedom Of Information Act (FOIA). For the following reasons, another public meeting based on an FOIA rationale will not be held.

Regarding the timber sales issue at Stump Lake, see District response to comment #42.

With regard to the issuance of the 404 permit, the Corps

does not issue itself a "permit". It does however document that regulatory procedures and requirements have been met by placing an official memorandum in the District files. While the
196 memorandum for this project was not signed prior to contract award, all regulatory compliance activities were accomplished well in advance of actual contract award.

In response to the concern regarding clearing. On February 3, 1995, a field investigation of the Stump Lake project site was conducted by the Regulatory Office staff to determine if the work being conducted was in compliance with the Section 404 requirements. A review of field data indicated that the width of the existing cleared area exceeded the 180 foot width (specified in the DPR/EA) in three places. Some of this alignment corridor has been impacted by historic encroachments which have impacted vegetation on public land. This factor may have created the impression of a wider corridor than was actually cleared by the contractor. Secondly, the data also shows that the average width for clearing accomplished to date is 123.6 feet. An analysis of projected clearing resulted in an average width of 120.1 feet - which compares favorably with the project average width of 120 feet mentioned in the EA. These deviations are not considered significant enough to void the EA nor constitute a Section 404 compliance problem.

63. THE SIERRA CLUB IS ATTEMPTING TO STOP THE CALHOUN POINT PROJECT (OR CALHOUN POINT & OTHER EMP PROJECTS) (6).

Care must be exercised in interpreting the views of the Sierra Club. Many of the concerns attributed to the Club originated directly or indirectly from the local Palisades Chapter (of which Mr. Bensman is a member). The views of Mr. Bensman are his own personal views and do not necessarily reflect the official position of the Sierra Club as an organization. Perhaps a better indication of the positions of the Sierra Club is revealed in the Illinois Chapter's (Mr. Albert Ettinger) letter of January 23, 1995. The Club's views (via Mr. Johnathan Ela, Midwest Office of Sierra Club, and Mr. Ettinger) were further expounded upon at the February 15, 1995 meeting of the Environmental Management Program--Coordination Committee (EMP-CC). Mr. Ela pointed out that the organization did have concerns with several HREP's which appear to focus on "game management". In ATTACHMENT B-1, the District has provided responses to Mr. Ettinger's comments. These responses have also considered the Club's input via the EMP-CC meeting.

64. OPPOSED TO CONVERTING FARM FIELDS TO MAST TREES. INSTEAD LOW VALUE FOREST TREES SHOULD BE REMOVED AND THEN PLANTED TO MAST TREES (1).

Of the 269 acres of cropland within the project area, 110 acres, or 41 percent, will be reforested. The remaining 59 percent will remain cropped. In light of the fact that agriculture dominates the surrounding landscape, we do not

believe that reforestation of the 110 acres is excessive.

65. QUESTION NEED FOR REPLACING TREES LOST DUE TO PROJECT CONSTRUCTION (1). 197

Corps policy requires that project induced losses to bottomland hardwood forest be fully mitigated.

66. MAST TREE STAND CREATION AT BATCHTOWN REFUGE WAS A FAILURE (1).

Tree planting efforts at Batchtown within the last several years were impacted by the '93 flood, an extreme event. We don't feel that such a rare event should deter our attempts to improve forest habitat quality at Calhoun Point.

67. SUPPORT SPENDING TAX DOLLARS ON CALHOUN PROJECT (2).

Comment noted. The Calhoun Point project is the product of an interagency planning effort yielding a highly cost-effective configuration for habitat restoration.

68. PROJECT WILL IMPROVE HABITAT (1).

The District agrees. The project yields a net gain of 586 wildlife AAHUs, and 129 aquatic AAHUs.

69. SUPPORT NOT DREDGING SQUAW ISLAND AND INCREASING DREDGING IN POHLMAN SLOUGH (1).

The District agrees with your Squaw Island comment, dredging at this location was found to be exceedingly cost-ineffective. The dredging zone for Pohlman Slough has been extended an additional 3,000 feet to approximately the vicinity of the existing boat ramp area. One thounsand foot long dredge cuts segments will be alternated between 4' deep and 7' deep. Compared to the Draft DPR configuration, this will increase the geographical influence of this feature without greatly increasing the cubic yards of material dredged.

70. TOPS OF CLEARED TREES SHOULD BE PLACED IN SLOUGH TO IMPROVE FISH HABITAT (1).

See District response to comment #14.

71. A STOP-LOG TYPE OF WATER CONTROL STRUCTURE SHOULD BE PLACED BETWEEN ROYAL LAKE AND POHLMAN SLOUGH (1).

The District concurs. The rationale for its conclusion is as follows:

a. The sponsor supports the inclusion of this feature.

b. This open top structure will allow for additional fish passage into the other lake compartments. Pohlman is the main

year round source of fish at the Calhoun Point site.

198 c. The structure would provide an additional service access for IDOC boats.

d. The structure would provide for greater water level management control flexibility. It completes the system.

72. PROPOSED PARKING LOT AND BOAT RAMP ON CHICKAHOMINY SLOUGH IS NOT NEEDED (1).

The District agrees, the parking lot and boat ramp have been deleted from the project.

73. THE TWO FINGER SLOUGHS ON SOUTHEAST SIDE OF POHLMAN SLOUGH SHOULD HAVE IMPROVED EARTH DIKES AND WATER CONTROL STRUCTURES (1).

The District will not improve or replace these structures as it would represent deferred maintainence of existing state O&M responsibilities.

74. BRUSH PILES SHOULD BE CREATED DURING CONSTRUCTION AS HABITAT (1).

See District response to comment #13.

75. BERMS NOT NEEDED TO CONTROL SEDIMENTATION. PERIODIC DROUGHTS WILL TAKE CARE OF THE PROBLEM (1).

The periodic drying of floodplain wetlands will result in some consolidation of the bottom substrate. However, such drying does not totally nulify the effects of sedimentation. Scientific studies of backwater areas on the UMRS shows a long-term net deposition of sediments. For the Calhoun Point area that deposition rate is about 0.5 inches per year.

76. CORPS SHOULD MIMIC NATURAL RIVER FLOW TO MEET ENVIRONMENTAL GOALS (1).

There is a common misconception that water flow through a backwater area (say a side channel) flushes out sediment and prolongs the life of that area. In reality, the opposite is true. Those wetlands that are the most isolated from the river's influence are the ones that survive the longest. Water passing thru a side channel may at times cause some localized scouring, but it also delivers an increased flow of sediment-laden water into the side channel. Overall, the process is a net filling of the side channel over time. In fact, the District has found that blocking the upstream end of a side channel will prolong its existence, not shorten it.

77. CALHOUN POINT WILL DIE IN A FEW SHORT YEARS FROM SILTATION WITHOUT THE PROPOSED PROJECT (1). 199

The long-term trend at Calhoun Point is one of deposition and this is very apparent when comparing different vintage photographs and maps for the site. The process will be nearly complete, not in a few years, but certainly within a few decades.

DISTRICT RESPONSES TO MR. ETTINGER LETTER COMMENTS

A. Reviewer Comment: General background information to Sierra Club organization is provided.

District Response: Comment noted.

B. Reviewer Comment: DPR/EA is not in compliance with NEPA, in terms of alternatives and cumulative impacts.

District Response: The District disagrees with this comment. See District letter responses to various comments on alternatives: public comments 17 (farm fields conversion to wetlands), 44 (range of alternatives), 45 (UMRS watershed sediment control), 47 (farm fields conversion to deepwater habitat), 50 (herbicide alternatives), and 61 (alternatives to dredging discharge). See District response to public letter comment 55 regarding cumulative impacts.

C. Reviewer Comment: A general description of the project area is provided.

District Response: Comment noted.

D. Reviewer Comment: A general comment is made regarding the direct impacts of project construction.

District Response: The comment is accurate regarding the direct impacts of the project. However, the description fails to note that these impacts are a trade-off in order to achieve considerable long-term wetlands habitat gains. The project will eliminate about 67 percent of future sediment deposition into the site's interior, and flood events during the growing season would be reduced from the present 1 event in 2 years to 1 event in 5 years. Fish access to Pohlman Slough, nearly <u>non-existent</u> at the present time, would be available on nearly a year round basis. The total net beneficial change in average annual habitat units (AAHUs, which is a unit of value reflecting the quantity and

quality of habitat present) would be +586 AAHUs for wildlife, and +129 AAHUs for fish. Restoring this site will provide spawning, rearing and wintering habitat for fish, and feeding, resting and breeding habitat for waterfowl. The site will also provide improved habitat for many species in addition to fish and waterfowl, including forest dwelling birds, amphibians, and invertebrates.

200

E. Reviewer Comment: Environmental impact of spraying herbicides for woody vegetation control has been inadequately considered.

District Response: The District disagrees. See District responses to public letter comments 50 (alternatives to herbicide use), 52 (herbicide type identification), and 58 (EIS requirement for herbicides use).

F. Reviewer Comment: Background information is given on navigation pool water stage fluctuations and sedimentation.

District Response: Comment noted.

G. Reviewer Comment: DPR/EA does not adequately consider measures to achieve project goals without the construction of a berm structure and its associated destruction of wetland.

District Response: The District disagrees, its rationale is provided in subsequent responses to comments more specific in focus.

H. Reviewer Comment: DPR/EA does not address cumulative impacts on aquatic ecosystem, fisheries, and flooding regime from this and other HREP projects, in particular Swan Lake and Stump Lake HREPs.

District Response: See District's response to public letter comment 55.

The results of the District's habitat analyses reflect net positive gains in fisheries habitat value for the Calhoun Point, Stump Lake, and Swan Lake projects. Taken together, they generate a total net beneficial impact of +829 aquatic Average Annual Habitat Units (AAHUs).

The District has taken into account the cumulative impacts of the three HREP projects on upstream water surface profiles (DPR APPENDIX E). The HEC-2 analysis was performed on the Illinois River and the Mississippi River for conditions with and without the low berms for floods ranging from a 2-year to a 500-year recurrence interval. No significant increases in water surface elevations were determined.

I. Reviewer Comment: UMRS watershed erosion control measure was either not adequately explored, or was dismissed for invalid

reasons.

District Response: 201

a. Exorbitant Costs.

We estimate that Calhoun Point receives approximately 0.5 inches of sediment each year. It is difficult to imagine a hillside sediment control program more intensive per square mile than that program presently being implemented at Swan Lake. That program yields in combination with the Conservation Reserves Program (CRP), a projected future 50-year sediment reduction potential of about 50 percent. Thus, if the same intensity of hillside control were to be applied throughout the UMR basin (assuming, as a working assumption, a basin-wide uniform erosion rate per unit area), a 50 percent reduction in sediment delivery to the river's wetlands might be anticipated. This would reduce the sediment load to the river's wetlands to about 0.25 inches per year at Calhoun Point. Extrapolating from the costs per unit area at Swan Lake to that of the entire UMRS would result in a sediment control program in the billions of dollars. The District considers this cost exorbitant, and at 0.25 inches of accumulation per year, the added sediment protection afforded by a berm might still be a viable option.

b. Sediment Data.

The U.S. Natural Resources Conservation Service has developed curves relating soil erosion rates to land use cover types. It is well known that farmland areas and stream and bed erosion are the source of much of the sediment delivered to the river system. This sediment is transported to the river during periods of heavy rainfall and heavy surface water runoff. Such periods correlate well with periods of river flooding. Major flooding in the St. Louis Region generally occurs during the late spring and early summer time frame.

c. Restoring Existing Upstream Leveed Floodplain Areas.

We assume that your statement refers to privately owned agricultural lands, and these are beyond the EMP's authority, unless acquired by a natural resources agency. The purchase of large land tracts (at $1,000-2,500 per acre, and potentially from many unwilling sellers) does not in itself contribute to improved habitat quality. The area must then be actively managed to improve habitat value. High real estate costs make it difficult to achieve the "biggest habitat bang for the buck". Greater EMP program cost-efficiency is achieved by utilizing lands that have already been acquired, i.e. existing publicly owned lands. A farm tract the size of Calhoun Point would require $6 million to acquire and then another $3-5 million for structural improvements to result in a viable habitat restoration

project.

202 **d. Watershed Erosion Control is Better than Berm Provided Sediment Control.**

Calhoun Point does not have a local watershed affecting its sediment input (as is the case with Swan Lake), and so no local watershed erosion control measure has been proposed. Due to the exorbitant costs associated with a UMRS watershed level erosion control program, and the questionable effectiveness of such a program for offsetting site-specific wetlands sedimentation problems, the District does not consider watershed level control to be a viable option.

In general, the higher the berm, the greater the amount of sediment reduction. However, there is greater cost-efficiency in building lower elevation structures. This is due to several factors. First, sediments are more concentrated in the lower portion of the water column. With each additional foot of berm elevation, there is proportionally less and less sediment to be deflected. Second, the frequency of lower elevation flood events (i.e. those below 424 NGVD), is far greater than that for higher elevation flood events. Third, the cost of additional increments of berm height is not linear--it is exponential. Thus, the biggest bang for the buck is in building lower elevation berms.

J. Reviewer Comment: Navigation pool water level manipulation was either not adequately explored, or was dismissed for invalid reasons.

District Response: The District disagrees as follows:

a. Navigation Needs.

The Locks and Dams were designed to ensure a minimum 9-foot depth navigation channel. It is Congressionally mandated that the Corps' will meet that objective. The only issue is whether or not the Corps can secondarily provide benefits to fish and wildlife species while meeting its navigation requirements.

b. Operational Flexibility.

The St. Louis District has embraced pool manipulation as a valid and significant method of achieving environmental benefits in Pool 26. In 1994, in cooperation with the Missouri Department of Conservation (MDOC), we undertook an experiment to determine the viability of pool manipulation for environmental goals. The MDOC gave us a set of goals to aim for if the conditions were available. The only rule was that we maintain navigation depths in the pool at all times. The flow conditions were such in 1994 that we were able to draw the pool down more than

1 foot, thereby exposing vast acres around the perimeter of the pool to vegetative growth. This drawdown continued for more than 30 days. MDOC reports that the 1994 results exceeded their expectations, and the agencies (MDOC, IDNR, FWS, COE) met recently to discuss appropriate environmental objectives for 1995. 203

For waterfowl management, pool regulation does not approach the same degree of reliability attainable by a site-specific berm-gate-pump water control system. The agencies realize that the 1994 pool manipulation benefits will not be achievable every year. In low flow years the Corps would be unable to draw the pool down without losing navigation depths. In high flow years it would be impossible to lower the pool, because the flow rates are such that high water levels are maintained naturally. However, there are years that the flows are moderate, and we can achieve positive results, and the District is committed to doing so.

c. Potential Resource Conflicts.

Setting environmental objectives for pool manipulation will be a major challenge in the future. For example, from a fisheries standpoint, it may be more beneficial during the summer season to have the side channel water elevations near normal pool, rather than having them draw down. As another example, recreational boaters may object to having a summer season pool drawn down.

d. Resource Problems not Addressed by Pool Regulation.

Pool regulation at the dams does not address the problem of sedimentation. Sedimentation was the major resource problem identified for Calhoun Point, and without a berm structure, there appears to be no cost-effective way of keeping out the sediments.

e. Real Estate Acquisition.

Land acquisition may become an issue in the future if it is determined that there is value in manipulating water elevations at elevations higher than normal. However, real estate acquisition issue aside, and for the reasons described below, the District would have great difficulty in recommending pool regulation as a viable site-specific alternative to the proposed Calhoun Point project plan.

f. Summary.

Pool regulation does not address the problem of sedimentation, it provides a less reliable means of water control, and it potentially impacts upon other river uses.

Furthermore, the Calhoun Point berm-gate-pump system is not incompatible with the concept of pool regulation. Both measures
204 are useful habitat restoration techniques, but each has its inherent limitations.

K. Reviewer Comment: Regular maintenance dredging was either not adequately explored, or was dismissed for invalid reasons.

District Response: It is the more numerous smaller floods (below 424 NGVD), not the infrequent larger floods, that carry the bulk of the annual sediment load into the site. The berm will reduce by approximately 67 percent the total future sediment. With a berm system in place, some redredging can be expected, but it would be on an order of magnitude less than in the absence of a berm. As indicated in the DPR, dredging is extremely expensive, and for this reason the District has steered away from its heavy usage in the EMP program. Maintenance dredging is simply not as cost-efficient in providing habitat units as is berm construction.

If maintenance dredging, was the sole tool for sediment control, the site's waterfowl food production would still be severely impacted by the entry of smaller flood events during the growing season.

L. Reviewer Comment: Riverside berm selection is questioned.

District Response: The District disagrees as follows:

A. Flooding/Sedimentation Input.

See District's paragraph K. response.

B. Mast Tree Species Flood Tolerance.

In response to the 1993 flood, tree mortality in the Pool 26 portion of the UMRS was 37 percent, and for saplings the mortality was 80 percent (1993 Flood Observation Report--Special Report 94-S011, December 1994). Different species of mast trees showed different degrees of tolerance to the flood, e.g. pecan trees were more flood tolerant than are pin oaks.

C. Post-flood Mast Trees Reproduction.

The likely effect of the 1993 flood on mast trees reproduction is generally known (Gary Swenson, Rock Island District forester). Some post-1993 flood sprouting from acorns has occurred in the navigation pool floodplains, as is often the case following flood events. The magnitude of this effect is site-specific. However, the sprouting of acorns in unleveed floodplain areas does not typically lead to advanced reproduction

(i.e. the successful growth and survival of seedlings).

Leveed floodplain areas are the ones that show the highest success rate in seedling development. Leveed areas allow the plant to grow without the threat of being overtopped and damaged by flood waters (Gary Swenson, Rock Island District). The regeneration of mast trees at Calhoun Point is not likely without berm protection. 205

The degree of success of the Calhoun Point project in reestablishing mast trees can't be predicted with absolute certainty. However, the project is viewed as providing several potential benefits to mast tree establishment. First, the berm system creates a drier site on the interior that is more conducive to the establishment of hard mast tree seedlings; second, the forest management program provides for the planting of a size class of trees less susceptible to flooding effects, and third, the trees will be planted on the higher site elevations.

d. Berm Purpose.

The purpose of the berm is not just for water regulation, but for sediment control as well.

M. Reviewer Comment: Selective deepwater dredging measure should be combined with maintenance dredging.

District Response: Maintenance dredging and selective deepwater dredging were never meant to be combinable. Maintenance dredging is the huge cost of doing business when you have no berm structure to keep out river sediment. Selective dredging is the least cost method of doing business when you have a berm in place to deflect much of the sediment down river.

N. Reviewer Comment: Page 4, Last Paragraph.

District Response:

a. Calhoun Point is in Good Ecological Condition.

To put the ecological health of Calhoun Point into perspective, one must look at past trends, and project those trends into the future. When old L&D 26 was first put into operation (1938), the acreage of backwater habitat increased to about 600 acres. Since that time, and as a result of sedimentation, backwater acres have declined to 450 acres. If the same trend continues into the future, we might expect only 300 acres of very shallow water habitat to remain at the end of the next 50 year period. All is not well at Calhoun Point. The wetlands creation process that once occurred in a free flowing river system is not present in the locks and dam controlled

navigation pools. Backwater habitat acreage is being lost, but not replaced. The presence of non-forested wetlands habitat on
206 the UMRS is essential to the health of the fish and wildlife resources of the future river environment. Your proposal accepts the status quo (i.e. the continued displacement of critical backwater habitats with low quality bottomland forest) and offers no economically viable options to offset the sedimentation and water level fluctuation problems that degrade the Calhoun Point site.

b. Backwaters Protected by Low Natural Berms.

Your statement appears to contradict your earlier contention that low profile berms are of no value.

c. Bottomland Forest as Windbreaks.

It should not be inferred that if a narrow band of trees are removed from the site for the construction of a berm that the backwaters would now be subjected to wind and wave action. The tree buffer between the berm path and the backwaters would still act as an effective windbreak.

d. Swan Lake will Aggravate River Flooding and Increase River Sedimentation.

The District's hydraulics analysis showed no significant effect on the flooding pattern. The berm is only slightly above the prevailing bank elevation. The structure is overtopped in major flood events (i.e. above elevation 424 NGVD).

As described in its DPR, the Swan Lake HREP will reduce the effects of sedimentation at that site. The District assumes that river navigation and upland farm operations will continue in the future. In the absence of sediment deflection devices at Swan, Stump, Calhoun Point and other HREP locations, we will witness the accelerated extinction of these backwater sites to river sedimentation. If we don't act now, discussions on how best to save these wetlands will be irrelevant.

O. Reviewer Comment: Page 5

District Response: The Corps has not rushed ahead to build berms without regard to ecosystem effects. The project's planning has been a thoroughly coordinated scientific effort. The cornerstone of this coordination was a workshop held in February 1991. The workshop was sponsored by the District's Riverlands Office and the USFWS (Region 3), in cooperation with the IDOC. Attendees included resource experts from the Service, the Corps (both District and Waterways Experiment Station staff), the Department, the Soil Conservation Service, the Gaylord Memorial Laboratory, and the University of Missouri--Columbia.

The workshop examined current resource management objectives, resource problems, and potential habitat improvement measures for Calhoun. The meeting was facilitated and documented by staff of the USFWS's National Ecology Research Center (NERC). The habitat restoration concept plan for Calhoun Point was a consensus agreement among the agencies. Decisions were made cognizant of diverse public opinions regarding how best to manage the river environment. 207

The EMP program, and particularly the habitat project sites, can be characterized as demonstrations, and are very limited in scope. It's a learning curve-- a possible 15 year long precursor to any future large scale habitat alteration attempts on the river system. The EMP habitat program is working only a fraction of the total habitat area of the UMRS. If all planned program activities turned out to be a failure (and most evidence evidence is to the contrary), it would not represent an irreversible, catastrophic impact on the river's ecosystem.

Monitoring evidence to date suggests that the HREPs are achieving their site-specific environmental objectives. If the program is funded by Congress to proceed beyond the 15-year authorized limit, for a broader application of the more viable habitat restoration techniques, then a systemic level assessment of specific habitat restoration needs is appropriate. Such a systemic level assessment would also serve as a long-term cumulative impacts assessment. The impacts of the presently programmed HREPs are generally positive. Whether these projects represent a system-wide balancing of resource needs is less critical now (due to the small impact of these projects on the system at large), but will become more critical if major UMRS habitat project installations are authorized.

It is not the intent of the Floodplain Management Assessment (FPMA) to develop site-specific floodplain management recommendations. However, it will evaluate a broad spectrum of potential management options that range from total berm system removal to major increases in the height of existing berms. Expansion of the EMP is one option that has been identified. It is too early to draw any conclusions about the future direction of floodplain management. Regardless of the eventual direction taken, the EMP is a valuable and necessary learning experience. The EMP will provide a "tool box" of field tested habitat restoration techniques applicable to any foreseeable future floodplain management setting.

SUMMARY

The letter comments to the Draft DPR/EA represent somewhat of an enigma. Typically, the Corps sees a high degree of

similarity between comments received at a public meeting, and those comments received by letter. Except for those comments made by Jim Bensman (Palisades Chapter of the Sierra Club), the
208 tone of the public meeting was not so much philosophical (i.e. whether or not the project itself is worthwhile) as it was project feature specific (e.g. remove access gate to Royal Landing). On the other hand, the tone of the written comments were less feature specific and more philosophical. Since 27 letters expressed opposition to the project (see TABLE B-2), the public's attitude towards the project was of key concern to the District.

The District sought to determine how representative these objections were of general public opinion. That is, were these letters more a reflection of an organized mailing campaign, or were they truly independent letters from the public that just happened to arrive at similar conclusions about the project. The District evaluated this issue from a number of different angles: (1) analysis of the content of the letters, (2) analysis of the letter mailing points of origin, (3) analysis of a sampling of opposition letters via a telephone survey, and (4) review of the February 1995 Palisades Chapter Newsletter. The District's findings were as follows:

Letter Content Most opposition letters reiterated in summary form one or more of the same themes described in more detail in Mr. Bensman's letter (see TABLE B-2). This similarity suggested a mailing campaign. The key points of opposition related to (1) the clearing of forested wetlands to build levees, (2) the spending of tax dollars, (3) the destruction of scarce natural forested wetlands habitat, (4) the purpose of the project (hunters vs wildlife), and (5) the need to convert farm fields on public lands to wetlands.

Mailing Points of Origin The point of origin of the opposition letters suggests a mailing campaign (see TABLE B-2). Eleven of the letters were received from individuals living in places remote from the project area (i.e. greater than 50 miles away). Seven of the individuals reside in the California Bay area (this includes San Francisco, Oakland, Berkeley, Piedmont, and Freemont, CA) which is the home base of the Sierra Club at the national level. Mr. Carlton in the District's random phone survey (see next paragraph) acknowledged being a club member. Six of the individuals writing opposition letters reside outside California, and outside the local area (i.e. Central IL, Southwest MO, KY, VA, and IN).

Random Telephone Survey The random telephone survey suggests a mailing campaign. Four individuals were called at random (Weissman, Meyer, Young, and Carlton). Three were local residents and one was from California. The profile of each was similar. They learned of the project either as a member of the

Sierra Club, or thru a Club representative. None had read the Draft DPR, but were rather responding to second hand accounts (organizational reports or fact sheets) of the nature of the project and its purported defects. Three of the individuals expressed an interest in receiving District information on the study. After a detailed project overview was provided, two of the individuals indicated that their concerns had been answered. 209

Palisades Newsletter Additional evidence of a Palisades Chapter mailing campaign is provided in the Chapter's newsletter. In the February issue of the newsletter, Mr. Bensman thanks the chapter members who wrote letters on the Calhoun Point EMP project.

Based on the above, the District concludes that it is highly likely that there was an organized mailing campaign. This campaign may have magnified certain issues in a manner not indicative of the concerns of the public at large. In this regard, the comments received from the public meeting were probably more reflective of the public's true concerns.

The Palisades Chapter mailing campaign appears to have triggered a cluster of letters (8 letters) from waterfowl interests; in particular, Migratory Waterfowl Hunters, Inc. Two common points in these letters were: (1) support for the project, and (2) a belief that the Sierra Club (Mr. Bensman) is trying to stop the project.

Perhaps a better indication of the positions of the Sierra Club, as an organization, is revealed in the Illinois Chapter's (Albert Ettinger) letter of January 23, 1995. The Club's views (via Johnathan Ela, Midwest Office of Sierra Club, and Al Ettinger) were further expounded upon at the February 15, 1995 meeting of the Environmental Management Program-- Coordination Committee (EMP-CC). Mr. Ela pointed out that the organization had concerns with several HREP's which appeared to focus on "game management". In this ATTACHMENT B-1, the District has provided responses to Mr. Ettinger's comments. These responses have also considered the Club's input via the EMP-CC meeting.

In conclusion, the District has carefully reviewed each of the public letters of comment. These comments do not reflect a broad public outcry for the termination of the Calhoun Point project. However, at an organizations level, philosophical differences do exist on the direction and intent of the Calhoun Point HREP and even the EMP in general. The District views these differences and the discussions they generate as constructive. To be truly successful, the EMP program must continually reassess where it has been, and where it is going. The program must stay fluid, not static. There is no "best way" to accomplish habitat restoration. Different agencies and sectors of the public perceive habitat restoration and management needs in different

ways. Within the public realm, we can anticipate differences of opinion from hunters, fishermen, bird watchers, wildlife photographers, naturalists, and non-resource users. Within the agencies and the academic community we can anticipate differences of opinion between fisheries biologists, wildlife biologists, waterfowl biologists, ecologists, botanists, foresters, endangered species specialists, wetlands specialists, water quality specialists, sedimentologists, hydrologists, etc. It's not that one group is clearly right and the other is clearly wrong, each contributes a uniquely different and important perspective on habitat restoration.

210

Part of the challenge for the District, and the EMP, is to accomplish habitat restoration in a manner that gives consideration to the many differing resource viewpoints. To achieve a reasonable amalgamation of thought, the District established an interagency planning team for each of the HREPs. The agencies represented on the team for Illinois projects has included: the St. Louis District, the Waterways Experiment Station, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service (Refuges, Ecological Services, and Environmental Management Technical Center), the Illlinois Environmental Protection Agency, the Illinois Department of Natural Resources (Planning, Fish and Wildlife Divisions), the U.S. Natural Resources Conservation Service, the Illinois Natural History Survey, and the local universities. To the extent possible, and within existing mandates, it has been the consensus opinion of this team that has driven the direction of the HREPs. This consensus has been reached after consideration of overall river resources needs, and of the views of various resource interest groups.

It is important to recognize that the HREPs within the EMP are of very limited scale, and the projects are intended to be of a demonstration nature. The EMP is a tool to be used towards river habitat restoration. It is recognized that our view of "the big picture" for the EMP will continue to change over time. Before there is a major application of the habitat restoration tools acquired during the EMP, there will need to be a comprehensive system-wide assessment of resource needs, objectives, measures and plans. It is appropriate that organizations such as the Sierra Club and Migratory Waterfowl Hunter's Inc. be a part of that future process.

The District thanks every one for providing comments. Modifications to the project have been made as a result of these comments. In the years to come, we look forward to working with the various organizations and the general public to strive to achieve a balanced vision for habitat restoration on the UMRS.

TABLE B-2. PUBLIC LETTERS RECEIVED SUMMARY--
(ORIGIN/SUPPORT/COMMENT ID CODE/NOTES/AFFILIATION)

NO.	FROM	DATE	ADDRESS	PROJECT SUPPORT	NOTES	COMMENT ID CODE	KNOWN AFFILIATION
1	Adams, Steve	28 Feb 95	RR 1, Box 84A Chesterfield, IL 62630-9734	Y	8	33	
2	Bensman, Jim	23 Jan 95	117 N. Shamrock St. Apt #1 East Alton, IL 62024	N	2	1 2 4 8 18 19 25 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62	Sierra Club
3	Birk, Jerry	Undated	2811 Woodbury Drive St. Louis, MO 63125	Y	8	28 29 30 31 32 33	
4	Beddall, Fred	17 Jan 95	236 Frisbie St. #B Oakland, CA 94611	N	1 5	1 8 10	
5	Bernaix, James	17 Feb 95	2609 Westmoreland Granite City, IL 62040	Y	2	33 63	Migratory Waterfowl Hunters, Inc.
6	Boyd, Elaine	15 Feb 95	8501 Shelbyville Road Louisville, KY 40222	N	1 6	1 2 8 9 10 17 18 19 42	
7	Brueckner, Miles	21 Feb 95	P.O. Box C Godfrey, IL 62035-0435	Y	2	33 63	IL Fed. Outdoor Res. Migratory Waterfowl Hunters, Inc.
8	Carlton, Allen	Undated	715 Santa Ray Ave. Piedmont, CA 94610	N	1 3 5	1 2 10 18 19 34	Sierra Club

TABLE B-2. Continued.

NO.	FROM	DATE	ADDRESS	PROJECT SUPPORT	NOTES	COMMENT ID CODE	KNOWN AFFILIATION
9	Catlin, Jim	20 Jan 95	2418 Ashby Ave. Berkley, CA 94707	N	1 5	1 17	
10	Ettinger, Albert	23 Jan 95	506 S. Wabash Suite #505 Chicago, IL 60605	?	2	A thru O (See ATTACH B-4 District Responses)	Sierra Club
11	Ford, Elizabeth	15 Jan 95	214 East Greenwood Jacksonville, IL 62650	N	1 7	1 2 9 18 19 26	
12	Franke, Greg	10 Jan 95	P.O. Box 175 Batchtown, IL 62006	Y	3	64 65 66	Migratory Waterfowl Hunters, Inc.
13	Gillespie, John	20 Feb 95	2910 Hillcrest Alton, IL 62002	Y	10	33 67	Waterfowl Hunter
14	Gineris, John	Undated	2315 Mound St. Alton, IL 62002	Y	2	33	Migratory Waterfowl Hunters, Inc.; DU; IL Fed. Outdoor Resources
15	Grafford, C.	Undated	402 Hena St. Greenville, IL 62246	N	1 7	1 2 8	
16	Hahnenkamp, Duane	21 Feb 95	P.O. Box 41 Grafton, IL 62037-0041	Y		33 63 68	
17	Harmon, Frances	14 Jan 95	4410 Harbord Dr. Oakland, CA 94618	N	1 5	10 17 34	
18	Hoover, Victoria	21 Jan 95	735 Geary St. San Francisco, CA 94109	N	1 5	1 2 8 10 18 34	

Inc.

TABLE B-2. Continued

NO.	FROM	DATE	ADDRESS	PROJECT SUPPORT	NOTES	COMMENT ID CODE	KNOWN AFFILIATION
19	Hudgins, Dan	12 Jan 95	P.O. Box 8009 Alton, IL 62002	Y	2	11 12 13 14	Migratory Waterfowl Hunters,
20	Hudgins, Dan	9 Feb 95	P.O. Box 8009 Alton, IL 62002	Y	2	33 69 70 71 72 73 74	Migratory Waterfowl
21	Jester, William	15 Feb 95	2401 Dewey Granite City, IL 62040	Y	10	33 63	Sportsman/ Recreatomost
22	Larson, Robert	18 Jan 95	Attorney at Law 121 West Third St. P.O. Box 434 Alton, IL 62002	N	1 3	9 19 27	Sierra Club
23	Lawson, Robert, Mrs	22 Jan 95	Box 85 Manchester, IL 62663	N		34 35	D.A.R.
24	Lee, Linda	22 Jan 95	RR 3, Box 402 Paoli, Indiana 47454	N	1 6	8 34	
25	Manning, Ross	16 Jan 95	P.O. Box 95 Roodhouse, IL 62082	N	6 9	1 7	
26	Meyer, Esther	16 Jan 95	615 Westwinds Dr. Jacksonville, IL 62650	N	9 10 19	1 3 7	D.A.R.
27	Mueller, Robert	23 Jan 95	Route 1, Box 250 Staunton, VA 24401	N	1 6	9 10 19	
28	Mussalone, Carole	19 Jan 95	400 Jefferson Ave. Alton, IL 62002	N	1 7	1 2 5 10	Sierra Club
29	Navarre, Michael	15 Jan 95	Box 143 Brussels, IL 62013	?	4	20 21 22 23 24	Landowner
30	Pate, Bill	21 Jan 95	111 Sergeant Joplin, MO 64801	N	1 6	8 9 10 18 19	

TABLE B-2. Continued

NO.	FROM	DATE	ADDRESS	PROJECT SUPPORT	NOTES	COMMENT ID CODE	KNOWN AFFILIATION
31	Pittman, David	17 Jan 95	2803 N. Peoria Ave. Peoria, IL 61603	N	1 6	2 18 75 76	
32	Powers, Marjorie	13 Jan 95	Greenbriar Box 27 Manchester, IL 62663	N	1 7	2 8 9 18	
33	Pufalt, Caroline	10 Jan 95	13415 Land O Woods #3 St. Louis, MO 63141	N	1 7	1 8 9 10 17 18 18	
34	Reid, Larry	15 Feb 95	3437 Milton Dr. Alton, IL 62002	Y		33 63 67	
35	Robbins, Jack	20 Jan 95	139 Stonewall Road Berkely, CA 94705	N	1 5	1 2 8 9 10 18 19	
36	Swearengin, Harold	7 Feb 95	1214 W. Pontoon Rd. Granite City, IL 62040-2233	Y		33 77	
37	Tavender, Steve	20 Jan 95	1012 W. College Jacksonville, IL 62650	N	1 2	1 2 8 9 10 19 36 37 38 39 40	Audubon Society
38	Timmings, Kristi	13 Jan 95	47152 Male Terrace Fremont, CA 94539	N	1 5	1 2 8 9 18 25	
39	Toigo, Mr. & Mrs.	9 Jan 95	4704 Brecht Lane Godfrey, IL 62035	N	1 7	1 8 9	
40	Warner, Barbara	23 Jan 95	1955 Tatum Lane Lebanon, Ky 40033	N	1 6	1 18 19	
41	Weissman, Stephen	10 Jan 95	9353 Loos Road Marine, IL 62061	N	1 3 7	1 2 3 4 5 6 7 8 9 10	Sierra Club
42	Woolard, Bill	5 Feb 95	39 Ray St. Cottage Hills, IL 62018	Y		33	

TABLE B-2. Continued

NO.	FROM	DATE	ADDRESS	PROJECT SUPPORT	NOTES	COMMENT ID CODE	KNOWN AFFILIATION
43	Wright, Michael	16 Feb 95	110 Donna Drive Hartford, IL 62048	Y		33 63	Migratory Waterfowl Hunters, Inc.
44	Young, Earl	14 Feb 95	P.O. Box 167 Manchester, IL 62663	N	1 3 7	1 2 9 18	D.A.R.

EXPLANATORY NOTES:

1. Individual's letter is a summary of issues raised in Jim Bensman's (Palisades Chapter Sierra Club) letter, and appears to reflect an affiliation with that group. Palisades is the Sierra Club chapter active in the Pool 26 reach of the Mississippi River.
2. Individual's organizational affiliation is identified by its letter.
3. Individual has in the past acknowledged being a member of this organization (via public meeting, organization newsletter, or telephone interview, etc.).
4. Individual indicated by letter or public meeting that they are a landowner.
5. Individual resides in California San Francisco Bay area (this includes San Francisco, Oakland, Berkeley, Piedmont, and Freemont, CA). This area is the home base of the Sierra Club at the national level.
6. Individual resides outside California, and outside local area (i.e. Central IL, Southwest MO, KY, VA, IN).
7. Individual resides in local area (i.e. within 50 miles of project area).
8. Individual appears to be unaffiliated with any particular organization.
9. Individual learned of project in summary form from Sierra Club newsletter or speaker.
10. Individual indicated by letter that they are a sportman or recreationist.

APPENDIX DPR-B

SECTION 2

ATTACHMENT B-2

Public Letter Comments--Excluding Mr. Ettinger Letter

2-28-95

Col. Thomas C. Suhrmann.
Corp of Engineers

217

Dear Sir

33 I would like to thank you for your support on the Calhoun Point Stump Lake & Swan Lake Preservation and Enhancement Program. I believe these programs are very important for the areas. It seems everyone will benefit from them.

Please continue to support and work for these programs.

Thank you.

Best regards.
Steve Adams

(2)

SIERRA CLUB-PIASA PALISADES GROUP

CONSERVATION CHAIRMAN

218

Colonel Thomas Suermann, District Engineer
US Army Corps of Engineers
ATTN: Planning Division, PD-F
1222 Spruce St.
St. Louis, MO 63103-2833

January 23, 1995

Re: Calhoun Point Wetland Destruction Proposal

Dear Colonel Suermann:

19 25 Thank you for the opportunity to comment on the so-called Calhoun Point Rehabilitation and Enhancement Project. The Piasa Palisades Group of the Sierra Club objects to this proposal in the strongest possible terms. The 1 District should start over and propose a project that does not include any levee building, wetland destruction, 2 deforestation, clearcuts, or hand and aerial spraying of poisons (herbicides) on the forest. The District should 4 propose a project that prevents sediment from entering the Illinois and Mississippi Rivers and converts some of the 18 more than 2,000 acres of former wetlands that the Illinois Department of Conservation (IDOC) and U.S. Fish & 40 Wildlife Service (USFWS) farm back into wetlands.

1 2 8 41 Our group has been vigorously fighting the District's EMP projects for years because all the proposals (Stump Lake, Swan Lake, Batchtown, and Calhoun Point) so far have been to bulldoze and destroy wetlands and bottomland forests to build levees so water can be pumped in for the hunters. The massive devastation that is now occurring at Stump Lake shows that our concerns were right on target. The Corps and IDOC are bulldozing and destroying more than 150 acres of bottomland forest and wetlands without any mitigation.

8 The levees allow IDOC to pump water into the areas during the hunting season. This makes it much easier for the hunters to get around. While the benefits to duck hunters are obvious, we see no real benefit to wildlife. The projects are supposed to benefit wildlife, not hunters.

42 43 When we were trying to redirect the Stump Lake EMP project into an environmentally sound project, the District and IDOC assured us that they would protect as many mast producing trees as possible. However, the Corps and IDOC refused to protect *any* of the mast producing trees, including pecan trees *hundreds of years old.* Instead the Corps gave all the trees away to the contractor.

After, the Flood of 93, we pleaded with the District to protect the mast trees not in the foot print of the levee since the flood killed so many mast trees. Even though the contract specifically allows the Corps to mark trees to be retained, the District choose to give the commercially valuable mast trees to the contractor instead of leaving them for wildlife. So the trees ended up in a sawmill instead of providing badly needed wildlife habitat.

This clearly shows that the District has absolutely no concern for wildlife and is acting on ulterior motives. This raises concern about corruption, fraud, waste and abuse. Why is the District proposing to spend millions of our tax dollars to reestablish mast trees as part of the Calhoun Point EMP when a few miles away the District is giving away perfectly good mast trees?

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I discussed this issue with the District's Office of Counsel. I was told that the trees have no commercial value and that is why they were given away. Even if this were true, the trees had value for the wildlife that the project was supposedly benefitting. Now the District is proposing to spend millions to reestablish mast trees on Calhoun Point.

The trees the District gave away could easily be worth more than $100,000. If these trees had no commercial value, why were the trees being hauled away by a logging company? We have pictures. Our FOIA request revealed that the District did not have any cruise data for the area. Without cruise data, it is impossible to determine the value of the trees that the District gave away. In other words, there is no way the District could have made an accurate determination that the tree had no commercial value since they did not look to see what was there.

Additionally, several years ago the District proposed a commercial timber sale a short distance away (in the Glades) to make the District some money. (The District stopped the sale under an imminent threat of a lawsuit by the Sierra Club.) I have hiked in the area the Corps is now clearing for the levee and the site the District had proposed the commercial timber sale often and I am familiar with the vegetation in both areas. I can say without a doubt that the vegetation was similar. So if it is commercially valuable in one place, it is commercially valuable in the other. The Corps would have had to construct a new road for the Glades sale, which would have been very expensive. So the trees were obviously worth more than the cost of the new road.

The Stump Lake EA stated: "Clearing, borrow and construction limits will not exceed 180 feet in width and will average about 120 feet." EA at 40. On January 20, 1995, Sierra Club members went up and measured how wide the clearing was. We measured six spots that exceeded the 180 foot clearing limit. One area was 296 feet across. The area where the ancient pecan trees were cut down was 235 feet across. There were many additional spots that obviously exceeded the 180 foot limit that we did not measure. The narrowest spot we found was 135 feet across. So it appears the 120 foot average is being greatly exceeded. The narrower areas tended to be in the areas with low value trees and the wide spots tended to be in areas with valuable timber.

RANGE OF ALTERNATIVES

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The National Environmental Policy Act (NEPA) requires Federal agencies to "study, develop, and describe appropriate alternatives to recommended courses of actions in any proposal." 42 USC § 4332(2)(e). This requirement has been held to be the "linchpin" or "heart" of the entire NEPA process. Moroe County Conservation Council v. Volpe, 472 F.2d 693, 697, (2nd Cir. 1972). In California v. Block, 690 F.2d. at 767, the court described the range of alternatives which must be studied as all those "necessary for a reasoned choice." The CEQ Regulations state:

> Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment. 40 CFR § 1500.2(e).

For years our local Sierra Club group has been continually objecting to building levees and destroying wetlands, and deforestation as parts of EMP projects in the St. Louis District. We have continually suggested alternatives of converting public lands that are farmed back into wetlands, stopping the sediment from entering the

rivers, and acquiring farm land to convert to wetlands. We have made theses suggestions at meetings, hearings, site visits, in comments on proposals, and in letters and phone calls. The District, however, refuses to consider any of these alternatives. This violates NEPA.

46 The District established four criteria for formulating and evaluating project measures: completeness, effectiveness, efficiency, and acceptability. EA at 21. The District used these criteria to eliminate potential measures from consideration as alternatives. This violates NEPA. These are valid considerations for not selecting an alternative, but they are not valid reasons for refusing to consider an alternative. The Corps can only eliminate unreasonable alternatives. The EA does not give any explanation as to why any of our suggested alternatives are not reasonable. 220

47 The District did not even consider the measure of converting farm land on public lands into deep water habitat. IDOC and USFWS farm more than 2,000 acres of former wetlands near the proposed project. The District cites the need for deep water habitat, but does not give any rationale or basis for why it cannot be on the land that is currently farmed. Building levees just moves the impacts to somewhere else, converting farmland into wetlands improves the habitat system-wide.

48 The EA states:

> UMRS Watershed Erosion Control. This measure was not found to be viable. While the system-wide effects of such a measure may be generally beneficial, the measure would not be effective in causing a major site-specific reduction in sedimentation at Calhoun Point. To be complete, the measure at a minimum would have to be coupled with other controls such as a riverside sediment barrier. The cost of a watershed level sediment treatment for Calhoun Point would be exorbitant. EA at 31.

First, the District's use of "may be generally beneficial" shows the Corps illegal biases against this solution. What could possibly not be beneficial about keeping sediment out of the river? If keeping sediment out of the river is not beneficial, why is the District proposing to spend millions of dollars to keep it out of Calhoun Point?

Secondly, the District has approved sediment control measures in the nearby Swan Lake EMP project. If the District can select watershed work as part of an adjacent EMP project, it is a reasonable alternative for this project.

49 We also dispute the claims about exorbitant costs. For example, IDOC farms steep slopes at the entrance to Graham Hollow. This is right across the river from the proposed project. Converting the cornfields to wildlife habitat would reduce the sediment going onto Calhoun Point. How can IDOC propose to spend millions of tax dollars to keep sediment out of Calhoun Point when they refuse to stop their own sediment from filling in the area? As we keep pointing out, IDOC and the USFWS farm more than 2,000 acres in the general area. Farm fields erode. Wetlands filter sediment.

50 Since the District is proposing to spay poisonous herbicides on the clearcuts, an alternative of not using any
51 toxic chemicals should have been considered. The District is proposing to spray toxic chemicals in an area that is frequently flooded. This greatly increases the potential to contaminate local water supplies. The District is proposing to aerial spray 161 acres of young forest with toxic chemicals to create moist soils units. Yet it refused
52 to consider an the Sierra Club's suggested alternative of converting IDOC farm fields into moist soil units.

Aerial spraying toxic chemicals (the Corps has concealed what poisons will be sprayed) and the deforestation of 161 acres both will have significant negative environmental effects. Converting farm fields to moist soil units does not have any negative environmental effects and it accomplishes the same objective. Thus, the District should have considered this alternative to deforestation and poisoning wetlands.

221 53 54 A researcher from the Illinois Natural History Survey gave our local group a presentation on his research on the impact of the Flood of 93 on bottomland forests in the project area. His suggestion was just to plant mast trees without clearing. Oaks are intermediate in tolerance. They do not need 8-10 acre clearcuts to reproduce.

Additional research by the Illinois Natural History Survey[1] shows the clearing the project proposes (clearcuts & levee building) would adversely impact forest interior species. This research, by Dr. Scott Robinson specifically recommends against creating the openings. Thus, the District should have considered an alternative that did not clearcut patches of forest. The District should be considering an alternative of planting the trees where a couple of canopy trees have died or just planting mast trees in farm fields.

ENVIRONMENTAL IMPACT STATEMENT

55 NEPA requires all federal agencies to prepare environmental impact statements (EIS's) on "major Federal actions significantly affecting the quality of the human environment." 42 USC §4332(2)(C). EIS's are required whenever actions "may significantly degrade some human environmental factor." Foundation for N. Am. Wild Sheep v. United States Department of Agriculture, 681 F.2d. 1172, 177-78 (9th Cir. 1982) (Emphasis added.) A United States Court of Appeals has held that if there are, "substantial questions as to whether (the proposed action) will have significant cumulative environmental effects . . . the Forest Service is required to prepare an EIS analyzing such effects" Thomas v. Peterson, 753 F.2d 754 (9th Cir. 1982).

55 56 The Corps and other agencies are conducting and are proposing other similar projects in the same general area. The Corps is currently destroying more than 150 acres of bottomland forest and wetlands to build a levee as a part of the Stump Lake EMP. The Corps is preparing to begin a similar project at Swan Lake and has proposed a similar project for the Batchtown Area. Additionally the Corps illegally authorized the U.S. Fish and Wildlife Service to bulldoze wetlands and bottomland forest to convert old roads into levees at Gilbert Lake and Brussels Division Road near Prairie Lake. These projects have cumulatively significant impacts. We would also argue that most of these projects have individually significant effects, as building levees has significant effects.

57 Additionally, this project is part of a larger program: the Environmental Management Program. The Corps has not prepared an EIS for the EMP program.

58 Part of the project consists of spraying herbicides (including 169 acres of aerial spraying) as part of clearcutting and deforestation. It is well established in case law that federal agencies cannot use herbicides as part of forest management unless they first prepare an EIS that addresses the impacts of using these poisons. The Forest Service has lost enough lawsuits that they now prepare region-wide or subregion-wide vegetation management EISs on the impacts of using herbicides before using herbicides for timber management. Just last year the Eastern Region Regional Forester stopped a timber sale on the Mark Twain National Forest that included herbicide use on the basis that there was not a vegetation management EIS that addressed herbicides.

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[1]Robinson, Scott K. "Effects of Selective Logging on Forest Birds in the Trail of Tears State Forest, Southern Illinois."

CUMULATIVE, SYSTEMATIC, AND INDIRECT EFFECTS

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The EA does not address the cumulative, systematic, or indirect effects of this proposal. The Council on Environmental Quality (CEQ) regulations define "cumulative" impact as:

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such actions.
> 40 CFR § 1508.7

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The Regulations also require the Corps to address the "indirect effects" of the project. Indirect effects are defined as effects:

> which are caused by the action and are later in time or farther removed in distance, but are still reasonable foreseeable.
> 40 CFR § 1508.8

When the Sierra Club sued the Corps over Lock and Dam 26, the Court ruled that the Corps violated NEPA by restricting its analysis to the dam site and not considering the systematic effects of the dam.

We have raised the issue of cumulative and indirect effects countless times. Yet the EA completely ignores all the cumulative, systematic, and indirect effects and limits its analysis to the project area. This is one of the ways the District has doctored the data to make it appear that this project will benefit wildlife.

Building a levee only makes the sediment go some place else. The sediment will either fill in another wetland or will increase the size of the 6,000 square mile dead zone in the Gulf of Mexico. Either way this will have negative environmental impacts. The District must balance the negative effects against the claimed beneficial effects of building the levee. Corps Regulations states:

> The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable determents.
> 36 CFR § 320.4

Converting farm land to wetlands and watershed work have nothing but beneficial environmental effects. If the District properly evaluated all the effects of the project, these alternatives would be shown to be the best for wildlife. The purpose of the project is to benefit wildlife, not levee builders.

Additionally, the District is proposing to use toxic chemicals for clearcutting and deforestation. Herbicides have lots of side effects, but the EA does not address any of them.

QUALITY OF THE ANALYSIS

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Federal courts have held a decision issued without explanation is prima facie unreasonable. See EDF v. Ruckelshaus, 439 F.2d 37 (D.C. Cir. 1978). Another Court recently reminded the Forest Service that:

> An agency must set forth a reasonable explanation for its decision and cannot simply assert that an action will have an insignificant effect on the environment.
> Marble Mountain Audubon Society v Rice, 914 F. 2d 179 (9th Cir. 1990).

The Supreme Court has held that:

> (1) the purpose of the NEPA is to insure that federal agencies "carefully consider detailed information" concerning significant environmental impacts; and (2) the NEPA commands that the agency cannot proceed with an action until it has taken a "hard look" at foreseeable environmental consequences.

223 60 Sabine River Authority v. Department of Interior, 951 F.2d 669, 676-677 (5th Cir.) cert. denied, 113 S.Ct. 75 (1992).

Another Federal court stated NEPA requires:

> Federal agencies to affirmatively develop a reviewable environmental record . . . perfunctory and cursory analysis simply [does] not suffice . . .
> Hanley v. Mitchel, 460 F. 2d 640 (2nd Cir. 1972).

In Trinity Episcopal School Corp., v. Romey, 460 F. 2d 88 (2nd Cir. 1975) the court extended the "reviewable environmental record" requirement to "even where the agency determines an EIS is not required."

The CEQ regulations require:

> NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.
> 40 CFR § 1500.1(b).

The Regulations further define an EA's requirements. EAs must:

> provide sufficient evidence and analysis for determining whether to prepare an EIS or FONSI . . . [and must include discussions] of the environmental impacts of the proposed action and alternatives . . .
> 40 CFR § 1508.9

Federal courts have held that NEPA is an environmental full disclosure law. One of the major purposes of the analysis required by the Act is to inform the public and officials, removed from the particular decision making process, of the potential consequences of proposed agency action. Iowa Citizens for Environmental Quality Inc. v. Volpe, 487 F.2d 849 (8th Cir. 1973). The courts have also held: NEPA requires "Federal agencies to affirmatively develop a reviewable environmental record." Hanley v. Mitchel, 460 F.2d 640 (2nd Cir. 1972).

The EA's analysis is inadequate in the following ways:

Herbicides:

The EA calls for poisoning trees in the proposed clearcuts and aerial spraying 169 acres of bottomland forest to convert the area into an open area, yet it does not even reveal what toxic chemicals will be used! Furthermore, there is absolutely no discussion of the environmental effects of using poisons. There is no mention of risks to nearby water intakes for communities such as Grafton. And there is no discussion of secondary impacts of the herbicides or impacts to non-target species.

Neotropical Migrants:

The project will clear hundreds of acres of bottomland forest. The Corps will clearcut areas to plant mast trees, bulldoze areas to make a levee, aerial spray areas for deforestation, and clear forest to provide a place for dredge spoils. All these areas currently provide habitat for neotropical migrant songbirds.

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Research being conducted throughout Illinois by Dr. Scott Robinson of the Illinois Natural History Survey has found that neotropical migrants are in serious trouble in Illinois. One of the main causes is cowbird parasitism. Dr. Robinson's research has found that "Both the percentage of nests parasitized and the number of cowbird eggs per nests were significantly lower in bottomland forests than in upland forests." Robinson, Scott K., Jeffery P. Hoover, James Herkert, and Rhetta Jack, "Cowbird Parasitism in a Fragmented Landscape: Effects of Tract Size, Habitat, and Abundance of Hosts," 1994. This shows that bottomland forests are vital for these songbirds. 224

Additional research by Dr. Robinson, mentioned in the alternative section recommended against making the 8-10 acre clearcuts proposed in this project. This study also contained other recommendations that apply to this area: "Millet should not be planted because it is a favorite food of cowbirds." "Discing in the spring should also be avoided because it creates cowbird feeding areas." Dr. Robinson also stated that moved areas (the levees will be mowed) should keep the grass at least six inches high to prevent the areas from providing feeding areas.

Thus, this project will clearly have significant negative impacts on the songbirds. Recent research conducted in Missouri shows this will have negative impacts on forest health. The study found that oaks have an enormous decline in biomass production when song birds are kept away. The Study concluded:

> Our results imply that declining populations of many neotropical migrant insectivorous bird species may result in decreased forest productivity. Where such population declines in certain bird species have been documented, they have not been offset by increases in populations of other insectivorous bird species. . . . Our research suggests that forest management practices that promote the conservation of insectivorous birds are imperative to maintain forest productivity. Such management practices would emphasizes strategies that maximize bird species diversity and the viability of their populations.

Marquis, Robert J. and Christopher J. Whelan, "Insectivorous Birds Increase Growth of White Oak Through Consumption of Leaf-Chewing Insects" Ecology, 75(7), 1994, pp. 2007-2014.

Thus the levees, clearcuts, and planting of millet will work against the project goal of providing mast trees. The EA did not consider, mention, or address any of these issues.

Biodiversity:

The analysis did not consider impacts on the following levels of diversity: 1) regional landscape, 2) community-ecosystem, 3) population-species, and 4) genetic.

The regional landscape analysis should have: 1) Identified the distribution, richness, and portions of patch (habitat) types and multipatch landscape types; 2) Considered the collective patterns of species distributions (richness, endemism); 3) Considered heterogeneity, connectivity, spatial linage, patchiness, porosity, contrast, grain size, fragmentation, juxtaposition, patch size frequency distribution, perimeter area ratios, and the pattern of habitat layer distribution; and 4) Considered the disturbance processes (areal extent, frequency, or return interval, rotation period, predictability, intensity, severity, and seasonality), nutrient cycling rates, energy flow rates, rates of erosion and geomorphic and hydrologic processes, and human land-use trends.

The community-ecosystem analysis should have: 1) Identified relative abundance, frequency, richness, evenness, and diversity of species and guilds; 2) Identified proportions of endemic, exotic, threatened, and endangered species; 3) Identified dominance-diversity curves, lifeform proportions, similarity coefficients, and C4:C3 plant species ratios. 4) Consider the substrate and soil variables, slope and aspect, vegetation biomass and physiognomy, foliage density and layering, horizontal patchiness, canopy openness and gap portions, abundance, density, density and distribution of key physical features (e.g., cliffs, sinkholes, and outcrops) and structural elements (snags and down logs), water and resources (mast) availability, and snow cover. 5) Considered the biomass and resource productivity, herbivory, parasitism, and predation rates, colonization and local extinction rates, patch dynamics (fine scale disturbance processes), nutrient cycling rates, and human intrusion rates.

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The population-species analysis should have: 1) Identified absolute or relative abundance, frequency, importance or cover value, biomass, and density. 2) Considered dispersion (micro-distribution), range (macro-distribution), population structure (sex and age ratio) habitat variables, and within-individual morphological variability. 3) Considered the demographic process (fertility, recruitment rate, survivorship, morality), metapopulation dynamics, population genetics, population fluctuations, physiology, growth rate (of individuals), acclimation, and adaptation.

The genetic analysis should have: 1) Identified allelic diversity and presence of rare alleles, deleterious recessive, or karyotpic variants. 2) Considered the effective population size, heterozygosity, chromosomal or phenotypic polymorphism, generation overlap, and heritability. 3) Considered inbreeding depression, outbreeding rate, rate of genetic drift, gene flow, mutation rate, and selection intensity.

The analysis did not consider the degree to which this area provides a biological corridor and its value as a corridor. Sampling effects and minimum area requirements of all species were not addressed. The impact of cowbird parasitism and predation to forest interior birds was not mentioned.

The analysis should have addressed the predation impact of levee building and clearing. The analysis should have considered the impact of increased populations of nest predators such as blue jays, raccoons, and black snakes. The analysis should have considered if interior species in can escape extinction without protecting areas like the timber sale area. The results of the USFWS Breeding Bird Survey should have also been considered.

Forest Service research shows dead and decaying wood accounts for about 25% of a forest's biodiversity. The impacts of removing trees on this component of the forest ecosystem should have been considered.

Benefits of Flooding:

Floods adapt trees that live in the floodplain to flooding. Some researchers are now speculating that the reason so many mast trees died is that levees kept out floods. Keeping the trees from flooding could lower the trees natural resistances to flooding. The EA does not mention, consider, or address this issue.

Indiana Bats:

The EA states that clearing activities will be conducted outside the Indiana Bat's maternity season. However, the project will involve clearing trees that provide maternity roosts. Yet the EA does not analyze or address these impacts to an Endangered Species.

Greenhouse effect:

60 The project includes 51 acres of deforestation for levee building and 169 acres of deforestation for moist soil units. Forests provide a sink for CO_2. The District's deforestation will release CO_2 into the atmosphere. This will impact global warming through the greenhouse effect. The EA does not mention, address, or consider this important environmental adverse effect.

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Wildlife protection:

The EA (pages 68-69) claims the Corps will not allow the construction activities to disturb eagles or waterfowl. The District is allowing the USFWS to bulldoze and destroy wetlands and bottomland forest at Gilbert Lake without requiring them to protect the eagles and waterfowl--and the USFWS is not protecting the waterfowl or eagles from disturbance from the bulldozers. The contract for the Stump Lake does not require the contractor to protect the eagles, even though this is a requirement of the 404 permit. The Corps assured us they would protect the mast trees at Stump Lake and they were given away to a contractor. The EA for Stump Lake said the clearing will not exceed 180 feet and it has greatly exceeded this limit. The CWA required the Corps to have a 404 permit before destroying the wetlands, but the District defied the law and cleared without a permit. Thus, it is reasonablely foreseeable that the District will not protect the eagles or waterfowl. Yet the EA does not address the impact this will have on the eagles and waterfowl.

PRACTICAL ALTERNATIVES

61 The Clean Water Act (404 (b) guidelines), E.O. 11988, and E.O. 11990 all prohibit discharges into wetlands if there are practical alternatives. The Corps 404 b analysis blows off this requirement by stating there were no better places in the project area to discharge the dredge material.

Our suggested alternative of converting farm fields to wetlands would not involve a discharge into wetlands. Our suggested alternative of watershed work also would not involve a discharge into wetlands. Thus there are practical alternatives that the Corps refused to consider.

REQUEST FOR A PUBIC HEARING

62 The Sierra Club hereby requests a public hearing at a reasonable location. The Public Meeting the District held was totaling inadequate. The meeting was held in the middle of nowhere. Additionally, the meeting was held in January when the Brussels Ferry was closed. So anyone who lived anywhere but Calhoun County, had to drive all the way to Hardin and then back to the Mark Twain National Wildlife Refuge Headquarters. Additionally, the meeting ended at 8:00 p.m. These factors combined to make it practically impossible for anyone who worked a day shift and lived in the Alton or St. Louis area to attend the meeting. We had many members who wanted to attend but were not able to.

Another contributing factor to the inadequacy of the public meeting was the fact that the District gave less than 30 days advance notice. The Sierra Club had much less time, sense the District did not send my notice to the correct address. Additionally, the District did not send the Notice of the Public Meeting to the list of people who have asked to receive all public notices regarding 404 permits.

The Public Notices for the meeting concealed the fact that the District was proposing the use of toxic chemicals as part of the project. The project includes using herbicides as part of clearcutting and aerial spraying 169 acres of bottomland forest to kill all the trees. At the evening section of the public meeting, the Corps failed

to mention that it was proposing to use poisons in the area. The EA buries the fact that herbicides will be used. You have to read the EA very carefully to discover what is being proposed. The Executive Summary does not reveal that herbicides will be used. We did not discover that massive herbicide use was being proposed until after the public meeting. The use of herbicides has never been brought up at any of the meetings or discussions of any of the EMP projects that the Sierra Club has attended. The use of herbicides is a very controversial issue. This issue needs to be addressed at a public hearing.

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The Public Notice did not disclose that the District was proposing clearcuts in Calhoun Point. There is widespread public opposition to clearcutting, particularly on public lands. Congress is currently considering legislation to ban clearcutting on all public lands. This issue needs to be addressed at a public hearing.

The Public Notices also indicate that only 51 acres of forest will be cleared. However, a close inspection of the EA reveals that the District is also planning on 169 acres of deforestation accomplished through aerial spraying of toxic chemicals. The EA also indicates that many areas will be clearcut.

The District violated the Freedom of Information Act by not responding to the Sierra Club's FOIA request on the Stump Lake EMP Project. If the District had obeyed the law, the Sierra Club would have had the documents before the public meeting. Since these projects are proposing the same thing, we would have used this information at the public meeting.

Our FOIA Request Revealed a couple of import facts that relate to the Calhoun Point Project:

1) The District did not determine the value of trees in the more than 150 acres of bottomland forest and gave away all the trees to the contractor for free. As explained above, this raises concerns about the Districts motives for proposing to destroy wetlands and bottomland forest under the guise of wildlife habitat improvement and raises concerns about corruption, fraud, abuse, and waste. The Corps is proposing to spend millions of tax dollars to replant mast tree as part of the Calhoun Point Project, yet it gave away all the mast trees at Stump Lake. This is irrational. These issues need to be explored at a public hearing.

2) The Corps started destroying over 150 acres of forested wetlands without a 404 permit. This is a blatant violation of the Clean Water Act. This raises concerns if the District will follow any other laws designed to protect the environment or do anything else they claim they will do in the proposal.

We discovered that the District is clearing much more timber at Stump Lake than the EA claimed would be cleared. This raises more concerns about, corruption, fraud, abuse, and waste. It also raises concern about how much more additional land will be cleared than the Corps claims in the EA. These concerns need to be addressed at a public hearing.

We request that the District review Corps regulation on how to handle requests for Public Hearings (36 CFR § 327) before responding to this request. These regulations give a major presumption to hold a Public Hearing. We note that the District has ignored our other recent requests for a public hearing on other 404 permits in a crystal clear violation of the Corps' public hearing regulation. We request that the District obey the law this time.

Thank you for the opportunity to comment.

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Sincerely,

Jim Bensman
117 North Shamrock ST APT #1
East Alton, IL 62024-1149
(618)259-3642, Fax also, Call First!
Internet: jim.bensman@sierraclub.org

cc: IDOC
USFWS
USEPA

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Mr. Dave Gates
US Army Corps of Engineers
Project Manager
Calhoun Point Project

Dear Mr. Gates:

I would like to thank you for the very informative telephone conversation you presented to me along with the follow-up material concerning the Calhoun Point Project.

I am 58 years old, have a B.S. degree in Geology from St. Louis U. and although I have an office job, I spend a very large amount of my spare time in the outdoors. My wife and children also enjoy the outdoors.

My mother and stepfather, originally from St. Louis, retired 40 years ago to Grafton as they loved to fish and hunt.

I have been fishing the Calhoun area regularly for at least 50 years. All of this by no means makes me an expert, contrary to that, it has shown me the enormous problems that exist in this type of an area, and how unpredictable this area can be..

I am very interested in the Calhoun area and while I know that things change and may never be the same again, my hope for the coming generation of peoples is that they may have the enjoyment and pleasure that I have had from this area. What fun it was 40 years ago.

I have read your material very carefully, more than once. When I first heard about the project I was very enthused. Now some things seem not right.

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Over the years sedimentation has been the big problem, as we all know. There have been various times that dredging has been performed. However, approximately 13 years ago (I'm guessing the years) when the IDOC decided to levy the area and plant water fowl food, this put a quick end to quality fishing and boating in the area. Many people in Grafton believe that at that time more study and effort should have been given to improving the lakes, and that the IDOC was swayed by the influence of waterfowl hunters (I am not anti waterfowl hunting.)

29 Now, to the present. The best fishing areas have always been the Coon Lake, Silver Lake, Rogers Hole, Wheelers Slough, Chickahominy Lake, Royal Lake, Saw Mill Pond areas with Pohlman Slough being just average. The plan for a 50 ft. wide, 6,000 ft. long canal in Pohlman Slough is fine, but comes way short of a good solution. This may come to approximately 7 acres of surface water, but I do not believe this will be quality fishing water. If you have fished the newly opened Peabody area near Kaskaskia, you find most people prefer to get away from these narrow strip areas where water traffic becomes a nuisance. So basically the plan is using 15% of the surface area water (I'm guessing) and converting it to a not so nice fishing area. 230

29 I believe the balance of the area will be ineffective to quality fishing or boating. Experience has taught us that the fish in these types of areas seek hard firm bottoms and stay away from the soft silting bottoms. Today, the areas I mentioned above away from Pohlman Slough are all badly silted in, there will be no quality fishing here unless something is done to try to improve these lakes other than raise the water level slightly.

28 I again believe the IDOC has been too heavily influenced by water fowl hunters, and is quite content to leave this as a waterfowl area. As you know, the waterfowl season may last 40 days, while families can enjoy the area in fishing or boating for 9 months. I believe the area outside of Pohlman Slough should be developed equally for the hunter and the fisherman.

30 I have some proposals, not easy to do, but they may help.

1) Keep outboard motor horsepower as small as possible - maybe 6 HP!

29 2) Over a period of years, but beginning as soon as possible, dredge the other 85% of the surface area.

2A) If cost prohibits dredging the remaining 85% area, do selective dredging in the lakes in this area using the 50 ft strip along the shallowest banks.

29,31	3) Try to carry a large amount of water in the 85% area, at least until there has been significant dredging to hold fish.
32	4) Do not have a summer "draw down" to plant waterfowl feed. Use nearby fields, or there will still be plenty of wetlands to plant in this area. Summer draw down is bad for fish and fishing.
28	5) Lastly, try to be fair to the majority of the people that will be able to use this area.
33	Thank you for reading my letter, and whatever way this project goes, I will support it to the best of my ability.

231

Sincerely,

Jerry H. Birk

Jerry H. Birk
2811 Woodbury Drive
St. Louis, MO 63125

236 Frisbie St #B, Oak (OAKLAND) CA
94611
Jan 17, 1995

(4)

232

District Engineer
US Army Corps of Engineers
Planning Division
1222 Spruce St
St. Louis, MO 63103-2833

re: Calhoun Point Project

Dear District Engineer,

1,8 I am writing to express my opposition to the proposal to bulldoze bottomland wetlands at the conjunction of the Illinois and Mississippi River — allegedly for the purpose of wetland rehabilitation, but apparently for the benefit of a few waterfowl hunters.

10 The Mississippi bottomlands are a priceless regional resource in a landscape thoroughly diked, drained, plowed, channelized, and otherwise ruined. I've travelled there recently and I believe you must preserve these last remnants of the midwest's national ecosystem.

Sincerely,

(BEDDALL)

5

February 17, 1995

233

Colonel Thomas C. Svermann
District Engineer St. Louis District
U.S. Corp of Engineers
1122 Spruce Street
St. Louis, MO 63103

Dear Colonel Svermann,

33
63

It has come to my attention that the Sierra Club is attempting to stop work on the Stump Lake and Swan Lake projects currently under construction in the EMP program. As a member of Migratory Waterfowl Hunters, Inc., I know that this club along with many other organizations including the Illinois Department of Conservation have studied and fought for some time to get these projects implemented. The Calhoun Point Habitat Rehabilitation and Enhancement Project is another EMP plan which is being threatened by the Sierra Club. It makes me sick to think that this organization can halt construction of millions of dollars of waterfowl enhancement projects on Federal owned lands that have been studied from every angle for years. The water control structures that are a part of these projects have been determined by many groups, organizations, and various government entities to be beneficial to waterfowl and other wildlife by enhancing and rehabilitating habitat.

I am asking your help to do what you can to thwart this "johnny come lately" attempt by the Sierra Club to stop these projects. In addition, I ask that you see that these projects continue as planned unimpeded in the future by such tactics.

Thank you,

James D. Bernaix

James D. Bernaix
2609 Westmoreland
Granite City, IL 62040

6

8501 Shelbyville Road
Louisville, KY 40222
February 15, 1995

234

Colonel Suermann, District Engineer
USArmy Engineer District, St. Louis
ATTN: Planning Division, TD-F
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Colonel Suermann:

1 2 9 I understand that the Corps of Engineers, in conjunction with the Illinois Dept. of Conservation, plans to bulldoze over 50 acres of bottomland forest in order to build a levee at the confluence of the Mississippi and Illinois Rivers. This is being referred to as the Calhoun Project. I had thought that, since the flooding of the Mississippi River two years ago, it had been realized that levees in that part of the river system were not only hazardous, somewhat counter productive and ill-advised, but also a significant taxpayer liability due to future costs of flood damage as well as highly questionable current expenditures.

8 10 17 42 Further, the Calhoun Project, like others, is being disguised as wetland protection. It will spend money originally allocated for wetlands to now build levees to allow the Illinois Dept. of Cons. to pump water into backwater lakes during the hunting season. Thus, the funds allocated for the restoration of wetlands destroyed by barge traffic have been tragically misappropriated. This terrible waste of woodland and habitat will be further insult on top of the 164 acres of bottomland forest recently destroyed at Stump Lake for similar reasons. It appears that absolutely no effort was made to preserve old Pecan trees there which could have easily been saved. And, then destroyed trees were given away to contractors. We just can't afford to destroy any more woodlands in this region. And, why would you just give away something that belongs to the public. Public property has value. Why throw it away?

9 18 19 Finally, instead of the plan to destroy more bottomland forest for a levee, why not use a more cost effective approach and convert approximately 2000 acres of farm fields in that general area which used to be wetlands back into wetlands. This would filter sediment, protect backwaters, cost less in the long run and be much less environmentally destructive. And, this alternative would be much more natural and logical than what you are doing now, which is basically wasting taxpayer money destroying the environment in the name of environmental protection. How can you justify this misuse of public funds to damage the environment at the same time that the Congress is threatening to close National Parks and sell off public lands in the name of financial responsibility? This is just the kind of irresponsibility that causes financial problems which legislators try to solve with populist, quick-fix, short-term solutions. Please reconsider and abandon the Calhoun destruction project. Thank you.

Sincerely,
Elaine Boyd

235

ILLINOIS FEDERATION OF OUTDOOR RESOURCES

P.O. Box C
Godfrey, IL 62035-0435
(618) 466-6526
FAX (618) 466-6527

February 21, 1995

Colonel Thomas C. Suermann
District Engineer, St. Louis District
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

Dear Colonel Suermann:

33
63

We are writing at the direction of our Board of Directors and the request of our affiliate, the Migratory Waterfowl Hunters, Inc. concerning various Habitat Rehabilitation and Enhancement projects located in Jersey and Calhoun counties in Illinois. Specifically, Calhoun Point, Stump Lake, and Swan Lake. It is our understanding these projects are in various stages of completion, from study and public hearings, to bidding, and that Stump Lake is in actual construction.

Several of our Directors and officers are cognizant of these projects and the area in which they are located. We are also aware that a Mr. Benseman of the local Sierra Club has all of a sudden become interested in these projects and has threatened to close them down for some reason or another. To the best of our knowledge, this man in not a contractor, engineer, planner, biologist nor possesses any other discipline that would give him credibility to continue his inane obstructionist efforts. His activities in the past have caused hardships on sportsmen in the Mississippi River Area that should not have to be tolerated.

These programs are good programs that are necessary for proper maintenance and management of these areas. We feel the planning, engineering, study and public involvement in these projects were adequate and satisfactory and should not now be second guessed and questioned. We are requesting your continued strong and complete support for these projects.

Sincerely,

Miles R. Brueckner,
Secretary

CC: Migratory Waterfowl Hunters, Inc.

(8)

236

Dist. Engineer
Army Corps
Planning Division
1222 Spruce St
St Louis MO 63103-2833

1
2
10
18
19
34

I oppose the Calhoun Point Project which will destroy bottomland forests. This will waste Taxpayer money, which would be better used to convert the farm fields back to wetlands. Levees to facilitate ~~bottom lands~~ hunting are not needed. Protecting natural areas is the most important

Allen Carlton
715 Santa Ray Ave
Piedmont CA 94610

237

(9)

James Catlin
(2418) → 2418 Ashby Ave
Berkeley CA 94707
94705

District Engineer
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Sir or Madam:

1,17 I recently heard about a proposal to destroy bottomland forests as mitigation for the Lock and Dam 26 project. These bottom lands are crucial not only for wetland protection but as insurance against flooding. I ask that you not destroy the bottomlands on Calhoun Point.

Thank you

Sincerely

James Catlin

(11)

238

62650-3424

214 East Greenwood
Jacksonville, Illinois
January 15, 1995

District Engineer
U. S. Army Corps of Engineers District
Planning Division, PD-F
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Sir:

19, 26 I am writing to protest the project you are planning (and are already working on, I'm told) near Lake Stump in Calhoun County, Illinois.

1, 2 I strongly oppose the destruction of bottomland forests and the building of a levee around Lake Stump.

18 Too many acres of wetlands have already been converted to agricultural use. Please reconsider this project; do not use our tax dollars for such destructive purposes.

9

Sincerely,

Elizabeth L. Ford

Elizabeth L. Ford

239

CALHOUN POINT HREP
PUBLIC MEETING
10 JAN 95

NAME: Greg FRANKE

ORGANIZATION:

ADDRESS: Po Box 175
BATCHTOWN, IL. 62006

C4 COMMENT(S): I believe it would be a mistake to displace the agricultural component (farm fields) within the Calhoun Point HREP with mast timber. If the COE is sincere about enhancing this wetland and creating biodiversity it seems illogical to me to remove the agricultural row cropping feature that is now providing enormous benefits for the wildlife resources that inhabit the Point. Biodiversity and the wildlife at Calhoun Point would be better served by removing cottonwood, boxelder, and silver maple trees from portions of the existing timber stand, then reintroducing mast trees in those areas.

C5 Who said that replacing timber lost to construction of HERP features (levees, service roads, boat launches) was mandatory or even biologically sound methodology?

C6 The USFWS has attempted in vain for 15 years to recreate a stand of mast bottom land hardwood timber on the Batchtown Refuge. 15 years and thousands of dollars later they have yet to produce one tree to their credit. Don't we learn by our mistakes?

(USE CONTINUATION SHEET(S) FOR ADDITIONAL SPACE)

(13)

240

Dear Colonel Thomas C. Suermann,

33
67

I would like to ask you to please continue with the Swan Lake, Calhoun Point, and Stump Lake, EMP Projects. As a taxpayer, and License and Duck Stamp Purchaser, I think these project should go ~~[illegible]~~ Forward. The monies have been allocated and approved for these projects.

Thanks: John Gillespie

John Gillespie
2910 Hillcrest
Alton, IL
62002

(14)

Colonel Thomas C. Suermann,

241

33

In regards to the Calhoun Point, Swan Lake, and Stump Lake projects that are now being initiated by the Corp of Engineers. This letter is being written to let you know that these projects are of the utmost importance to the waterfowl habitat restoration in the Mississippi Flyaway and must be continued. Please do not let the influence of individuals forsake the good that is being done for the overall resource. Please continue to maintain these projects on the present schedule.

Respectfully Yours,

John T. Gineris

JOHN GINERIS
Member of the Migratory
Waterfowl Hunters, Ducks
Unlimited, and Illinois
Federation of Outdoor
Resources

(15)

402 Hena Street
Greenville, IL. ~~62024~~
62246

242

District Engineer
U.S. Army Corps of Engineers District
Attn: Planning Division
PD-F
1222 Spruce Street
St. Louis, MO. 63103-2833

To whom it may concern:

128

I am writing on the behalf of the future of the environment and wildlife of Illinois. As you may know, the A.C.O.E., the Department of Conservation, and other groups are planning to destroy bottomland forests and to build levees in the Grafton area. This will cause a major disruption in the protection of wildlife in this area. There are plenty of hunting areas in Illinois and there is no need for any more, expecially in a important wooded area.

I am getting angered by agencies and people responsible for this sort of destruction and I plan to do everything in my power to stop it. Please consider the area wildlife, the environment, stop bull-dozing and for the sake of the preservation of the world stop making the blood-thirsty hunters more important than forests and wildlife...

Thank you for your time,
Sincerly,
C. Grafford

"CALHOUN PT. HABITAT Rehabilitation"

DUANE HAHNENKAMP
POB 41
GRAFTON IL 62037-0041

(16)

Colonal Thomas C. Suermann
U.S. ARMY CORP OF ENGINEERS

243

I AM WRITING TO VOICE MY OPINION IN FAVOR OF THE CALHOUN POINT PROJECT, NEAR GRAFTON, IN YOUR DISTRICT. I UNDERSTAND THAT THE LOCAL SIERRA CLUB, (SNUBBY-WANTABEE-KNOWITALLS) IS WANTING TO STOP THIS PROJECT AND ALL PROJECTS IN THE AREA!, THIS BECAUSE, IN THEIR EYES, IT WILL KILL TOO MANY TREES. ALL ONE HAS TO DO IS OPEN ONE'S EYES TO SEE THAT THESE TREES ARE DYING BY THE THOUSANDS, SINCE THE "93 FLOOD." THESE AREAS NEED MAJOR HELP TO IMPROVE THEIR HABITAT, AND YOUR PROJECT WILL DO JUST THAT. TO STOP NOW AND DO NOTHING WILL MEAN SURE DEATH OF THESE AREAS, AS MUCH NEEDED WATERFOWL AND FISHING AREAS!

33
63
68

THESE LAKES DRAW THOUSANDS of HUNTERS AND FISHERMEN AS WELL AS BOATERS AND TOURIST. TO STAND BY NOW AND WATCH THESE AREAS DIE AWAY, IS A TERRIBLE WASTE. IT IS ALSO A TERRIBLE WASTE OF TIME AND MONEY FOR YOUR PART, AND THE LOST OF FUTURE FUNDS THAT THESE (NEW) AREAS WOULD GENERATE, IS UNTHINKABLE!

PLEASE DO EVERYTHING IN YOUR POWER TO KEEP THESE PROJECTS ON TRACK. THIS PROJECT IS FAVORED BY THE MAJORITY OF PEOPLE THAT USE THESE LAKES AND ALSO THE PEOPLE THAT LIVE AROUND THESE AREAS. (DOLLARS!) THESE PEOPLE WANT THESE PROJECTS AND STAND BEHIND YOUR.

THANK YOU, DUANE HAHNENKAMP

(17)

1/14/95

Trango Towers, Karakoram Himalaya, Pakistan.

Dear Sir,

34 I take exception to the ACOE + the Illinois Dept. of Conservation spending millions of tax dollars on the destruction of bottomland forests in the Calhoun Point area. How is this supposed to

17 be mitigation for Lock & Dam 26??

Wetlands are essential for sediment

10 filtration; bottomland forest are essential for migratory neotropical songbirds. Illinois, like California, has already lost over 90% of its wetlands. California is feeling the loss in flood damage + severe population loss of many fish species (+ related industries). Am I expected to believe that Illinois has not been affected by its loss of wetlands?

Please reconsider

PM
9461

To
District Engineer
U.S. Army Corp of Engineer District
Attn: Planning Division, PD-F
1222 Spruce St.
St. Louis, MO 63103-2833

bulldozing these forested wetlands!

Thank you,
Frances Harmon
4410 Harbord Dr
Oakland, CA 94618

The Sierra Club MOUNTAIN LIGHT Postcard Collection.
Copyright © 1986 by Galen Rowell/Mountain Light, Inc.

(18)

January 21, 1995

245 U.S. Army Corps of Engineers
District Engineer
Attention: Planning Division, PD-F
1222 Spruce Street
St. Louis, MO 63103-2833

Sirs:

1 2 I am writing to express opposition to the so-called "Calhoun Point" project, on the grounds of 1] unnecssary eradication of wetlands/bottomlands forests and 2] construction of levees.

10 1] Wetlands and the type of wet forests to be bulldozed in this project have already been sharply diminished over their historical area and are in short supply; instead the ACOE and I Illinois Department of Conservation could fulfil an important function by restoring nearby 18 surplus farmlands to wetlands condition. The Corps should perform *constructive* rather than *destructive* projects.

8 2] the project, by allowing IDOC to pump new water into backwater lakes would merely benefit hunters and their ability to access the area; it would not benefit native wildlife nor serve the needs of valuable wetlands restoration mentioned above-as the EMP actually requires.

34 Furthermore, as a taxpayer, I oppose the spending of several millions of dollars of taxpayer contributions to destroy these valuable forests.

Thank you for considering this opinion as a part of your public comment period on the project.

Sincerely,

Victoria N. Hoover

Victoria N. Hoover
735 Geary St.
San Francisco, CA 94109

Migratory Waterfowl Hunters, Inc.

P.O. BOX 8009 ALTON, ILLINOIS 62002

19

246

January 12, 1995

District Engineer
U.S. Army Engineer Dist., St. Louis
ATTN: Planning Division, PD-F
1222 Spruce Street
St. Louis, MO 63103-2833

REF: CALHOUN POINT, CALHOUN COUNTY, ILLINOIS ENVIRONMENTAL MANAGEMENT PROGRAM HABITAT REHABILITATION AND ENHANCEMENT PROJECT.

11 We are in total agreement with the dredging of bottom land sloughs for creating over winter habitat for fish.

12, 13, 14 In regards to timber clearing that must be done for levee construction - we recommend that you allow the contractor to contract and sell the timber. The remaining slash could be piled at strategic locations and large stumps and root wads placed in the dredge to create fish habitat. Those trees along the dredge area could be pushed out so tree tops are in the water.

Benefits =

- o Brush piles for land based mammals
- o Escape islands during normal high water
- o Fish cover in areas that would become sterile after dredging

15 This Rehabilitation and Enhancement Project for Calhoun Point is totally acceptable for waterfowl. However, somewhat insufficient for maximum fish habitat. The downed timber
16 could be put to much better use that simply burning.

Thank you for the opportunity to voice our opinion on this very important and greatly needed program.

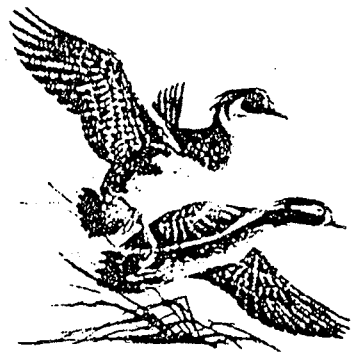
Let's get started!

Sincerely,

Dan Hudgins

C.D. Dan Hudgins,
President

CDH:mrb



Sponsor DUCKS UNLIMITED | Participating Member NATIONAL RIFLE ASSOCIATION OF AMERICA | Contributor THE WILDLIFE LEGISLATIVE FUND OF AMERICA | Member NATIONAL SHOOTING SPORTS FOUNDATION

5

Migratory Waterfowl Hunters, Inc.

P.O. BOX 8009
ALTON, ILLINOIS 62002

(618) 466-6526
FAX (618) 466-6527

20

DX AE
DDPM
Sutton WRS
PM-M } Cotn

247

February 9, 1995

Colonel Thomas C. Suermann
District Engineer, St Louis District
U.S. Army, Corps of Engineers
1122 Spruce Street
St. Louis, MO 63103

Dear Colonel Suermann;

33

RE: Calhoun Point, Stump Lake, Swan Lake and Batchtown EMP projects.

Our organization of 500 plus members stands in support of the Definite Project Report (SL-7) the Calhoun Project as well as the other referenced projects in our immediate area. We are attaching an addendum to our earlier letter concerning suggestions we think would make a good project at Calhoun Point even better.

Enclosed also is a copy of a letter we sent to our area legislators and other involved agencies. We hope our efforts will generate enough support for you to expedite the Calhoun Point project to early completion and maintain firm support for the other projects.

Sincerely,

Dan

C.D. "Dan" Hudgins
President

Encl: 2

CDH:mrb

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Participating Member
NATIONAL RIFLE ASSOCIATION OF AMERICA

Contributor
THE WILDLIFE LEGISLATIVE FUND OF AMERICA

Member
NATIONAL SHOOTING SPORTS FOUNDATION

ADDENDUM TO CALHOUN POINT, CALHOUN COUNTY, ILLINOIS ENVIRONMENTAL MANAGEMENT PROGRAM HABITAT REHABILITATION AND ENHANCEMENT PROJECT DATED JANUARY 12, 1995

69 1. In regards to the concept of deep water dredging, we support the concept of not dredging Squaw Island Slough and increasing the quantity of dredging to be conducted on Pohlman Slough.

70 The shorelines banks of the dredged areas should also be enhanced by leaving/placing the tops of large trees into the slough to promote fish/wildlife habitat.

71 2. The water control structure between Royal Lake and Pohlman Slough should be reinstated back into the project at this time. A stop log type structure without a grated top permitting vehicle passage would benefit from the capabilities for habitat manipulation which would be created by water control capabilities at this site.

72 3. There is no real need for a parking lot and boat ramp on Chickahomin Slough. These two items do not sufficiently enhance habitat or recreation to warrant the costs of construction and the annual maintenance.

73 4. The two finger sloughs on the southeast side of Pohlman slough should have improved earthen dikes constructed with water control structures being installed to facilitate moist soil management. Water levels could then be manipulated via existing portable pumps in order to increase waterfowl food production.

74 5. Why not create brush piles wherever and whenever possible during the construction phase of this project? Brush piles provide habitat for numerous species and are very simple and cost effective to construct.

Migratory Waterfowl Hunters, Inc.

P.O. BOX 8009
ALTON, ILLINOIS 62002

(618) 466-6526
FAX (618) 466-6527

249

Re: Calhoun Point Habitat Rehabilitation and Enhancement Project

This project is located at the confluence of the Mississippi and Calhoun County. Calhoun Point possesses an ecology and hydrology conducive to the recovery of 2,200 acres of "aging" river wetlands and conversion of fallow fields to create bottom land hardwoods and development of waterfowl management units. The completion of this project will make a monumental contribution toward realization of the North American Waterfowl Management Plan.

The development of the Calhoun Point Project has been accomplished by the dedicated team work of both agencies and sportsmen organizations such as ours working as "partners" toward a common goal.

This approximately $7 million project could bring much needed dollars to a community that is dangerously close to a 25% unemployment rate, not to mention difficulties presented to them by the Flood of '93.

The St Louis District Army Corps of Engineers is noted for turning areas with much less potential than Calhoun Point into recreational meccas, bring tourism dollars that can only be escalated by our growing demands for recreational opportunities.

It is important for you to know that most of the Calhoun Project is located on federally owned lands and will be 100 percent federal cost. A small portion of private land will be cost shared 75% federal and 25% non-federal. The operation and maintenance cost of $51,650.00 annually will be incurred by the Illinois Department of Conservation.

All paper work and funding is in order for this project as well as similar projects for Stump Lake and Swan Lake in the same general area. All together these projects total over $25 million. These projects came about after extensive study, planning, engineering and public hearings. Contractors have begun work at Stump Lake and will soon begin at Swan Lake. These projects are now being threatened by a Johnny-come-late, obstructionist effort by the local preservationists and environmentalists . These people have brought nothing into this area except strife, controversy, uninformed accusations and allegations that have caused nothing but delays and expensive cost overruns to many projects the Mel Price Lock and Dam being one outstanding example.

Sponsor
DUCKS UNLIMITED

Participating Member
NATIONAL RIFLE ASSOCIATION OF AMERICA

Contributor
THE WILDLIFE LEGISLATIVE FUND OF AMERICA

Member
NATIONAL SHOOTING SPORTS FOUNDATION

(21)

250

COL. THOMAS C. SUERMANN

33
63

WHEN I WAS A BOY BACK IN THE FORTYS, MY FATHER USED TO TAKE ME AND MY BROTHER TO STUMP LAKE FISHING. AS I GREW OLDER WE WENT FISHING AT SWAN LAKE AND SILVER LAKE AT CALHOUN POINT. WE FISHED BATCHTOWN AND REDS LANDING, ALSO ALTON LAKE. I HAVE KNOWN THE MISSISSIPPI RIVER ALL OF MY LIFE. I LIVE A QUARTER OF MILE FROM THE RIVER, AND HAVE, MY ENTIRE LIFE. I HAVE A GRANDSON WHO I WOULD LIKE TO ENJOY THE BENIFITS OF A GREAT RIVER. I KNOW THAT OVER THE YEARS THESE PLACES HAVE ERODED BECAUSE OF FLOODS AND SILTING. NOW THAT THERE IS A CHANCE TO CHANGE ALL OF THAT, AND MAKE PLACES FOR EVERYONE TO ENJOY DONT LET A FEW PEOPLE WHO DONT LIKE TO FISH, HUNT, AND ENJOY THE OUTDOORS STOP THE EMP PROJECTS.

Wm E Lester

ROBERT D. LARSON
ATTORNEY AT LAW
121 WEST THIRD STREET
P.O. BOX 434
ALTON, ILLINOIS 62002
(618) 462-4448

22

251

January 18, 1995

District Engineer
U. S. Army Corps of Engineers
Planning Division
1222 Spruce Street
St. Louis, MO 63103-2833

Gentlemen:

19 I heard recently that the Corps of Engineers is contemplating the construction of levees and other "improvements" on Calhoun Point.

Please don't.

I, and many others, are opposed to this project.

27 It is inconsistent with what will probably become the new federal and Corps of Engineers policy with reference to balancing flood control, navigation, habitat preservation, and other ecological interests, and it would be unwarranted and unnecessary to press forward with this project now and then have to abandon it.

9, 27 In addition to the substantial expense that could be avoided by not proceeding, I believe that the flora and fauna would benefit from "benign neglect" and letting this area return to a more natural state would balance, I think, the interests of many groups, including bird watchers and duck hunters and fishermen, boaters, and the like.

A test of the "public good" might be, what is it that 5 years from now reasonably, prudent, sensible people will have wished were done 5 years ago?

That seems to be an appropriate question or requirement for your Calhoun Point project and if you and your office don't consider that to be an appropriate test, I would appreciate your letting me know in writing at your earliest convenience.

Very truly yours,

Robert D. Larson

RDL/jmh

(23)

252

January 22, 1995
Manchester, Ill.

Dear Sir:

34 I read in the paper where some of these hunters are wanting Road built + blinds built so there "Sport" of hunting etc will be easier.

Then our D A R had a man give a program on Conservation + Recycling etc. He too mentioned this.

Believe me I am deffinitely against this making it easier + convenient. Spending top papers money for people too lazy to do their own transportation + blind building. Let them get exercise + realize that it was no easy task for our forfathers in old days + the rural areas today.

There are other ways to

34 enjoy their hunting. What about a Gun Club with Clay targets.

35 Why take land that some day if not preserved will be destroyed.

I am definitely against that & if brought to a vote of the people am sure they feel that way too.

Just putting in my point of view.

A concerned citizen;

Mr Robert F Lawson
Box 85
Manhattan, Ill. 60663

(24)

Colonel Suermann, District Engineer
US Army Engineer District, St. Louis
Attn: Planning Division, TD-F
1222 Spruce St
St. Louis, Mo 63103-2833

January, 22, 1995

254

Colonel Suermann,

8 The Calhoun Point Project is designed for hunters and not wildlife. Scrap it and
34 save the taxpayers millions of dollars. Destroy no more forests; think about the big picture and the long term.

Sincerely,
Linda Lee
RR 3 Box 402
Paoli, Indiana
47454

25

255

January 16, 1995

Planning Division, PD-F
U. S. Army Corps of Engineers

Gentlemen:

Since I started farming in the late 1940's, I have seen many good things the ACOE and the IDOC have done for farmers and the environment. Throughout my life I have loved nature and the living world. Both above agencies have helped in some ways to protect planet Earth-the only place we have to live.

6,9

However, it seems to me that the last few months they have done an about face and are not only wasting millions of our tax dollars but are breaking the laws protecting wetlands and wildlife (eagles). I am referring to the U.S. Fish and Wildlife Service destroying wetlands and bottomland forest at Gilbert Lake in Mark Twain National Wildlife Refuge. Bald Eagles winter in this area and depend on the trees, being or to be destroyed.

In my mind, there is no justifiable reason for this destruction and the waste of my tax dollars. All our government agencies should obey the Federal and State laws and regulations.

Sincerely,

Ross Manning

Ross Manning
P.O. Box 95
Roodhouse, IL 62082

CC: Edgar
DeMuzio
Ryder
Simon
Braun

M Esther D. Meyer
615 Westwinds Dr.
Jacksonville, IL 62650

(26)

January 16, 1995

256

U. S. Army Corps of Engineers
Planning Division. PD-F
1222 Spruce St.
St. Louis, Mo. 63103-2733

Dear Sirs:

10 This is to tell you that I truly object to the project that includes the destruction of the bottomland in Southern Calhoun County. Illinois needs its wetlands.

9 For, I am appalled at the great cost — millions of dollars to such a project.

19 I hope you will seriously consider all sensible opposition.

Sincerely,

Esther D. Meyer

257

Robert F. Mueller PhD
Route 1, Box 250
Stourton, Va. 24701

USA 19

27

Colonel Suermann
Dist. Engineer
U.S. Army Engineer District, St Louis
ATTN: Planning Division TD-F
1222 Spruce St
St. Louis MO 63103-2833

RECEIVED CO-FI

Jan 23, 1995

Dear Sir:

19 As a geologist and concerned Citizen I object to the Calhoun Point Project in Illinois. Forested

9 wetlands are at a premium in the the midwest as elsewhere

10 Many millions of acres have

19 already been lost. In addition to negative ecological effects this project would be yet another great waste of taxpayer funds. This doesn't clear very well with the public mood of economy of action. Please reject this project.

Sincerely,

Robert F. Mueller

Robert F. Mueller PhD

(28)

January 19, 1995
1100 Jefferson Ave
Alton, IL 62002

258

Dear Sirs

1 I am writing to express my concern about work going on at Gilbert Lake in Mark Twain National Wildlife Refuge. I understand the Fish and Wildlife Service has been bulldozing there, destroying bottomland forest and wetland areas. This is uncalled for.

2 I understand a levee may be built there. What for? Don't this a wildlife refuge?

5 Bald eagles are regularly seen in this area. Won't all this activity threaten the recovery plan set up to protect them under the Endangered Species Act?

10 Its time to call a halt to any and all efforts which result in the destruction of our natural habitats. What purpose justifies this?

Sincerely yours,
Carole Massalone

29

259

ATT CELMS-PD-F (P-1939)

U.S. Army Corps of Engineers
1222 Spruce St.
St. Louis Mo 63103-2833

Dear Mr. Gates, 1/15/95

I attended the public meeting 1/10/95, to discuss the Corps of Engineers Habitat Rehabilitation Project for Calhoun Point.

The main questions I had at the meeting were the road and the boat ramp. I have 38 acres of river front property on the south end of Royal Landing. I rent lots for weekend
20 recreation, from May through October. When construction of the road/levee starts, I would not like to see the road closed for construction. Plate 3 shows a 12 ft wide access
21 gate at the south end. This is the beginning of the Royal Landing road. The road is the only access I and Mr. Kinder as well as my renters have to the property and river.

I have been told the road is part Calhoun County and part Corps. I don't really care who maintains the road but
22 it has been in poor repair for a long time. With the new levee being put over the existing road I see where more maintenance would be needed. I don't want to sound harsh but I would like a road that I can get to the property year round. The road at the present time has three access roads,
23 and four culverts that drain my fields. I would not want any standing water or wet land on my side of the levee.

I would like to see something done about the boat ramp
24 at Royal Landing. This is the only public ramp in South Calhoun. All of my renters use this ramp as well as the general public. It would be a great inconvience to all if this ramp were lost.

My work phone is (314) 621-5700 ext 214
I am at this number each weekday from 8:00 to 4:30.
Thank you for your time and I hope to hear from you about the above.

Sincerly,

Michael J Navarre

Michael J Navarre
Land owner
Box 143
Brussels, IL 62013

30

260

111 Sergeant
Joplin, Missouri 64801
January 21, 1994

Colonel Suermann, District Engineer
US Army Engineer District, St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTN: Planning Division, TD-F

Dear Colonel Suermann:

19, 8, 10 I write you to urge the stopping of the Calhoun Point Project for several reasons. First, this project will benefit waterfowl hunters at the expense of wildlife. Bottomland forests provide valuable wildlife habitat for many species such as the neotropical migratory songbirds.

18 Second, alternatives to the project exist that would have the same effect, be more cost effective, and help restore the Mississippi shores to a more natural environment. For example, converting bottomland farms back to wetlands would be more appropriate.

9 Third, the new, Republican leadership in both chambers of Congress are pledged to put an end to misuse of Federal dollars. Because my representative is a member of that leadership, I am sending a copy of this letter to the Honorable Mel Hancock, R-MO.

Sincerely,

Bill Pate

Bill Pate

(31)

261

David Pittman
2803 N Peoria Avenue
Peoria, Illinois 61603

JANUARY 17, 1995

Colonel Suermann
District Engineer
USA Engineering District
1222 Spruce St
St Louis, Mo 63103-2833

Dear Sir;

2 I read with dismay your determination to build a levee at the confluence of the Mississippi and Illinois Rivers, known as the Calhoun Point Project. Wetland rehabilitation should not consist of
18 periodic flooding of backwater lakes but instead creation of wetlands in areas of floodplain where farmland now exists. Please
75 consider the inevitable problems with levee construction and its interference with the natural cycle of river systems, an ebb and flow where sediment filtration is done through the backwater lakes. Various studies suggest that the backwater lakes once periodically dried up in severe drought, which quickly corrected sedimentation into permanent, firm lake bottom. The 1988 drought here in central Illinois demonstrated this in many of our backwater lakes. Further, wildlife habitat flourished with tha native water plants seed for food. Corn fields are neither neccessary or desireable for waterfowl.

76 In summary, attempts by the Corps to mimic natural river flow will have greater success at less cost in meeting the goals of both waterfowl hunters and wetland preservationists. Levee construction and farmland production is not cost-effective over the long run. Please, stop to consider the long range effects and halt the Calhoun Point Project as now conceived.

Sincerely;

David Pittman

(32)

Greenbriar
Box 27
Manchester, Il. 62663
Jan. 13, 1995
— Gates

262

To Whom It May Concern:

2 I protest the use of my tax dollar to destroy
8 bottom land forests and the building of levees to
9 benefit hunters at the expense of wildlife

18 Why don't ACOE and IDOC restore the fields they farm to wetlands? Illinois needs more wetlands and we already have more than enough cornfields. Besides, it is unethical to farm public lands that used to be wetlands

Sincerely,

(Mrs Albert E.) Marjorie Powers

Sounds like Bensman's echo. DL

33

263

District Engineer
U S Army Corps of Engineers
Attn Planning Division
1222 Spruce St
St Louis MO 63103-2833

Jan 10 1995

Dear Sirs:

1	I am writing regarding the proposed Calhoun Point Project. I am definitely opposed to the project as currently planned because of the impending destruction of many acres of bottomland forests.
8, 10	This action may please waterfowl hunters but it is not the highest and best use of this area. Quality bottomland forests are rare and offer good wildlife habitat.
17	I understand that this project is part of the mitigation effort due to the EMP for Lock and Dam 26. This is a travesty and can only serve to undermine faith in further mitigation proposals.
9	Furthermore I am appalled at the Corps and Illinois Dept of Conservation are spending our tax dollars to destroy acres of bottomland forest at Stump Lake. Despite the Corp's efforts to change its image actions such as this show that the Corp cannot be trusted.
18	A far better alternative to the Calhoun Point Project would be to restore wetlands on nearby farm fields on public lands. Illinois needs more wetlands and bottomland forests, not more farm fields
19	Please stop the Calhoun Point Project.

Sincerely,
Caroline Pufalt

Caroline Pufalt
13415 Land O Woods #3
St Louis Mo 63141

(34) DD, JR

FEB. 15, '95

264

DEAR SIR:

33 CONCERNING THE CALHOUN POINT
67 HABITAT REHABILITATION & ENHANCEMENT PROJECT, YOU FOLKS HAVE DONE YOUR HOMEWORK AND HAVE THE TAX DOLLARS TO DO A MUCH NEEDED TASK.

63 PLEASE DO NOT BE INFLUNCED BY MINORITY GROUPS OR INDIVIDUALS AT FURTHUR EXPENSE TO TAXPAYERS AND THE MAJORITY.

I AM CONFIDENT YOUR DECISION TO CONTINUE AND COMPLETE THE CALHOUN POINT PROJECT WILL BE BENIFITUAL TO ALL WHO TRULY LOVE THE OUTDOORS.

SINCERELY

LARRY REID

January 20 '95

35

District Engineer
U.S. Army Corps of Engineers
attn: Planning Division PD-F
1222 Spruce Street
St. Louis MO 63103-2833

265

1 I am writing in opposition to the Calhoun
2 Point Project; particularly the destruction
19 of bottomland forests and the building of
8 levees. This project is intended to benefit
hunters at the expense of wildlife by
destroying this valuable wildlife habitat.

18 An alternative to this project would be to
restore all nearby farm fields on public
lands to wetlands. We should no longer
10 farm public lands that used to be wetlands;
especially in Illinois where over 90% of
the original wetlands have been destroyed.

9 I am offended that the Corps of Engineers
is spending millions of tax dollars to destroy
bottom land forest at Stump Lake for the
benefit of hunters, at the expense of the
rest of us.

Yours truly,
Jack Robbins
139 Stonewall Rd Berkeley CA
94705

2/7/95

36

266

DEAR MR. GATES,

I AM WRITING IN SUPPORT OF THE
33 CALHOUN POINT HABITAT REHABILITATION
77 AND ENHANCEMENT PROJECT. AFTER REVIEWING
THE PROJECT PLANS, I FEEL THIS PLAN COVERS
MOST OF THE ILL'S OF CALHOUN POINT. WITHOUT
THIS PROJECT THE "POINT" WILL DIE IN A
FEW SHORT YEARS FROM SILTATION.

SINCERLY
HAROLD W.
SWEARENGIN

Harold W. Swearengin

Harold W. Swearengin Sr
1214 W. Pontoon Rd
Granite City, IL 62040-2233

37

January 20, 1995

267

Dear Sir or Madam,

1,2,8 I am writing on behalf of the 50 members of the Morgan County Audubon Society, Jacksonville,Il. We recently became aware of a plan by the Army Corps of Engineers and the Illinois Department of Conservation to bulldoze approximately 100 acres of forest bottomlands to build a levee around Calhoun Point for the purpose of accomodating waterfowl hunters.

19 The Morgan County Audubon Society wishes to go on record as being vehemently opposed to this plan.

10,38 Scientific research continues to validate the value of wetlands to both plant and animals as well as to humans. Volumes have been written following the floods of 1993 which confirm the negative affects of artificial levees and the positive affects of wetlands in reducing flood damage. Wetlands also provide a unique habitat for wildlife and are especially important for migrating birds. With less than 1% of Illinois remaining in its natural state, the value of these 100 acres is compounded. The citizens of Illinois cannot afford to lose this land.

36,39 Aside from the numerous arguments for protecting wetlands/bottomlands from an esthetic or ethical point of view, it is very clear that the law dictates these areas must be protected from destruction.

9 And, without question, federal and state dollars are not to be used to destroy wetlands. If anything, these monies should be used to restore fragile areas like wetlands and bottomlands.

37 The Morgan County Audubon Society requests that you reconsider this project in consideration of the adverse affects it would have on the wildlife in the area and in consideration of the law which mandates that wetlands be protected.

40 Further, we ask that the money appropriated for this project be redirected to the restoration of wetlands along the river.

Thank you for your consideration of our comments. We would appreciate a response to this letter and notification of the final decision regarding this project. Copies of this letter are being forwarded to both state and federal legislators.

Sincerely,

Steve Tavender

Steve Tavender, President
Morgan County Audubon Society

1012 W. College
Jacksonville, IL 62650

38

January 13, 1995

268

District Engineer
U.S. Army Corps of Engineer District
Attn: Planning Division, PD-F
1222 Spruce Street
St. Louis, MO 63103-2833

Dear District Engineer:

9 I am writing to you today to express my concern regarding a project I have recently heard about which will spend millions of our federal tax dollars to bulldoze 51 acres of forested wetlands along the Illinois and Mississippi Rivers.

25 This project, the Calhoun Point Project does not sound like a rehabilitation project to me, although it is being proposed under the guise of being beneficial to the wetlands

1, 2, 8 I oppose the Calhoun Point Project, particularly the destruction of bottomland forests and the building of levees. The project will benefit waterfowl hunters at the expense of wildlife. Any biologist can tell you that bottomland forests provide valuable wildlife habitat for many species such as neotropical migratory songbirds.

18 Why can't the ACOE and IDOC restore all the nearby farm fields on public lands to wetlands? Illinois needs more wetlands, as over 90 percent of Illinois original wetlands have already been destroyed. It seems to me that Illinois already has more than enough cornfields.

9 I am discouraged that the ACOE and IDOC are spending millions of citizen tax dollars to destroy more than 100 acres of bottomland forest at Stump Lake. I urge you to reconsider this project and find a truly beneficial use for the funds.

Thank you for your consideration.

Sincerely,

Kristi Timmings
47152 Male Terrace
Fremont, CA 94539

(39)

269

Mr & Mrs Joe Toigo
4704 Brecht Lane
Godfrey, IL 62035
January 9, 1994

Dear Sir,

1 We object to the bulldozing that is occurring at Stump Lake, Gilbert Lake, and the proposed bulldozing at Calhoun Point.
8 Destroying bottomland forest to build levees will not help wildlife. It will definitely benefit hunters who want their waterfowl concentrated in certain areas.
9 Please place our names on record as opposing the use of federal money to destroy wetlands and bottomland forest.

Sincerely,
Joe Toigo
Deborah Toigo

(40)

1955 Tatum Ln.
Lebanon, Ky. 40033
Jan. 23, 1995

270

Dear Colonel Suermann,

I ask that my letter be included in
1 the comments concerning the Calhoun
18 Point Project ~~even though~~ as it will be
19 post marked Jan. 24, 1995.

I firmly oppose this Calhoun Point Project to bulldoze 51 acres of forested wetlands in Illinois. Instead the millions of dollars should be used to restore 2000A. farmland the IDOC & U.S. Fish & Wildlife Service uses to wetlands.

Thank you.

Sincerely
Mrs. Barbara H. Warner

(41)

9353 Loos Road
Marine, IL 62061
January 10, 1995

271

District Engineer
U.S. Army Corps of Engineers District
Attn: Planning Division, PD-F
1222 Spruce St.
St. Louis, MO 63103-2833

Dear Sir:

1,2,3 This letter is to express opposition to the bulldozing of bottomlands and building of levees and raising of roads at Stump Lake, Prairie Lake, and Gilbert Lake in Calhoun County, Illinois.

4,5 Destroying trees, disturbing habitat and driving away eagles in order to raise the level of roads is unnecessary. It is also in violation of the Endangered Species Act, for it is being done during the time that eagles are present, and it is being done without public notice in advance.

6,7 Furthermore, an endangered species of bat also lives in those bottomlands.

8 Raising the levels of roads and building levees might possibly benefit waterfowl hunters, but certainly not wildlife. I am shocked that you are spending tax money to destroy our bottomland forests, when money is so scarce and bottomlands in their natural state are so rare in Illinois.

9

10

Yours sincerely,

Stephen Weissman

Stephen Weissman

cc: Senator Richard Durbin
Illinois Department of Conservation

(42)

DX, DP, DD, CO-T
DE PD

272

Col:

33 I support the E.M.P Enhancement in Jersy and Calhoun Counties. this is the best thing that has happened to these areas in many years and its way past due.

I applaud the corps. Since you have Expanded from a single purpose department. I urge you to hold firm on this Project.

my congressman will be contacted, on this matter, for his support.

thank you
Bill Woolard
39 Ray St.
Cottage Hills, IL
62018

43

DD, COF
PD
DX AE
DPN
DE

2-16-1995

273

DEAR COL. SUERMAN

33 MY NAME IS MICHAEL A. WRIGHT AND I HAVE BEEN A MIGRATORY WATERFOWL MEMBER FOR WELL OVER TEN YEARS. IN REGARDS TO THE STUMP LAKE CALHOUN POINT REHABILITATION ENHANCEMENT PROJECT. I STRONGLY SUPPORT YOUR ENDEAVORS TO MAKE THESE PROJECTS A REALITY.

63 THIS SMALL NOTE IS TO RECOGNIZE THE FACT THAT PEOPLE LIKE JIM BENSMAN IS A THORN IN THE SIDE WHEN GOOD PEOPLE AND FINE ORGANIZATIONS TRY TO MAKE A DIFFERENCE FOR THE GOOD OF US ALL.

KEEP UP THE GOOD WORK COL. SUERMAN. WE BACK YOU AND YOUR PROJECTS 100%. I AM A CONSTRUCTION ELECTRICIAN AND I WORKED ON THE LOCK + DAM 26 PROJECT FOR OVER 2 YEARS, SO A FEDERAL JOB PLAYS AN IMPORTANT PART IN THIS AREA.

THANK YOU
MICHAEL A. WRIGHT
110 DONNA DRIVE
HARTFORD IL 62048

Manchester, Illinois
Jan. 14, 1995

(44)

274

District Engineer,
U.S. Army Corps of Engineers,
Att.: Planning Division, PD-F,
St. Louis,
Mo.

To Whom it may concern:

1,2,9 It has been called to our attention the tax money that is being spent to destroy more than 100 acres of bottom land forest at "Stump Lake". We were appalled at the spending of millions of tax dollars for the destruction of bottomland, forests and ~~building levees!~~

18 It has been suggested that ACOE and IDOC restore fields they farm in the area to wetlands. Illinois certainly needs more wetlands!

9 As farmers and tax payers we are concerned how our money is spent!

Respectfully,
Mr. & Mrs. L. Earl Young,
P.O. Box 167
Manchester,
Il. 62663.

APPENDIX DPR-B

SECTION 2

ATTACHMENT B-3

Public Letter Comments-- Mr. Ettinger Letter

276

(10)

Sierra Club Illinois Chapter

506 S. Wabash | Suite #505 | Chicago, IL 60605 | (312) 431-0158

January 23, 1995

Colonel Thomas C. Suermann
District Engineer
U.S. Army Engineer District, St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTN: Planning Division, PD-F

Re: Calhoun Point EMP-HREP DPR/EA

Dear Colonel Suermann:

(A) This letter constitutes the comments of the Illinois Chapter of the Sierra Club on the Draft Upper Mississippi River System-Environmental Management Program Definite Project Report (SL-7) With Integrated Environmental Assessment for the Calhoun Point Habitat Rehabilitation and Enhancement Project ("DPR/EA"), and related Section 10 and Section 404 compliance documentation, dated October 1994. The Illinois Chapter represents the more than 20,000 members of the Sierra Club who live in the State of Illinois many of whom benefit from and use the resources found in the Upper Mississippi River System ("UMRS").

(B) The Illinois Chapter has reviewed the DPR/EA and finds that is does not comply with the National Environmental Policy Act ("NEPA") or the U.S. EPA's 404(b)(1) Guidelines. Specifically, the DPR/EA does not adequately consider all reasonable alternatives to filling 33 acres of wetlands in the floodplains of the Illinois and Mississippi rivers or evaluate the cumulative impacts of this project in combination with the other HREP projects on the Upper Mississippi River and Lower Illinois River as required by NEPA.

Description of the Project

(C) Calhoun Point is a 2,157-acre waterfowl management area located at the confluence of the Illinois and Mississippi rivers in Calhoun County, Illinois. It consists mostly of undeveloped bottomland forest, backwater lakes, wetlands, and cropland within the floodplains of the two rivers. The land is owned by the Corps of Engineers and is managed by the Illinois Department of Conservation to produce waterfowl and to preserve the bottomland forest ecosystem. The purpose of the HREP is to improve the habitat value for fish species by reducing sedimentation of the backwater lakes, and enhance the management potential for production of waterfowl by building a series of dikes and levees. The EMP is

Recycled Paper

Colonel Thomas C. Suermann
January 23, 1995
Page 2

C CONT.

authorized by Section 1103 of the Water Resources Development Act of 1986, which was passed by Congress to "...preserve, protect, and restore habitat that is deteriorating due to natural and man-induced activities".

The proposed HREP would construct a riverside dike/levee to reduce sediment input to the site during the summer floods, and provide a water level control system for management of waterfowl habitat; selectively dredge Pohlman Slough to provide a deepwater fish refuge and water intake location for pumping operations; install gravity drain and stop-log structures to manage moist-soil areas for waterfowl food production; clear woody vegetation at selected locations to increase the area devoted to moist-soil plant production; install interior levees to expand the acreage of cropland available for fall inundation for goose feeding areas; and plant hardwood species to increase mast tree production.

D

About 51 acres of bottomland forest will be cleared and about 33 acres of wetlands filled for these projects. Creation of the seasonal greentree reservoir will inundate about 100 acres of bottomland forest during the fall and winter months. About 110 acres of dredged material disposal sites and cropland will be planted to bottomland mast producing tree species.

E

Aerial spraying of herbecides will be used to clear woody vegetation. That the environmental impact of this herbecide use is inadequately considered is a serious flaw in the DPR/EA.

F

The water level in most of the bottomland forest of Calhoun Point was raised when Lock and Dam 26 was constructed in 1938, making the area part of Pool 26. The water levels are regulated by the operation of the gates at the lock and dam. A series of low levees (both natural and man-made) are present along the rivers, but flooding of the area is common. The area is located at the "hinge point" of the navigation pool and is a depositional area for sediments carried down the two rivers. The dikes and levees are designed to prevent the lower summer floods from inundating the area while allowing the higher floods to overtop the levees. The levees are also designed to allow mast tree seedlings to become established to replace the large number of trees killed during the prolonged summer floods of 1993.

Comments

G

The DPR/EA does not adequately consider the alternative measures that are available to achieve the project goals without construction of riverside dikes and levees and destruction of wetlands. It also does not address the cumulative impacts on the aquatic ecosystem, fisheries, and flooding regime of the Mississippi and Illinois rivers from this and other HREP projects, in particular the nearby Swan Lake and Stump Lake HREPs.

H

Alternative measures that are not adequately explored, or that are dismissed for invalid reasons are:

I

UMRS Watershed Erosion Control. This measure to reduce sedimentation in Calhoun Point was found not to be viable due to "exorbitant" costs to control erosion in the watersheds of both rivers. However, there is no data presented on the sediment budget for the rivers, when sediment is delivered to the bottomland areas of the project area, or an evaluation of the sources of the sediments. The possibility of restoring floodplains upstream from the project area that have been leveed off from the rivers for use as sediment traps was not considered. Since much sediment is carried in floods that will overflow the dikes and levees, a program of watershed erosion control could have more effect in reducing sedimentation than construction of low dikes that will only retard the smallest floods.

J

Navigation Pool Water Level Manipulation. This alternative was dismissed because it would interfere with the needs of navigation and "...costly conservation easements would be needed within navigation Pool 26 to further increase operational flexibility." According to the DPR/EA current Corps policy prevents such acquisitions under the EMP. But the actual cost and locations of the needed easements is not presented, and the Corps' policy not to use EMP funds for acquisition of land or easements can and should be changed. There is no prohibition against land or easement acquisition in the law. In fact, a recent decision by the Corps would allow some EMP funds to be used for land acquisition.

Because Calhoun Point is located in the "hinge area" of Pool 26, the water levels in the area are directly controlled by Lock and Dam 26. It should be possible to maintain a stable water level during the summer months and manage the smaller floods by modification of the operating procedures at the dam. In addition, much of the land that would be subject to "costly conservation easements" was damaged in the 1993 floods, reducing the costs of easements and increasing the potential for willing sellers. This measure should be

reconsidered as an alternative to meet the project purposes without clearing and filling of wetlands.

K

Regular Maintenance Dredging. Because the dike/levee system will only keep out the smaller floods, it is likely that a program of regular maintenance dredging will be needed in addition to the dikes to remove the sediments carried into the backwater lakes during the larger floods. From the standpoint of enhancing habitat for fish species, this alternative may be preferred, and necessary in any event.

L

Riverside Dike/Levee. This was found to be one of the only viable alternatives to meet the project purposes. There are already man-made and natural levees along the rivers that keep out smaller floods. It is not clear what good the higher dikes and levees would do to reduce flooding and sedimentation in the area. The effect of flooding on reproduction of bottomland mast tree species that were killed in the 1993 floods is not known. It may be that mast trees that are subject to regular flooding are more tolerant of prolonged flooding. It also appears that natural regeneration of the mast trees is starting to occur. More data is needed to determine the proper ecological response to restoring the bottomland forest ecosystem at Calhoun Point before a decision is made to cut the forest off from regular flooding during the growing season. It appears that the only reason for installing the dikes and levees is to allow for the management of water levels in the waterfowl production areas.

M

Selective Deepwater Dredging. This is a viable alternative that could be combined with regular maintenance dredging to restore lost water depths to the site's backwater fisheries habitat. This measure could be accomplished separate from the riverside dike/levee project.

N

In general, Calhoun Point currently is in good ecological condition despite the damage done to the area by the construction of Lock and Dam 26. It provides many small backwaters that are protected by low natural levees and strips of bottomland forest that serve as windbreaks to reduce wave action on the open water surface and to filter sediments. The sedimentation that has occurred is the result of a number of factors, including being in a slackwater area of Pool 26. The elimination of backwater lakes and bottomland forests upstream from the confluence of the Mississippi and Illinois Rivers has also contributed to both increased flooding patterns and greater sedimentation. Recently approved HREP projects, such as the one at Swan Lake, will aggravate these problems.

280

The Corps is rushing to build more dikes and levees in the floodplain of the Mississippi and Illinois Rivers although it really is not known what is happening to the natural aquatic ecosystem of the UMRS. Since the 1993 floods there have been many calls for a re-evaluation of the series of levees that cut off the rivers from their floodplains, including a proposal to return the floodplain at the confluence of the Illinois, Mississippi and Missouri back to the rivers. In fact, the Corps is currently conducting a system-wide floodplain study of the Upper Mississippi River the report of which is due in June of this year.

The Corps should withhold a final decision on Calhoun Point until the floodplain management study is completed, and a cumulative impacts assessment is done for all of the HREP projects along the rivers. The Corps should also seriously consider all alternative measures, including modification of the operating procedures of Lock and Dam 26, that would achieve the project purposes before proceeding with this project.

Sincerely,

Albert Ettinger
Conservation Chairperson

cc: Marvin Hubble, IDOC
Joyce Collins, USF&WS - Marion

APPENDIX DPR-B

SECTION 3

Congressional Letters of Project Support

RICHARD J. DURBIN
20TH DISTRICT, ILLINOIS

AT-LARGE WHIP

COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON AGRICULTURE AND RURAL DEVELOPMENT
SUBCOMMITTEE ON TRANSPORTATION
SUBCOMMITTEE ON THE DISTRICT OF COLUMBIA

282

Congress of the United States
House of Representatives
Washington, DC 20515-1320

2463 RAYBURN BUILDING
WASHINGTON, DC 20515-1320
(202) 225-5271

525 SOUTH 8TH STREET
SPRINGFIELD, IL 62703
(217) 492-4062

400 ST. LOUIS STREET, SUITE #2
EDWARDSVILLE, IL 62025
(618) 692-1082

221 EAST BROADWAY, SUITE #106
CENTRALIA, IL 62801
(618) 532-4265

March 8, 1995

Colonel Thomas Suermann
Commander & Dist. Engineer
U.S. Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, Missouri 63103-2833

Dear Colonel Suermann:

I am writing in support of the Calhoun Point Habitat Rehabilitation and Enhancement Project. The proposal to recover 2,200 acres of "aging' river wetlands and convert fallow fields to create bottom land hardwoods and waterfowl management units will make a tremendous contribution toward realization of the North American Waterfowl Management Plan.

This project will also bring much needed dollars to a community that was devastated by the Flood of 1993 and is approaching a 25% unemployment rate.

Please continue to give your support to this project as well as the projects at Stump and Swan Lakes.

Very truly yours,

Dick

Richard J. Durbin
Member of Congress

RJD:amd

PRINTED ON RECYCLED PAPER

JERRY F. COSTELLO
12TH DISTRICT, ILLINOIS

PLEASE RESPOND TO THE
OFFICE CHECKED BELOW:

COMMITTEES:
BUDGET
TRANSPORTATION & INFRASTRUCTURE
SCIENCE
(ON LEAVE)

Congress of the United States
House of Representatives
Washington, DC 20515–1312

March 14, 1995

Colonel Thomas C. Suermann
Commander
St. Louis District
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

Dear Colonel Suermann:

I am writing to lend my support to the Calhoun Point Habitat Rehabilitation and Enhancement Project located at the confluence of the Mississippi and Illinois Rivers in Calhoun County.

Although the Project lies within Congressman Richard Durbin's congressional district, I was contacted by various local concerns and was asked to contribute to their effort.

Upon reviewing the proposal it seems the completion of the project will make a major contribution toward realization of the North American Waterfowl Management Plan. The project, estimated at approximately $7 million located on federal land, would also contribute to increasing local tourism and overall economic gain to the community.

Your serious consideration of the Calhoun Point Rehabilitation and Enhancement Project is respectfully requested.

Colonel Suermann, if you need further information please feel free to contact my district office manager Anne Risavy at 618/233-8026.

Sincerely,

JERRY F. COSTELLO
Member of Congress

JFC/amr

☐ 2454 RAYBURN BUILDING
WASHINGTON, DC 20515
TEL: (202) 225-5661
FAX: (202) 225-0285

☒ 327 W. MAIN ST.
BELLEVILLE, IL 62220
TEL: (618) 233-8026
FAX: (618) 233-8765

☐ 1363 NIEDRINGHAUS AVE.
GRANITE CITY, IL 62040
TEL: (618) 451-7065
FAX: (618) 451-2126

☐ 250 W. CHERRY ST.
CARBONDALE, IL 62901
TEL: (618) 529-3791
FAX: (618) 549-3768

☐ 8787 STATE ST.
EAST ST. LOUIS, IL 62203
TEL: (618) 397-8833

☐ 1330 SWANWICK ST.
CHESTER, IL 62233
TEL: (618) 826-3043

1538 D Troy Road
P.O. Box 248
Edwardsville, Illinois 62025
(618) 656-8847

284

Capitol Office:
Room M-103
State Capitol
Springfield, Illinois 62706
(217) 782-5247

Evelyn M. Bowles

State Senator - 56th District

February 27, 1995

Colonel Thomas C. Suermann
District Engineer, St. Louis District
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103

Dear Col. Suermann:

I would like to take this opportunity to add my voice supporting funding for the Calhoun Point Habitat Rehabilitation and Enhancement Project.

Most of the Calhoun Project is located on federally owned lands and will be 100 percent federal cost. A small portion of private land will be cost shared at 75% federal and 25% non-federal.

Since this project is located at the confluence of the Mississippi and Illinois Rivers in Calhoun County, Illinois called Calhoun Point, the completion of this project will make a monumental contribution toward realization of the North American Waterfowl Management Plan.

This project would be one that would be highly visible and would demonstrate how the federal and state governments continue to work harmoniously.

I hope that the St. Louis District Army Corps of Engineers will give strong support for this recreational mecca.

Sincerely,

Evelyn M. Bowles

Evelyn M. Bowles
State Senator

EMB:pj

Recycled paper - soybeasn inks

SENATOR VINCE DEMUZIO
ASSISTANT MINORITY LEADER
309 CAPITOL BUILDING
SPRINGFIELD, ILLINOIS 62706
217/782-8206

DISTRICT OFFICE:
140 CARLINVILLE PLAZA
CARLINVILLE, ILLINOIS 62626
217/854-4441

ILLINOIS STATE SENATE

March 15, 1995

Colonel Thomas C. Suermann
District Engineer, St. Louis District
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

Dear Colonel Suermann:

I am writing to offer my strong support of the proposed Calhoun Point Habitat Rehabilitation and Enhancement Project in Calhoun County, Illinois.

In addition to the benefits this proposed project would bring in the ongoing effort to implement the North American Waterfowl Management Plan, this project would be an economic gold mine for an area plagued by double digit unemployment and still suffering the effects of record flooding in 1993. The recreational opportunities would be enormous, and the project would contribute greatly to our efforts to lure tourists to this area. Many different groups and organizations have worked hard to make this project a reality, and it would be truly unfortunate if their efforts were not realized at this late date.

You have offered your strong support of this project in the past. I trust your continued strong support will be forthcoming.

Please do not hesitate to contact me if I may be of further assistance regarding this matter.

Sincerely,

Vince Demuzio

Vince Demuzio
Assistant Minority Leader
49th Senate District
State of Illinois

STATE CAPITOL
286 HOUSE POST OFFICE
SPRINGFIELD, ILLINOIS 62706

STATE OF ILLINOIS
89TH GENERAL ASSEMBLY
HOUSE OF REPRESENTATIVES

STEVE DAVIS
STATE REPRESENTATIVE
111TH DISTRICT

February 22, 1995

Colonel Thomas C. Suermann
District Engineer, St. Louis District
U. S. Army Corp of Engineers
1222 Spruce Street
St. Louis, MO 63103

Re: Calhoun Point Habitat Rehabilitation and Enhancement Project

Dear Colonel Suermann:

Please give the above Project your continued strong and complete support.

As you know, the development of the Project was accomplished by a dedicated team of organizations after extensive study, planning, engineering and public hearings. They are working toward a common goal to bring much needed dollars to a community with a very high unemployment rate.

I understand the completion of this project was threatened recently. I am asking for your support for the Project without delays.

If I can be of further assistance, please contact me.

Sincerely,

Steve Davis

Steve Davis
State Representative
111th District

cc: Migratory Waterfowl Hunters, Inc.

RECYCLED PAPER • SOYBEAN INKS

APPENDIX DPR-B

SECTION 4

Agency Letters of Comment & District Responses

PV-17

State of Illinois
DEPARTMENT OF AGRICULTURE
State Fairgrounds / P.O. Box 19281 / Springfield 62794-9281 TDD: 217/524-6858

288

Bureau of Environmental Programs 217/ 785-2427
Bureau of Farmland Protection 217/ 782-6297
Bureau of Soil and Water Conservation 217/ 782-6297

January 4, 1995

Mr. Owen Dutt
Chief, Planning Division
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Draft Upper Mississippi River System
Environmental Management Program
Definite Project Report (SL-7)
With Integrated Environmental Assessment

Calhoun Point Rehabilitation and Enhancement Project
Pool 26, Illinois and Mississippi Rivers
Calhoun County, Illinois

Dear Mr. Dutt:

The Illinois Department of Agriculture previously reviewed the proposal for its potential impacts to agricultural land and on August 24, 1994 submitted comments stating we did not object to the project's implementation.

We have no further comments on the project.

Sincerely,

Teresa J. Savko

Teresa J. Savko
Bureau of Farmland Protection

TJS:mdg

Illinois Department of Conservation
LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787 CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH • CHICAGO 60601
Brent Manning, Director John W. Comerio, Deputy Director Bruce F. Clay, Assistant Director

March 17, 1995

Mr. David Gates
U.S. Army Corps of Engineers
1222 Spruce St.
St. Louis, MO 63103-2833

ATTN: CELMS-PD-F (P-1939)

Re: Calhoun Point (Illinois) draft DPR

Dear Mr. Gates:

Enclosed are comments from the Illinois Department of Conservation regarding the draft Definite Project Report (DPR) for the Calhoun Point Habitat Rehabilitation and Enhancement Project.

The Department supports the intent of the draft DPR. We look forward to working cooperatively with the Corps of Engineers and Fish and Wildlife Service to implement this project.

We are sensitive to comments made by the public at the January 10, 1995 meeting regarding the modification of some portions of the project and ensuring access to private property. We want to ensure year round access to privately owned property. Property held by an agency and leased to private interest should be provided long term access consistent with the objectives of the site and requirements of applicable easements.

The basic elements of the project were developed in cooperation with a number of agencies and resource professionals. We feel that with the modifications recommended below, the project will provide habitat benefits to a broad range of resource concerns.

The Department has the following suggestions and comments regarding the draft DPR:

Comment Page 49 Item #6 <u>Selective Deepwater Dredging</u>

We support the decision to <u>not</u> pursue the dredging of Squaw Island Slough.

A feature which has been overlooked to date is fish cover. We would like to utilize some of the cleared timber as cover habitat in the Polhman Slough area. Placement of some of the large green timber along the bank with the tops extending into the water near the dredge cut has tremendous habitat potential for aquatic and terrestrial species. We recommend including

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this feature in the project.

290 Comment Page 49 under item #6 Selective Deepwater Dredging:

Deepwater dredging at Squaw Island for fisheries benefit was not found to be feasible. Therefore, we would like to encourage you to evaluate increasing the amount of dredging in Pohlman Slough from 40% to at least 50% of the area.

Comment Page 52 item #9 Water Control Structures Subsection "b" Interior Structures

We recommend that the location 3 structure between Pohlman Slough and Royal Lake be reinstated as a project feature. There presently is a structure at this location. The structure is an earthen embankment with a 36" gated CMP. We recommend an 8' wide stop log structure with no grating for vehicle passage.

The placement of this feature would maximize water control capabilities for Royal Lake. Additional fisheries benefits can also be expected, especially during years when Royal Lake is managed at a modified drawdown level. Royal Lake would be accessible to river fish via Pohlman Slough during these modified drawdown periods.

If we do not include this connection to Royal Lake we would eliminate the possibility of managing the complex with maximum flexibility. This connection would also allow water levels to be raised in Pohlman Slough when needed.

Comment page 53, under item (11) Clearing Shoreline Woody Vegetation:

Some statement (with reference(s)) should be made regarding the toxicity of herbicides to aquatic communities.

Question/comment page 53-56, item (13) Pumps:

What are the intake velocities of the 48,000 GPM and 5000 GPM pumps recommended for use in this project? Modern guidelines, developed from entrainment and impingement (e&i) studies, recommend intake velocities be held in the range of 0.3-0.5 fps to protect fishes and other aquatic organisms from e&i related mortality.

Comment page 88 section #12 Recreation

A. The fish access from the river to Pohlman's Slough is a vital interest, however, we do not recommend that this be used as a recreational boat connection. The demand from recreational boaters and the associated cabin owners along Pohlman Slough will cause multiple future management problems.

B. We also recommend that the vehicle passage grating not be

elevated to "bridge" status.

C. We do not recommend the proposed parking lot and boat ramp on Chickahominy Slough. When the structure is open, boats can pass through the structure the same as IDOC maintenance equipment. The access road will become another maintenance drain with very limited benefits. 291

There are two finger sloughs on the southeast side of Pohlman Slough which have existing water control structures that allow independent water control. These structures are presently deteriorated and require replacement. Repairing these structures will maximize moist soil management in these areas. This repair will maintain the fish benefits associated with a near year round river connection for Pohlman Slough with no loss of waterfowl benefits. We highly recommend refurbishing these structures. Two earthen dikes with gated 24" CMP is adequate. Pumping can be accomplished by existing portable units.

The forest improvement portion of the project does not take advantage of using the woody material as wildlife habitat. Therefore, we are recommending that a portion of woody material being removed, be utilized to construct brush piles.

Brushpiles offer excellent habitat for a multitude of birds and animals. A typical brushpile should be capped with topsoil and seeded leaving the ends open for access. These piles can also serve as escape islands during major flood events. As time takes its toll and the piles rot down, the higher topography would serve as ideal locations for mast tree plantings.

We recommend the addition of this habitat enhancing feature whenever clearing is going to occur.

Thank you for the opportunity to provide comments on the project. We look forward to our continued working relationship.

Sincerely,

John Tranquilli (06)

John Tranquilli
Office Director

MEH
cc: Jerry Beverlin
Jeff VerSteeg
Carl Becker
Mike Conlin
Rick Messinger
Neil Booth
Bill Bertrand
Marvin Hubbell

292

ST. LOUIS DISTRICT'S RESPONSE
TO DRAFT DPR COMMENTS FROM
ILLINOIS DEPARTMENT OF Natural Resources (JOHN TRANQUILLI)
DATED MARCH 17, 1995

Comment Page 49, item 6, Selective Deepwater Dredging - Use Cleared Timber as Fish Cover. The recommended plan has been modified to include cleared timber as fish cover. The tops of large live trees from the proposed clearing right-of-way for the riverside berm will be used. The nearest area of clearing is along the Illinois River. Tree tops will be placed in the water just off-shore of the west bank of Pohlman Slough, beginning at the north end at 100 foot intervals for a total distance of 5,000 feet (down to about where the cabins end). The potential for these trees to be carried by flood waters from Pohlman Slough into the Illinois or Mississippi Rivers is unlikely because the existing forest along the perimeter of Pohlman Slough and in the vicinity of its confluence with the Illinois should act as a trap. Therefore, no measures will be taken to hold these trees down.

Comment Page 49, item 6, Selective Deepwater Dredging - Increase Dredging in Pohlman Slough. The recommended plan currently calls for dredging about half of the length of Pohlman Slough to improve fisheries habitat. The current water depth averages about three feet. Starting from the north end of the slough, a total of 60,500 cubic yards of sediment are to be removed [6,500 feet long by 50 feet wide by 4 feet deep (below the existing bottom elevation)], thereby increasing the average depth to seven feet. Dredging will be extended an additional 3,000 feet to a point near the existing Pohlman Slough boat ramp, which represents about 75 percent of the waterbody's total length. To minimize the increase in total cubic yards of sediment dredged, the depth of dredging will alternate every 1,000 feet between one and four feet, thus providing alternating average water depths of four and seven feet. Under the modified dredging plan, 11 acres (instead of 7.5 acres) of slough will be deepened, thereby providing a larger area of improved fisheries habitat.

Comment Page 52, item 9, Water Control Structures - Interior location 3. This structure will be incorporated into the project plan. According to IDOC, inclusion of this feature will allow for additional fish passage into other lake compartments, provide an additional service access for IDOC boats, and will provide for greater flexibility in water level management control throughout the site.

Comment Page 53, item 11, Clearing Shoreline Woody Vegetation - Herbicide Effects on Aquatic Organisms. The draft report stated (p.82) that the herbicide used to kill young trees encroaching into the moist-soil management units would be one that is currently registered with the U.S. Environmental Protection Agency (USEPA) as

applicable for use in "wetland" environments. The report will be modified to change "wetland" to "aquatic." Aquatic herbicides have been developed to be used within or adjacent to all kinds of aquatic sites, such as lakes, ponds, rivers, streams, reservoirs, ditches, or canals. With all the open waterbodies at Calhoun Point, an herbicide with an aquatic label is appropriate. 293

There are about one dozen herbicides labelled for aquatic use, but only a few of these are effective in controlling woody vegetation. The 1995 Illinois Agricultural Pest Management Handbook lists glyphosate and 2,4-D as effective in killing woody emergent plants such as willow. Some commercial products with active ingredients that consist of these two chemicals are Rodeo and SEE 2,4-D, respectively. The Illinois Department of Agriculture requires that these and many other herbicide products by applied by a state-certified applicator.

Rodeo has been applied aerially on a number of occasions by the Illinois Department of Natural Resources at some of its moist-soil management areas along the lower Illinois River to effectively control encroaching woody vegetation. It is a systemic herbicide for emerged grasses, broadleaf weeds, brush, and trees growing in and around water. For effective treatment, it should be applied in fall just before leaf drop, and it must come into contact with plant tissues. Submersed plants or those with most of their foliage underwater are not controlled. Glyphosate and 2,4-D interfere with natural plant growth processes, which leads to the plant's death.

The half-life of glyphosate in soil has been reported to range from 1 to 174 days, for 2,4-D from 7 to 16 days. In water the half-life of glyphosate ranges from 12 days to 10 weeks, for 2,4-D from 1 to several weeks under oxygenated conditions. Both of these chemicals adhere tightly to soil, where microbes are primarily responsible for their breakdown. Half-lives in water decrease with increasing levels of nutrients, sediment load, and dissolved organic carbon. Because glyphosate adheres so well to most soils, very little is carried away from the application site by surface runoff. Despite its short half-life in soil and water, 2,4-D has been detected in groundwater and surface water in the U.S. at various locations.

The environmental effects of a one-time (acute) exposure of glyphosate or 2,4-D at dosage levels much higher than recommended for vegetation control have been studied in laboratory settings for a variety of animals. These herbicides are slightly toxic to the mallard, quail, pheasant, and pigeon. For fish, toxic effects of glyphosate are very slight, but some formulations of 2,4-D are very toxic whereas others are less so. For example, bluegill, trout, and carp have exhibited very little toxicity to Rodeo. Studies of the potential for glyphosate and 2,4-D to bioaccumulate in animal tissues indicate a low potential for aquatic invertebrates and

fish. In summary, Rodeo and SEE 2,4-D offer little potential to harm aquatic organisms when used according to directions on their labels.

294

There is little potential for dissolved oxygen levels in interior sloughs at Calhoun Point to be depleted by decomposing vegetation killed by herbicide treatment (leaves from sprayed trees and herbaceous plants under and adjacent to these trees). Moist-soil management units (all interior sloughs but Pohlman) will still be in the draw-down stage (lowered water levels) when herbicide is scheduled to be applied. Some of the vegetation killed by herbicide treatment is expected to become inundated when recharging of these areas occurs. However, water temperatures should be appreciably lower than those typical of mid-summer, when the potential for oxygen depletion is greatest.

Both Rodeo and SEE 2,4-D are labelled as harmful to people if swallowed or absorbed through the skin. Contact with the eyes or skin is to be avoided, as it may cause irritation. Skin absorption of SEE 2,4-D may cause nausea, muscle weakness, and fall in blood pressure. Both products are not to be applied within one-half mile upstream of any public water intake. There are no such water intakes in the vicinity of Calhoun Point (Grafton's water supply comes from two wells). The potential for accidental exposure of people at Calhoun Point with herbicide via aerial spraying is low. Although there are about 10 cabins located within the project area that could be in use, especially during late summer/early fall, they are located along the west and north edges of Pohlman Slough, where spraying is not proposed. Also, use of Calhoun Point by the visiting public is relatively low. Signs will be posted advising the visiting public to keep out of areas scheduled for spraying. Likewise, spraying will be scheduled on weekdays rather than weekends when expected use is lower.

This information will be included in Section 7, Environmental Effects of the elected Plan. References for the above information are Agrolinz (1989), EXTOXNET (1993, 1994), Ferree (1995), and Monsanto (1992). Based on the above evaluation, Rodeo has been selected as the herbicide of choice for Calhoun Point.

Agrolinz. 1989. Material safety data sheet, SEE 2,4-D. Prepared May 23, 1989. Agrolinz, Inc., Memphis, Tennessee. 5 pp.

EXTOXNET. 1993. Pesticide information profile, 2,4-D. Revised 9/93. Extension Toxicology Network, a pesticide information project of cooperative extension offices at Cornell university, Michigan State University, Oregon State University, and University of California at Davis. Primary file maintained and archived at Oregon State University (http://sulaco.oes.orst.edu:70/0/ext/extoxnet/pips/24d.p93.html).

EXTOXNET. 1994. Pesticide information profile, glyphosate.

Revised 5/94. Extension Toxicology Network, a pesticide information project of cooperative extension offices at Cornell university, Michigan State University, Oregon State University, and University of California at Davis. Primary file maintained and archived at Oregon State University (http://sulaco.oes.orst.edu:70/0/ext/extoxnet/pips/glyphos.p54).

Ferree, R. 1995. Controlling aquatic vegetation. Pp. 251-256, in 1995 Illinois Agricultural Pest Management Handbook.

Monsanto. 1992. Material safety data sheet, Rodeo herbicide. Prepared February 1992. Monsanto Company, St. Louis, Missouri. 4 pp.

295

Question/Comment Page 53-56, item 13, Pumps - Intake Velocities and Effects on Fish. Water velocity near the pump would be about 1 ft/sec. This is higher than the IDOC's recommended maximum water velocity of 0.3 to 0.5 ft/sec to avoid fish entrainment. The District has evaluated this problem, and the recommended plan will include a fish screen at Silver Lake's 48,000 GPM output pump site. See PLATE 15 of the final DPR for the design of the fish screen.

It is anticipated that such a device would reduce, but not eliminate, the potential for fish impingement. The District believes that the screen mesh should not be less than 1.5 inch by 1.5 inch, or else significant amounts of debris will collect, thus impeding water flow. Fish smaller than the 1.5 inch opening will pass through and into the pump.

No feasible design configuration was found for the 48,000 GPM input pump location near Chickahominy Lake. Because this pump is drawing water from the river rather than the lake--it should pose less of a hazzard to younger fish. No specific design drawing has been developed for the 5,000 GPM pumps. During its pumping operation, the Department could screen an area by using stakes and a ring of hardware cloth.

Comment Page 88, section 12, Recreation - Recreational Boat Connection and Vehicle Passage Grating. The height of the bridge over the water control structure at Pohlman Slough is a function of needing a minimal amount of space for operating the sluice gates. To give the Department control over boat movement thru the fish passage structure, we have included a swinging lockable gate into the design (See PLATE 11 of final DPR).

Comment Page 88, section 12, Recreation - Parking Lot and Boat Ramp at Chickahominy Slough. The proposed parking lot and boat ramp has been deleted from the recommended plan.

Comment, Replacement of Water Control Structures in Finger Sloughs of Pohlman Slough. The District has determined that

because replacement of these water control structures would represent deferred maintenance, they will not be included in the recommended plan.

296 Comment, Create Brush Piles as Wildlife Habitat with Cleared Timber. The District will include tree/brush piles as a feature in the recommended plan. Salvageable timber from the 51 acres of clearing for the levee will first be removed from the site. Fifty tree tops will be placed into Pohlman Slough as fisheries habitat. The unsalvaged timber will be placed into piles and lashed to the ground with cables. These piles will be spaced apart by about 500 feet. The lashing will consist of at least three 1/2-inch cables with 4-foot soil anchors (metal screw type). The clearing work and pile construction will be accomplished in no more than 1,000-foot segments at a time. The lashings and segmented clearing will minimize the potential for cleared timber to be carried into the navigation channel during flood events.

Illinois Department of Transportation
Division of Water Resources
3215 Executive Park Drive / P.O. Box 19484 / Springfield, Illinois / 62794-9484

297

December 28, 1994

SUBJECT: Calhoun Point Project
Mississippi and Illinois Rivers
Calhoun County

St. Louis District Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attention: Planning Division, PD-F

Gentlemen:

This is in response to your December 12, 1994 letter and a copy of the draft report for the subject project.

Enclosed is a copy of our rules for construction in floodways (Part 700) and public waters (Part 704). Any construction proposed within the normal stage of either river or any backwater lake will trigger our public notice procedure.

If you have any questions, please contact Dennis Luebbe of my staff at 217/782-3862.

Sincerely,

Dennis L. Kennedy, P.E., Head
Technical Analysis and Permit Unit

DLK:DML:lmt
Enclosures

11 AUG 1995

298

Planning Division
Plan Formulation Branch

Mr. Dennis L. Kennedy:
Illinois Department of Natural Resources
Office of Water Resources
3215 Executive Park Drive
P.O. Box 19484
Springfield, Illinois 62794-9484

Dear Mr. Kennedy:

In a letter dated December 28, 1994, the Illinois Department of Transportation instructed the St. Louis Corps District to prepare a permit request for its Calhoun Point Habitat Rehabilitation and Enhancement Project (HREP). This project is a component part of the Upper Mississippi River System--Environmental Management Program. The subject permit request is attached as Enclosure 1. A copy of the Definite Project Report (DPR) for Calhoun Point was furnished to your office in October 1994 at the same time that it was mailed to the public (an additional copy is furnished here as Enclosure 2).

As per prior discussions with the Department, the District issued a Joint Public Notice (Corps and state of Illinois, see Enclosure 3) for the HREP. The public's comments and the District's responses to those comments will be included as part of the final DPR for the project. A draft copy of the comments and responses will be made available to the Department upon request.

The District would like to secure the requested permit as soon as possible. If the District can be of any further assistance in the processing of the permit, please do not hestitate to call. Please contact Mr. Ron Dieckmann (314-331-8363) for questions directly relating to hydrologic engineering, and Mr. Dave Gates (314-331-8478) for other project questions.

Sincerely,

signed
OWEN D. DUTT
OWEN D. DUTT
Chief, Planning Division
Chief, Planning Division

Enclosures

JOINT APPLICATION FORM

1. Application Number (to be assigned by Agency)

2. Date 7 8 95 (Day Month Year)

3. For agency use only (Date Received).

4. Name and address of applicant
U.S. Army Corps of Engineers--St. Louis
1222 Spruce St.
St. Louis, Mo 63103-2833

Telephone no. during business hours A/C (314) 331-8451
A/C ( )

5. Name, address, and title of authorized agent.
Owen D. Dutt
Chief, Planning Division
U.S. Army Corps of Engineers--St. Louis
1222 Spruce Street
St. Louis, Mo 63103-2833

Telephone no. during business hours A/C ( )
A/C (314) 331-8451

299

6. Project Description and Remarks: Describe in detail the proposed activity, its purpose, and intended use. Use attachments if needed.

The Definite Project Report (DPR) previously provided your office describes in detail the proposed Calhoun Point Habitat Rehabilitation and Enhancement Project. See project plan maps ES-5 and Plates 2 and 3, project features description ES-3 and pp. 63-81, and the project goals & objectives ES-2 and pp 21-25. Attachment 1 of the DPR provides the project design drawings. The intended project purpose is habitat improvement compatible with the operational requirements of the Illinois Department of Natural Resources. The Section 404 analysis is provided in APP C of the DPR, the Hydrology & Hydraulics analysis in APP E, and the Real Estate APP O.

7. Names, address, and telephone numbers of all adjoining and potentially affected property owners, including the owner of subject property if different from applicant.

See attached page.

8. Location of activity

Legal Description:

Confluence Mississippi & Illinois Rivers
Name of waterway at location of the activity

1/4 Sec. T13S Twp. R1W Rge. P.M.

Address:
Adjacent to IL River Miles 2 to 4, & Miss. River Miles 220 to 223
Street, road, or other descriptive location

Grafton
In or near city or town

Hardin
Name of Local Governing Community

Calhoun
County

Illinois
State

Zip Code

9. Date activity is proposed to commence June 1997 Estimated Time of Construction 4 Years

10. Is any portion of the activity for which authorization is sought now complete? ____ Yes X No If answer is "Yes" give reasons in item 6.

Month and Year the activity was completed _____ Indicate the existing work on drawings.

11. List all approvals or certifications required by other federal, interstate, state, or local agencies for any structures, construction, discharges, deposits, or other activities described in this application. If this form is being used for concurrent application to the Corps of Engineers, Illinois Department of Transportation, and Illinois Environmental Protection Agency, these agencies need not be listed.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval
IEPA	Water Quality Certification	C-1539-94	October 1994	Pending
IEPA	Permit to Burn	To Be Applied for After Project Approval		
Corps	Section 404 Approval	P-1939	October 1994	Pending

12. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein. ____ Yes X No
(If "Yes", explain in item 6.)

13. Application is hereby made for authorizations of the activities described herein. I certify that I am familiar with the information contained in the application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

Owen D. Dutt
OWEN D. DUTT, CHIEF, PLANNING DIVISION
Signature of Applicant or Authorized Agent

Typed or Printed Name of Applicant or Authorized Agent

NCR FORM 426

7. Real Estate Information:

300 The project affected properties, project impacts and remedial actions to be taken are as follows:

* 23 cabin leases [13 inactive leases, 10 active leases (3 with cabins and 7 without cabins)] on private lands tract C-19A. Tract C-19A has three land owners--Yann, Wobbe, and Skelton.

Darwin Yann
4152 Yann Road
Marine, Illinois 62061
(618) 887-4417

Robert Wobbe
23 Susanne Court
Caseyville, Illinois 62232
(618) 345-6082

William Skelton
1011 Villa Ridge
Collinsville, Illinois 62234
(618) 344-0239

* 7 active cabin leases on Federal lands adjacent to the Illinois River portion of our project levee tie-in to the county road near the Brussels ferry crossing.

* 86 cabin leases on Federal lands in the vicinity of Pohlman Slough.

The Illinois River levee would have a minor, but direct, impact on the private lands tract, and the Federal leases along the Illinois River. The levee construction would result in a road about 2 feet higher than the existing road, it would be gravel topped, and maintained by the state of Illinois as part of its O&M responsibilities. Some minor ramping from the levee to the cabins and any river related access from the cabins would be included in the final project design.

The indirect impacts of the project on the private cabin sites would be minor. The levee would keep the more frequent flood events (those below elevation 424 NGVD) away from the cabins. However, events over elevation 424 NGVD could take a couple of days longer to drain from the area compared to the pre-project condition (since culverts represent a smaller opening than does an open floodplain). This short delay is not expected to result in a major impact to cabins useage (including septic systems, and general health considerations). The management of the waterfowl areas is not predicted to impact upon the ground water elevations at the lease areas. Pohlman Slough (normally held at river stage and open to the river via open culverts)

should intercept seepage from the waterfowl areas and divert it to the river.

The Corps' existing flowage easement on the private lands site was intended to cover only the impacts of the 9-foot navigation channel project, and is not adequate to cover any impacts resulting from the HREP. The state will either (1) obtain an easement agreement for the levee crossing, or (2) if the state so desires, acquire a fee title interest for the entire private lands tract. If option (2) is pursued, it appears that a willing sellers situation does exist. 301

The impacts, if any, on the federal lease areas along the Illinois River would be similar to those impacting upon the private lands tract. The current leases (cabin sites) in this location do not provide the District with authority to unilaterally reduce the lease area, therefore, the affected leases will be amended to accomplish this. The cabin sites that will be reduced in size require reappraisal to estimate the value of the leasehold interest of the reduced area. Based on the limited engineering data available to date, we do not believe this project will adversely affect the use and enjoyment of the leased areas by their respective tenants. However, if this project does substantially affect the cabin sites to the point that renders them useless for the present purpose, the leases will be terminated. The District does not plan to expend funds performing studies to determine if the project adversely affects the cabin sites.

302

Illinois Department of Transportation
Division of Highways / District 8
1100 Eastport Plaza Drive / P.O. Box 988 / Collinsville, Illinois 62234-6198

January 23, 1995

ATTN: CELMS-PD-F (P-1939)

Colonel Thomas C. Suermann, District Engineer
U.S. Army Engineer District, St. Louis
ATTN: Planning Division, PD-F
1222 Spruce Street
St. Louis, MO 63103-2833

Attn: Mr. Dave Gates
Calhoun Point Study Manager

Gentlemen:

This letter is in response to your December 20, 1994 public announcement requesting comments on the proposed Calhoun Point Habitat Rehabilitation & Enhancement Project draft DPR and EA. We appreciate the opportunity to review this project.

Although we do not have specific comments on your project itself, we wish to inform you of two related roadway studies within the Calhoun Point site vicinity recently undertaken by the Department. The first study involves a Consultant (Crawford, Murphy & Tilly, Inc.) evaluation of feasible options to maintain roadway access at twelve locations in District 8 that were isolated during the flood of 1993. One of these locations includes raising the roadway profile along various portions of IL Route 100 from Grafton to Nutwood. However, any profile adjustments along IL Route 100 would have no direct impact to the Calhoun Point site.

The second study concerns a Consultant (Oates Associates) evaluation of various options to provide improved access to Calhoun County. Included in this study are options such as a new Illinois River crossing near the Brussels Ferry site, raising the approach roadway to the Golden Eagle Ferry across the Mississippi River into Missouri, and raising the approaches to the Brussels Ferry to maintain operations during flood conditions. However, one of the objectives of this study is the identification and avoidance of environmentally sensitive areas and federal lands. Although it is unlikely that a new bridge would be built at the Calhoun Point site, we will inform our Consultant of the proposed rehabilitation and enhancement improvements.

303

Again, we wish to thank you for the opportunity to review the Calhoun Point Study draft reports and we will make this information available to our Consultants during further development of the Department's two studies.

Very truly yours,

Dale L. Klohr
District Engineer

Kent L. Muskopf

Kent L. Muskopf, P.E.
District Program Development Engineer

RRH/gaa/4089V

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 217
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

304

ER-94/969

February 17, 1995

Colonel Thomas C. Suermann
District Engineer
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street, Room 4.300
St. Louis, Missouri 63103-2833

Dear Colonel Suermann:

The Department of the Interior (Department) has reviewed the Draft Definite Project Report (DDPR) for the Calhoun Point Habitat Rehabilitation and Enhancement Project with Integrated Environmental Assessment and Draft Finding of No Significant Impact, dated October 1994. The objective of the project is to restore habitat diversity to benefit fish and wildlife species by: 1) maintaining and improving side channel and backwater habitat by reducing the rate of sediment accumulation in these areas; 2) increasing the quality and quantity of artificially flooded habitats for wetland-dependent wildlife, in particular migratory birds; 3) providing overwintering habitat for fish; 4) increasing the diversity of wetland types; and 5) maintaining and improving the quality and quantity of bottomland forest habitat within the project area.

General Comments

The subject document provides an appropriate description of the site, the proposed work, and assessment of anticipated impacts. The recommended plan consists of seven features: 1) construction of a dike/levee to reduce riverborne sediment input to the site, 2) selective dredging in Pohlman Slough, 3) placement of water-control facilities (gates and/or pumps) at Pohlman Slough, Silver Lake, Chickahominy Lake and Squaw Island, 4) placement of interior water-control facilities between Chickahominy and Silver Lakes and between Chickahominy and Royal Lakes, 5) removal of shoreline woody vegetation in certain locations, 6) installation of two small earthen embankments and associated stop-log structures in the Goose Field, and 7) mast tree plantings at dredge disposal sites, in certain existing cropfields, and within created forest openings. These habitat enhancement measures are estimated to provide a net gain of 546 Average Annual Habitat Units (AAHU's) for wildlife and 129 AAHU's for fishes.

The Department generally supports construction of the project, but suggests that the following measures be incorporated into the project plan to provide maximum overall project benefits:

1. Meander Scar Improvements: The DDPR indicates that this measure, which would have improved brood habitat for wood ducks, was not found to be cost-effective and was dropped from further consideration. However, the analysis is based on the Wildlife Habitat Analysis Guide (WHAG) model, which is generally not thought to be sensitive enough to accurately determine incremental benefits in small areas. We believe that the actual benefits to be derived from the meander scar improvements far exceed the benefits projected in terms of AAHU's by the WHAG model and that these benefits justify the costs to implement them. A primary purpose of the Mark Twain National Wildlife Refuge is to improve and maintain existing habitat to perpetuate optimum annual production of wood ducks. Without this measure, the proposed project will only provide 16 AAHU's for wood duck production. Therefore, the Department requests that the measure, or an equivalent one, be incorporated

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into the proposed project in order to meet the project goal of enhancing wood duck brood rearing habitat. 305

2. Selective Deepwater Dredging: We are aware that the selective dredging of Squaw Slough to provide additional fishery benefits was determined to be cost prohibitive, while the proposed dredging of Pohlman Slough would be relatively cost effective. We believe that the provision of suitable over-wintering habitat for riverine fish is a very important component of the project. In order to bolster this aspect of the project, we request that consideration be given to increasing the proposed dredging in Pohlman Slough from the presently proposed 40 percent of the slough length to approximately 60 percent of the slough length.

Specific Comments

Federal Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) inadvertently omitted the federally threatened decurrent false aster (*Boltonia decurrens*) from the list of endangered and threatened species provided to the Corps of Engineers (Corps) in the early planning stages of this project. Therefore, this species was not addressed in the Biological Assessment or DDPR. However, while the project site is within the known range of the species, the USFWS is not aware of any data indicating that the species has ever been found in the project area. In addition, the proposed action will not adversely affect habitat suitable for this species.

The DDPR indicates that in order to avoid any impacts upon the Indiana bat (*Myotis sodalis*), no clearing of trees that may provide suitable roosting habitat would occur between May 1 and August 31. The DDPR also indicates that the planned clearing of 56 acres of forested habitat is to be offset by the reestablishment of 110 acres of forest. If this seasonal cutting restriction is adhered to and reforestation feature is implemented, the USFWS concurs with your determination that the proposed project is not likely to adversely affect any known federally listed threatened or endangered species. This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated with the appropriate USFWS field office.

Other Fish and Wildlife Resources

The Department suggests that potential adverse impacts to specific mast trees located within or in close proximity to the levee alignment may be reduced through increased coordination between the project sponsors and the Corps at the time of plans and specifications development and also during actual levee construction.

The Illinois Department of Conservation (IDOC) has suggested two possible uses for the woody material which is to be removed as a part of land clearing for levee construction: 1) placement in brush piles to increase small mammal habitat, and 2) placement of larger green timber along the banks with buried root balls in the water will provide increased fisheries habitat. We believe that both of these suggested uses would provide additional benefits and recommend that these two measures be incorporated into the project plans.

The Department also concurs with IDOC suggestions to repair existing water control structures on the southeast side of Pohlman Slough and for an enhanced structure (i.e., 8-foot wide stop-log structure) between Pohlman Slough and Royal Lake to enhance water control capabilities and provide additional wildlife and fisheries benefits.

306 Detailed Technical Comments

Page ES-5: The Squaw Island facility should be clearly identified.

Page 12, (2) Open-water wetland: Statements in this section appear to devalue open-water wetlands for waterfowl. It should be indicated these types of wetlands provide sanctuary for all types of waterfowl and provide feeding areas for many species of diving ducks which feed on fish, as well as those that feed on invertebrates.

Page 14, (4) Cropland: This paragraph should be modified to indicate that: 1) the USFWS utilizes annual cooperative farming agreements, not leases, on its approximately 74 acres of agricultural lands in the project area, and 2) the USFWS manages these lands primarily for snow geese and ducks - they are not managed for and receive very little use by Canada geese.

Page 15, Paragraph 1: A revision is suggested since trend analysis no longer shows a steady decrease nationwide for duck populations.

Page 17, Section k: Reference should be made to the nearby heron rookery.

Page 19, Section o: It may be useful to modify this section to indicate that the project area is located approximately 10 miles to the northwest by air from the fringe of the St. Louis metropolitan area (25 miles from the center of St. Louis), but that the distance by road is considerably greater.

Page 31, (2) Navigation Pool Water Level Manipulation: The Department disagrees with the statement "water control needs for fish and wildlife must of necessity remain subservient to the needs of navigation." While it is true that the Upper Mississippi River System (UMRS) must be operated under certain reasonable constraints, Congress has declared the UMRS to be both a nationally significant transportation system and ecosystem. Therefore, the needs of both navigation and the environment should be considered in water control decisions. Neither need should be subservient to the other.

Page 52, (11) Clearing Shoreline Woody Vegetation: This section should include some information regarding the relative safety of utilizing herbicides to kill vegetation near water.

Page 56, (2) Alternative B - Wetlands Protection System: This alternative is intended to be a composite of all the measures surviving the measures evaluation. However, the meander scar improvements measure, which the DDPR indicates had failed the evaluation, appears to have been inadvertently included in Table 5.6.

Page 63, Paragraph 9: The Figure number referred to is incorrect, change Figure 5.8 to Figure 5.10.

Page 84, (a) Bottomland Forest, Paragraph 4: As the green tree reservoir will only function as such in the dormant season, it is unclear how the reservoir will provide brood rearing habitat for wood ducks.

Page 89, (b) Economic and Social Impacts: This paragraph should be modified to indicate that the USFWS utilizes annual cooperative farming agreements, not leases, on its portion of the project area croplands.

Conclusions

As expressed in the public meeting regarding this project, a greater site-specific knowledge of hydraulic impacts to the area is needed to more fully identify water removal capabilities following flooding, as well as possible

effects upon adjacent landowners and cabin leasers. We recognize that this project will impact local recreational opportunities, including boat access, and suggest that the DDPR clearly identify both the new boat ramp location and areas where access will be restricted (i.e., gated) by the IDOC. 307

The USFWS has indicated that a second public meeting is needed to address the concerns expressed in the first public meeting, as well as numerous additional comments which have been voiced to USFWS staff subsequent to the initial public meeting. Major changes, such as the revision of site placement for boat ramps, as well as vocal opinion by individuals at the first meeting indicating a desire for further contact relative to changes to the DDPR, strongly suggest that the agencies should be more responsive and conduct an additional meeting.

We appreciate the opportunity to review the document and provide comments.

Sincerely,

Don Henne

Don Henne
Regional Environmental Officer

308

ST. LOUIS DISTRICT'S RESPONSE
TO DRAFT DPR COMMENTS FROM
U.S. DEPARTMENT OF THE INTERIOR, OFFICE OF THE SECRETARY
(DON HENNE)
DATED FEBRUARY 17, 1995

General Comments - Meander Scar Improvements. This comment is addressed in the District's response to the U.S. Fish and Wildlife Service's letter dated February 23, 1995, under Meander Scar Improvements.

General Comments - Selective Deepwater Dredging. This comment is addressed in the District's response to the U.S. Fish and Wildlife Service's letter dated February 23, 1995, under Selective Deepwater Dredging.

Specific Comments - *Boltonia decurrens*, a federally threatened species. This comment is addressed in the District's response to the U.S. Fish and Wildlife Service's letter dated February 23, 1995, under *Boltonia decurrens*.

Specific Comments - Minimize Impacts to Specific Mast Trees. The District is appreciative of this comment, because it points out something that we can do better. We already have made a commitment within the District to ensure that impacts to bottomland forest, and especially to hard mast trees, are minimized during the development of plans and specifications and during actual construction.

Specific Comments - Use Cleared Trees for Wildlife and Fisheries Habitat. These two comments were addressed in the District's response to the Illinois Department of Natural Resources's letter dated March 17, 1995, under Use Cleared Timber as Fish Cover, and Create Brush Piles as Wildlife Habitat.

Specific Comments - Repair Existing Water Control Structures on Southeast Side of Pohlman Slough, and between Pohlman Slough and Royal Lake. These two comments were addressed in the District's response to the Illinois Department of Natural Resources's letter dated March 17, 1995, under Water Control Structures - interior location 3, and Replacement of Water Control Structures in Finger Sloughs of Pohlman Slough.

Detailed Technical Comments - page ES-5. The facilities for Squaw Island are presently shown in this figure (ES-1), but neither Squaw Island nor Squaw Island Slough were labelled. Labels will be placed in the final figure.

Detailed Technical Comments - page 12. The discussion in this section will be modified in the final report to reflect the importance of shallow water wetlands as sanctuary areas and feeding

areas for fish-eating diving ducks.

Detailed Technical Comments - page 14. The paragraph will be modified in the final report as suggested. 309

Detailed Technical Comments - page 15. The paragraph will be modified to reflect the current status of North American duck populations.

Detailed Technical Comments - page 17. The reference to the rookery will be included in the final report.

Detailed Technical Comments - page 19. The suggested modification will be included in the final report.

Detailed Technical Comments - page 31. Comment noted. The text wording has been rephrased.

Detailed Technical Comments - page 52. This comment was addressed in the District's response to the Illinois Department of Natural Resources's letter dated March 17, 1995, under Clearing Shoreline Woody Vegetation - Herbicide Effects. Information regarding the relative safety of using herbicide to kill vegetation near water will be included in Section 7, part (3), water quality.

Detailed Technical Comments - page 56. The meander scar improvements measure was inadvertently included in Table 5.6, and will be deleted from the final report.

Detailed Technical Comments - page 63. The correction will be made in the final report.

Detailed Technical Comments - page 84. Wood ducks would not use the greentree reservoir as brood rearing habitat. The paragraph will be corrected in the final report.

Detailed Technical Comments - page 89. The suggested change will be made in the final report.

Conclusions - Water Removal Capabilities Following Flooding. The hydraulics impacts of the project on the private cabin sites would be minor. The berm would keep the more frequent flood events (those below elevation 424 NGVD) away from the cabins. However, events over elevation 424 NGVD could take a couple of days longer to drain from the area compared to the pre-project condition (since culverts represent a smaller opening than does an open floodplain). This short delay is not expected to result in a major impact to cabins useage (including septic systems, and general health considerations). The management of the waterfowl areas is not predicted to impact upon the ground water elevations at the lease areas. Pohlman Slough (normally held at river stage and open to the river via open culverts) should intercept seepage from the

waterfowl areas and divert it to the river.

310 The Corps' existing flowage easement on the private lands site was intended to cover only the impacts of the 9-foot navigation channel project, and is not adequate to cover any hydraulic impacts resulting from the HREP. The state will either (1) obtain an easement agreement for the berm crossing, or (2) if the state so desires, acquire a fee title interest for the entire private lands tract. If option (2) is pursued, it appears that a willing sellers situation does exist.

The impacts, if any, on the federal lease areas along the Illinois River would be similar to those impacting upon the private lands tract. The current leases (cabin sites) in this location do not provide the District with authority to unilaterally reduce the lease area, therefore, the affected leases will be amended to accomplish this. The cabin sites, that will be reduced in size require reappraisal to estimate the value of the leasehold interest of the reduced area. Based on the limited engineering data available to date, we do not believe this project will adversely effect the use and enjoyment of the leased areas by their respective tenants. However, if this project does substantially affect the cabin sites to the point that it renders them useless for the present purpose, the leases will be terminated. The District does not plan to expend funds performing detailed studies to further determine the effects of the project on the cabin sites.

Conclusions - Proposed Boat Ramp. The proposed boat ramp and parking lot has been deleted from the recommended plan, as requested by the Illinois Department of Natural Resources.

Conclusions - Second Public Meeting. The District does not concur in the need for a second public meeting for those reasons stated in the District's response to public letter comment #62 (in APPENDIX B, Section 2, Attachment B-1). The District has made numerous positive changes to the project design in full consideration of public and agency suggestions. The final DPR\EA will be distributed to the public for its review and any final comments for the record.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
Rural Route 3, Box 328
Marion, Illinois 62959

311

IN REPLY REFER TO:

February 23, 1995

Colonel Thomas C. Suermann
St. Louis District
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTN: Mr. Bill Groth, CELMS-CO-F (P-1939)

Dear Colonel Suermann:

This is in reference to the application by the St. Louis District (District), Corps of Engineers for Department of the Army permits in accordance with Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act to place fill material into jurisdictional wetlands and waters of the United States in conjunction with the construction of the Calhoun Point Habitat Rehabilitation and Enhancement Project. The Calhoun Point project area is a wetland/backwater complex. Most of the area is managed by the Illinois Department of Conservation (IDOC) through a cooperative agreement with the Fish and Wildlife Service (Service).

These comments are provided in accordance with the provisions of the Fish and Wildlife Coordination Act, as amended; and the Endangered Species Act of 1973, as amended (ESA).

To facilitate compliance with Section 7(c) of the ESA, Federal agencies are required to obtain from the Service information concerning any species, listed or proposed to be listed which may be present in the area of a proposed action. Therefore, we are furnishing you the following updated list of species which may be present in the concerned area:

Classification	Common Name	Scientific Name	Habitat
Endangered	Bald eagle	*Haliaeetus leucocephalus*	Breeds and winters along major rivers and reservoirs
Endangered	Indiana bat	*Myotis sodalis*	Caves, mines; small steam corridors with well developed riparian woods; upland forests
Threatened	Decurrent false aster	*Boltonia decurrens*	Disturbed alluvial soils

There is no designated critical habitat in the project area at this time.

A Biological Assessment has been prepared for the proposed project. This document should be amended to include the decurrent false aster. Populations of this species are not known to occur in the project area and suitable habitat will not be adversely affected by the proposed action. If the provisions to eliminate adverse impacts to endangered species and/or their habitats described in the Biological Assessment are included in the project plans, the Service would concur that the proposed action is not likely to

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312

adversely affect any known federally listed threatened or endangered species. This precludes the need for further action on this project as required under Section 7 of the ESA. Should the project be modified or new information indicate endangered species may be affected, consultation should be initiated.

The Service generally supports construction of the project, but suggests that the following measures be incorporated into the project plans to provide maximum overall project benefits:

1. Meander Scar Improvements: The draft Definite Project Report indicates that this measure, which would have improved brood habitat for wood ducks, was not found to be cost-effective and was dropped from further consideration. However, the analysis is based on the Wildlife Habitat Analysis Guide (WHAG) model and the subsequent conversion of Habitat Suitability Indexes to Habitat Units. This process is generally not thought to be sensitive enough to accurately determine incremental benefits in small areas. We believe that the actual benefits to be derived from meander scar improvements far exceed the benefits projected in terms of Average Annual Habitat Units (AAHU's) by the WHAG model and that these benefits justify the costs to implement them. A primary purpose of the Mark Twain National Wildlife Refuge is to improve and maintain existing habitat to perpetuate optimum annual production of wood ducks. Without this measure, the proposed project will only provide 16 AAHU's for wood duck production. Therefore, the Service requests that the measure, or an equivalent one, be incorporated into the proposed project in order to meet the project goal of enhancing wood duck brood rearing habitat.

Selective Deepwater Dredging: We are aware that the selective dredging of Squaw Slough to provide additional fishery benefits was determined to be cost prohibitive, while the proposed dredging of Pohlman Slough would be relatively cost effective. We believe that the provision of suitable over-wintering habitat for riverine fish is a very important component of the project. In order to bolster this aspect of the project, we request that consideration be given to increasing the proposed dredging in Pohlman Slough from the presently proposed 40 percent of the slough length to approximately 60 percent of the slough length.

Approximately 51 acres of forested wetland will be cleared as a part of project construction. To off-set this loss, a forest habitat management plan has been developed that includes mast-tree plantings on 225 acres. The proposed project will result in a net gain of 546 AAHU's for wildlife and 129 AAHU's for fish. The Service has no objection to the issuance of a Department of the Army permit for the proposed work. However, we strongly encourage the District to include the above referenced measures in the project plans.

Thank you for the opportunity to comment.

Sincerely,

Joyce A. Collins
Acting Assistant Field Supervisor

cc: IDOC (Schanzle, Hubbell, Glosser, Booth, Atwood)
IESPB (Lauzon)
IEPA (Yurdin)
USEPA (Ehorn)
USFWS (Nelson, Bornstein, Drews, Surprenant)

313

Boltonia decurrens, a federally threatened species. The Biological Assessment has been modified in the final DPR to include this species.

Meander Scar Improvements. The Service objects to the elimination after a cost-efficiency analysis of meander scar improvements in the vicinity of Squaw Island to improve brood habitat for wood ducks. The District does not agree with the Service's assertion that the process of generating habitat units is not "sensitive enough to accurately determine incremental benefits in small areas." The District computed incremental benefits for three target species (mallard, heron, wood duck) for each of the measure's components (exterior water control structure and pump, dredging in slough, pothole excavation), but these values often turned out to be less than one average annual habitat unit per species per component. That is why these components became so "costly" in terms of dollars spent per habitat unit gained. The District believes the process of generating habitat units worked satisfactorily, and that the conclusion to be drawn is that new measures to improve brood habitat for wood ducks in a small area, if any, need to be developed that are less costly than those that were analyzed. Note that the recommended plan will increase the management flexibility of moist-soil management units within the complex in terms of spring drawdown. Although this flexibility was not quantified in terms of habitat units, it nevertheless should be able to accommodate brood rearing requirements of resident waterfowl, including wood ducks (see last paragraph in Section 7, part a.(8)(a) in the main report).

Selective Deepwater Dredging. The Service's recommendation to extend deepwater dredging in Pohlman Slough has been included into the recommended plan. About 75 percent, rather than 40 percent as described in the draft DPR, of the slough's length will be dredged to improve fisheries habitat. Further details for dredging are included in the District's response to IDOC's letter dated March 17, 1995.

314

United States Department of the Interior

Fish and Wildlife Service
Mark Twain National Wildlife Refuge
1704 N. 24th Street
Quincy, Illinois 62301

January 25, 1996

Thomas C. Suermann, Colonel
U.S. Army Corps of Engineers - CELM-PD-F
St. Louis District
ATTN: Mr. David Gates
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Colonel Suermann:

The U.S. Fish and Wildlife Service has reviewed the Definite Project Report for the Calhoun Point Habitat Rehabilitation and Enhancement Project and determined that the selected Alternative B of the proposal is compatible with the purposes for which the Mark Twain National Wildlife Refuge was established. The compatibility document is available upon request at the Mark Twain National Wildlife Refuge, Quincy, Illinois.

The Calhoun Point project, located at the confluence of the Illinois and Mississippi Rivers in Calhoun County, Illinois, is proposed under the Water Resources Development Act of 1986 (Public Law 99-662) as part of the Upper Mississippi River System Environmental Management Program and sponsored by the Illinois Department of Natural Resources.

The Calhoun Point project is situated on General Plan lands owned by the Corps and administered as part of the Mark Twain National Wildlife Refuge. Calhoun Point is managed for fish and wildlife and public use by the Illinois Department of Natural Resources under a cooperative agreement with the U.S. Fish and Wildlife Service. The Department of Natural Resources has agreed to accept responsibility for all operations and maintenance costs upon project completion.

We look forward to the continued cooperative efforts in working with you and other stakeholders in improving fish and wildlife habitat along the Upper Mississippi River. If we can be of further assistance, please let us know.

Sincerely,

Richard A. Steinbach

Dick Steinbach
Project Leader

COMPATIBILITY DETERMINATION

Station Name: Mark Twain National Wildlife Refuge

Date Established: 1958

Establishing Authority: Fish and Wildlife Coordination Act, Section 3 (48 Stat. 401)

Description of Proposed Use: Rehabilitation of the wetland complex within the Calhoun Point Wildlife Management Area at the confluence of the Illinois and the Mississippi Rivers. This is a Habitat Rehabilitation and Enhancement Project (HREP) sponsored by the Illinois Department of Natural Resources.

Purpose for Which Established: The Mark Twain National Wildlife Refuge was established
"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U. S. C. 715d (Migratory Bird Conservation Act)
"... shall be administered by him [Secretary of the Interior] directly or in accordance with the cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ..." 16 U.S.C. 664 (Fish and Wildlife Coordination Act)
"... Suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. 460k-1 (Refuge Recreation Act)

Anticipated Impacts on the Refuge Purposes: Long-term impacts of the habitat improvements resulting from this project are expected to provide positive benefits for fish and wildlife and for recreation users of these resources.

Stipulations that Would Make a Use Compatible with Refuge Purposes: Does not apply.

Justification: Nearly 50 percent of the wetlands in the United States have been drained and converted to other uses. Many of the remaining wetlands are degraded from excessive siltation and in need of rehabilitation to enhance their value to fish and wildlife resources. The proposed project will restore and enhance an important but degraded wetland complex in Calhoun County, Illinois.

Determination: The proposed use is compatible with the purposes for which the refuge was established.

Prepared by: Ross Adams Date: January 25, 1996
Ross Adams, EMP Coordinator

Determined by: Richard A. Steinbach Date: 1/25/96
Dick Steinbach, Project Leader

316

ILLINOIS
DEPARTMENT OF
NATURAL RESOURCES
Office of Water Resources

Gates

524 South Second Street, Springfield 62701-1787 — Jim Edgar, Governor • Brent Manning, Director

October 20, 1995

SUBJECT: Permit No. DS1995086
Calhoun Point Rehabilitation and Enchancement Project
Mississippi and Illinois River Floodplains
Calhoun County

U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attention: Owen D. Dutt, Chief
Planning Division

Gentlemen:

We are enclosing Permit No. DS1995086 authorizing the subject project. This permit is based, in part, on our concurrence with your analysis that the proposed work will have no impact on flood flows for recurrance intervals greater than 2 years. In addition to the general conditions of the permit, this approval is subject to the following special condition

a) Flood easements shall be obtained on all affected properties prior to completion of the project.

This permit does not relieve you of the responsibility of obtaining all other required, federal, state and local permits.

If any changes in the plans or location of the work are found necessary, revised plans should be submitted promptly to this office so that they may receive approval before work thereon is begun. When the work is done, please provide written notification that the project has been completed in accordance with the approved plans and conditions of the permit.

Please feel free to contact Dennis Luebbe of my staff at 217/782-3863 if you have any questions concerning this authorization.

Sincerely,

Robert H. Dalton

Robert H. Dalton, P.E.
Chief, Downstate Regulatory Programs

RHD:DML:lmt
Enclosure
cc: Calhoun County (Rita Kraushaar)
St. Louis District Corps of Engineers (Dave Gates)
Illinois Environmental Protection Agency
Illinois Department of Natural Resources, Office of Realty
& Environmental Assessment (Robert Schanzle)

Effective July 1, 1995, the Illinois Department of Natural Resources was created through the consolidation of the Illinois Department of Conservation, Department of Mines and Minerals, Abandoned Mined Lands Reclamation Council, the Department of Transportation's Division of Water Resources, and the Illinois State Museum and Scientific Surveys from the Illinois Department of Energy and Natural Resources.

[printed on recycled and recyclable paper]

PERMIT NO. DS 1995086
DATE: October 20, 1995

State of Illinois
Department of Natural Resources, Office of Water Resources

Permission is hereby granted to:

U. S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

to construct the Calhoun Point project in the Mississippi and Illinois River floodplains in Sections 1, 2, 3, 10, 11, 12, 14 and 15, Township 13 South, Range 1 West of the 4th Principal Meridian in Calhoun County

in accordance with an application dated Aug. 7, 1995, and the plans and specifications entitled:

CALHOUN POINT
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
MAIN REPORT AND APPENDICES
POOL 26, ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS
FINAL, SEPTEMBER 1995

Examined and Recommended:

Robert H. Dalton, Chief
Downstate Regulatory Programs Section

Approval Recommended:

Donald R. Vonnahme, Director
Office of Water Resources

Approved:

Brent Manning, Director
Department of Natural Resources

This PERMIT is subject to the terms and special conditions contained herein.

THIS PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

1) This permit is granted in accordance with the Rivers, Lakes and Streams Act "615 ILCS 5."

318

2) This permit does not convey title to the permittee or recognize title of the permittee to any submerged or other lands, and furthermore, does not convey, lease or provide any right or rights of occupancy or use of the public or private property on which the activity or any part thereof will be located, or otherwise grant to the permittee any right or interest in or to the property, whether the property is owned or possessed by the State of Illinois or by any private or public party or parties.

3) This permit does not release the permittee from liability for damage to persons or property resulting from the work covered by this permit, and does not authorize any injury to private property or invasion of private rights.

4) This permit does not relieve the permittee of the responsibility to obtain other federal, state or local authorizations required for the construction of the permitted activity; and if the permittee is required by law to obtain approvals from any federal or other state agency to do the work, this permit is not effective until the federal and state approvals are obtained.

5) The permittee shall, at the permittee's own expense, remove all temporary piling, cofferdams, false work, and material incidental to the construction of the project. If the permittee fails to remove such structures or materials, the Department may have removal made at the expense of the permittee.

6) In public waters, if future need for public navigation or other public interest by the state or federal government necessitates changes in any part of the structure or structures, such changes shall be made by and at the expense of the permittee or the permittee's successors as required by the Department or other properly constituted agency, within sixty (60) days from receipt of written notice of the necessity from the Department or other agency, unless a longer period of time is specifically authorized.

7) The execution and details of the work authorized shall be subject to the review and approval of the Department. Department personnel shall have the right of access to accomplish this purpose.

8) Starting work on the activity authorized will be considered full acceptance by the permittee of the terms and conditions of the permit.

9) The Department in issuing this permit has relied upon the statements and representations made by the permittee; if any substantive statement or representation made by the permittee is found to be false, this permit will be revoked; and when revoked, all rights of the permittee under the permit are voided.

10) In public waters, the permittee and the permittee's successors shall make no claim whatsoever to any interest in any accretions caused by the activity.

11) In issuing this permit, the Department does not ensure the adequacy of the design or structural strength of the structure or improvement.

12) Noncompliance with the conditions of this permit will be considered grounds for revocation.

13) If the construction activity permitted is not completed on or before December 31, 1998, this permit shall cease and be null and void. When all work is constructed, the permittee shall notify the Department so that a final inspection can be completed.

THIS PERMIT IS SUBJECT TO THE FOLLOWING SPECIAL CONDITIONS:

a) Flood easements shall be obtained on all affected properties within the project right of way prior to completion of the project.

APPENDIX DPR-C

CLEAN WATER ACT, SECTION 404(B)(1) EVALUATION

FOREWORD

APPENDIX DPR-C provides the Clean Water Act Section 404(b)(1) Evaluation Report for the Calhoun Point project and the Illinois Environmental Protection Agency's Section 401 Water Quality Certification.

APPENDIX DPR-C

320

SECTION 404(b)(1) EVALUATION REPORT ON THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES

CALHOUN POINT HABITAT REHABILITATION AND ENHANCEMENT PROJECT POOL 26, MISSISSIPPI RIVER, CALHOUN COUNTY, ILLINOIS

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

I. PURPOSE OF THIS EVALUATION

The proposed habitat rehabilitation and enhancement project at Calhoun Point, Pool 26, Mississippi River, Calhoun County, Illinois, will involve placement of dredged and fill materials into waters of the United States. Discharges of dredged or fill material into such waters are regulated under Section 404 of the Clean Water Act.

Under Section 404(b) of the Act, proposed discharges of dredged or fill material must conform to guidelines developed by the U. S. Environmental Protection Agency. On 5 September 1975, the Environmental Protection Agency published regulations (40 CFR 230) which outline criteria and procedures for evaluating activities subject to Section 404. On 24 December 1980, revised Section 404(b)(1) guidelines were published, and became effective 30 March 1981. It is mandatory that the guidelines be applied to all proposed discharges of dredged or fill material subject to approval under Section 404. This evaluation will address proposed discharges of dredged and fill material required for the habitat rehabilitation and enhancement at Calhoun Point.

On 25 August 1993 the final "Excavation Rule" was published (33 CFR Parts 323 and 328), and became effective on 24 September 1993. This regulation modifies the definition of "discharge of dredged material," which now means any addition of dredged material into, including any redeposit of dredged material within, the waters of the United States. The term includes, but is not limited to, a) the addition of dredged material to a specified discharge site located in waters of the United States; b) the runoff or overflow from a contained land or water disposal area; and c) any addition, including any redeposit, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized landclearing, ditching, channelization, or other excavation.

II. PROJECT DESCRIPTION

a. Location - The Calhoun Point project area is located in Calhoun County, Illinois, at the confluence of the Illinois and Mississippi Rivers. The 2,157-acre area lies in the floodplain of these two rivers, and nearly two-thirds (1,379 acres) of the area consists of bottomland forest. Within the interior of the project area, a mosaic of emergent and shallow open water wetlands comprises 466 acres (or about 22 percent of the area), several scattered agricultural fields encompass 269 acres (about 12 percent), and 43 acres consist of developed or disturbed areas (about 2 percent). 321

b. General Description

(1) Area Subject to Section 404 Jurisdiction - Much of the project area is considered to be a water of the United States, and therefore subject to Section 404 review requirements. This is because much of the project area is either below the plane of ordinary high water, or is wetland according to COE (1987). The average post-dam elevation of Pool 26 at Grafton, Illinois, which is adjacent to the project site, is 419.6 feet NGVD. The plane of ordinary high water at the project site is at the elevation of 421 feet NGVD. About one-quarter of the project area is below 421 feet NGVD.

Areas classified as wetland according to COE (1987) exhibit positive evidence of wetland soils, wetland vegetation, and wetland hydrology. Soil names, map symbols, and area represented by each of the five soil mapping units mapped within the project area by the Soil Conservation Service (1989) are as follows: Beaucoup silty clay loam (70) - 1,368 acres; Beaucoup silty clay loam, wet (1070) - 107 acres; Tice silt loam (284) - 298 acres;, Sarpy sand (92) - 20 acres; Wakeland silt loam (333) - 1 acre. The remainder of the project area is mapped as water (apparently 363 acres). For Calhoun County, all of the Beaucoup, Beaucoup wet, and Sarpy mapping units are considered hydric or wetland soils, whereas only inclusions of Beaucoup within the Tice and Wakeland units are hydric. More than half of the 269 acres of cropland within the project area has been classified as farmed wetland by the Soil Conservation Service, and the remainder as prior-converted wetland (SCS, 1994). Application of the COE (1987) methodology for wetland identification and delineation at Calhoun Point shows that about 1,900 acres of the project area is wetland. Areas not included as wetland are about 100 acres of bottomland forest along the Mississippi River, the prior-converted cropland (about 110 acres), and developed or disturbed areas (43 acres).

(2) Proposed Project Features - Recommended Plan - The proposed project consists of the following features.

(a) **Riverside berm.** A 30,100-foot (5.7-mile) long riverside berm forming a closed system, with a Mississippi River tie-in elevation of 426 NGVD, tapering in the downriver direction to 424 NGVD at the confluence area with the Illinois River. The berm along the Illinois River side of the project area will be at a constant elevation

of 424 NGVD. The berm will vary in height from 0 to 6 feet, will have 1 on 3 side slopes, a 10-foot wide crown, and rock placed on the crown as a road bedding. The berm includes a
322 2,000-foot long rock covered overflow structure (elevation 423.5 NGVD), just upriver of Island 525. Rip-rap protection will be provided at two locations where sideslopes are vulnerable to erosion, and includes the Illinois River segment for a distance of 1,800 feet, and the Mississippi River segment for a distance of 1,800 feet. The berm will permit enhanced interior water control for all of the management units, and will also serve to safeguard the loss of habitat to river sedimentation. Cleared trees (unsalvaged timber) will be placed as habitat structure. Fifty tree tops will be placed along the west side of Pohlman Slough, beginning at 200 foot intervals for 10,000 feet. Remaining unsalvaged timber will be placed as brush piles on the landward side of the berm, spaced 500 feet apart.

(b) **Exterior Water Control Facilities.**

(i) **Pohlman Slough Facility.** A combination open-topped water control/fish passage structure will be placed at the location of the former entrance to Pohlman Slough. The structure includes a 16 foot wide open-top concrete channel, one-half of which is fitted with stop-logs, and the other half with two 42" sluice gates with a grate covered bridge. Also included in this feature is the dredging of a connection between the river and the deeper portion of the slough. The feature will permit near year round fish movement between the slough and the river, and a sluice gate for easy equalization of interior/exterior water levels.

(ii) **Silver Lake Facility.** A 48,000 GPM permanently mounted output pump with a portable drive unit will be located at approximate Illinois River Mile 2.5. This pump will be used to discharge water from the interior of the site (Silver Lake, Chickahominy Lake, and Royal Lake) to the river during the summer drawdown phase of waterfowl management. A fish screen with 1.5-inch by 1.5-inch mesh will be installed to minimize loss of small fish that pass through the pump.

(iii) **Chickahominy Lake Facility.** A combination open-topped water control/fish passage structure will be placed at the river confluence, along the Mississippi River, just opposite the upriver end of Island 525. The unit is identical to item i. above. This feature also includes a dredged channel connection between the river and Silver Lake. A 48,000 GPM permanently mounted input pump with a portable drive unit will be installed to pump water from the river into the moist-soil area (Silver Lake, Chickahominy Lake, and Royal Lake) during the recharge period for moist-soil management.

(iv) **Squaw Island Facility.** A single 42" diameter CMP gravity drain and sluice gate will be located at the downriver end of Squaw Island in order to facilitate the area's use as a green tree area for waterfowl, and alternatively for wood duck brood rearing management. Also at this location will be placed a 5,000 GPM portable pump with portable drive unit to function in combination with the gated water control structure. Dredging will be required for the drainage approach channel.

(c) **Interior Water Control Facilities.**

(i) **Chickahominy/Silver Lake Facility.** An interior water control structure, consisting of an 8' wide concrete stoplog unit, will serve to help regulate Silver Lake and Chickahominy Lake as independent management units. 323

(ii) **Chickahominy/Royal Lake Facility.** An interior water control structure like the one above will be placed between Chickahominy and Royal Lakes to permit the independent water management of those two units. A drainage approach channel will be excavated.

(iii) **Royal Lake/Pohlman Slough Facility.** An interior water control structure like the one above will be placed between Royal Lake and Pohlman Slough to replace the existing deteriorated structure. It will improve the existing capability to independently manage these two units.

(d) **Interior Levees.** Two terrace embankment structures, each with 3' wide concrete stoplog units, will be placed at the north end of the goose fields in topographical depressions to permit fall ponding and summertime drainage of the goose fields. A 5,000 GPM portable pump will be provided for the fall flooding of the goose fields using water pumped from Pohlman Slough.

(e) **Selective Deepwater Dredging.** A deepwater dredge cut along 10,200 feet of Pohlman Slough towards the north end of the slough will be made to provide a fish refuge during the winter/summer stress periods. Two existing areas of cropland comprising 20 acres, and a 5-acre area of nonforested wetland, will serve as a disposal sites for the dredged material. Earthen material will be used to construct ring berms around the disposal areas.

(f) **Clearing of Shoreline Woody Vegetation.** To increase the area of moist-soil plant production, young willow and silver maple vegetation encroaching into emergent wetlands will be killed with herbicide. Ten percent of the project area's terrestrial habitat, or 169 acres, of such shoreline woody vegetation is targeted, but in reality a lesser area is expected to be treated because of tree mortality due to the 1993 flood.

(g) **Reforestation Plan.** The 25 acres of disposal sites for hydraulically dredged material will subsequently be planted to mast trees to help offset the bottomland forest impacts of riverside berm construction. Likewise, 110 acres of existing cropland will be planted with mast trees. Mast trees will be planted in 115 acres of bottomland forest where trees died from the 1993 flood.

(h) **Borrow sites.** Two borrow sites have been selected. A 26-acre area is located within the "Goose Field, and a 15-acre area is found along the Royal Landing access road. Earthen material for construction of the berm and other features will be

obtained from them.

324 c. Authority and Purpose - Public Law (PL) 95-502 authorized the construction of a new dam and 1,200-foot lock at Alton, Illinois, and directed the Upper Mississippi River Basin Commission to prepare a Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Basin Commission completed the Master Plan report and submitted it to Congress on 1 January 1982. The report recommended an environmental management program that included construction of habitat rehabilitation and enhancement projects.

The 1985 Supplemental Appropriations Bill (PL 99-88), signed into law by President Reagan on 15 August 1985, provided initial authorization and appropriations for an environmental management program for the Upper Mississippi River System. A more comprehensive authorization was later provided by the Water Resources Development Act of 1986 (PL 99-662).

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material (grain size, soil type)

(a) Fill Material - Fill materials include rock (quarry run limestone consisting of graded B stone, graded C stone, revetment C stone, 30" riprap, 3" minus stone, 6" minus stone, 9" bedding material, crushed stone), concrete, and earthen material (silts and clays).

(b) Dredged Material - Dredged material is defined as material that is either dredged or excavated from waters of the United States. Earthen material consisting of alluvial silts and clays will be hydraulically dredged and excavated.

(2) Quantity of Material - The following quantities of materials will be handled:

Riverside berm		
earthen material	31,500	cubic yards
revetment C stone	17,800	tons
overflow B stone	11,900	tons
road surfacing (crushed stone)	10,200	tons
3" minus stone	680	tons
Water control facilities		
Pohlman Slough		
excavation	30	cubic yards
concrete	107	cubic yards
dredging of earthen material for channel	10,000	cubic yards
Silver Lake		
excavation	1,320	cubic yards
concrete	17	cubic yards

30" riprap	727	tons	
9" bedding	233	tons	
backfill	3,089	cubic yards	325
Chickahominy Lake			
excavation	602	cubic yards	
concrete	787	cubic yards	
30" riprap	213	tons	
bedding material	64	tons	
backfill	1,604	cubic yards	
Squaw Island			
excavation	530	cubic yards	
concrete	3	cubic yards	
semi-compacted fill	150	cubic yards	
3" minus bedding	340	tons	
6" minus bedding	230	tons	
graded C stone	250	tons	
earthen cofferdam (temporary)	660	cubic yards	
dredging of earthen material for channel	4,400	cubic yards	
Chickahominy/Silver Lake			
excavation	1,080	cubic yards	
3" minus bedding	210	tons	
graded C stone	20	tons	
earthen cofferdam (temporary)	1,000	cubic yards	
concrete	52	cubic yards	
dredging of earthen material for channel	12,600	cubic yards	
Chickahominy/Royal Lake			
excavation	1,080	cubic yards	
3" minus bedding	210	tons	
graded C stone	20	tons	
earthen cofferdam (temporary)	1,000	cubic yards	
concrete	60	cubic yards	
dredging of earthen material for channel	6,300	cubic yards	
Royal Lake/Pohlman Slough			
excavation	1,080	cubic yards	
3" minus bedding	210	tons	
graded C stone	20	tons	
earthen cofferdam (temporary)	1,000	cubic yards	
concrete	60	cubic yards	
Interior levees			
excavation	220	cubic yards	
earthen material	1,960	cubic yards	
6" minus stone	10	tons	
concrete	46	cubic yards	
Pohlman dredging			

sediment	87,000	cubic yards
earthen embankment for disposal area	25,000	cubic yards
Borrow sites		
earthen material	33,000	cubic yards

(3) Source of Material - Stone used for the project will be obtained from commercial stone quarries in the vicinity of the project area. Concrete will be obtained commercially. Earthen material will be obtained from onsite.

e. Description of the Proposed Discharge Sites

(1) Location - The location of the proposed features and work is shown in FIGURE ES-1 and design plates 2 and 3. Most of the discharge sites are located around the perimeter of the project area adjacent to the Mississippi and Illinois Rivers, and the remainder are in the interior of the project area.

(2) Size (acres) and Types of Habitat - Construction of the riverside berm will require the loss of 51 acres of bottomland forest. Forty-one acres of cropland will be used for borrow sites. Disposal of hydraulically dredged sediment from Pohlman Slough and other aquatic areas will impact 20 acres of cropland and 5 acres of nonforested wetland. About 16 acres of Pohlman Slough, the fisheries management unit, will be dredged. Excavation to provide drainage approach channels will affect about 4 acres of shallow water habitat.

(3) Type of Site (confined, unconfined, open water)

(a) Permanent Deposits of Dredged and Fill Material - The construction sites for water control structures will be confined by the use of a temporary cofferdam in these aquatic areas. The hydraulically dredged disposal site will be confined by the employment of an earthen embankment around the perimeter of the site. The exterior and interior berm construction sites will be unconfined.

(b) Temporary Deposits of Fill Materials - Temporary cofferdams will be used in aquatic areas to construct three exterior and two interior water control structures.

(4) Timing and Duration of Discharge - Work to be performed will need to be accomplished during normal (nonflood) pool conditions. Depending on local weather and flooding conditions, the estimated duration of the construction period is about 45 months. Actual duration of discharges will only be a small fraction of that time.

f. Description of Disposal Method (hydraulic, drag line, etc.) - Sediment removed from Pohlman Slough and other aquatic areas will be dredged hydraulically. Heavy equipment such as a backhoe will be used to excavate sites for water control structures. Trucks will haul earthen material from the borrow sites to the berm construction sites.

III. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations

327

(1) Substrate Elevation and Slope - Calhoun Point lies in the floodplain of the lower Illinois and upper Mississippi Rivers and consists of alluvial material. The floodplain area is relatively flat, with elevations ranging from about 419.5 up to 430 feet NGVD, but much of the area is below 424 NGVD. Much of the project site is sloped no greater than 1-2 percent.

(2) Sediment Type (grain size) - The soil survey for Calhoun County describes the soils within the project area as silt loams and silty clay loams. Sediments within the interior sloughs consist of fine silts, clays, and organics.

(3) Dredged/Fill Material Movement - Earthen material used for berm construction, disposal area embankment, and as backfill will be compacted. Stone used for the overflow area and as riprap on the exterior berm has been sized to withstand the force of flood waters, and is not expected to move. Earthen material used for berms is subject to erosion but will be stabilized through the use of relatively flat sideslopes and revegetation measures.

(4) Physical Effects on Benthos (burial, changes in sediment type, etc.) - Benthos are found only in the aquatic portions of the project area. Construction of the water control structures will result in the burial and loss of some benthic organisms. Removal of sediment from Pohlman Slough and other aquatic areas for construction of drainage approach channels will also result in loss of benthic organisms. However, these areas are expected to be recolonized within one year, possibly with different assemblages of benthic organisms.

(5) Other Effects - No other effects are expected.

(6) Actions Taken to Minimize Impacts - The primary actions taken to avoid adverse effects on the substrate are designing stable slopes on structures, the use of immobile stone for constructing some structures (rather than earthen material), and revegetation measures to minimize erosion (lateral movement) of disposal areas.

b. Water Circulation, Fluctuation and Salinity Determinations

(1) Water

(a) Salinity - Not applicable.

(b) Water Chemistry - Hydraulic dredging is not expected to release unacceptable levels of un-ionized ammonia to the water column at the point of removal and at the disposal site.

(c) Clarity - Elevated suspended sediment levels are expected to occur in a localized nature within Pohlman Slough during hydraulic dredging. Likewise, slightly elevated
328 suspended sediment levels can be expected in the Mississippi and Illinois Rivers during the construction of cofferdams around sites for water control structures. Decreased water clarity is expected to be short-term at these sites.

(d) Color - No change is expected.

(e) Odor - The project is not expected to have an impact on water odors.

(f) Taste - The project is not expected to impact water taste.

(g) Dissolved Gas Levels - Construction activities associated with the project will have no significant adverse impact on dissolved gas levels.

(h) Nutrients - Some nutrients will be released to the water column during sediment removal; however, this will represent a temporary increase and is not considered significant.

(i) Eutrophication - The project is not expected to contribute toward eutrophication of the water column.

(j) Water Temperature - Temperatures are not expected to change.

(2) Current Patterns and Circulation

(a) Current Patterns and Flow - Small floods (those occurring once every one to two years) will be excluded from the project area by the exterior berm. Overall, the project will slightly alter circulation and flow patterns.

(b) Velocity - Small increases in current velocity of the Illinois and Mississippi Rivers are expected only during 1-2 year frequency floods when the exterior berm is not overtopped. When the structure is overtopped, there should be no change in current velocity.

(c) Stratification - Stratification does not occur within the project area because of shallow depths.

(d) Hydrologic Regime - The project will not alter the hydrologic regime of Pool 26, but it will raise slightly the flood profiles of the Mississippi and Illinois Rivers.

(3) Normal Water Level Fluctuations (tides, river stage, etc.) - The project will not affect normal fluctuations in the elevation of Pool 26.

(4) Salinity Gradients - Not applicable.

(5) Actions Taken to Minimize Impacts - The riverside berm will be constructed to a relatively low elevation (424 feet NGVD) so as to minimize the effect of the structure on flood heights. If hydraulic dredging in Pohlman Slough and other aquatic areas causes unacceptably high levels of un-ionized ammonia during the summer months, then dredging will be postponed until the potential for this problem disappears. 329

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site - Increases in suspended particulates and turbidity due to construction of water control structures are expected to be minimal because cofferdams will confine the construction sites, and the area within the cofferdam will be dewatered during the construction process. Such levels will be elevated locally within Pohlman Slough and other aquatic areas during hydraulic dredging. The disposal areas for hydraulically dredged material will have highly elevated levels of suspended particulates and turbidity, and return water will have the potential to impair water quality of receiving waters if settling times are not adequate.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column - Hydraulic dredging in Pohlman Slough and other aquatic areas has the greatest potential to adversely affect the water column.

(a) Light Penetration - Dredging is expected to give rise to reductions in light penetration that range from slight to excessive. These impacts should last up to several days once dredging is complete.

(b) Dissolved Oxygen - A short-term, localized decrease in dissolved oxygen (DO) levels is expected to occur during dredging.

(c) Toxic Metals and Organics - Results of the analysis of sediment samples for agricultural chemicals and metals indicated no detection of either parameter. The disturbance of sediments during project construction should have no significant impact.

(d) Pathogens - There is no reason to believe any pathogens exist in any of the proposed areas of construction.

(e) Aesthetics - Increased levels of suspended particulates and turbidity could be aesthetically unpleasant to the visiting public or people who live within the project area on land leased by the Corps.

(f) Water Temperature - No short-term changes in water temperatures are expected to occur.

(3) Effects on Biota

330 (a) Primary Production, Photosynthesis - Minor short-term impacts to primary production and photosynthetic processes are expected to occur locally.

(b) Suspension/Filter Feeders - A localized, short-term, and minor reduction in benthos production due to increased suspended sediments is expected for Pohlman Slough and other aquatic areas.

(c) Sight Feeders - Impacts to sight-feeders associated with hydraulic dredging are expected to be short-term and range from slight to substantial.

(4) Actions taken to Minimize Impacts - Actions to minimize impacts associated with suspended particulates and turbidity include detention of return water in the disposal sites to allow particulate and turbidity levels to return to ambient conditions, having return water from the disposal sites go back into waterbodies within the project site rather than the Illinois or Mississippi Rivers, compaction of earthen materials, and revegetation of disturbed terrestrial areas.

d. Contaminant Determinations - Sediment samples were analyzed for metals and agricultural chemicals, and results indicated that neither parameter was present.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton - Increased suspended sediments and turbidity levels associated with cleanout will adversely impact phytoplankton production. This impact will be short-term and last for the duration elevated levels. In the long term, the project is expected to maintain and protect plankton production by preventing the conversion of aquatic habitat to terrestrial habitat due to sedimentation.

(2) Effects on Benthos - Benthic organisms in the immediate vicinity of open-water sites designated for the placement of earthen material for cofferdams probably will be lost due to burial. Loss of benthos will also occur as a result of hydraulic dredging. Also in the long term, the project is expected to maintain and protect benthic production in the project area by preventing the conversion of aquatic habitat to terrestrial habitat due to sedimentation.

(3) Effects on Nekton - The term "nekton" refers basically to larger, free-swimming aquatic organisms, such as fishes. Adverse impacts on sight-feeding fish due to hydraulic dredging are expected to be short-term and minor. In the long-term, the project is expected to maintain and protect fish habitat in the side channels by preventing the conversion of aquatic habitat to terrestrial habitat due to sedimentation.

(4) Effects on Aquatic Food Web - Construction activities are expected to disrupt

the aquatic food chain of the interior sloughs to a minor degree.

(5) Effects on Special Aquatic Sites 331

(a) Sanctuaries and Refuges - The project area is managed by the Illinois Department of Natural Resources and U.S. Fish and Wildlife Service as a waterfowl rest area. The project is expected to benefit migratory and resident waterfowl, fisheries, and other wetland wildlife.

(b) Wetlands - The 2157-acre project area consists of about 1,900 acres of wetlands subject to Section 404 of the Clean Water Act. The wetlands include about 1,280 acres of bottomland forest, 466 acres of emergent and open water wetlands (interior sloughs), and 159 acres of farmed wetland. The project area also includes 110 acres of prior-converted cropland, but this landcover type is not wetland.

About 51 acres of bottomland forest will be lost to construction activities, of which about 15 acres are wetland. Hydraulic dredging will deepen about 20 acres of shallow-water wetlands in Pohlman, Silver, Chickahominy, and Royal Lakes. Disposal sites for hydraulically dredged sediment will directly affect about 13 acres of farmed wetland, and about 5 acres of nonforested wetland. Creation of the seasonal greentree reservoir will inundate about 100 acres of bottomland forest wetland during the fall and winter months.

The recommended plan includes the conversion of the 7, 13, and 5-acre dredged material disposal sites and 90 acres of cropland to bottomland forest by planting of bottomland mast tree species.

(c) Mud Flats - Under the current management, seasonal mud flats occur within the moist-soil management unit during the summer months. The project will provide the capability to create mud flats in these sloughs on a more reliable basis.

(d) Vegetated Shallows - Vegetated shallows occur in the project area when moist-soil plants are mature and the moist-soil management unit is flooded in the fall. The project will increase the area of moist-soil plant production by about 170 acres through the application of herbicide to kill woody growth, such as willows and silver maples, that has encroached into the moist-soil management area.

(e) Coral Reefs - Not applicable.

(f) Riffle and Pool Complexes - There are no riffle and pool complexes in the project area.

(6) Threatened and Endangered Species - The bald eagle, Indiana bat, decurrent false aster, lake sturgeon, and spectacle case mussel are Federally listed endangered or Category 2 species that may be found in the project area. There currently is no designated

critical habitat in the project area. With the inclusion of efforts to eliminate adverse impacts on the bald eagle, Indiana bat, and decurrent false aster, the project will not adversely affect any of these species.

332

(7) Other Wildlife - Adverse impacts to wildlife habitat caused by construction activities include the loss of about 51 acres of bottomland forest, 20 acres of cropland, and 5 acres of nonforested wetland. Vegetation clearing and other construction activities will destroy some wildlife, whereas other wildlife in the immediate vicinity will be displaced to adjacent areas.

The affected habitats will be replaced by 115 acres of bottomland forest created by tree planting on 25 acres of dredged material disposal sites, and 90 acres of cropland. Mast tree species will also be planted in 115 acres of bottomland forest where trees have died due to the 1993 flood. Wetland wildlife, especially migrating waterfowl, will benefit from increases in habitat quality and quantity within the moist-soil management area (Silver, Chickahominy, and Royal Lakes) and Goose Field.

(8) Actions to Minimize Impacts - Actions that will minimize impacts to the aquatic ecosystem and its organisms include the following. Disposal sites located in nonaquatic areas will be used to contain hydraulically dredged material; return water will remain physically isolated from the Illinois and Mississippi Rivers. Dredging will cease if un-ionized ammonia levels exceed state water quality standards, and will resume when the appropriate ambient temperatures are attained. Tree planting will occur on 25 acres of disposal sites, on 90 acres of cropland, and in 115 acres of bottomland forest. Contractors will be required to submit an environmental protection plan to include protection methods and procedures for avoiding landscape defacement, providing for water and air pollution prevention, for disposal of solid and chemical waste, and for protecting fish and wildlife resources. Government inspectors will oversee construction projects to ensure that personnel, equipment, and construction techniques meet all contract specifications, including environmental requirements.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination - The discharges of fill and dredged material will largely occur in nonaquatic areas (such as bottomland forest for the levee, land disposal sites for dredged material); discharges in aquatic areas are limited to earthen material used for cofferdams and riprap. The concentration of resuspended material associated with construction of water control structures will not be high enough to require a mixing zone.

(2) Determination of Compliance with Applicable Water Quality Standards - The project is expected to comply with applicable water quality standards. The District has coordinated with the Illinois Environmental Protection Agency (IEPA) in regard to water quality requirements for hydraulic dredging, and has incorporated that agency's recommendations into the proposed project. Section 401 water quality certification from the IEPA has been issued.

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply - No municipal water supply will be adversely impacted by project construction. 333

(b) Recreational and Commercial Fisheries - The proposed project is expected to improve winter and summer habitat conditions for fish, and thereby the likelihood of successful recreational fishing opportunities.

(c) Water Related Recreation - Water-related recreation (hunting, boating, fishing, etc.) is not expected to be adversely impacted by the project in the long-term. Certain opportunities may be unavailable during the construction period, such as boating within interior sloughs while dredging is in progress. Hunting at the "Goose Field" is not expected to be adversely affected.

(d) Aesthetics - Construction activities will have minor impacts on the aesthetic quality of the project area during the duration of the work. The most visible activities will occur adjacent to the Illinois River (construction of the riverside berm near the Brussels ferry and adjacent clubhouses), and Pohlman Slough (dredging in Pohlman Slough adjacent to clubhouses). Most construction activities will not be visible except from the main channel of the Mississippi and Illinois Rivers.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves - The project will not impact any of these resources.

g. Determination of Cumulative Effects on the Aquatic Ecosystem - The Environmental Management Program should have a positive impact on the Upper Mississippi River System. Other projects within the program, specifically those at Stump and Swan Lakes just upstream on the Illinois River, have been examined in conjunction with the proposal at Calhoun Point in terms of cumulative effects of riverside berms on flood heights of the Illinois River, and no cause for concern has been identified. No other work in the aquatic environment is proposed for the project area. APPENDIX DPR-R has further details on cumulative impacts.

h. Determination of Secondary Effects on the Aquatic Ecosystem - No significant secondary impacts to the aquatic ecosystem have been identified.

IV. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation - In our evaluation of discharges proposed in connection with the Calhoun Point Habitat Rehabilitation and Enhancement Project, the Environmental Protection Agency's Section

404(b)(1) Guidelines of 24 December 1980 were applied without significant adaptation.

334 b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem - Because most of the project area is a water of the United States, the selection of nonwetland (upland) disposal sites was limited. Siting of borrow sites and disposal sites for hydraulically dredged material included bottomland forest, open water wetland, and cropland. Cropland was chosen in most cases because impacts to bottomland forest and open water wetlands would be avoided, and cropland with suitable characteristics was located nearby. The alinement of the riverside dike/levee parallels the Illinois and Mississippi Rivers, and overlaps with nonwetland soil for about half of its length along the Mississippi River. One 5-acre disposal site will be located in nonforested wetland at the tip of Calhoun Point. This site was chosen because the other two disposal sites are too far away for a disposal pipe to reach, it is adjacent to the dredging site in Silver/Chickahominy Lakes, and it has been previously disturbed.

c. Compliance with Applicable State Water Quality Standards - Water quality certification under Section 401 of the Clean Water Act has been issued.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act - The proposed activities will not violate the toxic effluent standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act of 1973 - The habitat rehabilitation project will not jeopardize the existence of Federally listed endangered or threatened species or their critical habitat. With the inclusion of measures to avoid adverse impacts, the project is unlikely to affect the Indiana bat or bald eagle.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 - not applicable.

g. Findings of Significant Degradation of the Waters of the United States - The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected in a significant manner. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values would not occur.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem - All appropriate and practicable measures have been taken through application of procedures contained in Subpart H of the Guidelines to insure minimal adverse effects of the proposed discharges.

i. On the Basis of the Guidelines the Proposed Disposal Sites for the Discharge of Dredged and Fill Material - Based on this evaluation, the proposed work is specified as complying with the requirements of these guidelines with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem. 335

September 14, 1995
Date

Thomas C. Suermann
Thomas C. Suermann
Colonel, Corps of Engineers
District Engineer

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director 2200 Churchill Road, Springfield, IL 62794-9276

336

217/782-0610

September 13, 1995

St. Louis District
Corps of Engineers
1222 Spruce Street
St. Louis, Mo. 63103

Re: St. Louis District Corps of Engineers (Calhoun County)
Calhoun Point HREP-Illinois and Mississippi Rivers
Log # C-1539-94 [CoE appl.# P-1939]

Gentlemen:

This Agency received a request on August 24, 1995 from the St. Louis District Corps of Engineers requesting necessary comments for environmental consideration concerning the Calhoun Point Habitat Rehabilitation and Enhancement Project, which includes the construction of exterior and interior dikes and levees, selective dredging, water control structure installation and other measures, at Silver Lake, Pohlman Slough and other areas between the Illinois and Mississippi Rivers. Dredging will involve the removal of approximately 100,000 cubic yards of material from various sloughs and channels and the disposal of this material in three confined disposal areas. We offer the following comments.

Based on the information included in this submittal, it is our engineering judgment that the proposed project may be completed without causing water pollution as defined in the Illinois Environmental Protection Act, provided the project is carefully planned and supervised.

These comments are directed at the effect on water quality of the construction procedures involved in the above described project and is not an approval of any discharge resulting from the completed facility, nor an approval of the design of the facility. These comments do not supplant any permit responsibilities of the applicant toward the Agency.

This Agency hereby issues certification under Section 401 of the Clean Water Act (PL 95-217), subject to the applicant's compliance with the following conditions:

1. The applicant shall not cause:

   a. violation of applicable water quality standards of the Illinois Pollution Control Board, Title 35, Subtitle C: Water Pollution Rules and Regulation;

   b. water pollution defined and prohibited by the Illinois Environmental Protection Act; and

   c. interference with water use practices near public recreation areas or water supply intakes.

2. The applicant shall provide adequate planning and supervision during the project construction period for implementing construction methods, processes and cleanup procedures necessary to prevent water pollution and control erosion.

3. Any spoil material excavated, dredged or otherwise produced must not be returned to the waterway but must

be deposited in a self-contained area in compliance with all state statutes, regulations and permit requirements with no discharge to waters of the State unless a permit has been issued by this Agency. Any backfilling must be done with clean material and placed in a manner to prevent violation of applicable water quality standards.

4. All areas affected by construction shall be mulched and seeded as soon after construction as possible. The applicant shall undertake necessary measures and procedures to reduce erosion during construction. Interim measures to prevent erosion during construction shall be taken and may include the installation of staked straw bales, sedimentation basins and temporary mulching. All construction within the waterway shall be conducted during zero or low flow conditions. The applicant shall be responsible for obtaining an NPDES Storm Water Permit prior to initiating construction if the construction activity associated with the project will result in the disturbance of 5 (five) or more acres, total land area. An NPDES Storm Water Permit may be obtained by submitting a properly completed Notice of Intent (NOI) form by certified mail to the Agency's Division of Water Pollution Control, Permit Section.

5. The applicant shall implement erosion control measures consistent with the "Standards and Specifications for Soil Erosion and Sediment Control" (IEPA/WPC/87-012).

6. The applicant shall obtain a permit to construct and operate the three disposal facilities for the disposal of dredged sediment from Pohlman Slough and other areas, pursuant to 35 Il. Adm. Code 309.202 and 309.203. Effluent limits for the return water from the disposal facilities are established under Parts 302 and 304 of Subtitle C.

This certification becomes effective when the Department of the Army, Corps of Engineers, includes the above condition #1 through 6 as conditions of the requested permit issued pursuant to Section 404 of PL 95-217.

This certification does not grant immunity from any enforcement action found necessary by this Agency to meet its responsibilities in prevention, abatement, and control of water pollution.

Very truly yours,

Thomas G. McSwiggin, P. E.
Manager, Permit Section
Division of Water Pollution Control

TGM/by/9-12

cc: IEPA, Records Unit
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FOREWORD

APPENDIX DPR-D provides the mailing list used for the distribution of the Final DPR. This list is similar to that list used for the Draft DPR except that it also includes the names and addresses of those individuals that attended the public meeting and/or provided comment letters to the draft report.

APPENDIX DPR-D

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APPENDIX DPR-E

HYDROLOGY AND HYDRAULICS

FOREWORD

APPENDIX DPR-E presents the hydrologic/hydraulic effort leading to the proposed project. The appendix provides a discussion of climate, existing hydraulics and project hydraulics.

358

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
DEFINITE PROJECT REPORT

CALHOUN POINT PROJECT
REHABILITATION AND ENHANCEMENT
POOL 26, ILLINOIS RIVER MILES 2.2-3.7
& MISSISSIPPI RIVER MILES 220.5-223.0

APPENDIX E

HYDROLOGY AND HYDRAULICS

General. The Calhoun Point project, shown on Plate 1 of the main report, is located at the confluence of the Illinois River with the Mississippi River, just upstream of Grafton, Illinois. This appendix will present the hydrologic/hydraulic effort leading to the proposed improvements to the Calhoun Point area.

Climate. The climate of the Illinois region in which Calhoun Point is located is typical midwestern, with warm, humid summers and cold, relatively-dry winters. Normal temperature extremes range from 100 degrees or more in mid-summer to below zero in mid-winter. The average annual temperature in the local area is 51 degrees.

Significant precipitation occurs in every month of the year, with the greatest amounts normally in April-May and the least in January-February. The area averages slightly under 35 inches precipitation per year, with about 24 inches of snowfall in a typical winter. Average annual evaporation is not available for this immediate area. Table E-1 gives average monthly precipitation totals at Grafton, Illinois, and average monthly evaporation totals at the National Weather Service gage at St. Louis.

TABLE E-1

Average Monthly Precipitation and Evaporation

Month	Precip. (in.)	Evap. (in.)	Month	Precip. (in.)	Evap. (in.)
January	1.66	0.69	July	3.69	5.85
February	2.05	1.01	August	3.15	4.87
March	3.25	2.00	September	3.04	3.48
April	3.70	3.24	October	2.42	2.32
May	3.90	4.59	November	2.65	1.22
June	3.56	5.24	December	2.22	0.69

Existing Hydraulics. Illinois River stages at Swan Lake are controlled by regulation at Melvin Price Locks and Dam. The pool stage at the dam is 419.0 NGVD under normal conditions, and exceeds 419 NGVD only during flows approaching bankfull or greater. As shown on FIGURE E-1, which gives the annual stage-duration relationship at Grafton, Illinois (just downstream), stages are less than 421 NGVD more than 90% of the time on an annual basis. Minimum stages occur during floods when the pool goes "on tilt" and proceeds to an open river condition. Minimum regulated stage is 414 NGVD at the dam and about 418 NGVD at Calhoun Point. At this point all gates at Melvin Price Locks and Dam are out of the water. As flood flows continue to increase, the minimum, regulated stage increases as well, with the only effect of the locks and dam being a small local swellhead just upstream of the dam. Exterior elevations at the downstream end of Calhoun Point less than 418 could only occur during a loss of pool, a situation which has not happened since the

early 1950's.

a. Floods. Illinois River discharge- and stage-frequency relationships for the reach have been well-established from previous analytical and physical model studies. Flood-frequency relationships at the downstream and upstream end of the Calhoun Point Project are shown on Table E-2. 359

TABLE E-2

Frequency (yrs)	Stage - Frequency Illinois River Mile 2.2 Elevation (NGVD)	Mississippi River Mile 223.0 Elevation (NGVD)
2	424.0	426.0
5	428.2	429.2
10	431.3	432.5
25	434.4	436.1
50	437.5	438.3
100	440.5	441.3

The flood-of-record occurred in 1993 and reached an elevation of about 441.8 NGVD at Grafton. Figure E-2 shows the stage-hydrograph for Grafton for the period of record (1962-1993).

b. Sedimentation. Sedimentation data on either the Illinois River or the Mississippi River in this reach are essentially non-existent. Because of the low velocities through the navigation pools at normal flows, the sediment load consists of silts and clays which settle very slowly. During a rising river, water backs into Calhoun Point causing deposition. During floods, when open-river conditions exist, the natural levees along the riverfront are overtopped and deposition occurs. Poulman Slough has become less desirable for fish habitat as the water depth has decreased substantially.

Project Hydraulics. To minimize continued sediment deposition from the Illinois River and to improve management of the system for wildlife habitat, a number of alternatives were evaluated. Primary components of the recommended plan are shown on Plates 2 and 3 of the main report and consist of a low riverfront earthen berm, three permanent pumping units, two for filling and one for draining the interior lakes, a portable pumping unit and two small stop log structures to supply and pond water for the goose field area, two stop log structures for conveying water between Chickahominy, Royale and Silver lakes, sluice gated gravity drains and fish passage structures with stop logs connecting Poulman Slough and Silver Lake to the Illinois River, and a sluice gated gravity drain connecting Squaw Island to the Mississippi River.

a. Riverfront Berm.

A low earthen berm was designed to prevent frequent Illinois River floods from depositing sediments within Calhoun Point area. The berm will extend from higher ground near Calhoun County Route 1 at approximate Mississippi River mile 223.0 downstream to mile 220.5, and then turning up the Illinois River and tieing into higher ground south of the 23 acre private lands tract near the Brussels Ferry-crossing, forming a closed berm system. An HEC-2 water surface profile analysis was performed on the Illinois River and the Mississippi River with the low berms proposed and without (existing conditions) for a range of floods from the 2-year to the 500-year recurrence interval. No significant increase in water surface elevetion was determined.

Table E-3 shows the effect of the Calhoun Point proposed berm on both the Illinois River and the Mississippi River.

360

TABLE E-3

Effect of Calhoun Point Berm on Upstream Water Surface Profiles on:

Illinois River

		Increase in Depth over Existing Condition (feet) Return Period (years)						
River Mile	Location	2	5	10	25	50	100	500
3.7	Upstream Limits of Calhoun Point Proposed Berm	0	0	0	0	0	0	0
21.6	Hardin Gage	0	0	0	0	0	0	0
31.7	Kampsville	0	0	0	0	0	0	0
43.2	Pearl Gage	0	0	0	0	0	0	0
56.0	Florence Gage	0	0	0	0	0	0	0
70.8	Meredosia Gage	0	0	0	0	0	0	0

Mississippi River

		Increase in Depth over Existing Condition (feet) Return Period (years)						
River Mile	Location	2	5	10	25	50	100	500
223.0	Upstream Limits of Calhoun Point Proposed Berm	.06	0	0	0	0	0	0
241.2	L & D 25 TW	.02	0	0	0	0	0	0
260.3	Mosier Landing, IL	.01	0	0	0	0	0	0
273.2	L & D 24 TW	0	0	0	0	0	0	0

(1) Crown elevation. A range of crown elevations for the riverfront berm were analyzed to determine appropriate elevations to exclude most of the sediment, while minimizing construction cost. Table E-4 shows the average annual duration associated with various berm crown elevations. Due to an absence of sediment data, it was assumed that the percent reduction in sediment inflow to the complex would be similar to the percent time reduction of complex inundation. This assumption is admittedly qualitative, the actual reduction could be somewhat higher or lower. The 424 berm will prevent sediment-carrying waters from entering the Calhoun Point complex about 67% of

the time. Deposited material within the berm, after the project is constructed, is expected to be minimal, with possible exceptions during a major, long duration event such as the 1993 flood. Therefore, even though much of the sediment is transported during floods, the assumption that sediment reduction to the project area is proportional to the time duration is judged reasonable and valid. 361

TABLE E-4
Average Annual Duration vs. Structure Elevation

Reference Point Near Downstream End (RM 220.5)		Reference Point Near Upstream end (RM 223.0)	
Crown Elev. (NGVD)	Sediment Reduction (%)	Crown Elev. (NGVD)	Sediment Reduction (%)
420	0	422	0
422	45	424	45
424	67	426	67
426	80	428	80
429	94	431	94

At the reference point at mile 220.5, the cost of berm construction above elevation 424 increased at a far greater rate than the incremental amount of sediment reduction. Consequently, minimum net berm crown elevations of 424.0 NGVD at the downstream end of the complex and 426.0 NGVD at the upstream end were selected.

(2) Berm overtopping. Overtopping of these structures will be a fairly frequent occurrence. The berm crown elevation of 424.0 NGVD at the downstream end represents a stage that corresponds to an approximate recurrence interval of 2 years. An evaluation of the past 32 years of record at Grafton (1962-1993) on Figure E-2 shows 18 years having events greater than 424.0 NGVD, an elevation which would cause the berm to overtop. Floods and overtopping would normally occur in the late winter-early spring of the year, due to upstream snowmelt and normal spring rains. When the low earthen berms are overtopped, some local damage may occur, but should be minimal. Any berm damage during most of these events would be repairable prior to the fall season, when higher interior water levels are required. To ensure minimal damage from overtopping to the main berm, a 2000 ft. length of berm near the downstream end set at elevation 423.5 and protected by stone riprap will be used for initial overflow.

b. Drainage Structures.

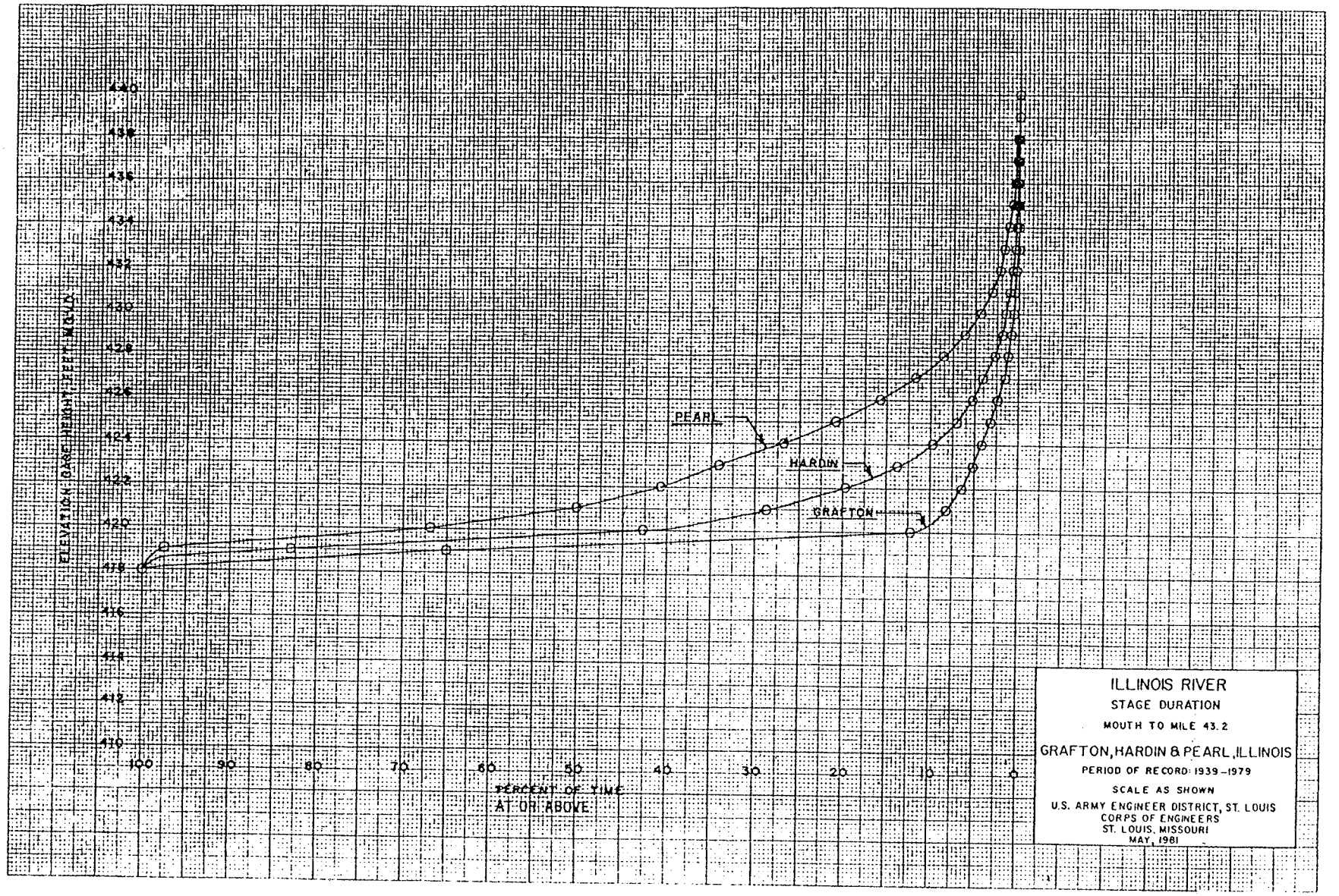
(1) Exterior Drainage Structures. Since the proposed riverfront berm forms a closed system, three new structures were required to fill or to drain the interior system by gravity whenever river conditions allow. Both the Poulman Slough and Silver Lake areas, will have a single structure combining double 42 inch outlets with sluice gates and a single 8 foot wide fish passage structure with stop logs. Fishery biologists have indicated that fish would be more likely to enter Poulman Slough for spawning through such an open structure as compared to a closed culvert. When overtopping of the berm from high river levels becomes imminent, the gates in both Poulman Slough and Silver Lake would be opened to allow backflooding, reducing the chance of damage to the berm. Also a single 42 inch gravity drain with sluice gate will be provide for Squaw Island so that it can be managed separately from the other interior lakes.

(2) Permanent Pumping. In order to have the capability to either flood or drain the system (Silver, Coon, Royale, and Chickahominy Lakes) two pumping stations were designed. Each pumping station, shown on Plates 11 and 12, consists of a single "Couch" type pump with a capacity of 48000 gallons per minute (gpm). The pumps will be powered by the same portable diesel engine powered drive unit. The pump to drain the system will be located at Silver Lake on the Illinois side of the project. The pump was located there because the deepest water depth in Silver Lake is at that location which will provide a natural sump area for the pump. The pump to flood the system will be located on the Mississippi side of the system to take advantage of the deeper water in the Mississippi for a natural sump as compared to the Illinois side of the project. The filling or emptying of the system could be accomplished in about 10 days with the selected pumping capacity.

A third permanent pump with a capacity of 5000 gpm is needed to provide separate water management to the Squaw Island area. It also will permit filling of the area within 10 days.

(3) Interior Drainage Structures. Two stop log structures, one between Chickahominy Lake and Royale Lake and one between Chickahominy Lake and Silver Lake is required for management of water levels if desired or to drain excess water from one compartment to the other as well as providing boat access when lake levels are the same.

(4) Portable Pumping. In the agricultural area known as the Goose Field, flooding of several fields in the fall to provide habitat for the canada geese is needed. A portable 5000 gpm pumping unit will be provided. This pump will be able to fill the fields in several days.


ELEVATION ABOVE MEAN SEA LEVEL IN FEET
440
438
436
434
432
430
428
426
424
422
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418
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412
410
100
90
80
70
60
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40
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20
10
PERCENT OF TIME
AT OR ABOVE
PEARL
HARDIN
GRAFTON
ILLINOIS RIVER
STAGE DURATION
MOUTH TO MILE 43.2
GRAFTON, HARDIN & PEARL, ILLINOIS
PERIOD OF RECORD: 1939-1979
SCALE AS SHOWN
U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI
MAY, 1981

FIGURE E-1

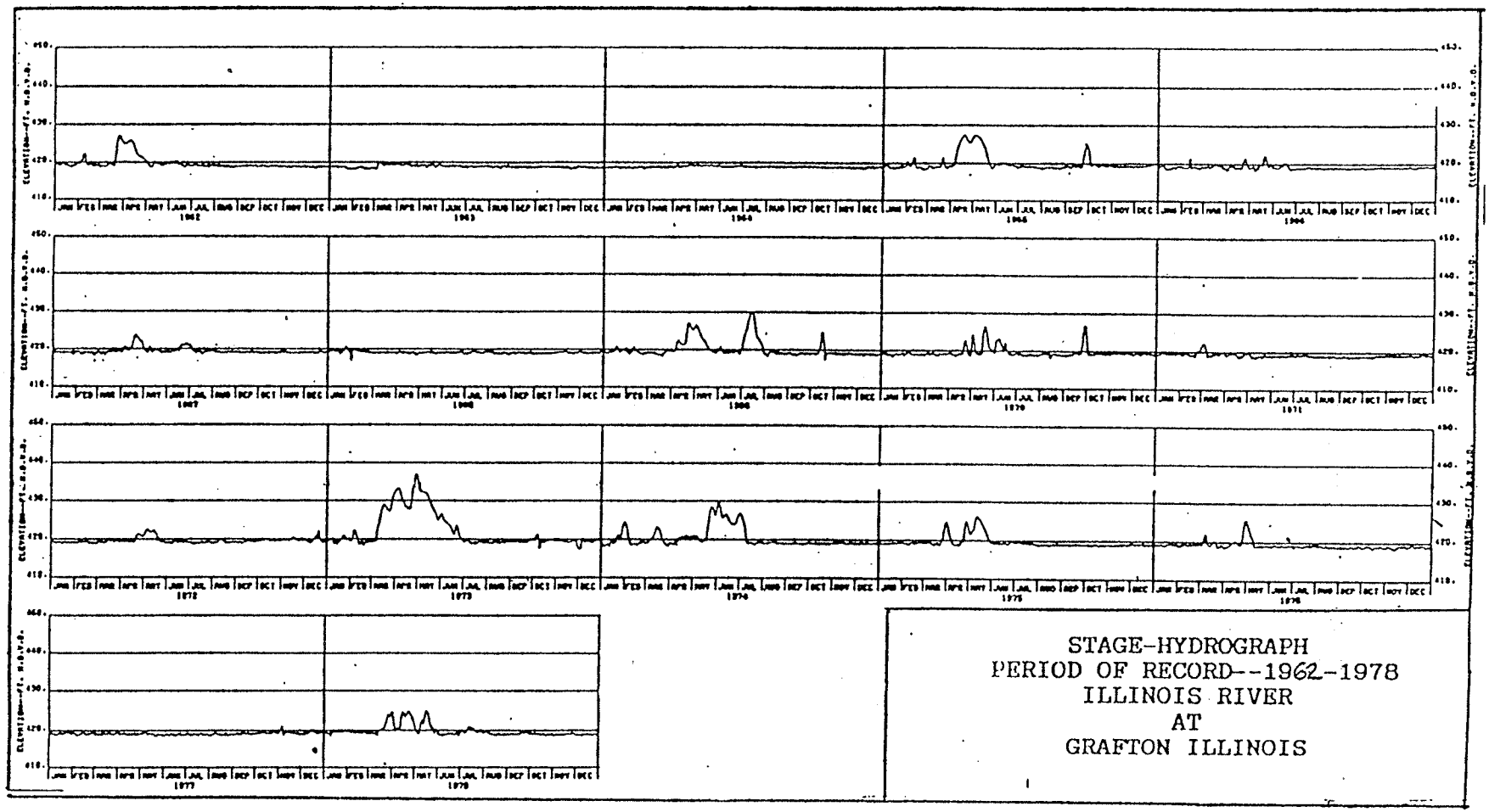
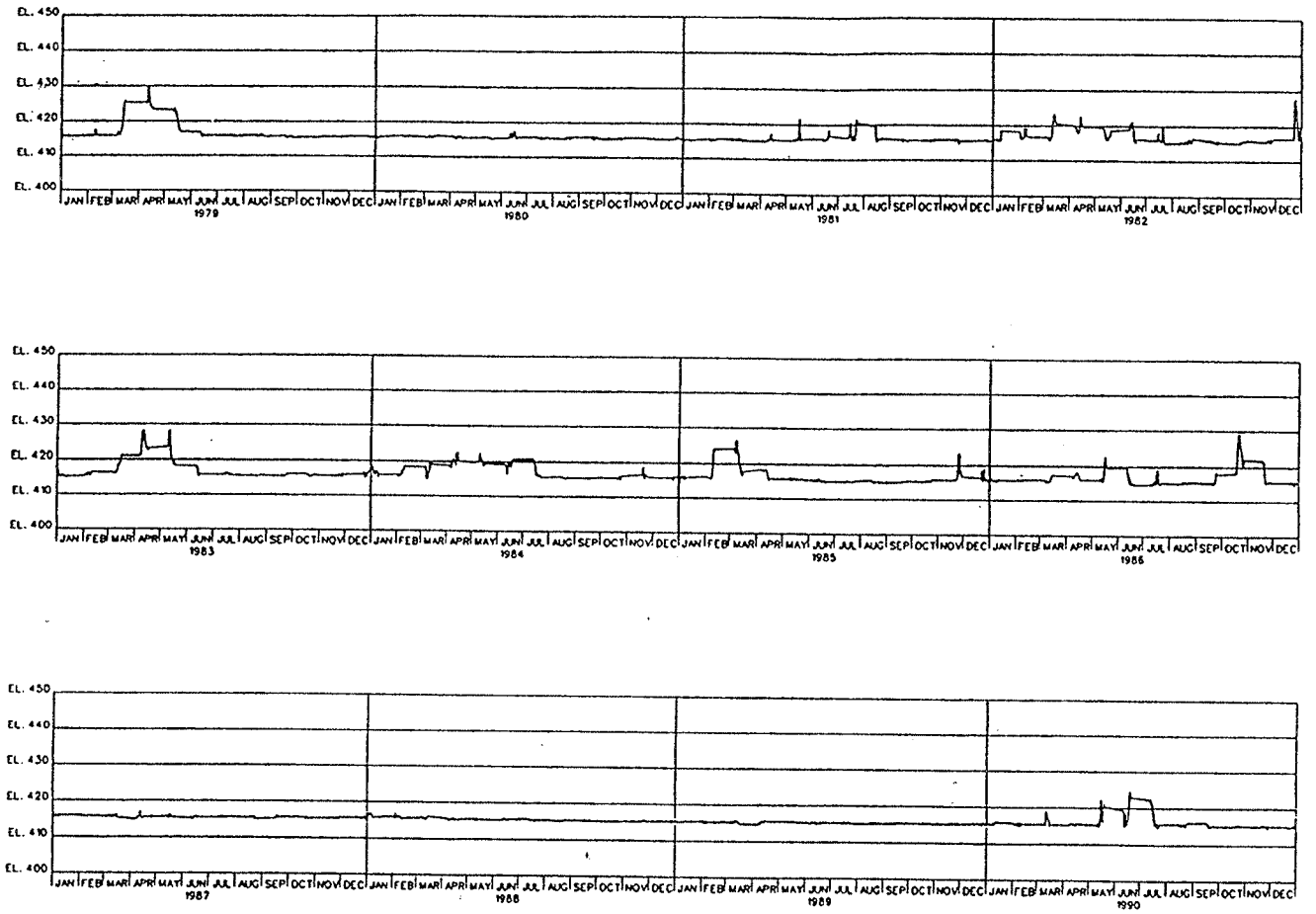

STAGE-HYDROGRAPH
PERIOD OF RECORD--1962-1978
ILLINOIS RIVER
AT
GRAFTON ILLINOIS

FIGURE E-2A



LEGEND:

—— PERIOD OF RECORD 1979 - 1993

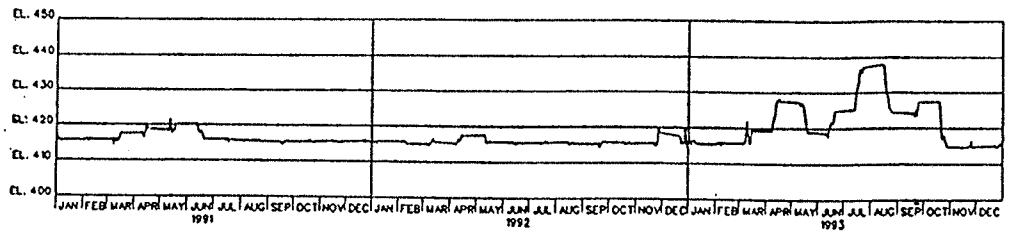
U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

UPPER MISSISSIPPI RIVER BASIN
POOL 26, CALHOUN COUNTY, ILLINOIS
ENVIRONMENTAL MANAGEMENT PROGRAM
SWAN LAKE - ITEM 8
HYDRAULIC DATA

GRAFTON, ILLINOIS
STAGE HYDROGRAPH

D DACW 43 M-EMP 99/6

FIGURE E-2



LEGEND:

—— PERIOD OF RECORD 1979 - 1993

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS

POOL 26, CALHOUN COUNTY
ENVIRONMENTAL MANAGEMENT
SWAN LAKE - ITEM
HYDRAULIC DATA

GRAFTON, ILLIN
STAGE HYDROG

D DACW 43 M-E

FIGURE E-2C

APPENDIX DPR-F

GEOTECHNICAL CONSIDERATIONS

FOREWORD

APPENDIX DPR-F presents the geotechnical effort leading to the proposed project.

APPENDIX F: GEOTECHNICAL CONSIDERATIONS

368

1. GENERAL

a. This section presents the results of Geotechnical studies and analyses including:

i. Subsurface exploration program.

ii. Stratigraphy.

iii. Soils Testing program.

iv. Slope stability analyses.

v. Bearing capacity, settlement and lateral earth pressure analyses.

vi. Underseepage analyses.

b. Drawings F-1 through F-7 referenced by this section may be found in VOLUME II of this report. All FIGURES referenced by this section may be found at the end of this section.

2. STRATIGRAPHY

a. General. The exploration program has revealed the following profiles:

i. Illinois River Reach. The Illinois River Reach extends from the project beginning to the confluence of the Illinois River with the Mississippi River (Station 0+00 to 73+30). The stratigraphy of this reach is shown on DRAWING F-3 and consists of a layer of lean clays overlying a coarse grained substratum. The overburden is 41 to 78 feet thick and is underlain by bedrock.

ii. Mississippi River Reach. The Mississippi River Reach extends from the confluence of the Illinois and Mississippi Rivers to the Royal Landing area (Station 73+30 to 291+66). The stratigraphy of this reach is shown on DRAWINGS F-4 and F-5 and consists of lean clays overlying a coarse grained substratum. The overburden is 60 to 65 feet thick and is underlain by bedrock.

iii. Interior Structures. The proposed interior structures are located at various points throughout the region. The foundation conditions at each of these proposed structures is shown on DRAWING F-6.

iv. Borrow Pits. Conditions within the first 2 to 15 feet of the borrow pits are shown by the boring logs on DRAWING F-7.

3. SUBSURFACE EXPLORATION PROGRAM

a. General. The subsurface exploration program was designed to determine the vertical and horizontal extent of the foundation features and the engineering characteristics of the earthen materials used in this project. The exploration program was carried out by Geotechnology Incorporated of St. Louis, Missouri. The drillers advanced 22 borings with a Central Mining Equipment drill rig using augers and rotary methods. They obtained 5-inch diameter undisturbed samples, split spoon samples and bag samples. Where conditions prohibited access by the drill rig, the drillers advanced 14 borings with a hand-held power auger. Only bag samples were obtained with this drilling method.

b. Boring Locations. The St. Louis District field located the borings along the berm centerline, in borrow pits and at all structures. DRAWING F-1 and F-2 shows the boring locations taken in the project vicinity. The nomenclature of the boring labels is described below.

i. Centerline Borings. The centerline borings are either 'deep' or 'shallow' borings located at 500-foot centers. The labels are prefaced with 'CPL'.

ii. Pump Station Borings. Deep borings were drilled near the centerline of each of the three proposed pump stations. The labels of these borings are prefaced with 'CPPS'.

iii. Borrow Pit Borings. Borrow pit borings are located in the proposed borrow pits at regular spacing. The labels for these borings are prefaced with 'CPB'.

iv. Interior Borings. Shallow borings were taken at each location of proposed interior structures. Since difficult conditions prohibited the use of the machine drill, these borings were drilled with the hand-held power auger. The labels for these borings are prefaced with 'CPI'.

c. Boring Nomenclature. The boring labels are of the form 'CPaa-xx-yyU where:

i. 'CP' denotes the Calhoun Point project and 'aa' is one of the following codes which denotes which feature the boring describes:

L - centerLine	PS - Pump Station
B - Borrow Pit	I - Interior Boring

ii. 'xx' is a sequential number and 'yy' is the year the borings were drilled.

iii. 'U' denotes if undisturbed samples were taken in the boring.

iv. TABLE 1 lists all the borings taken for this project:

370

TABLE 1

Boring	Project Feature	Boring Type*	Proj Station	Ground Elev
Centerline Borings Along the Illinois River				
CPL-01-93U	Centerline	D	5+00	422
CPL-02-93U	Centerline	D	26+79	422
CPL-03-93	Centerline	S	40+00	422
CPPS-01-93U	Pump Station	D	60+09	422
CPL-04-93	Centerline	S	73+30	422
Centerline Borings Along the Mississippi River				
CPPS-02-93U	Pump Station	D	86+20	422
CPL-05-93	Centerline	S	100+00	424
CPL-06-93	Centerline	S	120+00	424
CPL-07-93	Centerline	S	140+00	424
CPPS-03-93U	Pump Station	D	156+06	424
CPL-08-93	Centerline	S	180+00	420
CPL-09-93	Centerline	S	200+00	420
CPL-10-93	Centerline	S	230+00	420
CPL-11-93	Centerline	S	245+00	422
CPL-12-93U	Centerline	D	257+00	422
CPL-13-93	Centerline	S	275+00	430
INTERIOR BORINGS				
CPI-01A-93	Interior	P		
CPI-01B-93	Interior	P		
CPI-02-93	Interior	P		
CPI-03-93	Interior	P		
CPI-04-93	Interior	P		
CPI-05-93	Interior	P		
BORROW PIT BORINGS				
GOOSE FIELD BORROW AREA:				
CPB-01-93	Borrow Area	B		
CPB-02-93	Borrow Area	B		
CPB-03-93	Borrow Area	B		
CPB-04-93	Borrow Area	B		
CPB-05-93	Borrow Area	B		
ROYAL LANDING BORROW AREA:				
CPB-06A-93	Borrow Area	B		
CPB-06B-93	Borrow Area	B		
CPB-06C-93	Borrow Area	B		
CPB-07A-93	Borrow Area	B		
CPB-07B-93	Borrow Area	B		
EXISTING MOIST SOIL UNIT BORROW AREA:				
CPB-08A-93	Borrow Area	B		
CPB-08B-93	Borrow Area	B		
CPB-09-93	Borrow Area	B		

*Notes:

'S'- Shallow machine boring, 'D'- Deep machine boring

'B'- Borrow pit boring, 'P'- hand-held Power auger boring

d. Sampling.

i. Deep borings were taken to rock. The drillers utilized undisturbed sampling techniques on 5-foot centers in the fine grained materials and split spoon sampling techniques on 10-foot centers in the coarse grained materials. As a rule, undisturbed samples were taken only in the 'deep' borings. 371

ii. Shallow borings completely penetrated the overlying fine grained blanket and extended 10-feet into the underlying sands. The drillers utilized general sampling techniques at 5-foot centers in fine grained materials and split spoon techniques at 10-foot centers in the coarse grained materials.

iii. All borrow pit borings are 2 to 15 feet deep and were advanced with augers. The cuttings were used to make up 50 to 70 pound bag samples.

4. SOILS TESTING PROGRAM

a. General. Geotechnology's St. Louis Laboratory determined the Atterberg limits of all fine grained samples, the grain size distribution of all coarse grained samples, the moisture density curves for compacted borrow pit samples and the unconfined compression strength of selected undisturbed and compacted samples. This laboratory also completed one-dimensional consolidation tests on selected undisturbed samples. The results of all the soil testing are summarized on FIGURES 1 to 10. The design parameters for the earthen materials used in this project are described below.

b. Design Parameters for In-Situ Foundation Clays.

i. The design undrained shear strength of the in-situ foundation clays at Calhoun Point is based on unconfined compression tests of undisturbed samples. TABLE 2 summarizes the results of these tests. The design undrained shear strength of the in-situ clays is ϕ=0°, C=200 psf. All undisturbed samples were close to or below the piezometric level found in the boring. The low undrained strenght values are a result of the saturated conditions of the undisturbed samples.

ii. The drained shear strengths of the in-situ clays at Calhoun Point were based on Atterberg limits correlations shown in TR-3-604, Engineering Parameters of Fine Grained Mississippi Valley Alluvial Soils Meander Belt and Backswamp Deposits. The design drained shear strength is ϕ=24°, C=0 for CH clays and ϕ=28°, C=0 for CL clays.

iii. The design unit weight of the in-situ clays is 125 pcf.

iv. One dimensional consolidation tests were done on samples 1U and 3U in boring CPPS-01-93U, sample 2U in boring CPPS-02-93U and sample 2U in boring CPPS-03-93U. FIGURES 11 to 14 present the e-log p curves.

372

TABLE 2

Results of Unconfined Compression Tests on Undisturbed Samples			
BORING	SAMPLE	W_{NAT}	C
CPL-02-93U	T-1U	21	440
CPL-12-93U	T-1U	27	140
CPPS-01-93U	T-1U	33	220
CPPS-02-93U	T-1U	35	160
CPPS-02-93U	T-2U	34	50
CPPS-03-93U	T-2U	38	110

TABLE 3

Results of Unconfined Compression Tests on Compacted Borrow Pit Samples						
BORING	SAMPLE	W_{TEST}	TEST DENSITY	MAX DRY DENSITY	W_{OPT}	C
CPB-01-93	BAG 1	16	107	106.5	13.2	900
CPB-02-93	BAG 1	24	98	102.3	18.5	240
CPB-03-93	BAG 1	19	106	104.1	16.7	110
CPB-04-93	BAG 1	18	105	110.1	14.1	80
CPB-05-93	BAG 1	18	107	111.9	15.9	480
CPB-06A-93	BAG 1	22	97	103.3	19.1	380
CPB-06B-93	BAG 1	20	96	100	18.8	800
CPB-07A-93	BAG 1	15	106	107.3	11.2	410
CPB-07B-93	BAG 1	22	98	101	18.8	300
CPB-07C-93	BAG 1	20	99	105	18.6	480
CPB-08A-93	BAG 1	26	93	96.6	23.5	450
CPB-08B-93	BAG 1	21	102	105.9	17.9	370
CPB-09-93	BAG 1	25	94	98.2	22.8	370

c. Design Parameters for Compacted Clay.

i. The undrained shear strength of compacted clays was determined from unconfined compression tests run on samples compacted using semi-compacted (15-blow) methods. FIGURES 15 to 27 show the moisture density curves of the compacted samples. The optimum moisture content of the semi-compacted samples is generally less than the naturally occurring water content found in the borrow pits. Anticipating that the borrow will be used at it's naturally occurring moisture content, the unconfined compression strength samples were compacted at water contents 2 to 4% wet of optimum. TABLE 3 summarizes the results of these strength tests. The design undrained shear strength of the compacted material is ϕ=0°, C=400 psf for the on-site borrow pits. 373

ii. The drained shear strength of the compacted samples is the same as the in-situ material.

iii. The saturated unit weight of the compacted clays is 125 pcf.

5. SLOPE STABILITY ANALYSES. No detailed slope stability analyses were performed. The embankments for this project will be constructed of semi-compacted earthen materials obtained from the identified borrow pits. The embankments will be 4 to 6 feet high and will be required to hold back no more than 2-feet of differential head. Based on experience with the final design of two other similar EMP projects in the region, the shear strengths of the foundation and compacted clays are adequate to perform their desired function.

6. BEARING CAPACITY, SETTLEMENT AND LATERAL EARTH PRESSURES ANALYSES. These detailed analyses will be performed for the pumpstations, gravity drains and other various water control structures during the plans and specification phase of this project. This exploration and testing program provides all the information necessary complete these detailed analyses.

7. UNDERSEEPAGE ANALYSES. No detailed underseepage studies were performed for this project. The overlying blankets appear thick enough to prevent significant volumes of underseepage from entering the system at the design differential heads. The district will determine the construction dewatering requirements during the plans and specifications phase.

FIGURE F-1

SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
CPL-01-93U	JAR 1	5.0-7.0	CL	27	34	16	18				
"	JAR 2	10.0-11.5	SP	21							
"	JAR 3	18.0-19.5	SP	24							
"	JAR 4	28.0-29.5	SP-SM	19	NP	NP	NP				
"	JAR 5	38.0-39.5	SP-SM	15	NP	NP	NP				
"	JAR 6	48.0-49.5	SM	23	NP	NP	NP				
"	JAR 7	58.0-59.5	SP	13							
"	JAR 8	68.0-69.5	SP	19							
"	JAR 9	78.0-79.5	SP	18							
CPL-02-93U	JAR\TUBE 1U	4.0-6.0	CL	23 22	28	18	10	0.44	3.1	101	
"	JAR\TUBE 2U	9.0-11.0	CL	23	27	18	9				sample disturbed
"	JAR 3U	14.0-16.0	CL-ML	27	23	17	6				
"	JAR 4	22.0-23.5	CL	33	29	21	8				
"	JAR 5	27.0-28.5	SP	20							
"	JAR 6	32.0-33.5	SP	25							

FIGURE F-2
SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
"	JAR 7	37.0-38.5	SP								
"	JAR 8	42.0-43.5	SP								
"	JAR 9	47.0-48.5	SP								
"	JAR 10	52.0-53.5	SP								
"	JAR 11	57.0-58.5	SP								
"	JAR 12	62.0-63.5	SP								
"	JAR 13	67.0-68.5	SP								
CPL-03-93	JAR 1	4.0-5.5	CL	29	33	22	11				
"	JAR 2	9.0-10.5	CL	30	39	24	15				
"	JAR 3	14.0-15.5	SM	23	NP	NP	NP				
"	JAR 4	19.0-20.5	SP-SM	22	NP	NP	NP				
"	JAR 5	24.0-25.5	SP	24							
CPL-04-93	JAR 1	4.0-5.5	CL	31	41	25	16				
"	JAR 2	9.0-10.5	CL	31	49	25	24				
"	JAR 3	14.0-15.5	SP	19							
"	JAR 4	19.0-20.5	SP-SM	17	NP	NP	NP				

FIGURE F-3

SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
"	JAR 5	24.0-25.5	SP	22							
CPL-05-93	BAG 1	2.0	CH	34	76	26	50				
"	BAG 2	4.0	CL	26	44	24	20				
"	BAG 3	6.0	ML	27	NP	NP	NP				
CPL-06-93	BAG 1	2.0	CH	33	61	30	31				
"	BAG 2	4.0	CH	28	51	26	25				
"	BAG 3	8.0	CL	31	27	20	7				
CPL-07-93	BAG 1	2.0	CH	33	61	30	31				
"	BAG 2	4.0	CH	26	63	27	36				
"	BAG 3	5.0	CL	33	33	22	11				
CPL-08-93	BAG 1	2.0	CH	32	50	28	22				
"	BAG 2	4.0	CH	29	53	22	31				
"	BAG 3	10.0	CL	30	31	20	11				
CPL-09-93	BAG 1	2.0	CL	28	34	18	16				
"	BAG 2	4.0	CH	25	54	25	29				
"	BAG 3	5.0	SP-SM	21	NP	NP	NP				

FIGURE F-4
SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
CPL-10-93	JAR 1	5.0-6.5	CH	34	57	27	30				
"	JAR 2	10.0-11.5	SM	28	NP	NP	NP				
"	JAR 3	15.0-16.5	SP	23							
CPL-11-93	JAR 1	5.0-6.5	SM	23	NP	NP	NP				
"	JAR 2	10.0-11.5	CL	30	31	21	10				
"	JAR 3	15.0-16.5	SP-SM	19	NP	NP	NP				
CPL-12-93U	JAR\TUBE 1U	5.0-7.0	CL	28 26	41	19	22	0.14	1.3	91	
"	JAR 2	10.0-11.5	SM	34	NP	NP	NP				
"	JAR 3	20.0-21.5	SP-SM	20	NP	NP	NP				
"	JAR 4	30.0-31.5	SM	24	NP	NP	NP				
"	JAR 5	40.0-41.5									coarse gravel
"	JAR 6	50.0-51.5	SP	20							
"	JAR 7	60.0-61.5	SP	15							
"	JAR 8	70.0-71.5	SP	17							
"	JAR 9	80.0-81.5	SP	19							

FIGURE F-5

SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
CPL-13-93	JAR 1	5.0-6.5	CL	24	35	23	12				
"	JAR 2	10.0-11.5	SP-SM	22	NP	NP	NP				
"	JAR 3	15.0-16.5	SP	24							
CPB-01-93	JAR\BAG 1	0.5-5.0	CL	25 16	35	21	14	0.90	3.1	107	
"	JAR\BAG 2	5.0-7.0	ML	26	47	28	19				
CPB-02-93	JAR\BAG 1	0.5-5.0	CL	26 24	46	23	23	0.24	14.5	98	
"	JAR\BAG 2	5.0-7.0	CL	27	44	22	22				
CPB-03-93	JAR\BAG 1	0.5-5.0	CL	24 19	29	21	8	0.11	4.1	106	
"	JAR\BAG 2	5.0-8.0	CL	25	31	22	9				
CPB-04-93	JAR\BAG 1	0.5-5.0	CL	25 18	38	22	16	0.08	2.3	105	
"	JAR\BAG 2	5.0-8.0	SM	26	NP	NP	NP				
CPB-05-93	JAR\BAG 1	0.5-5.0	CL	24 18	37	19	18	0.48	9.0	107	
"	JAR\BAG 2	5.0-8.0	SM	30	NP	NP	NP				

FIGURE F-6

SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
CPB-06A-93	JAR\BAG 1	1.0-6.0	CL	37 22	39	24	15	0.38	14.0	97	
CPB-06B-93	JAR\BAG 1	2.0-6.5	CH	26 20	51	25	26	0.80	9.3	96	
CPB-07A-93	JAR\BAG 1	0.5-2.0	CL	19 15	28	21	7	0.41	4.0	106	
CPB-07B-93	JAR\BAG 1	0.5-3.0	CL	27 22	40	21	19	0.30	10.4	98	
CPB-07C-93	JAR\BAG 1	0.5-5.0	CL	38 20	39	25	14	0.48	7.7	99	
CPB-08A-93	JAR\BAG 1	1.0-5.0	CH	30 26	74	22	52	0.45	15.0	93	
"	JAR\BAG 2	5.0-10.0	CH	28	57	21	36				
CPB-08B-93	JAR\BAG 1	1.0-5.0	CL	24 21	37	18	19	0.37	12.0	102	
"	JAR\BAG 2	5.0-10.0	CL	26	35	20	15				
CPB-09-93	JAR\BAG 1	1.0-5.0	CH	29 25	65	20	45	0.37	11.6	94	
"	JAR\BAG 2	5.0-10.0	CH	29	57	20	37				

FIGURE F-7
SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
CPI-01A-93	JAR 1	2.0	CL	32	38	24	14				
"	JAR 2	4.0	CH	48	70	26	44				
"	JAR 3	7.0	CH	43	68	26	42				
CPI-01B-93	JAR 1	2.0	CH	39	63	25	38				
"	JAR 2	4.0	CH	48	63	32	31				
"	JAR 3	7.0	CH	101	96	40	56				
"	JAR 4	10.0	CL	34	45	18	27				
CPI-02-93	JAR 1	5-6.5	CL	33	41	24	17				
"	JAR 2	10.0-11.5	SP-SM	26	NP	NP	NP				
"	JAR 3	15.0-16.5	SM	28	NP	NP	NP				
CPI-03-93	JAR 1	5.0-6.5	CL	35	40	22	18				
"	JAR 2	10.0-11.5	ML	33	NP	NP	NP				
"	JAR 3	15.0-16.5	SP-SM	27	NP	NP	NP				
CPI-04-93	JAR 1	5.0-6.5	CL	35	42	18	24				
"	JAR 2	10.0-11.5	CH	36	52	27	25				
"	JAR 3	15.0-16.5	SM	28	NP	NP	NP				

FIGURE F-8
SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
"	JAR 4	20.0-21.5	SM	31	NP	NP	NP				
CPI-05-93	JAR 1	5.0-6.5	CL	25	35	21	14				
"	JAR 2	10.0-11.5	CL	28	31	17	14				
"	JAR 3	15.0-16.5	SP-SM	27	NP	NP	NP				
"	JAR 4	20.0-21.5	SM	18							
CPPS-01-93U	JAR\TUBE 1U	4.0-6.0	CH	32 29	61	30	31	0.22	2.3	90	consolidation test
"	JAR\TUBE 2U	9.0-11.0	CL	31	49	22	27				sample disturbed
"	JAR\TUBE 3U	14.0-16.0	CL-ML	26	27	22	5				consolidation test
"	JAR 4	18.0-19.5	CH	42	53	22	31				
"	JAR 5	28.0-29.5	SP-SM	25	NP	NP	NP				
"	JAR 6	38.0-39.5	SP	23							
"	JAR 7	48.0-49.5	SP	20							
"	JAR 8	58.0-59.5	SP	21							
"	JAR 9	68.0-69.5									coarse gravel

FIGURE F-9
SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-30-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
CPPS-02-93U	JAR\TUBE 1U	5.0-7.0	ML	36 33	44	27	17	0.16	6.4	94	
"	JAR\TUBE 2U	10.0-12.0	CL	38 36	38	21	17	0.05	2.0	82	consolidation test
"	JAR 3	15.0-16.5	SM	42	NP	NP	NP				
"	JAR 4	25.0-26.5	SM	30	NP	NP	NP				
"	JAR 5	35.0-36.5	SP	24							
"	JAR 6	45.0-46.5	SP	18							
"	JAR 7	55.0-56.5	SP	17							
"	JAR 8	65.0-66.5	SP	20							
"	JAR 9	75.0-76.5	SP	23							
"	JAR 10	85.0-86.5	SP	19							
CPPS-03-93U	JAR\TUBE 1U	5.0-7.0	CH	35	59	30	29				sample disturbed
"	JAR\TUBE 2U	10.0-12.0	CH	37 36	59	27	32	0.11	8.6	82	consolidation test
"	JAR 3	20.0-21.5	SP	25							

FIGURE F-10

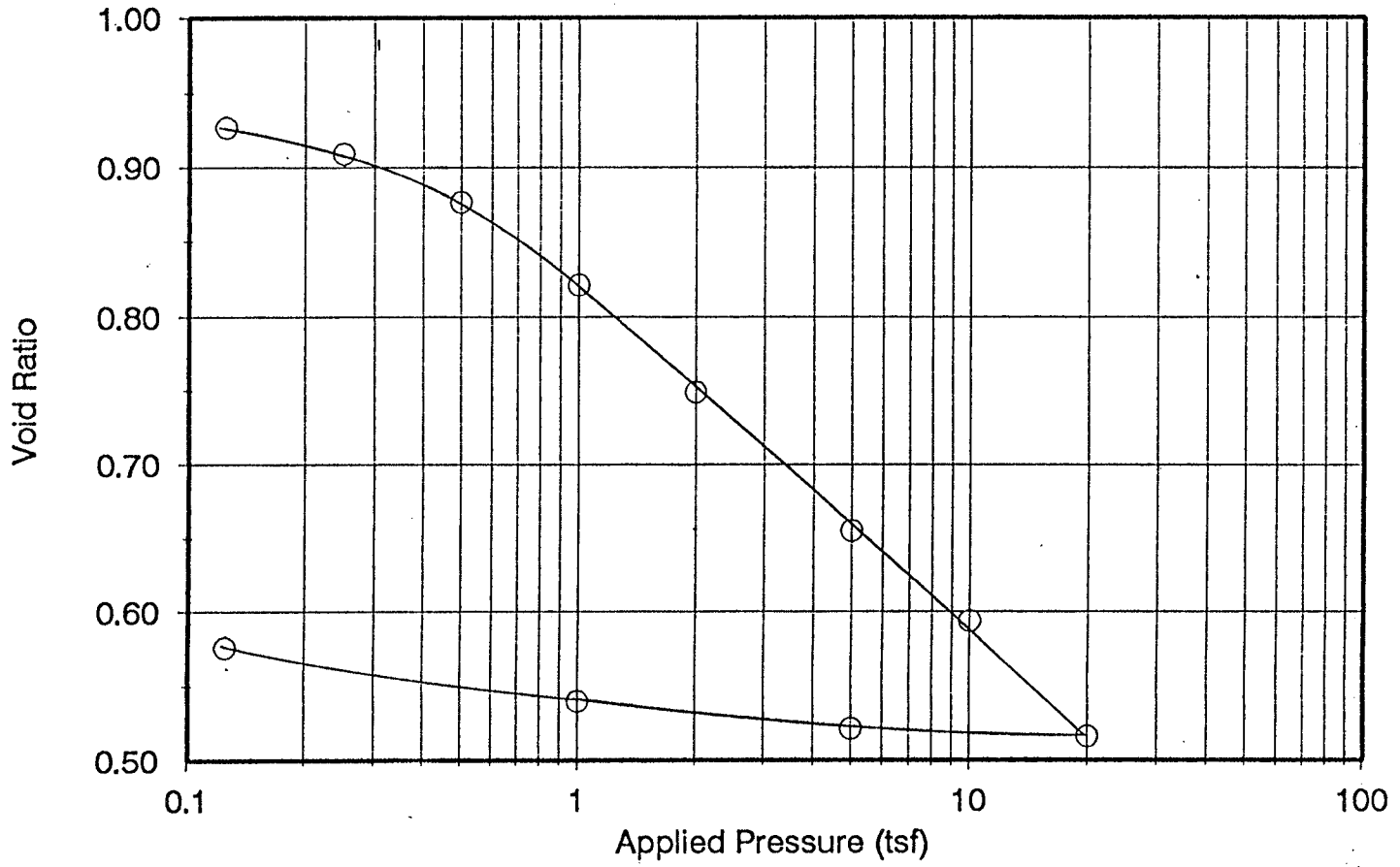
SUMMARY OF SOIL TEST RESULTS

Project: CALHOUN POINT EMP
Job No.: 2439.02.3115.002
Date: 3-80-94

Boring No.	Sample No.	Depth (ft.)	Group Symbol	Water Cont. %	Atterberg Limits			Shear Strength		Unit Dry Weight lb/cu ft.	Remarks
					LL	PL	PI	Stress Ton/ sq ft.	Strain %		
"	JAR 4	30.0-31.5	SM	22	NP	NP	NP				
"	JAR 5	40.0-41.5	SP	19							
"	JAR 6	50.0-51.5	SP	22							
"	JAR 7	60.0-61.5	SP-SM	35	NP	NP	NP				

FIGURE F-11

ONE-DIMENSIONAL CONSOLIDATION TEST
VOID RATIO VERSUS LOG OF PRESSURE



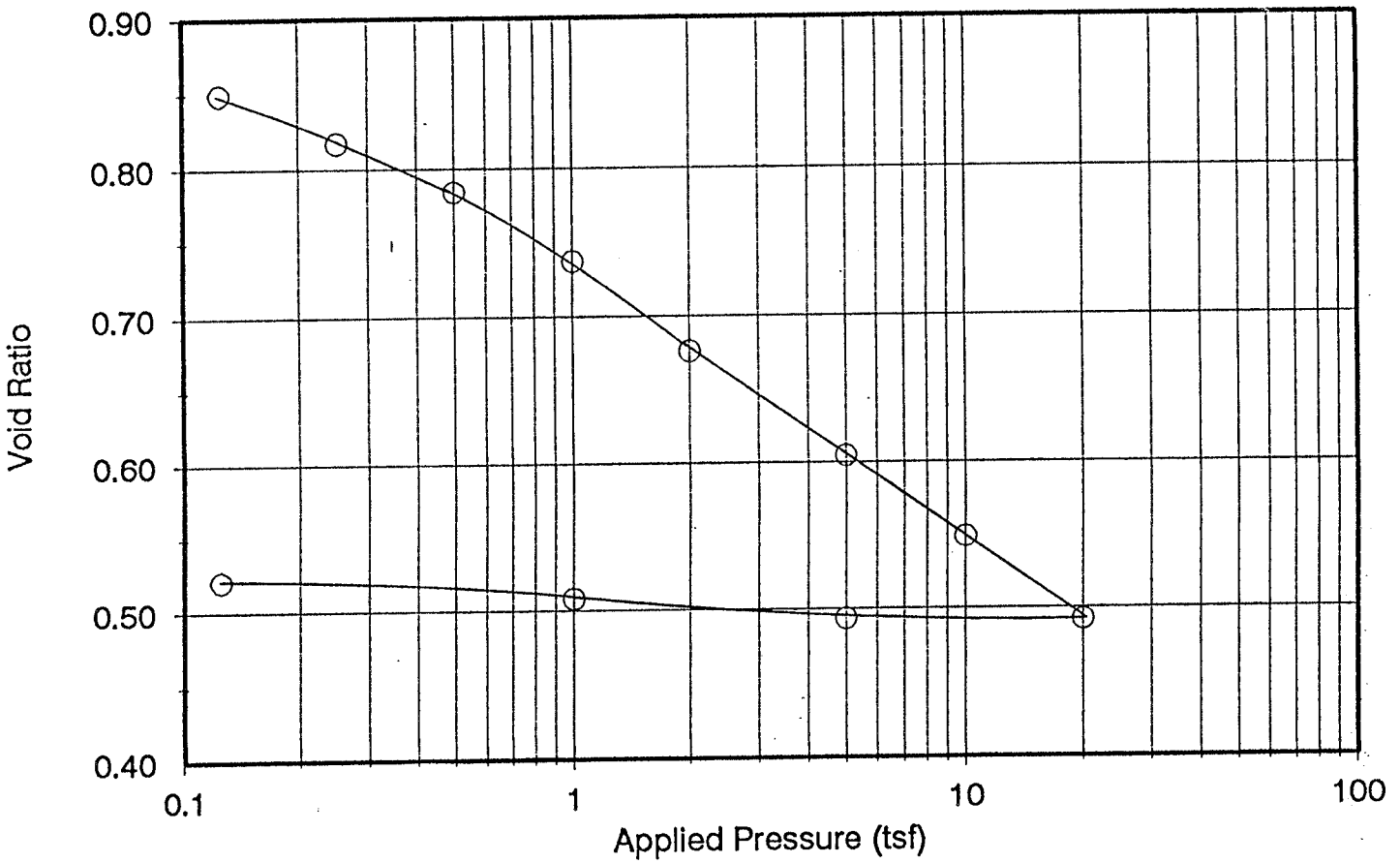
Boring: CPPS-03-93U
Sample: 2U
Depth: 10.0-12.0 feet

CALHOUN POINT EMP

Job No. 2439.02.3115.002

FIGURE F-12

ONE-DIMENSIONAL CONSOLIDATION TEST
VOID RATIO VERSUS LOG OF PRESSURE



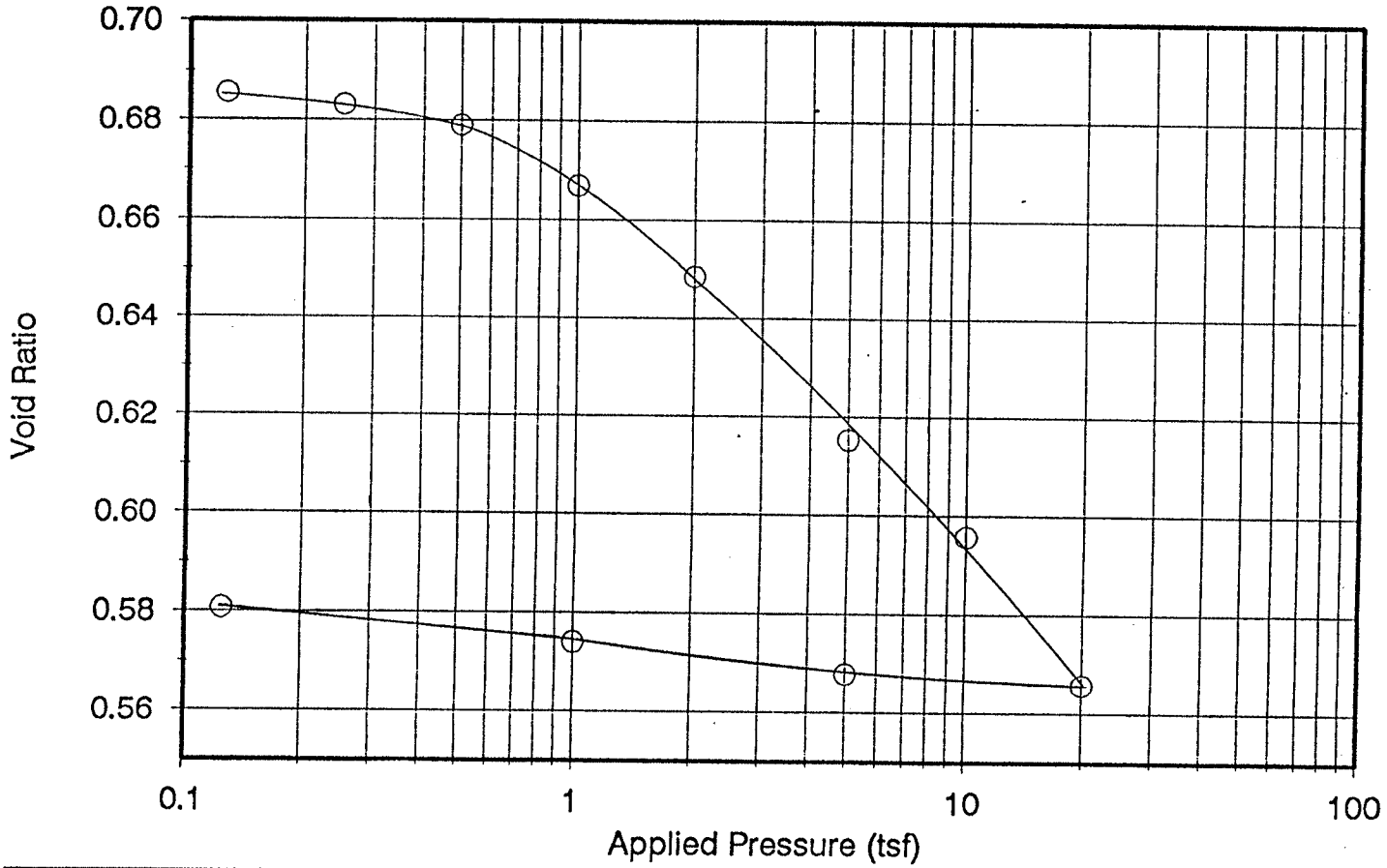
Boring: CPPS-02-93U
Sample: 2U
Depth: 10.0-12.0 feet

CALHOUN POINT EMP

Job No. 2439.02.3115.002

FIGURE F-13

ONE-DIMENSIONAL CONSOLIDATION TEST
VOID RATIO VERSUS LOG OF PRESSURE



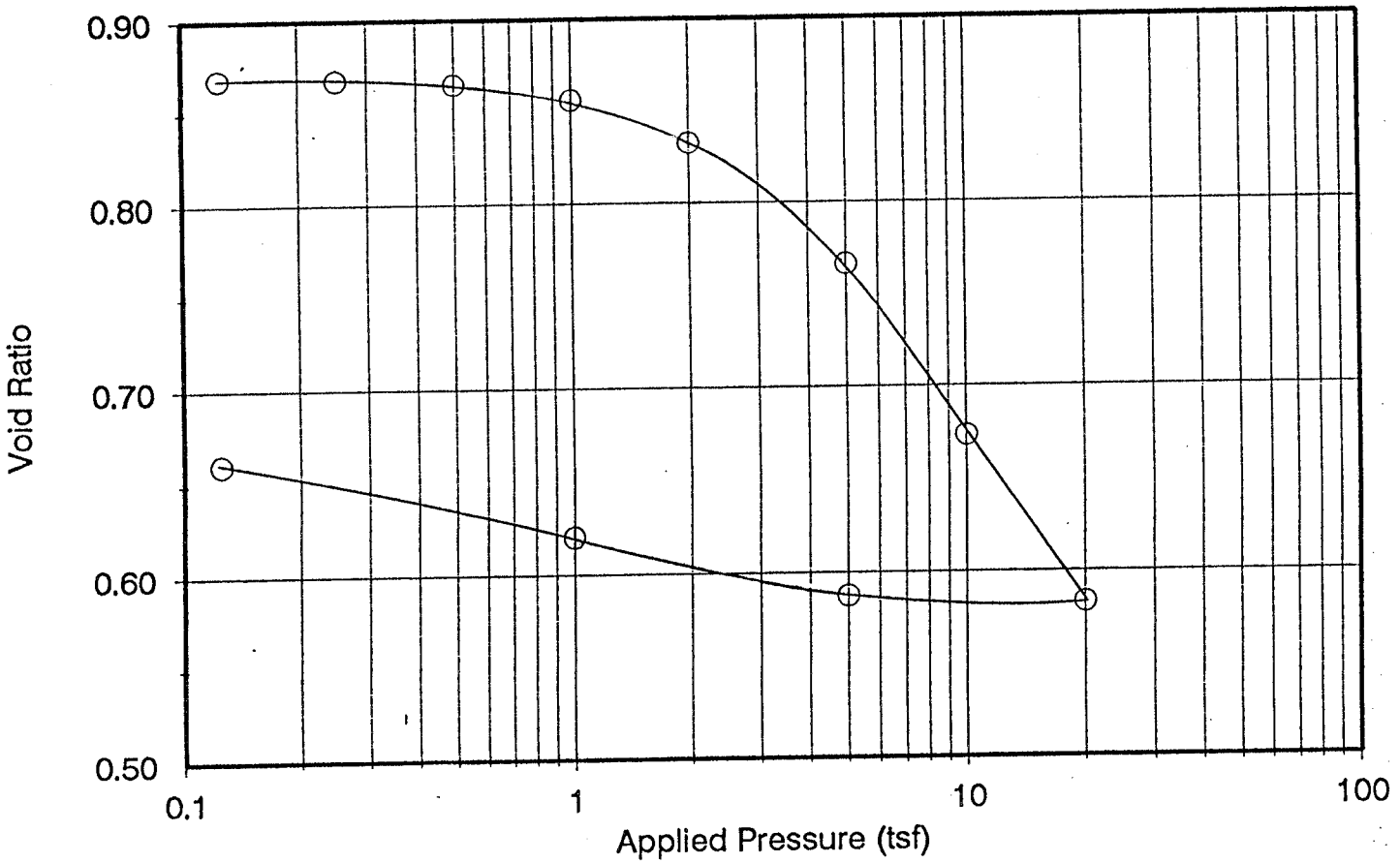
Boring: CPPS-01-93U
Sample: 3U
Depth: 14.0-16.0 feet

CALHOUN POINT EMP

Job No. 2439.02.3115.002

FIGURE F-14

ONE-DIMENSIONAL CONSOLIDATION TEST
VOID RATIO VERSUS LOG OF PRESSURE



Boring: CPPS-01-93U
Sample: 1U
Depth: 5.0-7.0 feet

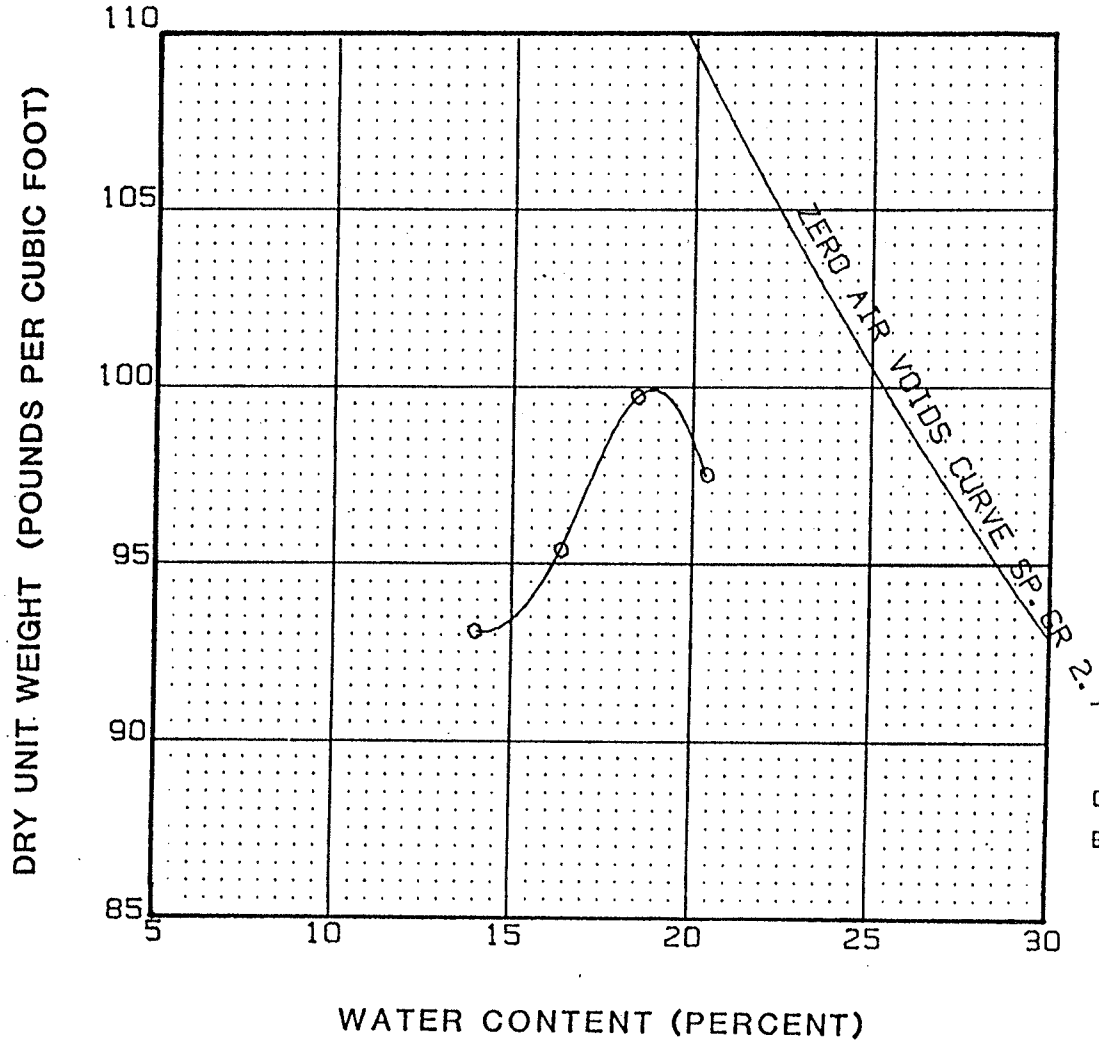
CALHOUN POINT EMP

Job No. 2439.02.3115.002

L-2 10/88

Job # 2439.02
Date: 3-7-94

FIGURE F-15



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
100.0	18.8	26

DESCRIPTION

Brown CLAY with silt and sand

ATTERBERG LIMITS

LL- 51 PL- 25 PI- 26

CLASSIFICATION SYSTEM

UNIFIED : CH

AASHTO :

SAMPLE INFORMATION

CPB-06B-93

Bag 1 2.0-6.5 feet

CALHOUN POINT EMP

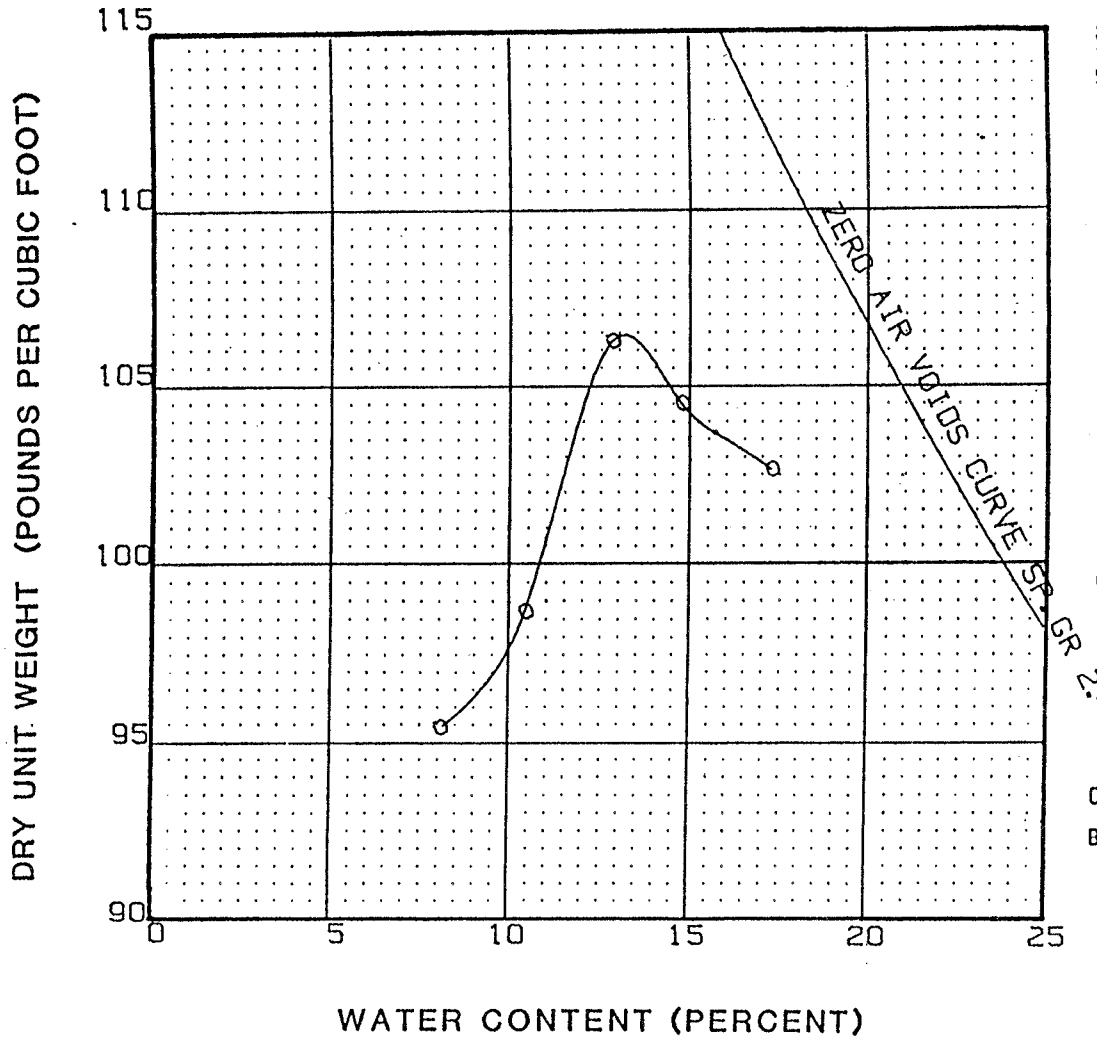
COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE

Job # 2439.02
Date: 3-1-94

FIGURE F-16



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
106.5	13.2	25

DESCRIPTION

Brown, silty CLAY

ATTERBERG LIMITS

LL- 35 PL- 20 PI- 15

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-01-93

Bag 1 0.5-5.0 feet

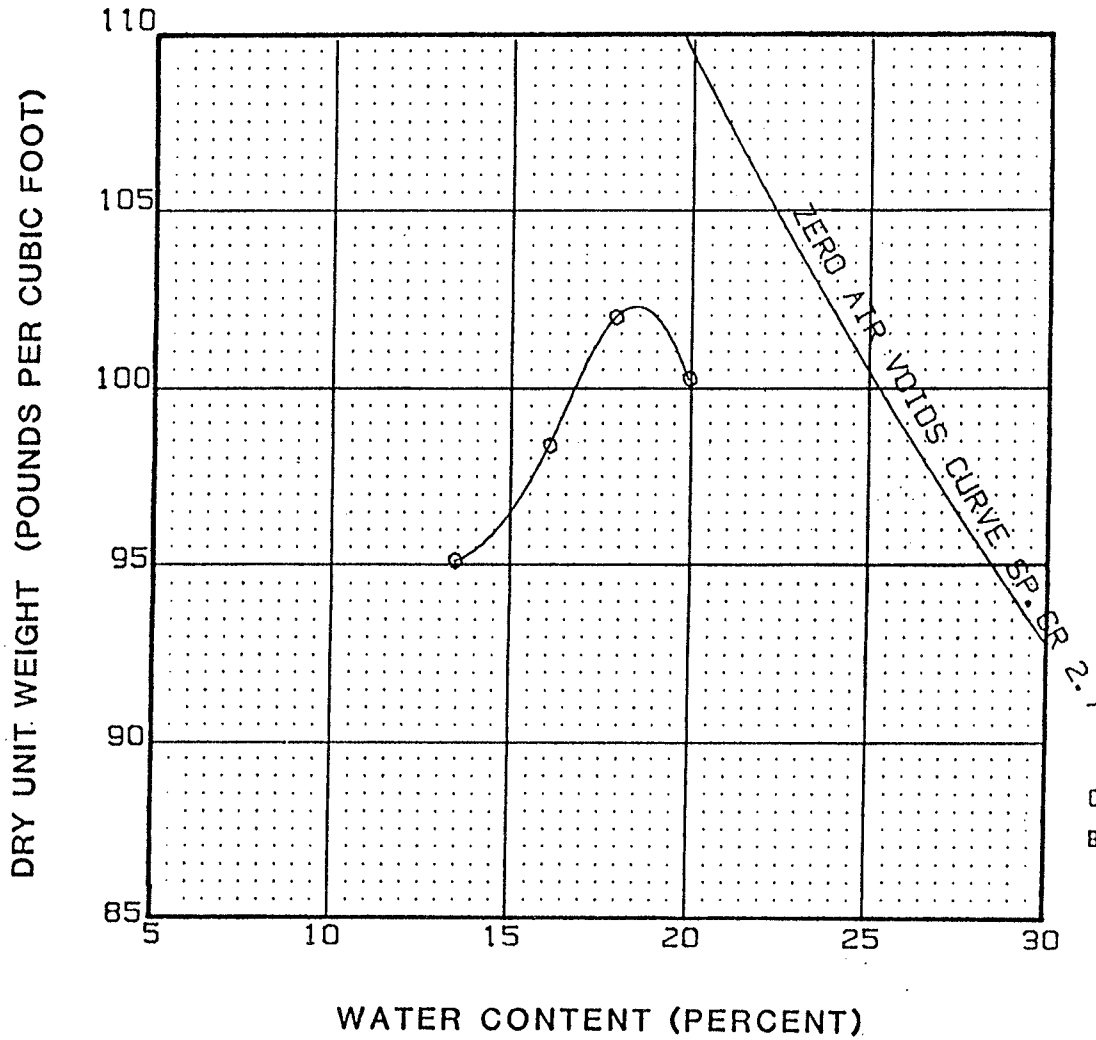
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-7-94

FIGURE F-17



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
102.3	18.5	26

DESCRIPTION

Brown, silty CLAY

ATTERBERG LIMITS

LL- 46 PL- 23 PI- 23

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-02-93

Bag 1 0.5-5.0 feet

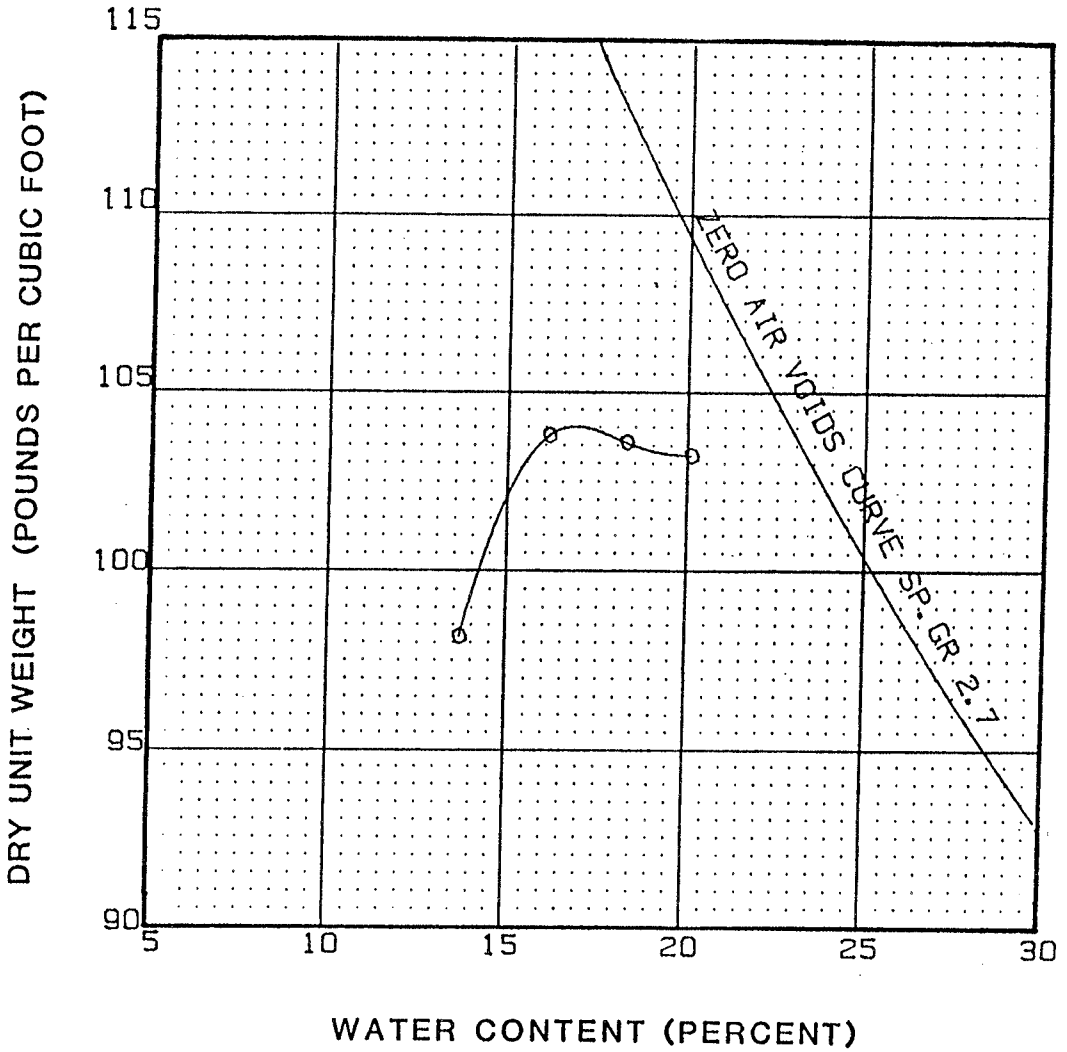
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-9-94

FIGURE F-18



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
104.1	16.7	24

DESCRIPTION

Brown SILT, trace clay and fine sand

ATTERBERG LIMITS

LL- 29 PL- 23 PI- 6

CLASSIFICATION SYSTEM

UNIFIED : ML

AASHTO :

SAMPLE INFORMATION

CPB-03-93

Bag 1 0.5-5.0 feet

CALHOUN POINT EMP
(15 blow method)

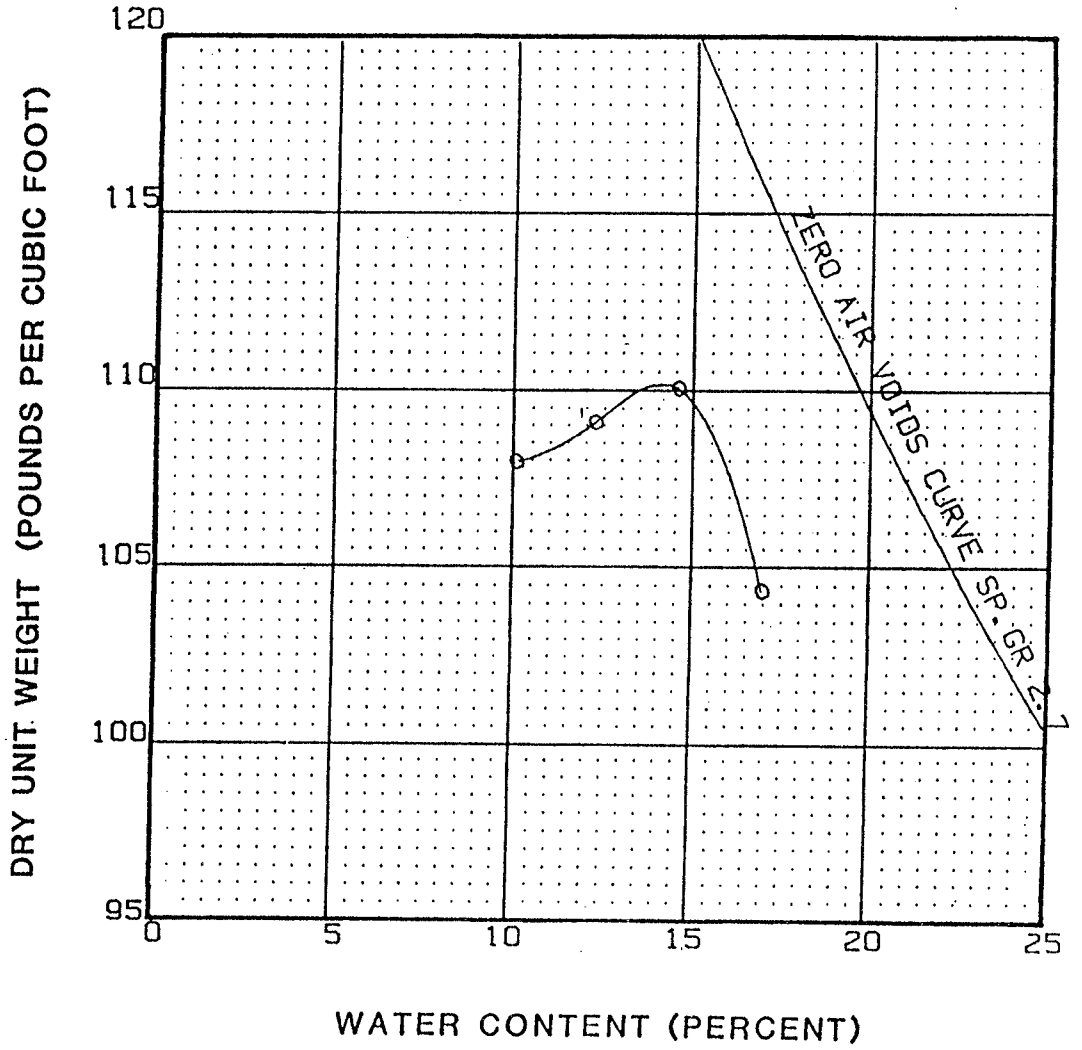
COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

L-2 10/88

Job # 2439.02
Date: 3-7-94

FIGURE F-19



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
110.1	14.1	25

DESCRIPTION

Brown, silty CLAY, trace fine sand

ATTERBERG LIMITS

LL- 38 PL- 22 PI- 16

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-04-93

Bag 1 0.5-5.0 feet

CALHOUN POINT EMP
(15 blow method)

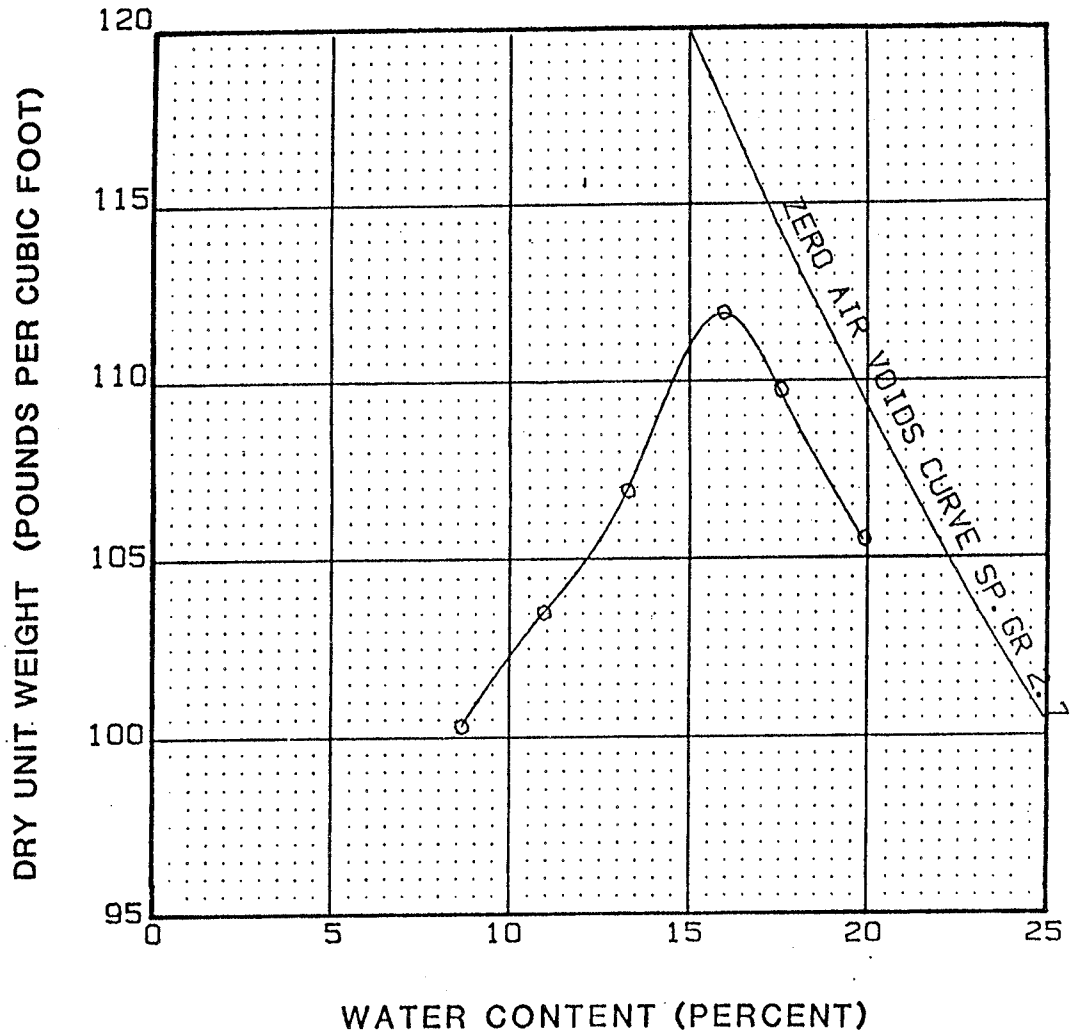
COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE

Job # 2439.02
Date: 3-7-94

FIGURE F-20



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
111.9	15.9	24

DESCRIPTION

Brown, silty CLAY, trace fine sand

ATTERBERG LIMITS

LL- 37 PL- 19 PI- 18

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-05-93

Bag 1 0.5-5.0 feet

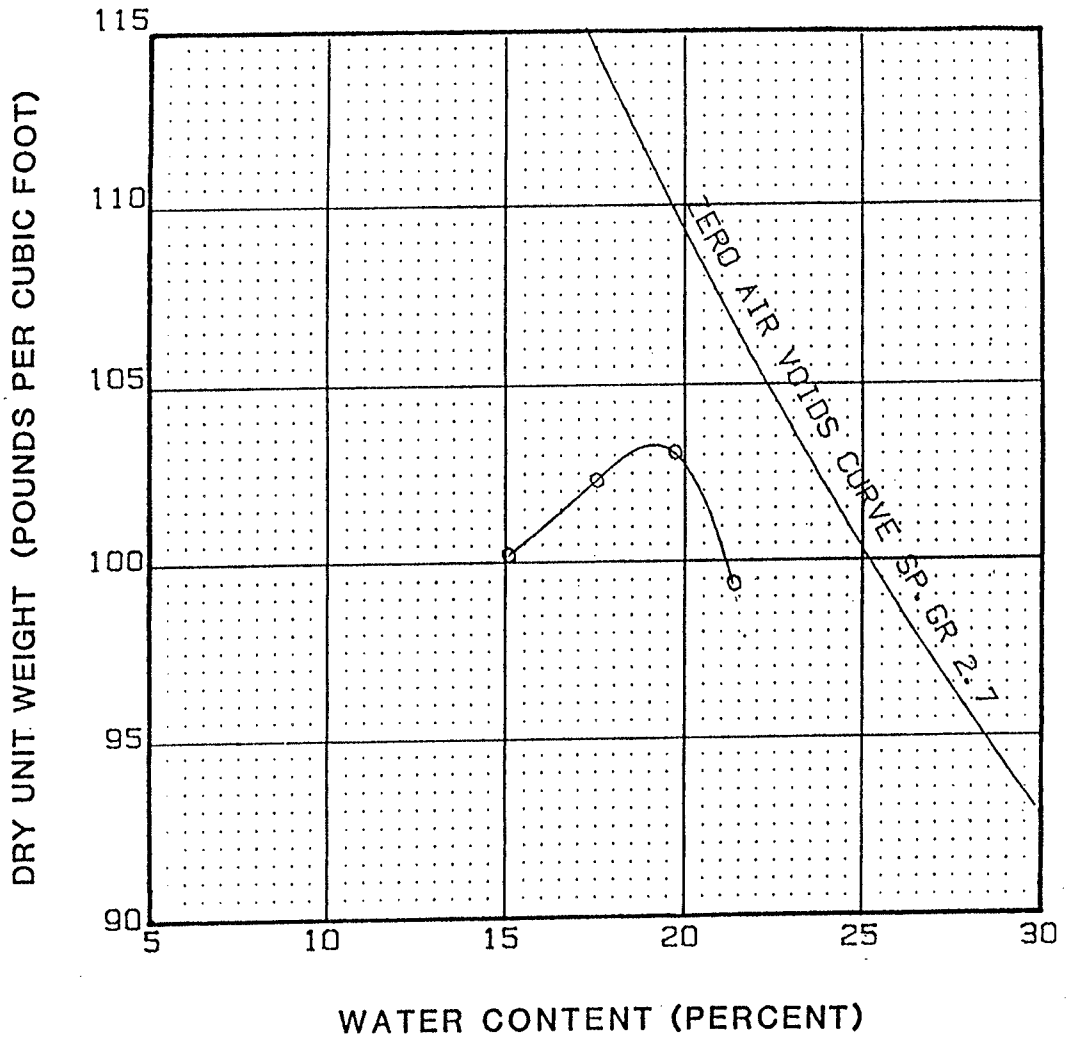
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-7-94

FIGURE F-21



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
103.3	19.1	

DESCRIPTION

Brown, silty CLAY, trace sand

ATTERBERG LIMITS

LL- 39 PL- 24 PI- 15

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-06A-93

Bag 1 1.0-6.0 feet

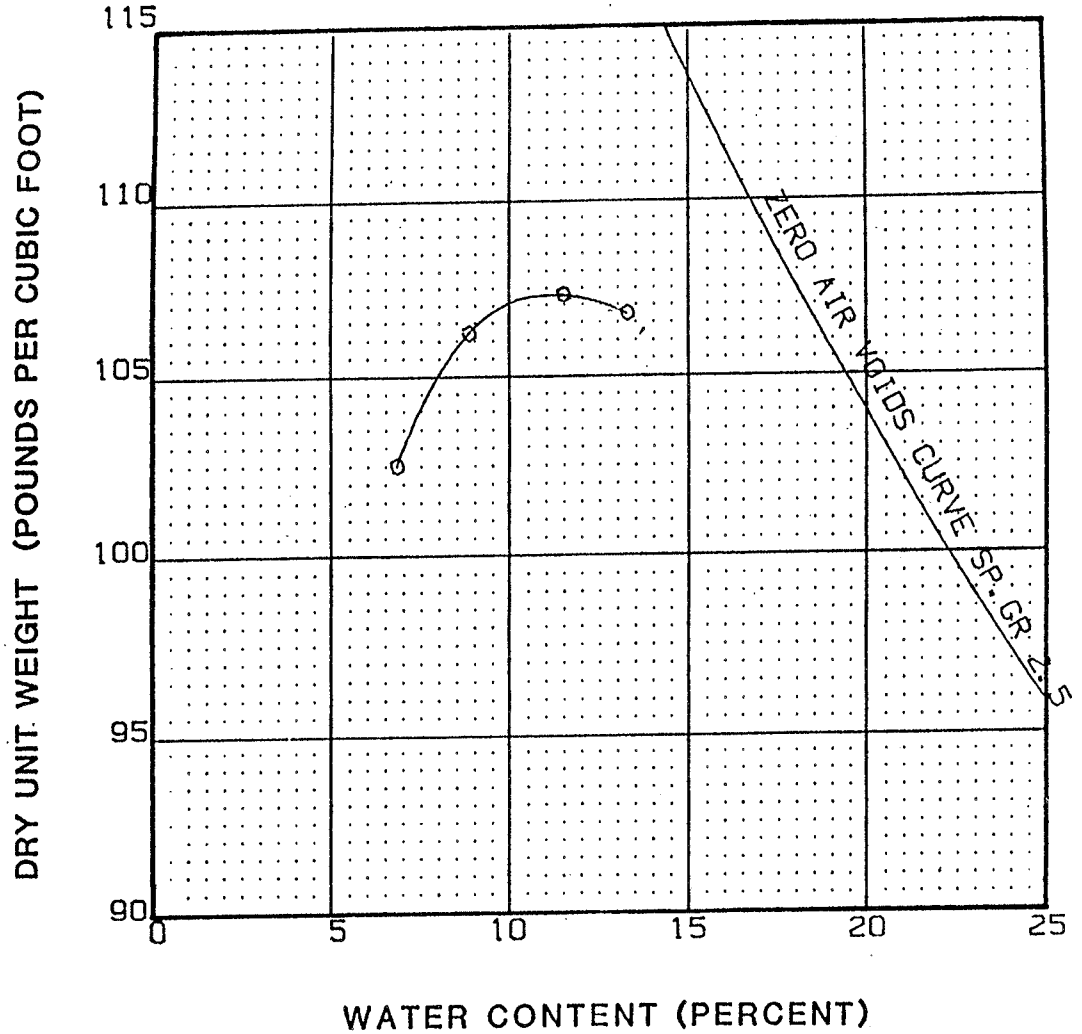
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-2-94

FIGURE F-22



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
107.3	11.2	

DESCRIPTION

Brown, silty CLAY, trace sand

ATTERBERG LIMITS

LL- 28 PL- 21 PI- 7

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-07A-93

Bag 1 0.5-2.0 feet

CALHOUN POINT EMP
(15 blow method)

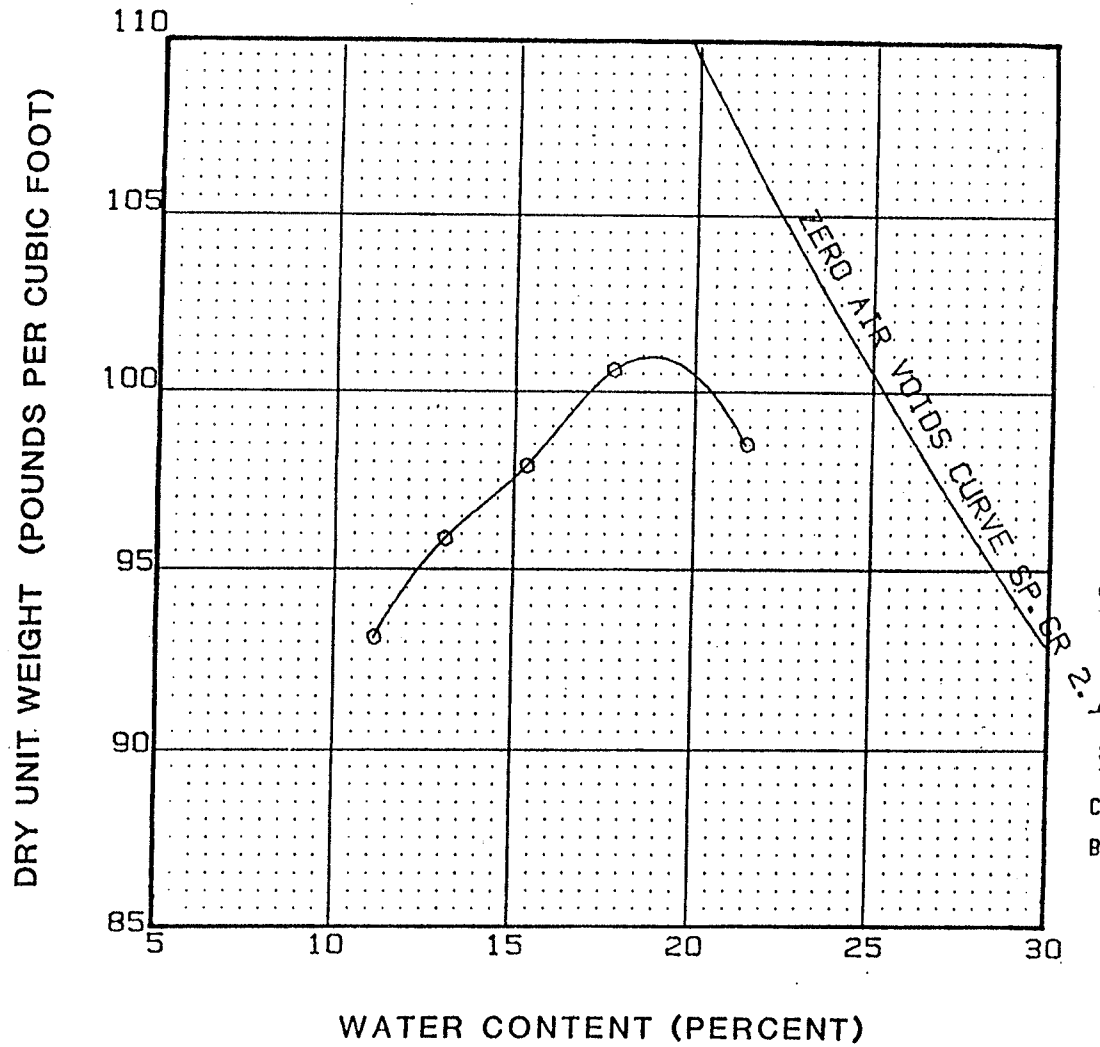
COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

L-2 10/88

Job # 2439.02
Date: 3-7-94

FIGURE F-23



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
101.0	18.8	27

DESCRIPTION

Brown, silty CLAY with sand

ATTERBERG LIMITS

LL- 40 PL- 21 PI- 19

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-07B-93

Bag 1 0.5-3.0 feet

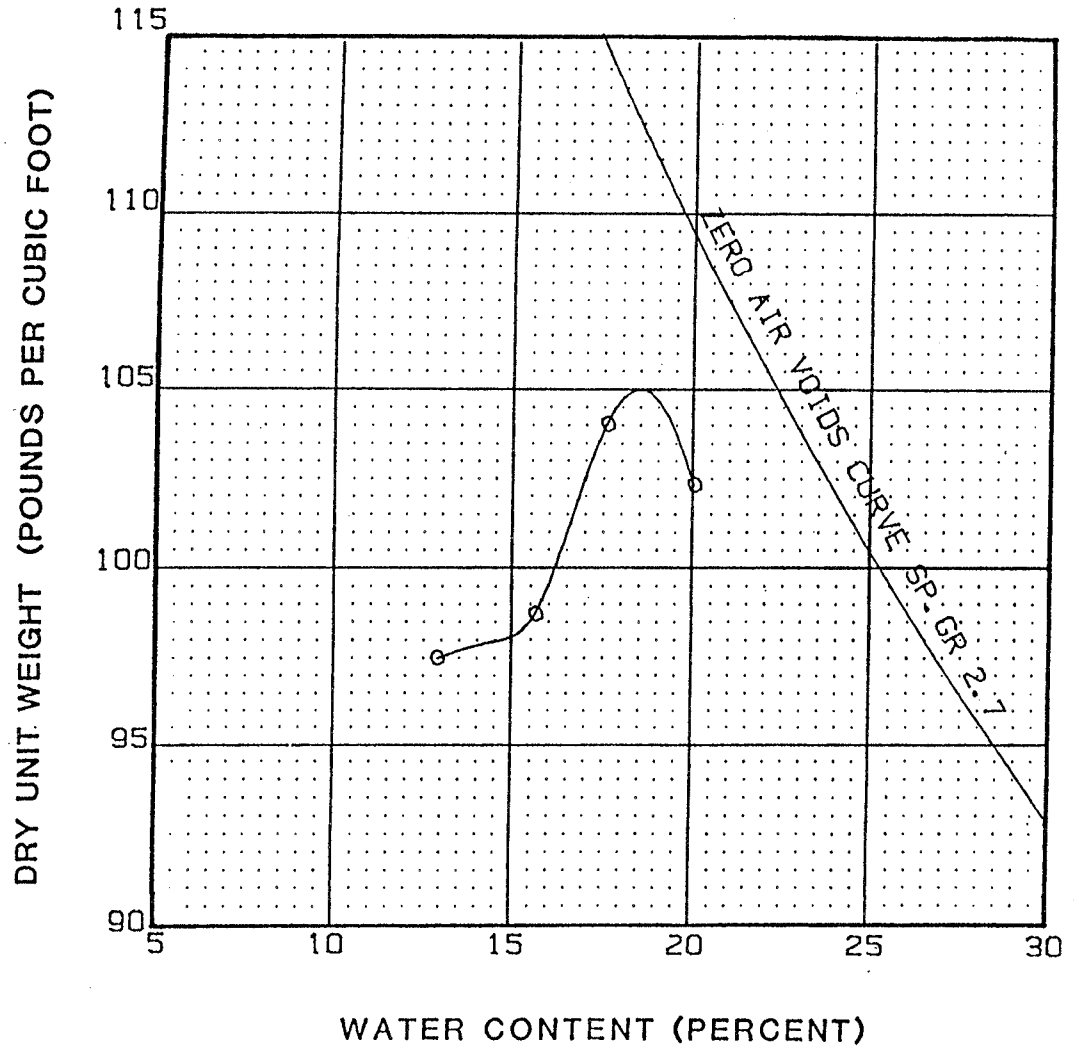
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-2-94

FIGURE F-24



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
105.0	18.6	

DESCRIPTION

Brown, silty CLAY, trace sand

ATTERBERG LIMITS

LL- 39 PL- 25 PI- 14

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-7C-93

Bag 1 0.5-2.5 feet

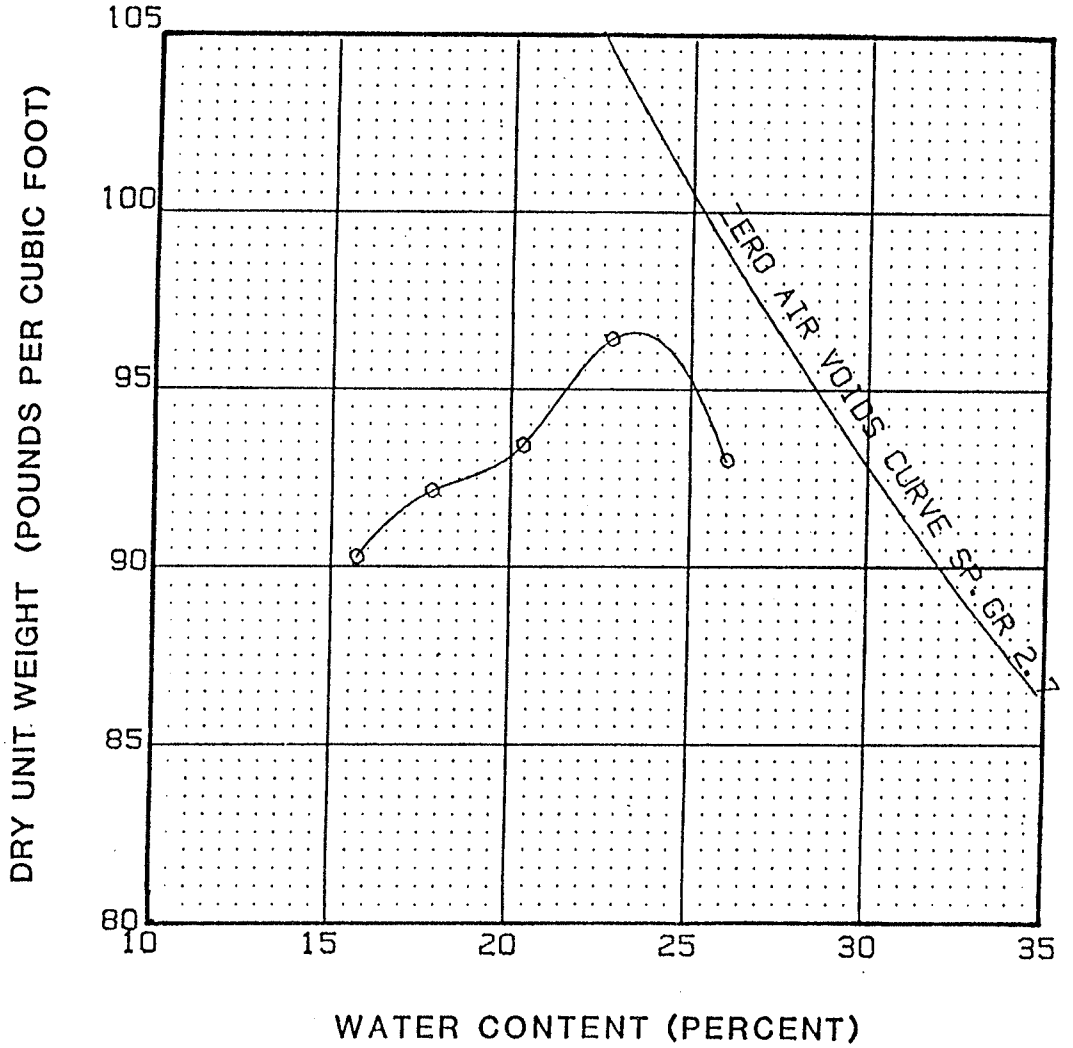
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-7-94

FIGURE F-25



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
96.6	23.5	30

DESCRIPTION

Brown to black CLAY, trace silt and fine sand

ATTERBERG LIMITS

LL- 74 PL- 22 PI- 52

CLASSIFICATION SYSTEM

UNIFIED : CH

AASHTO :

SAMPLE INFORMATION

CPB-08A-93

Bag 1 1.0-5.0 feet

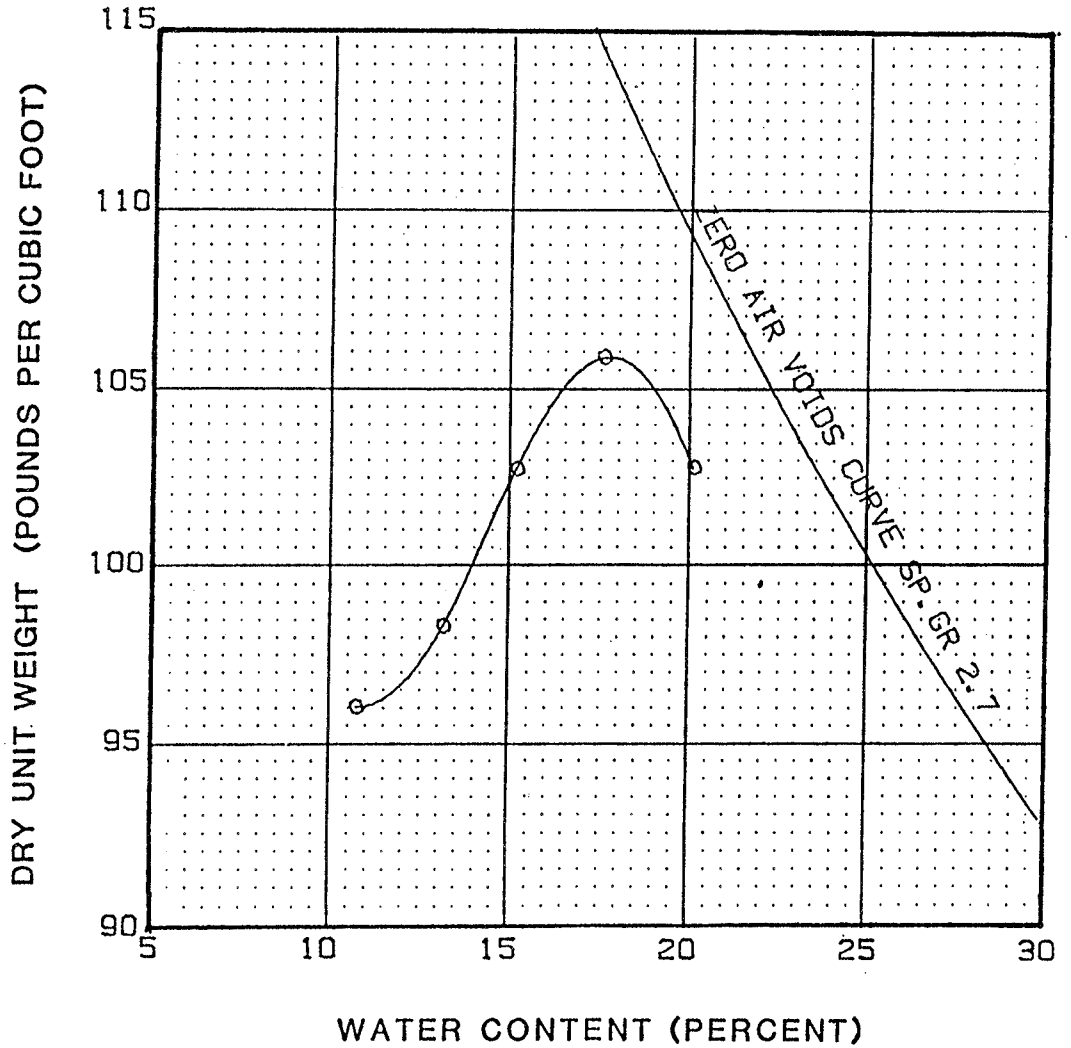
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-22-94

FIGURE F-26



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
105.9	17.9	24.2

DESCRIPTION

Brown to black CLAY, with silt, trace very fine sand

ATTERBERG LIMITS

LL- 37 PL- 18 PI- 19

CLASSIFICATION SYSTEM

UNIFIED : CL

AASHTO :

SAMPLE INFORMATION

CPB-08B-93

Bag 1 1.0-5.0 feet

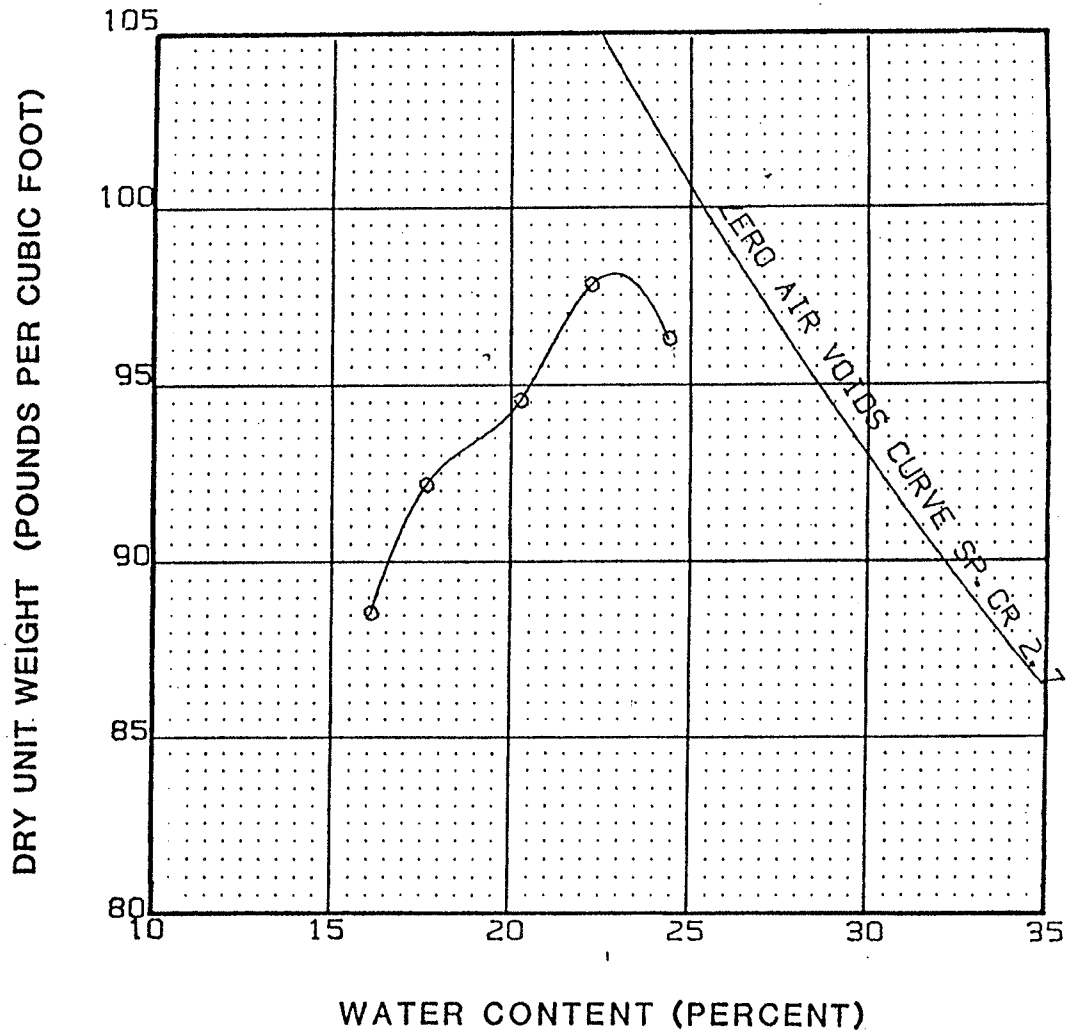
CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

Job # 2439.02
Date: 3-7 94

FIGURE F-27



SPECIFICATIONS

STANDARD PROCTOR
AASHO T 99-70, ASTM D 698-78 (Method A)

MAX DRY DENSITY (PCF)	WATER CONTENT %	
	OPTIMUM	NATURAL
98.2	22.8	29

DESCRIPTION

Brown to black CLAY with silt and fine sand

ATTERBERG LIMITS

LL- 65 PL- 20 PI- 45

CLASSIFICATION SYSTEM

UNIFIED : CH

AASHTO :

SAMPLE INFORMATION

CPB-09-93

Bag 1 1.0-5.0 feet

CALHOUN POINT EMP
(15 blow method)

COMPACTION TEST

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

APPENDIX DPR-G

CULTURAL RESOURCES DOCUMENTATION

FOREWORD

APPENDIX DPR-G provides (1) the SHPO's project determination letter, (2) the District's historic properties evaluation, and (3) a 1991 resource survey of that portion of Calhoun Point most likely to have significant properties.

SHPO'S PROJECT DETERMINATION LETTER

402

Illinois Historic Preservation Agency

1 Old State Capitol Plaza • Springfield, Illinois 62701-1507 • (217) 782-4836 • TTY (217) 524-7128

217/785-4997

CALHOUN COUNTY
Calhoun Point
OLD LOG #910208017TRW
Waterfowl Rest Area Project

PLEASE REFER TO:
IHPA LOG #950822002P-C

August 23, 1995

Mr. Terry Norris, Staff Archaeologist
US Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Gentlemen:

Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our staff has reviewed the specifications and assessed the impact of the project as submitted by your office. We have determined, based on the available information, that this project, as proposed, will have no effect on any Historic Properties. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Sincerely,

Anne E. Haaker
Deputy State Historic
Preservation Officer

AEH:JSP

cc: Dr. Harold Hassen
David Gates

DISTRICT'S HISTORIC PROPERTIES EVALUATION

Calhoun Point Historic Properties Evaluation

The culture history of the land surrounding the confluence of the Illinois and Mississippi Rivers is long and complex, spanning at least 11,000 years. Archaeological investigations conducted by the Illinois department of Conservation (Tankersley 1991), and the U.S. Army Corps of Engineers (Lopinot 1992), identified a total of 5 archaeological sites within the proposed project area.

A significant portion of the project area was not surveyed for the presence of archaeological remains following an inspection of mid-nineteenth century U.S. government channel maps and early nineteenth century General Land Office survey records. This analysis suggested that only "Goose Field" and "Marshall Landing" proposed borrow site portions of the project area were stable land masses prior to the late nineteenth/early twentieth centuries. The balance of the project area consisted of shallow marsh and wetland areas, at or near the elevation of the river channels. Historically, such areas have not been suitable locations for long-term human occupation.

Agricultural practices of the twentieth century have resulted in the deposition of up to one meter of sediment on these low-lying areas. Recent archaeological investigations at the Mortland Island and Napoleon Hollow sites on the Lower Illinois River have documented such twentieth century sedimentation rates. Any nineteenth century (or earlier) land surfaces located within such low-lying areas are presently buried more than one meter below the present-day ground surface. Given the depth of recent sediment, and the low probability of occupation within such contexts, these areas were not surveyed for the presence of archaeological remains.

The proposed limits of the "Goose Field" borrow pit shall be designed to avoid each of the five archaeological sites referenced in paragraph one.

In the unlikely event that archaeological remains are inadvertently uncovered during the completion of the project, all construction activities in the immediate vicinity of the find shall be halted until a determination of the significance of such remains has been completed. Such evaluations shall include coordination and input from the State Historic Preservation Officer.

1991 SITE RESOURCE SURVEY

Illinois Historic
Preservation Agency

406 Old State Capitol Springfield, Illinois 62701 (217) 782-4836
Suite 4-900 State of Illinois Center 100 W. Randolph Chicago, IL 60601 (312) 814-1409

217/785-4997

CALHOUN COUNTY
Calhoun Point
Wetland Project

IHPA LOG #910208017TRW

February 20, 1991

Mr. Jack F. Rasmussen
Chief, Planning Division
Environmental Analysis Branch
Department of the Army
St. Louis District, Corps of Engineers
Attention: Mr. Owen Dutt
1222 Spruce Street
St. Louis, Missouri 63103-2833

Gentlemen:

We have received notification from the Department of Conservation that the archaeological reconnaissance for the above referenced project has been completed. Thank you for requesting comments from our office concerning the possible effects of the project referenced above on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our staff has reviewed the Archaeological Survey Short Report submitted by Illinois State Museum Society for the proposed project referenced above.

The Phase I survey and assessment of the archaeological resources appear to be adequate. Eight (8) archaeological sites were located during the Phase I survey. Prehistoric sites C-286A, C-287, C-288A, C-290A, C-291A and C-282A are not, in our opinion, significant and, consequently, are not eligible for listing on the National Register of Historic Places. Prehistoric/historic sites C-285A and C-289A are potentially significant and, consequently, may be eligible for listing on the National Register of Historic Places.

The IHPA, in consultation with IDOC, recommends that sites C-285A and C-289A be avoided. The contracting archaeologist will set flagged markers between construction areas and site limits providing, at a minimum, a 50 foot buffer zone between the site areas and the proposed construction areas.

Illinois Historic
Preservation Agency
Old State Capitol Springfield, Illinois 62701 (217) 782-4836
Suite 4-900 State of Illinois Center 100 W. Randolph Chicago, IL 60601 (312) 814-1409

Please retain this letter in your files as evidence of compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

If you have any further questions, please contact Thomas R. Wolforth, Staff Archaeologist, Illinois Historic Preservation Agency, Old State Capitol, Springfield, Illinois 62701, 217/782-9345.

Sincerely,

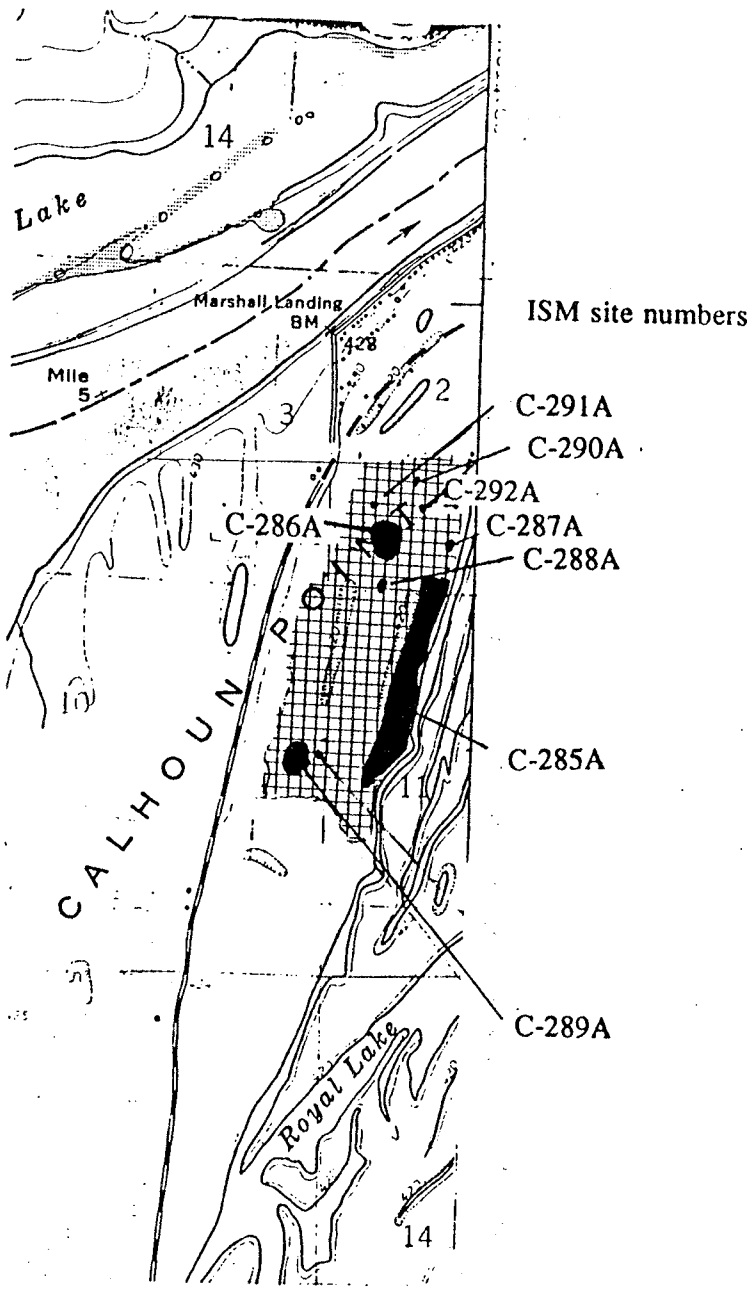
Theodore W. Hild
Deputy State Historic
Preservation Officer

TWH:TRW:bb1017A/30-31

cc: Hal Hassen, IDOC
Ken Tankersley, ISMS

CALHOUN POINT
WATERFOWL REST AREA PROJECT

BRUSSELS, ILL.-MO.
7.5 min. topographic map, 1954
photorevised 1968; photoinspected 1974

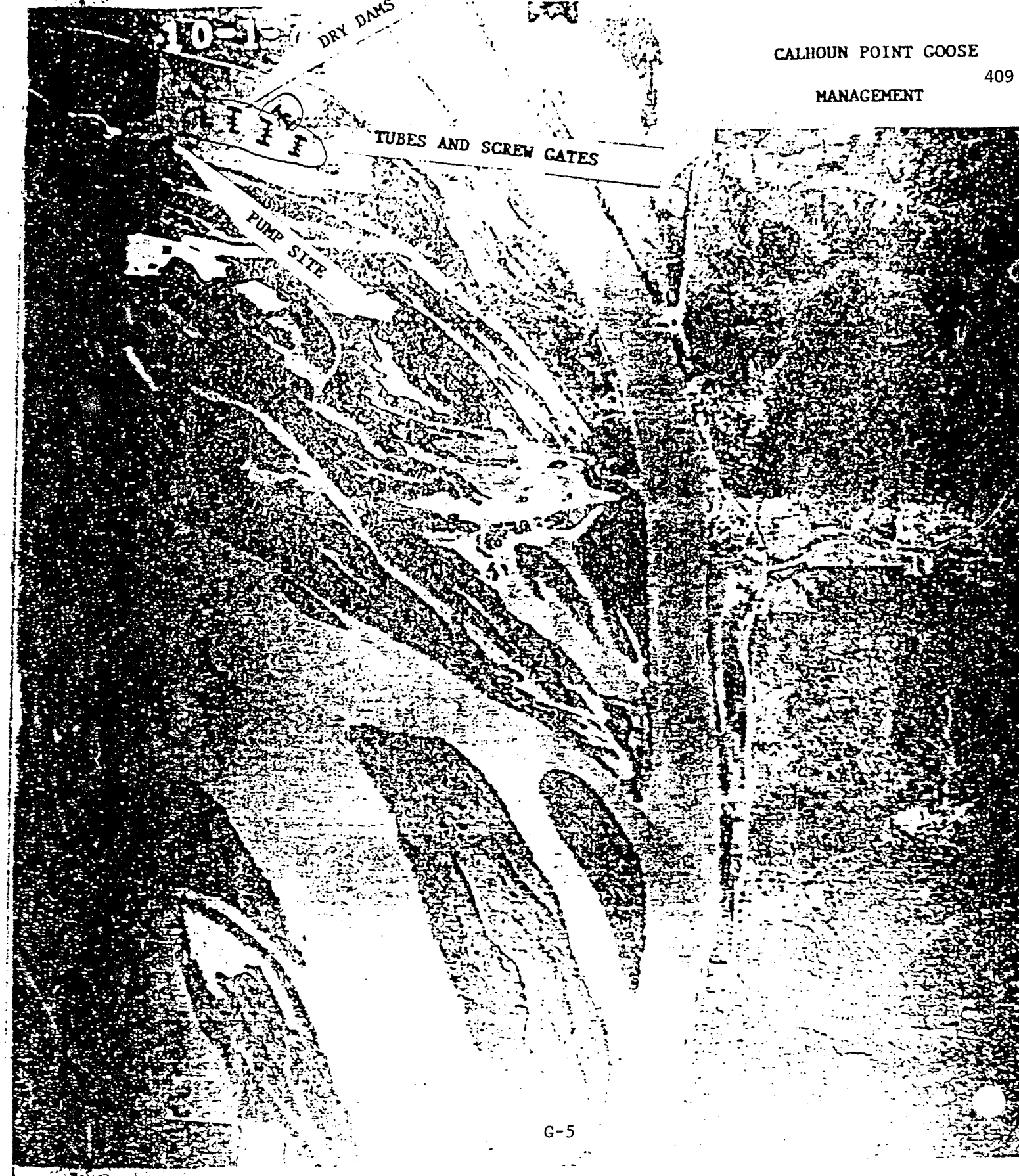


N

0 FEET 2000

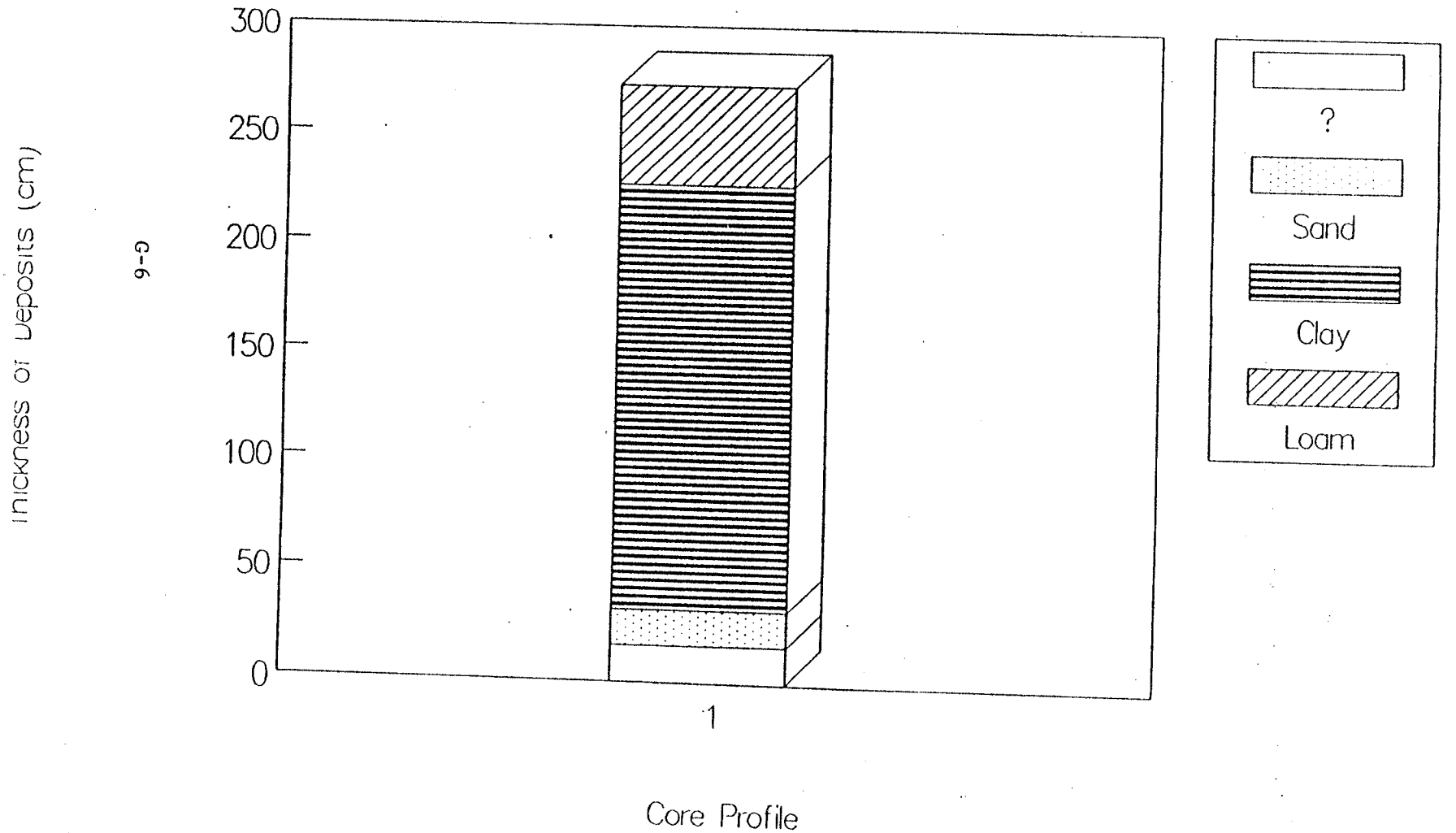
0 KM 0.5

Surveyed Area


10-1
DRY DAMS
TUBES AND SCREW GATES
PUMP SITE

Calhoun Point

Alluvium (Texture)



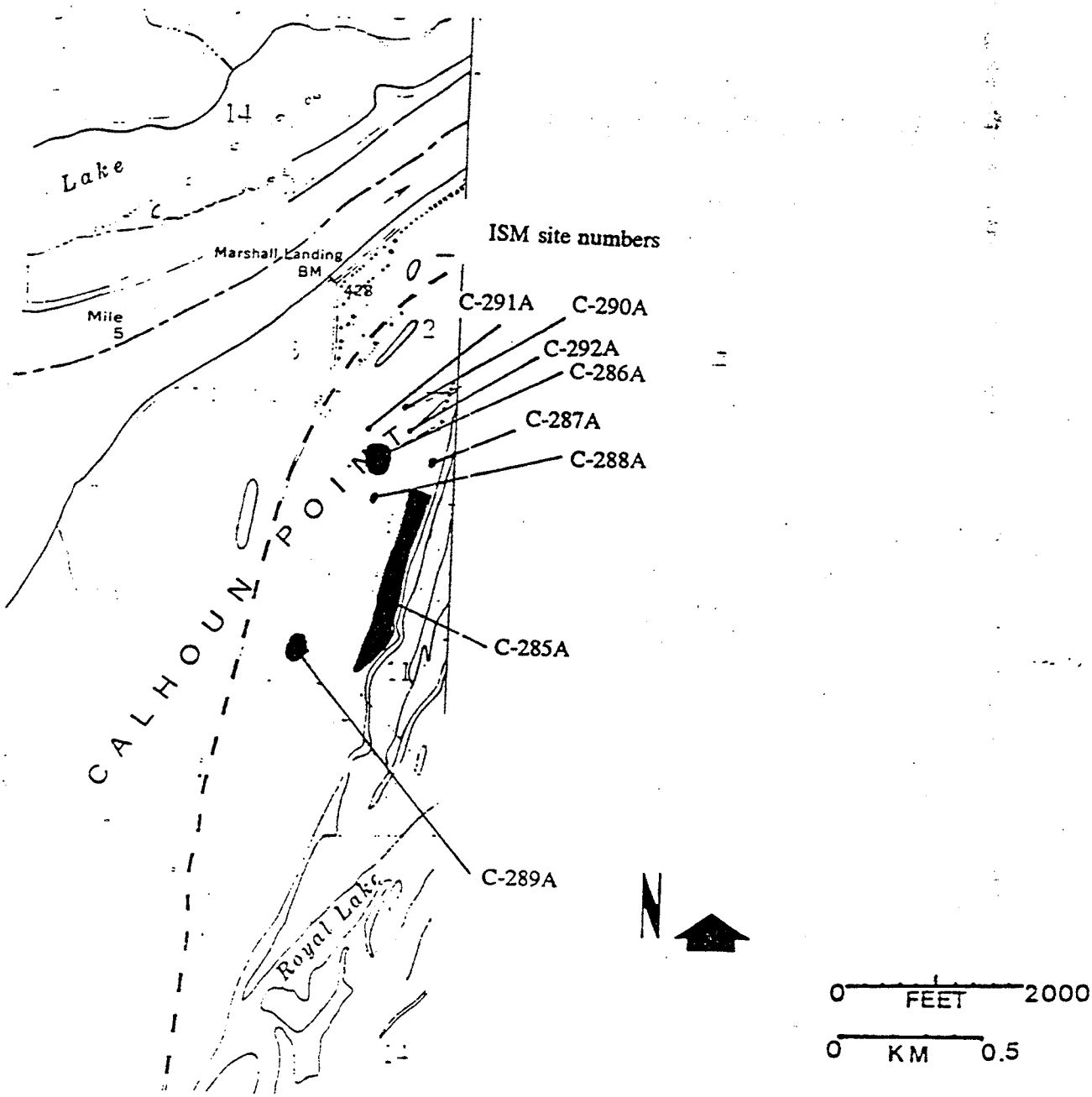
Mississippi River Fish & Wildlife Area
Calhoun Point Management Unit

411

Giddings Core Data

Depth (Centimeters)	Munsell Soil Color and Texture
0-46	*10YR2/2 silty clay loam*
46-60	*10YR4/4 silty clay with charcoal flecks at 56 cm*
60-120	*5YR4/4 stiff clay*
120-126	*5YR4/4 silty clay*
126-166	*5YR4/4 mottled stiff clay*
166-170	*5YR3/4 oleaginous clay*
170-288	*10YR5/2 silty clay with manganese dioxide inclusions*
288-247	*10YR5/2 clay with phlogopite inclusions with a 10YR5/2 sand lens at 241-243*
247-257	*10YR4/2 sand with hematite mottling and a silty clay lens at 256*

412



CALHOUN POINT
WATERFOWL REST AREA PROJECT

BRUSSELS, ILL.-MO.
7.5 min. topographic map, 1954
photorevised 1968; photoinspected 1974

ARCHAEOLOGICAL SURVEY SHORT REPORT
Illinois Historic Preservation Agency
Old State Capitol Bldg., Springfield, IL 62701
(217) 785-4997

Reviewer_____

Date: _____

413

____Accepted ___Rejected
IHPA use only (Form ASSR0886)

LOCATIONAL INFORMATION AND SURVEY CONDITIONS

County: Calhoun

Quadrangle: Brussels, ILL.-Mo., 1954 (photorevised 1968,1974)

Project type/title: Survey for waterfowl rest area, Calhoun Pt., Mississippi River FWA

Responsible federal/state agencies: Illinois Dept. of Conservation
Legal location:(1/4s) NE NE SE & E1/2 E1/2 SE NE & N1/4 SE NE SE Sec.10 T.13S R.1W and W1/2 NW NW & SE NW NW & W1/2 NE NW NW & N1/2 SW NW & SW SW NW & W1/2 SE SW NW & W1/2 NW SW & NW NE NW SW Sec.11 T.13S R.1W
U.T.M. Zone 15 SE corner N4313200 E716380; ENE edge N4314180 E716590; SW corner N4313330 E716040; NW corner N4314390 E716225; NE corner N4314400 E716400

Project description: Construction of five dry dams (max. height of 0.91 m, width of 3 m) with drainage tubes and screw gates across the natural swales in the agricultural field at Calhoun Point. This will allow 25 acres of the field to be seasonally inundated to max. depth of 25 cm.

Topography: floodplain with gentle ridge/swale topography; low knoll at SW edge
Soils: Tice silt loam & Beaucoup silty clay loam (*Soils of Calhoun County, Illinois* U of I report #130, 1989).
Drainage: Illinois River via slough; also collects overflow from Mississippi R. in flood.
Land use/ground cover (include % visibility): 95-100% visibility. Newly planted wheat. Field was well washed by rain at time of survey.

Survey limitations: none

ARCHAEOLOGICAL AND HISTORICAL INFORMATION

Historic plats/atlases/sources: USGS St. Charles, MO-ILL. 15' Quad, 1933 (1923, 1927 surveys). Structure located at SE SW NW SW Sec. 11 (not in survey area) may be related to historic artifact scatters (ISM sites C-285A & C-289A).
Previously reported sites: IAS 11-C-152,153 (west of highway)
Previous surveys: none in project area
Regional Arch. contacted: Dr. Michael D. Wiant

Investigation techniques: Pedestrian reconnaissance, 10 m intervals. Artifacts encountered during the initial walkover were flagged to define site boundaries. Sites were then resurveyed at 5 meter intervals (2 meters for the N1/3 of site 11-C-289A). A deep core (Giddings trailer mounted drill rig) was extracted from the base of slough to determine the depositional history of these deposits.
Time expended: 60 person hours

Sites/find spots located: 8 sites; ISM nos. (11-C-285A, 286A, 287A, 288A, 289A, 290A, 291A, 292A).
Cultural material: see sites forms (attached).
Curated at: ISM-RCC
Collection techniques: all cultural material >0.6 cm^3 (with the exception of building stone) were collected.
Area surveyed (acres & square meters): 115 acres (46.5 ha)

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded

Survey No.

414

County Calhoun
Twp. Calhoun Point
Quadrangle Brussels 7.5" 1954
(photorevisions 1968, 1974)

Reg. Inst. No. ISM 11-C-292A
Culture Undetermined Prehistoric
Type of site isolated artifact

Legal Decription (1/4's; S & W overlay)
SE SW NE NW NW

Sec.	Twp.	Range
11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL U.T.M. Zone 15
center N4314265 E716480

Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) Unknown (isolated artifact)

Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location floodplain (129 m asl)
Water Supply Illinois River (to west) or slough (to east)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-286A,287A,288A,290A,291A

Modern occupation (building, plowing, etc.) wheat field (waterfowl rest area)
Type of soil: Tice silt loam & Beaucoup silty clay loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE 1 chert core (271.5 grams)

Surface coll. by Tankersley/Knight/Schroeder Date 10/19/90 Institution ISM
Tested by Date Institution
Excavated by Date Institution
Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. All artifacts observed were collected.

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin

Site reported by Tankersley Date Dec. 6, 1990 Visited
Survey report by Tankersley & Schroeder Date Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season.* Fall, 1991.

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded

Survey No. 415

County Calhoun
Twp. Calhoun Point
Quadrangle Brussels 7.5" 1954
(photorevisions 1968, 1974)

Reg. Inst. No. ISM 11-C-291A
Culture Undetermined Prehistoric
Type of site Undetermined

Legal Decription (1/4's; S & W overlay)
W/12 SE NW NW NW

Sec.	Twp.	Range
11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL **U.T.M.** Zone 15
center N4314270 E716330

Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) Unknown (isolated artifact)

Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location floodplain (129 m asl)
Water Supply Illinois River (to west) or slough (to east)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-286A,287A,288A,290A,292A

Modern occupation (building, plowing, etc.) wheat field (waterfowl rest area)
Type of soil: Tice silt loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE 2 pieces of chert debitage (1 chert core, 1 flake)

Surface coll. by Tankersley/Knight/Schroeder **Date** 10/19/90 **Institution** ISM
Tested by **Date** **Institution**
Excavated by **Date** **Institution**
Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. All artifacts observed were collected.

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin

Site reported by Tankersley **Date** Dec. 6, 1990 **Visited**
Survey report by Tankersley & Schroeder **Date** Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season.* Fall, 1991.

ILLINOIS ARCHAEOLOGICAL SURVEY

416 Recorded

Survey No.

County Calhoun
Twp. Calhoun Point
Quadrangle Brussels 7.5" 1954
(photorevisions 1968, 1974)

Reg. Inst. No. ISM 11-C-290A
Culture Undetermined Prehistoric
Type of site isolated artifact

Legal Decription (1/4's; S & W overlay)
SE NW NE NW NW

Sec.	Twp.	Range
11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL U.T.M. Zone 15
center N4314350 E716460

Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) Unknown (isolated artifact)

Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location floodplain (129 m asl)
Water Supply Illinois River (to west) or slough (to east)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-285A,286A,287A,288A,289A
Modern occupation (building, plowing, etc.) wheat field (waterfowl rest area)
Type of soil: Tice silt loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE 1 chert biface thinning flake

Surface coll. by Tankersley/Knight/Schroeder Date 10/19/90 Institution ISM
Tested by Date Institution
Excavated by Date Institution
Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. All artifacts observed were collected.

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin

Site reported by Tankersley Date Dec. 6, 1990 Visited
Survey report by Tankersley & Schroeder Date Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season.* Fall, 1991.

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded **Survey No.**

County Calhoun **Reg. Inst. No.** ISM 11-C-289A
Twp. Calhoun Point **Culture** Undetermined Prehistoric & Historic (post 1850)
Quadrangle Brussels 7.5" 1954 (photorevisions 1968, 1974) **Type of site** Multicomponent

417

Legal Decription (1/4's; S & W overlay) W1/2 SE NE NE SE & E1/2 SW NE NE SE

Sec.	Twp.	Range
10	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL **U.T.M.** Center N4313450 E716130 Zone 15
Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) Historic scatter 0.8 ha (1.98 acres); prehistoric artifact scatter is from the north 1/3 of the same area.

Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location low knoll in floodplain (129.5 m asl)
Water Supply Illinois River (slough)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-285A,286A,287A,288A,290A
Modern occupation (building, plowing, etc.) wheat field (waterfowl rest area)
Type of soil: Beaucoup silty clay loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: 0% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE Prehistoric artifacts include: 4 pieces of debitage (3 blocky fragments of chert, 1 core, & 1 tertiary flake); and one informal tool (biface-possibly a digging tool). Historic artifacts include: 278 pc. pottery (Bristol-, Albany-, & salt-glazed stoneware, porcelain, whiteware/ironstone, terre cotte); 416 pc. glass (amethyst-tinted [1880-1918], milk-glass [post 1875], clear, aqua, brown, & green container glass & clear/aqua flat glass); 11 pc. metal (includes horseshoe, shotgun shell base, fasteners); and 1 piece of slate.

Surface coll. by Tankersley/Knight/Schroeder **Date** 10/19/90 **Institution** ISM
Tested by **Date** **Institution**
Excavated by **Date** **Institution**

Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. The site was collected at 2-5 m intervals; all artifacts >0.6 cm dia. were collected. The oldest available map illustrating structures (St. Charles, Mo.-Ill. 1933 USGS quadrangle map, 15' series [based on 1923 & 1927 surveys]) shows a building in the SE SW NE OF SW 1/4, Sec. 11. This artifact concentration may be associated with this structure or an unmapped building (e.g., fishing/hunting cottage).

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin
Site reported by Tankersley **Date** Dec. 6, 1990 **Visited**
Survey report by Tankersley & Schroeder **Date** Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season*. Fall, 1991.

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded

Survey No.

418

County Calhoun
Twp. Calhoun Point
Quadrangle Brussels 7.5" 1954
(photorevisions 1968, 1974)

Reg. Inst. No. ISM 11-C-288A
Culture Undetermined Prehistoric
Type of site Undetermined

Legal Decription (1/4's; S & W overlay)
SE SW NW NW & NE NW SW NW

Sec.	Twp.	Range
11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL U.T.M. Zone 15
center N4314020 E716365

Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) unknown
Previous excavation None
Pitting None

ENVIRONMENT
Topography and Location floodplain (129 m asl)
Water Supply Illinois River (slough)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-285A,286A,287A,289A,290A
Modern occupation (building, plowing, etc.) wheat field (waterfowl rest area)
Type of soil: Tice silt loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE 2 pieces of debitage (1 blade-like flake, 1 blocky fragment of chert).
Surface coll. by Tankersley/Knight/Schroeder Date 10/17&19/90 Institution ISM
Tested by Date Institution
Excavated by Date Institution
Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. All artifacts observed were collected.

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin

Site reported by Tankersley Date Dec. 6, 1990 Visited
Survey report by Tankersley & Schroeder Date Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season*. Fall, 1991.

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded **Survey No.**

County Calhoun **Reg. Inst. No.** ISM 11-C-287A 419
Twp. Calhoun Point **Culture** Undetermined Prehistoric
Quadrangle Brussels 7.5" 1954 **Type of site** isolated artifact
(photorevisions 1968, 1974)

Legal Decription (1/4's; S & W overlay)	**Sec.**	**Twp.**	**Range**
NE SE NW NW	11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL **U.T.M.** Zone 15
center N4314150 E716575

Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) ISOLATED ARTIFACT
Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location floodplain (129 m asl)
Water Supply Illinois River (slough)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-285A,286A,288A,289A,290A
Modern occupation (building, plowing, etc.) wheat field (waterfowl rest area)
Type of soil: Tice silt loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE 1 chert flake with use wear on margin
Surface coll. by Tankersley/Knight/Schroeder **Date** 10/19/90 **Institution** ISM
Tested by **Date** **Institution**
Excavated by **Date** **Institution**
Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area.

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin

Site reported by Tankersley **Date** Dec. 6, 1990 **Visited**
Survey report by Tankersley & Schroeder **Date** Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season*. Fall, 1990.

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded

Survey No.

420

County Calhoun
Twp. Calhoun Point
Quadrangle Brussels 7.5" 1954
(photorevisions 1968, 1974)

Reg. Inst. No. ISM 11-C-286A
Culture Undetermined Prehistoric
Type of site Undetermined Prehistoric

Legal Decription (1/4's; S & W overlay)
NE SW NW NW & W1/2 NW SE NW NW

Sec.	Twp.	Range
11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL U.T.M. Zone 15
UTMs--Center N4314160 E716365

Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) 0.88 ha (2.2 acres), depth unknown
Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location floodplain (129 m asl)
Water Supply Illinois River (slough)
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-285A,287A,288A,289A,290A
Modern occupation (building, plowing, etc.) wheat field, btwn 2 hunter pit-blinds
Type of soil: Tice silt loam (*Soils of Calhoun County*, U of I report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.

MATERIAL FROM SITE Prehistoric artifacts include: 3 piecies of debitage (1 blocky fragment of chert, 1 bifacial thinning flake, 1 core fragment); and 1 tabular piece of chert (manuport).

Surface coll. by Tankersley/Knight/Schroeder Date 10/19/90 Institution ISM
Tested by Date Institution
Excavated by Date Institution
Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. After the perimeters of the site were defined, the surface was surveyed at 2-5 m intervals.

Curation Illinois State Museum Research & Collection Center, Springfield

MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin

Site reported by Tankersley Date Dec. 6, 1990 Visited
Survey report by Tankersley & Schroeder Date Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season*. Fall, 1990.

ILLINOIS ARCHAEOLOGICAL SURVEY

Recorded **Survey No.**

County Calhoun **Reg. Inst. No.** ISM 11-C-285A
Twp. Calhoun Point **Culture** Archaic, Late Woodland/Mississippian, & Historic (post 1850)

421

Quadrangle Brussels 7.5" 1954 (photorevisions 1968, 1974) **Type of site** Multicomponent

Legal Decription (1/4's; S & W overlay)

	Sec.	Twp.	Range
E1/2 NW NW SW & W1/2 NE NW SW & W1/2 SE SW NW & E1/2 SW NE SW NW & NE NE SW NW & S1/2 SE SE NW NW	11	13S	01W

Site owner IDOC
Site address Miss. R. Area F&WA, Rosedale, IL **U.T.M.** Zone 15
UTMs--South tip: N4313380 E716330 NE corner: N4314040 E716570
NW corner: N4314050 E716500
Previous owners
Present tenant Mississippi River Fish and Wildlife Area
Directed to site by Neil Booth, site superintendent
Mapped by K. Tankersley
Extent of site (area and depth) 4 ha (10 acres), depth unknown
Previous excavation None
Pitting None

ENVIRONMENT

Topography and Location floodplain (128 m asl)
Water Supply Illinois River (slough), 20 m east
Drainage Illinois River
Nearby sites IAS 11-C-152, 153 (west of Hwy.); ISM C-286A,287A,288A,289A,290A
Modern occupation (building, plowing, etc.) waterfowl rest area (wheat field)
Type of soil: Tice silt loam (*Soils of Calhoun County*, UI report #130, 1989).
Ground cover: <10% cover; newly planted to wheat. Field well washed by rain.
MATERIAL FROM SITE Prehistoric artifacts include: 39 pieces of chert debitage (10 cores, 16 secondary flakes, 13 tertiary flakes); 6 informal chipped stone tools (1 unifacial end scraper, 1 unifacial awl, 1 hoe flake, 3 biface fragments); and 1 fire cracked rock). Historic artifacts include: 318 pot sherds (Albany-, salt-, and Bristol-glazed stoneware [post 1850], porcelain, whiteware/ironstone); 271 fragments glass (amethyst [1880-1918], milk glass canning lids [post 1875], clear & colored container, aqua/clear flat glass); 3 glass buttons, 1 clay marble, 1 clay pipestem, 1 shotgun shell base, 1 glass bead, 22 pieces iron (nails, square nuts, spike, & unident.); 1 perforated brass lid; 3 pieces slate; and 5 brick fragments.
Surface coll. by Knight, Schroeder, Tankersley **Date** Oct. 16, 17, & 19, 1990 **Institution** ISM

Tested by **Date** **Institution**
Excavated by **Date** **Institution**

Nature and extent of survey - Field conditions Well-washed field with some newly sprouted wheat. Pedestrian reconnaissance (10 m interval) of proposed waterfowl resting area. After the perimeters of the site were defined, the surface was surveyed at 2-5 m intervals. The oldest available map illustrating structures (St. Charles, Mo.-Ill. 1933 USGS quadrangle map, 15' series [based on 1923 & 1927 surveys]) shows a building in the SE SW NE OF SW 1/4, Sec. 11. This artifact concentration may be associated with the structure or an unmapped building (e.g., fishing/hunting cottage). **Curation** ISM-RCC
MATERIAL REPORTED AS BELONGING TO SITE
Owner of Material
Certainty of Origin
Site reported by Marjorie Schroeder **Date** Dec. 6, 1990 **Visited**
Survey report by Tankersley & Schroeder **Date** Dec. 7, 1990
Publication: *Cultural Resource Studies at Illinois Department of Conservation Parks and Recreation Areas, Volume 6: The 1990 Season*. Fall 1991.

422

Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62701-1787
CHICAGO OFFICE • ROOM 4-300 • 100 WEST RANDOLPH 60601
MARK FRECH, DIRECTOR - KATHY SELCKE, ASSISTANT DIRECTOR

January 30, 1991

Mr. Owen Dutt
Chief, Environmental Analysis Branch
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce
St. Louis, Missouri 63101-7833

Dear Mr. Dutt:

Enclosed is an Archaeological Survey Short Report completed by Illinois State Museum.

Project includes:

1. Calhoun Point Wetland Project

Significant cultural resources were documented and it is recommended that a National Register evaluation be conducted prior to any future development of the area. The Department of Conservation requests HPA concurrence with the project recommendation.

Please contact me at 782-3715 if you need additional information or have any questions.

Sincerely,

Harold Hassen

Harold Hassen, Ph.D.
Cultural Resource Coordinator
Division of Planning

HH:mip

cc: Ann Haaker

Illinois Department of Conservation
life and land together

memorandum

423

to: Owen Dutt and Tom Wolforth

from: Hal Hassen HH

date: January 30, 1991 reference:

subject: Calhoun Point, Wetland Project

Eight archaeological sites were documented. Only two sites are recommended for future National Register evaluations, C-285A and C-289A. The evaluations should occur if these sites are to be impacted.

The remaining six sites, C-286A, C-287A, C-288A, C-290A, C-291A, and C-292A are not recommended for additional work because of the low density of artifacts and the low probability of intact subsurface deposits.

HH:bg

Springfield, IL 62706 • R. Bruce McMillan, Museum Director • Telephone 217-782-7386

springfield illinois state museum

424

Dr. Harold Hassen
Illinois Department of Conservation
Lincoln Towers Towers
Springfield, IL 62706

December 10, 1990

Dear Dr. Hassen:

Enclosed please find copies of the ASSR and site forms for the Calhoun Point wetland project.

Our Phase 1 archaeological reconnaissance of the project area has located eight archaeological sites, two of which may meet the requirements for National Register eligibility. These sites are located along the margins of the abandon sloughs that will be inundated. If the ground disturbances are restricted to the basins of the slough, then none of the sites that were identified in the survey will be impacted. This statement is also supported by deep core data which demonstrates that cultural deposits are absent from the slough, i.e., this area has only recently been a land surface.

Sincerely yours,

Kenneth B. Tankersley, Ph.D.
Research Associate

enc.

APPENDIX DPR-H

FISH AND WILDLIFE COORDINATION ACT DOCUMENTATION

FOREWORD

APPENDIX DPR-H provides the U.S. Fish and Wildlife Service's Planning Aid Letter (PAL, provided as early planning stage guidance) and the Final Fish and Wildlife Coordination Act Report (Final FWCAR, provided as advanced planning stage guidance) for the Calhoun Point project. The service's Final FWCAR (dated May 10, 1995) reflects general agreement with the proposed project configuration. The appendix also provides St. Louis District's responses to the Service's specific project recommendations. The District will continue to involve the Service in all future phases of the project effort.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

MARION FIELD OFFICE (ES)
RURAL ROUTE 3, BOX 328
MARION, ILLINOIS 62959

IN REPLY REFER TO:

COMM: 618/997-5491
FTS: 700/331-9340

426

February 1, 1993

'93 JAN 33 A9:48

Colonel James D. Craig
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Colonel Craig:

This constitutes our planning aid letter identifying important fish and wildlife resources in the Calhoun Point Wildlife Management Area. This report is prepared under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); and the Endangered Species Act of 1973, as amended.

INTRODUCTION

Calhoun Point is located in Calhoun County, Illinois, at the confluence of the Illinois and Mississippi Rivers and is Corps of Engineers owned General Plan land that is managed by the Illinois Department of Conservation (IDOC). The 2,200 acre area consists mostly of bottomland forest, about 450 acres of open water and sloughs, and a few agricultural fields. Current management is directed at providing waterfowl habitat and hunting opportunity and preserving the bottomland hardwood ecosystem. Management practices rely on pumping in the spring to dewater areas for growing waterfowl foods and in the fall to recharge these areas to make food available for waterfowl and provide access to hunters.

When the gates of Lock and Dam 26 were closed (1938), hundreds of acres of bottomland and timberland were inundated. The flooding improved certain habitat conditions for waterfowl and drastically reduced habitat for land animals. Sedimentation, due to the expansion of bottomland and terrace agricultural tillage, occurred in the 50's and 60's, followed by a series of high water events during the 1970's, resulted in the reduction of the water surface acreages from 600 to 450 acres. Sedimentation has severely impacted deep water habitat and very little aquatic vegetation is present. In addition, the turbidity and shallow depth decrease the habitat value of the area for most fish species.

Because of its importance in providing habitat for waterfowl, fish and other species and its location at the confluence of the Illinois and Mississippi River, the involved agencies are interested in enhancing the resources and management potential at Calhoun Point. For this reason, Calhoun Point has been included in the Environmental Management Program (EMP) as a Habitat Rehabilitation and Enhancement Project (HREP).

DESCRIPTION OF HABITAT

Bottomland Hardwoods

The bottomland hardwoods of Calhoun Point are dominated by an aggregate of silver maple and cottonwood. Boxelder is a common understory species and sycamores of great size are found in some areas. Mast producing trees include pin oak, pecan, and walnut. These species are confined to the higher elevations, usually along the banks of channels and sloughs. Understory and ground cover appears good in most areas.

Open Water and Sloughs

The open water and sloughs of Calhoun Point are of poor quality for fish and waterfowl. Due to sedimentation and poor water flow, many of the sloughs dry out in the summer or become very shallow and covered with duckweed. Open water areas carry a high sediment load and are quite turbid. These areas are currently not conducive to the establishment of submerged and emergent aquatic vegetation due to a poor substrate and inadequate light penetration.

Agricultural Fields

The agricultural fields of Calhoun Point are currently planted in corn, milo or other crops which can provide a food source for waterfowl and other wildlife.

THREATENED AND ENDANGERED SPECIES

Federal Species

In accordance with Section 7(c) of the Endangered Species Act of 1973, as amended, you are advised that the proposed study area (Calhoun Point) lies within the range of two federally listed threatened or endangered species and two Category 2 candidate species.

The endangered Indiana bat (*Myotis sodalis*) is found throughout Illinois. Optimum habitat for the bat consists of the riparian and floodplain corridors of small streams. The riparian forest is essential to the foraging and reproductive habits of the bat. The bat will utilize rough bark or the loose bark of dead trees to roost and form maternity colonies.

The bald eagle (*Haliaeetus leucocephalus*) is listed as endangered throughout Illinois. Bald eagles utilize trees along ice free bodies of water to forage for fish in the winter. At night, wintering eagles often congregate at communal roost trees. The roosts are usually in locations protected from wind by vegetation or terrain. Birds may abandon roost sites when human disturbance occurs. Large concentrations of eagles can be found on the Illinois and Mississippi Rivers during the winter months.

The lake sturgeon (*Acipenser fulvescens*) is a candidate species for the federally endangered or threatened species list. This species lives on the bottoms of large rivers and in the moderately shallow water of large lakes. Substrates of sand and gravel are preferred over soft bottoms.

The spectacle case mussel (*Cumberlandia monodonta*) is a candidate species for the federally endangered or threatened species list. Although known to be present in the river systems around Calhoun County, it is not known to occur at Calhoun Point.

428

State species

The State of Illinois protects all species of fauna and flora that have been identified as endangered or threatened. Endangered species are any species which is in danger of extinction as a breeding species within Illinois. Threatened species are those likely to become endangered within the foreseeable future in Illinois.

The proposed project area lies within the ranges of five vertebrate, one invertebrate and five plant species listed as threatened or endangered in Illinois. One plant species has been identified as occurring in the project area.

Salt meadow grass (*Leptochloa panicoides*) is listed as endangered in Illinois. This is a species of wet shores, marshes, and ditches, and reaches its northern range limit in west-central Illinois. This species is found on the shore of the Mississippi River just south of Squaw Island.

Many state endangered or threatened birds are known to migrate through Calhoun Point. These include the great egret (*Casmerodius albus*), little blue heron (*Florida caerulea*), black-crowned night-heron (*Nycticorax nycticorax*), and osprey (*Pandion haliaetus*).

SENSITIVE AREAS

A heron rookery is located on Island 525 just off Calhoun Point at the river confluence. The great egret (*Casmerodius albus*), a state endangered species, is known to nest in this rookery.

The lake sturgeon (*Acipenser fulvescens*), a candidate and state threatened species, has been known to occur in Pool 25.

SUMMARY

The most significant fish and wildlife resources likely to be affected by the project are the bottomland hardwood forests and the open water slough areas. While not containing a large number of mast producing trees, the bottomland hardwoods at Calhoun Point provide valuable habitat for a diversity of species, including neotropical migrants. Even undesirable woody vegetation, such as willow, provides habitat for many species. "Rabbits, deer and beaver regard willow trees and shrubs as favorite winter foods. In the spring, many bird species feed on the buds, while honey bees swarm to its nectar-bearing flowers " (Outdoor Highlights, 1992).

The open water and sloughs of backwater areas such as, Calhoun Point, provide valuable spawning and overwintering sites for riverine fishes. Access to these backwaters is imperative for the continued existence of many species.

Wildlife resource problems at Calhoun Point derive from lack of water level control, flooding and sedimentation. All opportunities to address these problems should be considered in the feasibility phase.

429

RECOMMENDATIONS

Potentially significant impacts that could result from meeting study purposes and objectives could include the destruction or degradation of existing wetland habitats. The exact acreage of the types and locations of wetlands affected will need to be identified in the next planning phase. Efforts should be made during the planning of the project to avoid and minimize impacts to these areas. The construction plan should include a mitigation plan to provide in-kind replacement of unavoidable adverse impacts to wetlands and wildlife habitats within or as close to the project area as possible. We recommend both WHAG and AHAG analyses be conducted to determine the probable benefits and impacts of the proposed project. Specific comments will be provided in the draft Fish and Wildlife Coordination Act Report that will be prepared after reviewing the construction and operation plan.

Sincerely,

for Joyce A. Collins

for Thomas M. Groutage
Assistant Field Supervisor

cc: IDOC (Lutz, Messenger, Major, Donels, Glosser)
IESPB (Lauzon)
USFWS (Bornstein, Drews, Surprenant)

PD-F

430

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
Rural Route 3, Box 328
Marion, Illinois 62959

IN REPLY REFER TO:

May 10, 1995

Colonel Thomas C. Suermann
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

ATTN: Mr. Dave Gates, CELMS-PD-F

Dear Colonel Suermann:

This letter constitutes our Final Fish and Wildlife Coordination Act Report (FWCAR) for the Calhoun Point Habitat Rehabilitation and Enhancement Project (HREP) in Pool 26, Calhoun County, Illinois. This report is intended to provide compliance with Subsection 2(b) of the Fish and Wildlife Coordination Act and Section 7 consultation requirements of the Endangered Species Act of 1973, as amended.

The Calhoun Point HREP is a component of the Upper Mississippi River System Environmental Management Program (EMP) authorized by Section 1103 of the Water Resources Development Act of 1986. The goal of EMP is to implement "numerous enhancement efforts...to preserve, protect, and restore habitat that is deteriorating due to natural and man-induced activities".

INTRODUCTION

Calhoun Point is located in Calhoun County, Illinois, at the confluence of the Illinois and Mississippi Rivers and is Corps of Engineers (Corps) owned General Plan land that is managed by the Illinois Department of Conservation (IDOC). Current management is directed at providing waterfowl habitat and hunting opportunities and preserving the bottomland hardwood ecosystem. Management practices rely on pumping in the spring to dewater areas for growing waterfowl foods and in the fall to recharge these areas to make food available for waterfowl and provide access to hunters.

Sedimentation has severely impacted deep water habitat and very little aquatic vegetation is present. In addition, the turbidity and shallow depth decreases the habitat value of the area for most fish species. Because of its importance in providing habitat for waterfowl, fish and other species and its location at the confluence of the Illinois and Mississippi Rivers, the involved agencies are interested in enhancing the resources and management potential at Calhoun Point. For this reason, Calhoun Point has been included in EMP.

DESCRIPTION OF THE PROJECT AREA

Prior to lock and dam construction, Calhoun Point consisted of wooded ridges, sloughs, small lakes and marshes. When the gates on Lock and Dam 26 were closed (1938), hundreds of acres of bottomland and timberland were inundated. The flooding improved certain habitat conditions for waterfowl and drastically reduced habitat for land animals. Sedimentation, due to the expansion of bottomland and terrace agricultural tillage, occurred in the 1950's and 1960's, followed by a series of high water events in the 1970's, resulted in the reduction of the water surface acreages from 600 to 450 acres. Today, the

2,200 acre area consists mostly of bottomland forest, about 450 acres of open water and sloughs and a few agricultural fields.

The bottomland forest of Calhoun Point is dominated by silver maple and cottonwood. Boxelder and hackberry are common understory species and large sycamores are found in some areas. Hard mast producing species include pin oak and pecan. These species are restricted to higher elevations, usually along the banks of channels and sloughs.

The open water and sloughs of Calhoun Point are of poor quality for fish and waterfowl. Due to sedimentation and poor water flow, many of the sloughs and potholes dry out or become very shallow in the summer. This reduces the available habitat for wood duck broods. Open water areas carry a high sediment load and are quite turbid. These areas are currently not conducive to the establishment of submerged and emergent aquatic vegetation due to a poor substrate and inadequate light penetration. Shallow water and lack of vegetation reduces the value of these areas for fish and waterfowl.

Agricultural fields on Calhoun Point consist of one large, managed field (Goose Field) and a few, smaller, unmanaged fields. These fields are currently planted in corn, milo or other crops which provide a food source for waterfowl and other wildlife.

RESOURCE PROBLEMS AND OPPORTUNITIES

An interagency team consisting of the Corps, IDOC and the Fish and Wildlife Service (Service) have defined problems occurring at Calhoun Point. These problems can be grouped into three broad categories: water levels due to Lock and Dam 26, over-bank flooding and sedimentation.

Water levels resulting from the creation of Pool 26 have reduced forest habitat diversity for nesting wood ducks and wintering dabbling ducks. Mast producing trees, a valuable food source for wildlife, are almost non-existent. Currently, little exposed lake margin is available for moist-soil plant production. Pumping is necessary in order to dewater lakes. During the fall, river levels are below lake levels. This causes water to percolate out of lakes into the river reducing the available habitat for migratory birds and riverine fish.

In order to improve wildlife habitat at Calhoun Point, efforts have been made to establish mast-producing trees. However, summer floods often kill planted tree seedlings. These floods also inhibit the production of moist-soil plants.

Finally, sedimentation on Calhoun Point and other backwater areas is drastically reducing available habitat for fish and wildlife. Silt deposition inhibits reestablishment of submerged aquatic vegetation and mast-producing trees and allows the encroachment of undesirable woody vegetation. Reduced water depths result in seasonally low dissolved oxygen levels and water temperature extremes. Silt eliminates firm substrates and clear water needed for spawning sunfishes. Backwaters are becoming increasingly isolated, thus limiting fish movement.

GOALS AND OBJECTIVES

The goal of this project is to rehabilitate and enhance the fish and wildlife resources of Calhoun Point. This can be accomplished by attempting to meet the following objectives established by IDOC:

432

a. Reduce sedimentation in Calhoun Point by construction of a peripheral levee. Sediment reduction is critically important for any habitat enhancement activity in the project area.

b. Deepening selective lakes and sloughs to provide fish refuge during stress periods and providing fish access into these lakes and sloughs.

c. To provide additional habitat for wood ducks and other wildlife by deepening swales and potholes and establishing mast-producing trees.

d. To provide additional moist-soil management capability by interconnecting interior lakes and providing water-control structures and pumps (where appropriate). This will improve habitat conditions for waterfowl and fish.

e. To provide additional waterfowl habitat in the Goose Field with added water management capability.

PROPOSED PROJECT FEATURES

The Corps' recommended plan proposes the following features to meet the goals and objectives:

a. A riverside dike/levee forming a closed system, with a Mississippi River tie-in elevation of 426 national geodetic vertical datum (NGVD) tapering in the downriver direction to 424 NGVD at the confluence area with the Illinois River. The levee along the Illinois River side of the project area will be at a constant elevation of 424 NGVD.

b. A combination open-topped water control/fish passage structure would be placed at the location of the former entrance to Pohlman Slough. A connection will also be dredged between the river and the deeper portion of the slough.

c. A 48,000 GPM permanently mounted output pump with a portable drive unit will be located at approximate Illinois River Mile 2.5. This will allow summer drawdown of interior lakes for moist-soil plant production.

d. A combination open-topped water control/fish passage structure will be placed at the river confluence, along the Mississippi River.

e. A singe 42" diameter CMP gravity drain and sluice gate will be located at the downriver entrance to Squaw Island in order to facilitate the areas use as a greentree reservoir.

f. A 5,000 GPM portable input pump will be placed near the entrance to Squaw Island.

g. An interior water control structure, consisting of an 8' wide concrete stoplog unit will serve to help regulate Silver Lake and Chickahominy Lake as independent management units.

h. An interior water control structure, similar to item g. will be placed between Chickahominy and Royal Lakes to permit the independent water management of those two units.

i. Two terrace embankment structures, each with 3' wide concrete stoplog units, will be placed at the north end of the goose fields to permit fall ponding and summertime drainage of the goose fields.

j. A 5,000 GPM portable input pump will be made available for the fall flooding of the goose fields using water pumped from Pohlman Slough.

k. A deepwater hydraulic dredge cut along 40% of the length of Pohlman Slough towards the north end of the slough to provide fish refuge during the winter/summer stress periods.

l. A forest management plan to allow for mast tree plantings on dredge disposal areas and in selected crop fields.

m. Selective removal of shoreline woody vegetation (willow/maples) totaling 10% of the area's terrestrial habitat (169 acres). This feature is aimed at restoring some of the area's aquatic habitat lost due to sedimentation and subsequent encroachment of woody species.

METHODOLOGY

Calhoun Point wildlife and fishery habitats were analyzed by using the Wildlife Habitat Appraisal Guide (WHAG) and the Aquatic Habitat Appraisal Guide (AHAG). Existing conditions, future without project conditions and future with project conditions were examined. This analysis employed an interagency team with team members representing the Corps, IDOC, Illinois Natural History Survey and the Service.

The WHAG and AHAG analyses produce a rating of habitat quality for each respective habitat type. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing and future habitat conditions compared to optimum habitat which is 1.0. This value, when multiplied by the available habitat within the project area, will provide a measure of available habitat quality and quantity known as habitat units.

Each analysis includes limiting factors in each matrix. Absence of critical life requisites for a particular species makes the habitat unsuitable and results in a HSI value of 0.1 regardless of other habitat characteristic scores. Average annual habitat units (AAHU's) for each species are calculated to reflect expected habitat conditions over a 50-year project life.

EXISTING AND FUTURE WITHOUT PROJECT CONDITIONS

A number of assumptions were made about what the project area and vicinity would be like 50 years in the future without any project. The chief assumption was that Pool 26 would continue to be managed as it is now and that there would be no change in normal pool elevation. Sedimentation due to overbank flooding from the Illinois and Mississippi Rivers would continue to occur at current rates. Tables 1 and 2 display the existing and future without HSI's for the project area.

Sloughs and Lakes

a. Pohlman Slough--The available open water and emergent (aquatic) type habitats are expected to decline from approximately 74 acres to 52 acres. Habitat quality for fish is expected to decline, but remain relatively good (see Table 2).

b. Squaw Slough--This slough is approximately 18 acres in size. It is expected to silt in and become terrestrial habitat. Current fishery values will be lost (see Table 2).

c. Silver, Chickahominy and Royal Lakes--Due to sedimentation, the surface area of these lakes will decrease from approximately 329 acres to 230 acres. Habitat quality for fish and migratory birds is expected to continue declining (see Table 2).

434

TABLE 1: EXISTING CONDITIONS

AHAG HSI's

Target species	Pohlman Slough	Squaw Slough	Silver, Chickahominy and Royal Lakes
Smallmouth buffalo	0.72	0.73	0.21
Bluegill	0.68	0.71	0.18

WHAG HSI's

Target species	Nonforested* wetlands	Forested** wetlands	Cropland***	GTR**** Squaw Island
Mallard	0.41		0.60	0.10
Canada Goose	0.40		0.60	
Green Heron	0.74			
Wood Duck		0.25		0.44
Northern Parula		0.38		0.65
Prothonotary Warbler		0.27		0.44

* Average of nonforested-emergent and nonforested-open water for Silver, Chickahominy and Royal Lakes
** Average for all forested types analyzed (i.e. low, high, etc.)
*** Goose Field only
**** GTR = Greentree Reservoir

TABLE 2: FUTURE WITHOUT PROJECT (YEAR 50)

AHAG HSI's

Target species	Pohlman Slough	Squaw Slough	Silver, Chickahominy and Royal Lakes
Smallmouth buffalo	0.68	0.00	0.11
Bluegill	0.68	0.00	0.10

WHAG HSI's

Target species	Nonforested* wetlands	Forested** wetlands	Cropland***	GTR**** Squaw Island
Mallard	0.11		0.39	0.10
Canada goose	0.12		0.48	
Green heron	0.74			
Wood duck		0.42		0.42
Northern parula		0.58		0.68
Prothonotary warbler		0.41		0.30

* Average of nonforested-emergent and nonforested-open water HSI's for Silver, Chickahominy and Royal Lakes
** Average for all forested types (i.e. low, high, etc.)
*** Goose Field only
**** GTR = Greentree Reservoir

Bottomland Forest

Forested habitat on Calhoun Point is expected to increase from approximately 1379 acres to 1506 acres. This 127 acre increase will be due to encroachment of non-mast producing species on silt depositions. While this will be an overall net benefit for many species of terrestrial wildlife, overall available aquatic habitat will continue to decline. High quality aquatic habitat is becoming limiting in the Mississippi River due to sedimentation. These areas are vital for riverine fish and many species of migratory birds. The quality of the bottomland forest was expected to increase (see Tables 1 and 2). However, these HSI's were calculated prior to the Flood of 1993. Tree mortality resulting from the prolonged flooding is expected to be significant. Therefore, habitat quality will be quite low until the forest recovers from the effects of the flood.

Cropland

Cropland quantity is not expected to change. However, the quality of this habitat will decline (see Tables 1 and 2).

FUTURE WITH PROJECT CONDITIONS

Sloughs and Lakes

a. Pohlman Slough--The river connection for this slough will be maintained. While the surface area will continue to decline due to sedimentation, it will occur at a decreased rate. Habitat quality for fish will increase overall and remain relatively high (see Table 3).

b. Squaw Slough--The surface area of this slough will be maintained, and thus, available for fish use. The current quality of this habitat will be maintained or increased over the 50 year project life (see Table 3).

c. Silver, Chickahominy and Royal Lakes--The surface area of these lakes will decline from 329 acres to approximately 297 acres due to silt deposition. However, this decline will occur at a lower rate. Aquatic fishery habitat value will remain the same or increase slightly. The ability to manage these areas as moist-soil units will significantly increase their habitat value for terrestrial target species (see Table 3).

Bottomland Forest

Forested habitat is expected to increase from approximately 1379 acres to 1397 acres. This is primarily due to encroachment of woody vegetation. However, this will occur at a significantly lower rate. Forested habitat quality is not expected to change significantly overall. However, the ability to manage Squaw Island as a green-tree reservoir will provide significant benefits for mallards and prothonotary warblers (see Table 3). The habitat quality for wood ducks and parula warblers will be maintained. The levee will protect Calhoun Point from frequent flooding and may allow mast producing tree regeneration at higher elevations.

Cropland

The available cropland area is expected to decrease by approximately 110 acres. A forest management plan will allow for reforestation to occur on the smaller fields. The additional management capability provided by the project will increase the habitat value of the Goose Field for mallards and Canada geese (see Table 3).

436

TABLE 3: FUTURE WITH PROJECT CONDITIONS (YEAR 50)

AHAG HSI's

Target species	Pohlman Slough	Squaw Slough	Silver, Chickahominy and Royal Lakes
Smallmouth Buffalo	0.82	0.84	0.19
Bluegill	0.79	0.84	0.18

WHAG HSI's

Target species	Nonforested* wetlands	Forested** wetlands	Cropland***	GTR**** Squaw Island
Mallard	0.51		0.64	0.64
Canada goose	0.49		0.63	
Green heron	0.71			
Wood duck		0.44		0.48
Northern parula		0.57		0.68
Prothonotary warbler		0.55		0.59

* Average of nonforested-emergent and nonforested-open water for Silver, Chickahominy and Royal Lakes
** Average for all forested types (i.e. low, high, etc.)
*** Goose Field only
**** GTR = Greentree reservoir

THREATENED AND ENDANGERED SPECIES

With regard to federally listed threatened and endangered species, a Biological Assessment has been prepared for the proposed activity. This document lists the species that may occur in the area and describes efforts to eliminate adverse impacts to these species and their habitats. The previous list of threatened and endangered species provided to the Corps by the Service did not identify the decurrent false aster (*Boltonia decurrens*) as potentially occurring in Calhoun County. This species utilizes alluvial soils and is disturbance dependent. No populations of or suitable habitat for this species are known to occur on Calhoun Point. Should populations of decurrent false aster be encountered during project construction, the construction activity should cease immediately and the Service contacted.

If this recommendation for decurrent false aster is incorporated into project plans, the Service would concur that the proposed action is not likely to adversely affect any known federally listed or proposed threatened or endangered species. This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Consultation should be reinitiated should the project be modified, new information indicate endangered species may be affected or if a species or critical habitat that occurs in the project vicinity is listed prior to project completion.

DISCUSSION

Approximately 24 acres of forested habitat is anticipated to be lost due to levee construction. Reforestation measures in selected cropfields and dredge disposal sites are proposed to offset this loss.

The project as proposed will result in a net gain of 540 AAHU's for target wildlife species and 119 AAHU's for target fish species (Table 4). We anticipate significant habitat benefits for a variety of non-target species, as well (see Table 5).

Table 4: Net habitat changes (in AAHU's) for all target species derived from all proposed management measures.

Species	Future With Project	Future Without Project	Net Change
Wildlife			
Mallard	342	152	190
Canada Goose	291	150	141
Green-backed Heron	332	248	84
Wood Duck	619	603	16
Northern Parula	869	883	-14
Prothonotary Warbler	718	595	123
Subtotal	3171	2631	540
Fish			
Buffalo	395	337	58
Bluegill	387	326	61
Subtotal	782	663	119
Total	3953	3294	659

Sedimentation is seen as the most severe problem affecting fish and wildlife resources in the Mississippi River. Aquatic vegetation production is inhibited by soft substrates and high turbidity. Surface areas of sloughs, side channels and backwaters continue to decline, reverting to terrestrial habitat. The aquatic vegetation forms the basis of the substrate needed for aquatic macroinvertebrate production. These invertebrates, as well as the vegetative parts of aquatic plants, provide an important food base for many species of migratory birds and riverine fish. The aquatic vegetation also provides important spawning and brood rearing habitat for fish.

It is a challenge for the Corps and fish and wildlife managers to develop techniques to reduce sedimentation in backwaters and side channels before these important habitats are lost forever. While levee construction is not the best solution, it gives us the opportunity to enhance our remaining resources. It is incumbent upon all of us to work cooperatively so these areas can be best managed to the benefit of both fish and wildlife. The project proposed thus far at Calhoun Point is a good step in the right direction. However, we should also continuously strive to develop techniques and ideas to reduce sedimentation which may make levee construction unnecessary (i.e. upland sediment treatment).

***Table 5: Net habitat changes (in AAHU's) for non-target species derived from proposed management measures.**

Species	Net Change	Species	Net Change
**Wildlife		Fish	
Lesser Yellowlegs	79	White Bass	21
King Rail	70	Emerald Shiner	37
		Walleye	67
		Largemouth Bass	62
Total	149		187

*The AAHU's for non-target species are estimates developed by Corps staff and were not computed in the same manner as the AAHU's for target species.
**AAHU's for nontarget wildlife species do not include the contribution, or lack thereof, of the proposed dike/levee management measure.

CONCLUSIONS AND RECOMMENDATIONS

A number of features have been dropped from further consideration because the WHAG and AHAG models did not show substantial habitat benefits (in terms of AAHU's) with these features. This is primarily due to the small amount of habitat area considered. The HSI's showed a significant increase for target species (see Tables 1 and 3).

In this instance, the Service believes the biology, not the model, should dictate the features included as part of the project. Therefore, we recommend the following be included as proposed project features:

1. Potholes/Swales--Numerous small potholes or swales occur throughout Calhoun Point. Historically, these have provided essential wood duck brood rearing habitat. Most of these areas have silted in to the point they contain little or no water during the brood-rearing season. This may seriously impact wood duck production on Calhoun Point. Therefore, we recommend selective sites be deepened and mast producing trees planted on the spoil sites to benefit this species. This is justified considering the project as proposed will provide only 16 AAHU's for this target species (see Table 4).

2. Selective Deepwater Dredging: We are aware that the selective dredging of Squaw Slough to provide additional fishery benefits was determined to be cost prohibitive, while the proposed dredging of Pohlman Slough would be relatively cost effective. We believe that the provision of suitable over-wintering habitat for riverine fish is a very important component of the project. In order to bolster this aspect of the project, we request that consideration be given to increasing the proposed dredging in Pohlman Slough from the presently proposed 40 percent of the slough length to approximately 60 percent of the slough length.

Finally, the Flood of 1993 has caused a great deal of tree mortality in much of the Mississippi River floodplain. This mortality rate is estimated at 60% in some areas and may increase over the next few years. Mast-producing trees tend to be intolerant of flooding. Therefore, it is not unreasonable to suggest that most, if not all, of the mast producing trees on Calhoun Point will die either directly or indirectly from the flood. Tree planting has been included as an integral part of the project plan for habitat enhancement at Calhoun Point. This will provide substantial habitat benefits for target and non-target species.

The Service recommends a reforestation and timber stand improvement component be included as a project feature in all future HREP projects along the Mississippi and Illinois Rivers. Tree planting will provide additional habitat benefits that will supplement other habitat enhancement efforts. This is particularly important to wood ducks and dabbling ducks, as well as other species of migratory birds and resident wildlife. This component will also help offset the loss of forested wetlands which may result from construction activity.

Thank you for the opportunity to provide this report.

Sincerely,

Joyce A. Collins
Acting Assistant Field Supervisor

cc: IDOC (Schanzle, Messenger, Major, Hubbell, Glosser, Booth, Atwood)
IESPB (Lauzon)
USFWS (Nelson, Bornstein, Drews, Surprenant)
USEPA (Orzehoskie)

ST. LOUIS DISTRICT'S RESPONSE
TO FINAL FISH AND WILDLIFE COORDINATION ACT REPORT FROM
U.S. DEPARTMENT OF THE INTERIOR, U.S. FISH AND WILDLIFE SERVICE
(JOYCE COLLINS)
DATED MAY 10, 1995

Threatened and Endangered Species - decurrent false aster. The biological assessment and the final report has been modified to include the recommendation that construction activity will cease immediately and the Service contacted if the decurrent false aster is encountered at the project site.

Discussion - first paragraph. About 51, not 24 acres, of forested habitat is expected to be lost due to levee construction. The higher figure was included in the draft report on page 84, and remains unchanged in the final report.

Conclusions and Recommendations - Potholes/Swales. The District will not reinstate this feature. As the Draft FWCAR points out, a substantial increase in HSI for the wood duck was projected for the Squaw Island area. Because of this, the effectiveness of the wood duck HSI model in the WHAG method has not been questioned. However, the area affected by the proposed measure did not change from the future-without to future-with project condition, and involved only 28 acres - the 18-acre Squaw Slough (wet "pothole"), and 10 acres of dry "pothole" habitat. Therefore, the wood duck measure (exterior water control structure at Squaw Island, pump, deepwater dredging in Squaw Slough, and pothole excavation) generated very few wood duck AAHUs. Only 1 AAHU was generated by the exterior water control structure (C1/C2), 2 AAHUs by the pump (I1/I2), 1 AAHU by dredging over 40% of the slough's length (K2/K4/K6), and 2 AAHUs by pothole excavation (M1/M2/M3/M4).

The wood duck measure proved to be inefficient in terms of AAHUs gained per dollar spent, even after adding in fish AAHUs (smallmouth buffalo and bluegill) generated by the wood duck measure, which also were few. The exterior water control structures were estimated to cost $6,499/AAHU (C1) and $7,990/AAHU (C2). The pumps were $700/AAHU (I1) and $500/AAHU (I2). Deepwater dredging ranged from $1,400 to over $2,100/AAHU, and pothole excavation was $1,238/AAHU (M1/M2) and $3,374/AAHU (M3/M4). Based on the District's experience with other HREPs, we view critically habitat measures that yield unusually high dollar costs per unit of output. For the Calhoun Point project, we set $1,000/AAHU as a reasonable upper limit. Given that the wood duck HSI model performed adequately, we see no reason to make an exception and include inefficient measures into the recommended plan.

Operation of the proposed green tree reservoir should benefit

wood ducks in terms of brood-rearing habitat. The reservoir will be drained in the early spring to remove water from the flooded forest, but water can be held in Squaw Slough through the summer for wood duck broods. In addition, the project as proposed earlier showed an overall increase of 16 AAHUs for the wood duck, based on reforestation of 75 acres of cropland (including disposal areas). Reforestation will now encompass 115 acres. In addition, 115 acres of forest will be planted with mast tree species in response to tree mortality imposed by the 1993 flood. These 30 acres of mast tree plantings will benefit the wood duck significantly.

The District doesn't disagree with the intent to do good things for wood ducks, but we do disagree with a policy of doing good things whatever they may cost. If we make exceptions to our policy of recommending cost-efficient features, as the Service suggests, then we could easily find ourselves recommending every feature developed with good intentions, and never screening out those that offered too little "bang for the buck."

Conclusions and Recommendations - Selective Deepwater Dredging. The District will implement the suggested extension of dredging in Pohlman Slough.

Conclusions and Recommendations - Reforestation and Timber Stand Improvements. Forestry measures will be included in all future habitat projects whenever possible.

APPENDIX DPR-I

ENDANGERED SPECIES ACT DOCUMENTAION

FOREWORD

APPENDIX DPR-I provides the list of Federally threatened and endangered species which may occur in the area of the proposed project as furnished by the Service in its letter of 16 September 1992. A revised species listing was provided 1 February 1993 as part of the Service's Planning Aid Letter (See APPENDIX DPR-H). Also included in this appendix is the District's biological assessment for these species. The USFWS's concurrence with this assessment is included in the APPENDIX DPR-H Final FWCAR.

443

United States Department of the Interior

FISH AND WILDLIFE SERVICE

MARION FIELD OFFICE (ES)
RURAL ROUTE 3, BOX 328
MARION, ILLINOIS 62959

COMM: 618/997-5491
FTS: 700/331-9340

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

September 16, 1992

Owen D. Dutt
Chief, Planning Division
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce St.
St. Louis, Missouri 63103-2833

ATTN: Dr. Leo Nico, CELMS-PD

Dear ~~Mr. Dutt~~ Owen:

This is in response to your August 20, 1992, request for information to facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, for species that are listed or proposed to be listed as endangered or threatened that may be present in the area of Calhoun Point, Calhoun County, Illinois. The following list of species is provided for the project area:

Classification	Common Name	Scientific Name	Habitat
Endangered	Indiana bat	*Myotis sodalis*	Caves & riparian
Endangered	Bald eagle	*Haliaeetus leucocephalus*	Breeding & wintering along major rivers & reservoirs
Category 2	Lake sturgeon	*Acipenser fulvescens*	Bottoms of large rivers and lakes

There is no designated critical habitat in the project area at this time.

There is a heron colony located on Island 525, just east of the Northeast corner of Calhoun Point. In addition, a population of Salt Meadow Grass (*Leptochloa panicoides*), a state endangered species, is located along the east shore of Calhoun Point just south of Squaw Island.

If this office can be of further assistance, please contact Joyce Collins at one of the above numbers.

Sincerely,

Thomas M. Groutage
Assistant Field Supervisor

cc: IDOC (Messinger, Major, Glosser, Donels)
IESPB (Lauzon)

APPENDIX I

FEDERALLY ENDANGERED SPECIES: BIOLOGICAL ASSESSMENT.

a. Introduction. This Biological Assessment evaluates the environmental effects of the habitat rehabilitation and enhancement at Calhoun Point on Federally endangered and threatened species. In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested that the U. S. Fish and Wildlife Service (USFWS) provide a listing of Federally threatened or endangered species, currently classified or proposed for classification, that may be found in the project area. The USFWS, in letters dated September 16, 1992, February 1, 1993, and February 23, 1995, provided the following list:

Common Name	Scientific Name	Classification	Habitat
Bald eagle	Haliaeetus leucocephalus	Endangered	Breeding and wintering along major rivers and reservoirs
Indiana bat	Myotis sodalis	Endangered	Caves and riparian
Lake sturgeon	Acipenser fulvescens	Category 2	Bottoms of large rivers and lakes
Spectacle case mussel	Cumberlandia monodonta	Category 2	Large rivers
Decurrent false aster	Boltonia decurrens	Threatened	Disturbed alluvial soils

There is no designated critical habitat in the project area at this time for any of these four species.

b. Bald Eagle. This large bird is a common winter inhabitant of the major river systems of Illinois and Missouri. As winter arrives on the breeding grounds of northern Alaska and Canada, deep snows and sub-freezing temperatures cause waterways to become icebound. This reduces the availability of fish, the preferred food of the Bald eagle. Eagles respond to this annual paucity of food by migrating south to milder climates and more accessible food sources. Eagles winter as far north as open water and food permit.

The vicinity of the confluence of the Illinois and Mississippi Rivers receives high eagle use. Calhoun Point provides primarily perching and loafing habitat in the form of large trees, such as cottonwoods and sycamores, along the Illinois and Mississippi Rivers (Roelle and Hamilton, 1991). Night roosting habitat is found in the interior of the

area, but it is of secondary importance because this type of habitat is also found on islands and bluffs overlooking the rivers. Swan Lake, to the immediate west of Calhoun Point, is a
445 fishing and loafing site for bald eagles (Hindmarsh and McNamee, 1980, cited in Dunstan and Fawks, 1981). On the opposite side of the Illinois River, Pere Marquette State Park is a primary roosting location and also serves as a severe weather refuge to wintering eagles (Dunstan and Fawks, 1981). Furthermore, a bald eagle nest is located on an island in the Mississippi River a short distance downriver from Calhoun Point.

Calhoun Point is used by eagles generally from October through February (Roelle and Hamilton, 1991). The greatest stress to eagles usually occurs during mid-December to mid-February when temperatures are low and food is least available.

According to Dunstan, Ives, and Harper (1982), there are three types of impacts to wintering eagles: destruction or harm to the source of food on the wintering site, destruction of eagle wintering habitat, and disturbance of daily eagle behavior.

Food Source. Eagles feed primarily upon fish, but also eat waterfowl and other birds, as well as carrion. To feed upon fish, eagles concentrate around areas of open water. During cold weather, open water on rivers is often found immediately below dams; portions of channels may stay open naturally, such as at the confluence of tributaries, or by the repeated passage of tows. For example, eagles can be observed foraging in ice-free water where the Brussels Ferry crosses the Illinois River, immediately adjacent to Calhoun Point. The project is not expected to impact food sources.

Habitat. Eagles use trees at night for roosting, and during the day for foraging (searching for food), feeding (consuming food), and resting (neither foraging or feeding). Dunstan, Ives, and Harper (1982) and Harper (1983) reported that trees used as foraging perch sites are 1) located along the shoreline (ideally adjacent to open water), and usually lean out toward the water or have limbs which jut out over the water, 2) are most often cottonwoods, and 3) are taller than adjacent trees. These authors state that foraging perches may sometimes serve as feeding perches, but preferred feeding perches consist of silver maples with dense branches which are located away from the shoreline; the use of such trees apparently reduces the chances of food being pirated by other eagles. During the day eagles may also rest at foraging perches, but they may use other trees located away from the shoreline that are protected from wind. The flood of 1993 is estimated to have killed about 50 percent of the trees at Calhoun Point, but the impact on day and night tree perches is unknown.

There is little potential for habitat disturbance in the form of tree clearing. About 51 acres of trees will be cleared to construct the riverside berm. However, the berm alignment was deliberately set back from the riverbank to avoid potential foraging perch sites. Along the Mississippi River, the berm has been set back from the river from about 150 to 600 feet. Along the Illinois River, the berm will follow an existing access road along most of its path, and will leave undisturbed the narrow band of trees riverside of that road.

Within the interior of the project area, 115 acres of trees killed by the flood of 1993 will be cleared for planting of mast tree species; trees larger than 8 inches dbh will be left standing. Along the edge of the moist-soil management unit, 169 acres of woody encroachment will be killed with herbicide to reestablish emergent wetland vegetation. The proposed tree clearing is unlikely to adversely affect riverside perching sites, or interior night roosts. 446

Eagle Disturbance. Although Bald eagles concentrate in large numbers in the winter near human activities, most observations indicate that certain types of human activities within certain distances will cause Bald eagles to leave an area. Stalmaster and Newman (1978) reported that high human activity, such as that occurring frequently in the sight of eagles, caused the birds to use less suitable habitat. They report that feeding behavior was the most sensitive activity observed. Activities directly on the channel of the river, such as boating and fishing, were most disturbing if the activities did not regularly occur there. Harper (1983) reported disruptions of daily activities of eagles at Lock and Dam No. 24 by hunters, fishermen in watercraft, and aircraft. If eagles are disturbed while on a feeding ground, they usually fly to nearby perch sites and do not resume feeding for long periods (Stalmaster, 1976).

The proposed habitat enhancement work at Calhoun Point may occur in part during the winter months when eagles are present. The potential for construction activities to disturb the known night roost will be minimized by the fact that most construction activities will occur around the perimeter of the point, whereas the night roost is located toward the point's interior. A buffer zone of 500 feet will be established around any night roost, within which no trees can be felled. With regard to feeding or perching habitat, any disturbance by the proposed work to eagles sporadically feeding or perching in trees along or near the edge of the island is expected to be short term.

c. Indiana Bat. In the central and southern portions of the eastern United States, Indiana bats (*Myotis sodalis*) hibernate during the winter in caves and mines (hibernacula) with cool and stable temperatures throughout the winter (USFWS, 1983). Only seven hibernacula support about 85 percent of the entire known population (USFWS, 1983). Two mines and 11 caves have been designated as critical winter habitat by the U.S. Fish and Wildlife Service. Although seven of these hibernacula occur in Missouri and Illinois, none of these are near Calhoun Point. The most serious known cause of decline of the Indiana bat is human disturbance of hibernating bats (Clawson, 1987). Because there are no hibernacula in the project area, the proposed habitat rehabilitation work will not impact winter hibernating habitat of the Indiana bat.

In general, Indiana bats disperse from hibernacula in the spring and migrate to summer habitat in midwestern and eastern United States. They are entirely insectivorous. Clawson and Titus (1988) reviewed food habitat studies and determined that this bat preys upon insects from eight or more orders. These include (in order of preference): Lepidoptera (moths), Coleoptera (beetles), Diptera (flies and mosquitos),

Trichoptera (caddis flies), Plecoptera (stone flies), Homoptera (aphids and scale insects), Neuroptera (lacewings), and Hymenoptera (bees, wasps, and ants). The bat's foraging strategy is apparently dependent upon prey availability - when preferred prey species are abundant, it will feed selectively, whereas the bat becomes opportunistic and feeds on a wider variety of prey items when the preferred ones are less abundant (Clawson and Titus, 1988).

447

In general, summer habitat requirements are not well known. Foraging habitat usually consists of the tree canopy of riparian and upland forest, but this bat may also feed along forest edges and over old fields and pastures (Clawson and Titus, 1988). During the warm months, female Indiana bats give birth to young. USFWS (1983) stated that maternity colonies are established mostly in riparian and flood plain areas of small to medium-sized streams. However, Gardner (1990) recently discovered a maternity roost on an island in the Mississippi River near Quincy, Illinois. Such colonies are usually formed under the loose bark of dead trees, but they can be found under the loose bark of live trees, or in tree cavities. Potential roost trees must also be at least 9 to 10 inches in diameter at breast height (Hofmann, 1994). Tree species known to be used for roosting in Illinois include silver maple, cottonwood, shingle oak, slippery elm, northern red oak, bitternut hickory, sassafras, shagbark hickory, sugar maple, post oak, and white oak (Gardner, Hofmann, and Garner, 1989, 1990). Not every tree with loose bark or cavities provides the microclimate of a suitable roost; probably only a small portion of such trees possess the properties required to shelter maternity colonies from weather extremes (hot temperatures, early freezes, extended periods of rain, etc.) (Gardner, 1990). Recent studies of summer habitat use indicate that wooded uplands may be used more extensively for rearing of young than has been previously known (Clark, Bowles, and Clark, 1987; Clawson, 1987; Gardner, Hofmann, and Garner, 1990).

Studies of banded Indiana bats indicate they may return to the same summer locality in successive years. However, an individual tree may serve as a roost for only a relatively short time, perhaps 6 to 8 years. Thus, the bats seem to have the behavioral flexibility to move their homesite every few years, probably to nearby trees that permit them to use the same general foraging area (Humphrey, Richter, and Cope, 1977).

Essentially all of Illinois and Missouri are within the known and suspected range of the Indiana bat (USFWS, 1983; Clawson and Titus, 1988). The species apparently has not been found in Calhoun County, Illinois, but has been encountered in the nearby Illinois Counties of Pike, Scott, Jersey, Macoupin, Madison, and Monroe (Gardner, Hofmann, and Garner, 1990; Hofmann, 1994), which range from 12 to 35 miles away.

According to Gardner (1990), Indiana bats probably use the flood plain forests of large rivers such as the Mississippi as summer habitat, including that found at the project site. For this project, it is reasonable to assume that the species does use Calhoun Point and vicinity as foraging and maternity roost habitat. The proposed habitat

rehabilitation work will involve the clearing of bottomland forest for the construction of some project features. Trees to be cleared probably include potentially suitable roosting trees.

448

d. Lake sturgeon. This fish is being considered for possible addition to the List of Endangered and Threatened Wildlife. Its designation as a category 2 species means that information now in possession of the U.S. Fish and Wildlife Service indicates that proposing to list as endangered or threatened is possibly appropriate, but conclusive data on biological vulnerability and threat are not currently available to support a proposal to list.

This species lives on the bottoms of large rivers and in the moderately shallow water of large lakes. Substrates of sand and gravel are preferred over soft bottoms. The lake sturgeon was a common and economically important fish in the Upper Mississippi River before 1900, but since then it declined dramatically in abundance and is rare today. Overfishing and pollution at the turn of the century were the chief causes of its decline. The Missouri Department of Conservation initiated a reintroduction plan for lake sturgeon in 1984 by stocking Mark Twain Lake on the Salt River in northeastern Missouri with fingerlings (MDOC, 1986). Since reintroduction, commercial fisherman have apparently captured this fish in Pool 24, where the Salt River joins the Mississippi. Fish community sampling in Pool 26 from 1987-1990 has not included this species (Sheehan, Lewis, and Bodensteiner, 1990; Farabee, 1992; Gutreuter, 1992).

The project is unlikely to adversely affect this species.

e. Spectacle case mussel. According to Fuller (1985), this mussel is not common in the Upper Mississippi River. The Missouri Department of Conservation has found live specimens from Pool 24 (Koch, 1991). In Missouri, it is common in the Meramec River basin (Buchanan, 1980; Oesch, 1984). In Illinois, its distribution includes medium to large-sized rivers where it is uncommon (Parmalee, 1967). The species apparently prefers substrates of gravel, cobbles, or boulders, and has been found inhabiting wing dams, but substrates of sand and firm mud are also used (Buchanan, 1980; Fuller, 1985).

At Calhoun Point, a mussel bed is found adjacent to the left descending bank of the Mississippi River, extending from Royal Landing to Squaw Island (USFWS, 1991). However, mussels are not known to occur in the aquatic habitats within Calhoun Point. The project as proposed is not likely to affect the spectacle case mussel.

f. Decurrent False Aster. The following information is taken from USFWS (1990). The decurrent false aster (Boltonia decurrens), a perennial plant of the Aster family, is endemic to Illinois and Missouri. Its historical range includes a 400 km segment of the Illinois and Mississippi River floodplain extending from LaSalle, Illinois to the vicinity of St. Louis, Missouri. It is not known to occur at the project site. In 1989, the species was found on the Mississippi River floodplain in St. Clair County, Illinois, and in St. Charles County, Missouri, to the south and east of the project site. Its historical distribution also includes Lincoln County, Missouri, to the immediate north.

This tall, bushy plant usually grows to a height of 1.5 meters, but sometimes exceeds 2 meters. From August to October it produces aster-like flower heads
449 about the size of a quarter-dollar. The flower consists of yellow disks 7-14 mm wide, and white to pale violet rays about 1-1.8 cm long. The leaves, narrow and elongated, are about 5-15 cm long and about 5-20 mm wide. The leaves are decurrent - the base of each leaf extends downward along the stem to which it is attached. B. decurrens reproduces both vegetatively (asexually) by producing basal shoots, and sexually by producing seeds.

The decurrent false aster grows in open wetland habitats, and it appears to require abundant light. Historical collection data indicates that this species once inhabited the shores of lakes and the banks of streams. Although it grows in these habitats today, it is most common in disturbed lowland areas where it appears to be dependant on human activity for survival. The species' decline appears to be caused by habitat destruction and modification: drainage of natural lakes, wet prairies and marshes with conversion to crop land; alteration of natural flood regimes by man-made levee systems; and high rates of silt deposition upon floodplains. Other threats to its existence may include such agricultural practices as discing and the use of herbicides for weed control. However, almost all currently known populations are found in open habitats that are kept free of woody vegetation by occasional cropping. It is also believed that prolonged flooding during the growing season can limit natural reproduction and survival.

The decurrent false aster is not known from the project area, and the project will not affect this species.

g. Efforts to Eliminate Adverse Impacts on Species and Habitats.

(1) Bald Eagle. To avoid impacts to the bald eagle, the St. Louis District will place a special condition on the contracted work as follows. The contracting officer will ensure appropriate compliance.

"No construction work or activity, located within 500 feet of any night roosts, will occur during the day or night while eagles are present during the winter and using the roosts. Such work will be postponed until the eagles leave the area. This includes but is not limited to tree clearing. Although no bald eagle nests now occur within the project area, if a nest is encountered, then a management plan will be developed and implemented in accordance with the U.S. Fish and Wildlife Service's recovery plan for the bald eagle."

(2) Indiana Bat. The felling of trees greater than 9 inches diameter at breast height will be scheduled during September through April, which is outside the period May 1 - August 31, when Indiana bats are known to inhabit summer habitat. If for any reason clearing of trees greater than 9 inches diameter at breast height has to be carried out during the period May 1 - August 31, a site visit will be conducted first by a team of biologists to determine if any roost trees are among those proposed to be felled. The team will consist of representatives from the Illinois Department of Conservation, U. S. Fish and Wildlife Service, and St. Louis District. The District will enter into formal consultation with the U. S. Fish and Wildlife Service if removal of a roost tree during the period May 1 - August 31 is proposed.

(3) Decurrent False Aster. Although this plant is not known to occur within the project area, if it is encountered during the construction phase, then construction activity will cease immediately and the Service will be notified. 450

h. Conclusions. It is the St. Louis District's conclusion that the habitat rehabilitation of Calhoun Point, in conjunction with the described measures to avoid impacts to the Bald eagle, Indiana bat, and decurrent false aster, will have no effect on Federally endangered or threatened species or their critical habitat.

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451

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APPENDIX DPR-J

PROJECT HABITAT QUANTIFICATION

FOREWORD

APPENDIX DPR-J establishes a basis for evaluating the biological impacts of the various project alternatives, and provides a biological baseline for post-project performance evaluation monitoring. Section 1 of the appendix deals with target species (those receiving special management emphasis). Section 2 includes a District letter report to the USFWS dealing with non-target species.

SECTION 1

455

APPENDIX J

CALHOUN POINT

PROJECT HABITAT QUANTIFICATION

A. INTRODUCTION. This section provides a quantification of habitat outputs for the Calhoun Point HREP incremental cost analysis. The purpose of the analysis is to assess the incremental outputs/costs relationships of 15 potential management measures and 57 management measure increments presented in the DPR Report.

The unit of measure applied to the habitat output evaluation of the area is the habitat unit (HU). A habitat unit is the product of the estimated acreage for a given habitat type and a habitat suitability index (HSI) value for that habitat type. HSIs result from the numeric ranking of habitat sample site characteristics. HUs can be annualized for specific target years to project changes in habitat over time. The effects of various alternative features can then be compared by applying the HSIs to the acreages of habitats for each feature considered.

For the alternatives evaluated for the study area, both wildlife and fisheries based HU accounting methodologies were needed. For the wildlife evaluation, the Wildlife Habitat Appraisal Guide (WHAG) was used (MDOC and SCS, 1990). WHAG was developed by the Missouri Department of Conservation (MDOC) and the U.S. Soil Conservation Service based on the U.S. Fish and Wildlife Service's (USFWS) Habitat Evaluation Procedures methodology (HEP). WHAG is widely accepted by local agencies, and it has become the primary habitat-based method used in the St. Louis District. It is the method currently in use for evaluation of the Upper Mississippi River System--Environmental Management Program (UMRS-EMP) Habitat Rehabilitation and Enhancement Projects (HREPs).

The fisheries evaluation methodology that has gained the most acceptance within the St. Louis District and along the entire Upper Mississippi River is the Aquatic Habitat Appraisal Guide (AHAG) method (Killgore and Hardy, 1992). The AHAG was developed by the Corps' Waterways Experiment Station (WES) in coordination with the Corps' Rock Island District. The HSI models for the methodology follow the format of the Missouri WHAG. The AHAG is still evolving, and it has not yet been field verified; however, the procedure does represent the state-of-the-art. For that reason, the AHAG has been applied to the Calhoun Point study area.

The specific details of the application of the WHAG and AHAG procedures to the study area are described in the next two sections.

B. WILDLIFE HABITAT APPRAISAL GUIDE (WHAG) METHOD.

1. Description of Method. The WHAG provides HSI values for areas classified into broad land-use types. WHAG is based on the assumption that habitat can be numerically described by HSIs calculated from species-habitat models. WHAG utilizes checklist-type appraisals for each habitat type. The guide breaks down habitat into the most important characteristics which are rated on a 1-to-5 or 1-to-10 scale, depending on their importance. Field data values are entered into a computer program which rates habitat types based on life requisite requirements for a variety of species. The resulting index ranges from a low HSI of 0.1 to a high of 1.0. The HSIs and acres can be combined to assess the value of various proposed habitat improvements on the study area. Hus are annualized for the target years in order to evaluate the changes in project features over time. Because the WHAG method rates habitat quality in terms of individual wildlife species, habitat units are also relative to individual species. 456

The habitat characteristics and species used for evaluation are presented in EXHIBIT J-1. The information in EXHIBIT J-1 is referred to as the wetland species characteristic matrix. The matrix includes 54 habitat characteristics and 12 wetland-dependent wildlife species, including 10 birds and two mammals. In the matrix, habitat is categorized into four wetland types - forested wetland, nonforested wetland, wet cropland, and wet grassland. Of the 54 habitat characteristics, only a portion are applicable to each habitat type. Likewise, no habitat characteristic is applicable to all 12 wildlife species.

Using the matrix, the team rated all applicable habitat characteristics at each sample tract under existing conditions (year 1994). The team also rated each sample tract under future conditions with and without a project for years 1999 and 2044, or five and 50 years in the future. Year 1999 with the project was defined as four years after project completion. Year 2019 (25 years) was also evaluated for one management measure. The ratings were entered into the WHAG computer software by the St. Louis District to calculate habitat suitability indices for all 12 species, by habitat type and project condition. To save space, field ratings are not presented in this appendix.

There are two approaches to evaluating the effects of individual measures or increments on habitat quality. One approach is to assess the effect of each measure or increment independently. The other approach is to assess the collective effect of a group of measures considered to be the "best possible project," and then break the effect down according to its component measures or increments. The first approach involves as many iterations through the habitat evaluation process as there are measures or increments, whereas the second involves far fewer iterations. A major drawback to the first approach is that a particular method chosen for habitat evaluation may not be "sensitive" enough to distinguish differences between each measure or increment, whereas this is usually not a concern for the second approach.

For EMP-HREP projects, the St. Louis District has traditionally evaluated the "best

possible" project for the future with project condition, and then produced the HSI for it - the
457 "maximum" HSI. The difference in HSI between the future-with-maximum and future-without conditions is then broken down according to the different measures or increments. To do this, every habitat characteristic is examined to identify those that change with the project. For those habitat characteristics that change, the measures or increments causing that change are identified, and the relative contribution of each measure is assigned subjectively on a scale from 0 to 1. This process is done separately for each habitat type. For each habitat type, a weighted average is assigned to each measure or increment according to how many habitat characteristics it changes, and by how much. The weighted average (scale from 0 to 1) for each measure or increment is multiplied by the overall change in HSI to give the change in HSI for that measure or increment. This process is repeated for each habitat type.

Representatives of the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and St. Louis District participated as a team in the evaluation of habitat quality and quantity for existing, future without, and future with conditions.

2. Assumptions. During the WHAG analysis, certain assumptions were developed.

(a). The term habitat restoration, for the purposes of this analysis, is defined as measures undertaken to return habitat resources to a modern historic condition.

(b). The modern historic condition is taken as the level of habitat conditions that prevailed in the study area in the year 1935. This is a point in time just prior to the completion of the Corps' 9-foot navigation channel project.

(c). Significant wildlife of the study area include migratory and wintering dabbling ducks (such as the mallard and wood duck), Canada goose, and bald eagle.

(d). Target species were chosen to represent the focus of management efforts at the wildlife area and to aid in the evaluation of management measures. Of the dozen WHAG evaluation species, six target species were chosen to represent the three applicable WHAG habitat types: nonforested wetland - mallard, Canada goose, green-backed heron; forested wetland - wood duck, northern parula, prothonotary; wet cropland - Canada goose and mallard.

(e). Since habitat conditions can change over time, several target years or points in time were selected as a focus for habitat evaluations. These were years 0, 5, and 50, which correspond to 1994, 1999, and 2044. The year 25 was also used for reforestation (2015).

(f). In the next fifty years, it was assumed that 35 percent of Calhoun

Point's interior aquatic habitat would fill with sediment carried by flood waters and be converted to terrestrial habitat.

458

(g). It was assumed that the proportion of aquatic acres "saved" from future sedimentation by the presence of a riverside dike/levee was the same as the estimated efficiency of each levee increment in deflecting sediment loads carried by all expected flood events (422-45%, 424-67%, 426-80%, 428-90%).

(h). Management practices by IDOC and the USFWS at the project area will remain the same for the next 50 years.

(i). PLATE J-1 shows fifteen sites at which habitat characteristics were sampled. The number and location of these sites was assumed by the team to be representative of the prevailing habitat conditions.

3. Results.

(a). **WHAG Habitat Categories.** Eight kinds of existing habitat were sampled (see PLATE J-1): open water (sample sites 4 & 7), emergent (3 & 6), "pothole" (old oxbows or meander scars, 9 & 11), woody encroachment (15), low forest (elevation 420-424, sites 5 & 8), high forest (elevation 424-428, sites 10, 12 & 13), cropland with water control capabilities for goose management (2), cropland without water control capabilities but vegetative management for geese, or cropland managed for small game (1 & 14). A ninth habitat, new woody encroachment, was applicable to future conditions. These nine habitats correspond to the WHAG habitat types as follows: nonforested wetland (open water, emergent, pothole), forested wetland (existing and new woody encroachment, low and high forest), and wet cropland (cropland managed either for geese or small game).

Some habitat types at Calhoun Point were subdivided further according to existing management practices. For example, open water and emergent wetland types in Pohlman Slough, which is dedicated to fisheries management such that water levels fluctuate with the river, were distinguished from open water and emergent wetland types in moist-soil management areas. In the latter case, water levels of Silver Lake, north and south Royal Lake, and Chickahominy Slough are controlled independent of the river, and are lowered one foot below normal pool elevation in summer, and raised one foot above normal pool elevation in fall and winter.

(b). **WHAG Field Data.** The field data for the 56 habitat characteristics and 15 sample sites for existing and future conditions are not included in this appendix in order to save space.

(c). **WHAG Habitat Suitability Indices.** The WHAG computer program was used to compute habitat suitability indices for all 12 evaluation species, for each habitat category, and for each project condition. HSIs for forested wetland habitat types

are presented in TABLE J-1, for nonforested wetland habitat types in TABLES J-2, J-3, J-4, and J-5, for wet cropland in TABLE J-6.

459 At Squaw Island, which currently is not managed for any wildlife or fish species, the option of green tree reservoir management was considered, and HSIs for forested and nonforested wetland types are presented in TABLE J-7. Reforestation of existing cropland within the project area was also considered as an option, and HSIs for this measure are presented in TABLE J-8.

Note that the HSI values presented in TABLES J-1 through J-8 for the future-with-project condition reflect existing management practices with the best or "maximum" project possible. HSIs are not presented for individual measures or increments.

(d). **WHAG Habitat Acres**. Acres of habitat for existing and future-without-project conditions are provided in TABLE J-9. Data for existing conditions are derived in large part from data provided by the Environmental Management Technical Center (EMTC) of the National Biological Survey, which developed a geographical information system (GIS) interface for the project area (see APPENDIX K for the EMTC's area by cover type data). The EMTC's forested landcover type was subdivided into three types: existing encroachment, low forest, and high forest. Estimates of area for each forest subtype were based on results obtained by hand planimeter and from the GIS interface.

Acres of habitat for the future-with-project condition are presented in TABLE J-10, which reflects the construction of a riverside levee around the perimeter of the entire project area at an elevation of 424 feet NGVD. Similar tables were developed for 15 other levee alternatives that represent four different alinements and four different heights, but these tables are not presented in this appendix in order to save space.

(e). **WHAG Habitat Units**. In order to save space, documentation of the process used to break down "maximum" HSIs into HSI changes associated with individual measures or increments is not presented in this appendix. Average annualized habitat units for all management measures and increments are presented in TABLE J-12, and reflect target species only. These data were computed using the Habitat Evaluation System computer software.

4. Discussion. A problem was encountered with the old oxbow and meander scar habitat of Squaw Island and vicinity. The initial objective for this habitat was wood duck management, yet the wood duck is not included among the evaluation species for nonforested habitat. Because the wood duck is among the forest evaluation species, old oxbow and meander scar habitat was reevaluated as though it was forested to generate wood duck HSIs (see TABLE J-5).

Features C, I, and K were proposed to benefit both the wood duck and riverine fishes in Squaw Slough and adjacent old oxbow and meander scar habitat, but they produced

relatively few habitat units (19 AAHUs, see TABLE J-12). This occurred despite the sizable changes in HSIs with the project (0.8 for fish, 0.2-0.6 for wood duck). The habitat units are few because the acres to be improved are relatively few (27 acres). 460

As an alternative to wood duck management, green tree reservoir management with features C-1/2R, I-1/2R, and K were evaluated for Squaw Island. After examination of the 2-foot topographical map of the project area, the elevation of 422 feet NGVD was selected as the target elevation for the reservoir. This elevation is about 2.5 feet above normal pool, and such a reservoir would encompass about 18 acres of old oxbow and meander scar habitat and 100 acres of low forest. Habitat units associated with features for green tree reservoir management are relatively numerous (62 AAHUs) because of the greater number of acres improved (118 acres versus 27 acres).

Tree planting on the riverside levee's sideslopes was explored but rejected. In IDOC's experience, trees on levee sideslopes give rise to erosion problems during high water conditions. Trees provide shade which prohibits the development of a satisfactory groundcover, and flood waters tend to scour around tree trunks and root systems.

The HSIs presented in the habitat evaluation for bottomland forest (Appendix J) are probably no longer valid for all evaluation species under each project condition (existing, future without project, and future with project). Habitat conditions were assessed prior to the 1993 flood. A survey of flood induced tree mortality in the vicinity of the project area (pool 26) showed that about 37 percent of all trees and about 80 percent of all saplings have died (Yin et al., 1994). If existing conditions had been evaluated after the flood, about 11 of the 27 WHAG habitat variables applicable to bottomland forest probably would have been scored differently (in most cases only slightly differently). Without recalculating habitat suitability indices (HSIs), existing (postflood) habitat quality probably would be higher for the mallard and beaver, lower for the wood duck and prothonotary warbler, and about the same for the green-backed heron and northern parula. Likewise, some variables undoubtedly would have been rated differently for the future conditions, leading to HSI changes for at least some species. With or without the flood of 1993, the same habitat problems and opportunities would be evident. Had the assessment of habitat conditions taken the 1993 flood into account, the overall pattern of HSI changes, comparing the future-with project condition against the future-without, would be expected to be similar to that presented in Appendix J. Habitat quantity for the three project conditions would also be unlikely to change. Therefore, the justification of project features would not be significantly affected, especially for the forestry management measures.

C. AQUATIC HABITAT APPRAISAL GUIDE (AHAG) METHOD.

1. Description of Method. There are two phases to the AHAG: (1) preparation of habitat guilds for fishes that have been collected in the study area, and (2) determining habitat quality ratings for selected target species representative of each guild according to habitat preference and life history stage. Each phase is discussed below,

including assumptions made.

461 A list of fish species obtained for the study area was separated into five guilds: swiftwater-large fishes (Group 1), swiftwater-small fishes (Group 2), slackwater-large fishes (Group 3), slackwater-small fishes (Group 4), and generalists (Group 5). Most species in Groups 1 and 2 are uncommon or occur only on a seasonal basis. These fishes prefer swiftwater habitats usually associated with coarse grain substrate. Their presence is indicative of good riverine habitat. Groups 3 and 4 are usually found in slackwater, although they occasionally enter swiftwater areas for feeding, dispersal, or spawning. Many of these species are economically important. Species in Group 5 are typically widespread and can tolerate a wide range of habitat conditions.

The AHAG uses HSI scores to relate the value of selected habitat variables to a defined guild. Physical and water quality variables used in the guides have been identified as important in structuring fish communities in a variety of stream ecosystems. Furthermore, they characterize physical changes that have or could influence habitat quality. Each variable may limit the abundance and distribution of guild members.

For each guild, the range of habitat values is divided into classes and an HSI score was assigned to each class by life history stage (spawning, rearing, and adults). Each variable class is rated as excellent (1), good (.75), fair (.5), poor (.25), or unusable (0) habitat. The rating is based on information found in the HSI models published by the USFWS and other data sources. HUs can be determined by multiplying HSIs and acres. The AHAG data forms allow the user to enter all habitat measurements and calculate HSI values directly in the field.

The AHAG method includes eight evaluation species: white bass (guild 1); emerald shiner and river darter (guild 2); northern pike, smallmouth buffalo, walleye, and largemouth bass (guild 3); and bluegill (guild 4). The method also includes 16 habitat characteristics, of which 14 were applicable to the Calhoun Point project area (two pertaining to lotic habitats were excluded). EXHIBIT J-2 presents the AHAG habitat characteristics and evaluation species.

Using the matrix, the team rated all applicable habitat characteristics at each sample site under existing conditions (year 1993). The team also rated each sample site under future conditions with and without a project for years 1998 and 2043, or five and 50 years in the future. Year 1998 with the project was defined as four years after project completion. The ratings were entered into the AHAG computer software by the St. Louis District to calculate habitat suitability indices for all eight species, by project condition. To save space, field ratings are not presented in this appendix.

The team included representation from the USFWS, Illinois Department of Conservation, National Biological Survey, and the St. Louis District. Prior to the evaluation, the team reviewed hydrographic maps and existing biological data for the project

area.

2. Assumptions. During the AHAG analysis, the following assumptions were developed: 462

(a). Species abundance and distribution responds in a predictable and measurable fashion to changes in habitat quality.

(b). Species within a guild have similar habitat requirements which can be described by the same set of habitat variables.

(c). At least one of the habitat variables used in the guide can potentially limit the distribution and abundance of the guild members.

(d). Given the absence of swiftwater conditions in the project area under normal pool conditions, members of the slackwater fish guilds are the focus of fisheries management. Suitable target species for the fisheries analysis are the smallmouth buffalo for the large slackwater fish guild, and the bluegill for the small slackwater fish guild. The river darter and northern pike were excluded from analysis because neither has been collected during recent fish community sampling in Pool 26 (Farabee, 1992; Gutreuter, 1992; Sheehan et al., 1990).

(e). PLATE J-2 shows the location of nine sites where habitat conditions were sampled: B1 and B2 (Pohlman Slough), C (South Royal Lake), D1 and D2 (Silver Lake), E (Chickahominy Lake), F1 and F2 (Squaw Slough), and G (North Royal Lake). The number and location of these sites was assumed by the team to be representative of the prevailing habitat conditions.

(f). Same assumptions as WHAG assumptions (a), (b), (e), (f), (g), and (h). With regard to assumption (f) concerning sedimentation of aquatic areas, the team assumed that Squaw Slough would undergo a complete conversion to terrestrial habitat by target year 50.

3. Results.

(a). **AHAG Field Data.** The field data for the 14 habitat characteristics and nine sample sites for existing and future conditions are not included in this appendix in order to save space.

(b). **AHAG Habitat Suitability Indices.** The AHAG software initially calculated HSIs for all eight evaluation species, for all three life stages (spawning, rearing, juvenile/adult), for all four seasons, for three management areas (Pohlman Slough - fish management, Silver/Chickahominy/Royal - moist soil management, and Squaw Slough - no management), and for three project conditions (existing, future without, future with). To

simplify the habitat evaluation analysis, the life stage and season variables were collapsed into one value (an average) prior to computing habitat units, and these averages are presented in TABLE J-11.

463

Once again, the HSIs with the project represent the maximum possible - the aggregate of all of the most desirable or effective features that have been proposed. HSIs are not presented for individual measures or increments.

The AHAG team found it useful to evaluate the quality of aquatic habitat within the project area in relation to two groupings of fish - resident versus riverine. Resident fish were defined as those individuals that spend most of their life time within the project area, and are unable to move out and into the main channel because of the presence of a physical barrier, such as a levee or closed water control structure. On the other hand, riverine fish are individuals living in the main channel that cannot gain access to the project area because of the physical barrier. This dichotomy was useful because recent investigations on the ecology of fishes in the Upper Mississippi River show that a number of species avoid the stressful main channel environment during the winter, with its low temperatures and strong current, by moving into backwater areas in the fall where conditions are more conducive to survival (Sheehan et al., 1990). Likewise, numerous species seek backwater areas in the spring and summer for spawning.

With this dichotomy in mind, the fish HSIs in TABLE J-11 reflect habitat quality of aquatic areas within Calhoun Point with respect to riverine fish. HSIs for resident fish are also presented for the moist-soil management units (Silver, Chickahominy, and north and south Royal Lakes) because water control management for migratory waterfowl dictates that these units be physically isolated from the river for nearly the entire year.

(c). **AHAG Habitat Acres.** Area of existing aquatic habitat was obtained using data provided by the EMTC. They quantified 10 landcover types at Calhoun Point using digitized 1989 aerials. Six of the 10 types were placed into two categories of aquatic habitat: this exercise's emergent category includes their emergent and grass/forb types, and this exercise's open water category includes their open water, submergent, sub/rooted floating, and rooted floating types. Some adjustments were made to account for the fact that the EMTC data did not reflect any aquatic habitat corresponding to Squaw Slough and other similar areas classified as forest because of the overhanging tree canopy. Area of aquatic habitat for existing and future-without conditions is presented in TABLE J-9 under nonforested wetland.

Acres of aquatic habitat for the future-with-project condition are presented in TABLE J-10, which reflects the construction of a riverside levee around the perimeter of the entire project area at an elevation of 424 feet NGVD. Similar tables were developed for 15 other levee alternatives that represent four different alinements and four different heights, but these tables are not presented in this appendix in order to save space.

(d). **AHAG Habitat Units.** The Habitat Evaluation System computer software was used to calculate average annual habitat units. Fish AAHUs are presented in TABLE J-12. In order to save space, documentation of the process used to break down "maximum" HSIs into HSI changes associated with individual measures or increments is not presented in this appendix. 464

4. Discussion. Note that in TABLE J-12, there are two values for fish AAHUs for the 16 levee increments. The positive value represents benefits to resident fish, and the negative value to riverine fish.

D. CONCLUSIONS.

Net habitat benefits (in annualized habitat units) are presented in TABLE J-12 for all management measures - both terrestrial and aquatic. These net benefits represent the difference between the future with and future without conditions. The values in this table are outputs for project planning purposes.

E. REFERENCES.

Killgore, K. J., and T. B. Hardy. 1992. "Aquatic Habitat Appraisal Guide for Fishes of the Upper Mississippi River System", Technical Report EL-92- , U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. 37 pp.

Missouri Department of Conservation (MDOC), and U.S.D.A. Soil Conservation Service (SCS). 1990. Wildlife Habitat Appraisal Guide (WHAG), User's Guide. Jefferson City, Missouri. 102 pp.

Yin, Y., J.C. Nelson, G.V. Swenson, H.A. Langrehr, and T.A. Blackburn. 1994. Tree mortality in the Upper Mississippi River and floodplain following an extreme flood in 1993. In National Biological Service, Illinois Natural History Survey, Iowa Department of Natural Resources, and Wisconsin Department of Natural Resources. Long Term Resource Monitoring Program 1993 Flood Observations. National Biological Service, Environmental Management Technical Center, Onalaska, Wisconsin, December 1994. LTRMP 94-S011. 190 pp.

EXHIBIT J-1. WHAG matrix (p. 1)

Wetland Species Characteristic Matrix

Wildlife Area: _____

Date: _____

Habitat Type: _____

CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Pintail	Prothonotary Warbler
1. Percent Nonforest Wetlands in 2 Mile Wide Circle	N												
1. >75%				10	10	10	10				10		
2. 50 - 75%				8	8	8	8				8		
3. 25 - 50%				6	6	6	6				6		
4. 10 - 25%				4	4	4	4				4		
5. <10%				1	1	1	1				1		
2. Percent Nonforest Wetlands and Lakes or Reservoirs in 2 Mile Wide Circle	N,C,G												
1. >75%			10										
2. 50 - 75%			8										
3. 25 - 50%			6										
4. 10 - 25%			4										
5. <10%			1F										
3. Percent Bottomland Hardwoods and Nonforest Wetlands in 2 Mile Wide Circle	N,B,C												
1. >75%		10						10	10	10			
2. 50 - 75%		8						8	8	8			
3. 25 - 50%		6						6	6	6			
4. 10 - 25%		4						4	4	4			
5. <10%		1F						1	1	1			
4. Fall Winter Water Conditions	N,B,C												
1. Water present annually (predictable & water levels controlled		10	10										
2. Water present most years with occasional lapse & water levels controlled		7	7										
3. Water present 1 out of 3 years (opportunistic) & water levels controlled		4	4										
4. Water unpredictable; dry during fall and winter; or no control when present		1F	1F										
5. Fall-Winter Flood Conditions (food plant availability)	N,B	M	M										
1. Food plants unaffected		10	10										
2. Reduced 1 - 25% (Multiply index by .75)		8	8										
3. Reduced 25 - 50% (Multiply index by .50)		6	6										
4. Reduced 50 - 75% (Multiply index by .25)		4	4										
5. Reduced >75% (Multiply index by .25)		1	1										
6. Water Depth 4" - 18" Fall - Winter	N,B,C												
1. >90%		10	10										
2. 75 - 90%		8	8										
3. 50-75%		6	6										
4. 25 - 50%		4	4										
5. <25%		1	1										
7. Water Depth <4" During May	N												
1. >90%					10						1F		
2. 75 - 90%					8						2		
3. 25 - 75%					6						4		
4. 1 - 25%					4						7		
5. ZERO or all >4" Deep					1						10		
8. Water Depth 4 - 18" by August	N												
1. >75%				1		10	1	10			10		
2. 50 - 75%				7		7	7	7			7		
3. 25 - 50%				10		4	10	4			4		
4. <25%				4		1	4	1			1		
9. Permanent Water Entire Year	N					M							
1. >90%						10							
2. 75 - 90% (Multiply index by .90)						8							
3. 50 - 75% (Multiply index by .75)						6							
4. 25 - 50% (Multiply index by .50)						4							
5. <25% (Multiply index by .25)						1							
10. Percent Emergent Vegetation Within 2 yds. of Water	N												
1. >75% of emer. veg. within 2 yd. of water				10							10		
2. 50-75% of emer. veg. within 2 yd. of water				7							7		
3. 25-50% of emer. veg. within 2 yd. of water				4							4		
4. <25% of emer. veg. within 2 yd. of water				1							1		

Wetland Species Characteristic Matrix

CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Pintail	Prothonotary Warbler
11. Woody Invasion	N												
1. <10%				10		5	6	1					
2. 10 - 25%				8		4	8	6					
3. 25 - 50%				6		3	10	8					
4. 50 - 75%				4		2	4	10					
5. >75%				1		1	1	4					
12. Emergent Vegetation Coverage	N,B												
1. >90%				6	1F			1					
2. 75 - 90%				10	2			2					
3. 50 - 75%				8	4			4					
4. 25 - 50%				4	6			10					
5. 10 - 25%				2	8			7					
6. <10%				1F	10			1					
13. Cattail and Bulrush Coverage	N												
1. >75%						10	1F				8		
2. 50 - 75%						8	2				10		
3. 25 - 50%						6	4				6		
4. 10 - 25%						4	7				4		
5. <10%						1	10				1F		
14. Wetland Size	N,B												
1. >200 acres				10	10	10	10	10			10		
2. 100 - 200 acres				10	8	8	8	10			10		
3. 50 - 100 acres				8	6	6	6	10			8		
4. 25 - 50 acres				6	4	4	4	10			6		
5. 5 - 25 acres				4	1	2	2	5			4		
6. <5 acres				1F	1F	1	1	1F			1F		
15. Wetland Edge	N,B												
1. >75% Bottomland H. - & adj. to water								10					
2. 50-75% Nonforest w.-& woody or adj. to								8					
3. 25 - 50% bottomland hardwoods								6					
4. 10 - 25%								4					
5. <10%								1					
16. Water Regime	N												
1. Gradual drying with >75% water remaining by Aug. 1				4	4	8	2	10			8		
2. Gradual drying with 50 - 75% water remaining by Aug. 1				6	6	6	6	6			6		
3. Gradual drying with 25 - 50% water remaining by Aug. 1				10	10	4	10	4			4		
4. Gradual drying with <25% water remaining by Aug. 1				8	8	2	8	2			2		
5. Stable water				2	4	10	4	10			10		
6. Rapid drying; or no water after June 1				1F	1F	1F	1F	1F			1F		
17. Important Food Plant Coverage	N,B	M	M										
1. >75%		10	10										
2. 50 - 75% (Multiply index by .75)		8	8										
3. 25 - 50% (Multiply index by .50)		6	6										
4. 10 - 25% (Multiply index by .25)		4	4										
5. <10% (Multiply index by .25)		1	1										
18. Plant Diversity	N,B												
1. >7		5	5										
2. 4 - 7		3	3										
3. <4		1	1										
19. Persistent Emergent and Woody Vegetation Coverage	N												
1. 5 - 15%		5	5										
2. 15 - 25%		4	4										
3. 25 - 50%		2	2										
4. <5% or >50%		1	1										

EXHIBIT J-1. WHAG matrix (cont.) (p. 2)

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
20.	Substrate - Surface Water Interspersion	N												
	1. Substrate interspersed with shallow water					10								
	2. Shallow water occurring as one or few pools					1								
21.	Percent Open Water	N												
	1. <10%		5	5			10					6		
	2. 10 - 25%		3	3			8					10		
	3. 25 - 50%		1	1			6					8		
	4. 50 - 90%		1	1			4					4		
	5. >90%		1	1			1					1		
22.	Winter Water Depth (Oct. - March)	N												
	1. 15 - 24"						10							
	2. 10 - 15" or 24 - 30"						7							
	3. 6 - 10" or 30 - 36"						4							
	4. <6" or >36"						1							
23.	Sedge Canopy Coverage	N												
	1. >90%							8						
	2. 75 - 90%							10						
	3. 50 - 75%							6						
	4. 25 - 50%							4						
	5. 1 - 25%							2						
	6. Zero							LF						
24.	Wetland Substrate	N												
	1. Mucky					5								
	2. Sandy					3								
	3. Gravel					1								
25.	Percent Soil Waterlogged Substrate During May	N												
	1. >90% of substrate waterlogged					10								
	2. 75 - 90% of substrate waterlogged					8								
	3. 50 - 75% of substrate waterlogged					6								
	4. 25 - 50% of substrate waterlogged					4								
	5. <25% of substrate waterlogged					1								
26.	Percent Exposed Wetland Substrate and 1-4" Shallow Water Covered by Vegetation May-June	N												
	1. <10%					10								
	2. 10 - 25%					8								
	3. 25 - 50%					6								
	4. 50 - 75%					4								
	5. 75 - 90%					2								
	6. >90%					LF								
27.	Percent Channel with Aquatic Vegetation	B								10	10			
	1. >10%									7	7			
	2. 5 - 10%									4	4			
	3. 1 - 5%									1	1			
	4. None; or 1/4 mi. from center stand													
28.	Average Water Fluctuation in Channel	B									10			
	1. Bank full <3 times per year										7			
	2. Bank full 3-5 times per year										4			
	3. Bank full 5-7 times per year										1			
	4. Bank full >7 times per year; or >1/4 mile from channel													
29.	Cropfield Management	C												
	1. No fall tillage		10	10										
	2. Winter Wheat		2	10										
	3. Chisel plowing		8	8										
	4. Chopped, baled, grazed		6	6										
	5. Fall disc		4	4										
	6. Fall moldboard		1	1										

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
30.	Cropping Practice	C												
	1. >50 unharvested		10	10										
	2. 25-50% harvested		7	7										
	3. 10 - 25% unharvested		4	4										
	4. <10% unharvested		1	1										
31.	Crop Rotation	C												
	1. SG - RC - L			5										
	2. SG - RC; or idle some years			3										
	3. Continuous SG or RC			1										
32.	Field Size (% w/in 660' Woodland or Treeline)	C,G												
	1. <25%			10										
	2. 25 - 50%			6										
	3. 50 - 75%			3										
	4. >75%			1										
33.	Grassland Composition	G												
	1. Bluegrass, clover, alfalfa			10										
	2. Timothy, orchardgrass or mixed CSG			5										
	3. Fescue or WSG			1										
34.	Average Height Herbaceous Vegetation (Fall)	G												
	1. <6"			10										
	2. >6"			1										
35.	Woodland Tree Species	B												
	1. >50% trees as elm, walnut, cottonwood, sycamore, willow, maple, ash		1						8	10				
	2. 25 - 50% trees as elm, walnut, cottonwood, sycamore, willow, maple, ash		4						10	8				
	3. <25% trees as elm, walnut, cottonwood, sycamore, willow, maple, ash; or <25% pin oak (or other small acorns)		6					LF	1	6				
	4. 25 - 50% pin oak (or other small acorns)		8						4	4				
	5. >50% pin oak (or other small acorns)		10						6	1				
36.	Permanent Water Within Woodland	B												
	1. >25%		1					10	10					10
	2. 10 - 25%		3					7	7					7
	3. 5 - 10%		5					4	4					4
	4. 1 - 5%		3					2	2					2
	5. Zero		2					1	1					1
37.	Forest Openings (Q ac. in size)	B												
	1. 15 - 30% scattered		1					10	10	5				
	2. 15 - 30% one or few		3					7	7	4				
	3. 5 - 15%		5					4	4	3				
	4. <5% or >30%		1					1	1	1				
38.	Woodland Size Class	B												
	1. Sawtimber - open canopy		10					4	10	4		10		10
	2. Sawtimber - close canopy		8					1	8	1		10		10
	3. Pole with 25-50% sawtimber		6					10	6	6		7		7
	4. Regeneration with 25-50% sawtimber		4					8	4	8		2		2
	5. Regeneration		1					8	LF	10		LF		LF
	6. Pole		1					6	2	6		4		4
39.	Percent Canopy From Old Growth (>16" dbh)	B												
	1. >25%								10	1				
	2. 10 - 25%								8	4				
	3. 5 - 10%								6	6				
	4. 1 - 5%								4	8				
	5. Zero								1	10				

EXHIBIT J-1. WHAG matrix (cont.) (p. 3)

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
40.	Woodland Overstory Canopy Height (feet)	B												
	1. >80'												10	10
	2. 65-80'												7	7
	3. 40-65'												4	4
	4. <40'												1	1
41.	Percent Subcanopy Closure	B												
	1. >75%												10	1
	2. 50-75%												7	4
	3. 25-50%												4	10
	4. <25%												1	7
42.	Woodland (Stand) Size	B												
	1. <25%												10	10
	2. 25-50%												7	7
	3. 50-75%												4	4
	4. >75%												1	1
43.	Percent Forest Canopy Adjacent to or Over Permanent Water	B												M
	1. >25%													10
	2. 10-25%													7
	3. 5-10%													4
	4. <5%													1
44.	Number of Snags Trees per Acre	B												
	1. >4								5					10
	2. 3-4								5					7
	3. 1-2								3					4
	4. <1								1					1
45.	Number of Cavity Trees Per Acre	B												
	1. >9								10					10
	2. 3 - 9								7					7
	3. 1 - 3								4					4
	4. None								1					1
46.	Stems per Square Yard of Shrub and Tree Regeneration >3 Feet Tall	B												
	1. >3								1	10			10	1
	2. 1-3								3	7			7	4
	3. .5-1								5	4			4	10
	4. <.5								2	1			1	7
47.	Percent Woodland Within 660' of Permanent Water	B						M	M	M				
	1. >75%							10	10	10			10	10
	2. 50 - 75% (Multiply Index by .75)							7	7	7			7	7
	3. 25 - 50% (Multiply Index by .50)							4	4	4			4	4
	4. <25% (Multiply Index by .25)							1	1	1			1	1
48.	Distance to Nonforest Wetland, Oxbow or Slough	B,C,G												
	1. <250' water predictable		10	10				10	10	10				
	2. 250'-1/8 mi. water predictable		10	10				10	10	5				
	3. 1/8-1 mi. water predictable		10	10				1	1	1				
	4. <250' water predictable 1 of 3 years		5	5				5	5	3				
	5. 250'-1/8 mi. water predictable 1 of 3 yrs.		5	5				5	5	2				
	6. 1/8-1 mi. water predictable 1 of 3 yrs.		5	5				1	1	1				
	7. >1 mi.; or <1 mi. water unpredictable		1	1				1	1	1				
49.	Distance to Bottomland Hardwoods	N,C												
	1. <1/4 mi. water predictable		10					5						
	2. 1/4-1/2 mi. water predictable		10					3						
	3. 1/2-1 mi. water predictable		8					1						
	4. <1/4 mi. water predictable 1 of 3 yrs.		6					5						
	5. 1/4-1/2 mi. water predictable 1 of 3 yrs.		6					3						
	6. 1/2-1 mi. water predictable 1 of 3 yrs.		4					1						
	7. >1 mi.; or <1 mi. water unpredictable		1					1						

Wetland Species Characteristic Matrix

	CHARACTERISTIC	Habitat Type	Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
50.	Distance to Cropland	N,B,G												
	1. <1/4 mi., unharvested or partially unharvested and water predictable		10	10										
	2. 1/4-1/2 mi. unharvested or partially unharvested and water predictable		8	8										
	3. 1/2-1 mi. unharvested or partially unharvested and water predictable		6	6										
	4. <1/4 mi., unharvested or partially unharvested and water predictable 1 of 3 years; or adjacent, unflooded with residues undisturbed		5	5										
	5. 1/4-1/2 mi. unharvested or partially unharvested and water predictable 1 of 3 years; or 1/4-1/2 mi. unflooded with residues and undisturbed		4	4										
	6. 1/2-1 mi. unharvested or partially unharvested and water predictable 1 of 3 yrs; or 1/2-1 mi. unflooded with residues undisturbed; or winter wheat		2	2										
	7. >1 mi. to any cropfield; or <1 mi. unflooded cropfield with residues disced or plowed		1	1										
51.	Distance to Grassland	N,C												
	1. <1/2 mi. with winter height <6" and field size >40 acres			10										
	2. 1/2-1 mi. with winter height <6" and field size >40 acres			7										
	3. <1 mi. with winter height <6" and field size <40 acres			4										
	4. >1 mi. to any grassland with winter height <6"; or grassland with winter height>6"			1										
52.	Distance to Stream or River (permanent flow or pools)	N,B												
	1. <1/4 mi.								10					
	2. 1/4 - 1/2 mi.								5					
	3. >1/2 mi.								1					
53.	Distance to Major River, Lake or Reservoir >100 Acres	N,C,G												
	1. <1 miles Missouri, Mississippi, Grand, St. Francis			10										
	2. 1 - 5 miles			7										
	3. 5 - 10 miles			4										
	4. >10 miles			1										
54.	Distance to FALL Canada Goose Concentration Area	N,C,G		M										
	1. <4 miles			10										
	2. 4 - 10 miles (Multiply Index by .75)			7										
	3. 10 - 25 miles (Multiply Index by .50)			4										
	4. >25 miles (Multiply Index by .25)			1										

EXHIBIT J-1. WHAG matrix (cont.) (p. 4)

Wetland Species Characteristic Matrix

		Mallard	Canada Goose	Least Bittern	Lesser Yellowlegs	Muskrat	King Rail	Green-backed Heron	Wood Duck	Beaver	American Coot	Northern Parula	Prothonotary Warbler
Total													
Maximum Possible													
HMSI													
Multiplier													
Revised HMSI													
	N	85	105	70	85	85	70	85			80		
	B	105						100	110	95		60	100
	C	70	105										
	F/G	20	80										

Abbreviations

C = cropfield, G = grassland, N = nonforest wetland, B = bottomland hardwoods,
LF - limiting factor, score Habitat Type Suitability Index (HMSI) as .1 if characteristic scores .1.
M = multiplier. Multiply HMSI by the appropriate value to calculate revised HMSI. Use lowest value if 2 multiplier values apply.

Limiting Factors

	Character Number
Mallard - If Percent in Bottomland Hardwood and Nonforest Wetland or Fall Winter Water Conditions score 1, HMSI = .1.	3,4
Canada goose - If Percent in Nonforest Wetland or Fall Winter Water Conditions score 1, HMSI = .1.	2,4
Lesser yellowlegs - If Wetland Size, Water Regime or Percent Wetland Substrate score 1, HMSI = .1.	14,16,26
Green-backed heron - If Wetland Size Water or Regime HMSI = .1.	14,66
Wood duck - If Woodland Size Class or Number of Tree Cavities score 1, HMSI = .1.	38,45
Least bittern - If Emergent Vegetation Coverage, Wetland Size, or Water Regime Score 1, HMSI = .1.	12,14,16
American Coot - If Cattail and Bulrush Coverage, Wetland Size or Water Regime Score 1, HMSI = .1.	13,14,16
King Rail - If Sedge Canopy Coverage or Water Regime Score 1, HMSI = .1 Score 1, HMSI = .1.	23,16
Northern Parula - If Woodland Size Class	40
Prothonotary Warbler - If Woodland Size Class	40
Muskrat - If [illegible]	

Multiplier

Mallard - Important Food Plant Coverage (Nonforest wetland)	17
Fall-Winter Flood Conditions	5
Canada goose - Distance to Major Canada Goose Winter Area	54
Important Food Plant Coverage (Nonforest wetland)	17
Fall-Winter Flood Conditions	5
Muskrat - Percent Permanent Water Entire Year	9
Wood duck - Percent Woodland Within 660' of Permanent Water	47
Beaver - Percent Woodland Within 660' of Permanent Water	47
Green-backed Heron - Percent Woodland Within 660' of Permanent Water	47
Prothonotary Warbler - Percent Forest Canopy Adjacent to or Over Permanent Water	43

3/89

PLATE J-1. WHAG Sample Sites for Wildlife Habitat.

469

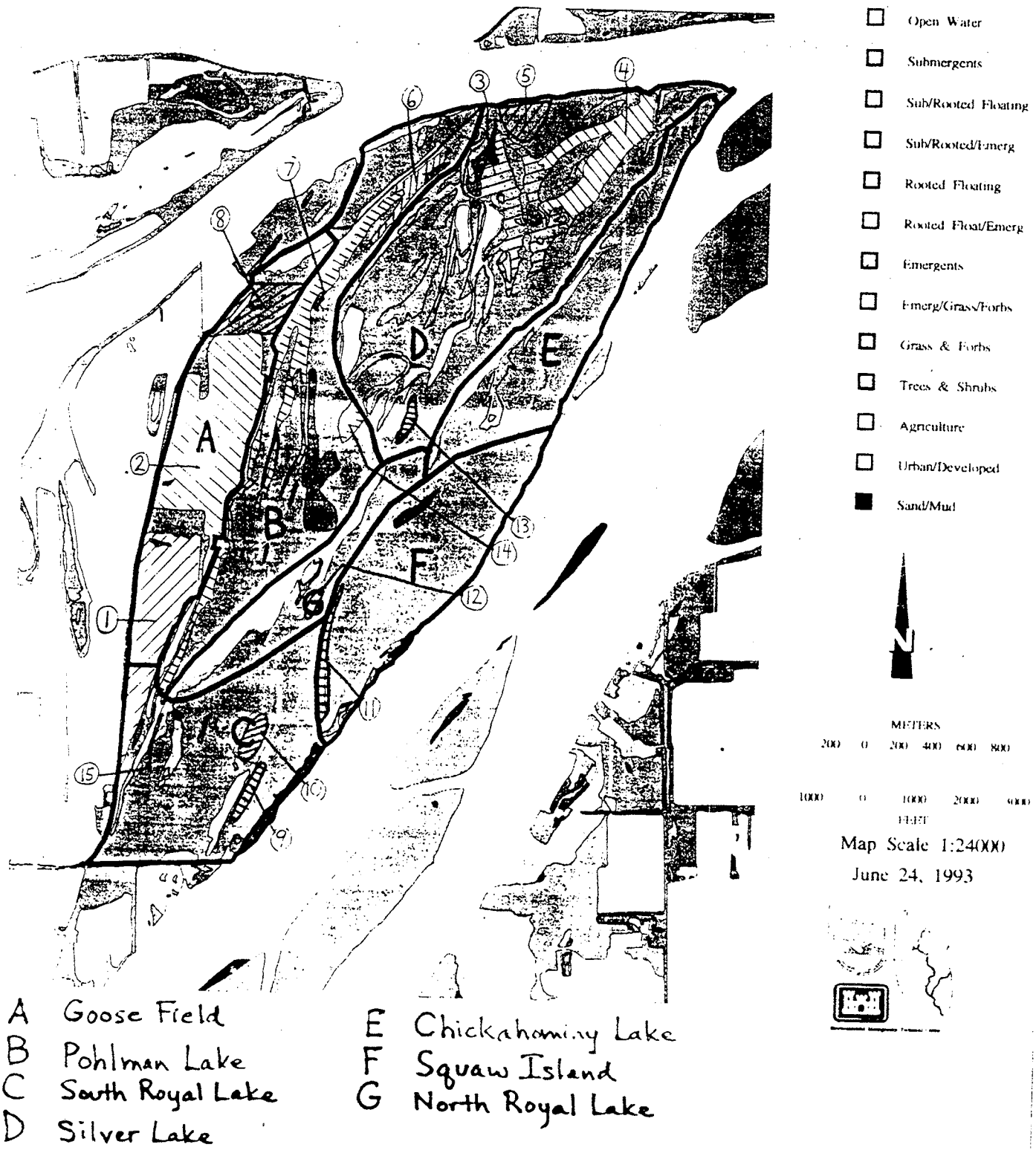


TABLE J-1. Projected quality (in habitat suitability indices) of four types of forested wetland habitat for forest wildlife species at Calhoun Point.

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Low Bottomland Forest (420-424 NGVD)					
Mallard	.10	.10	.10	.10	.10
Green-backed Heron	.42	.42	.32	.42	.36
Wood Duck [2]	.48	.48	.47	.48	.51
Beaver	.48	.48	.36	.48	.40
Northern parula [2]	.68	.68	.70	.68	.63
Prothonotary Warbler [2]	.61	.61	.31	.61	.76
High Bottomland Forest (424-428 feet NGVD)					
Mallard	.10	.10	.10	.10	.10
Green-backed Heron	.13	.13	.11	.13	.11
Wood Duck [2]	.32	.32	.32	.32	.34
Beaver	.34	.34	.24	.34	.26
Northern Parula [2]	.64	.64	.73	.64	.75
Prothonotary Warbler [2]	.28	.28	.32	.28	.32
Existing Woody Encroachment in Aquatic Areas					
Mallard	.10	.10	.10	.10	.10
Green-backed Heron	.10	.10	.10	.10	.10
Wood Duck [2]	.10	.10	.60	.10	.60
Beaver	.73	.73	.47	.73	.47
Northern Parula [2]	.10	.10	.60	.10	.60
Prothonotary Warbler [2]	.10	.10	.68	.10	.79
Future Woody Encroachment in Aquatic Areas					
Mallard	.00	.10	.10	.10	.10
Green-backed Heron	.00	.10	.10	.10	.10
Wood Duck [2]	.00	.10	.30	.10	.30
Beaver	.00	.10	.23	.10	.23
Northern parula [2]	.00	.10	.30	.10	.30
Prothonotary Warbler [2]	.00	.10	.34	.10	.34

[1] Maximum project consists of the following management measures and increments: A-4 (428 levee along river), and Q-3 (removal of existing encroaching woody vegetation - willow and maple - along perimeter of aquatic areas equivalent to 10 percent of project area's total terrestrial habitat acres).
[2] Chosen as target species.

TABLE J-2. Projected quality (in habitat suitability indices) of emergent wetland habitat for nonforest wildlife species at Calhoun Point.

471

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Emergent - under waterfowl management [2]					
Mallard [3]	.72	.72	.11	.88	.88
Canada Goose [3]	.69	.69	.13	.83	.83
Least Bittern	.57	.57	.43	.69	.69
Lesser Yellowlegs	.55	.55	.10	.56	.56
Muskrat	.13	.13	.10	.14	.14
King Rail	.56	.56	.10	.53	.49
Green-backed Heron [3]	.74	.74	.72	.68	.68
American Coot	.10	.10	.10	.10	.56
Emergent - under fisheries management [4]					
Mallard [3]	.10	.10	.10	.10	.10
Canada Goose [3]	.10	.10	.10	.10	.10
Least Bittern	.59	.59	.10	.50	.54
Lesser Yellowlegs	.10	.10	.10	.10	.10
Muskrat	.10	.10	.10	.24	.26
King Rail	.57	.57	.10	.46	.41
Green-backed Heron [3]	.53	.53	.10	.59	.59
American Coot	.10	.10	.10	.10	.10

[1] Maximum project consists of the following management measures and increments.
Under waterfowl management: A-4 (428 levee along river), D (exterior water control/fish passage structure at Silver Lake, with lake interconnections between Royal/Chickahominy and Silver/Chickahominy Lakes), E (interior water control structure between Chickahominy and Silver Lakes), F (interior water control structure between Chickahominy and Royal Lakes), H (pumping), and Q-3 (removal of existing encroaching woody vegetation - willow and maple - along perimeter of aquatic areas equivalent to 10 percent of project area's total terrestrial habitat acres).
Under fisheries management: A-4 (428 levee along river), B (exterior water control/fish passage structure), Q-3 (removal of existing encroaching woody vegetation - willow and maple - along perimeter of aquatic areas equivalent to 10 percent of project area's total terrestrial habitat acres).
[2] Includes Silver, Chickahominy, and north and south Royal Lakes.
[3] Chosen as target species.
[4] Includes Pohlman Slough.

TABLE J-3. Projected quality (in habitat suitability indices) of open water wetland habitat for nonforest wildlife species at Calhoun Point.

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Open Water - under waterfowl management [2]					
Mallard [3]	.10	.10	.10	.14	.14
Canada Goose [3]	.10	.10	.10	.14	.14
Least Bittern	.10	.10	.44	.10	.10
Lesser Yellowlegs	.58	.58	.10	.58	.58
Muskrat	.59	.59	.49	.59	.59
King Rail	.10	.10	.43	.10	.10
Green-backed Heron [3]	.74	.74	.75	.74	.74
American Coot	.10	.10	.10	.10	.10
Open Water - under fisheries management [4]					
Mallard [3]	.10	.10	.10	.15	.15
Canada Goose [3]	.10	.10	.10	.13	.13
Least Bittern	.10	.10	.40	.10	.10
Lesser Yellowlegs	.60	.60	.52	.60	.60
Muskrat	.51	.51	.41	.51	.51
King Rail	.49	.49	.41	.49	.49
Green-backed Heron [3]	.51	.51	.58	.55	.55
American Coot	.10	.10	.10	.10	.10

[1] Maximum project consists of the following management measures and increments.
Under waterfowl management: A-4 (428 levee along river), D (exterior water control/fish passage structure at Silver Lake, with lake interconnections between Royal/Chickahominy and Silver/Chickahominy Lakes), E (interior water control structure between Chickahominy and Silver Lakes), F (interior water control structure between Chickahominy and Royal Lakes), H (pumping), and Q-3 (removal of existing encroaching woody vegetation - willow and maple - along perimeter of aquatic areas equivalent to 10 percent of project area's total terrestrial habitat acres).
Under fisheries management: A-4 (428 levee along river), B (exterior water control/fish passage structure), Q-3 (removal of existing encroaching woody vegetation - willow and maple - along perimeter of aquatic areas equivalent to 10 percent of project area's total terrestrial habitat acres).
[2] Includes Silver, Chickahominy, and north and south Royal Lakes.
[3] Chosen as target species.
[4] Includes Pohlman Slough.

TABLE J-4. Projected quality (in habitat suitability indices) of old oxbow and meander scar wetland habitat for nonforest wildlife species under proposed wood duck management at Squaw Island within Calhoun Point.

473

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Old Oxbows and Meanders - usually with standing water in the summer					
Mallard [2]	.10	.10	.10	.14	.14
Canada Goose [2]	.10	.10	.10	.14	.14
Least Bittern	.10	.10	.10	.10	.10
Lesser Yellowlegs	.10	.10	.10	.10	.10
Muskrat	.22	.22	.10	.35	.35
King Rail	.49	.49	.10	.10	.10
Green-backed Heron [2]	.56	.56	.10	.52	.52
American Coot	.10	.10	.10	.10	.10
Old Oxbows and Meanders - usually without standing water in the summer					
Mallard [2]	.10	.10	.10	.15	.15
Canada Goose [2]	.10	.10	.10	.15	.15
Least Bittern	.10	.10	.10	.10	.10
Lesser Yellowlegs	.10	.10	.10	.10	.10
Muskrat	.10	.10	.10	.35	.35
King Rail	.49	.49	.10	.10	.10
Green-backed Heron [2]	.10	.10	.10	.58	.58
American Coot	.10	.10	.10	.10	.10

[1] Maximum project consists of the following management measures and increments: A-4 (428 levee along river), C (exterior water control/fish passage structure at Squaw Island), I (pumping at Squaw Island), K-2/4/6 (deepwater dredging at Squaw Island for 40 percent of slough's length), M-3/4 (excavate five potholes, and interconnect them to Squaw Slough).
[2] Chosen as target species.

TABLE J-5. Projected quality (in habitat suitability indices) of old oxbow and meander scar wetland habitat for forest wildlife species under proposed wood duck management at Squaw Island within Calhoun Point.

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Old Oxbows and Meander Scars - usually with standing water in summer					
Mallard	.10	.10	.10	.47	.53
Green-backed Heron	.70	.70	.10	.70	.65
Wood Duck [2]	.65	.65	.61	.67	.85
Beaver	.79	.79	.58	.82	.66
Northern parula [2]	.80	.80	.75	.75	.85
Prothonotary Warbler [2]	.64	.64	.71	.67	.91
Old Oxbows and Meander Scars - usually without standing water in summer					
Mallard	.10	.10	.10	.52	.59
Green-backed Heron	.10	.10	.10	.75	.70
Wood Duck [2]	.19	.19	.24	.67	.85
Beaver	.28	.28	.24	.82	.66
Northern Parula [2]	.65	.65	.65	.75	.85
Prothonotary Warbler [2]	.19	.19	.31	.67	.91

[1] Maximum project consists of the following management measures and increments: A-4 (428 levee along river), C (exterior water control/fish passage structure at Squaw Island), I (pumping at Squaw Island), K-2/4/6 (deepwater dredging at Squaw Island for 40 percent of slough's length), M-3/4 (excavate five potholes, and interconnect them to Squaw Slough).
[2] Chosen as target species.

TABLE J-6. Projected quality (in habitat suitability indices) of wet cropland habitat for cropland wildlife species at Calhoun Point.

475

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Cropland - managed for Canada Geese ("Goose Field")					
Mallard [2]	.60	.60	.39	.64	.64
Canada Goose [2]	.60	.60	.48	.63	.63
Cropland - areas other than "Goose Field"					
Mallard [2]	.30	.30	.30	.30	.30
Canada Goose [2]	.42	.42	.42	.42	.42

[1] Maximum project consists of the following management measures and increments.
Under goose management: A-4 (428 levee along river), J (pumping for goose field), P-3 (interior levees at Goose Field at both locations).
Not under goose management: A-4 (428 levee along river).
[2] Chosen as target species.

TABLE J-7. Projected quality (in habitat suitability indices) of low bottomland forest and old oxbow and meander scar wetland habitat for forest and nonforest wildlife species under proposed green tree reservoir management at Squaw Island within Calhoun Point.

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without any project		With maximum project[1]	
		yr. 5	yr. 50	yr. 5	yr. 50
Low Bottomland Forest (420-424 NGVD)					
Mallard [2]	.10	.10	.10	.62	.64
Green-backed Heron	.38	.38	.28	.42	.35
Wood Duck [2]	.44	.44	.42	.46	.48
Beaver	.44	.44	.32	.44	.36
Northern parula [2]	.65	.65	.68	.75	.68
Prothonotary Warbler [2]	.44	.44	.30	.49	.59
Old Oxbows and Meander Scars					
Mallard [3]	.10	.10	.10	.15	.15
Canada Goose [3]	.10	.10	.10	.15	.15
Least Bittern	.10	.10	.10	.10	.10
Lesser Yellowlegs	.10	.10	.10	.10	.10
Muskrat	.16	.16	.10	.29	.29
King Rail	.50	.50	.10	.10	.10
Green-backed Heron [3]	.52	.52	.50	.61	.61
American Coot	.10	.10	.10	.10	.10

[1] Maximum project consists of the following management measures and increments: A-4 (428 levee along river), C-1/2R (exterior water control/fish passage structure for Squaw Island), I-1/2R (pumping for Squaw Island).
[2] Chosen as target species for forested wetland.
[3] Chosen as target species for nonforested wetland.

TABLE J-8. Projected quality (in habitat suitability indices) of cropland under proposed reforestation for cropland and forest wildlife species at Calhoun Point.

477

Species	Habitat Suitability Index					
	Existing Condition	Future Condition				
		Without any project		With maximum project[1]		
		yr. 5	yr. 50	yr. 5	yr. 25	yr. 50
Cropland lost to reforestation						
Mallard [2]	.60	.60	.39	.00	.00	.00
Canada Goose [2]	.60	.60	.48	.00	.00	.00
Cropland reforested with mast tree species						
Mallard	.10	.10	.10	.10	.10	.10
Green-backed Heron	.10	.10	.10	.10	.24	.22
Wood Duck [3]	.10	.10	.10	.10	.39	.62
Beaver	.10	.10	.10	.10	.60	.42
Norther Parula [3]	.10	.10	.10	.10	.50	.60
Prothonotary Warbler [3]	.10	.10	.10	.10	.22	.35

[1] Maximum project consists of the following management measures and increments: A-4 (428 levee along river), R (mast tree plantings).
[2] Chosen as target species for wet cropland.
[3] Chosen as target species for forested wetland.

TABLE J-9. Projected quantity of suitable terrestrial habitat (in acres) for wildlife species under future-without-project condition at Calhoun Point.

Habitat Type	Acres of Habitat - Future Without Project														
	Goose Field (goose management)			Pohlman Slough (fisheries management)			Squaw Island (no management)			Silver, Chickahominy, north & south Royal Lakes (moist-soil management)			Total		
	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50
Nonforested Wetland															
Open Water	0	0	0	57	55	40	18	16	0	167	162	117	242	233	157
Emergent	4	4	3	17	15	12	0	0	0	162	157	113	183	176	128
Old Oxbows & Meander Scars	6	6	6	1	1	1	13	15	26	21	21	21	41	43	54
SUBTOTAL	10	10	9	75	71	53	31	31	26	350	340	251	466	452	339
Forested Wetland															
Existing Woody Encroachment	0	0	0	45	45	45	23	23	23	161	161	161	229	229	229
Low Bottomland Forest (420-424)	50	50	50	186	186	186	151	151	151	533	533	533	920	920	920
High Bottomland Forest (424-428)	12	12	12	47	47	47	38	38	38	133	133	133	230	230	230
New Woody Encroachment	0	0	1	0	4	22	0	0	5	0	10	99	0	14	127
SUBTOTAL	62	62	63	278	282	300	212	212	217	827	837	926	1379	1393	1506
Wet Cropland															
Cropland under goose management	123	123	123	0	0	0	0	0	0	0	0	0	123	123	123
Cropland not under goose management	69	69	69	36	36	36	4	4	4	37	37	37	146	146	146
SUBTOTAL	192	192	192	36	36	36	4	4	4	37	37	37	269	269	269
TOTAL WETLAND ACRES	264	264	264	389	389	389	247	247	247	1214	1214	1214	2114	2114	2114

TABLE J-10. Projected quantity of suitable terrestrial habitat (in acres) for wildlife species under future-with-condition (A-4, riverside levee at height of 424 feet NGVD) at Calhoun Point.

Habitat Type	Acres of Habitat - Future with riverside levee at height of 424 feet NGVD														
	Goose Field (goose management)			Pohlman Slough (fisheries management)			Squaw Island (no management)			Silver, Chickahominy, north & south Royal Lakes (moist-soil management)			Total		
	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50	yr.0	yr.5	yr.50
Nonforested Wetland															
Open Water	0	0	0	57	56	51	18	17	12	167	165	151	242	238	214
Emergent	4	4	4	17	17	15	0	0	0	162	160	146	183	181	165
Old Oxbows and Meander Scars	6	6	6	1	1	1	13	14	17	21	21	21	41	42	45
SUBTOTAL	10	10	10	75	74	67	31	31	29	350	346	318	466	461	424
Forested Wetland															
Existing Woody Encroachment	0	0	0	45	45	45	23	23	23	161	161	161	229	229	229
Low Bottomland Forest (420-424)	50	50	50	186	184	184	151	146	146	533	524	524	920	904	904
High Bottomland Forest (424-428)	12	12	12	47	47	47	38	35	35	133	128	128	230	222	222
New Woody Encroachment	0	0	0	0	1	8	0	0	2	0	4	32	0	5	42
SUBTOTAL	62	62	62	278	277	284	212	204	206	827	817	845	1379	1360	1397
Wet Cropland															
Cropland under goose management	123	123	123	0	0	0	0	0	0	0	0	0	123	123	123
Cropland not under goose management	69	69	69	36	36	36	4	4	4	37	37	37	146	146	146
SUBTOTAL	192	192	192	36	36	36	4	4	4	37	37	37	269	269	269
Riverside Levee															
Levee	0	0	0	0	2	2	0	8	8	0	14	14	0	24	24
TOTAL WETLAND ACRES	264	264	264	389	389	389	247	247	247	1214	1214	1214	2114	2114	2114

EXHIBIT J-2. AHAG matrix (p.1)

AQUATIC HABITAT APPRAISAL GUIDE-UPPER MISSISSIPPI RIVER SYSTEM

Sample Site:_____ Habitat: lentic lotic Date:_____ Season: Winter Spring Summer Fall

Suitability Index Scoring Criteria: Excellent = 1 Good = 0.75 Fair = 0.5 Poor = 0.25 Unusable = 0.0

Habitat Variable	Suitability Index (SI) Score by Species and Life Stage																							
	WHITE BASS			EMERALD SHINER			RIVER DARTER			NORTHERN PIKE			SMALLMOUTH BUFFALO			WALLEYE			LARGEMOUTH BASS			BLUEGILL		
	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A
1. Average water temperature, °C																								
1. >30	0	0	.5	0	.25	.5	0	.5	.75	0	0	0	0	.25	.5	0	0	0	0	0	.5	0	.25	.75
2. 25-30	0	.5	1	.5	.75	.75	.75	1	1	0	0	.75	.5	1	1	0	.25	.25	.25	.5	1	.5	1	1
3. 20-25	.75	.75	1	1	1	1	1	1	1	0	0	1	1	1	1	0	.5	1	1	1	1	1	1	1
4. 15-20	1	1	1	.75	1	1	.75	.75	1	0	.25	1	1	.5	1	.25	1	1	1	1	1	1	1	1
5. 10-15	.25	.5	1	.5	.75	1	.5	.5	1	0	.5	.75	.5	.25	.75	.75	.75	.75	.25	.25	.75	.5	.5	.75
6. 4-10	0	0	.75	0	.25	.75	0	.25	.75	.5	1	.5	0	.25	.5	1	.25	.5	0	.25	.5	0	.25	.5
7. 2-4	0	0	.5	0	0	.25	0	0	.25	1	.25	.25	0	0	.25	0	0	.25	0	0	.25	0	0	.25
8. 0-2	0	0	.25	0	0	0	0	0	.25	.5	0	.25	0	0	0	0	0	0	0	0	0	0	0	0
2. Average turbidity, NTU																								
1. 0-10	.75	.75	1	1	1	1	.5	.5	.5	1	1	1	.75	.75	1	.25	.5	.5	1	1	1	1	1	1
2. 10-50	1	1	1	1	1	1	.75	1	.75	1	1	1	1	1	1	.75	1	1	1	1	1	1	1	1
3. 50-100	1	1	1	.75	.75	1	1	1	1	1	1	.75	1	1	1	1	1	1	1	.75	1	1	1	1
4. 100-150	.5	.75	1	.5	.75	.75	.75	.75	1	.5	.5	.5	.75	.5	1	.75	.5	.75	.5	.5	.75	.75	.75	1
4. 150-200	.25	.5	.75	.25	.5	.5	.5	.5	.75	.25	.25	.25	.5	.25	.75	.25	.25	.25	.25	.25	.5	.5	.5	.75
4. >200	.25	.25	.5	0	.25	.25	.25	.25	.5	0	0	.25	0	.25	.5	0	0	.25	0	0	.25	.25	.25	.5
3. Minimum daily dissolved oxygen, mg/l																								
1. 0-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. 1-3	.0	.25	.25	.25	.25	.5	.25	.25	.5	0	.25	.25	.25	.25	.25	.25	.25	.25	0	.25	.25	.0	.25	.25
3. 3-5	.5	.5	.5	.5	.75	.75	.5	.75	.75	.5	.5	.5	.5	.75	.75	.5	.75	.75	.5	.5	.5	.5	.5	.75
4. >5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4. Percent of shoreline rip-rapped																								
1. 0	.25	.5	.75	1	.5	.75	.5	.5	.75	1	1	1	1	.5	.5	.25	.25	.25	1	.5	.25	.5	.25	.5
2. 1-10	.25	.75	1	1	.75	1	.75	1	1	.75	.75	1	1	.75	.75	.25	.5	.5	1	.75	.5	.75	.5	.75
3. 10-25	.75	1	1	1	1	1	1	1	1	.25	.5	1	.5	1	1	.5	.75	.75	.75	1	.75	1	.75	1
4. 25-50	1	1	1	1	1	1	1	1	1	0	.25	.75	.5	1	1	.75	1	.75	.5	1	1	1	1	1
5. >50	1	1	1	1	1	1	1	1	1	0	.25	.5	.25	1	1	1	1	1	.5	1	1	1	1	1
5. Dominant substrate type																								
1. Plants/detritus	.5	.5	.25	.25	.75	.5	0	.25	.25	1	1	1	1	1	1	1	1	.75	.5	1	1	1	1	1
2. Clay/Silt (<1.0 mm)	.5	.25	.5	.25	.5	.5	0	.25	.25	0	.25	.25	.25	.5	.75	.5	.25	.25	.25	.25	.5	.5	.75	.5
3. Sand (1-2 mm)	.75	1	1	1	1	1	.5	1	1	.25	.5	.5	.25	1	1	.25	.5	.75	1	1	1	1	1	1
4. Gravel (2-64 mm)	1	1	1	1	1	1	1	1	1	0	.25	.25	0	1	1	1	1	1	1	1	1	1	1	1
5. Rocks (>64 mm)	1	.75	1	1	1	1	1	1	1	0	.25	.25	0	.75	1	1	1	1	.25	1	1	1	1	1

481

EXHIBIT J-2. AHAG matrix (cont.) (p. 2)

Habitat Variable	Suitability Index (SI) Score by Species and Life Stage																				
	WHITE BASS			EMERALD SHINER			RIVER DARTER			NORTHERN PIKE			SMALLMOUTH BUFFALO			WALLEYE			LARGEMOUTH BASS			BLUEGILL		
	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A
6. Percent of surface area with visible logs, inundated timber, undercut banks, and/or brush																								
1. 0-5	1	1	1	1	1	1	1	1	1	0	.25	.25	.25	.5	1	1	1	1	.25	.25	.25	.25	.25	.5
2. 5-10	1	1	.75	.75	.5	.5	.75	1	.75	.25	.5	.5	.75	.75	1	1	1	1	.5	.25	.5	.25	.25	.75
3. 10-25	.5	.75	.25	.5	.5	.25	.25	.75	.5	.75	.75	.75	1	1	.75	.75	1	1	.75	.5	.75	.5	.5	1
4. 25-50	.25	.5	.25	.25	.25	.25	0	.25	.25	1	1	1	1	.5	.5	.5	.5	.75	1	.75	1	.75	.75	1
5. >50	0	.25	0	.25	.25	.25	0	.25	.25	1	1	1	.75	.5	.25	.25	.25	.25	1	1	1	1	1	1
7. Percent of surface area with aquatic vegetation lentic habitats only)																								
1. 0-10	1	1	1	1	1	1	1	1	1	0	.25	.25	.25	.75	1	1	1	1	.5	.25	.25	.25	.25	.25
2. 10-25	.75	.25	.75	.75	.75	.5	.5	.75	.5	.5	.5	.75	.5	1	1	.75	1	1	.75	.5	.5	.75	.5	.5
3. 25-50	.25	0	.25	.25	.25	.25	.25	.25	.25	.75	.75	1	1	.75	.75	.5	.5	.5	1	1	1	1	.75	1
4. 50-75	0	0	.25	.25	.25	.25	0	0	0	1	1	1	1	.5	.25	0	.25	.25	.5	1	1	.5	1	.75
5. >75	0	0	0	0	.25	.25	0	0	0	1	1	1	.75	.25	.25	0	.25	0	.25	.5	.5	.25	1	.25
8. Water level fluctuation																								
1. Stable	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Slow rise (0.5-1 m)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3. Rapid rise (1-2 m)	.75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.75	1	1
4. Rapid fall (0.5-1 m)	0	.25	.5	.5	.5	.75	.5	.5	.75	.25	.25	.5	.25	.5	.5	.25	.25	.25	.25	.25	.5	.5	.5	.75
9. Variation in water depth, coefficient of variation, t																								
Mean depth < 1 meter																								
1. 0-25	.25	.25	.5	.75	.75	1	.25	.5	.75	.5	.5	.5	.25	.5	.75	.25	.5	.75	.25	.25	.25	.25	.25	.5
2. 25-50	.50	.75	.75	1	1	1	.5	.75	1	.75	.75	.75	.5	1	1	.75	1	1	.75	.75	.5	.75	.75	.75
3. 50-100	.75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.75	1	1	1
4. >100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mean depth > 1 meter																								
1. 0-20	.25	.25	.5	.75	.75	1	.25	.5	.75	.5	.5	.5	.25	1	.75	.25	.5	.75	.25	.25	.25	.25	.25	.5
2. 20-30	.50	.75	.75	1	1	1	.5	.75	1	.75	.75	.75	.5	1	1	.75	1	1	.75	.75	.5	.75	.75	.75
3. 30-50	.75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.75	1	1	1
4. >50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10. Percent of area with water depth greater than 1 m (lentic habitats only)																								
1. 0-10	0	0	.25	.5	.75	.75				.5	.25	.25	.75	.5	.25	.25	.25	.25	.5	.25	.25	.75	.5	.25
2. 10-25	.25	.50	.50	.75	1	1				.75	.5	.5	1	.75	.25	.5	.5	.25	.75	.5	.25	1	.75	.5
3. 25-50	.5	.75	.75	1	1	1				1	.75	.75	1	1	.5	.75	.75	.5	1	.75	.5	1	1	.75
4. 50-75	.75	1	1	1	1	1				1	1	1	.75	1	.75	1	1	.75	1	1	.75	1	1	1
5. >75	1	1	1	1	1	1				1	1	1	.5	1	1	1	1	1	1	1	1	1	1	1

EXHIBIT J-2. AHAG matrix (cont.) (p. 3)

Habitat Variable	Suitability Index (SI) Score by Species and Life Stage																							
	WHITE BASS			EMERALD SHINER			RIVER DARTER			NORTHERN PIKE			SMALLMOUTH BUFFALO			WALLEYE			LARGEMOUTH BASS			BLUEGILL		
	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A
11. Percent of year/season backwaters are contiguous with the mainstem river (lentic habitats only)																								
1. 0	.75	.25	.75	.5	.5	.5				.25	.5	.25	0	0	.5	.5	.5	.5	.25	.5	.5	.5	.75	1
2. 1-25	1	.50	1	.75	.75	.75				.75	1	.5	.25	.25	.75	.5	.5	.75	.5	.75	.5	.75	.75	1
3. 25-50	1	.75	1	1	1	1				1	1	.75	.5	.75	1	1	.75	1	.75	1	.75	1	1	1
4. 50-75	1	1	1	1	1	1				1	1	1	.75	1	1	1	1	1	1	1	1	1	1	1
5. >75	1	1	1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12. Average water velocity, cm/s																								
1. 0	0	1	.5	.5	1	.25	0	.25	0	1	1	1	1	1	1	.25	1	.75	1	1	1	1	1	1
2. 0.1-1	0	1	.5	.75	1	.5	0	.25	.25	1	1	1	1	1	1	1	1	1	1	.75	1	.75	1	1
3. 1-4	.25	1	.75	1	1	1	.25	.75	.75	.75	.75	1	.75	.75	1	1	.75	1	.25	.5	1	.25	.5	1
4. 4-10	.75	.75	1	1	.75	1	.75	1	1	.5	.75	.75	.5	.5	.75	1	.25	1	0	.25	.75	.25	.25	.5
5. 10-25	1	.5	1	.75	.5	1	1	.75	1	0	.5	.5	.5	.5	.75	.5	0	.75	0	.0	.25	0	0	.25
6. 25-50	1	.25	1	.5	.25	1	1	.5	1	0	.25	.5	.25	.5	.75	.25	0	.5	0	0	.25	0	0	0
7. 50-75	.75	0	1	.25	.25	.75	.5	.25	1	0	.25	.25	0	.25	.5	0	0	.25	0	0	0	0	0	0
8. >75	.25	0	.5	.25	0	.5	.25	.25	1	0	0	.25	0	.25	.5	0	0	.25						
13. Average depth of thalweg, m (lotic habitats only)																								
1. < 3	1	1	.25	.5	.75	.5	.75	1	.75		1	.25		.5	.25	.25	.5	.25		.5	.25		.75	.25
2. 3-5	1	1	.75	.75	1	.75	1	1	1		1	1		.75	.5	.5	.75	.5		.5	.5		1	.75
3. 5-7	.75	.75	1	1	1	1	1	1	1		1	1		1	1	.75	1	.75		.75	.75		1	1
4. >7	.5	.5	1	1	1	1	1	1	1		1	1		1	1	1	1	1		1	1		1	1
14. Distance to nearest backwater with average water depth greater than 1 meter, miles (lotic habitats only)																								
1. < 1	1	1	1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. 1-2	1	.5	1	1	1	1				.75	.5	1	1	.75	1	1	.5	1	.75	.25	.75	.5	.25	1
3. 2-5	.75	.25	1	1	1	1				.5	.25	1	.75	.5	.5	.75	.25	.5	.5	0	.5	.25	0	.5
4. >5	.5	.25	1	1	1	1				.25	0	.5	.5	.25	.25	.5	0	.25	.25	0	.25	0	0	.25
15. Distance to side channel with permanent water > 2 m and year around connection to main channel, miles																								
1. < 0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2. 0.5-0.75	1	.75	1	1	1	1	1	1	1	.75	.75	1	1	1	1	1	.75	1	1	.75	1	.75	.5	.75
3. 0.75-1	.75	.5	1	1	1	1	1	.5	1	.5	.5	.75	.75	.75	1	.75	.5	.75	.5	.25	.75	.25	.25	.5
4. 1-2	.5	.25	1	.5	.5	1	1	.25	1	.25	.25	.5	.5	.5	1	.5	.25	.5	.25	.25	.5	.25	.25	.25
5. >2 miles	.25	0	.75	.5	.5	1	1	0	1	.25	.25	.25	.5	.25	.75	.25	.25	.5	0	.25	.25	0	1	.25

EXHIBIT J-2. AHAG matrix (cont.) (p. 4)

483

Habitat Variable	Suitability Index (SI) Score by Species and Life Stage																				
	WHITE BASS			EMERALD SHINER			RIVER DARTER			NORTHERN PIKE			SMALLMOUTH BUFFALO			WALLEYE			LARGEMOUTH BASS			BLUEGILL		
	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A	S	R	J/A
16. Percent of backwater area suitable as over-wintering habitat from Nov-Feb (no current, water temperature at least 1°C warmer than main channel, DO_2 3.0 mg/l, water depth ≥ 1.5 m, periodically contiguous with main river channel)																					
1. 0			.25			.5						.25			.25			0			0
2. 1-25			.25			.75						.25			.25			.25			.25
3. 25-50			.5			1						.5			.5			.5			.5
4. 50-75			.75			1						.75			.75			.75			.75
5. >75			1			1						1			1			1			1
CALCULATIONS																					
Total Score																					
Average HSI Value (total score/number of variables)																					
Minimum HSI Value/1 (optional)																					
Limiting Factor HSI Score (sum of selected variables/number of variables) (optional)																					
Weighted HSI Value (see users manual) (optional)																					
Total Acres																					
Habitat Units (HSI x Total Acres																					

PLATE J-2. AHAG Sample Sites for Fisheries Habitat.

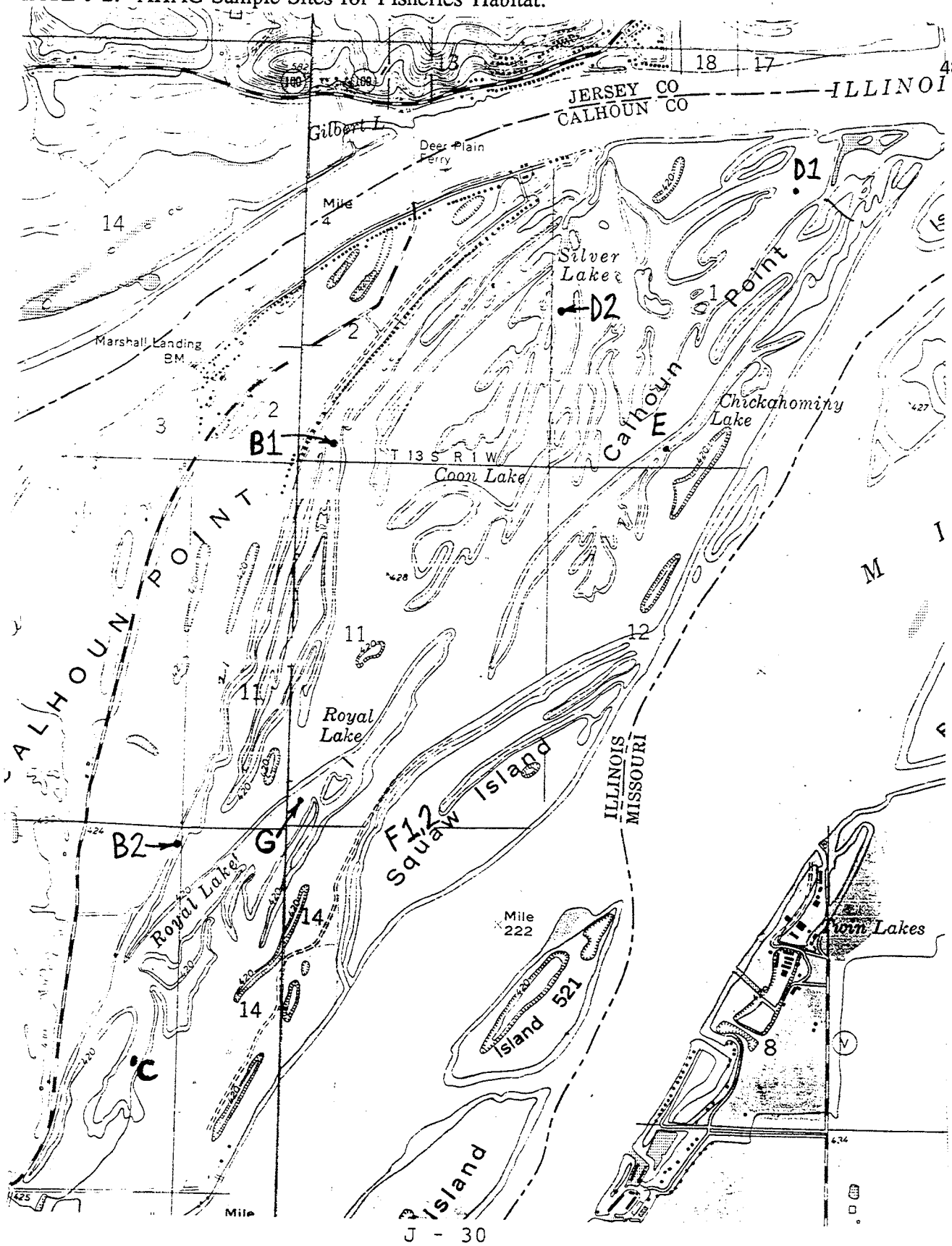


TABLE J-11. Projected quality of aquatic habitat (in habitat suitability indices) for six fish species at Calhoun Point.

485

Species	Habitat Suitability Index				
	Existing Condition	Future Condition			
		Without Any Project		With Maximum Project[1]	
		yr.5	yr.50	yr.5	yr.50
Pohlman Slough (fisheries management - riverine fish)					
White Bass	.67	.67	.61	.70	.70
Shiner	.77	.77	.74	.80	.80
Buffalo [2]	.72	.72	.68	.82	.82
Walleye	.65	.65	.59	.73	.73
Largemouth Bass	.64	.64	.62	.76	.76
Bluegill [2]	.68	.68	.68	.79	.79
Silver, Chickahominy and Royal Lakes (moist-soil management - resident fish)					
White Bass	.64	.64	.58	.70	.70
Shiner	.74	.74	.70	.79	.79
Buffalo [2]	.71	.71	.68	.81	.81
Walleye	.63	.63	.58	.72	.72
Largemouth Bass	.65	.65	.63	.76	.76
Bluegill [2]	.68	.68	.68	.79	.79
Silver, Chickahominy and Royal Lakes (moist-soil management - riverine fish)					
White Bass	.14	.14	.10	.10	.10
Shiner	.24	.24	.13	.17	.17
Buffalo [2]	.21	.21	.11	.19	.19
Walleye	.13	.13	.10	.10	.10
Largemouth Bass	.15	.15	.10	.14	.14
Bluegill [2]	.18	.18	.10	.18	.18
Squaw Slough (no management - riverine fish)					
White Bass	.63	.63	.00	.73	.73
Shiner	.75	.75	.00	.82	.82
Buffalo [2]	.73	.73	.00	.84	.84
Walleye	.68	.68	.00	.73	.73
Largemouth Bass	.67	.67	.00	.81	.81
Bluegill [2]	.71	.71	.00	.84	.84

[1] Maximum project consists of the following management measures and increments.
For Pohlman Slough: A-4 (428 levee along river), B-2 (open-topped exterior water control/fish passage structure), L-2/4/6 (deepwater dredging in Pohlman Slough for 40 percent of slough's length).
For Silver, Chickahominy, and Royal Lakes: A-4 (428 levee along river), D-1 (open-topped exterior water control/fish passage structure at Silver Lake), E-1 (interior stop-log water control structure between Chickahominy and Silver Lakes), F-1 (interior stop-log water control structure between Chickahominy and Royal Lakes).
For Squaw Slough: A-4 (428 levee along river), C-1 (open-topped exterior water control/fish passage structure at Squaw Island), K-2/4/6 (deepwater dredging at Squaw Island for 40 percent of slough's length), M-3/4 (excavate five potholes, and interconnect them to Squaw Slough).
[2] Chosen as target species.

TABLE J-12. Net habitat benefits (in average annualized habitat units) for all target species and all management measures (and associated increments) at Calhoun Point. For fish data cells with two numbers separated by a slash, first number represents habitat units for resident fish, second for river fish capable of accessing interior of Calhoun Point. [Data for nontarget species not included.]

Management Measure (and increments)	Net Change in Average Annualized Habitat Units																				
	Wildlife Evaluation Species												Total Wild-life	Fish Evaluation Species						Total Fish	Total Wildlife & Fish
	Mal	CaG	LeB	LeY	Mus	KiR	GrH	WoD	Bea	AmC	NoP	PrW		WhB	EmS	SmB	Wal	LaB	Blu		
A1 - Riverside berm	20	22					20	-5			-18	51	90			27/-53			26/-47	-47	43
A2 - Riverside berm	38	36					29	-10			-43	106	156			39/-51			39/-45	-18	138
A3 - Riverside berm	48	43					36	-15			-53	119	178			48/-50			46/-44	0	178
A4 - Riverside berm	55	50					40	-19			-63	130	193			53/-49			51/-44	11	204
A5 - Riverside berm	20	22					18	-6			-18	39	75			27/-49			26/-42	-38	37
A6 - Riverside berm	38	36					26	-14			-42	80	124			38/-47			38/-41	-12	112
A7 - Riverside berm	47	43					32	-19			-52	88	139			47/-46			45/-40	4	143
A8 - Riverside berm	55	50					35	-24			-63	95	148			52/-45			49/-40	16	164
A9 - Riverside berm	20	22					18	-7			-19	41	75			27/-49			26/-42	-38	37
A10 - Riverside berm	38	36					26	-11			-41	87	135			38/-47			38/-41	-12	123
A11 - Riverside berm	47	43					32	-16			-51	97	152			47/-46			45/-40	6	158
A12 - Riverside berm	55	50					35	-21			-61	105	163			52/-45			49/-40	16	179
A13 - Riverside berm	20	22					20	-7			-21	45	79			27/-53			26/-47	-47	32
A14 - Riverside berm	38	36					29	-12			-44	97	144			39/-51			39/-45	-18	126
A15 - Riverside berm	48	43					36	-17			-55	108	163			48/-50			46/-44	0	163
A16 - Riverside berm	55	50					40	-23			-66	116	172			53/-49			51/-44	11	183
B1 - Ext. Wtr. Cntrl. - Pohl.	0	1					1	0			0	0	2			26			24	50	52
B2 - Ext. Wtr. Cntrl. - Pohl.	0	1					1	0			0	0	2			26			24	50	52
B3 - Ext. Wtr. Cntrl. - Pohl.	0	1					1	0			0	0	2			26			24	50	52
C1 - Ext. Wtr. Cntrl. - Squa. wood duck mgmt.	0	0					0	1			0	0	1			0			1	1	2
C2 - Ext. Wtr. Cntrl. - Squa. wood duck mgmt.	0	0					0	1			0	0	1			0			0	0	1
C1R -Ext. Wtr. Cntrl. - Squa. GTR Mgmt.	19	0					1	1			2	1	24			0			1	1	25
C2R -Ext. Wtr. Cntrl. - Squa. GTR Mgmt.	19	0					1	1			2	1	24			0			0	0	24
D1 - Ext. Wtr. Cntrl. - Silv.	6	7					1	0			0	0	14			18			18	36	50
D2 - Ext. Wtr. Cntrl. - Silv.	7	6					1	0			0	0	14			0			0	0	14
E1 - Int. Wtr. Cntrl. - Silv.	4	4					-1	0			0	0	7			3			3	6	13
E2 - Int. Wtr. Cntrl. - Silv.	4	4					-1	0			0	0	7			0			0	0	7
F1 - Int. Wtr. Cntrl. - Roya.	8	5					-1	0			0	0	12			3			3	6	18
F2 - Int. Wtr. Cntrl. - Roya.	8	5					-1	0			0	0	12			0			0	0	12
H1 - Pumping - Silver	13	13					-1	0			0	0	25			0			0	0	25

F2 - Int. Wtr. Cntrl. - Roya.	8	5					-1	0			0	0	12			0			0	0	12
H1 - Pumping - Silver	13	13					-1	0			0	0	25			0			0	0	25
H2 - Pumping - Silver	13	13					-1	0			0	0	25			0			0	0	25
I1 - Pumping - Squaw wood duck mgmt.	0	0					0	2			0	0	2			0			0	0	2
I2 - Pumping - Squaw wood duck mgmt.	0	0					0	2			0	0	2			0			0	0	2
I1R -Pumping - Squaw GTR mgmt.	19	0					1	1			0	1	22			0			0	0	22
I2R -Pumping - Squaw GTR mgmt.	19	0					1	1			0	1	22			0			0	0	22
J1 - Pumping - Goose Field	10	6					0	0			0	0	16			0			0	0	16
K1 - Dredging - Squaw	0	0					0	0			0	0	0			1/1			1/1	4	4
K2 - Dredging - Squaw	0	0					1	1			0	0	2			3/4			2/4	13	15
K3 - Dredging - Squaw	0	0					0	0			0	0	0			1/1			1/1	4	4
K4 - Dredging - Squaw	0	0					1	1			0	0	2			3/4			2/4	13	15
K5 - Dredging - Squaw	0	0					0	0			0	0	0			1/1			1/1	4	4
K6 - Dredging - Squaw	0	0					1	1			0	0	2			3/4			2/4	13	15
L1 - Dredging - Pohlman	0	0					0	0			0	0	0			9			5	16	16
L2 - Dredging - Pohlman	0	0					0	0			0	0	0			20			19	49	49
L3 - Dredging - Pohlman	0	0					0	0			0	0	0			9			5	16	16
L4 - Dredging - Pohlman	0	0					0	0			0	0	0			20			19	49	49
L5 - Dredging - Pohlman	0	0					0	0			0	0	0			9			5	16	16
L6 - Dredging - Pohlman	0	0					0	0			0	0	0			20			19	49	49
M1 - Pothole Excavation	1	0					5	2			0	0	8			0			0	0	8
M2 - Pothole Excavation	1	0					5	2			0	0	8			0			0	0	8
M3 - Pothole Excavation	0	0					3	2			0	0	5			0			0	0	5
M4 - Pothole Excavation	0	0					3	2			0	0	5			0			0	0	5
P1 - Levees - Goose Field	5	2					0	0			0	0	7			0			0	0	7
P2 - Levees - Goose Field	3	2					0	0			0	0	5			0			0	0	5
P3 - Levees - Goose Field	8	5					0	0			0	0	13			0			0	0	13
Q1 - Clear Woody Vegetation	27	26					22	0			0	0	75			0			0	0	75
Q2 - Clear Woody Vegetation	44	40					32	0			0	0	116			0			0	0	116
Q3 - Clear Woody Vegetation	68	67					54	0			0	0	189			0			0	0	189
R1 - Plant Trees - Disposal	0	0					0	13			15	8	36			0			0	0	36
R2 - Plant Trees - Cropfield	0	0					0	11			12	7	30			0			0	0	30
R3 - Plant Trees - Both	0	0					0	24			27	15	66			0			0	0	66

SECTION 2

PD-A READING FILE

12 APR 1995

Planning Division
Environmental Planning Branch

Ms. Joyce Collins
U.S. Fish and Wildlife Service
Ecological Services Office
Rural Route 3, Box 198A
Marion, Illinois 62959

Dear Ms. Collins:

We are forwarding information at your request to assist you in preparing your Final Fish and Wildlife Coordination Act Report (FWCAR) for the Calhoun Point Habitat Rehabilitation and Enhancement Project. Enclosed is a 2-page table showing net changes in average annual habitat units (AAHUs) for nontarget fish and wildlife species. This is the same information sent to you electronically on April 6, 1995, by Tim George of our Environmental Planning Branch.

The draft Definite Project Report (DPR) dated October 1994, includes net changes in AAHUs for target species, but none for nontarget species. Time did not permit the calculation of data prior to the release of the draft DPR. We notified you of this situation in mid-1994, and at that time you informed Mr. George that the nontarget AAHUs were necessary to assess project impacts on all evaluation species, and that if these data were not to become available, then the District should notify you in writing.

In the interim, at your request Mr. George calculated and forwarded to you the actual AAHU values under future-without and future-with conditions for all target fish and wildlife species and all recommended measures, so as to provide you with a better understanding of project impacts, and to further assist you in preparing your draft FWCAR.

After examination of the enclosed table, you will see that most of the information you requested for nontarget species is provided, but the table is incomplete. We have calculated net AAHUs for all four nontarget fish species, and for all six nontarget wildlife species except for one measure. For the riverside dike/levee (increments A1-A16), AAHUs were calculated for only the beaver, and not the other five wildlife species.

We wish to bring to your attention that the values in the enclosed table are estimates prepared by Mr. George. They are

not numbers resulting from application of the Habitat Evaluation System (HES) software. Not enough time and money are available given the present project schedule and funding to provide HES calculations. Note that the AAHU data presented in the draft DPR required several months of continuous effort from Mr. George, and the estimates in the enclosed table required about two weeks of his time. The estimates were prepared by making comparisons with data for target species, and Mr. George believes that they are reliable.

Although he attempted to provide estimates for all nontarget wildlife species, the table is incomplete for measure A for two reasons. First, estimating values would be very time-consuming for these species because each cell represents about one-half dozen nonforested habitat types, each of which need to be treated separately and then summed. Second, patterns of change in habitat suitability indices (HSIs) for these nontarget species, in terms of magnitude or direction, often were not comparable enough to changes occurring in target species to yield reliable estimates.

Were the process we use to calculate HSIs and acres for all alternatives, evaluation species, habitat types, and target years fully automated, the data you requested would be relatively simple to produce. We have discussed these limitations here within the Planning Division, and realize there is a real need to develop software that would shorten the time and effort we now require to calculate this data. We hope to have such an automated procedure ready for use for future habitat projects. Until then, we regret any concern this situation may have caused you.

If you have any questions regarding this matter, please contact Tim George at 314-331-8459.

Sincerely,

Owen D. Dutt
Chief, Planning Division

Enclosure

TABLE J-13. Estimates of net habitat benefits (in average annualized habitat units) for nontarget species and all management measures (and associated increments) at Calhoun Point. Blank cells indicate no estimate was prepared. For fish data cells with two numbers separated by a slash, first number represents habitat units for resident fish, second for river fish capable of accessing interior of Calhoun Point.

Management Measure (and increments)	Net Change in Average Annualized Habitat Units									
	Wildlife Evaluation Species						Fish Evaluation Species			
	LeB	LeY	Mus	KiR	Bea	AmC	WhB	EmS	Wal	LaB
A1 - Riverside berm					5		24/-48	18/-56	29/-47	27/-46
A2 - Riverside berm					5		34/-46	25/-55	41/-46	39/-45
A3 - Riverside berm					7		42/-46	32/-54	51/-45	48/-44
A4 - Riverside berm					7		46/-45	35/-53	56/-44	53/-44
A5 - Riverside berm					4		24/-45	18/-53	29/-44	27/-43
A6 - Riverside berm					3		33/-43	25/-50	40/-42	38/-41
A7 - Riverside berm					4		41/-42	31/-49	50/-41	47/-41
A8 - Riverside berm					4		46/-41	34/-48	55/-40	52/-40
A9 - Riverside berm					4		24/-45	18/-53	29/-44	27/-43
A10 - Riverside berm					3		33/-43	25/-50	40/-42	38/-41
A11 - Riverside berm					4		41/-42	31/-49	50/-41	47/-41
A12 - Riverside berm					3		46/-41	34/-48	55/-40	52/-40
A13 - Riverside berm					-1		24/-48	18/-56	29/-47	27/-46
A14 - Riverside berm					4		34/-46	25/-55	41/-46	39/-45
A15 - Riverside berm					6		42/-46	32/-54	51/-45	48/-44
A16 - Riverside berm					5		46/-45	35/-53	56/-44	53/-44
B1 - Ext. Wtr. Cntrl. - Pohl.	0	1	1	2	0	0	24	28	24	23
B2 - Ext. Wtr. Cntrl. - Pohl.	0	1	1	2	0	0	24	28	24	23
B3 - Ext. Wtr. Cntrl. - Pohl.	0	1	1	2	0	0	24	28	24	23
C1 - Ext. Wtr. Cntrl. - Squa. wood duck mgmt.	0	0	0	0	0	0	0	0	0	1
C2 - Ext. Wtr. Cntrl. - Squa. wood duck mgmt.	0	0	0	0	0	0	0	0	0	0
C1R -Ext. Wtr. Cntrl. - Squa. GTR Mgmt.	0	0	0	0	1	0	0	0	0	1
C2R -Ext. Wtr. Cntrl. - Squa. GTR Mgmt.	0	0	0	0	1	0	0	0	0	0
D1 - Ext. Wtr. Cntrl. - Silv.	0	3	0	1	0	2	18	18	24	21
D2 - Ext. Wtr. Cntrl. - Silv.	0	3	0	1	0	2	0	0	0	0
E1 - Int. Wtr. Cntrl. - Silv.	0	3	0	1	0	2	3	3	4	3
E2 - Int. Wtr. Cntrl. - Silv.	0	3	0	1	0	2	0	0	0	0
F1 - Int. Wtr. Cntrl. - Roya.	0	3	0	1	0	2	3	3	4	3

F2 - Int. Wtr. Cntrl. - Roya.	0	3	0	1	0	2	0	0	0	0
H1 - Pumping - Silver	4	6	0	5	0	6	0	0	0	0
H2 - Pumping - Silver	4	6	0	5	0	6	0	0	0	0
I1 - Pumping - Squaw wood duck mgmt.	0	0	0	0	0	0	0	0	0	0
I2 - Pumping - Squaw wood duck mgmt.	0	0	0	0	0	0	0	0	0	0
I1R -Pumping - Squaw GTR mgmt.	0	0	0	0	1	0	0	0	0	0
I2R -Pumping - Squaw GTR mgmt.	0	0	0	0	1	0	0	0	0	0
J1 - Pumping - Goose Field	0	0	0	0	0	0	0	0	0	0
K1 - Dredging - Squaw	0	0	0	0	0	0	1/1	1/1	1/1	1/1
K2 - Dredging - Squaw	0	0	0	0	0	0	2/4	2/4	2/4	2/4
K3 - Dredging - Squaw	0	0	0	0	0	0	1/1	1/1	1/1	1/1
K4 - Dredging - Squaw	0	0	0	0	0	0	2/4	2/4	2/4	2/4
K5 - Dredging - Squaw	0	0	0	0	0	0	1/1	1/1	1/1	1/1
K6 - Dredging - Squaw	0	0	0	0	0	0	2/4	2/4	2/4	2/4
L1 - Dredging - Pohlman	0	0	0	0	0	0	8	10	8	8
L2 - Dredging - Pohlman	0	0	0	0	0	0	15	19	16	18
L3 - Dredging - Pohlman	0	0	0	0	0	0	8	10	8	8
L4 - Dredging - Pohlman	0	0	0	0	0	0	15	19	16	18
L5 - Dredging - Pohlman	0	0	0	0	0	0	8	10	8	8
L6 - Dredging - Pohlman	0	0	0	0	0	0	15	19	16	18
M1 - Pothole Excavation	0	0	3	-3	0	0	0	0	0	0
M2 - Pothole Excavation	0	0	3	-3	0	0	0	0	0	0
M3 - Pothole Excavation	0	0	1	-3	0	0	0	0	0	0
M4 - Pothole Excavation	0	0	1	-3	0	0	0	0	0	0
P1 - Levees - Goose Field	0	0	0	0	0	0	0	0	0	0
P2 - Levees - Goose Field	0	0	0	0	0	0	0	0	0	0
P3 - Levees - Goose Field	0	0	0	0	0	0	0	0	0	0
Q1 - Clear Woody Vegetation	24	25	23	25	0	25	0	0	0	0
Q2 - Clear Woody Vegetation	34	36	33	36	0	36	0	0	0	0
Q3 - Clear Woody Vegetation	56	60	55	60	0	60	0	0	0	0
R1 - Plant Trees - Disposal	0	0	0	0	10	0	0	0	0	0
R2 - Plant Trees - Cropfield	0	0	0	0	20	0	0	0	0	0
R3 - Plant Trees - Both	0	0	0	0	30	0	0	0	0	0

APPENDIX DPR-K

INCREMENTAL COST ANALYSIS

FOREWORD

APPENDIX DPR-K provides the incremental cost analysis for the Calhoun Point HREP. It represents an investigation and characterization of how the costs of extra units of output increase as the level of output increases (i.e. the plan becomes larger and the number of habitat units produced increases). In such analyses a display or array of implementable plan increments are ranked from most to least cost effective.

APPENDIX DPR-K

INCREMENTAL COST ANALYSIS

INTRODUCTION

The primary purpose of this project is the provision of wildlife habitat. Therefore, when completing the Incremental Cost Analysis, it was necessary to first analyze the output and cost data on a wildlife habitat unit (WHAG) basis. Then, given the recommended level of WHAG output, similar steps were taken to analyze the output and cost data from the perspective of the secondary project purpose of aquatic habitat provision (AHAG).

*Please Note: This is primarily a "wildlife" habitat provision project. However, some measures decrease the suitability of habitat for aquatic resources in the project area. Hence, this first incremental cost analysis focuses solely on identifying the incremental costs of providing additional "wildlife" habitat units. This permits identification of the costs of providing additional output for the primary project purpose. This subsequently permits identification of costs necessary to mitigate losses of aquatic habitat units given the level of output recommended for wildlife habitat. The incremental cost analysis is thus completed based only on wildlife habitat units and then is further extended to include aquatic habitat units given a level of wildlife habitat output.

INCREMENTAL COST ANALYSIS - WHAG

Step 1 - Display Outputs and Costs. Average Annual Costs were developed for all measures. The costs involved were construction costs (50 year project life), replacement costs as needed, and annual operation and maintenance costs.

A spreadsheet was created which displayed and analyzed several items:

a) The output measured in Wildlife Habitat Units (WHAG's) and Aquatic Habitat Units (AHAG's) per measure.

b) Cost data were entered into the spreadsheet See Exhibits K-1 and K-2 for detailed information regarding itemized cost estimates for each potential project measure. The cost data were comprised of:

   1. Initial Costs - Year 0, 1994 Price Level, including 25 percent Contingencies, 22 percent Engineering/Design, and Supervisory/Administrative Costs;
   2. Annual Operation & Maintenance Costs - Years 1-50; and
   3. Replacement Costs as Necessary, including 25 percent Contingencies.

c) Output from the spreadsheet showed:

1. The Net Present Value of the 50 year cost stream for each measure, computed with a discount rate of 7.75 percent;
2. The Average Annual Cost per measure; and
3. The Average Annual Cost per WHAG per measure.

Exhibit K-3 displays the results of these computations.

Step 2 - Identify Combinable Management Measures. All combinable measures were determined from an exhibit which showed all project measures with any dependencies. See Exhibit K-4 for details of the relationships between project measures.

Step 3 - Calculate Outputs and Costs of All Combinations. Utilizing the information which delineates the combinable measures, there were over 327 million different combinations of measures available. In order to make the number of measures manageable, a combination of Steps 4 and 5 below were applied. The economically inefficient and ineffective increments were first eliminated within each measure. For example:

Measure A5, 75 WHAG, $25,600 Annual Cost;
Measure A9, 75 WHAG, $26,900 Annual Cost; hence

-Plan A9 may be eliminated as economically inefficient.

The following measures were determined to be inefficient and/or ineffective:

A9; A6; A7; A11; A8; A12; A16; *B2; B3; C1; C2; C1(R); D1; E2; F2; H1; I1; I2; I1(R); K1; K3; K4; K5; K6; L1; L2; L3; L4; L5; L6; **M2; M3; M4; and P2.

*Note: Measure B2 was eliminated for the purposes of incremental cost analysis. This measure represented a similar procedure as Measure B1, but in a different location. When choosing the optimal plan, if a B measure is to be chosen, either location is economically feasible.

**Note: Measure M2 was eliminated for purposes of incremental cost analysis. It yielded the exact same WHAG for the same annual cost as Measure M1. When the final choices are made, M2 is as feasible as M1.

Some measures require other measures to be in service before they may be considered for implementation into a plan. (See Exhibit K-4). Note that the dependency relationships may be partitioned into independent "paths." Note further that each path may be examined independently for efficient and effective combinations of measures within that path.

After elimination of all individually economically inefficient and ineffective measures, feasible combinations of the measures were evaluated to determine economically efficient or effective combinations of measures. Each "path" was considered independently and all combinations of measures within each path were examined for efficiency and effectiveness.

The following combinations of measures are economically efficient or effective combinations and are utilized for the final analysis:

MEASURE A - INDEPENDENT OF ALL OTHER MEASURES

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
A5	A-1	75	$ 25,600
A13	A-2	79	$ 26,900
A1	A-3	90	$ 29,600
A10	A-4	135	$ 43,600
A14	A-5	144	$ 46,600
A2	A-6	156	$ 48,500
A15	A-7	163	$ 74,600
A3	A-8	178	$ 75,400
A4	A-9	193	$111,000

Nine measures considered for final analysis.

PATH D - H - E - F - Q

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
D2	D-1	14	$ 21,200
D2+H2	D-2	39	$ 47,000
D2+H2+Q1	D-3	114	$ 47,700
D2+H2+Q2	D-4	155	$ 48,700
D2+H2+Q3	D-5	228	$ 49,200
D2+H2+E1+Q3	D-6	235	$ 52,400
D2+H2+F1+Q3	D-7	240	$ 55,700
D2+H2+E1+F1+Q3	D-8	247	$ 58,900

Eight measures and combinations considered for final analysis.

PATH C - I - K

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
C2(R)	C-1	24	$ 10,600
C2(R)+I2(R)	C-2	46	$ 16,800
C2(R)+I2(R)+K2	C-3	48	$ 45,000

Three measures and combinations considered for final analysis.

PATH B - L

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
B1	B-1	2	$ 27,400

One measure considered for final analysis. Measure B2 is also efficient and could be utilized in place of B1. All "L" measures were considered inefficient since none produced any WHAG output.

MEASURE R - ALL INDEPENDENT VARIABLES

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
R1	R-1	36	$ 6,400
R2	R-2	30	$ 4,300
R3	R-3	66	$ 10,200

Three measures considered for final analysis.

MEASURE M - ALL INDEPENDENT VARIABLES

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
M1	M-1	8	$ 13,300

One measure considered for final analysis. Measure M2 is also efficient and could be utilized in place of M1.

PATH P1, P3 - J

Measures	Identification Number for Analysis	Total WHAG	Total Annual Cost
P1	P-1	7	$ 3,200
P3	P-2	13	$ 6,100
P1+J1	P-3	23	$ 9,400
P3+J1	P-4	29	$ 12,300

Four measures and combinations considered for final analysis.

After all efficient combinations within each separate independent path were determined, a program was developed which computed all possible combinations based on the dependency flowchart. The

program generated a total of 25,924 possible combinations of measures and computed the average annual WHAG and average annual cost of each combination of measures.

Step 4 - Eliminate Economically Inefficient Combinations. This step was completed in the above analysis for all combinable measures within each dependency path. The 25,924 possible combinations of "surviving" measures were then examined for economic efficiency and effectiveness. The combinations were sorted in ascending order by WHAG output and then by annual cost within equal output levels. The data was analyzed and inefficient and ineffective combinations were eliminated. The method employed was the same as that used to eliminate combinations within dependency paths and between scales of individual measures. All combinations that had equal or lower WHAG output for greater costs were eliminated as economically inefficient or ineffective.

Step 5 - Eliminate Economically Ineffective Combinations. See Step 4 discussed above.

Step 6 - Calculate and Display Incremental Costs. After all inefficient or ineffective combinations were eliminated (See Steps 4 and 5 above), 109 potentially economically efficient plans remained. The Incremental WHAG output, Incremental Annual Cost and Incremental Annual Cost per WHAG unit are displayed in Exhibit K-5. Exhibits K-6 and K-7 display the Incremental Cost Curve and Average Cost Curve in graphical format.

Step 7 - Calculate Change in Unit Cost from No-Action Plan to all Other Plans. At this point in the analysis, the data was examined in order to determine a way in which the incremental data could be displayed in a manner more consistent with a classic incremental cost curve. The analysis performed revealed somewhat irregular, non-continuously increasing cost changes which are uncharacteristic of such a curve. Therefore, a method of "smoothing" the data was utilized. The total array of data for the 109 remaining combinations was examined.

The idea behind the smoothing process is to compare the incremental cost and incremental output of all plans over the no-action plan. The no-action plan is a baseline condition to which every other plan is compared. As a decision rule (according to Nine Easy Steps guidance), the plan with the lowest incremental cost per unit is the first baseline point. By definition, the plan with the smallest average annual cost per WHAG was chosen as the beginning point (compared to the no-action plan, the plan with the lowest average annual cost per WHAG is the plan with the lowest incremental cost per unit). The combinations preceding the chosen path (i.e. those paths whose total WHAG outputs were smaller) were not utilized within this analysis.

Step 8 - Recalculate Change in Unit Cost From Last Selected Plan. After the beginning point is established, the remaining database

(the combination with the minimum average annual cost per WHAG unit and all combinations with greater outputs) is analyzed and compared to the "new" baseline point. Each combination is evaluated in relation to the beginning point. The incremental outputs and incremental costs are established and finally the incremental cost per additional unit of output is calculated. This value is examined for each separate combination and the combination with the lowest incremental cost per incremental output is chosen. This combination then becomes the beginning point in the next recalculation. This recalculation process continues until all combinations (with greater outputs than the initial beginning point) have either been eliminated or chosen. When the recalculation is completed, a number of combinations with corresponding outputs and costs are left. This data is utilized when plotting the final incremental cost curve.

The smoothing process was utilized within this analysis. See Exhibit K-8 for the analysis and outcome of the recalculations.

Step 9 - Tabulate and Display Incremental Costs of Selected Plans. Exhibit K-9 displays the Incremental Cost data for the plans which survived the smoothing process. Exhibit K-10 displays the information in graphical form. Please note that while the smoothed data, when graphically displayed, depicts the recognizable incremental cost curve, any one of the 109 plans in the previous step were determined to be efficient and effective.

As mentioned, the plan which produced 369 units of output showed the lowest Average Annual Cost per WHAG. Under normal circumstances, if the project could be reproduced elsewhere, for example if there were no limit of critical input resources (in this case, land available to support similar projects), the plan which produced the 369 units at the lowest Average Annual Cost per WHAG would be a good recommendation. However, this project could not be reproduced elsewhere. The project site was geographically limited and contained several unique features. The Incremental Cost Curve was utilized to determine the overall project scale. As mentioned, the smoothed Incremental Cost Curve revealed slight increases in unit incremental costs until 544 WHAG units at which point the unit incremental costs increased at a rapidly increasing rate.

To incorporate other important planning considerations such as implementability, effectiveness, and completeness, the plan which produced 546 WHAG units at an average annual cost of $157,100 was recommended by the Study Team. This plan, which produced 546 WHAG units, was included within the 109 plans which the analysis showed to be cost effective and efficient.

While primarily a "wildlife" driven project, another significant goal of the project is to enhance aquatic resources. Therefore, the same nine steps utilized for analyzing the data based on WHAG output were used to examine the data based on AHAG output given

the recommended level of 546 WHAG units. This permitted the identification of the incremental costs of providing AHAG outputs given the recommended level of WHAG output.

INCREMENTAL COSTS ANALYSIS - AHAG

Step 1 - Display Outputs and Costs of Management Measures. Step One did not require changes except to measure the output in Aquatic Habitat Units (AHAG's).

Step 2 - Identify Combinable Management Measures. Step Two was identical to the process described in the WHAG analysis.

Step 3 - Calculate Outputs and Costs of All Combinations. The complete delineation of all combinable measures again provided an unmanageable number of combinations. Therefore, the same process as was undertaken in the WHAG analysis was again utilized to reduce this number.

The following text provides guidelines concerning how any certain measure could be considered inefficient or ineffective and thus eliminated for further consideration in the AHAG analysis.

- The measures must contribute a total of 546 WHAG units. The 546 units were determined to be the recommended quantity in the incremental WHAG analysis.

-All "A" measures which contributed less than 156 WHAG units (this was the efficient "A" measure in the WHAG analysis) may be eliminated due to the fact that at least 156 WHAG units are required in order to reach the 546 WHAG units. Consequently, the following "A" measures may be eliminated:

A1; A5; A6; A7; A8; A9; A10; A11; A13; and A14.

-Under the "D-H-E-F-Q" path, the total number of WHAG units must equal at least 200. This was determined by utilizing the largest possible WHAG outputs per measure and path and still requiring the total to equal 546 total WHAG units. Therefore, some of the possible combinations within this path were eliminated due to the contribution of insufficient total WHAG units.

After elimination of all individually economically inefficient/ ineffective measures, all remaining feasible combinations of the measures were evaluated to determine the economically efficient or effective combinations of measures. Each "path" was considered independently and all combinations of measures within each path were examined for efficiency and effectiveness.

The following combinations of measures are economically efficient or effective and are utilized for the final AHAG incremental cost analysis.

MEASURE A - INDEPENDENT OF ALL OTHER MEASURES

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
A2	1	156	-18	$ 48,500
A15	2	163	0	$ 74,600
A12	3	163	16	$100,500
A3	4	178	0	$ 75,400
A4	5	193	11	$111,000
A16	6	172	11	$110,200

Six measures were considered for final analysis. Please note, Measure "A12" cannot be eliminated within this analysis because it contributes more AHAG units than measure "A15."

PATH D - H - E - F - Q

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
D2+H2+Q3	1	228	0	$ 49,200
D2+H2+E1+Q3	2	235	6	$ 52,400
D1+H2+Q3	3	228	36	$ 55,100
D2+H2+F1+Q3	4	240	6	$ 55,700
D1+H2+E1+Q3	5	235	42	$ 58,300
D2+H2+E1+F1+Q3	6	247	12	$ 58,900
D1+H2+F1+Q3	7	240	42	$ 61,600
D1+H2+E1+F1+Q3	8	247	48	$ 66,000

Eight measures and combinations considered for final analysis.

PATH C - I - K

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
C2(R)	1	24	0	$ 10,600
C1(R)	2	24	1	$ 16,500
C2(R)+I2(R)	3	46	0	$ 16,800
C1(R)+I2(R)	4	46	1	$ 22,700
C2(R)+I2(R)+K1	5	46	4	$ 25,400
C1(R)+I2(R)+K1	6	46	5	$ 31,300
C2(R)+I2(R)+K2	7	48	13	$ 45,000
C1(R)+I2(R)+K2	8	48	14	$ 50,900

Eight measures and combinations considered for final analysis.

PATH B - L

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
B1	1	2	50	$ 27,400
B1+L1	2	2	66	$ 37,100
B1+L2	3	2	99	$ 61,700

Three measures considered for final analysis.

MEASURE R - ALL INDEPENDENT VARIABLES

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
R1	1	36	0	$ 6,400
R2	2	30	0	$ 4,300
R3	3	66	0	$ 10,200

Three measures considered for final analysis.

MEASURE M - ALL INDEPENDENT VARIABLES

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
M1	1	8	0	$ 13,300

One measure considered for final analysis. Measure M2 is also efficient and could be utilized in place of M1.

PATH P1, P3 - J

Measures	Identification Number for Analysis	Total WHAG	Total AHAG	Total Annual Cost
P1	1	7	0	$ 3,200
P3	2	13	0	$ 6,100
P1+J1	3	23	0	$ 9,400
P3+J1	4	29	0	$ 12,300

Four measures and combinations considered for final analysis.

After all efficient combinations within each separate independent path were determined, a program was developed which computed all possible combinations based on the given dependency flowchart.

The program generated a total of 309 possible combinations of measures and computed the average annual AHAG and average annual cost of each combination of measures.

Step 4 - Eliminate Economically Inefficient Combinations. This step was completed in the above analysis for all combinable measures within each dependency path. The 309 possible combinations of "surviving" measures were then examined for economic efficiency and effectiveness. The combinations were sorted in ascending order by AHAG output and then by annual cost within equal output levels. The data was analyzed and inefficient combinations were eliminated. The method employed was the same as that used to eliminate inefficient combinations within dependency paths. All combinations that had equal or lower AHAG output for greater costs were eliminated as economically inefficient or ineffective.

Step 5 - Eliminate Economically Ineffective Combinations. See Step 4 discussed above.

Step 6 - Calculate and Display Incremental Costs. After all inefficient or ineffective combinations were eliminated (See Steps 4 and 5 above), 33 potentially economically efficient plans remained. The Incremental WHAG output, Incremental Annual Cost and Incremental Annual Cost per WHAG unit are displayed in Exhibit K-11. Exhibits K-12 and K-13 illustrate the Incremental Cost Curve and Average Cost Curve in graphical format.

Step 7 - Calculate Change in Unit Cost from No-Action Plan to All Other Plans. Again, in order to display a typical incremental cost curve, the data was smoothed at this point. The same methods applied to the WHAG data was applied to the AHAG data. The WHAG output was held constant at 546 units of output and the comparisons and recalculations were applied to the AHAG data. The same basis was utilized to choose the beginning point which was the plan which produced 546 WHAG units and provided 30 AHAG units.

Step 8 - Recalculate Change in Unit Cost From Last Selected Plan. The smoothing process was utilized within this analysis. See Exhibit K-14 for the analysis and outcome of the recalculations.

Step 9 - Tabulate and Display Incremental Costs of Selected Plans. Exhibit K-15 displays the Incremental Cost data for the plans which survived the smoothing process. Exhibit K-16 displays the information in graphical form. Please note that while the smoothed data, when graphically displayed, depicts the recognizable incremental cost curve, any one of the 33 plans in the previous step were determined to be efficient and effective.

Utilizing the recommended WHAG Plan (WHAG output is 546 units), the Minimum Average Cost AHAG Plan produces an AHAG output of -6 units at an annual cost of $157,100. However, after analyzing both the Incremental and Average Cost Curves (with WHAG output

held constant at 546 units), the Recommended WHAG and AHAG Plan was determined. The Recommended Plan also produces WHAG output of 546 units, however, it also produces an AHAG output of 129 units for a total average annual cost of $215,500. This plan is the most efficient plan for producing the 129 units of AHAG output given the 546 units of recommended WHAG output. The Recommended Plan results in a net increase of 135 AHAG units (129 with the Recommended Plan versus -6 AHAG units with the WHAG Efficient Plan) for an incremental cost of $58,400. After analyzing all data and the Incremental and Average Cost Curves, the Recommended Plan was determined to be economically efficient. The differences between

the WHAG Efficient Plan and the Recommended Plan are described in Exhibit K-17.

TABLE J-12. Net habitat benefits (in average annualized habitat units) for all target species and all management measures (and associated increments) at Calhoun Point. For fish data cells with two numbers separated by a slash, first number represents habitat units for resident fish, second for river fish capable of accessing interior of Calhoun Point. [Data for nontarget species not included.]

Management Measure (and Increments)	Net Change In Average Annualized Habitat Units																				
	Wildlife Evaluation Species												Total Wild-life	Fish Evaluation Species						Total Fish	Total Wildl life & Fish
	Mal	CaG	LeB	LeY	Mus	KIR	GrH	WoD	Bea	AmC	NoP	PrW		WhB	EmS	SmB	Wal	LaB	Blu		
A1 - Riverside dike/levee	20	22					20	-5			-18	51	90			27/-53			26/-47	-47	43
A2 - Riverside dike/levee	38	36					29	-10			-43	106	156			39/-51			39/-45	-18	138
A3 - Riverside dike/levee	48	43					36	-15			-53	119	178			48/-50			46/-44	0	178
A4 - Riverside dike/levee	55	50					40	-19			-63	130	193			53/-49			51/-44	11	204
A5 - Riverside dike/levee	20	22					18	-6			-18	39	75			27/-49			26/-42	-38	37
A6 - Riverside dike/levee	38	36					26	-14			-42	80	124			38/-47			38/-41	-12	112
A7 - Riverside dike/levee	47	43					32	-19			-52	88	139			47/-46			45/-40	4	143
A8 - Riverside dike/levee	55	50					35	-24			-63	95	148			52/-45			49/-40	16	164
A9 - Riverside dike/levee	20	22					18	-7			-19	41	75			27/-49			26/-42	-38	37
A10 - Riverside dike/levee	38	36					26	-11			-41	87	135			38/-47			38/-41	-12	123
A11 - Riverside dike/levee	47	43					32	-16			-51	97	152			47/-46			45/-40	6	158
A12 - Riverside dike/levee	55	50					35	-21			-61	105	163			52/-45			49/-40	16	179
A13 - Riverside dike/levee	20	22					20	-7			-21	45	79			27/-53			26/-47	-47	32
A14 - Riverside dike/levee	38	36					29	-12			-44	97	144			39/-51			39/-45	-18	126
A15 - Riverside dike/levee	48	43					36	-17			-55	108	163			48/-50			46/-44	0	163
A16 - Riverside dike/levee	55	50					40	-23			-66	116	172			53/-49			51/-44	11	183
B1 - Ext. Wtr. Cntrl. - Pohl.	0	1					1	0			0	0	2			26			24	50	52
B2 - Ext. Wtr. Cntrl. - Pohl.	0	1					1	0			0	0	2			26			24	50	52
B3 - Ext. Wtr. Cntrl. - Pohl.	0	1					1	0			0	0	2			26			24	50	52
C1 - Ext. Wtr. Cntrl. - Squa. wood duck mgmt.	0	0					0	1			0	0	1			0			1	1	2
C2 - Ext. Wtr. Cntrl. - Squa. wood duck mgmt.	0	0					0	1			0	0	1			0			0	0	1
C1R -Ext. Wtr. Cntrl. - Squa. GTR Mgmt.	19	0					1	1			2	1	24			0			1	1	25
C2R -Ext. Wtr. Cntrl. - Squa. GTR Mgmt.	19	0					1	1			2	1	24			0			0	0	24
D1 - Ext. Wtr. Cntrl. - Silv.	6	7					1	0			0	0	14			18			18	36	50
D2 - Ext. Wtr. Cntrl. - Silv.	7	6					1	0			0	0	14			0			0	0	14
E1 - Int. Wtr. Cntrl. - Silv.	4	4					-1	0			0	0	7			3			3	6	13
E2 - Int. Wtr. Cntrl. - Silv.	4	4					-1	0			0	0	7			0			0	0	7
F1 - Int. Wtr. Cntrl. - Roya.	8	5					-1	0			0	0	12			3			3	6	18

F2 - Int. Wtr. Cntrl. - Roya.	8	5					-1	0			0	0	12			0			0	0	12
H1 - Pumping - Silver	13	13					-1	0			0	0	25			0			0	0	25
H2 - Pumping - Silver	13	13					-1	0			0	0	25			0			0	0	25
I1 - Pumping - Squaw wood duck mgmt.	0	0					0	2			0	0	2			0			0	0	2
I2 - Pumping - Squaw wood duck mgmt.	0	0					0	2			0	0	2			0			0	0	2
I1R -Pumping - Squaw GTR mgmt.	19	0					1	1			0	1	22			0			0	0	22
I2R -Pumping - Squaw GTR mgmt.	19	0					1	1			0	1	22			0			0	0	22
J1 - Pumping - Goose Field	10	6					0	0			0	0	16			0			0	0	16
K1 - Dredging - Squaw	0	0					0	0			0	0	0			1/1			1/1	4	4
K2 - Dredging - Squaw	0	0					1	1			0	0	2			3/4			2/4	13	15
K3 - Dredging - Squaw	0	0					0	0			0	0	0			1/1			1/1	4	4
K4 - Dredging - Squaw	0	0					1	1			0	0	2			3/4			2/4	13	15
K5 - Dredging - Squaw	0	0					0	0			0	0	0			1/1			1/1	4	4
K6 - Dredging - Squaw	0	0					1	1			0	0	2			3/4			2/4	13	15
L1 - Dredging - Pohlman	0	0					0	0			0	0	0			9			5	16	16
L2 - Dredging - Pohlman	0	0					0	0			0	0	0			20			19	49	49
L3 - Dredging - Pohlman	0	0					0	0			0	0	0			9			5	16	16
L4 - Dredging - Pohlman	0	0					0	0			0	0	0			20			19	49	49
L5 - Dredging - Pohlman	0	0					0	0			0	0	0			9			5	16	16
L6 - Dredging - Pohlman	0	0					0	0			0	0	0			20			19	49	49
M1 - Pothole Excavation	1	0					5	2			0	0	8			0			0	0	8
M2 - Pothole Excavation	1	0					5	2			0	0	8			0			0	0	8
M3 - Pothole Excavation	0	0					3	2			0	0	5			0			0	0	5
M4 - Pothole Excavation	0	0					3	2			0	0	5			0			0	0	5
P1 - Levees - Goose Field	5	2					0	0			0	0	7			0			0	0	7
P2 - Levees - Goose Field	3	2					0	0			0	0	5			0			0	0	5
P3 - Levees - Goose Field	8	5					0	0			0	0	13			0			0	0	13
Q1 - Clear Woody Vegetation	27	26					22	0			0	0	75			0			0	0	75
Q2 - Clear Woody Vegetation	44	40					32	0			0	0	116			0			0	0	116
Q3 - Clear Woody Vegetation	68	67					54	0			0	0	189			0			0	0	189
R1 - Plant Trees - Disposal	0	0					0	13			15	8	36			0			0	0	36
R2 - Plant Trees - Cropfield	0	0					0	11			12	7	30			0			0	0	30
R3 - Plant Trees - Both	0	0					0	24			27	15	66			0			0	0	66

EXHIBIT K-2

GOVERNMENT ESTIMATE

COST EVALUATION OF VARIOUS ALTERNATIVE MEASURES

FOR

CALHOUN POINT HREP DPR

13 MAY 1994

US Army Corps
of Engineers

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities EL 422
Levee - RS & LS Alternatives
File:E:\CALHOUN\CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
LEVEE, RS ONLY (A1)				
Embankment	5,100	Cu.Yd.	2.75	14,025
Clearing	14.3	Ac.	1,980.00	28,314
Seeding	4.9	Ac.	1,320.00	6,468
Crushed Stone Acess Road	10,000	Ton	13.20	132,000
Real Estate Cost	Sum	Job		30,000
TOTAL				**$210,807**
LEVEE, W/LS 2-3, 4-5 (A5)				
Embankment	3,500	Cu.Yd.	2.75	9,625
Clearing	9.9	Ac.	1,980.00	19,602
Seeding	3.3	Ac.	1,320.00	4,356
Crushed Stone Access Road	10,800	Ton	13.20	142,560
TOTAL				**$176,143**
LEVEE, W/RS 1-3, LS 4-5 (A9)				
Embankment	3,475	Cu.Yd.	2.75	9,556
Clearing	10	Ac.	1,280.00	12,800
Seeding	3	Ac.	1,320.00	3,960
Crushed Stone Access Road	10,300	Ton	13.20	135,960
Real Estate Cost	Sum	Job		30,000
TOTAL				**$192,276**
LEVEE,W/LS 2-3, RS 4-5 (A13)				
Embankment	5,100	Cu.Yd.	2.75	14,025
Clearing	14.3	Ac.	1,980.00	28,314
Seeding	4.9	Ac.	1,320.00	6,468
Crushed Stone Access Road	10,500	Ton	13.20	138,600
TOTAL				**$187,407**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities EL 424
Levee - RS & LS Alternatives
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
LEVEE, RS ONLY (A2)				
Embankment	27,700	Cu.Yd.	2.75	76,175
Clearing	51	Ac.	1,980.00	100,980
Seeding	19	Ac.	1,320.00	25,080
Crushed Stone Acess Road	10,000	Ton	13.20	132,000
Real Estate Cost	Sum	Job		30,000
TOTAL				**$364,235**
LEVEE, W/LS 2-3, 4-5 (A6)				
Embankment	23,800	Cu.Yd.	2.75	65,450
Clearing	54	Ac.	1,980.00	106,920
Seeding	20	Ac.	1,320.00	26,400
Crushed Stone Access Road	10,800	Ton	13.20	142,560
TOTAL				**$341,330**
LEVEE, W/RS 1-3, LS 4-5 (A10)				
Embankment	23,500	Cu.Yd.	2.75	64,625
Clearing	52	Ac.	1,280.00	66,560
Seeding	19	Ac.	1,320.00	25,080
Crushed Stone Access Road	10,300	Ton	13.20	135,960
Real Estate Cost	Sum	Job		30,000
TOTAL				**$322,225**
LEVEE,W/LS 2-3, RS 4-5 (A14)				
Embankment	28,100	Cu.Yd.	2.75	77,275
Clearing	53.6	Ac.	1,980.00	106,128
Seeding	19.8	Ac.	1,320.00	26,136
Crushed Stone Access Road	10,500	Ton	13.20	138,600
TOTAL				**$348,139**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities EL 426
Levee - RS &LS Alternatives
File:CALHOUN.WB1

DATE: 18-May-9
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUN
LEVEE, RS ONLY (A3)				
Embankment	84,218	Cu.Yd.	2.75	231,600
Clearing	79.7	Ac.	1,980.00	157,806
Seeding	26.6	Ac.	1,320.00	35,112
Crushed Stone Acess Road	10,000	Ton	13.20	132,000
Real Estate Cost	Sum	Job		30,000
TOTAL				**$586,518**
LEVEE, W/LS 2-3, 4-5 (A7)				
Embankment	79,900	Cu.Yd.	2.75	219,725
Clearing	82.8	Ac.	1,980.00	163,944
Seeding	24.8	Ac.	1,320.00	32,736
Crushed Stone Access Road	10,800	Ton	13.20	142,560
TOTAL				**$558,965**
LEVEE, W/RS 1-3, LS 4-5 (A11)				
Embankment	77,500	Cu.Yd.	2.75	213,125
Clearing	79	Ac.	1,280.00	101,120
Seeding	23.5	Ac.	1,320.00	31,020
Crushed Stone Access Road	10,300	Ton	13.20	135,960
Real Estate Cost	Sum	Job		30,000
TOTAL				**$511,22**
LEVEE,W/LS 2-3, RS 4-5 (A15)				
Embankment	86,600	Cu.Yd.	2.75	238,150
Clearing	83.5	Ac.	1,980.00	165,330
Seeding	27.9	Ac.	1,320.00	36,82
Crushed Stone Access Road	10,500	Ton	13.20	138,60
TOTAL				**$578,90**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities EL 428
Levee-RS & LS Alternatives
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUN
LEVEE, RS ONLY (A4)				
Embankment	157,200	Cu.Yd.	2.75	432,300
Clearing	122.4	Ac.	1,980.00	242,352
Seeding	34.8	Ac.	1,320.00	45,936
Crushed Stone Acess Road	10,000	Ton	13.20	132,000
Real Estate Cost	Sum	Job		30,000
TOTAL				**$882,588**
LEVEE, W/LS 2-3, 4-5 (A8)				
Embankment	155,800	Cu.Yd.	2.75	428,450
Clearing	126.9	Ac.	1,980.00	251,262
Seeding	37.2	Ac.	1,320.00	49,104
Crushed Stone Access Road	10,800	Ton	13.20	142,560
TOTAL				**$871,376**
LEVEE, W/RS 1-3, LS 4-5 (A12)				
Embankment	153,300	Cu.Yd.	2.75	421,575
Clearing	123.1	Ac.	1,280.00	157,568
Seeding	35.8	Ac.	1,320.00	47,256
Crushed Stone Access Road	10,300	Ton	13.20	135,960
Real Estate Cost	Sum	Job		30,000
TOTAL				**$792,359**
LEVEE,W/LS 2-3, RS 4-5 (A16)				
Embankment	159,700	Cu.Yd.	2.75	439,175
Clearing	126.2	Ac.	1,980.00	249,876
Seeding	36.2	Ac.	1,320.00	47,784
Crushed Stone Access Road	10,500	Ton	13.20	138,600
TOTAL				**$875,435**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
OPTION B1,B2
File:CALHOUN.WB1

DATE: 18-May-9
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUN
OPTION B1 (=OLD C4)				
Concrete Stop Log 16' w/ Grate	sum	job		50,075
Gravity Drain, 1-42" CMP (w/sluice gate)	sum	job		44,068
Ditch Excavation (Hyd.)	30,800	Cu.Yd.	3.00	92,400
Seeding	5.8	Ac.	1,320.00	7,656
Clearing	6.1	Ac.	1,980.00	12,078
(Location 1)				
TOTAL				$206,277
OPTION B2 (=OLD C5)				
Concrete Stop Log 16' w/Grate	sum	job		50,075
Gravity Drain, 1-42" CMP (w/sluice gate)	sum	job		44,068
Ditch Excavation (Hyd.)	30,800	Cu.Yd.	3.00	92,400
Seeding	5.8	Ac.	1,320.00	7,656
Clearing	6.1	Ac.	1,980.00	12,078
(Location 2)				
TOTAL				$206,277

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
OPTION B3,C1,C2
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
OPTION B3 (=OLD C6)				
Concrete Stop Log 16' w/ Grate	sum	job		50,625
Gravity Drain, 1-42" CMP (w/sluice gate)	sum	job		43,300
Ditch Excavation (Hyd.)	35,700	Cu.Yd.	3.00	107,100
Seeding	5.8	Ac.	1,320.00	7,656
Clearing	6.1	Ac.	1,980.00	12,078
Conc. Stop Log 8' Open	sum	job		22,481
Remove Control Structure	sum	job		6,000
(location 5)				
TOTAL				$249,240
OPTION C1 (=OLD D2)				
Concrete Stop Log 16' w/Grate	sum	job		50,075
Gravity Drain 1-42" CMP (w/sluice gate)	sum	job		43,300
Ditch Excavation (Hyd.)	10,000	Cu.Yd.	3.00	30,000
Seeding	2.00	Ac.	1,320.00	2,640
Clearing	2.00	Ac.	1,980.00	3,960
(Location 3)				
TOTAL				$129,975
OPTION C2 (=OLD D4)				
Gravity Drain 1-42" CMP (w/sluice gate)	sum	job		43,300
Ditch Excavation (Hyd.)	10,000	Cu.Yd.	3.00	30,000
Seeding	2.00	Ac.	1,320.00	2,640
Clearing	2.00	Ac.	1,980.00	3,960
(Location 3)				
TOTAL				$79,900

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
OPTION D1,D2,E1,E2,F1,F2
File:CALHOUN.WB1

SHEET 7 OF 18
DATE: 18-May-9
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUN
OPTION D1 (=OLD E2)				
Concrete Stop Log 16' w/ Grate	sum	job		50,625
Gravity Drain, 2-42" CMP (w/sluice gate)	sum	job		86,550
Ditch Excavation (Hyd.)	21,500	Cu.Yd.	3.00	64,500
Seeding	4.80	Ac.	1,320.00	6,336
Clearing	4.40	Ac.	1,980.00	8,712
TOTAL				~~$15,048~~
				216,723
OPTION D2 (=OLD D4)				
Gravity Drain 2-42" CMP (w/sluice gate)	sum	job		86,550
Ditch Excavation (Hyd.)	21,500	Cu.Yd.	3.00	64,500
Seeding	4.80	Ac.	1,320.00	6,336
Clearing	4.40	Ac.	1,980.00	8,712
TOTAL				$166,098
OPTION E1 (=OLD F1)				
Conc. Stop Log 8'	sum	job		22,481
TOTAL				$22,481
OPTION E2 (=OLD F2)				
Gravity Drain, 1-42" CMP (with sluice gate)	sum	job		43,300
TOTAL				$43,300
OPTION F1 (=OLD G1)				
Conc. Stop Log 8' w/Grate	sum	job		23,831
Ditch Excavation (Land based)	7,000	Cu.Yd.	2.75	19,250
Seeding	2.50	Ac.	1,320.00	3,300
Clearing	2.00	Ac.	1,980.00	3,960
TOTAL				$50,341
OPTION F2 (=OLD G2)				
Gravity Drain , 1-42"CMP (w/sluice gate)	sum	job		43,300
Ditch Excavation (Land based)	7,000	Cu.Yd.	2.75	19,250
Seeding	2.50	Ac.	1,320.00	3,300
Clearing	2.00	Ac.	1,980.00	3,960
TOTAL				$69,810

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
OPTION H1, H2,I1,I2,J1,K1,K2,K3,K5,K4,K6
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUN
OPTION H1				
48000 Gpm Fixed Pumps	2	ea	110,000.00	220,000
Portable Drive Unit (251 HP)	1	ea	32,000.00	32,000
TOTAL				**$252,000**
OPTION H2				
48000 Gpm Portable Pump & Drive Unit	1	EA	142,000.00	142,000
TOTAL				**$142,000**
OPTION I1				
5000 Gpm Fixed Pumps	1	ea	6,000	6,000
Portable Drive Unit (25 HP.)	1	ea	8,000	8,000
TOTAL				**$14,000**
OPTION I2				
5000 Gpm Portable Pump & Drive Unit	1	ea	10,000	10,000
TOTAL				**$10,000**
OPTION J1				
5000 Gpm Portable Pump & Drive Unit	1	ea	10,000	10,000
TOTAL				**$10,000**
OPTION K1 (Hyd.)				
Excavation, Slough 10%	11800	Cu.Yd.	3.00	35,400
Seeding	3.4	Ac.	1,320.00	4,488
Clearing	5.6	Ac.	1,980.00	11,088
Embankment	5100	Cu.Yd.	2.75	14,025
TOTAL				**$65,001**
OPTION K2 (Hyd.)				
Excavation, Slough 40%	47300	Cu.Yd.	3.00	141,900
Seeding	5.1	Ac.	1,320.00	6,732
Clearing	18.4	Ac.	1,980.00	36,432
Embankment	10300	Cu.Yd.	2.75	28,325
TOTAL				**$213,389**
OPTION K3 & K5 (Mech.)				
Excavation, Slough 10%	11800	Cu.Yd.	6.00	70,800
Seeding	2.3	Ac.	1,320.00	3,036
Clearing	2.8	Ac.	1,980.00	5,544
TOTAL				**$79,380**
OPTION K4 & K6 (Mech.)				
Excavation, Slough 40%	47300	Cu.Yd.	6.00	28[illegible]
Seeding	9.3	Ac.	1,320.00	1[illegible]
Clearing	9.8	Ac.	1,980.00	19,404
TOTAL				**$315,48[illegible]**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
OPTION L1,L2,L3,L5,L4,L6
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
OPTION L1 (Hyd.)				
Excavation, Slough 10%	15100	Cu.Yd.	3.00	45,300
Embankment	6100	Cu.Yd.	2.75	16,775
Clearing	4.9	Ac.	1,980.00	9,702
Seeding	1.4	Ac.	1,320.00	1,848
TOTAL				**$73,625**
OPTION L2 (Hyd.)				
Excavation, Slough 40%	60500	Cu.Yd.	3.00	181,500
Embankment	12100	Cu.Yd.	2.75	33,275
Clearing	19.9	Ac.	1,980.00	39,402
Seeding	4	Ac.	1,320.00	5,280
TOTAL				**$259,457**
OPTION L3,L5 (Mech.)				
Excavation, Slough 10%	15100	Cu.Yd.	6.00	90,600
Clearing	3.4	Ac.	1,980.00	6,732
Seeding	2.9	Ac.	1,320.00	3,828
TOTAL				**$101,160**
OPTION L4,L6 (Mech.)				
Excavation, Slough 40%	60500	Cu.Yd.	6.00	363,000
Clearing	12.2	Ac.	1,980.00	24,156
Seeding	11.7	Ac.	1,320.00	15,444
TOTAL				**$402,600**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
OPTION M1,M3,N1,O1
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
OPTION M1,2 (Land based)				
Excavation	40,000	Cu.Yd.	2.00	80,000
Clearing	9.6	Ac.	1,980.00	19,008
Seeding	9		1,320.00	**$99,008**
TOTAL				
OPTION M3,4 (Land Based)				
Excavation	40000	Cu.Yd.	2.00	80,000
Excavation, Interconnect	28500	Cu.Yd.	2.00	57,000
Clearing	9.8	Ac.	1,980.00	19,404
Seeding	9.3	Ac.	1,320.00	12,276
TOTAL				**$168,680**

SUBJECT: Estimated Quantities
OPTION P1,P2,Q1,Q2,Q3,R1,R3,R4

DATE: 18-May-9
ESTIMATOR: DOMBI

File:CALHOUN.WB1

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUN
OPTION P1 (Land based)				
Embankment	3200	Cu.Yd.	2.75	8,80
Clearing	1.5	Ac.	1,980.00	2,97
Seeding	0.8	Ac.	1,320.00	1,05
Conc. Stoplog 3'Ft.	sum	job		12,00
TOTAL				**$24,82**
OPTION P2 (Land based)				
Embankment	600	Cu.Yd.	2.75	1,65
Clearing	0.4	Ac.	1,980.00	79
Seeding	0.2	Ac.	1,320.00	26
TOTAL				**$2,70**
OPTION P3				
Options P1 + P2				**$27,53**
OPTION Q1				
Vegetation Removal (2%)	34	Ac.	70.00	**$2,38**
OPTION Q2				
Vegetation Removal (5%)	84	Ac.	70.00	**$5,88**
OPTION Q3				
Vegetation Removal (10%)	109	Ac.	70.00	**$7,63**
OPTION R1				
Tree Planting	40	Ac.	340.00	**$13,60**
OPTION R3				
Tree Planting	33	Ac.	340.00	**$11,22**
OPTION R4				
Tree Planting	73	Ac.	340.00	**$24,82**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
GRAVITY DRAIN, 1-42" CMP
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
42"-DIA SLUICE GATED CULVERT				
42"-Dia Sluice Gate	1	Ea.	16,500.00	16,500
Excavation	530	Cu.Yd.	1.65	875
Semi-Complacted Fill	150	Cu.Yd.	2.50	375
3"-Minus Beding	340	Ton	16.50	5,610
6-Minus Beding	230	Ton	16.50	3,795
Graded C Stone	250	Ton	12.10	3,025
Geotextile	230	Sq.Yd.	4.40	1,012
42"-Dia CMP Pipe	84	Lin.Ft.	60.00	5,040
42"-Dia Metal End Section	2	Ea.	300.00	600
72"-Dia\ CMP Riser Pipe	12	Lin.Ft.	71.50	858
Cofferdam, Earth (inc.rem.)	660	Cu.Yd.	4.50	2,970
Concrete Slab, reinf.	3	Cu.Yd.	200.00	600
Ladder Fibergla\ss	12	Lin.Ft.	120.00	1,440
Grating, Fiberglass	30	Sq.Ft.	20.00	600
TOTAL				
TOTAL				$43,300

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
GRAVITY DRAIN, 2-42" CMP
File:CALHOUN.WB1

SHEET 13 OF 18
DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
42"-DIA SLUICED GATED CULVERT				
42"-Dia Sluice Gate	2	Ea.	16,500.00	33,000
Excavation	1030	Cu.Yd.	1.65	1,700
Semi-Complacted Fill	300	Cu.Yd.	2.50	750
3"-Minus Beding	680	Ton	16.50	11,220
6-Minus Beding	460	Ton	16.50	7,590
Graded C Stone	500	Ton	12.10	6,050
Geotextile	460	Sq.Yd.	4.40	2,024
42"-Dia CMP Pipe	168	Lin.Ft.	60.00	10,080
42"-Dia Metal End Section	4	Ea.	300.00	1,200
72"-Dia\ CMP Riser Pipe	24	Lin.Ft.	71.50	1,716
Cofferdam, Earth (inc.rem.)	1320	Cu.Yd.	4.50	5,940
Concrete Slab, reinf.	6	Cu.Yd.	200.00	1,200
Ladder Fibergla\ss	24	Lin.Ft.	120.00	2,880
Grating, Fiberglass	60	Sq.Ft.	20.00	1,200
TOTAL				$86,550

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
CONCRETE STOPLOG STRUCTURE 8'
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
CONCRETE STOPLOG STRUCTURE 8'				
Excavation	1080	Cu.Yd.	1.65	1,782
3"-Minus Beding	210	Ton	15.50	3,255
Graded C Stone	20	Ton	12.10	242
Geogrid	100	Sq.Yd.	11.00	1,100
Geotextile	210	Sq.Yd.	4.40	924
Cofferdam, Earth (inc.rem.)	1000	Cu.Yd.	4.50	4,500
Concrete (Structura\l)	23	Cu.Yd.	300.00	6,900
Reinforcing Steel	3020	Lbs	1.10	3,322
Stop Logs, 6" x12"	38	Lin.Ft.	12.00	456
TOTAL				**$22,481**
OPTION 1				
Bridge Conc. w/steel grating	3.4	Cu.Yd	300.00	1,020
Reinforcing Steel	300	Lbs	1.10	330
TOTAL				**$1,350**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: CALHOUN POINT DPR
SUBJECT: Estimated Quantities
CONCRETE STOPLOG STRUCTURE 16'
File:CALHOUN.WB1

DATE: 18-May-94
ESTIMATOR: DOMBI

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
CONCRETE STOPLOG STRUCTURE 16'				
Excavation	2100	Cu.Yd.	1.65	3,465
3"-Minus Beding	420	Ton	15.50	6,510
Graded C Stone	40	Ton	12.10	484
Geogrid	200	Sq.Yd.	11.00	2,200
Geotextile	420	Sq.Yd.	4.40	1,848
Cofferdam, Earth (inc.rem.)	2000	Cu.Yd.	4.50	9,000
Concrete (Structural)	46	Cu.Yd.	300.00	13,800
Reinforcing Steel	4040	Lbs	1.10	4,444
Stop Logs, 6" x12"	77	Lin.Ft.	12.00	924
TOTAL				$42,675
OPTION 1				
Steel Grate for Bridge	185	Sq.Ft.	40.00	7,400
Reinforcing Steel	500	Lbs.	1.10	550
TOTAL				$7,950
TOTAL				

GOVERNMENT ESTIMATE WORK SHEET

ESTIMATED OPERATION, MAINTENANCE AND REPLACEMENT COST
FOR PRELIMINARY OPTIONS

OPT-ION	OPERATING COST						MAINTENACE COST				REPLACEMENT COST				TOTAL EST. AMOUNT
	Years	Qty.	Unit	U.Price $	NOTE	Annualized Cost	Cost/Int.	Interval	NOTE	Annualized Cost	Cost/Int.	Interval	NOTE	Annualized Cost	
A-1							5,000	1 Year		5,000					$5,000
A-5							5,000	1 Year		5,000					$5,000
A-9							5,000	1 Year		5,000					$5,000
A-13							5,000	1 Year		5,000					$5,000
A-2							6,000	1 Year		6,000					$6,000
A-6							6,000	1 Year		6,000					$6,000
A-10							6,000	1 Year		6,000					$6,000
A-14							6,000	1 Year		6,000					$6,000
A-3							7,000	1 Year		7,000					$7,000
A-7							7,000	1 Year		7,000					$7,000
A-11							7,000	1 Year		7,000					$7,000
A-15							7,000	1 Year		7,000					$7,000
A-4							8,000	1 Year		8,000					$8,000
A-8							8,000	1 Year		8,000					$8,000
A-12							8,000	1 Year		8,000					$8,000
A-16							8,000	1 Year		8,000					$8,000
B1	Annual	12	Hrs.	25	Gate Operation	300	5,000	5 Year	Debris Removal, Painting		144,700	25 Years	Sluice gate, Grate, Appr.Chan. Exc.		$300
B2	Annual	12	Hrs.	25	Gate Operation	300	5,000	5 Year	Debris Removal, Painting		144,700	25 Years	Sluice gate, Grate, Appr.Chan. Exc.		$300
B3	Annual	12	Hrs.	25	Gate Operation	300	6,000	5 Year	Debris Removal, Painting		158,000	25 Years	Sluice gate, Grate, Appr.Chan. Exc		$300
C1	Annual	12	Hrs.	25	Gate Operation	300	4,000	5 Year	Debris Removal, Painting		23,900	25 Years	Sluice Gate ,Grate,Appr.Chan Exc.		$300
C2	Annual	12	Hrs.	25	Gate Operation	300	4,000	5 Year	Debris Removal, Painting		16,500	25 Years	Sluice Gate, Appr. Chan Ex		$300
D1	Annual	12	Hrs.	25	Gate Operation	300	6,000	5 Years	Debris Removal, Painting		33,000	25 Years	Sluice Gate, Appr. Chan Ex		$300
D2	Annual	12	Hrs	25	Gate Operation	300	6,000	5 Years	Debris Removal, Painting		33,000	25 Years	Sluice Gate, Appr. Chan Ex		$300

GOVERNMENT ESTIMATE WORK SHEET

ESTIMATED OPERATION, MAINTENANCE AND REPLACEMENT COST
FOR PRELIMINARY OPTIONS

OF i-ION	OPERATING COST						MAINTENACE COST				REPLACEMENT COST				TOTAL EST. AMOUNT
	Years	Qty.	Unit	U.Price $	NOTE	Annualize Cost	Cost/Int.	Interval	NOTE	Annualized Cost	Cost/Int.	Interval	NOTE	Annualized Cost	
E1	Annual	12	Hrs.	25	Gate Opration	300									$300
E2	Annual	12	Hrs.	25	Gate Operation	300									$300
F1	Annual	12	Hrs.	25	Gate Operation	300					19,250	25 Years	Appr.Channel Excavation		$300
F2	Annual	12	Hrs.	25	Gate Operation	300					19,250	25 Years	Appr.Channel Excavation		$300
H1(F)	Annual	576	Hrs.	5	Fuel Cost	2,880	5,000	5 Years	Debris Removal,& Maint.		252,000	25 Years			$2,880
H1(L)	Annual	204	Hrs.	18	Labor Cost	3,672									$3,672
H2(F)	Annual	576	Hrs.	5	Fuel Cost	2,880	3,000	5 Years	Debris Removal,& Maint.		142,000	25 Years			$2,880
H2(L)	Annual	204	Hrs.	18	Labor Cost	3,672									$3,672
I1(F)	Annual	576	Hrs.	2	Fuel Cost	1,152	3,000	5 Years	Debris Removal,& Maint.		14,000	25 Years			$1,152
I1 (L)	Annual	204	Hrs.	18	Labor Cost	3,672									$3,672
I2 (F)	Annual	576	Hrs.	2	Fuel Cost	1,152	500	5 Year	Debris Removal,& Maint.		10,000	25 Years			$1,152
I2 (L)	Annual	204	Hrs.	18	Labor Cost	3,672									$3,672
J1 (F)	Annual	576	Hrs.	2	Fuel Cost	1,152	500	5 Year	Debris Removal,& Maint.		10,000	25 Years			$1,152
J1 (L)	Annual	204	Hrs.	18	Labor Cost	3,672									$3,672
K1											65,001	25 Years	Redredging		$0
K2											213,389	25 Years	Redredging		$0
K3,K											79,380	25 Years	Redredging		$0
K4,K											315,480	25 Years	Redredging		$0
L1											73,625	25 Years	Redredging		$0
L2											259,457	25 Years	Redredging		$0
L3,L5											101,160	25 Years	Redredging		$0
L4,L6											402,600	25 Years	Redredging		$0

GOVERNMENT ESTIMATE WORK SHEET

ESTIMATED OPERATION, MAINTENANCE AND REPLACEMENT COST
FOR PRELIMINARY OPTIONS

OPTION	OPERATING COST						MAINTENACE COST				REPLACEMENT COST				TOTAL EST. AMOUNT
	Years	Qty.	Unit	U.Price $	NOTE	Annualize Cost	Cost/Int.	Interval	NOTE	Annualized Cost	Cost/Int.	Interval	NOTE	Annualized Cost	
M1,2											110,888	25 Years	Re-excavate		$0
M3,4											168,680	25 Years	Re-excavate		$0
Q1											2,380	5 Years	Remove Vegetation		$0
Q2											5,880	5 Years	Remove Vegetation		$0
Q3											7,630	5 Years	Remove Vegetation		$0
R1							4,800	Annual	Grass Cutting	4,800					$4,800
R2							3,000	Annual	Grass Cutting	3,000					$3,000-
R3							7,300	Annual	Grass Cutting	7,300					$7,300
P1					Per D. Gates	300									
P2						300									
P3						300									

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

MEASURES	A1	A5	A9	A13	A2	A6	A10	A14	A3
AA WHAG	90	75	75	79	156	124	135	144	178
AA AHAG	-47	-38	-38	-47	-18	-12	-12	-18	0
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-309886	-258930	-282646	-275488	-535425	-501755	-473671	-511764	-862181
1999	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2000	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2001	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2002	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2003	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2004	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2005	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2006	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2007	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2008	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2009	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2010	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2011	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2012	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2013	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2014	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2015	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2016	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2017	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2018	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2019	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2020	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2021	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2022	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2023	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2024	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2025	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2026	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2027	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2028	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2029	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2030	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2031	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2032	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2033	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2034	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2035	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2036	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2037	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2038	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2039	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2040	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2041	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2042	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2043	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2044	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2045	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2046	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
2047	-5000	-5000	-5000	-5000	-6000	-6000	-6000	-6000	-7000
PRESENT VALUE OF COST STREAM	-372700	-321800	-345500	-338300	-610800	-577200	-549100	-587200	-950200
AVG ANN COST	-29600	-25600	-27400	-26900	-48500	-45800	-43600	-46600	-75400
AVG ANN COST PER WHAG	-329	-341	-365	-341	-311	-369	-323	-324	-424

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

MEASURES	A7	A11	A15	A4	A8	A12	A16	B1	B2
AA WHAG	139	152	163	193	148	163	172	2	2
AA AHAG	4	6	0	11	16	16	11	50	50
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-821679	-751501	-850995	-1297404	-1280923	-1164768	-1286889	-303227	-303227
1999	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2000	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2001	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2002	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2003	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2004	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2005	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2006	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2007	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2008	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2009	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2010	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2011	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2012	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2013	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2014	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2015	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2016	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2017	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2018	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2019	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2020	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2021	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2022	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2023	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-186175	-186175
2024	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2025	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2026	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2027	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2028	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2029	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2030	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2031	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2032	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2033	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2034	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2035	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2036	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2037	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2038	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2039	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2040	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2041	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2042	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2043	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-5300	-5300
2044	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2045	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2046	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
2047	-7000	-7000	-7000	-8000	-8000	-8000	-8000	-300	-300
PRESENT VALUE OF COST STREAM	-909700	-839500	-939000	-1398000	-1381500	-1265300	-1387500	-345700	-345700
AVG ANN COST	-72200	-66700	-74600	-111000	-109700	-100500	-110200	-27400	-27400
AVG ANN COST PER WHAG	-519	-439	-458	-575	-741	-617	-641	-13700	-13700

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

MEASURES	B3	C1	C2	C1(R)	C2(R)	D1	D2	E1	E2
AA WHAG	2	1	1	24	24	14	14	7	7
AA AHAG	50	1	0	1	0	36	0	6	0
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-366383	-191063	-117453	-191063	-117453	-318583	-244164	33047	-63651
1999	-300	-300	-300	-300	-300	-300	-300	-300	-300
2000	-300	-300	-300	-300	-300	-300	-300	-300	-300
2001	-300	-300	-300	-300	-300	-300	-300	-300	-300
2002	-300	-300	-300	-300	-300	-300	-300	-300	-300
2003	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2004	-300	-300	-300	-300	-300	-300	-300	-300	-300
2005	-300	-300	-300	-300	-300	-300	-300	-300	-300
2006	-300	-300	-300	-300	-300	-300	-300	-300	-300
2007	-300	-300	-300	-300	-300	-300	-300	-300	-300
2008	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2009	-300	-300	-300	-300	-300	-300	-300	-300	-300
2010	-300	-300	-300	-300	-300	-300	-300	-300	-300
2011	-300	-300	-300	-300	-300	-300	-300	-300	-300
2012	-300	-300	-300	-300	-300	-300	-300	-300	-300
2013	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2014	-300	-300	-300	-300	-300	-300	-300	-300	-300
2015	-300	-300	-300	-300	-300	-300	-300	-300	-300
2016	-300	-300	-300	-300	-300	-300	-300	-300	-300
2017	-300	-300	-300	-300	-300	-300	-300	-300	-300
2018	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2019	-300	-300	-300	-300	-300	-300	-300	-300	-300
2020	-300	-300	-300	-300	-300	-300	-300	-300	-300
2021	-300	-300	-300	-300	-300	-300	-300	-300	-300
2022	-300	-300	-300	-300	-300	-300	-300	-300	-300
2023	-203800	-34175	-24925	-34175	-24925	-47550	-47550	-24363	-24363
2024	-300	-300	-300	-300	-300	-300	-300	-300	-300
2025	-300	-300	-300	-300	-300	-300	-300	-300	-300
2026	-300	-300	-300	-300	-300	-300	-300	-300	-300
2027	-300	-300	-300	-300	-300	-300	-300	-300	-300
2028	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2029	-300	-300	-300	-300	-300	-300	-300	-300	-300
2030	-300	-300	-300	-300	-300	-300	-300	-300	-300
2031	-300	-300	-300	-300	-300	-300	-300	-300	-300
2032	-300	-300	-300	-300	-300	-300	-300	-300	-300
2033	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2034	-300	-300	-300	-300	-300	-300	-300	-300	-300
2035	-300	-300	-300	-300	-300	-300	-300	-300	-300
2036	-300	-300	-300	-300	-300	-300	-300	-300	-300
2037	-300	-300	-300	-300	-300	-300	-300	-300	-300
2038	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2039	-300	-300	-300	-300	-300	-300	-300	-300	-300
2040	-300	-300	-300	-300	-300	-300	-300	-300	-300
2041	-300	-300	-300	-300	-300	-300	-300	-300	-300
2042	-300	-300	-300	-300	-300	-300	-300	-300	-300
2043	-6300	-4300	-4300	-4300	-4300	-6300	-6300	-300	-300
2044	-300	-300	-300	-300	-300	-300	-300	-300	-300
2045	-300	-300	-300	-300	-300	-300	-300	-300	-300
2046	-300	-300	-300	-300	-300	-300	-300	-300	-300
2047	-300	-300	-300	-300	-300	-300	-300	-300	-300
PRESENT VALUE OF COST STREAM	-413500	-208000	-132900	-208000	-132900	-341500	-267100	25600	-71100
AVG ANN COST	-32800	-16500	-10600	-16500	-10600	-27100	-21200	2000	-5600
AVG ANN COST PER WHAG	-16400	-16500	-10600	-688	-442	-1936	-1514	286	-800

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

MEASURES	F1	F2	H1	H2	I1	I2	I1(R)	I2(R)	J1
AA WHAG	12	12	25	25	2	2	22	22	16
AA AHAG	6	0	0	0	0	0	0	0	0
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-74001	-102621	-370440	-208740	-20580	-14700	-20580	-14700	-14700
1999	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2000	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2001	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2002	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2003	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2004	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2005	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2006	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2007	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2008	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2009	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2010	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2011	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2012	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2013	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2014	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2015	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2016	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2017	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2018	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2019	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2020	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2021	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2022	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2023	-24363	-24363	-326552	-187052	-25324	-17824	-25324	-17824	-17824
2024	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2025	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2026	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2027	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2028	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2029	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2030	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2031	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2032	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2033	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2034	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2035	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2036	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2037	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2038	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2039	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2040	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2041	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2042	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2043	-300	-300	-11552	-9552	-7824	-5324	-7824	-5324	-5324
2044	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2045	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2046	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
2047	-300	-300	-6552	-6552	-4824	-4824	-4824	-4824	-4824
PRESENT VALUE OF COST STREAM	-81500	-110100	-512200	-325000	-90300	-78300	-90300	-78300	-78300
AVG ANN COST	-6500	-8700	-40700	-25800	-7200	-6200	-7200	-6200	-6200
AVG ANN COST PER WHAG	-542	-725	-1628	-1032	-3600	-3100	-327	-282	-388

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

MEASURES	K1	K2	K3	K4	K5	K6	L1	L2	L3
AA WHAG	0	2	0	2	0	2	0	0	0
AA AHAG	4	13	4	13	4	13	16	49	16
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-95551	-313682	-116689	-463756	-116689	-463756	-108229	-381402	-148705
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0
2023	-81251	-266736	-99225	-394350	-99225	-394350	-92031	-324321	-126450
2024	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0	0
2036	0	0	0	0	0	0	0	0	0
2037	0	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0	0
2041	0	0	0	0	0	0	0	0	0
2042	0	0	0	0	0	0	0	0	0
2043	0	0	0	0	0	0	0	0	0
2044	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0	0
PRESENT VALUE OF COST STREAM	-108100	-355000	-132000	-524800	-132000	-524800	-122500	-431600	-168300
AVG ANN COST	-8600	-28200	-10500	-41700	-10500	-41700	-9700	-34300	-13400
AVG ANN COST PER WHAG	NO WHAG	-14100	NO WHAG	-20850	NO WHAG	-20850	NO WHAG	NO WHAG	NO WHAG

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

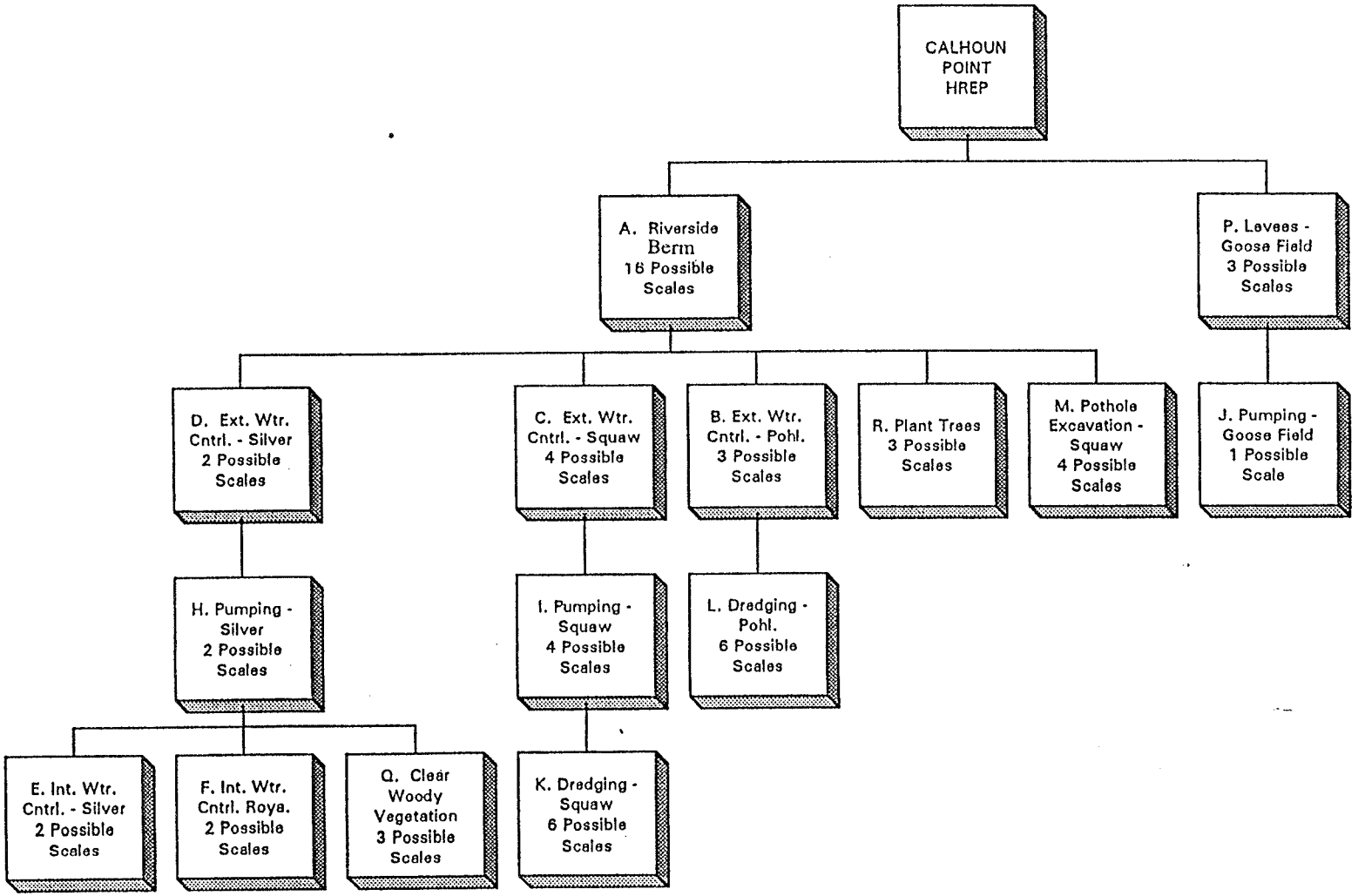
MEASURES	L4	L5	L6	M1	M2	M3	M4	P1	P2
AA WHAG	0	0	0	8	8	5	5	7	5
AA AHAG	49	16	49	0	0	0	0	0	0
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-591822	-148705	-591822	-145542	145542	247960	-247960	-36494	-36494
1999	0	0	0	0	0	0	0	-300	-300
2000	0	0	0	0	0	0	0	-300	-300
2001	0	0	0	0	0	0	0	-300	-300
2002	0	0	0	0	0	0	0	-300	-300
2003	0	0	0	0	0	0	0	-300	-300
2004	0	0	0	0	0	0	0	-300	-300
2005	0	0	0	0	0	0	0	-300	-300
2006	0	0	0	0	0	0	0	-300	-300
2007	0	0	0	0	0	0	0	-300	-300
2008	0	0	0	0	0	0	0	-300	-300
2009	0	0	0	0	0	0	0	-300	-300
2010	0	0	0	0	0	0	0	-300	-300
2011	0	0	0	0	0	0	0	-300	-300
2012	0	0	0	0	0	0	0	-300	-300
2013	0	0	0	0	0	0	0	-300	-300
2014	0	0	0	0	0	0	0	-300	-300
2015	0	0	0	0	0	0	0	-300	-300
2016	0	0	0	0	0	0	0	-300	-300
2017	0	0	0	0	0	0	0	-300	-300
2018	0	0	0	0	0	0	0	-300	-300
2019	0	0	0	0	0	0	0	-300	-300
2020	0	0	0	0	0	0	0	-300	-300
2021	0	0	0	0	0	0	0	-300	-300
2022	0	0	0	0	0	0	0	-300	-300
2023	-503250	-126450	-503250	-138610	-138610	-210850	-210850	-300	-300
2024	0	0	0	0	0	0	0	-300	-300
2025	0	0	0	0	0	0	0	-300	-300
2026	0	0	0	0	0	0	0	-300	-300
2027	0	0	0	0	0	0	0	-300	-300
2028	0	0	0	0	0	0	0	-300	-300
2029	0	0	0	0	0	0	0	-300	-300
2030	0	0	0	0	0	0	0	-300	-300
2031	0	0	0	0	0	0	0	-300	-300
2032	0	0	0	0	0	0	0	-300	-300
2033	0	0	0	0	0	0	0	-300	-300
2034	0	0	0	0	0	0	0	-300	-300
2035	0	0	0	0	0	0	0	-300	-300
2036	0	0	0	0	0	0	0	-300	-300
2037	0	0	0	0	0	0	0	-300	-300
2038	0	0	0	0	0	0	0	-300	-300
2039	0	0	0	0	0	0	0	-300	-300
2040	0	0	0	0	0	0	0	-300	-300
2041	0	0	0	0	0	0	0	-300	-300
2042	0	0	0	0	0	0	0	-300	-300
2043	0	0	0	0	0	0	0	-300	-300
2044	0	0	0	0	0	0	0	-300	-300
2045	0	0	0	0	0	0	0	-300	-300
2046	0	0	0	0	0	0	0	-300	-300
2047	0	0	0	0	0	0	0	-300	-300
PRESENT VALUE OF COST STREAM	-669700	-168300	-669700	-167000	124100	215300	-280600	-40300	-40300
AVG ANN COST	-53200	-13400	-53200	-13300	9900	17100	-22300	-3200	-3200
AVG ANN COST PER WHAG	NO WHAG	NO WHAG	NO WHAG	-1663	1238	3420	-4460	-457	-640

CALHOUN POINT DPR
COST ANALYSIS
1994 PRICE LEVEL
50 YEARS, 7.75% INTEREST

MEASURES	P3	Q1	Q2	Q3	R1	R2	R3
AA WHAG	13	75	116	189	36	30	66
AA AHAG	0	0	0	0	0	0	0
YEAR	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS	COSTS
1998	-72988	-3499	-8644	-11216	-19992	-16493	-36485
1999	-300	0	0	0	-4800	-3000	-7300
2000	-300	0	0	0	-4800	-3000	-7300
2001	-300	0	0	0	-4800	-3000	-7300
2002	-300	0	0	0	-4800	-3000	-7300
2003	-300	-2380	-5880	-7630	-4800	-3000	-7300
2004	-300	0	0	0	-4800	-3000	-7300
2005	-300	0	0	0	-4800	-3000	-7300
2006	-300	0	0	0	-4800	-3000	-7300
2007	-300	0	0	0	-4800	-3000	-7300
2008	-300	-2380	-5880	-7630	-4800	-3000	-7300
2009	-300	0	0	0	-4800	-3000	-7300
2010	-300	0	0	0	-4800	-3000	-7300
2011	-300	0	0	0	-4800	-3000	-7300
2012	-300	0	0	0	-4800	-3000	-7300
2013	-300	-2380	-5880	-7630	-4800	-3000	-7300
2014	-300	0	0	0	-4800	-3000	-7300
2015	-300	0	0	0	-4800	-3000	-7300
2016	-300	0	0	0	-4800	-3000	-7300
2017	-300	0	0	0	-4800	-3000	-7300
2018	-300	-2380	-5880	-7630	-4800	-3000	-7300
2019	-300	0	0	0	-4800	-3000	-7300
2020	-300	0	0	0	-4800	-3000	-7300
2021	-300	0	0	0	-4800	-3000	-7300
2022	-300	0	0	0	-4800	-3000	-7300
2023	-300	-2380	-5880	-7630	-4800	-3000	-7300
2024	-300	0	0	0	-4800	-3000	-7300
2025	-300	0	0	0	-4800	-3000	-7300
2026	-300	0	0	0	-4800	-3000	-7300
2027	-300	0	0	0	-4800	-3000	-7300
2028	-300	-2380	-5880	-7630	-4800	-3000	-7300
2029	-300	0	0	0	-4800	-3000	-7300
2030	-300	0	0	0	-4800	-3000	-7300
2031	-300	0	0	0	-4800	-3000	-7300
2032	-300	0	0	0	-4800	-3000	-7300
2033	-300	-2380	-5880	-7630	-4800	-3000	-7300
2034	-300	0	0	0	-4800	-3000	-7300
2035	-300	0	0	0	-4800	-3000	-7300
2036	-300	0	0	0	-4800	-3000	-7300
2037	-300	0	0	0	-4800	-3000	-7300
2038	-300	-2380	-5880	-7630	-4800	-3000	-7300
2039	-300	0	0	0	-4800	-3000	-7300
2040	-300	0	0	0	-4800	-3000	-7300
2041	-300	0	0	0	-4800	-3000	-7300
2042	-300	0	0	0	-4800	-3000	-7300
2043	-300	-2380	-5880	-7630	-4800	-3000	-7300
2044	-300	0	0	0	-4800	-3000	-7300
2045	-300	0	0	0	-4800	-3000	-7300
2046	-300	0	0	0	-4800	-3000	-7300
2047	-300	0	0	0	-4800	-3000	-7300
PRESENT VALUE OF COST STREAM	-76800	-8600	-21200	-27500	-80300	-54200	-128200
AVG ANN COST	-6100	-700	-1700	-2200	-6400	-4300	-10200
AVG ANN COST PER WHAG	-469	-9	-15	-12	-178	-143	-155

EXHIBIT K-4 - DEPENDENCY OF MEASURES

FOR INCLUSION IN POTENTIAL PLANS



Note: Prior to inclusion of any measure, preceding measures (in a given path) must first be incorporated.

EXHIBIT K-5

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	AVG COST/ WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
7	3200	7	3200	457	457	0	0	0	0	0	0	1
13	6100	6	2900	483	469	0	0	0	0	0	0	2
23	9400	10	3300	330	409	0	0	0	0	0	0	3
29	12300	6	2900	483	424	0	0	0	0	0	0	4
75	25600	46	13300	289	341	1	0	0	0	0	0	0
79	26900	4	1300	325	341	2	0	0	0	0	0	0
82	28800	3	1900	633	351	1	0	0	0	0	0	1
90	29600	8	800	100	329	3	0	0	0	0	0	0
105	29900	15	300	20	285	1	0	0	0	2	0	0
109	31200	4	1300	325	286	2	0	0	0	2	0	0
111	32000	2	800	400	288	1	0	0	0	1	0	0
112	33100	1	1100	1100	296	1	0	0	0	2	0	1
115	33300	3	200	67	290	2	0	0	0	1	0	0
120	33900	5	600	120	283	3	0	0	0	2	0	0
141	35800	21	1900	90	254	1	0	0	0	3	0	0
145	37100	4	1300	325	256	2	0	0	0	3	0	0
148	39000	3	1900	633	264	1	0	0	0	3	0	1
156	39800	8	800	100	255	3	0	0	0	3	0	0
163	43000	7	3200	457	264	3	0	0	0	3	0	1
164	45200	1	2200	2200	276	1	0	0	0	3	0	2
169	45900	5	700	140	272	3	0	0	0	3	0	3
170	48100	1	2200	2200	283	1	0	0	0	3	0	4
179	49200	9	1100	122	275	3	0	0	0	3	0	3
180	50400	1	1200	1200	280	3	0	1	0	3	0	0
185	52100	5	1700	340	282	3	0	0	0	3	0	4
187	52600	2	500	250	281	1	0	2	0	3	0	1
201	53800	14	1200	86	268	4	0	0	0	3	0	0
202	56600	1	2800	2800	280	3	0	2	0	3	0	0
210	56800	8	200	25	270	5	0	0	0	3	0	0
222	58700	12	1900	158	264	6	0	0	0	3	0	0
229	61900	7	3200	457	270	6	0	0	0	3	0	1
235	64800	6	2900	483	276	6	0	0	0	3	0	2
245	68100	10	3300	330	278	6	0	0	0	3	0	3
246	69300	1	1200	1200	282	6	0	1	0	3	0	0
247	70600	1	1300	1300	286	4	0	2	0	3	0	0
251	71000	4	400	100	283	6	0	0	0	3	0	4
253	72500	2	1500	750	287	6	0	1	0	3	0	1
256	73600	3	1100	367	288	5	0	2	0	3	0	0
303	74800	47	1200	26	247	1	5	0	0	0	0	0

EXHIBIT K-5

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	AVG COST/ WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
307	76100	4	1300	325	248	2	5	0	0	0	0	0
310	78000	3	1900	633	252	1	5	0	0	0	0	1
318	78800	8	800	100	248	3	5	0	0	0	0	0
333	79100	15	300	20	238	1	5	0	0	2	0	0
337	80400	4	1300	325	239	2	5	0	0	2	0	0
339	81200	2	800	400	240	1	5	0	0	1	0	0
340	82300	1	1100	1100	242	1	5	0	0	2	0	1
343	82500	3	200	67	241	2	5	0	0	1	0	0
348	83100	5	600	120	239	3	5	0	0	2	0	0
369	85000	21	1900	90	230	1	5	0	0	3	0	0
373	86300	4	1300	325	231	2	5	0	0	3	0	0
376	88200	3	1900	633	235	1	5	0	0	3	0	1
384	89000	8	800	100	232	3	5	0	0	3	0	0
391	92200	7	3200	457	236	3	5	0	0	3	0	1
392	94400	1	2200	2200	241	1	5	0	0	3	0	3
397	95100	5	700	140	240	3	5	0	0	3	0	2
398	95400	1	300	300	240	3	6	0	0	3	0	1
399	97600	1	2200	2200	245	1	6	0	0	3	0	3
404	98300	5	700	140	243	3	6	0	0	3	0	2
407	98400	3	100	33	242	3	5	0	0	3	0	3
408	99600	1	1200	1200	244	3	5	1	0	3	0	0
413	101300	5	1700	340	245	3	5	0	0	3	0	4
414	101600	1	300	300	245	3	6	0	0	3	0	3
415	101800	1	200	200	245	1	5	2	0	3	0	0
429	103000	14	1200	86	240	4	5	0	0	3	0	0
430	105800	1	2800	2800	246	3	5	2	0	3	0	0
438	106000	8	200	25	242	5	5	0	0	3	0	0
450	107900	12	1900	158	240	6	5	0	0	3	0	0
457	111100	7	3200	457	243	6	5	0	0	3	0	1
463	114000	6	2900	483	246	6	5	0	0	3	0	2
464	114300	1	300	300	246	6	6	0	0	3	0	1
470	117200	6	2900	483	249	6	6	0	0	3	0	2
473	117300	3	100	33	248	6	5	0	0	3	0	3
474	118500	1	1200	1200	250	6	5	1	0	3	0	0
475	119800	1	1300	1300	252	4	5	2	0	3	0	0
479	120200	4	400	100	251	6	5	0	0	3	0	4
480	120500	1	300	300	251	6	6	0	0	3	0	3
481	121700	1	1200	1200	253	6	5	1	0	3	0	1
484	122800	3	1100	367	254	5	5	2	0	3	0	0

EXHIBIT K-5

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	AVG COST/ WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
486	123400	2	600	300	254	6	6	0	0	3	0	4
487	124600	1	1200	1200	256	6	5	1	0	3	0	2
496	124700	9	100	11	251	6	5	2	0	3	0	0
503	127900	7	3200	457	254	6	5	2	0	3	0	1
509	130800	6	2900	483	257	6	5	2	0	3	0	2
510	131100	1	300	300	257	6	6	2	0	3	0	1
516	134000	6	2900	483	260	6	6	2	0	3	0	2
519	134100	3	100	33	258	6	5	2	0	3	0	3
525	137000	6	2900	483	261	6	5	2	0	3	0	4
526	137300	1	300	300	261	6	6	2	0	3	0	3
532	140200	6	2900	483	264	6	6	2	0	3	0	4
537	143500	5	3300	660	267	6	7	2	0	3	0	4
538	143800	1	300	300	267	6	8	2	0	3	0	3
544	146700	6	2900	483	270	6	8	2	0	3	0	4
545	156800	1	10100	10100	288	6	7	2	0	3	1	4
546	157100	1	300	300	288	6	8	2	0	3	1	3
552	160000	6	2900	483	290	6	8	2	0	3	1	4
554	167100	2	7100	3550	302	8	6	2	0	3	0	4
559	170400	5	3300	660	305	8	7	2	0	3	0	4
560	170700	1	300	300	305	8	8	2	0	3	0	3
566	173600	6	2900	483	307	8	8	2	0	3	0	4
567	183700	1	10100	10100	324	8	7	2	0	3	1	4
568	184000	1	300	300	324	8	8	2	0	3	1	3
574	186900	6	2900	483	326	8	8	2	0	3	1	4
575	206300	1	19400	19400	359	9	8	2	0	3	0	3
581	209200	6	2900	483	360	9	8	2	0	3	0	4
582	219300	1	10100	10100	377	9	7	2	0	3	1	4
583	219600	1	300	300	377	9	8	2	0	3	1	3
589	222500	6	2900	483	378	9	8	2	0	3	1	4
591	249900	2	27400	13700	423	9	8	2	1	3	1	4
593	278100	2	28200	14100	469	9	8	3	1	3	1	4

EXHIBIT K-6

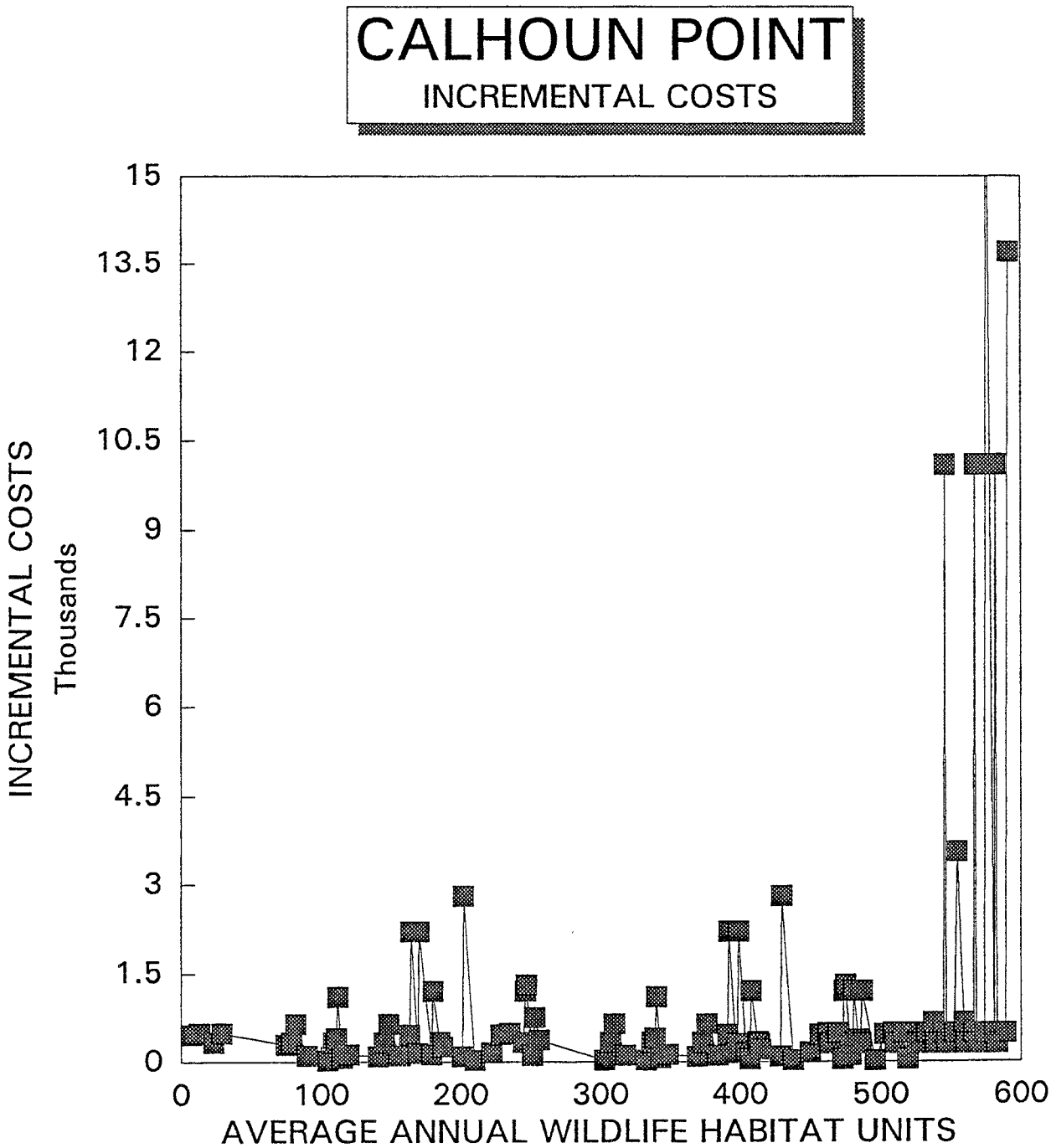

CALHOUN POINT
INCREMENTAL COSTS
INCREMENTAL COSTS
Thousands
15
13.5
12
10.5
9
7.5
6
4.5
3
1.5
0
0
100
200
300
400
500
600
AVERAGE ANNUAL WILDLIFE HABITAT UNITS

EXHIBIT K-7

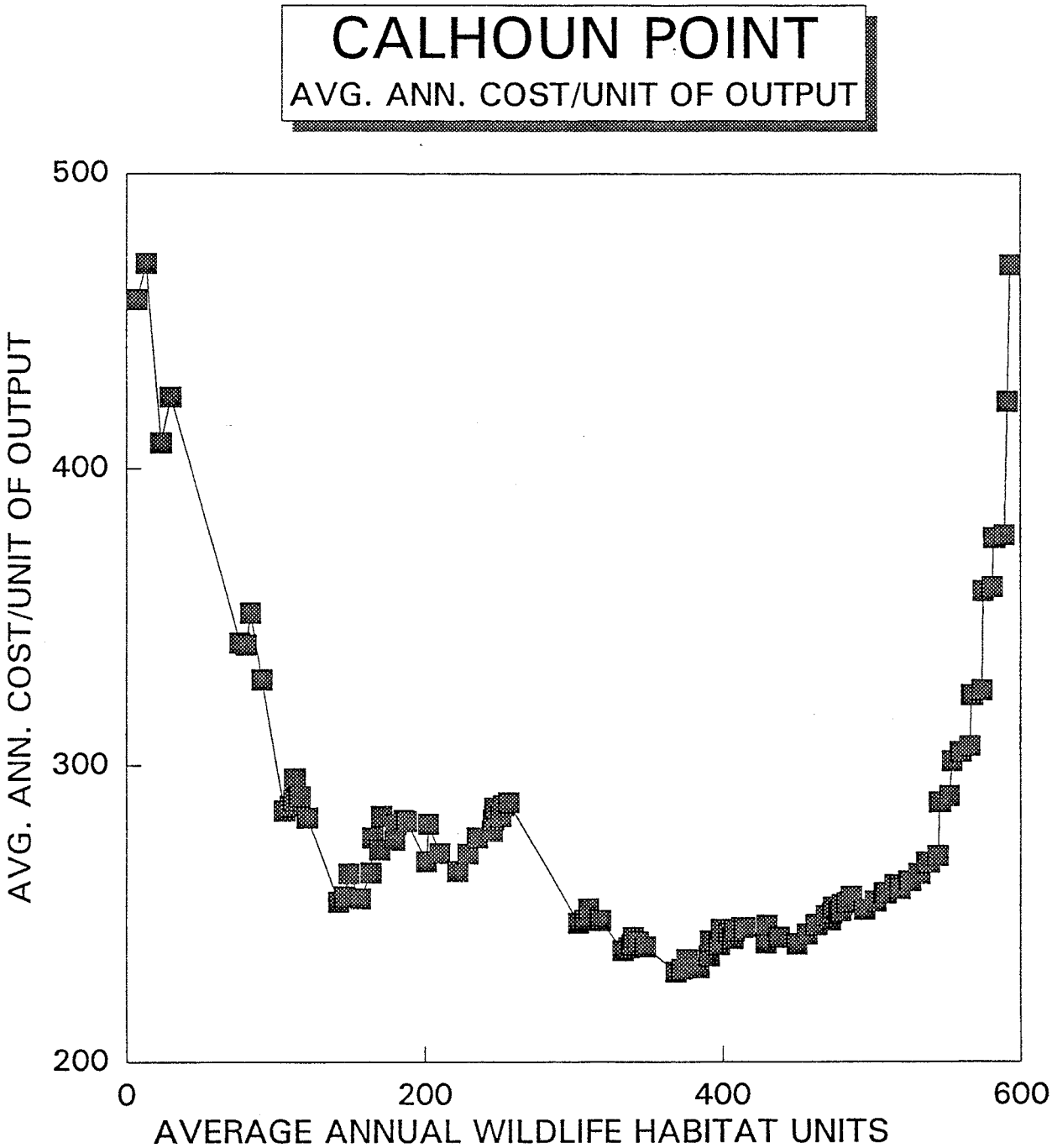

CALHOUN POINT
AVG. ANN. COST/UNIT OF OUTPUT
500
400
300
200
AVG. ANN. COST/UNIT OF OUTPUT
0
200
400
600
AVERAGE ANNUAL WILDLIFE HABITAT UNITS

EXHIBIT K-8

1ST RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
0	0	0	0	0	0	0	0	0	0	0	0
7	3200	7	3200	457	0	0	0	0	0	0	1
13	6100	13	6100	469	0	0	0	0	0	0	2
23	9400	23	9400	409	0	0	0	0	0	0	3
29	12300	29	12300	424	0	0	0	0	0	0	4
75	25600	75	25600	341	1	0	0	0	0	0	0
79	26900	79	26900	341	2	0	0	0	0	0	0
82	28800	82	28800	351	1	0	0	0	0	0	1
90	29600	90	29600	329	3	0	0	0	0	0	0
105	29900	105	29900	285	1	0	0	0	2	0	0
109	31200	109	31200	286	2	0	0	0	2	0	0
111	32000	111	32000	288	1	0	0	0	1	0	0
112	33100	112	33100	296	1	0	0	0	2	0	1
115	33300	115	33300	290	2	0	0	0	1	0	0
120	33900	120	33900	283	3	0	0	0	2	0	0
141	35800	141	35800	254	1	0	0	0	3	0	0
145	37100	145	37100	256	2	0	0	0	3	0	0
148	39000	148	39000	264	1	0	0	0	3	0	1
156	39800	156	39800	255	3	0	0	0	3	0	0
163	43000	163	43000	264	3	0	0	0	3	0	1
164	45200	164	45200	276	1	0	0	0	3	0	2
169	45900	169	45900	272	3	0	0	0	3	0	3
170	48100	170	48100	283	1	0	0	0	3	0	4
179	49200	179	49200	275	3	0	0	0	3	0	3
180	50400	180	50400	280	3	0	1	0	3	0	4
185	52100	185	52100	282	3	0	0	0	3	0	1
187	52600	187	52600	281	1	0	2	0	3	0	1
201	53800	201	53800	268	4	0	0	0	3	0	0
202	56600	202	56600	280	3	0	2	0	3	0	0
210	56800	210	56800	270	5	0	0	0	3	0	0
222	58700	222	58700	264	6	0	0	0	3	0	0
229	61900	229	61900	270	6	0	0	0	3	0	1
235	64800	235	64800	276	6	0	0	0	3	0	2
245	68100	245	68100	278	6	0	0	0	3	0	3
246	69300	246	69300	282	6	0	1	0	3	0	0
247	70600	247	70600	286	4	0	2	0	3	0	0
251	71000	251	71000	283	6	0	0	0	3	0	4

EXHIBIT K-8

253	72500	253	72500	287	6	0	1	0	3	0	1
256	73600	256	73600	288	5	0	2	0	3	0	0
303	74800	303	74800	247	1	5	0	0	0	0	0
307	76100	307	76100	248	2	5	0	0	0	0	0
310	78000	310	78000	252	1	5	0	0	0	0	1
318	78800	318	78800	248	3	5	0	0	0	0	0
333	79100	333	79100	238	1	5	0	0	2	0	0
337	80400	337	80400	239	2	5	0	0	2	0	0
339	81200	339	81200	240	1	5	0	0	1	0	0
340	82300	340	82300	242	1	5	0	0	2	0	1
343	82500	343	82500	241	2	5	0	0	1	0	0
348	83100	348	83100	239	3	5	0	0	2	0	0
369	85000	369	85000	230	1	5	0	0	3	0	0
373	86300	373	86300	231	2	5	0	0	3	0	0
376	88200	376	88200	235	1	5	0	0	3	0	1
384	89000	384	89000	232	3	5	0	0	3	0	0
391	92200	391	92200	236	3	5	0	0	3	0	1
392	94400	392	94400	241	1	5	0	0	3	0	3
397	95100	397	95100	240	3	5	0	0	3	0	2
398	95400	398	95400	240	3	6	0	0	3	0	1
399	97600	399	97600	245	1	6	0	0	3	0	3
404	98300	404	98300	243	3	6	0	0	3	0	2
407	98400	407	98400	242	3	5	0	0	3	0	3
408	99600	408	99600	244	3	5	1	0	3	0	0
413	101300	413	101300	245	3	5	0	0	3	0	4
414	101600	414	101600	245	3	6	0	0	3	0	3
415	101800	415	101800	245	1	5	2	0	3	0	0
429	103000	429	103000	240	4	5	0	0	3	0	0
430	105800	430	105800	246	3	5	2	0	3	0	0
438	106000	438	106000	242	5	5	0	0	3	0	0
450	107900	450	107900	240	6	5	0	0	3	0	0
457	111100	457	111100	243	6	5	0	0	3	0	1
463	114000	463	114000	246	6	5	0	0	3	0	2
464	114300	464	114300	246	6	6	0	0	3	0	1
470	117200	470	117200	249	6	6	0	0	3	0	2
473	117300	473	117300	248	6	5	0	0	3	0	3
474	118500	474	118500	250	6	5	1	0	3	0	0
475	119800	475	119800	252	4	5	2	0	3	0	0
479	120200	479	120200	251	6	5	0	0	3	0	4
480	120500	480	120500	251	6	6	0	0	3	0	3
481	121700	481	121700	253	6	5	1	0	3	0	1
484	122800	484	122800	254	5	5	2	0	3	0	0
486	123400	486	123400	254	6	6	0	0	3	0	4

487	124600	487	124600	256	6	5	1	0	3	0	2
496	124700	496	124700	251	6	5	2	0	3	0	0
503	127900	503	127900	254	6	5	2	0	3	0	1
509	130800	509	130800	257	6	5	2	0	3	0	2
510	131100	510	131100	257	6	6	2	0	3	0	1
516	134000	516	134000	260	6	6	2	0	3	0	2
519	134100	519	134100	258	6	5	2	0	3	0	3
525	137000	525	137000	261	6	5	2	0	3	0	4
526	137300	526	137300	261	6	6	2	0	3	0	3
532	140200	532	140200	264	6	6	2	0	3	0	4
537	143500	537	143500	267	6	7	2	0	3	0	4
538	143800	538	143800	267	6	8	2	0	3	0	3
544	146700	544	146700	270	6	8	2	0	3	0	4
545	156800	545	156800	288	6	7	2	0	3	1	4
546	157100	546	157100	288	6	8	2	0	3	1	3
552	160000	552	160000	290	6	8	2	0	3	1	4
554	167100	554	167100	302	8	6	2	0	3	0	4
559	170400	559	170400	305	8	7	2	0	3	0	4
560	170700	560	170700	305	8	8	2	0	3	0	3
566	173600	566	173600	307	8	8	2	0	3	0	4
567	183700	567	183700	324	8	7	2	0	3	1	4
568	184000	568	184000	324	8	8	2	0	3	1	3
574	186900	574	186900	326	8	8	2	0	3	1	4
575	206300	575	206300	359	9	8	2	0	3	0	3
581	209200	581	209200	360	9	8	2	0	3	0	4
582	219300	582	219300	377	9	7	2	0	3	1	4
583	219600	583	219600	377	9	8	2	0	3	1	3
589	222500	589	222500	378	9	8	2	0	3	1	4
591	249900	591	249900	423	9	8	2	1	3	1	4
593	278100	593	278100	469	9	8	3	1	3	1	4

2ND RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
369	85000	0	0	0	1	5	0	0	3	0	0
373	86300	4	1300	325	2	5	0	0	3	0	0
376	88200	7	3200	457	1	5	0	0	3	0	1
384	89000	15	4000	267	3	5	0	0	3	0	0

EXHIBIT K-8

391	92200	22	7200	327	3	5	0	0	3	0	1
392	94400	23	9400	409	1	5	0	0	3	0	3
397	95100	28	10100	361	3	5	0	0	3	0	2
398	95400	29	10400	359	3	6	0	0	3	0	1
399	97600	30	12600	420	1	6	0	0	3	0	3
404	98300	35	13300	380	3	6	0	0	3	0	2
407	98400	38	13400	353	3	5	0	0	3	0	3
408	99600	39	14600	374	3	5	1	0	3	0	0
413	101300	44	16300	370	3	5	0	0	3	0	4
414	101600	45	16600	369	3	6	0	0	3	0	3
415	101800	46	16800	365	1	5	2	0	3	0	0
429	103000	60	18000	300	4	5	0	0	3	0	0
430	105800	61	20800	341	3	5	2	0	3	0	0
438	106000	69	21000	304	5	5	0	0	3	0	0
450	107900	81	22900	283	6	5	0	0	3	0	0
457	111100	88	26100	297	6	5	0	0	3	0	1
463	114000	94	29000	309	6	5	0	0	3	0	2
464	114300	95	29300	308	6	6	0	0	3	0	1
470	117200	101	32200	319	6	6	0	0	3	0	2
473	117300	104	32300	311	6	5	0	0	3	0	3
474	118500	105	33500	319	6	5	1	0	3	0	0
475	119800	106	34800	328	4	5	2	0	3	0	0
479	120200	110	35200	320	6	5	0	0	3	0	4
480	120500	111	35500	320	6	6	0	0	3	0	3
481	121700	112	36700	328	6	5	1	0	3	0	1
484	122800	115	37800	329	5	5	2	0	3	0	0
486	123400	117	38400	328	6	6	0	0	3	0	4
487	124600	118	39600	336	6	5	1	0	3	0	2
496	124700	127	39700	313	6	5	2	0	3	0	0
503	127900	134	42900	320	6	5	2	0	3	0	1
509	130800	140	45800	327	6	5	2	0	3	0	2
510	131100	141	46100	327	6	6	2	0	3	0	1
516	134000	147	49000	333	6	6	2	0	3	0	2
519	134100	150	49100	327	6	5	2	0	3	0	3
525	137000	156	52000	333	6	5	2	0	3	0	4
526	137300	157	52300	333	6	6	2	0	3	0	3
532	140200	163	55200	339	6	6	2	0	3	0	4
537	143500	168	58500	348	6	7	2	0	3	0	4
538	143800	169	58800	348	6	8	2	0	3	0	3
544	146700	175	61700	353	6	8	2	0	3	0	4
545	156800	176	71800	408	6	7	2	0	3	1	4
546	157100	177	72100	407	6	8	2	0	3	1	3
552	160000	183	75000	410	6	8	2	0	3	1	4

554	167100	185	82100	444	8	6	2	0	3	0	4
559	170400	190	85400	449	8	7	2	0	3	0	4
560	170700	191	85700	449	8	8	2	0	3	0	3
566	173600	197	88600	450	8	8	2	0	3	0	4
567	183700	198	98700	498	8	7	2	0	3	1	4
568	184000	199	99000	497	8	8	2	0	3	1	3
574	186900	205	101900	497	8	8	2	0	3	1	4
575	206300	206	121300	589	9	8	2	0	3	0	3
581	209200	212	124200	586	9	8	2	0	3	0	4
582	219300	213	134300	631	9	7	2	0	3	1	4
583	219600	214	134600	629	9	8	2	0	3	1	3
589	222500	220	137500	625	9	8	2	0	3	1	4
591	249900	222	164900	743	9	8	2	1	3	1	4
593	278100	224	193100	862	9	8	3	1	3	1	4

3RD RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
384	89000	0	0	0	3	5	0	0	3	0	0
391	92200	7	3200	457	3	5	0	0	3	0	1
392	94400	8	5400	675	1	5	0	0	3	0	3
397	95100	13	6100	469	3	5	0	0	3	0	2
398	95400	14	6400	457	3	6	0	0	3	0	1
399	97600	15	8600	573	1	6	0	0	3	0	3
404	98300	20	9300	465	3	6	0	0	3	0	2
407	98400	23	9400	409	3	5	0	0	3	0	3
408	99600	24	10600	442	3	5	1	0	3	0	0
413	101300	29	12300	424	3	5	0	0	3	0	4
414	101600	30	12600	420	3	6	0	0	3	0	3
415	101800	31	12800	413	1	5	2	0	3	0	0
429	103000	45	14000	311	4	5	0	0	3	0	0
430	105800	46	16800	365	3	5	2	0	3	0	0
438	106000	54	17000	315	5	5	0	0	3	0	0
450	107900	66	18900	286	6	5	0	0	3	0	0
457	111100	73	22100	303	6	5	0	0	3	0	1
463	114000	79	25000	316	6	5	0	0	3	0	2
464	114300	80	25300	316	6	6	0	0	3	0	1
470	117200	86	28200	328	6	6	0	0	3	0	2

EXHIBIT K-8

473	117300	89	28300	318	6	5	0	0	3	0	3
474	118500	90	29500	328	6	5	1	0	3	0	0
475	119800	91	30800	338	4	5	2	0	3	0	0
479	120200	95	31200	328	6	5	0	0	3	0	4
480	120500	96	31500	328	6	6	0	0	3	0	3
481	121700	97	32700	337	6	5	1	0	3	0	1
484	122800	100	33800	338	5	5	2	0	3	0	0
486	123400	102	34400	337	6	6	0	0	3	0	4
487	124600	103	35600	346	6	5	1	0	3	0	2
496	124700	112	35700	319	6	5	2	0	3	0	0
503	127900	119	38900	327	6	5	2	0	3	0	1
509	130800	125	41800	334	6	5	2	0	3	0	2
510	131100	126	42100	334	6	6	2	0	3	0	1
516	134000	132	45000	341	6	6	2	0	3	0	2
519	134100	135	45100	334	6	5	2	0	3	0	3
525	137000	141	48000	340	6	5	2	0	3	0	4
526	137300	142	48300	340	6	6	2	0	3	0	3
532	140200	148	51200	346	6	6	2	0	3	0	4
537	143500	153	54500	356	6	7	2	0	3	0	4
538	143800	154	54800	356	6	8	2	0	3	0	3
544	146700	160	57700	361	6	8	2	0	3	0	4
545	156800	161	67800	421	6	7	2	0	3	1	4
546	157100	162	68100	420	6	8	2	0	3	1	3
552	160000	168	71000	423	6	8	2	0	3	1	4
554	167100	170	78100	459	8	6	2	0	3	0	4
559	170400	175	81400	465	8	7	2	0	3	0	4
560	170700	176	81700	464	8	8	2	0	3	0	3
566	173600	182	84600	465	8	8	2	0	3	0	4
567	183700	183	94700	517	8	7	2	0	3	1	4
568	184000	184	95000	516	8	8	2	0	3	1	3
574	186900	190	97900	515	8	8	2	0	3	1	4
575	206300	191	117300	614	9	8	2	0	3	0	3
581	209200	197	120200	610	9	8	2	0	3	0	4
582	219300	198	130300	658	9	7	2	0	3	1	4
583	219600	199	130600	656	9	8	2	0	3	1	3
589	222500	205	133500	651	9	8	2	0	3	1	4
591	249900	207	160900	777	9	8	2	1	3	1	4
593	278100	209	189100	905	9	8	3	1	3	1	4

EXHIBIT K-8

4TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
450	107900	0	0	0	6	5	0	0	3	0	0
457	111100	7	3200	457	6	5	0	0	3	0	1
463	114000	13	6100	469	6	5	0	0	3	0	2
464	114300	14	6400	457	6	6	0	0	3	0	1
470	117200	20	9300	465	6	6	0	0	3	0	2
473	117300	23	9400	409	6	5	0	0	3	0	3
474	118500	24	10600	442	6	5	1	0	3	0	0
475	119800	25	11900	476	4	5	2	0	3	0	0
479	120200	29	12300	424	6	5	0	0	3	0	4
480	120500	30	12600	420	6	6	0	0	3	0	3
481	121700	31	13800	445	6	5	1	0	3	0	1
484	122800	34	14900	438	5	5	2	0	3	0	0
486	123400	36	15500	431	6	6	0	0	3	0	4
487	124600	37	16700	451	6	5	1	0	3	0	2
496	124700	46	16800	365	6	5	2	0	3	0	0
503	127900	53	20000	377	6	5	2	0	3	0	1
509	130800	59	22900	388	6	5	2	0	3	0	2
510	131100	60	23200	387	6	6	2	0	3	0	1
516	134000	66	26100	395	6	6	2	0	3	0	2
519	134100	69	26200	380	6	5	2	0	3	0	3
525	137000	75	29100	388	6	5	2	0	3	0	4
526	137300	76	29400	387	6	6	2	0	3	0	3
532	140200	82	32300	394	6	6	2	0	3	0	4
537	143500	87	35600	409	6	7	2	0	3	0	4
538	143800	88	35900	408	6	8	2	0	3	0	3
544	146700	94	38800	413	6	8	2	0	3	0	4
545	156800	95	48900	515	6	7	2	0	3	1	4
546	157100	96	49200	513	6	8	2	0	3	1	3
552	160000	102	52100	511	6	8	2	0	3	1	4
554	167100	104	59200	569	8	6	2	0	3	0	4
559	170400	109	62500	573	8	7	2	0	3	0	4
560	170700	110	62800	571	8	8	2	0	3	0	3
566	173600	116	65700	566	8	8	2	0	3	0	4
567	183700	117	75800	648	8	7	2	0	3	1	4
568	184000	118	76100	645	8	8	2	0	3	1	3
574	186900	124	79000	637	8	8	2	0	3	1	4
575	206300	125	98400	787	9	8	2	0	3	0	3

581	209200	131	101300	773	9	8	2	0	3	0	4
582	219300	132	111400	844	9	7	2	0	3	1	4
583	219600	133	111700	840	9	8	2	0	3	1	3
589	222500	139	114600	824	9	8	2	0	3	1	4
591	249900	141	142000	1007	9	8	2	1	3	1	4
593	278100	143	170200	1190	9	8	3	1	3	1	4

5TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
496	124700	0	0	0	6	5	2	0	3	0	0
503	127900	7	3200	457	6	5	2	0	3	0	1
509	130800	13	6100	469	6	5	2	0	3	0	2
510	131100	14	6400	457	6	6	2	0	3	0	1
516	134000	20	9300	465	6	6	2	0	3	0	2
519	134100	23	9400	409	6	5	2	0	3	0	3
525	137000	29	12300	424	6	5	2	0	3	0	4
526	137300	30	12600	420	6	6	2	0	3	0	3
532	140200	36	15500	431	6	6	2	0	3	0	4
537	143500	41	18800	459	6	7	2	0	3	0	4
538	143800	42	19100	455	6	8	2	0	3	0	3
544	146700	48	22000	458	6	8	2	0	3	0	4
545	156800	49	32100	655	6	7	2	0	3	1	4
546	157100	50	32400	648	6	8	2	0	3	1	3
552	160000	56	35300	630	6	8	2	0	3	1	4
554	167100	58	42400	731	8	6	2	0	3	0	4
559	170400	63	45700	725	8	7	2	0	3	0	4
560	170700	64	46000	719	8	8	2	0	3	0	3
566	173600	70	48900	699	8	8	2	0	3	0	4
567	183700	71	59000	831	8	7	2	0	3	1	4
568	184000	72	59300	824	8	8	2	0	3	1	3
574	186900	78	62200	797	8	8	2	0	3	1	4
575	206300	79	81600	1033	9	8	2	0	3	0	3
581	209200	85	84500	994	9	8	2	0	3	0	4
582	219300	86	94600	1100	9	7	2	0	3	1	4
583	219600	87	94900	1091	9	8	2	0	3	1	3
589	222500	93	97800	1052	9	8	2	0	3	1	4
591	249900	95	125200	1318	9	8	2	1	3	1	4
593	278100	97	153400	1581	9	8	3	1	3	1	4

EXHIBIT K-8

6TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
519	134100	0	0	0	6	5	2	0	3	0	3
525	137000	6	2900	483	6	5	2	0	3	0	4
526	137300	7	3200	457	6	6	2	0	3	0	3
532	140200	13	6100	469	6	6	2	0	3	0	4
537	143500	18	9400	522	6	7	2	0	3	0	4
538	143800	19	9700	511	6	8	2	0	3	0	3
544	146700	25	12600	504	6	8	2	0	3	0	4
545	156800	26	22700	873	6	7	2	0	3	1	4
546	157100	27	23000	852	6	8	2	0	3	1	3
552	160000	33	25900	785	6	8	2	0	3	1	4
554	167100	35	33000	943	8	6	2	0	3	0	4
559	170400	40	36300	908	8	7	2	0	3	0	4
560	170700	41	36600	893	8	8	2	0	3	0	3
566	173600	47	39500	840	8	8	2	0	3	0	4
567	183700	48	49600	1033	8	7	2	0	3	1	4
568	184000	49	49900	1018	8	8	2	0	3	1	3
574	186900	55	52800	960	8	8	2	0	3	1	4
575	206300	56	72200	1289	9	8	2	0	3	0	3
581	209200	62	75100	1211	9	8	2	0	3	0	4
582	219300	63	85200	1352	9	7	2	0	3	1	4
583	219600	64	85500	1336	9	8	2	0	3	1	3
589	222500	70	88400	1263	9	8	2	0	3	1	4
591	249900	72	115800	1608	9	8	2	1	3	1	4
593	278100	74	144000	1946	9	8	3	1	3	1	4

7TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
526	137300	0	0	0	6	6	2	0	3	0	3

EXHIBIT K-8

532	140200	6	2900	483	6	6	2	0	3	0	4
537	143500	11	6200	564	6	7	2	0	3	0	4
538	143800	12	6500	542	6	8	2	0	3	0	3
544	146700	18	9400	522	6	8	2	0	3	0	4
545	156800	19	19500	1026	6	7	2	0	3	1	4
546	157100	20	19800	990	6	8	2	0	3	1	3
552	160000	26	22700	873	6	8	2	0	3	1	4
554	167100	28	29800	1064	8	6	2	0	3	0	4
559	170400	33	33100	1003	8	7	2	0	3	0	4
560	170700	34	33400	982	8	8	2	0	3	0	3
566	173600	40	36300	908	8	8	2	0	3	0	4
567	183700	41	46400	1132	8	7	2	0	3	1	4
568	184000	42	46700	1112	8	8	2	0	3	1	3
574	186900	48	49600	1033	8	8	2	0	3	1	4
575	206300	49	69000	1408	9	8	2	0	3	0	3
581	209200	55	71900	1307	9	8	2	0	3	0	4
582	219300	56	82000	1464	9	7	2	0	3	1	4
583	219600	57	82300	1444	9	8	2	0	3	1	3
589	222500	63	85200	1352	9	8	2	0	3	1	4
591	249900	65	112600	1732	9	8	2	1	3	1	4
593	278100	67	140800	2101	9	8	3	1	3	1	4

8TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
532	140200	0	0	0	6	6	2	0	3	0	4
537	143500	5	3300	660	6	7	2	0	3	0	4
538	143800	6	3600	600	6	8	2	0	3	0	3
544	146700	12	6500	542	6	8	2	0	3	0	4
545	156800	13	16600	1277	6	7	2	0	3	1	4
546	157100	14	16900	1207	6	8	2	0	3	1	3
552	160000	20	19800	990	6	8	2	0	3	1	4
554	167100	22	26900	1223	8	6	2	0	3	0	4
559	170400	27	30200	1119	8	7	2	0	3	0	4
560	170700	28	30500	1089	8	8	2	0	3	0	3
566	173600	34	33400	982	8	8	2	0	3	0	4
567	183700	35	43500	1243	8	7	2	0	3	1	4
568	184000	36	43800	1217	8	8	2	0	3	1	3

574	186900	42	46700	1112	8	8	2	0	3	1	4
575	206300	43	66100	1537	9	8	2	0	3	0	3
581	209200	49	69000	1408	9	8	2	0	3	0	4
582	219300	50	79100	1582	9	7	2	0	3	1	4
583	219600	51	79400	1557	9	8	2	0	3	1	3
589	222500	57	82300	1444	9	8	2	0	3	1	4
591	249900	59	109700	1859	9	8	2	1	3	1	4
593	278100	61	137900	2261	9	8	3	1	3	1	4

9TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
544	146700	0	0	0	6	8	2	0	3	0	4
545	156800	1	10100	10100	6	7	2	0	3	1	4
546	157100	2	10400	5200	6	8	2	0	3	1	3
552	160000	8	13300	1663	6	8	2	0	3	1	4
554	167100	10	20400	2040	8	6	2	0	3	0	4
559	170400	15	23700	1580	8	7	2	0	3	0	4
560	170700	16	24000	1500	8	8	2	0	3	0	3
566	173600	22	26900	1223	8	8	2	0	3	0	4
567	183700	23	37000	1609	8	7	2	0	3	1	4
568	184000	24	37300	1554	8	8	2	0	3	1	3
574	186900	30	40200	1340	8	8	2	0	3	1	4
575	206300	31	59600	1923	9	8	2	0	3	0	3
581	209200	37	62500	1689	9	8	2	0	3	0	4
582	219300	38	72600	1911	9	7	2	0	3	1	4
583	219600	39	72900	1869	9	8	2	0	3	1	3
589	222500	45	75800	1684	9	8	2	0	3	1	4
591	249900	47	103200	2196	9	8	2	1	3	1	4
593	278100	49	131400	2682	9	8	3	1	3	1	4

EXHIBIT K-8

10TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
566	173600	0	0	0	8	8	2	0	3	0	4
567	183700	1	10100	10100	8	7	2	0	3	1	4
568	184000	2	10400	5200	8	8	2	0	3	1	3
574	186900	8	13300	1663	8	8	2	0	3	1	4
575	206300	9	32700	3633	9	8	2	0	3	0	3
581	209200	15	35600	2373	9	8	2	0	3	0	4
582	219300	16	45700	2856	9	7	2	0	3	1	4
583	219600	17	46000	2706	9	8	2	0	3	1	3
589	222500	23	48900	2126	9	8	2	0	3	1	4
591	249900	25	76300	3052	9	8	2	1	3	1	4
593	278100	27	104500	3870	9	8	3	1	3	1	4

11TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
574	186900	0	0	0	8	8	2	0	3	1	4
575	206300	1	19400	19400	9	8	2	0	3	0	3
581	209200	7	22300	3186	9	8	2	0	3	0	4
582	219300	8	32400	4050	9	7	2	0	3	1	4
583	219600	9	32700	3633	9	8	2	0	3	1	3
589	222500	15	35600	2373	9	8	2	0	3	1	4
591	249900	17	63000	3706	9	8	2	1	3	1	4
593	278100	19	91200	4800	9	8	3	1	3	1	4

12TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P

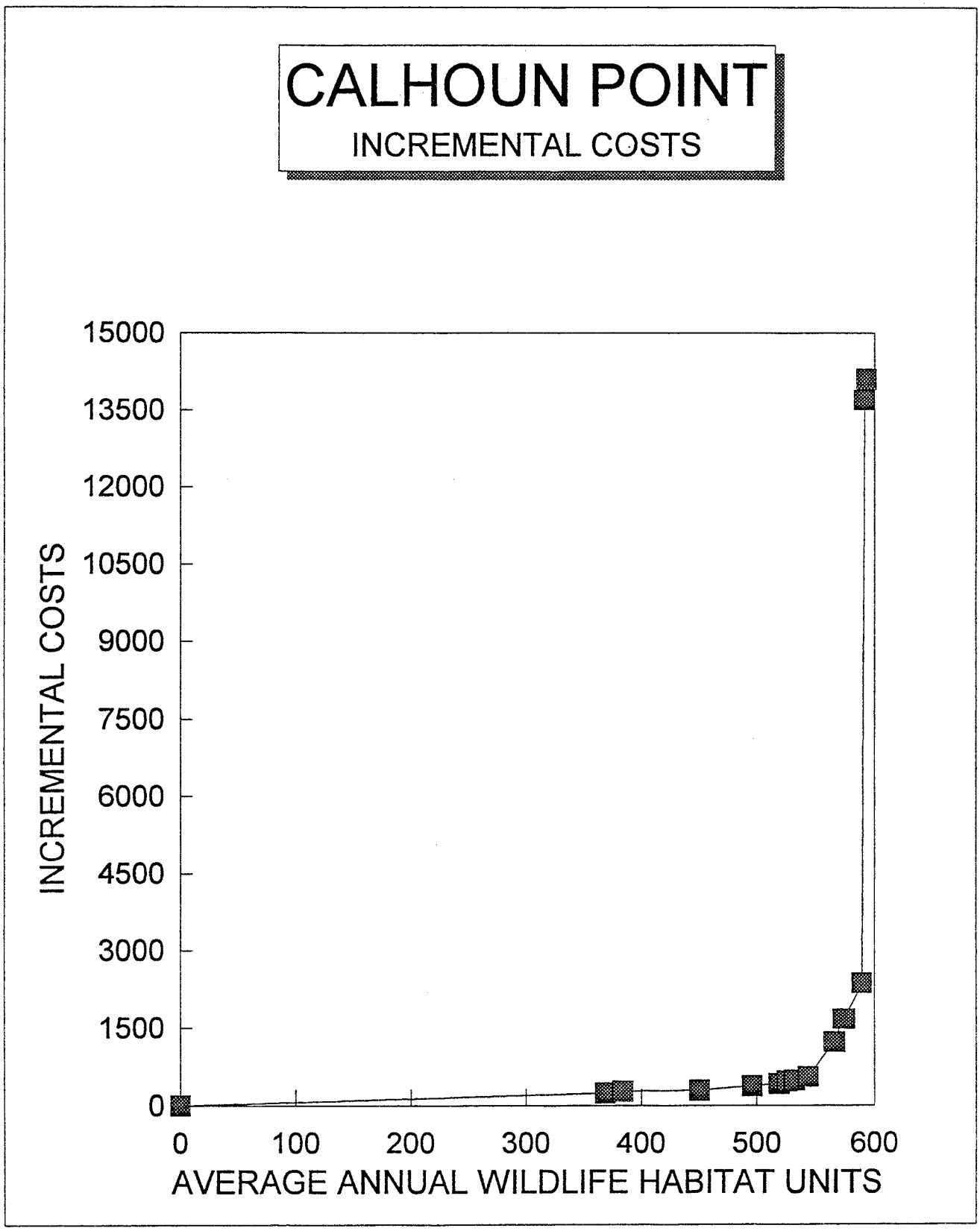
589	222500	0	0	0	9	8	2	0	3	1	4
591	249900	2	27400	13700	9	8	2	1	3	1	4
593	278100	4	55600	13900	9	8	3	1	3	1	4

13TH RECALCULATION

TOTAL WHAG	AVG ANNUAL COST	INC. WHAG	INC. COST	INC. COST/ INC. WHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
591	249900	0	0	0	9	8	2	1	3	1	4
593	278100	2	28200	14100	9	8	3	1	3	1	4

EXHIBIT K-9

TOTAL WHAG	AVG. ANNUAL COST	INC. WHAG	INC. COST	INC. COSTS	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
0	0	0	0	0	0	0	0	0	0	0	0
369	85000	369	85000	230	1	5	0	0	3	0	0
384	89000	15	4000	267	3	5	0	0	3	0	0
450	107900	66	18900	286	6	5	0	0	3	0	0
496	124700	46	16800	365	6	5	2	0	3	0	0
519	134100	23	9400	409	6	5	2	0	3	0	3
526	137300	7	3200	457	6	6	2	0	3	0	3
532	140200	6	2900	483	6	6	2	0	3	0	4
544	146700	12	6500	542	6	8	2	0	3	0	4
566	173600	22	26900	1223	8	8	2	0	3	0	4
574	186900	8	13300	1663	8	8	2	0	3	1	4
589	222500	15	35600	2373	9	8	2	0	3	1	4
591	249900	2	27400	13700	9	8	2	1	3	1	4
593	278100	2	28200	14100	9	8	3	1	3	1	4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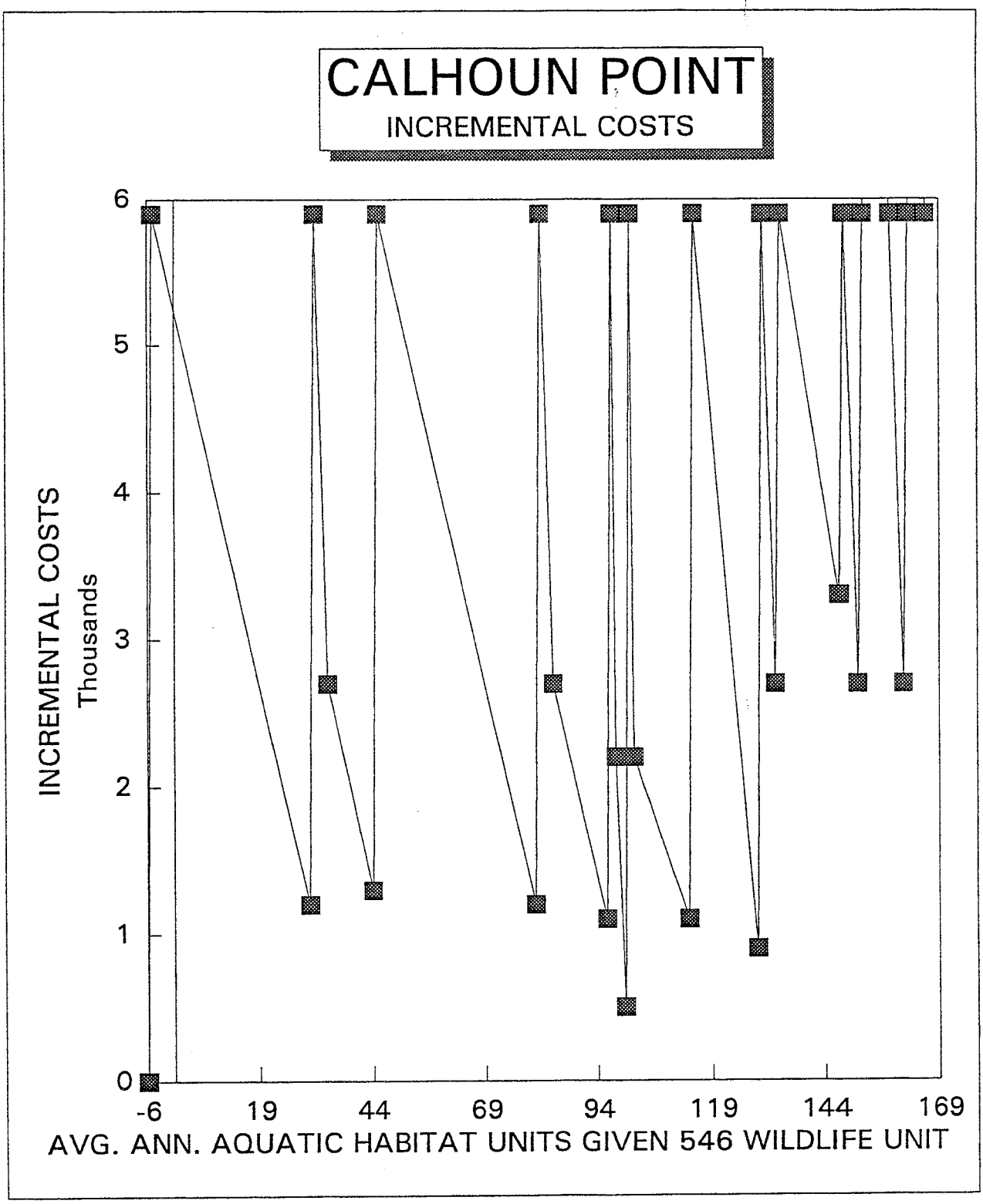
9000
7500
6000
4500
3000
1500
0
INCREMENTAL COSTS
0
100
200
300
400
500
600
AVERAGE ANNUAL WILDLIFE HABITAT UNITS

EXHIBIT K-11

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	AVG COST/ AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	-6	157100		0			1	6	3	0	3	1	3
546	-5	163000	1	5900	5900	5900	1	6	4	0	3	1	3
546	30	164200	35	1200	34	197	1	8	3	0	3	1	3
546	31	170100	1	5900	5900	351	1	8	4	0	3	1	3
546	34	172800	3	2700	900	393	1	8	5	0	3	1	3
546	44	174100	10	1300	130	340	1	6	3	1	3	0	4
546	45	180000	1	5900	5900	449	1	6	4	1	3	0	4
546	80	181200	35	1200	34	280	1	8	3	1	3	0	4
546	81	187100	1	5900	5900	345	1	8	4	1	3	0	4
546	84	189800	3	2700	900	363	1	8	5	1	3	0	4
546	96	190900	12	1100	92	331	1	8	3	2	3	0	4
546	97	196800	1	5900	5900	385	1	8	4	2	3	0	4
546	98	199000	1	2200	2200	403	4	8	3	1	3	0	1
546	100	199500	2	500	250	400	1	8	5	2	3	0	4
546	101	205400	1	5900	5900	451	1	8	6	2	3	0	4
546	102	207600	1	2200	2200	468	4	8	5	1	3	0	1
546	114	208700	12	1100	92	430	4	8	3	2	3	0	1
546	115	214600	1	5900	5900	475	4	8	4	2	3	0	1
546	129	215500	14	900	64	433	1	8	3	3	3	0	4
546	130	221400	1	5900	5900	473	1	8	4	3	3	0	4
546	133	224100	3	2700	900	482	1	8	5	3	3	0	4
546	134	230000	1	5900	5900	521	1	8	6	3	3	0	4
546	147	233300	13	3300	254	498	4	8	3	3	3	0	1
546	148	239200	1	5900	5900	533	4	8	4	3	3	0	1
546	151	241900	3	2700	900	540	4	8	5	3	3	0	1
546	152	247800	1	5900	5900	574	4	8	6	3	3	0	1
546	157	263100	5	15300	3060	650	3	7	3	3	3	0	4
546	158	269000	1	5900	5900	682	3	7	4	3	3	0	4
546	161	271700	3	2700	900	686	3	7	5	3	3	0	4
546	162	277600	1	5900	5900	717	3	7	6	3	3	0	4
546	163	285500	1	7900	7900	760	6	8	6	3	3	0	2
546	165	294800	2	9300	4650	805	6	5	7	3	3	0	3
546	166	300700	1	5900	5900	835	6	5	8	3	3	0	3

EXHIBIT K-12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INCREMENTAL COSTS
Thousands
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2
3
4
5
6
-6
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94
119
144
169
AVG. ANN. AQUATIC HABITAT UNITS GIVEN 546 WILDLIFE UNIT

EXHIBIT K-13

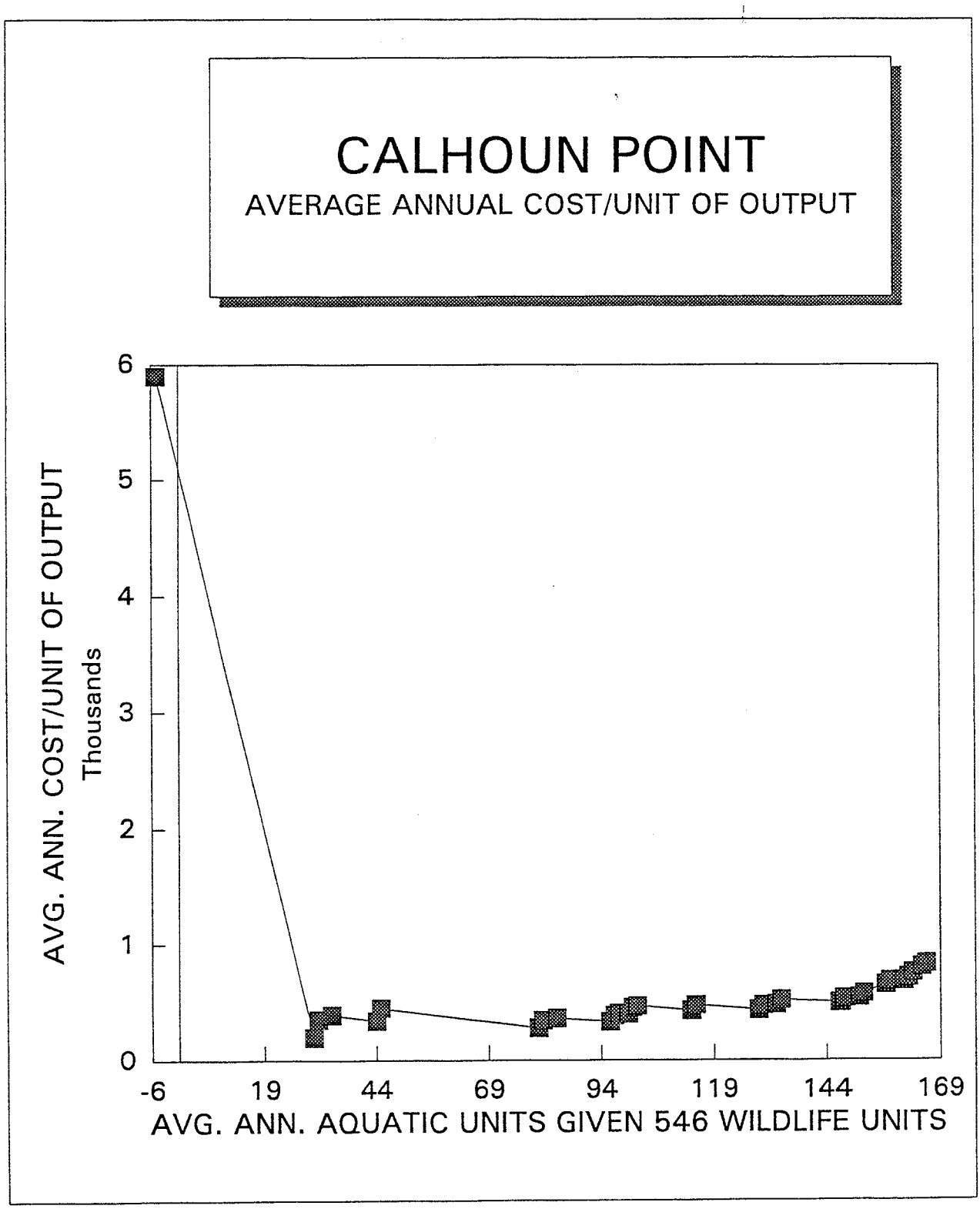

CALHOUN POINT
AVERAGE ANNUAL COST/UNIT OF OUTPUT
AVG. ANN. COST/UNIT OF OUTPUT
Thousands
6
5
4
3
2
1
0
-6
19
44
69
94
119
144
169
AVG. ANN. AQUATIC UNITS GIVEN 546 WILDLIFE UNITS

EXHIBIT K-14

1ST RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	-6	157100	0	0	0	1	6	3	0	3	1	3
546	-5	163000	1	5900	5900	1	6	4	0	3	1	3
546	30	164200	36	7100	197	1	8	3	0	3	1	3
546	31	170100	37	13000	351	1	8	4	0	3	1	3
546	34	172800	40	15700	393	1	8	5	0	3	1	3
546	44	174100	50	17000	340	1	6	3	1	3	0	4
546	45	180000	51	22900	449	1	6	4	1	3	0	4
546	80	181200	86	24100	280	1	8	3	1	3	0	4
546	81	187100	87	30000	345	1	8	4	1	3	0	4
546	84	189800	90	32700	363	1	8	5	1	3	0	4
546	96	190900	102	33800	331	1	8	3	2	3	0	4
546	97	196800	103	39700	385	1	8	4	2	3	0	4
546	98	199000	104	41900	403	4	8	3	1	3	0	1
546	100	199500	106	42400	400	1	8	5	2	3	0	4
546	101	205400	107	48300	451	1	8	6	2	3	0	4
546	102	207600	108	50500	468	4	8	5	1	3	0	1
546	114	208700	120	51600	430	4	8	3	2	3	0	1
546	115	214600	121	57500	475	4	8	4	2	3	0	1
546	129	215500	135	58400	433	1	8	3	3	3	0	4
546	130	221400	136	64300	473	1	8	4	3	3	0	4
546	133	224100	139	67000	482	1	8	5	3	3	0	4
546	134	230000	140	72900	521	1	8	6	3	3	0	4
546	147	233300	153	76200	498	4	8	3	3	3	0	1
546	148	239200	154	82100	533	4	8	4	3	3	0	1
546	151	241900	157	84800	540	4	8	5	3	3	0	1
546	152	247800	158	90700	574	4	8	6	3	3	0	1
546	157	263100	163	106000	650	3	7	3	3	3	0	4
546	158	269000	164	111900	682	3	7	4	3	3	0	4
546	161	271700	167	114600	686	3	7	5	3	3	0	4
546	162	277600	168	120500	717	3	7	6	3	3	0	4
546	163	285500	169	128400	760	6	8	6	3	3	0	2
546	165	294800	171	137700	805	6	5	7	3	3	0	3
546	166	300700	172	143600	835	6	5	8	3	3	0	3

EXHIBIT K-14

2ND RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	30	164200	0	0	0	1	8	3	0	3	1	3
546	31	170100	1	5900	5900	1	8	4	0	3	1	3
546	34	172800	4	8600	2150	1	8	5	0	3	1	3
546	44	174100	14	9900	707	1	6	3	1	3	0	4
546	45	180000	15	15800	1053	1	6	4	1	3	0	4
546	80	181200	50	17000	340	1	8	3	1	3	0	4
546	81	187100	51	22900	449	1	8	4	1	3	0	4
546	84	189800	54	25600	474	1	8	5	1	3	0	4
546	96	190900	66	26700	405	1	8	3	2	3	0	4
546	97	196800	67	32600	487	1	8	4	2	3	0	4
546	98	199000	68	34800	512	4	8	3	1	3	0	1
546	100	199500	70	35300	504	1	8	5	2	3	0	4
546	101	205400	71	41200	580	1	8	6	2	3	0	4
546	102	207600	72	43400	603	4	8	5	1	3	0	1
546	114	208700	84	44500	530	4	8	3	2	3	0	1
546	115	214600	85	50400	593	4	8	4	2	3	0	1
546	129	215500	99	51300	518	1	8	3	3	3	0	4
546	130	221400	100	57200	572	1	8	4	3	3	0	4
546	133	224100	103	59900	582	1	8	5	3	3	0	4
546	134	230000	104	65800	633	1	8	6	3	3	0	4
546	147	233300	117	69100	591	4	8	3	3	3	0	1
546	148	239200	118	75000	636	4	8	4	3	3	0	1
546	151	241900	121	77700	642	4	8	5	3	3	0	1
546	152	247800	122	83600	685	4	8	6	3	3	0	1
546	157	263100	127	98900	779	3	7	3	3	3	0	4
546	158	269000	128	104800	819	3	7	4	3	3	0	4
546	161	271700	131	107500	821	3	7	5	3	3	0	4
546	162	277600	132	113400	859	3	7	6	3	3	0	4
546	163	285500	133	121300	912	6	8	6	3	3	0	2
546	165	294800	135	130600	967	6	5	7	3	3	0	3
546	166	300700	136	136500	1004	6	5	8	3	3	0	3

EXHIBIT K-14

3RD RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	80	181200	0	0	0	1	8	3	1	3	0	4
546	81	187100	1	5900	5900	1	8	4	1	3	0	4
546	84	189800	4	8600	2150	1	8	5	1	3	0	4
546	96	190900	16	9700	606	1	8	3	2	3	0	4
546	97	196800	17	15600	918	1	8	4	2	3	0	4
546	98	199000	18	17800	989	4	8	3	1	3	0	1
546	100	199500	20	18300	915	1	8	5	2	3	0	4
546	101	205400	21	24200	1152	1	8	6	2	3	0	4
546	102	207600	22	26400	1200	4	8	5	1	3	0	1
546	114	208700	34	27500	809	4	8	3	2	3	0	1
546	115	214600	35	33400	954	4	8	4	2	3	0	1
546	129	215500	49	34300	700	1	8	3	3	3	0	4
546	130	221400	50	40200	804	1	8	4	3	3	0	4
546	133	224100	53	42900	809	1	8	5	3	3	0	4
546	134	230000	54	48800	904	1	8	6	3	3	0	4
546	147	233300	67	52100	778	4	8	3	3	3	0	1
546	148	239200	68	58000	853	4	8	4	3	3	0	1
546	151	241900	71	60700	855	4	8	5	3	3	0	1
546	152	247800	72	66600	925	4	8	6	3	3	0	1
546	157	263100	77	81900	1064	3	7	3	3	3	0	4
546	158	269000	78	87800	1126	3	7	4	3	3	0	4
546	161	271700	81	90500	1117	3	7	5	3	3	0	4
546	162	277600	82	96400	1176	3	7	6	3	3	0	4
546	163	285500	83	104300	1257	6	8	6	3	3	0	2
546	165	294800	85	113600	1336	6	5	7	3	3	0	3
546	166	300700	86	119500	1390	6	5	8	3	3	0	3

4TH RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	96	190900	0	0	0	1	8	3	2	3	0	4
546	97	196800	1	5900	5900	1	8	4	2	3	0	4
546	98	199000	2	8100	4050	4	8	3	1	3	0	1
546	100	199500	4	8600	2150	1	8	5	2	3	0	4

546	101	205400	5	14500	2900	1	8	6	2	3	0	4
546	102	207600	6	16700	2783	4	8	5	1	3	0	1
546	114	208700	18	17800	989	4	8	3	2	3	0	1
546	115	214600	19	23700	1247	4	8	4	2	3	0	1
546	129	215500	33	24600	745	1	8	3	3	3	0	4
546	130	221400	34	30500	897	1	8	4	3	3	0	4
546	133	224100	37	33200	897	1	8	5	3	3	0	4
546	134	230000	38	39100	1029	1	8	6	3	3	0	4
546	147	233300	51	42400	831	4	8	3	3	3	0	1
546	148	239200	52	48300	929	4	8	4	3	3	0	1
546	151	241900	55	51000	927	4	8	5	3	3	0	1
546	152	247800	56	56900	1016	4	8	6	3	3	0	1
546	157	263100	61	72200	1184	3	7	3	3	3	0	4
546	158	269000	62	78100	1260	3	7	4	3	3	0	4
546	161	271700	65	80800	1243	3	7	5	3	3	0	4
546	162	277600	66	86700	1314	3	7	6	3	3	0	4
546	163	285500	67	94600	1412	6	8	6	3	3	0	2
546	165	294800	69	103900	1506	6	5	7	3	3	0	3
546	166	300700	70	109800	1569	6	5	8	3	3	0	3

5TH RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	129	215500	0	0	0	1	8	3	3	3	0	4
546	130	221400	1	5900	5900	1	8	4	3	3	0	4
546	133	224100	4	8600	2150	1	8	5	3	3	0	4
546	134	230000	5	14500	2900	1	8	6	3	3	0	4
546	147	233300	18	17800	989	4	8	3	3	3	0	1
546	148	239200	19	23700	1247	4	8	4	3	3	0	1
546	151	241900	22	26400	1200	4	8	5	3	3	0	1
546	152	247800	23	32300	1404	4	8	6	3	3	0	1
546	157	263100	28	47600	1700	3	7	3	3	3	0	4
546	158	269000	29	53500	1845	3	7	4	3	3	0	4
546	161	271700	32	56200	1756	3	7	5	3	3	0	4
546	162	277600	33	62100	1882	3	7	6	3	3	0	4
546	163	285500	34	70000	2059	6	8	6	3	3	0	2
546	165	294800	36	79300	2203	6	5	7	3	3	0	3
546	166	300700	37	85200	2303	6	5	8	3	3	0	3

EXHIBIT K-14

6TH RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	147	233300	0	0	0	4	8	3	3	3	0	1
546	148	239200	1	5900	5900	4	8	4	3	3	0	1
546	151	241900	4	8600	2150	4	8	5	3	3	0	1
546	152	247800	5	14500	2900	4	8	6	3	3	0	1
546	157	263100	10	29800	2980	3	7	3	3	3	0	4
546	158	269000	11	35700	3245	3	7	4	3	3	0	4
546	161	271700	14	38400	2743	3	7	5	3	3	0	4
546	162	277600	15	44300	2953	3	7	6	3	3	0	4
546	163	285500	16	52200	3263	6	8	6	3	3	0	2
546	165	294800	18	61500	3417	6	5	7	3	3	0	3
546	166	300700	19	67400	3547	6	5	8	3	3	0	3

7TH RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	151	241900	0	0	0	4	8	5	3	3	0	1
546	152	247800	1	5900	5900	4	8	6	3	3	0	1
546	157	263100	6	21200	3533	3	7	3	3	3	0	4
546	158	269000	7	27100	3871	3	7	4	3	3	0	4
546	161	271700	10	29800	2980	3	7	5	3	3	0	4
546	162	277600	11	35700	3245	3	7	6	3	3	0	4
546	163	285500	12	43600	3633	6	8	6	3	3	0	2
546	165	294800	14	52900	3779	6	5	7	3	3	0	3
546	166	300700	15	58800	3920	6	5	8	3	3	0	3

8TH RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P

546	161	271700	0	0	0	3	7	5	3	3	0	4
546	162	277600	1	5900	5900	3	7	6	3	3	0	4
546	163	285500	2	13800	6900	6	8	6	3	3	0	2
546	165	294800	4	23100	5775	6	5	7	3	3	0	3
546	166	300700	5	29000	5800	6	5	8	3	3	0	3

9TH RECALCULATION

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COST/ INC. AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	R	M	P
546	165	294800	0	0	0	6	5	7	3	3	0	3
546	166	300700	1	5900	5900	6	5	8	3	3	0	3

EXHIBIT K-15

TOTAL WHAG	TOTAL AHAG	AVG ANNUAL COST	INC. AHAG	INC. COST	INC. COSTS/ AHAG	MEASURES IDENTIFICATION NUMBERS A	D	C	B	M	P
546	-6	157100	0	0	0	1	6	3	0	1	3
546	30	164200	36	7100	197	1	8	3	0	1	3
546	80	181200	50	17000	340	1	8	3	1	0	4
546	96	190900	16	9700	606	1	8	3	2	0	4
546	129	215500	33	24600	745	1	8	3	3	0	4
546	147	233300	18	17800	989	4	8	3	3	0	1
546	151	241900	4	8600	2150	4	8	5	3	0	1
546	161	271700	10	29800	2980	3	7	5	3	0	4
546	165	294800	4	23100	5775	6	5	7	3	0	3
546	166	300700	1	5900	5900	6	5	8	3	0	3

EXHIBIT K-16

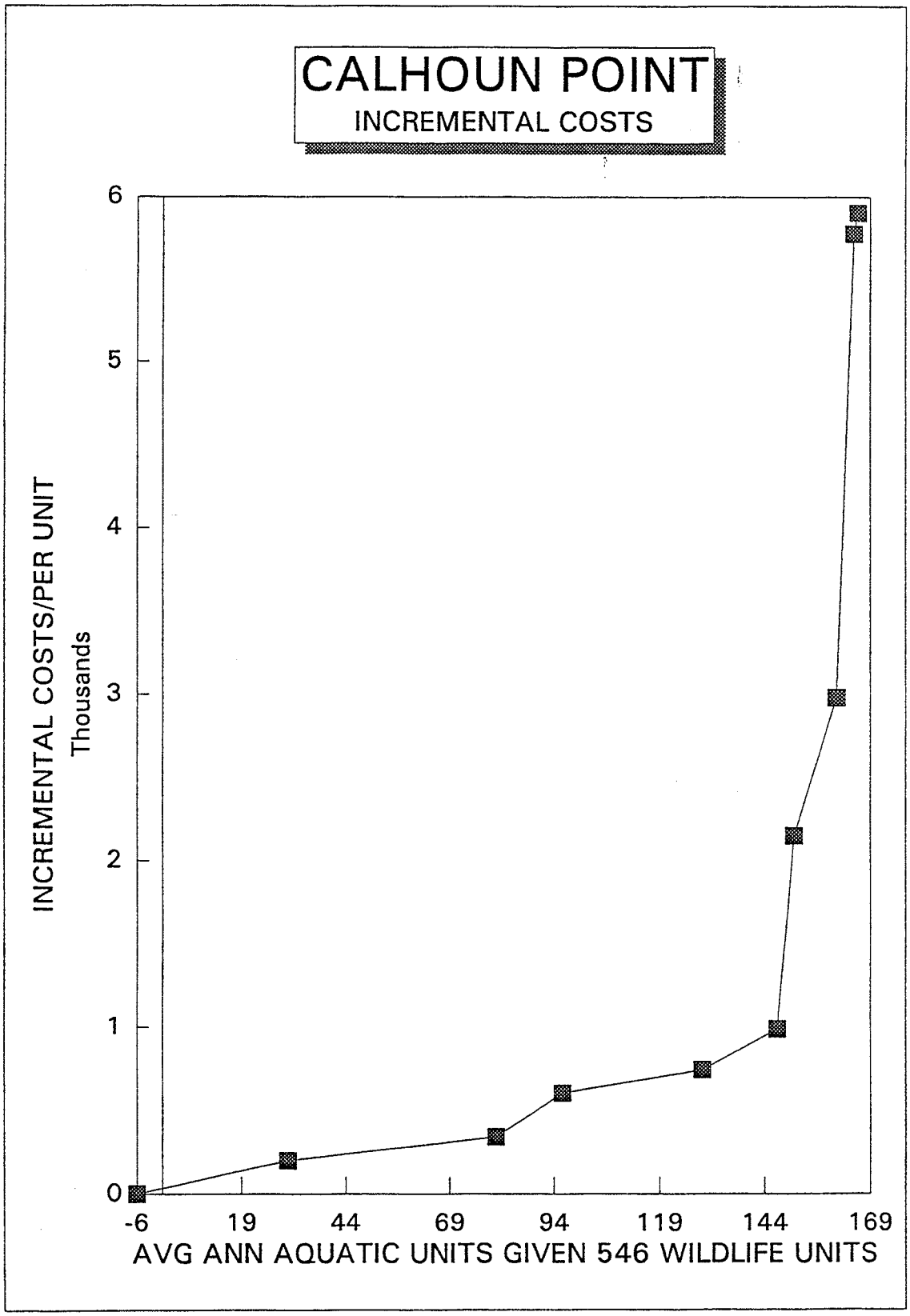

CALHOUN POINT
INCREMENTAL COSTS
INCREMENTAL COSTS/PER UNIT
Thousands
0
1
2
3
4
5
6
-6
19
44
69
94
119
144
169
AVG ANN AQUATIC UNITS GIVEN 546 WILDLIFE UNITS

EXHIBIT K-17

WHAG EFFICIENT PLAN

TOTAL WHAG: 546
TOTAL AHAG: - 6
TOTAL AVERAGE ANNUAL COST: $157,100

MEASURE	WHAG	AHAG	TOTAL ANNUAL COST
A-2	156	-18	$ 48,500
D2+H2+E1+ F1+Q3	247	12	$ 58,900
C2(R)+I2(R)	46	0	$ 16,800
R3	66	0	$ 10,200
M1	8	0	$ 13,300
P1+J1	23	0	$ 9,400
TOTALS	546	- 6	$157,100

RECOMMENDED PLAN

TOTAL WHAG: 546
TOTAL AHAG: 129
TOTAL AVERAGE ANNUAL COST: $215,500

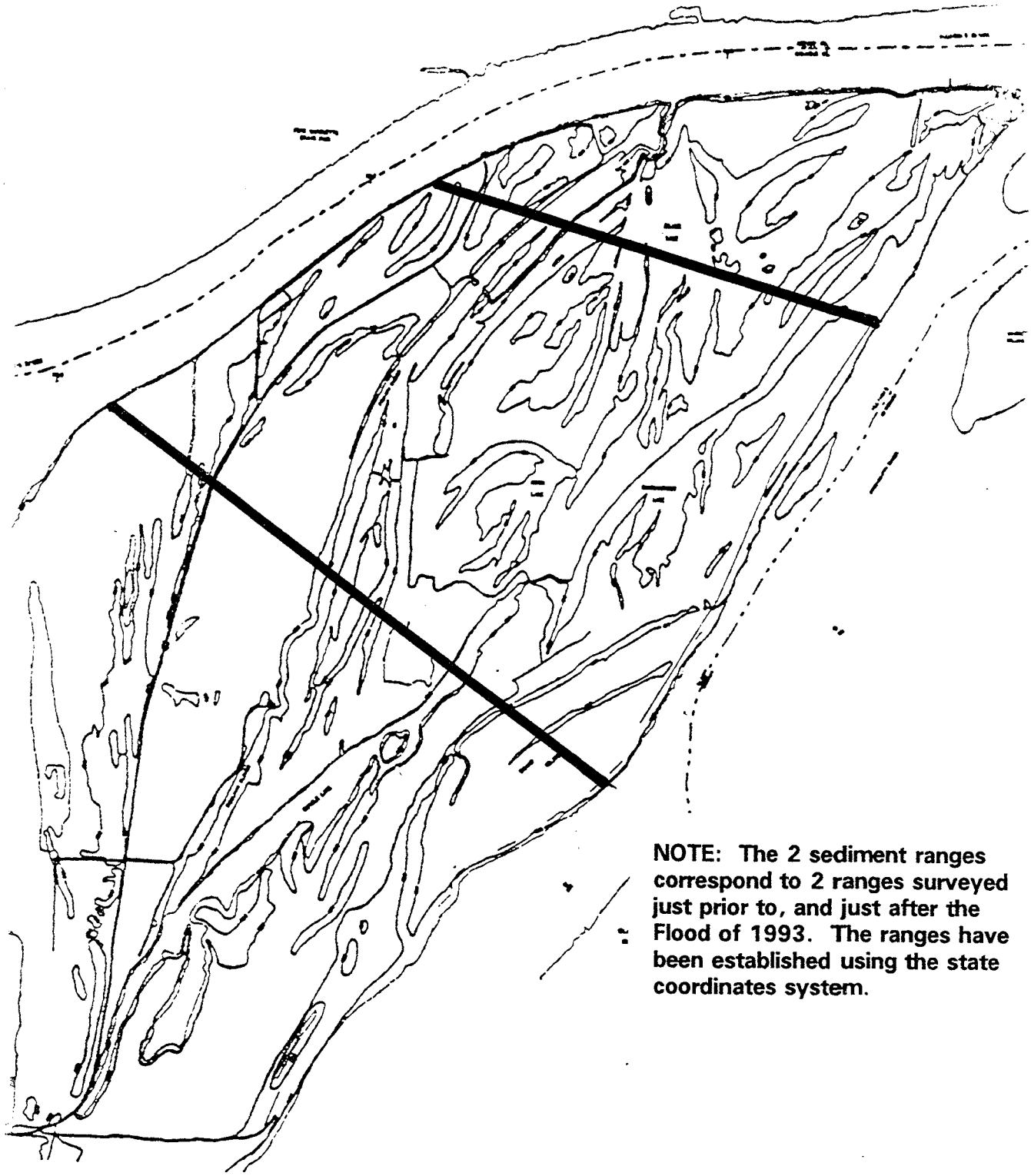
MEASURE	WHAG	AHAG	TOTAL ANNUAL COST
A-2	156	-18	$ 48,500
B2+L2	2	99	$ 61,700
D1+H2+E1+ F1+Q3	247	48	$ 66,000
C2(R)+I2(R)	46	0	$ 16,800
R3	66	0	$ 10,200
P3+J1	29	0	$ 12,300
TOTALS	546	129	$215,500

APPENDIX DPR-L

PERFORMANCE EVALUATION MONITORING--
PHYSICAL, CHEMICAL SAMPLING LOCATIONS

FOREWORD

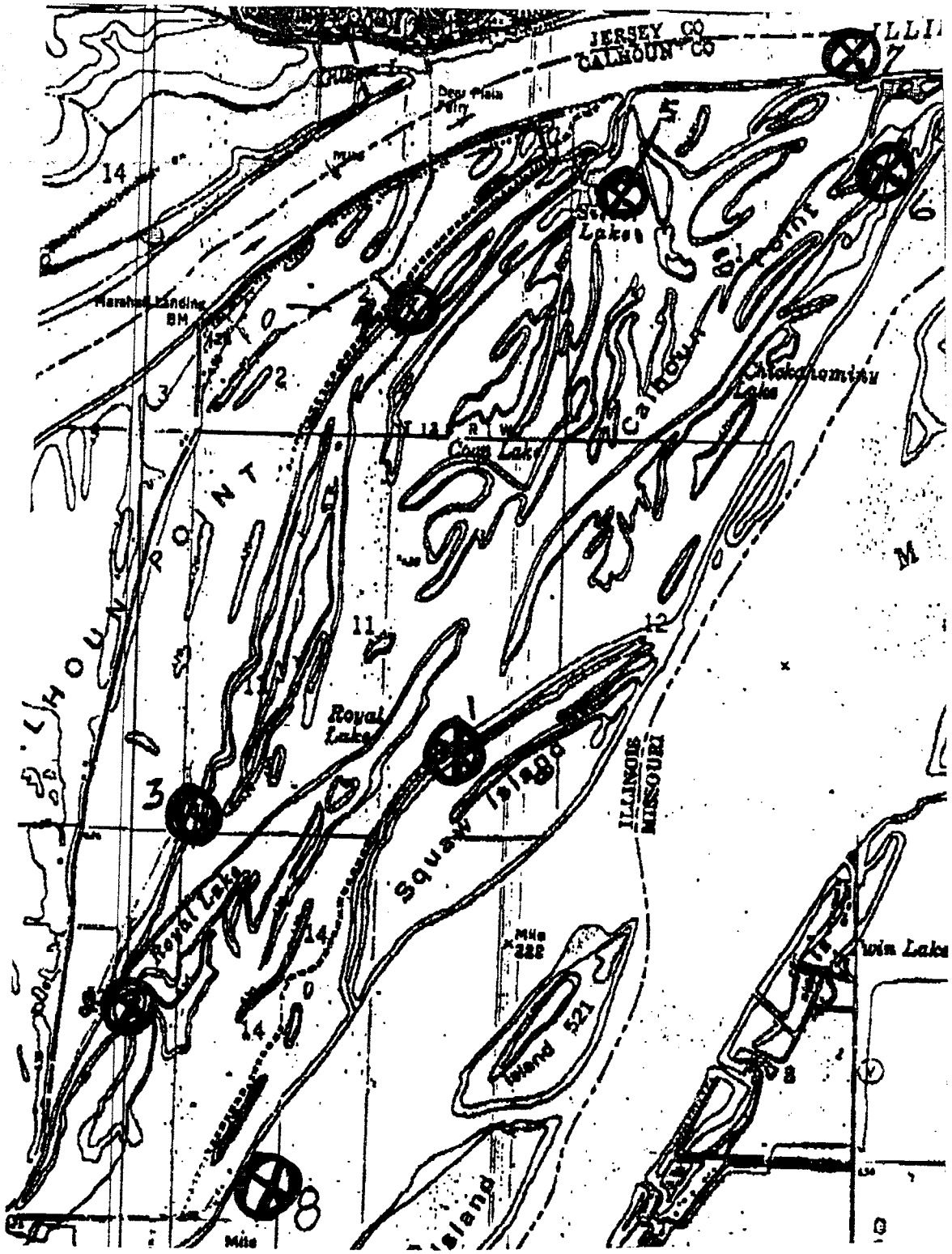
APPENDIX DPR-L provides the proposed ranges for post-project sedimentation monitoring, the proposed locations for limited water quality testing, and a listing of the water quality parameters to be assessed.



NOTE: The 2 sediment ranges correspond to 2 ranges surveyed just prior to, and just after the Flood of 1993. The ranges have been established using the state coordinates system.

PROPOSED SEDIMENT MONITORING RANGES

FIGURE L-1



WATER QUALITY STATIONS

FIGURE L-2

TABLE L-1

STANDARD FIELD PARAMETERS FOR WATER QUALITY MONITORING

Parameter	Unit of Measure
Air temperature	oC
Water temperature	oC
Wind velocity	km/h
Wind direction	N,S,E,W, etc.
Cloud cover	%
Wave height	m
Water depth	m
Water velocity	m/sec
Secchi disk depth	m
Ice cover (seasonal)	%
Ice thickness (seasonal)	m
Snow cover (seasonal)	%
Snow depth (seasonal)	m
Dissolved oxygen	mg/l
pH	units
Alkalinity	mg/l as CaCO3
Specific conductance	micromhos/cm at 25oC

APPENDIX DPR-M

FARMLAND PROTECTION POLICY ACT DOCUMENTATION

FOREWORD

APPENDIX DPR-N provides a letter from the St. Louis District to the Illinois Department of Agriculture (via the U.S. Soil Conservation Service regarding potential prime farmland conversion impacts induced by the project. The appendix also includes the Department's site assessment for the Calhoun Point project, and the Department's letter of comment (January 4, 1995) on the project following its review of the draft DPR/EA.

June 17, 1994

Environmental Planning Section
Planning Division

Mr. James B. Johnson
Soil Conservation Service
U.S. Department of Agriculture
1902 Fox Drive
Champaign, Illinois 61820

Dear Mr. Johnson:

We are forwarding for your review a Form AD-1006 for the proposed Calhoun Point Habitat Rehabilitation and Enhancement Project, located in Calhoun County at the confluence of the Illinois and Mississippi Rivers. We have completed parts I and III of the form.

The project area is located in sections 1, 2, 10, 11, 12, 14, and 15, of T13S, R1W. The 2,100-acre area consists mostly of bottomland hardwood forest, about 450 acres of open water, and a few scattered agricultural fields. Most of Calhoun Point was acquired by the Corps in conjunction with construction of Lock and Dam 26 on the Mississippi River in the 1930's. Since the mid-1950's, Calhoun Point has been administered by the U.S. Fish and Wildlife Service (USFWS) as part of the national wildlife refuge system under a general plan agreement with the Corps.

The Illinois Department of Conservation has responsibility for day-to-day management of the area under the terms of a cooperative agreement with the USFWS. Current management is directed primarily at providing waterfowl habitat and preserving the bottomland hardwood ecosystem. Ongoing management practices rely heavily on pumping in the spring to dewater areas for growing waterfowl foods and in the fall to recharge these areas to make food available for waterfowl.

Soil names, map symbols, and area represented by each of the mapping units within the project area are as follows: Beaucoup (70) - 1,368 acres; Beaucoup (1070) - 107 acres; Sarpy (92) - 20 acres; Tice (284) - 298 acres; Wakeland (333) - 1 acre. Water (w) occupies 329 acres. Soil maps from the Soil Survey of Calhoun County have been digitized for the project area.

A topographic map showing 2-foot contour intervals for most of the project area is enclosed. A general plan map depicting the proposed features is also included. The proposed features are as follows.

a. A 5-mile long riverside dike/levee forming a closed system, with a Mississippi River tie-in elevation of 426 NGVD tapering in the downriver direction to 424 NGVD at the confluence area with the Illinois River. The levee along the Illinois River side of the project area will be at a constant elevation of 424 NGVD. The levee includes a 2,000' long rock covered overflow structure (elevation 423 NGVD), just upriver of Island 525. Rip-rap protection is provided at several locations where the bankline is vulnerable to erosion. The levee will permit enhanced interior water control for all of the management units, and will also serve to safeguard the loss of habitat to river sedimentation.

b. A combination open-topped water control/fish passage structure would be placed at the location of the former entrance to Pohlman Slough (structure #1). The structure includes a 16 foot wide stop-log unit, and a single 42" sluice gate with a grate covered bridge. Also included in this feature is the dredging of a connection between the river and the deeper portion of the slough. The feature will permit near year round fish movement between the slough and the river, and a sluice gate for easy equalization of interior/exterior water levels.

c. A 48,000 GPM permanently mounted output pump with a portable drive unit will be located at approximate Illinois River Mile 2.5 (structure #2). This pump will be used to discharge water from the interior of the site (Silver Lake, Chickahominy Lake, Coon Lake and Royal Lake) to the river during the summer drawdown phase of waterfowl management.

d. A combination open-topped water control/fish passage structure will be placed at the river confluence, along the Mississippi River, just opposite the upriver end of Island 525 (structure #3). The unit is identical to item b. above, except that there are two sluice gates. This feature also includes a dredged channel connection between the river and Silver Lake.

e. A single 42" diameter CMP gravity drain and sluice gate will be located at the downriver entrance to Squaw Island in order to facilitate the areas use as a green tree area for waterfowl and herons (structure #4).

f. Also near the entrance to Squaw Island will be placed a 5,000 GPM permanently mounted pump with portable drive unit to function in combination with the item e. gated structure in water control (structure #5).

g. An interior water control structure, consisting of an 8' wide concrete stoplog unit will serve to help regulate Silver Lake and Chickahominy Lake as independent management units (structure #6).

h. An interior water control structure similar to item g. will be placed between Chickahominy and Royal Lakes to permit the independent water management of those two units (structure #7).

i.&j. Two terrace embankment structures, each with 3' wide concrete stoplog units, will be placed at the north end of the goose fields to permit fall ponding and summertime drainage of the goose fields (structures #9 & 10).

k. A 5,000 GPM portable input pump will be made available for the fall flooding of the goose fields using water pumped from Pohlman Slough (structure #8).

l. A deepwater dredge cut along 40% of the length of Pohlman Slough towards the north end of the slough to provide a fish refuge during the winter/summer stress periods (dotted line in Pohlman Slough).

m. Other project features include the construction of two containment areas on existing crop land areas for the disposal of hydraulically dredged material from channel deepening with Pohlman Slough (cross-hatched areas). At this time, it is assumed that these areas will subsequently be planted to mast trees to help offset the bottomland forest impacts of levee placement.

n. Several areas (as noted on the attached general plan maps) have been selected and soils tested as acceptable open land borrow sites for obtaining levee fill material (hatched areas). The exact configuration and total acres of borrow area needed has not yet been determined.

In your response to us, please include some blank copies of Form AD 1006, as we have exhausted our supply.

If you have any questions concerning this matter, please contact Mr. Tim George of our Environmental Planning Section at 314-331-8459.

Sincerely,

B. Hawickhorst
Acting Chief, Planning Division

Enclosure

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: June 17, 1994
Name Of Project: Calhoun Point Habitat Rehabilitation & Enhance.	Federal Agency Involved: U.S. Army Corps of Engineers, St. Loui
Proposed Land Use: wildlife management	County And State: Calhoun County, Illinois
PART II *(To be completed by SCS)*	Date Request Received By SCS

Does the site contain prime, unique, statewide or local important farmland? Yes ☐ No ☐
(If no, the FPPA does not apply — do not complete additional parts of this form).

Major Crop(s)	Farmable Land In Govt. Jurisdiction: Acres: %	Acres Irrigated	Average Farm Size
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Amount Of Farmland As Defined in FPP: Acres: %	Date Land Evaluation Returned By SCS

PART III *(To be completed by Federal Agency)* see attached sheet	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site				
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by SCS)* Land Evaluation Criterion				
Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

PART III (Form AD 1006)

Calhoun Point Habitat Rehabilitation and Enhancement Project, Calhoun County, Illinois

Alternative Site Rating	Total Acres To Be Converted Directly [1]	Total Acres To Be Converted Indirectly	Total Acres in Site
Levee Site	24.0	0	24.0
Structure #1 Site	n/a [2]	0	n/a
Structure #2 Site	0.05	0	0.05
Structure #3 Site	n/a	0	n/a
Structure #4 Site	n/a	0	n/a
Structure #5 Site	0.05	0	0.05
Structure #6 Site	n/a	0	n/a
Structure #7 Site	n/a	0	n/a
Structure #8 Site	n/a	0	n/a
Structure #9 Site	0.25	0	0.25
Structure #10 Site	0.15	0	0.15
Hydraulic Dredging Site	n/a	0	n/a
Disposal Site #1	8.0	0	8.0
Disposal Site #2	15.0	0	15.0
Borrow Site #1	(87.0)	0	(87.0)
Borrow Site #2	(13.0)	0	(13.0)

[1] we show acres affected, and not necessarily acres converted to nonagricultural use, as we have not yet encountered any guidelines in print defining the types of activities or structures which constitute a nonagricultural use.

[2] n/a = not applicable for existing aquatic sites, or for proposed portable pump.

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

1902 FOX DRIVE
CHAMPAIGN, IL 61820

July 13, 1994

Steve Chard
ATTN: Teresa Savko
IDOA, Bureau of Soil & Water Conservation
State Fairgrounds, P.O. Box 19281
Springfield, IL 62794-9281

Re: Calhoun Point Habitat Rehabilitation and Enhancement
Wildlife Management
Lesa Analysis

Dear Steve:

Enclosed is the AD-1006 for said subject. If you have any questions give me a call.

Sincerely,

ACTING FOR
CHARLES WHITMORE
State Conservationist

Enclosure

CC:
Tim George, COE, St. Louis, Missouri

RLM:jm

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State of Illinois
DEPARTMENT OF AGRICULTURE
State Fairgrounds / P.O. Box 19281 / Springfield 62794-9281 TDD: 217/524-6858

Bureau of Environmental Programs 217/ 785-2427
Bureau of Farmland Protection 217/ 782-6297
Bureau of Soil and Water Conservation 217/ 782-6297

August 24, 1994

Mr. Tim George
St. Louis District, Army Corps of Engineers
ATTN: Environmental Planning Section
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Calhoun Point Habitat Rehabilitation
and Enhancement Management
Calhoun County, Illinois

Dear Mr. George:

The Illinois Department of Agriculture has examined the proposed improvements for their potential impact to agricultural land as well as its compliance with Illinois' Farmland Preservation Act. Accordingly, we submit the following comments.

The project involves drainage related improvements to the 21,000 acre Calhoun Point Waterfowl Management Area which was acquired by the Corps in conjunction with construction of Lock and Dam 26 on the Mississippi River in the 1930's. Since the mid-1950's, Calhoun Point has been administered by the U.S. Fish and Wildlife Service (USFWS) as part of the national wildlife refuge system under a general plan agreement with the Corps. The Illinois Department of Conservation has responsibility for day-to-day management of the area under terms of a cooperative agreement with the USFWS.

The Area consists mostly of bottomland hardwood forest, about 450 acres of open water and a few scattered agricultural fields. Current management is directed primarily at providing waterfowl habitat and preserving the bottomland hardwood ecosystem. Ongoing management practices rely heavily on pumping in the spring to dewater areas for growing waterfowl food and in the fall to recharge these areas to make food available for waterfowl.

General features to be constructed include a 5 mile long riverside dike/levee forming a closed system with a Mississippi River tie-in tapering in the downriver direction to the confluence area with the Illinois River. Additionally, other water control structures and appurtenances are included in the total construction project. Because the water control improvements will be contained within the boundaries of the Refuge Area and additional land will not be acquired for its implementation, we do not object to the project.

Enclosed is the completed USDA-Soil Conservation Service AD-1006 Form which is to be included in the project's environmental assessment. A copy has been forwarded to the State SCS office in Champaign for their records.

Sincerely,

Teresa J. Savko

Teresa J. Savko
Bureau of Farmland Protection

TJS:mdg

Enclosure (2)

cc: Robert McLeese, State SCS

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: June 17, 1994
Name Of Project: Calhoun Point Habitat Rehabilitation & Enhance.	Federal Agency Involved: U.S. Army Corps of Engineers, St. Louis
Proposed Land Use: wildlife management	County And State: Calhoun County, Illinois
PART II *(To be completed by SCS)*	Date Request Received By SCS: 6-27-94

Does the site contain prime, unique, statewide or local important farmland? Yes [X] No [ ]
(If no, the FPPA does not apply — do not complete additional parts of this form).

Acres Irrigated: | Average Farm Size: 300

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
Corn, Soybeans, Wheat, Hay	Acres: 31,200,000 % 87	Acres: 31,200,000 % 87
Name Of Land Evaluation System Used	Name Of Local Site Assessment System: Statewide	Date Land Evaluation Returned By SCS: 7-14-94

PART III *(To be completed by Federal Agency)* see attached sheet	Alternative Site Rating			
	~~Site A~~	Site ~~B~~ A	Site C	Site D
A. Total Acres To Be Converted Directly		147.5		
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site		147.5		
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	167	136.5		
B. Total Acres Statewide And Local Important Farmland	20	2.0		
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.00005	.004		
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	82	74		
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	63	74		

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area	(See attached Illinois Site Assessment Factors)				
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS *200	~~160~~		68		
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100		74		
Total Site Assessment *(From Part VI above or a local site assessment)* *200	~~160~~		68		
TOTAL POINTS *(Total of above 2 lines)* *300	~~260~~		141.3		

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes [ ] No [X] ~~State Site Assessment System~~

Reason For Selection:

* When utilizing the state Site Assessment factors, 200 points are assigned to the Site Assessment section of the LESA system for a maximum score of 300 points.

(See Instructions on reverse side)

Form AD-1006 (10-83)

Calhoun Point Habitat
Rehabilitation and Enhancement Wildlife Management
Calhoun County, Illinois
St. Louis Army Corps of Engineers

PART VI-A **Illinois Site Assessment Criteria**	**Maximum Point**	**Site A**
1. Land Use on the Site	20	0
2. Adjacent Land Use	20	0
3. General Character of Area Within 1½ Miles of Site	20	0
4. Distance to City	20	20
5. Zoned Use of Proposed Site	20	0
6. Zoned Use of Land Adjacent to Proposed Site	20	0
7. Planned Land Use of Proposed Site	20	10
8. Compatibility of Proposed Use with Surrounding Land Uses	20	0
9. Alternative Sites Proposed on Less Productive Land	10	10
10. Availability of Central Water System	10	10
11. Availability of Central Waste Disposal System (Sewer)	10	10
12. Transportation	10	8
TOTAL SITE ASSESSMENT POINTS	**200**	**68**

PART VII		
Relative Value of Farmland	100	73.3
Total Site Assessment	200	68
TOTAL ILLINOIS LESA POINTS	**300**	**141.3**

082494
TJS:mdg

PD-17

State of Illinois
DEPARTMENT OF AGRICULTURE
State Fairgrounds / P.O. Box 19281 / Springfield 62794-9281 TDD: 217/524-6858

Bureau of Environmental Programs 217/ 785-2427
Bureau of Farmland Protection 217/ 782-6297
Bureau of Soil and Water Conservation 217/ 782-6297

January 4, 1995

Mr. Owen Dutt
Chief, Planning Division
St. Louis District, Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Draft Upper Mississippi River System
Environmental Management Program
Definite Project Report (SL-7)
With Integrated Environmental Assessment

Calhoun Point Rehabilitation and Enhancement Project
Pool 26, Illinois and Mississippi Rivers
Calhoun County, Illinois

Dear Mr. Dutt:

The Illinois Department of Agriculture previously reviewed the proposal for its potential impacts to agricultural land and on August 24, 1994 submitted comments stating we did not object to the project's implementation.

We have no further comments on the project.

Sincerely,

Teresa J. Savko

Teresa J. Savko
Bureau of Farmland Protection

TJS:mdg

APPENDIX DPR-N

SITE WATER MANAGEMENT PLAN

FOREWORD

APPENDIX DPR-N provides a description of existing and future water management at Calhoun Point. Water management plans are presented for fisheries management (Pohlman Slough), moist-soil management (Silver, Chickahominy, and Royal lakes), green tree reservoir management (Squaw Island), and goose management ("Goose Field").

WATER MANAGEMENT PLAN FOR MOIST-SOIL UNITS

Silver, Chickahominy, and North and South Royal Lakes are managed primarily as habitat for migratory waterfowl, especially dabbling ducks. Existing water regulation plans for moist-soil management will not differ substantially from future plans. Water regulation for a typical year is as follows (see FIGURE N-1).

In January, the two exterior water control structures will be in a closed position, and water elevations of Silver, Chickahominy, and Royal Lakes will be about 1.5 feet higher than normal pool on the Illinois and Mississippi Rivers. From winter until mid-June, the interior water levels will fluctuate in response to seepage to the river and local runoff, provided that the riverside dike/levee is not overtopped by a spring flood.

In late June, these interior water levels will be lowered gradually using gravity flow and the pump on the Illinois River. The target elevation for drawdown for moist-soil management will be about 1.5 feet lower than normal pool. This drawdown will permit the germination and growth of natural or aerially seeded plants beneficial to waterfowl, especially dabbling ducks. The pump will be used as needed during the drawdown period to counteract seepage from the river.

About mid-September, water levels will be raised using gravity flow and the pump on the Mississippi River. This fall flooding will occur over a two-week period, and will bring interior water levels to a point 1.5 feet above normal pool. Seed heads of food plants will remain above water and be made available to waterfowl. The unit is recharged, as needed, during the remainder of the waterfowl migration season, to counteract seepage to the river.

Actual moist-soil management is not static from year to year, as the above "typical" year would imply. Variability in timing of drawdowns (early, midseason, late), drawdown rate, scheduling of fall flooding (early, midfall, late), and flooding rate (continuous, incremental), allows for influencing the composition and production of moist-soil plants, and the composition and diversity of wetland wildlife responding to those food sources as they become available. Variability will also be possible within the moist-soil unit, since semi-independent water control will be possible between Silver, Chickahominy, and South and North Royal Lakes with the project.

Over the life of the project, efforts to consolidate the unit's substrate will be included as needed, perhaps every ten or so years. The moist-soil unit will be drained as low as possible to dry the lake bottom and consolidate the sediment. This action will enhance the ability of aquatic macrophytes to root in the

substrate, and will improve water clarity once the unit is reflooded. These changes will further enhance the quality of the reflooded habitat for waterfowl, fish, invertebrates, and other species.

Although current management practices in this unit preclude its year-round use by fish, the area may still have some utility as a spawning/nursery area for river fishes. The fish passage portion of the exterior water control structure on the Mississippi River can be opened during two times of the year. The first is when the moist-soil unit is dewatered in the spring/early summer, but before pumping begins to bring interior levels below pool elevation. The second is when the moist-soil unit is recharged in the fall, but before pumping begins to elevate interior levels above pool. Of course, movement of fishes in and out of the moist-soil unit will also occur during flood events that overtop the riverside dike/levee.

WATER MANAGEMENT PLAN FOR POHLMAN SLOUGH

As the fisheries management unit, Pohlman Slough is kept open to the Illinois River on a year-round basis. With the project, this management emphasis will not change. The water control structure in the riverside dike/levee will be left open much of the time so fish can access the slough for overwintering and reproduction (see FIGURE N-2).

Fish movement between the river and slough will be prevented during periods of impending floods and for bottom consolidation, when the structure will be closed. It is desirable to keep flood water out of Pohlman Slough for two reasons. First, flood water transports sediment, which would otherwise be deposited inside the riverside dike/levee in the slough, leading to sedimentation. Second, flood water can interfere with water management in the moist-soil unit, which is hydraulically isolated from Pohlman Slough only up to the elevation of 422 feet NGVD. Spring is the season most typical of flooding.

WATER MANAGEMENT PLAN FOR GREEN TREE RESERVOIR

Squaw Island and Squaw Slough are currently not targeted for any management emphasis. With the project, an exterior water control structure and pump in the riverside dike/levee will allow for green tree reservoir management, which provides shallowly flooded forest as habitat for migratory and resident waterfowl. Water regulation for a typical year is as follows.

In January, the water control structure in the riverside dike/levee will be closed. The surface elevation of the seasonal green tree reservoir will be no more than 2.5 feet above normal

pool of the Mississippi and Illinois Rivers (see FIGURE N-3). At its maximum height, the reservoir will encompass the 18-acre Squaw Slough and 100 acres of adjacent bottomland forest.

In mid-February, the water control structure will be opened to gravity flow standing water out of the forest and dewater the reservoir; pumping will be used if pool conditions do not allow for gravity flow. Complete dewatering will take place over a period of 2-3 weeks, and will be completed by the time trees break dormancy in early March. At this time the water control structure will be closed, and the reservoir will coincide with Squaw Slough. Water will be kept in Squaw Slough from spring through summer to provide brood rearing habitat for the wood duck.

In the early fall, water will be pumped into Squaw Slough to recreate the shallow reservoir. Pumping will begin at the beginning of October and end by the beginning of November.

Like moist-soil management, green tree reservoir management also is not static from year to year, as the description above implies. The reservoir will be established about six of every seven years, and on the off year it will be kept dry. The timing of fall flooding and spring drawdowns will vary from one year to the next, as will the surface elevation of the water. For example, fall flooding could commence anytime during the period 1 October - 15 November, and spring drawdown anytime during the period 15 February - 1 March. The variability in timing and depth of the reservoir is an attempt to mimic the hydrology of natural river flooding, so as to minimize stress and mortality on the flooded trees, as well as to attract different types of wetland-dependent birds, such as waterfowl and shorebirds.

WATER MANAGEMENT PLAN FOR "GOOSE FIELD"

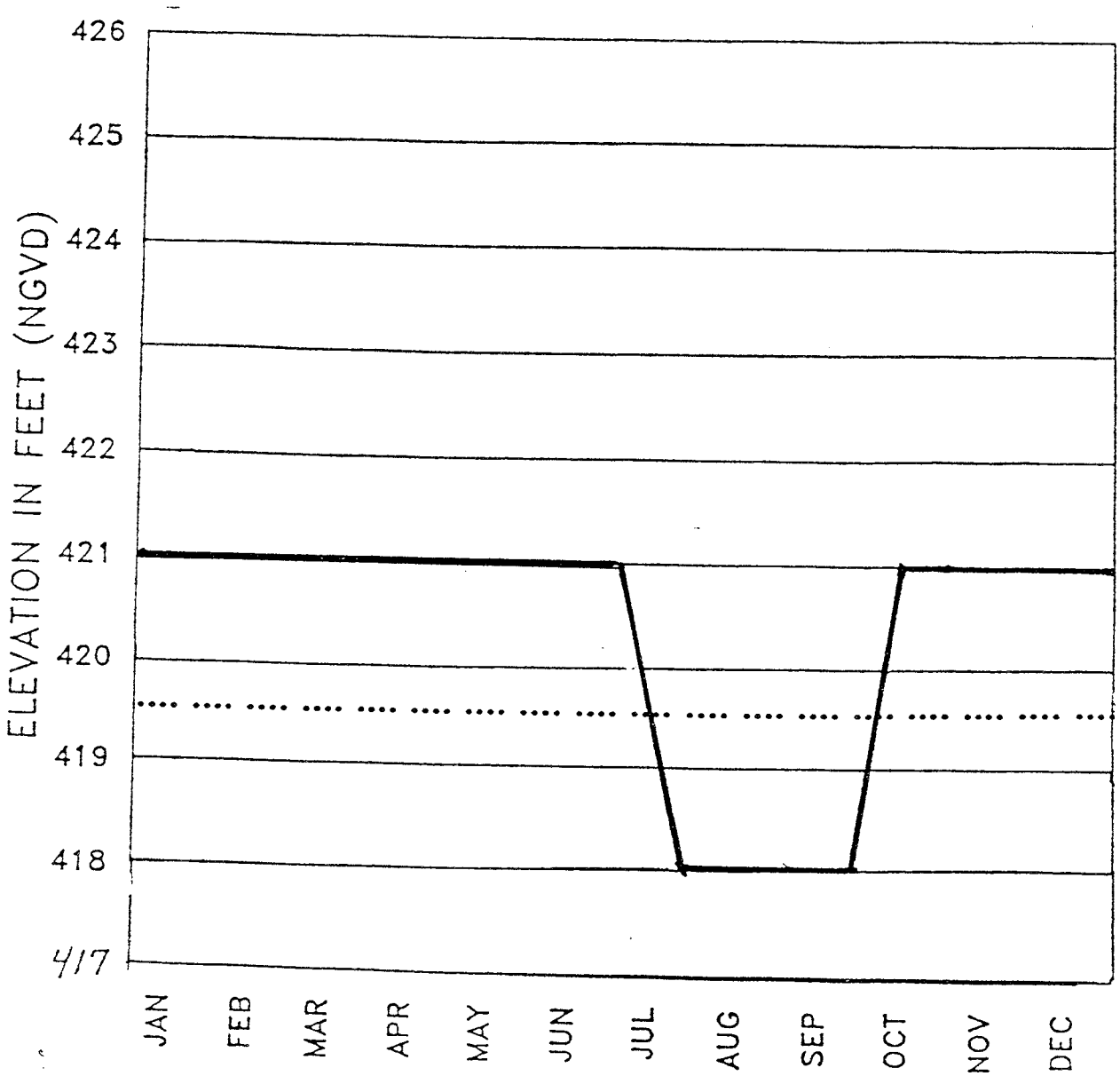
Water management for migratory Canada geese in the "Goose Field" involves the shallow flooding of cropland. The current water management plan will not differ substantially from the future plan with the project. A typical year is as follows.

In January, the two stop log structures are closed, impounding shallow water up to 2 feet deep (see FIGURE N-4). In March, the stop logs are removed in each structure to allow the cropland to drain. Any local runoff from rainfall will pass through the structures.

In October, the two stoplog structures are closed to impound water. The "Goose Field" pump is used to create a shallow water impoundment up to two feet deep.

MOIST-SOIL MANAGEMENT
(SILVER, CHICKAHOMINY, AND ROYAL LAKES)

WATER LEVELS FOR "TYPICAL" YEAR



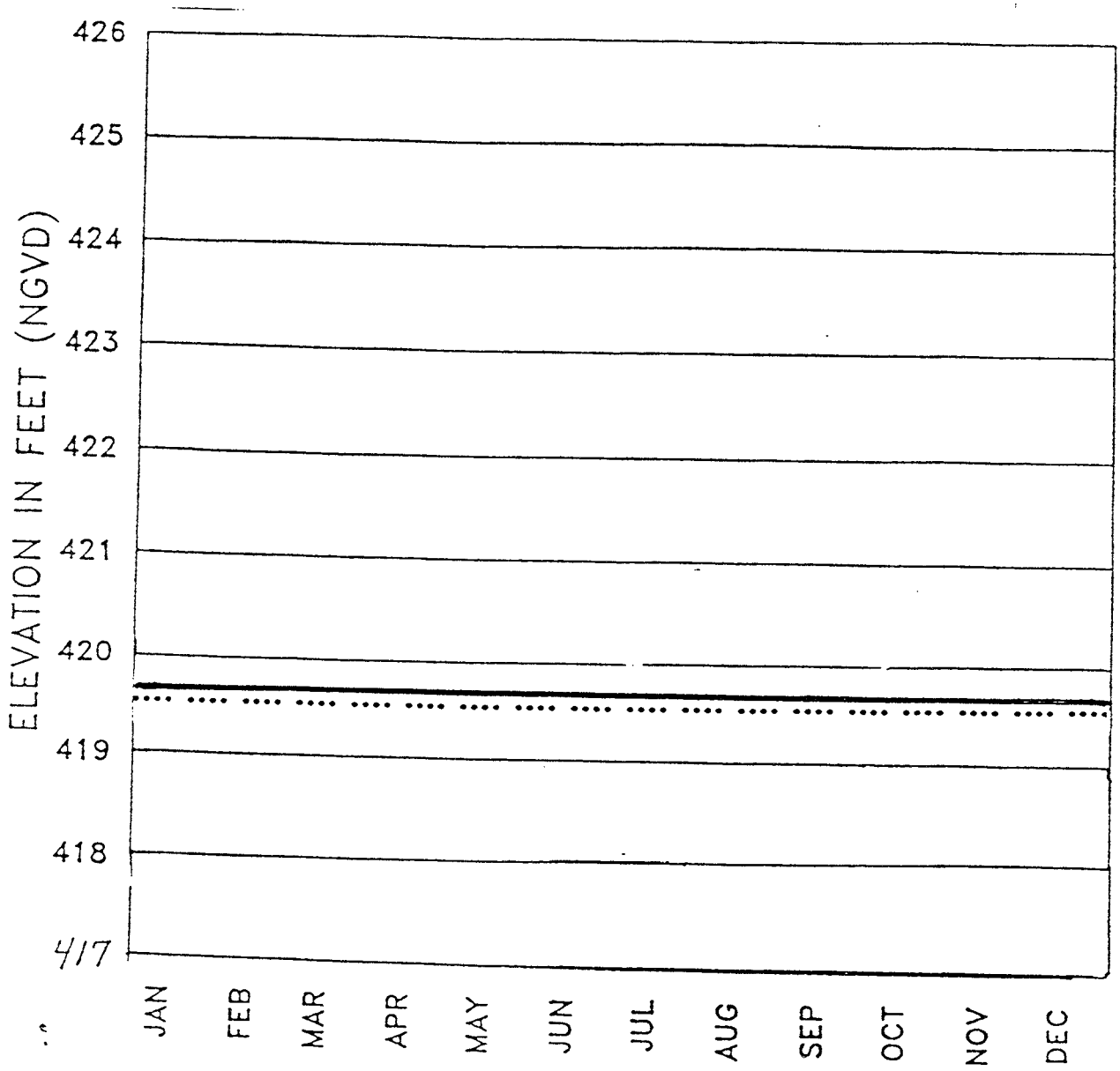
.... NORMAL ELEVATION OF POOL 26

——— DESIRED WATER ELEVATION

FIGURE N-1.

FISHERIES MANAGEMENT
(POHLMAN SLOUGH)

WATER LEVELS FOR "TYPICAL" YEAR



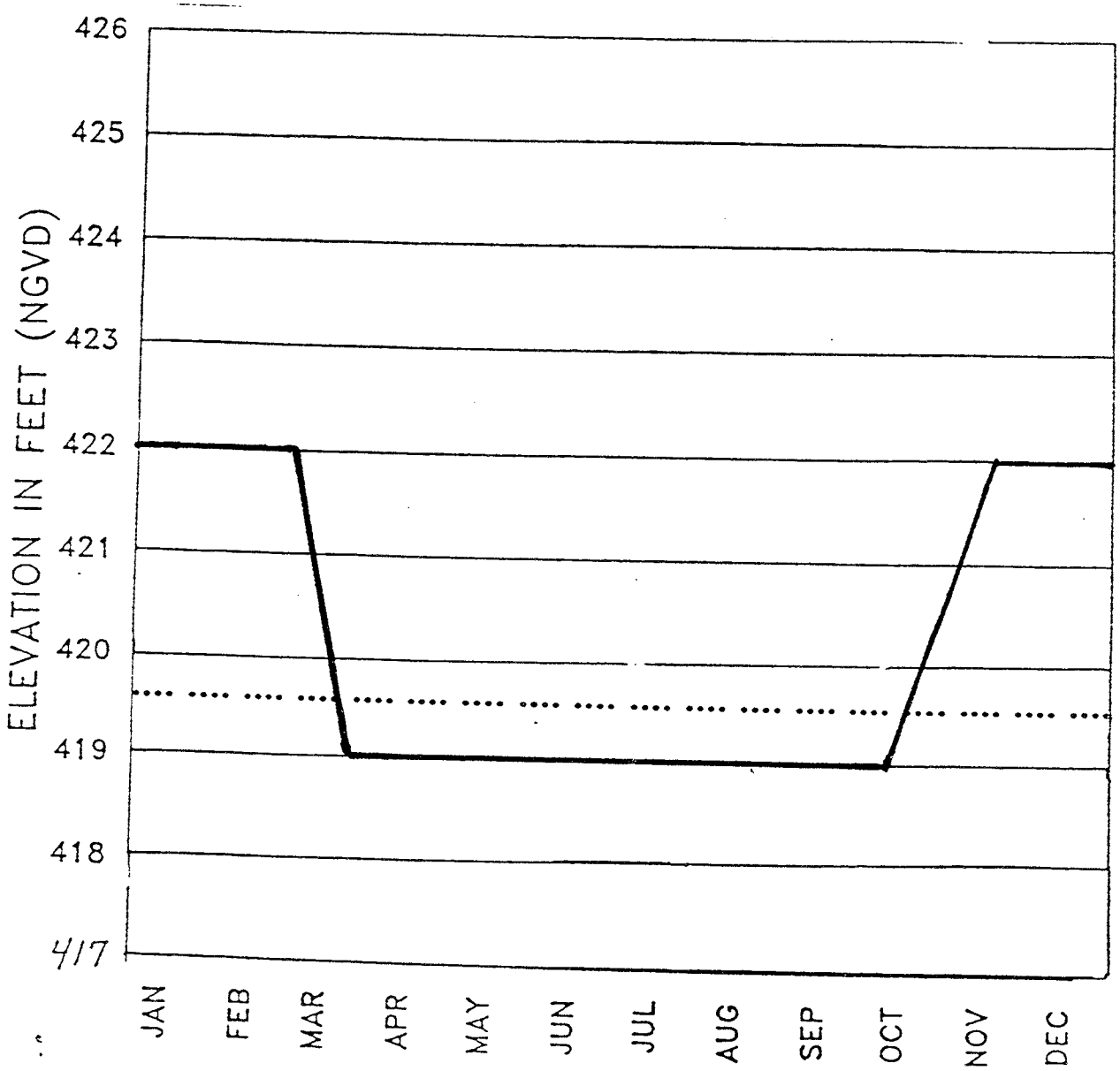
.... NORMAL ELEVATION OF POOL 26

——— DESIRED WATER ELEVATION

FIGURE N-2.

GREEN TREE RESERVOIR MANAGEMENT
(SQUAW SLOUGH AND ISLAND)

WATER LEVELS FOR "TYPICAL" YEAR



.... NORMAL ELEVATION OF POOL 26

——— DESIRED WATER ELEVATION

FIGURE N-3.

GOOSE MANAGEMENT
("GOOSE FIELD")

WATER LEVELS FOR "TYPICAL" YEAR

.... GROUND ELEVATION (APPROXIMATE)

——— DESIRED WATER ELEVATION

FIGURE N-4.

APPENDIX DPR-O

REAL ESTATE CONSIDERATIONS

FOREWORD

APPENDIX DPR-R provides the real estate requirements for the Calhoun Point HREP. The memo recommends the acquisition of certain lands vital to the construction and operation of the proposed project.

ESTIMATED REAL ESTATE REQUIREMENTS

CALHOUN POINT PROJECT

1. **Purpose.** The purpose of this report is to recommend acquisition of land which will enable the construction and operation of the Calhoun Point Project. This report is for planning purposes only. The final real property acquisition lines and the estimate of value are subject to minor revision after approval.

2. **Background.** This project represents the culmination of the Corps "Wetland Recovery Plan"; the USF&WS/ National Ecology Research Center's "A Concept Plan for Enhancement of Fish and Wildlife Resources: and the Illinois Department of Conservation fact sheet for an EMP project. The Definite Project Report (DPR) is pending approval from higher levels of Corps authority. Approval of the DPR will be pending the recommendation of HQUSACE to the Assistant Secretary of the Army (ASA) for FY 95 funding. Approval of these real estate requirements is subject to approval of the DPR requirements.

3. **Description of the Project.** Calhoun Point is located at the confluence of the Illinois and Mississippi Rivers (river mile 221) and is bounded on the north and west by the Illinois River and on the east by the Mississippi River. It is in the Illinois County of Calhoun, approximately 3 miles west of the City of Grafton and serves as the landing point for the Brussels Ferry.

Calhoun Point contains approximately 2,157 acres of land and, with the exception of Tract C-19A, was acquired in fee simple title by the Corps of Engineers in the late 1930's and early 1940's for the Lock and Dam 26 navigation project.

Tract C-19A, shown in red on "Exhibit A", contains 23.08 acres and is privately owned by the following individuals: Darwin Yann (618) 887-4417, 4152 Yann Road, Marine, Il. 62061; Robert Wobbe (618) 345-6082, #23 Susanne Court, Caseyville, Il 62232, William Skelton (618) 344-0239, 1011 Villa Ridge, Collinsville, Il 62234. The tract is encumbered with a number of leases to individuals for cabin site purposes along with a perpetual flowage easement to the Corps of Engineers and an easement to the Calhoun County Highway Department.

The project consists of the construction of a peripheral levee with a top elevation of 424 MSL, beginning at the Brussels Ferry landing, extending down the Illinois River and up the Mississippi River - outside Squaw Island and inside Royal Landing, and ending at the county road to the

ferry landing. The levee will be constructed entirely upon federal land with the exception of that portion of the levee under the county roadway.

4. **Proposed Acquisition.** With the exception of Tract C-19A and the county road right-of-way all of the land needed for this project is under governmental ownership and is managed by either the U.S. Army Corps of Engineers or the U.S. Department of Interior (see Exhibit "B").

Tract C-19A will be affected in a noncompensable manner by the elevation of their access roadway. This construction and driveway tie-ins can be done entirely within existing 40 foot county highway right-of-way.

The top of the levee will be 424 MSL or approximately 2 feet above the existing ground level. This will reduce the frequency of flood waters entering C-19A, however when flooding does occur the levee will restrict interior drainage and cause water to stand for a longer duration. The existing perpetual flowage easement over this tract is inadequate to cover this increased duration of standing water. An additional upgraded flowage easement must be purchased form the private landowners.

The western, approximately 1000 feet, of the levee in Tract C-19A will be over the existing gravel cabin access road. This is a public roadway and is maintained by the county. The roadway will be elevated approximately 2 feet, will become the top of the levee and will be maintained by the state of Illinois. Landside slope of the levee will be such as to permit vehicular access from the elevated roadway to the cabins. A permanent easement for levee and roadway purposes from Calhoun County must be obtained.

5. **Estate Selection.** Land requirements are limited to the minimum amount necessary to provide access and accommodate the project purposes.

Levee Easement. A perpetual and assignable easement and right-of-way in, on, over and across (the existing county road from the Brussels Ferry Landing and extending northeasterly approximately .31 miles) for the location, construction, operation, maintenance, alteration and replacement of a levee and appurtenances thereto; together with the right to trim, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the easement; reserving, however, to the owners, their heirs and assigns, the right to travel upon and cross over the easement for access to their adjoining land or for river access, subject however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Since this easement will be on existing county right of way and the existing county road will be relocated to the top of the levee and the roadway will continue to provide the same access this easement should be acquired at no cost. The approximate 2 foot elevation of the roadway will require tie-ins to the privately owned cabins. These tie-ins should be able to be constructed in the existing 40 foot wide county right of way.

Permanent Flowage Easement. The privately owned Tract C-19A is currently encumbered with a Corps permanent flowage easement intended to cover the impacts of the 9-foot navigation channel project, and is not adequate to cover any impacts resulting from this HREP. An additional permanent flowage easement over the entire 23.08 acres is required to accommodate the delayed property drainage for flood events over 424 NGVD.

6. **Public Law 91-646 Requirements.** The proposed acquisition is not anticipated to displace any persons from their home, business or farm; and all acquisition activities will comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) as amended by Public Law 100-17.

7. **Estimated Costs of Acquisition.** The minimum real property interests for the construction of this project can be acquired at a total cost of approximately $18,000. The following table represents a summary of theses costs.

Estimate of Costs
Calhoun Point Project (HREP)

Permanent Flowage Easement	$7,000	
Improvements:	0	
Proximity Damages:	0	
Total Real Estate Cost		$ 7,000
Contingencies 25% (rounded up)	$2,000	
Acquisition Costs - 1 ownership X $8,000	8,000	
PL 91-646 Cost (Misc.)	1,000	
Total Administrative and Contingencies		11,000
Total Estimated Acquisition Cost		$18,000

The total value of this privately owned tract was appraised March 20, 1995 with a fair market value of $98,000. This included $71,000 for land and $27,000 for the nine cabins that contribute value. Should this entire tract be acquired minimal relocation expenses for personal property located in the cabins would be an additional expense. Informal discussions with the property owners of C-19A have indicated

a willingness to sell their entire tract rather than grant an additional flowage easement and increase the duration of standing water after certain flood events.

8. **Schedule of Acquisition.** Contract award has tentatively been scheduled for FY 95, depending upon the submission and approval of the DPR.

9. **Funding.** Pending approval of the DPR and availability of funds, acquisition will be accomplished by the Illinois Department of Conservation, in cooperation with the Corps of Engineers as required.

Real Estate Requirements.

The Illinois Department of Conservation will acquire all necessary private land interests, at no cost to the Government, however, the majority of the land needed for this construction is under Federal ownership. It was acquired approximately 50 years ago by the Corps and the U. S. Fish and Wildlife Service. The Corps need to periodically flood Calhoun Point enhanced Fish and Wildlife's use as a waterfowl migration area and a deep water habitat. Sedimentation over the past 40 years, however, has severely impacted the value of Calhoun Point as a wildlife area.

The principal objective of this plan is to provide optimum habitat for wildlife species. Rehabilitating and enhancing these wetland and aquatic habitats would provide breeding, nesting, and feeding habitats for many forms of waterfowl, mammals, and reptiles, and would furnish productive spawning and nursery areas for riverine fishes.

Real estate needed consists of a strip of land on which to construct and maintain a peripheral levee with a top elevation of 424 MSL. The levee will begin at the Brussels Ferry landing, extend down the Illinois River and up the Mississippi River and end at the county road to the ferry landing. With the exception of the project section which is within the Calhoun County Highway Department right-of-way this entire project is on Federal land. A permanent easement for levee and roadway use will be obtained from Calhoun County.

Due to the extended duration of standing water on the privately owned Tract C-19A the existing permanent flowage will be upgraded.

The Illinois Department of Conservation has informally agreed to acquire the noted easements, the St. Louis District is expecting written confirmation to be forthcoming.

APPENDIX DPR-P

DETAILED PROJECT COST ESTIMATE

FOREWORD

APPENDIX DPR-T provides a detailed display of base year project associated costs for each of the construction cost categories presented in Section 6 of the DPR main report. This estimate is in the MCACES format.

REVISED MCACES COST ESTIMATE
FOR
CALHOUN POINT
REHABILITATION AND ENHANCEMENT
PROJECT
POOL 26, ILLINOIS RIVER
CALHOUN COUNTY, ILLINOIS

DEPARTMENT OF THE ARMY
ST.LOUIS DISTRICT, CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

DATE of ESTIMATE: 29 MAY 1996

ESTIMATE APPROVED BY:

Michael A. Thompson

MICHAEL A. THOMPSON
Project Manager

Thomas R. Hewlett

THOMAS R. HEWLETT
Chief, Real Estate Division

Ronald E. Rauh

RONALD E. RAUH
Chief, Cost Engineering Branch

GERALD W. BARNES
Deputy District Engineer
For Project Management

BASIS OF MCACES COST ESTIMATE
FOR CALHOUN POINT (HREP)

01. GENERAL.

The MCACES construction cost estimate was developed using the preliminary cost estimate from the draft DPR as a basis. Current designs and recent bid abstracts for similar projects in the area have been used as a reference. An appropriate contingency was applied to each line item.

02. RELIABILITY OF DESIGNS, QUANTITIES, AND UNIT PRICES.

a. Relocations. Relocations are considered minor in nature. This work consists of placing crushed stone at some existing road ramps that provide access to private property. There are also some parking lots that will require placement of crushed stone.

b. Fish and Wildlife Facilities. The following work items have all been considered as part of Fish and Wildlife Facilities; Water Control Facilities, Forest Management Plan, Channel Excavation, Embankment Construction, Gravity Drainage Structure, and Pumping Plants.

1. Water Control Facilities. These facilities consist of Water Control/Fish Passage Structures and Stoplog Structures. These structures have been designed to increase the control of interior water levels that are typically dependent on river stages. The basic structures will be constructed of reinforced concrete. Only minor dewatering is assumed to be required for the construction of these structures.

2. Forest Management Plan. The forest management plan for this project is similar to those used on previous EMP projects and has been developed with input from IDNR. The major component of this plan consists of mast tree planting. The flood of 93 caused extensive damage to the forest in the project area. Many of the trees have died as a result of the flood. Mast tree plantings along with the other measures considered will help to improve and sustain the environmental integrity of the project area. Quantities are based on known acreages of specific areas.

3. Channels. Channel excavation will be accomplished by dragline as well as hydraulic dredging. All channel excavation has been predetermined and is assumed to be limited to site specific areas. Quantities therefore are assumed to be reasonably accurate. Slightly higher contingencies were used for dredging due to the uncertainty of dredge pipe lengths.

4. Levees. The design of the levees is based on the performance other recently constructed EMP projects in the region. It is assumed that a stability analysis will not be required for

this project. The embankment will be constructed of semicompacted earthen materials obtained from local designated borrow areas.

The design of the CMP gravity drainage structure has been used on previously constructed projects similar in nature and have proven effective. To limit dewatering concerns to a minimum, contractors on previous projects have fabricated these structures in the dry and placed them in the wet. Under normal conditions you could expect approximately 2'-3' of water in the bottom of the excavation.

d. Pumping Plant. The pump stations will be constructed of reinforced concrete and will utilize both stationary and portable pumps. Dewatering is assumed to be a major concern for the constructability of this structure. Due to the design elevations a deep well type dewatering system has been assumed. The MCACES smart assembly was used to develop the cost for the dewatering system.

04. VARIABLE CONTINGENCIES.

The cost estimate for this project involves contingencies ranging in value from 10% to 15%. Assigned contingencies are based on the inherent difficulties in visualizing and quantifying certain types of work. The contingencies used for this project are percieved to be average and are based on the St. Louis Districts previous experience with similar EMP projects in the region.

As requested the project contingencies have been reviewed and determined to be reasonable. The St. Louis District has designed and constructed a number of similar projects. Due to the success of these projects it is felt that higher contingencies are not required.

Ronald E. Rauh

Ronald E. Rauh
Chief, Cost Engineering Branch

CALHOUN POINT - *REVISED* DPR
HABITAT REHABILITATION AND
ENHANCEMENT PROJECT (HREP)
POOL 26, MISSISSIPPI RIVER
LINCOLN & ST. CHARLES COUNTIES

Designed By: ST. LOUIS DISTRICT, COE
Estimated By: ST. LOUIS DISTRICT, COE

Prepared By: GREG DYN
Reviewed by: RONALD RAUH, P.E.

Preparation Date: 05/29/96
Effective Date of Pricing: 00/00/00
Est Construction Time: 720 Days

Sales Tax: 6.00%

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This estimate has been revised to reflect cost deviations caused by the realignment of the levee. The realignment of the levee was determined to be necessary in order to avoid undesirable real estate acquisition. Reference the revised drawing for General Site Plan - Plate 2.

The following quantity changes have been considered for the revision of this estimate.

Levee Embankment	+400 cy
Crushed Stone for Levee Crown	+200 ton
Seeding	+1 acre

SUMMARY REPORTS SUMMARY PAGE

PROJECT OWNER SUMMARY - Feature.....1
PROJECT OWNER SUMMARY - Sub Feat.....2
PROJECT OWNER SUMMARY - Item.....4
PROJECT INDIRECT SUMMARY - Feature.....13
PROJECT INDIRECT SUMMARY - Sub Feat.....14
PROJECT INDIRECT SUMMARY - Item.....16
PROJECT DIRECT SUMMARY - Feature.....25
PROJECT DIRECT SUMMARY - Sub Feat.....26
PROJECT DIRECT SUMMARY - Item.....28

DETAILED ESTIMATE DETAIL PAGE

01. Prime Contractor
0. Overhead Items - PM
01. Field Office Overhead.....1
02. Mob and Demob.....2
03. Construct Haul Roads.....4
01. Lands and Damages
20. Definite Project Report (DPR)
03. Real Estate Analysis Documents
07. All Other Real Estate Analy/Docs.....5
02. Relocations
01. Roads, Construction Activities
39. Road Surfacing
01. Crushed Stone Road Ramps.....6
02. Crushed Stone Parking Lots (2ea).....6
99. Associated General Items
01. 12" CMP Culverts (3ea).....6
06. Fish and Wildlife Facilities
01. Water Control/Fish Passage
01. Water Control/Fish Passage Struc
01. Excavation.....8
02. Backfill.....8
03. Concrete Slabs.....8
04. Concrete Walls.....9
05. Reinforcing Steel.....9
06. Stop Logs.....10
07. Sluice Gates - 42".....10
08. Gate Operators.....10
09. Steel Grating.....10
10. Jib Crane w/Trolly Hoist.....11
11. Staff Gages.....11
12. Concrete Boat Ramp.....11
13. Riprap.....12
14. Bedding.....12
15. Security Gates.....12
02. Fish Passage Structure at Pump S
01. Excavation.....13
02. Backfill.....13
03. Concrete Slabs.....14

DETAILED ESTIMATE DETAIL PAGE

04. Concrete Walls.....14
05. Reinforcing Steel.....15
06. Miscellaneous Metal.....15
07. Miscellaneous Fiberglass.....16
02. Concrete Stoplog Structures
01. 8' Stoplog Structures
01. Excavation.....16
02. Concrete Slabs.....16
03. Concrete Walls.....17
04. Reinforcing Steel.....17
05. Steel Grating (location 7 only).....18
06. Stop Logs.....18
07. Jib Crane w/Trolly Hoist.....18
08. Bedding - 3" minus.....18
09. C Stone.....18
10. Geogrid.....19
11. Geotextile.....19
12. Staff Gage.....19
02. 3' Stoplog Structures
01. Excavation.....19
02. Concrete Slabs.....20
03. Concrete Walls.....20
04. Reinforcing Steel.....21
06. Stop Logs.....21
07. Jib Crane w/Trolly Hoist.....21
03. Forest Management Plan
A. Mast Tree Plantings (disposal ar
01. Herbicide Application.....22
02. Seedlings - Bare Root.....22
03. Seedlings - 2 Gal containers.....22
B. Mast Tree Plantings (cropland)
01. Establish Ground Cover.....22
02. Seedlings - Bare Root.....23
03. Seedlings - 2 Gal containers (11.....23
04. Seedlings - 2 Gal containers (22.....23
05. Tree Shelters.....23
C. Mast Tree Plantings (forest)
01. Establish Ground Cover.....23
02. Mechanized Clearing.....24
03. Seedlings - 2 Gal containers (11.....24
04. Herbicide Application.....24
D. Woody Vegetation Control w/aeria
02. Vegetation Removal.....24
04. Channels
01. Squaw Island
02. Excavation - Dragline.....25
03. Clearing.....25
04. Seeding.....25
02. Royal to Chickahominy
02. Excavation - Dragline.....26
03. Clearing.....26

DETAILED ESTIMATE DETAIL PAGE

04. Seeding....26
03. Pohlman
01. Remove Existing Control Struct....26
02. Excavation - Dredging....27
03. Clearing....27
04. Seeding....27
04. Silver Lake to Chickahominy
02. Excavation - Dredging....28
05. Dredge Disposal Areas
02. Embankment - Disposal Retainment....28
03. Stripping/Clearing....28
04. Seeding....28
06. Borrow Areas
03. Stripping/Clearing....29
05. Levees
01. Dike/Levee, RS Only
02. Clearing(Includes Salvage Value)....29
03. Embankment - Levee....29
04. Crushed Stone - Levee Crown....30
05. Remove Existing Culverts....30
06. B Stone - Overflow....30
07. Stone - 3" minus....31
08. Access Gate....31
09. Seeding....31
10. Timber Piles....31
11. Fish Habitat @ Polhman Slough....32
02. Interior Levees (2 structures)
01. Clearing....32
02. Embankment - Levee....33
03. Stone - 6" minus....33
04. Seeding....33
03. 42" Dia. CMP Gravity Drain Str.
02. Excavation....33
03. Semi-Compacted Fill....34
04. 42" CMP Culvert....34
05. 42" CMP End Section....34
06. 42" Sluice Gate....35
07. 72' Dia Riser Pipe....35
08. Concrete Slab....35
09. Fiberglass Ladders....36
10. Fiberglass Grating....36
11. Bedding - 3" minus....36
12. Bedding - 6" minus....36
13. C Stone....37
14. Geotextile....37
15. Staff Gage....37
06. Pumping Plant
01. Pump Station, Location No. 2
02. Care and Diversion of Water
10. Install Dewatering (Sq. or Rect)....37
20. Dewater Operation Expense Per/Mo....38

DETAILED ESTIMATE DETAIL PAGE

30. Remove Dewatering Equipment.....39
03. Excavation.....39
04. Backfill.....39
05. Bedding Material.....40
06. Riprap.....40
07. Concrete.....40
08. Reinforcing Steel.....41
09. Sheet Pile.....41
10. H-Pile.....42
11. 42" Discharge Pipe.....42
12. 42" Dresser Coupling.....42
13. 42" Flap Gate.....42
14. Pump - 48000 GPM.....43
15. Jack Shaft Assembly.....43
16. Staff Gage.....43
02. Pump Station, Location No. 3
02. Care and Diversion of Water
10. Install Dewatering (Sq. or Rect).....43
20. Dewater Operation Expense Per/Mo.....44
30. Remove Dewatering Equipment.....45
03. Excavation.....45
04. Backfill.....45
05. Bedding Material.....46
06. Riprap.....46
07. Concrete.....46
08. Reinforcing Steel.....47
09. Sheet Pile.....47
10. H-Pile.....48
11. 42" Discharge Pipe.....48
12. 42" Dresser Coupling.....48
13. 42" Elbow (90).....48
14. 42" Flap Gate.....49
15. 42" Slide Gate.....49
16. Gate Operators.....49
17. Steel Grating.....49
18. Stop Logs.....49
19. Pump - 48000 GPM.....50
20. Portable Drive Unit For Pump.....50
21. Jib Crane w/Trolly Hoist.....50
22. Jack Shaft Assembly.....50
23. Staff Gage.....50
03. Portable Pump Units
01. Pump and Drive Unit - 5000 GPM.....51
02. Portable Fuel Tank (1000 gal).....51
03. Portable Fuel Tank (500 gal).....51
07. Bank Stabilization
01. Revetment, N.E. Corner
01. C Stone.....51
30. Planning, Engineering and Design
01. PED Prior to Completion of DPR
01. PED Prior to Completion of DPR.....52

DETAILED ESTIMATE DETAIL PAGE

04. Environment-Regulatory Activity
01. Environment-Regulatory Activity.....52
08. Plans and Specifications
01. Plans and Specifications.....52
10. Engineering During Construction
01. Engineering During Construction.....52
13. Cost Engineering
01. Cost Engineering.....52
14. Const-Supply Contract Award Acty
01. Const-Supply Contract Award Acty.....52
24. Value Engineerng Analysis Docmnt
01. Value Engineerng Analysis Docmnt.....53
26. Miscellaneous Activities
01. Miscellaneous Activities.....53
31. Construction Management (S&I)
01. Project Office S&A
01. Project Office S&A.....54
02. Area Office S&A
01. Area Office S&A.....54
03. District Office S&A
01. District Office S&A.....54
26. Programs/Project Managmnt Docmnt
01. Programs/Project Managmnt Docmnt.....54

BACKUP REPORTS 'BACKUP PAGE

CREW BACKUP.....1
LABOR BACKUP.....9
EQUIPMENT BACKUP.....10

* * * END TABLE OF CONTENTS * * *

** PROJECT OWNER SUMMARY - Feature (Rounded to 100's) **

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages		18,000	0	18,000	
02 Relocations		9,400	900	10,300	
06 Fish and Wildlife Facilities		3,708,400	478,900	4,187,300	
30 Planning, Engineering and Design		1,015,000	67,400	1,082,400	
31 Construction Management (S&I)		512,600	106,900	619,400	
TOTAL CALHOUN POINT - *REVISED* DPR		5,263,300	654,000	5,917,300	

** PROJECT OWNER SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages					
0120 Definite Project Report (DPR)		18,000	0	18,000	
TOTAL Lands and Damages		18,000	0	18,000	
02 Relocations					
0201 Roads, Construction Activities		9,400	900	10,300	
TOTAL Relocations		9,400	900	10,300	
06 Fish and Wildlife Facilities					
0601 Water Control/Fish Passage		191,800	28,800	220,500	
0602 Concrete Stoplog Structures		113,200	17,000	130,200	
0603 Forest Management Plan		250,500	25,100	275,600	
0604 Channels		530,800	77,500	608,200	
0605 Levees		806,600	82,900	889,500	
0606 Pumping Plant		1,430,300	209,200	1,639,500	
0607 Bank Stabilization		385,300	38,500	423,900	
TOTAL Fish and Wildlife Facilities		3,708,400	478,900	4,187,300	
30 Planning, Engineering and Design					
3001 PED Prior to Completion of DPR		561,000	0	561,000	
3004 Environment-Regulatory Activity		5,000	500	5,500	
3008 Plans and Specifications		364,000	54,600	418,600	
3010 Engineering During Construction		25,000	3,800	28,800	
3013 Cost Engineering		20,000	3,000	23,000	
3014 Const-Supply Contract Award Acty		10,000	2,000	12,000	
3024 Value Engineerng Analysis Docmnt	1.00 EA	25,000	2,500	27,500	27500
3026 Miscellaneous Activities		5,000	1,000	6,000	
TOTAL Planning, Engineering and Design		1,015,000	67,400	1,082,400	
31 Construction Management (S&I)					
3101 Project Office S&A		280,800	51,400	332,200	
3102 Area Office S&A		25,300	6,300	31,600	
3103 District Office S&A		184,500	46,100	230,600	
3126 Programs/Project Managmnt Docmnt		22,000	3,000	25,000	
TOTAL Construction Management (S&I)		512,600	106,900	619,400	

** PROJECT OWNER SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL CALHOUN POINT - *REVISED* DPR			5,263,300	654,000	5,917,300	

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
01 Lands and Damages					
0120 Definite Project Report (DPR)					
012003 Real Estate Analysis Documents					
012003_07 All Other Real Estate Analy/Docs		18,000	0	18,000	
TOTAL Real Estate Analysis Documents		18,000	0	18,000	
TOTAL Definite Project Report (DPR)		18,000	0	18,000	
TOTAL Lands and Damages		18,000	0	18,000	
02 Relocations					
0201 Roads, Construction Activities					
020139 Road Surfacing					
020139_01 Crushed Stone Road Ramps	110.00 TON	1,300	100	1,400	12.89
020139_02 Crushed Stone Parking Lots (2ea)	250.00 TON	5,600	600	6,100	24.45
TOTAL Road Surfacing		6,800	700	7,500	
020199 Associated General Items					
020199_01 12" CMP Culverts (3ea)	66.00 LF	2,500	300	2,800	41.90
TOTAL Associated General Items		2,500	300	2,800	
TOTAL Roads, Construction Activities		9,400	900	10,300	
TOTAL Relocations		9,400	900	10,300	
06 Fish and Wildlife Facilities					
0601 Water Control/Fish Passage					
060101 Water Control/Fish Passage Struc					
060101_01 Excavation	1750.00 CY	3,200	500	3,700	2.11
060101_02 Backfill	560.00 CY	1,300	200	1,500	2.60
060101_03 Concrete Slabs	92.00 CY	8,300	1,300	9,600	104.23
060101_04 Concrete Walls	80.00 CY	40,800	6,100	47,000	587.14
060101_05 Reinforcing Steel	18500 LB	8,900	1,300	10,300	0.55
060101_06 Stop Logs	136.00 LF	1,500	200	1,800	12.89

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
060101_07	Sluice Gates - 42"	2.00	EA	18,300	2,700	21,000	10519
060101_08	Gate Operators	2.00	EA	17,100	2,600	19,700	9851.32
060101_09	Steel Grating	17400	LB	25,200	3,800	29,000	1.67
060101_10	Jib Crane w/Trolly Hoist	1.00	EA	1,200	200	1,400	1429.80
060101_11	Staff Gages	2.00	EA	3,700	600	4,300	2144.70
060101_12	Concrete Boat Ramp			3,600	500	4,100	
060101_13	Riprap	670.00	TON	14,500	2,200	16,700	24.90
060101_14	Bedding	200.00	TON	4,100	600	4,800	23.76
060101_15	Security Gates	200.00	TON	2,400	400	2,800	14.04
TOTAL	Water Control/Fish Passage Struc	1.00	EA	154,300	23,200	177,500	177498
060102	Fish Passage Structure at Pump S						
060102_01	Excavation	50.00	CY	100	0	100	2.11
060102_02	Backfill	25.00	CY	100	0	100	2.60
060102_03	Concrete Slabs	43.00	CY	4,100	600	4,800	110.78
060102_04	Concrete Walls	59.00	CY	11,900	1,800	13,600	231.11
060102_05	Reinforcing Steel	15300	LB	7,300	1,100	8,400	0.55
060102_06	Miscellaneous Metal			7,700	1,200	8,900	
060102_07	Miscellaneous Fiberglass			6,200	900	7,200	
TOTAL	Fish Passage Structure at Pump S	1.00	EA	37,400	5,600	43,000	43026
TOTAL	Water Control/Fish Passage			191,800	28,800	220,500	
0602	Concrete Stoplog Structures						
060201	8' Stoplog Structures						
060201_01	Excavation	3300.00	CY	6,100	900	7,000	2.11
060201_02	Concrete Slabs	105.00	CY	10,100	1,500	11,600	110.32
060201_03	Concrete Walls	75.00	CY	24,000	3,600	27,600	367.49
060201_04	Reinforcing Steel	17100	LB	8,200	1,200	9,400	0.55
060201_05	Steel Grating (location 7 only)	12000	LB	17,300	2,600	19,900	1.66
060201_06	Stop Logs	300.00	LF	600	100	700	2.42
060201_07	Jib Crane w/Trolly Hoist	3.00	EA	3,700	600	4,300	1429.80
060201_08	Bedding - 3" minus	630.00	TON	13,000	2,000	15,000	23.76
060201_09	C Stone	60.00	TON	1,300	200	1,500	24.90
060201_10	Geogrid	300.00	SY	2,400	400	2,700	9.14
060201_11	Geotextile	630.00	SY	1,400	200	1,600	2.58
060201_12	Staff Gage	6.00	EA	11,200	1,700	12,900	2144.70
TOTAL	8' Stoplog Structures	3.00	EA	99,300	14,900	114,200	38056
060202	3' Stoplog Structures						
060202_01	Excavation	220.00	CY	400	100	500	2.11

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
060202_02	Concrete Slabs	24.00	CY	2,400	400	2,800	115.11
060202_03	Concrete Walls	22.00	CY	6,000	900	6,900	312.84
060202_04	Reinforcing Steel	4600.00	LB	2,200	300	2,500	0.55
060202_06	Stop Logs	200.00	LF	400	100	500	2.42
060202_07	Jib Crane w/Trolly Hoist	2.00	EA	2,500	400	2,900	1429.80
TOTAL	3' Stoplog Structures	2.00	EA	13,900	2,100	16,000	7999.14
TOTAL	Concrete Stoplog Structures			113,200	17,000	130,200	
0603	Forest Management Plan						
0603 A	Mast Tree Plantings (disposal ar						
0603 A_01	Herbicide Application	20.00	ACR	600	100	700	33.00
0603 A_02	Seedlings - Bare Root	20.00	ACR	6,800	700	7,500	374.00
0603 A_03	Seedlings - 2 Gal containers	20.00	ACR	17,000	1,700	18,700	935.00
TOTAL	Mast Tree Plantings (disposal ar			24,400	2,400	26,800	
0603 B	Mast Tree Plantings (cropland)						
0603 B_01	Establish Ground Cover	90.00	ACR	7,200	700	7,900	88.00
0603 B_02	Seedlings - Bare Root	60.00	ACR	20,400	2,000	22,400	374.00
0603 B_03	Seedlings - 2 Gal containers (11	30.00	ACR	25,500	2,600	28,100	935.00
0603 B_04	Seedlings - 2 Gal containers (22	60.00	ACR	10,200	1,000	11,200	187.00
0603 B_05	Tree Shelters	60.00	ACR	9,900	1,000	10,900	181.50
TOTAL	Mast Tree Plantings (cropland)			73,200	7,300	80,500	
0603 C	Mast Tree Plantings (forest)						
0603 C_01	Establish Ground Cover	60.00	ACR	4,800	500	5,300	88.00
0603 C_02	Mechanized Clearing	60.00	ACR	30,000	3,000	33,000	550.00
0603 C_03	Seedlings - 2 Gal containers (11	115.00	ACR	97,800	9,800	107,500	935.00
0603 C_04	Herbicide Application	115.00	ACR	3,500	300	3,800	33.00
TOTAL	Mast Tree Plantings (forest)			136,000	13,600	149,600	
0603 D	Woody Vegetation Control w/aeria						
0603 D_02	Vegetation Removal	169.00	ACR	16,900	1,700	18,600	110.00
TOTAL	Woody Vegetation Control w/aeria			16,900	1,700	18,600	
TOTAL	Forest Management Plan			250,500	25,100	275,600	

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
0604 Channels						
060401 Squaw Island						
060401_02 Excavation - Dragline	4400.00	CY	13,300	1,300	14,600	3.32
060401_03 Clearing	0.20	ACR	400	0	500	2276.65
060401_04 Seeding	0.20	ACR	300	0	300	1647.98
TOTAL Squaw Island			14,000	1,400	15,400	
060402 Royal to Chickahominy						
060402_02 Excavation - Dragline	6300.00	CY	19,000	1,900	20,900	3.32
060402_03 Clearing	0.30	ACR	600	100	700	2276.65
060402_04 Seeding	0.30	ACR	400	0	500	1647.98
TOTAL Royal to Chickahominy			20,100	2,000	22,100	
060403 Pohlman						
060403_01 Remove Existing Control Struct.	1.00	EA	4,300	600	4,900	4927.81
060403_02 Excavation - Dredging	87400	CY	326,000	48,900	374,900	4.29
060403_03 Clearing	0.40	ACR	800	100	1,000	2380.13
060403_04 Seeding	0.40	ACR	600	100	700	1722.89
TOTAL Pohlman			331,700	49,800	381,500	
060404 Silver Lake to Chickahominy						
060404_02 Excavation - Dredging	12600	CY	47,000	7,000	54,000	4.29
TOTAL Silver Lake to Chickahominy			47,000	7,000	54,000	
060405 Dredge Disposal Areas						
060405_02 Embankment - Disposal Retainment	25000	CY	93,200	14,000	107,200	4.29
060405_03 Stripping/Clearing	29.00	ACR	9,900	1,500	11,400	392.86
060405_04 Seeding	4.00	ACR	6,000	900	6,900	1722.89
TOTAL Dredge Disposal Areas			109,100	16,400	125,500	
060406 Borrow Areas						
060406_03 Stripping/Clearing	26.00	ACR	8,900	900	9,800	375.78

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL	Borrow Areas			8,900	900	9,800	
TOTAL	Channels			530,800	77,500	608,200	
0605	Levees						
060501	Dike/Levee, RS Only						
060501_02	Clearing(Includes Salvage Value)	51.00	ACR	96,000	9,600	105,600	2071.51
060501_03	Embankment - Levee	28800	CY	130,600	13,100	143,600	4.99
060501_04	Crushed Stone - Levee Crown	10000	TON	116,700	11,700	128,400	12.84
060501_05	Remove Existing Culverts			2,700	300	3,000	
060501_06	B Stone - Overflow	11900	TON	292,900	29,300	322,200	27.08
060501_07	Stone - 3" minus	680.00	TON	14,000	1,400	15,500	22.73
060501_08	Access Gate	1.00	EA	3,100	300	3,400	3419.09
060501_09	Seeding	20.00	ACR	30,000	3,000	33,000	1647.98
060501_10	Timber Piles			25,900	2,600	28,500	
060501_11	Fish Habitat @ Polhman Slough			10,300	1,000	11,300	
TOTAL	Dike/Levee, RS Only			722,200	72,200	794,500	
060502	Interior Levees (2 structures)						
060502_01	Clearing	1.00	ACR	2,100	200	2,300	2276.65
060502_02	Embankment - Levee	2000.00	CY	9,100	900	10,000	4.99
060502_03	Stone - 6" minus	10.00	TON	200	0	200	22.73
060502_04	Seeding	19.00	ACR	28,500	2,800	31,300	1647.98
TOTAL	Interior Levees (2 structures)			39,800	4,000	43,800	
060503	42" Dia. CMP Gravity Drain Str.						
060503_02	Excavation	530.00	CY	1,300	200	1,500	2.87
060503_03	Semi-Compacted Fill	150.00	CY	300	100	400	2.60
060503_04	42" CMP Culvert	40.00	LF	3,300	500	3,800	93.97
060503_05	42" CMP End Section	2.00	EA	2,500	400	2,900	1432.41
060503_06	42" Sluice Gate	1.00	EA	9,100	1,400	10,500	10519
060503_07	72' Dia Riser Pipe	12.00	LF	4,000	600	4,700	387.74
060503_08	Concrete Slab	2.00	CY	300	0	300	170.13
060503_09	Fiberglass Ladders	12.00	LF	1,500	200	1,700	142.98
060503_10	Fiberglass Grating	30.00	SF	700	100	800	26.12
060503_11	Bedding - 3" minus	340.00	TON	7,000	1,100	8,100	23.76
060503_12	Bedding - 6" minus	230.00	TON	4,800	700	5,500	23.76
060503_13	C Stone	250.00	TON	5,400	800	6,200	24.90
060503_14	Geotextile	230.00	SY	500	100	600	2.58
060503_15	Staff Gage	2.00	EA	3,700	600	4,300	2144.70

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
TOTAL 42" Dia. CMP Gravity Drain Str.				44,500	6,700	51,200	
TOTAL Levees				806,600	82,900	889,500	
0606 Pumping Plant							
060601 Pump Station, Location No. 2							
060601_02	Care and Diversion of Water			73,500	11,000	84,500	
060601_03	Excavation	1320.00	CY	3,300	500	3,800	2.87
060601_04	Backfill	3100.00	CY	7,000	1,100	8,100	2.60
060601_05	Bedding Material	240.00	TON	5,000	700	5,700	23.76
060601_06	Riprap	730.00	TON	15,800	2,400	18,200	24.90
060601_07	Concrete	17.00	CY	6,500	1,000	7,400	437.86
060601_08	Reinforcing Steel	1700.00	LB	800	100	900	0.53
060601_09	Sheet Pile	7200.00	SF	161,400	24,200	185,600	25.78
060601_10	H-Pile	17200	LB	8,300	1,200	9,500	0.55
060601_11	42" Discharge Pipe	60.00	LF	7,300	1,100	8,400	139.70
060601_12	42" Dresser Coupling	1.00	EA	1,300	200	1,400	1438.13
060601_13	42" Flap Gate	1.00	EA	3,500	500	4,000	4001.56
060601_14	Pump - 48000 GPM	1.00	EA	74,600	11,200	85,800	85788
060601_15	Jack Shaft Assembly	1.00	EA	18,600	2,800	21,400	21447
060601_16	Staff Gage	2.00	EA	3,700	600	4,300	2144.70
TOTAL Pump Station, Location No. 2				390,500	58,600	449,100	
060602 Pump Station, Location No. 3							
060602_02	Care and Diversion of Water			73,500	11,000	84,500	
060602_03	Excavation	600.00	CY	1,500	200	1,700	2.87
060602_04	Backfill	1600.00	CY	3,600	500	4,200	2.60
060602_05	Bedding Material	70.00	TON	1,400	200	1,700	23.76
060602_06	Riprap	210.00	TON	4,500	700	5,200	24.90
060602_07	Concrete	800.00	CY	283,800	42,600	326,400	407.99
060602_08	Reinforcing Steel	80400	LB	175,300	26,300	201,600	2.51
060602_09	Sheet Pile	8220.00	SF	184,300	27,600	211,900	25.78
060602_10	H-Pile	6410.00	LB	3,100	500	3,500	0.55
060602_11	42" Discharge Pipe	60.00	LF	7,300	1,100	8,400	139.70
060602_12	42" Dresser Coupling	1.00	EA	1,300	200	1,400	1438.13
060602_13	42" Elbow (90)	1.00	EA	8,300	1,200	9,500	9494.35
060602_14	42" Flap Gate	1.00	EA	3,500	500	4,000	4001.56
060602_15	42" Slide Gate	2.00	EA	5,900	900	6,800	3392.43
060602_16	Gate Operators	2.00	EA	17,100	2,600	19,700	9851.32
060602_17	Steel Grating	22500	LB	24,600	3,700	28,300	1.26
060602_18	Stop Logs	136.00	LF	4,500	700	5,200	38.42
060602_19	Pump - 48000 GPM	1.00	EA	74,600	11,200	85,800	85788
060602_20	Portable Drive Unit For Pump	1.00	EA	31,100	4,700	35,700	35745
060602_21	Jib Crane w/Trolly Hoist	1.00	EA	1,200	200	1,400	1429.80
060602_22	Jack Shaft Assembly	1.00	EA	18,600	2,800	21,400	21447

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
060602_23 Staff Gage	2.00	EA	3,700	600	4,300	2144.70
TOTAL Pump Station, Location No. 3			932,800	139,900	1,072,800	
060603 Portable Pump Units						
060603_01 Pump and Drive Unit - 5000 GPM	2.00	EA	67,100	6,700	73,900	36926
060603_02 Portable Fuel Tank (1000 gal)	1.00	EA	17,400	1,700	19,100	19147
060603_03 Portable Fuel Tank (500 gal)	2.00	EA	22,400	2,200	24,600	12309
TOTAL Portable Pump Units			106,900	10,700	117,600	
TOTAL Pumping Plant			1,430,300	209,200	1,639,500	
0607 Bank Stabilization						
060701 Revetment, N.E. Corner						
060701_01 C Stone	17800	TON	385,300	38,500	423,900	23.81
TOTAL Revetment, N.E. Corner			385,300	38,500	423,900	
TOTAL Bank Stabilization			385,300	38,500	423,900	
TOTAL Fish and Wildlife Facilities			3,708,400	478,900	4,187,300	
30 Planning, Engineering and Design						
3001 PED Prior to Completion of DPR						
300101 PED Prior to Completion of DPR			561,000	0	561,000	
TOTAL PED Prior to Completion of DPR			561,000	0	561,000	
3004 Environment-Regulatory Activity						
300401 Environment-Regulatory Activity			5,000	500	5,500	
TOTAL Environment-Regulatory Activity			5,000	500	5,500	
3008 Plans and Specifications						
300801 Plans and Specifications			364,000	54,600	418,600	
TOTAL Plans and Specifications			364,000	54,600	418,600	

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
3010 Engineering During Construction						
301001 Engineering During Construction			25,000	3,800	28,800	
TOTAL Engineering During Construction			25,000	3,800	28,800	
3013 Cost Engineering						
301301 Cost Engineering			20,000	3,000	23,000	
TOTAL Cost Engineering			20,000	3,000	23,000	
3014 Const-Supply Contract Award Acty						
301401 Const-Supply Contract Award Acty			10,000	2,000	12,000	
TOTAL Const-Supply Contract Award Acty			10,000	2,000	12,000	
3024 Value Engineerng Analysis Docmnt						
302401 Value Engineerng Analysis Docmnt	1.00	EA	25,000	2,500	27,500	27500
TOTAL Value Engineerng Analysis Docmnt	1.00	EA	25,000	2,500	27,500	27500
3026 Miscellaneous Activities						
302601 Miscellaneous Activities			5,000	1,000	6,000	
TOTAL Miscellaneous Activities			5,000	1,000	6,000	
TOTAL Planning, Engineering and Design			1,015,000	67,400	1,082,400	
31 Construction Management (S&I)						
3101 Project Office S&A						
310101 Project Office S&A			280,800	51,400	332,200	
TOTAL Project Office S&A			280,800	51,400	332,200	
3102 Area Office S&A						
310201 Area Office S&A			25,300	6,300	31,600	
TOTAL Area Office S&A			25,300	6,300	31,600	

** PROJECT OWNER SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
3103 District Office S&A						
310301 District Office S&A			184,500	46,100	230,600	
TOTAL District Office S&A			184,500	46,100	230,600	
3126 Programs/Project Managmnt Docmnt						
312601 Programs/Project Managmnt Docmnt			22,000	3,000	25,000	
TOTAL Programs/Project Managmnt Docmnt			22,000	3,000	25,000	
TOTAL Construction Management (S&I)			512,600	106,900	619,400	
TOTAL CALHOUN POINT - *REVISED* DPR			5,263,300	654,000	5,917,300	

** PROJECT INDIRECT SUMMARY - Feature (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
01 Lands and Damages		18,000	0	0	0	0	18,000	
02 Relocations		7,500	600	400	700	100	9,400	
06 Fish and Wildlife Facilities		3,031,700	221,300	150,100	262,500	42,800	3,708,400	
30 Planning, Engineering and Design		1,015,000	0	0	0	0	1,015,000	
31 Construction Management (S&I)		512,600	0	0	0	0	512,600	
CALHOUN POINT - *REVISED* DPR		4,584,800	221,900	150,500	263,200	43,000	5,263,300	
Contingency							654,000	
TOTAL INCL OWNER COSTS							5,917,300	

** PROJECT INDIRECT SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
01 Lands and Damages								
0120 Definite Project Report (DPR)		18,000	0	0	0	0	18,000	
TOTAL Lands and Damages		18,000	0	0	0	0	18,000	
02 Relocations								
0201 Roads, Construction Activities		7,500	600	400	700	100	9,400	
TOTAL Relocations		7,500	600	400	700	100	9,400	
06 Fish and Wildlife Facilities								
0601 Water Control/Fish Passage		154,200	12,300	8,300	14,600	2,400	191,800	
0602 Concrete Stoplog Structures		91,000	7,200	4,900	8,600	1,400	113,200	
0603 Forest Management Plan		250,500	0	0	0	0	250,500	
0604 Channels		426,900	34,000	23,000	40,300	6,600	530,800	
0605 Levees		648,700	51,600	35,000	61,200	10,000	806,600	
0606 Pumping Plant		1,150,400	91,500	62,100	108,600	17,700	1,430,300	
0607 Bank Stabilization		309,900	24,700	16,700	29,200	4,800	385,300	
TOTAL Fish and Wildlife Facilities		3,031,700	221,300	150,100	262,500	42,800	3,708,400	
30 Planning, Engineering and Design								
3001 PED Prior to Completion of DPR		561,000	0	0	0	0	561,000	
3004 Environment-Regulatory Activity		5,000	0	0	0	0	5,000	
3008 Plans and Specifications		364,000	0	0	0	0	364,000	
3010 Engineering During Construction		25,000	0	0	0	0	25,000	
3013 Cost Engineering		20,000	0	0	0	0	20,000	
3014 Const-Supply Contract Award Acty		10,000	0	0	0	0	10,000	
3024 Value Engineerng Analysis Docmnt	1.00 EA	25,000	0	0	0	0	25,000	25000
3026 Miscellaneous Activities		5,000	0	0	0	0	5,000	
TOTAL Planning, Engineering and Design		1,015,000	0	0	0	0	1,015,000	
31 Construction Management (S&I)								
3101 Project Office S&A		280,800	0	0	0	0	280,800	
3102 Area Office S&A		25,300	0	0	0	0	25,300	
3103 District Office S&A		184,500	0	0	0	0	184,500	
3126 Programs/Project Managmnt Docmnt		22,000	0	0	0	0	22,000	
TOTAL Construction Management (S&I)		512,600	0	0	0	0	512,600	

** PROJECT INDIRECT SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
TOTAL CALHOUN POINT - *REVISED* DPR		4,584,800	221,900	150,500	263,200	43,000	5,263,300	
Contingency							654,000	
TOTAL INCL OWNER COSTS							5,917,300	

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
01 Lands and Damages								
0120 Definite Project Report (DPR)								
012003 Real Estate Analysis Documents								
012003_07 All Other Real Estate Analy/Docs		18,000	0	0	0	0	18,000	
TOTAL Real Estate Analysis Documents		18,000	0	0	0	0	18,000	
TOTAL Definite Project Report (DPR)		18,000	0	0	0	0	18,000	
TOTAL Lands and Damages		18,000	0	0	0	0	18,000	
02 Relocations								
0201 Roads, Construction Activities								
020139 Road Surfacing								
020139_01 Crushed Stone Road Ramps	110.00 TON	1,000	100	100	100	0	1,300	11.71
020139_02 Crushed Stone Parking Lots (2ea)	250.00 TON	4,500	400	200	400	100	5,600	22.23
TOTAL Road Surfacing		5,500	400	300	500	100	6,800	
020199 Associated General Items								
020199_01 12" CMP Culverts (3ea)	66.00 LF	2,000	200	100	200	0	2,500	38.10
TOTAL Associated General Items		2,000	200	100	200	0	2,500	
TOTAL Roads, Construction Activities		7,500	600	400	700	100	9,400	
TOTAL Relocations		7,500	600	400	700	100	9,400	
06 Fish and Wildlife Facilities								
0601 Water Control/Fish Passage								
060101 Water Control/Fish Passage Struc								
060101_01 Excavation	1750.00 CY	2,600	200	100	200	0	3,200	1.84
060101_02 Backfill	560.00 CY	1,000	100	100	100	0	1,300	2.26
060101_03 Concrete Slabs	92.00 CY	6,700	500	400	600	100	8,300	90.64
060101_04 Concrete Walls	80.00 CY	32,900	2,600	1,800	3,100	500	40,800	510.55
060101_05 Reinforcing Steel	18500 LB	7,200	600	400	700	100	8,900	0.48
060101_06 Stop Logs	136.00 LF	1,200	100	100	100	0	1,500	11.21

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
060101_07	Sluice Gates - 42"	2.00	EA	14,700	1,200	800	1,400	200	18,300	9146.94
060101_08	Gate Operators	2.00	EA	13,800	1,100	700	1,300	200	17,100	8566.37
060101_09	Steel Grating	17400	LB	20,300	1,600	1,100	1,900	300	25,200	1.45
060101_10	Jib Crane w/Trolly Hoist	1.00	EA	1,000	100	100	100	0	1,200	1243.30
060101_11	Staff Gages	2.00	EA	3,000	200	200	300	0	3,700	1864.96
060101_12	Concrete Boat Ramp			2,900	200	200	300	0	3,600	
060101_13	Riprap	670.00	TON	11,700	900	600	1,100	200	14,500	21.65
060101_14	Bedding	200.00	TON	3,300	300	200	300	100	4,100	20.66
060101_15	Security Gates	200.00	TON	2,000	200	100	200	0	2,400	12.21
TOTAL	Water Control/Fish Passage Struc	1.00	EA	124,100	9,900	6,700	11,700	1,900	154,300	154346
060102	Fish Passage Structure at Pump S									
060102_01	Excavation	50.00	CY	100	0	0	0	0	100	1.84
060102_02	Backfill	25.00	CY	0	0	0	0	0	100	2.26
060102_03	Concrete Slabs	43.00	CY	3,300	300	200	300	100	4,100	96.33
060102_04	Concrete Walls	59.00	CY	9,500	800	500	900	100	11,900	200.97
060102_05	Reinforcing Steel	15300	LB	5,900	500	300	600	100	7,300	0.48
060102_06	Miscellaneous Metal			6,200	500	300	600	100	7,700	
060102_07	Miscellaneous Fiberglass			5,000	400	300	500	100	6,200	
TOTAL	Fish Passage Structure at Pump S	1.00	EA	30,100	2,400	1,600	2,800	500	37,400	37414
TOTAL	Water Control/Fish Passage			154,200	12,300	8,300	14,600	2,400	191,800	
0602	Concrete Stoplog Structures									
060201	8' Stoplog Structures									
060201_01	Excavation	3300.00	CY	4,900	400	300	500	100	6,100	1.84
060201_02	Concrete Slabs	105.00	CY	8,100	600	400	800	100	10,100	95.93
060201_03	Concrete Walls	75.00	CY	19,300	1,500	1,000	1,800	300	24,000	319.55
060201_04	Reinforcing Steel	17100	LB	6,600	500	400	600	100	8,200	0.48
060201_05	Steel Grating (location 7 only)	12000	LB	13,900	1,100	800	1,300	200	17,300	1.44
060201_06	Stop Logs	300.00	LF	500	0	0	0	0	600	2.10
060201_07	Jib Crane w/Trolly Hoist	3.00	EA	3,000	200	200	300	0	3,700	1243.30
060201_08	Bedding - 3" minus	630.00	TON	10,500	800	600	1,000	200	13,000	20.66
060201_09	C Stone	60.00	TON	1,000	100	100	100	0	1,300	21.65
060201_10	Geogrid	300.00	SY	1,900	200	100	200	0	2,400	7.95
060201_11	Geotextile	630.00	SY	1,100	100	100	100	0	1,400	2.25
060201_12	Staff Gage	6.00	EA	9,000	700	500	800	100	11,200	1864.96
TOTAL	8' Stoplog Structures	3.00	EA	79,800	6,400	4,300	7,500	1,200	99,300	33092
060202	3' Stoplog Structures									
060202_01	Excavation	220.00	CY	300	0	0	0	0	400	1.84

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
060202_02	Concrete Slabs	24.00	CY	1,900	200	100	200	0	2,400	100.10
060202_03	Concrete Walls	22.00	CY	4,800	400	300	500	100	6,000	272.03
060202_04	Reinforcing Steel	4600.00	LB	1,800	100	100	200	0	2,200	0.48
060202_06	Stop Logs	200.00	LF	300	0	0	0	0	400	2.10
060202_07	Jib Crane w/Trolly Hoist	2.00	EA	2,000	200	100	200	0	2,500	1243.30
TOTAL 3' Stoplog Structures		2.00	EA	11,200	900	600	1,100	200	13,900	6955.77
TOTAL Concrete Stoplog Structures				91,000	7,200	4,900	8,600	1,400	113,200	
0603 Forest Management Plan										
0603 A Mast Tree Plantings (disposal ar										
0603 A_01	Herbicide Application	20.00	ACR	600	0	0	0	0	600	30.00
0603 A_02	Seedlings - Bare Root	20.00	ACR	6,800	0	0	0	0	6,800	340.00
0603 A_03	Seedlings - 2 Gal containers	20.00	ACR	17,000	0	0	0	0	17,000	850.00
TOTAL Mast Tree Plantings (disposal ar				24,400	0	0	0	0	24,400	
0603 B Mast Tree Plantings (cropland)										
0603 B_01	Establish Ground Cover	90.00	ACR	7,200	0	0	0	0	7,200	80.00
0603 B_02	Seedlings - Bare Root	60.00	ACR	20,400	0	0	0	0	20,400	340.00
0603 B_03	Seedlings - 2 Gal containers (11	30.00	ACR	25,500	0	0	0	0	25,500	850.00
0603 B_04	Seedlings - 2 Gal containers (22	60.00	ACR	10,200	0	0	0	0	10,200	170.00
0603 B_05	Tree Shelters	60.00	ACR	9,900	0	0	0	0	9,900	165.00
TOTAL Mast Tree Plantings (cropland)				73,200	0	0	0	0	73,200	
0603 C Mast Tree Plantings (forest)										
0603 C_01	Establish Ground Cover	60.00	ACR	4,800	0	0	0	0	4,800	80.00
0603 C_02	Mechanized Clearing	60.00	ACR	30,000	0	0	0	0	30,000	500.00
0603 C_03	Seedlings - 2 Gal containers (11	115.00	ACR	97,800	0	0	0	0	97,800	850.00
0603 C_04	Herbicide Application	115.00	ACR	3,500	0	0	0	0	3,500	30.00
TOTAL Mast Tree Plantings (forest)				136,000	0	0	0	0	136,000	
0603 D Woody Vegetation Control w/aeria										
0603 D_02	Vegetation Removal	169.00	ACR	16,900	0	0	0	0	16,900	100.00
TOTAL Woody Vegetation Control w/aeria				16,900	0	0	0	0	16,900	
TOTAL Forest Management Plan				250,500	0	0	0	0	250,500	

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
0604 Channels									
060401 Squaw Island									
060401_02 Excavation - Dragline	4400.00	CY	10,700	800	600	1,000	200	13,300	3.01
060401_03 Clearing	0.20	ACR	300	0	0	0	0	400	2069.68
060401_04 Seeding	0.20	ACR	200	0	0	0	0	300	1498.17
TOTAL Squaw Island			11,200	900	600	1,100	200	14,000	
060402 Royal to Chickahominy									
060402_02 Excavation - Dragline	6300.00	CY	15,300	1,200	800	1,400	200	19,000	3.01
060402_03 Clearing	0.30	ACR	500	0	0	0	0	600	2069.68
060402_04 Seeding	0.30	ACR	400	0	0	0	0	400	1498.17
TOTAL Royal to Chickahominy			16,100	1,300	900	1,500	200	20,100	
060403 Pohlman									
060403_01 Remove Existing Control Struct.	1.00	EA	3,400	300	200	300	100	4,300	4285.06
060403_02 Excavation - Dredging	87400	CY	262,200	20,900	14,200	24,700	4,000	326,000	3.73
060403_03 Clearing	0.40	ACR	700	100	0	100	0	800	2069.68
060403_04 Seeding	0.40	ACR	500	0	0	0	0	600	1498.17
TOTAL Pohlman			266,800	21,200	14,400	25,200	4,100	331,700	
060404 Silver Lake to Chickahominy									
060404_02 Excavation - Dredging	12600	CY	37,800	3,000	2,000	3,600	600	47,000	3.73
TOTAL Silver Lake to Chickahominy			37,800	3,000	2,000	3,600	600	47,000	
060405 Dredge Disposal Areas									
060405_02 Embankment - Disposal Retainment	25000	CY	75,000	6,000	4,000	7,100	1,200	93,200	3.73
060405_03 Stripping/Clearing	29.00	ACR	8,000	600	400	800	100	9,900	341.62
060405_04 Seeding	4.00	ACR	4,800	400	300	500	100	6,000	1498.17
TOTAL Dredge Disposal Areas			87,800	7,000	4,700	8,300	1,400	109,100	
060406 Borrow Areas									
060406_03 Stripping/Clearing	26.00	ACR	7,100	600	400	700	100	8,900	341.62

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
TOTAL Borrow Areas			7,100	600	400	700	100	8,900	
TOTAL Channels			426,900	34,000	23,000	40,300	6,600	530,800	
0605 Levees									
060501 Dike/Levee, RS Only									
060501_02 Clearing(Includes Salvage Value)	51.00	ACR	77,200	6,100	4,200	7,300	1,200	96,000	1883.19
060501_03 Embankment - Levee	28800	CY	105,000	8,400	5,700	9,900	1,600	130,600	4.53
060501_04 Crushed Stone - Levee Crown	10000	TON	93,900	7,500	5,100	8,900	1,400	116,700	11.67
060501_05 Remove Existing Culverts			2,200	200	100	200	0	2,700	
060501_06 B Stone - Overflow	11900	TON	235,600	18,700	12,700	22,200	3,600	292,900	24.61
060501_07 Stone - 3" minus	680.00	TON	11,300	900	600	1,100	200	14,000	20.66
060501_08 Access Gate	1.00	EA	2,500	200	100	200	0	3,100	3108.26
060501_09 Seeding	20.00	ACR	24,100	1,900	1,300	2,300	400	30,000	1498.17
060501_10 Timber Piles			20,800	1,700	1,100	2,000	300	25,900	
060501_11 Fish Habitat @ Polhman Slough			8,300	700	400	800	100	10,300	
TOTAL Dike/Levee, RS Only			580,900	46,200	31,400	54,800	8,900	722,200	
060502 Interior Levees (2 structures)									
060502_01 Clearing	1.00	ACR	1,700	100	100	200	0	2,100	2069.68
060502_02 Embankment - Levee	2000.00	CY	7,300	600	400	700	100	9,100	4.53
060502_03 Stone - 6" minus	10.00	TON	200	0	0	0	0	200	20.66
060502_04 Seeding	19.00	ACR	22,900	1,800	1,200	2,200	400	28,500	1498.17
TOTAL Interior Levees (2 structures)			32,000	2,500	1,700	3,000	500	39,800	
060503 42" Dia. CMP Gravity Drain Str.									
060503_02 Excavation	530.00	CY	1,100	100	100	100	0	1,300	2.50
060503_03 Semi-Compacted Fill	150.00	CY	300	0	0	0	0	300	2.26
060503_04 42" CMP Culvert	40.00	LF	2,600	200	100	200	0	3,300	81.71
060503_05 42" CMP End Section	2.00	EA	2,000	200	100	200	0	2,500	1245.58
060503_06 42" Sluice Gate	1.00	EA	7,400	600	400	700	100	9,100	9146.94
060503_07 72' Dia Riser Pipe	12.00	LF	3,300	300	200	300	100	4,000	337.16
060503_08 Concrete Slab	2.00	CY	200	0	0	0	0	300	147.94
060503_09 Fiberglass Ladders	12.00	LF	1,200	100	100	100	0	1,500	124.33
060503_10 Fiberglass Grating	30.00	SF	500	0	0	100	0	700	22.72
060503_11 Bedding - 3" minus	340.00	TON	5,600	400	300	500	100	7,000	20.66
060503_12 Bedding - 6" minus	230.00	TON	3,800	300	200	400	100	4,800	20.66
060503_13 C Stone	250.00	TON	4,400	300	200	400	100	5,400	21.65
060503_14 Geotextile	230.00	SY	400	0	0	0	0	500	2.25
060503_15 Staff Gage	2.00	EA	3,000	200	200	300	0	3,700	1864.96

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
TOTAL	42" Dia. CMP Gravity Drain Str.			35,800	2,800	1,900	3,400	600	44,500	
TOTAL	Levees			648,700	51,600	35,000	61,200	10,000	806,600	
0606	Pumping Plant									
060601	Pump Station, Location No. 2									
060601_02	Care and Diversion of Water			59,100	4,700	3,200	5,600	900	73,500	
060601_03	Excavation	1320.00	CY	2,700	200	100	300	0	3,300	2.50
060601_04	Backfill	3100.00	CY	5,600	400	300	500	100	7,000	2.26
060601_05	Bedding Material	240.00	TON	4,000	300	200	400	100	5,000	20.66
060601_06	Riprap	730.00	TON	12,700	1,000	700	1,200	200	15,800	21.65
060601_07	Concrete	17.00	CY	5,200	400	300	500	100	6,500	380.75
060601_08	Reinforcing Steel	1700.00	LB	600	100	0	100	0	800	0.46
060601_09	Sheet Pile	7200.00	SF	129,800	10,300	7,000	12,300	2,000	161,400	22.42
060601_10	H-Pile	17200	LB	6,700	500	400	600	100	8,300	0.48
060601_11	42" Discharge Pipe	60.00	LF	5,900	500	300	600	100	7,300	121.48
060601_12	42" Dresser Coupling	1.00	EA	1,000	100	100	100	0	1,300	1250.55
060601_13	42" Flap Gate	1.00	EA	2,800	200	200	300	0	3,500	3479.62
060601_14	Pump - 48000 GPM	1.00	EA	60,000	4,800	3,200	5,700	900	74,600	74598
060601_15	Jack Shaft Assembly	1.00	EA	15,000	1,200	800	1,400	200	18,600	18650
060601_16	Staff Gage	2.00	EA	3,000	200	200	300	0	3,700	1864.96
TOTAL	Pump Station, Location No. 2			314,100	25,000	17,000	29,600	4,800	390,500	
060602	Pump Station, Location No. 3									
060602_02	Care and Diversion of Water			59,100	4,700	3,200	5,600	900	73,500	
060602_03	Excavation	600.00	CY	1,200	100	100	100	0	1,500	2.50
060602_04	Backfill	1600.00	CY	2,900	200	200	300	0	3,600	2.26
060602_05	Bedding Material	70.00	TON	1,200	100	100	100	0	1,400	20.66
060602_06	Riprap	210.00	TON	3,700	300	200	300	100	4,500	21.65
060602_07	Concrete	800.00	CY	228,300	18,200	12,300	21,500	3,500	283,800	354.77
060602_08	Reinforcing Steel	80400	LB	141,000	11,200	7,600	13,300	2,200	175,300	2.18
060602_09	Sheet Pile	8220.00	SF	148,200	11,800	8,000	14,000	2,300	184,300	22.42
060602_10	H-Pile	6410.00	LB	2,500	200	100	200	0	3,100	0.48
060602_11	42" Discharge Pipe	60.00	LF	5,900	500	300	600	100	7,300	121.48
060602_12	42" Dresser Coupling	1.00	EA	1,000	100	100	100	0	1,300	1250.55
060602_13	42" Elbow (90)	1.00	EA	6,600	500	400	600	100	8,300	8255.96
060602_14	42" Flap Gate	1.00	EA	2,800	200	200	300	0	3,500	3479.62
060602_15	42" Slide Gate	2.00	EA	4,700	400	300	400	100	5,900	2949.94
060602_16	Gate Operators	2.00	EA	13,800	1,100	700	1,300	200	17,100	8566.37
060602_17	Steel Grating	22500	LB	19,800	1,600	1,100	1,900	300	24,600	1.09
060602_18	Stop Logs	136.00	LF	3,700	300	200	300	100	4,500	33.41
060602_19	Pump - 48000 GPM	1.00	EA	60,000	4,800	3,200	5,700	900	74,600	74598
060602_20	Portable Drive Unit For Pump	1.00	EA	25,000	2,000	1,300	2,400	400	31,100	31083
060602_21	Jib Crane w/Trolly Hoist	1.00	EA	1,000	100	100	100	0	1,200	1243.30
060602_22	Jack Shaft Assembly	1.00	EA	15,000	1,200	800	1,400	200	18,600	18650

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
060602_23 Staff Gage	2.00 EA	3,000	200	200	300	0	3,700	1864.96
TOTAL Pump Station, Location No. 3		750,300	59,700	40,500	70,800	11,600	932,800	
060603 Portable Pump Units								
060603_01 Pump and Drive Unit - 5000 GPM	2.00 EA	54,000	4,300	2,900	5,100	800	67,100	33569
060603_02 Portable Fuel Tank (1000 gal)	1.00 EA	14,000	1,100	800	1,300	200	17,400	17406
060603_03 Portable Fuel Tank (500 gal)	2.00 EA	18,000	1,400	1,000	1,700	300	22,400	11190
TOTAL Portable Pump Units		86,000	6,800	4,600	8,100	1,300	106,900	
TOTAL Pumping Plant		1,150,400	91,500	62,100	108,600	17,700	1,430,300	
0607 Bank Stabilization								
060701 Revetment, N.E. Corner								
060701_01 C Stone	17800 TON	309,900	24,700	16,700	29,200	4,800	385,300	21.65
TOTAL Revetment, N.E. Corner		309,900	24,700	16,700	29,200	4,800	385,300	
TOTAL Bank Stabilization		309,900	24,700	16,700	29,200	4,800	385,300	
TOTAL Fish and Wildlife Facilities		3,031,700	221,300	150,100	262,500	42,800	3,708,400	
30 Planning, Engineering and Design								
3001 PED Prior to Completion of DPR								
300101 PED Prior to Completion of DPR		561,000	0	0	0	0	561,000	
TOTAL PED Prior to Completion of DPR		561,000	0	0	0	0	561,000	
3004 Environment-Regulatory Activity								
300401 Environment-Regulatory Activity		5,000	0	0	0	0	5,000	
TOTAL Environment-Regulatory Activity		5,000	0	0	0	0	5,000	
3008 Plans and Specifications								
300801 Plans and Specifications		364,000	0	0	0	0	364,000	
TOTAL Plans and Specifications		364,000	0	0	0	0	364,000	

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
3010 Engineering During Construction								
301001 Engineering During Construction		25,000	0	0	0	0	25,000	
TOTAL Engineering During Construction		25,000	0	0	0	0	25,000	
3013 Cost Engineering								
301301 Cost Engineering		20,000	0	0	0	0	20,000	
TOTAL Cost Engineering		20,000	0	0	0	0	20,000	
3014 Const-Supply Contract Award Acty								
301401 Const-Supply Contract Award Acty		10,000	0	0	0	0	10,000	
TOTAL Const-Supply Contract Award Acty		10,000	0	0	0	0	10,000	
3024 Value Engineerng Analysis Docmnt								
302401 Value Engineerng Analysis Docmnt	1.00 EA	25,000	0	0	0	0	25,000	25000
TOTAL Value Engineerng Analysis Docmnt	1.00 EA	25,000	0	0	0	0	25,000	25000
3026 Miscellaneous Activities								
302601 Miscellaneous Activities		5,000	0	0	0	0	5,000	
TOTAL Miscellaneous Activities		5,000	0	0	0	0	5,000	
TOTAL Planning, Engineering and Design		1,015,000	0	0	0	0	1,015,000	
31 Construction Management (S&I)								
3101 Project Office S&A								
310101 Project Office S&A		280,800	0	0	0	0	280,800	
TOTAL Project Office S&A		280,800	0	0	0	0	280,800	
3102 Area Office S&A								
310201 Area Office S&A		25,300	0	0	0	0	25,300	
TOTAL Area Office S&A		25,300	0	0	0	0	25,300	

** PROJECT INDIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	DIRECT	FOOH&MOB	HOME OFC	PROFIT	BOND	TOTAL COST	UNIT
3103 District Office S&A								
310301 District Office S&A		184,500	0	0	0	0	184,500	
TOTAL District Office S&A		184,500	0	0	0	0	184,500	
3126 Programs/Project Managmnt Docmnt								
312601 Programs/Project Managmnt Docmnt		22,000	0	0	0	0	22,000	
TOTAL Programs/Project Managmnt Docmnt		22,000	0	0	0	0	22,000	
TOTAL Construction Management (S&I)		512,600	0	0	0	0	512,600	
TOTAL CALHOUN POINT - *REVISED* DPR		4,584,800	221,900	150,500	263,200	43,000	5,263,300	
Contingency							654,000	
TOTAL INCL OWNER COSTS							5,917,300	

** PROJECT DIRECT SUMMARY - Feature (Rounded to 100's) **

	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
01 Lands and Damages		0	0	0	18,000	18,000	
02 Relocations		3,000	1,100	3,400	0	7,500	
06 Fish and Wildlife Facilities		872,800	401,700	844,400	912,900	3,031,700	
30 Planning, Engineering and Design		0	0	0	1,015,000	1,015,000	
31 Construction Management (S&I)		0	0	0	512,600	512,600	
TOTAL CALHOUN POINT - *REVISED* DPR		875,800	402,900	847,700	2,458,400	4,584,800	
Field Off. Overhead, Mob, & Haul Road						221,900	
SUBTOTAL						4,806,700	
Home Office Overhead						150,500	
SUBTOTAL						4,957,200	
Profit						263,200	
SUBTOTAL						5,220,400	
Bond						43,000	
TOTAL INCL INDIRECTS						5,263,300	
Contingency						654,000	
TOTAL INCL OWNER COSTS						5,917,300	

** PROJECT DIRECT SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
01 Lands and Damages							
0120 Definite Project Report (DPR)		0	0	0	18,000	18,000	
TOTAL Lands and Damages		0	0	0	18,000	18,000	
02 Relocations							
0201 Roads, Construction Activities		3,000	1,100	3,400	0	7,500	
TOTAL Relocations		3,000	1,100	3,400	0	7,500	
06 Fish and Wildlife Facilities							
0601 Water Control/Fish Passage		51,500	9,500	88,800	4,400	154,200	
0602 Concrete Stoplog Structures		30,500	7,700	38,800	14,000	91,000	
0603 Forest Management Plan		0	0	0	250,500	250,500	
0604 Channels		17,100	29,600	5,200	375,000	426,900	
0605 Levees		267,000	196,200	184,900	600	648,700	
0606 Pumping Plant		383,000	71,400	427,500	268,400	1,150,400	
0607 Bank Stabilization		123,500	87,300	99,100	0	309,900	
TOTAL Fish and Wildlife Facilities		872,800	401,700	844,400	912,900	3,031,700	
30 Planning, Engineering and Design							
3001 PED Prior to Completion of DPR		0	0	0	561,000	561,000	
3004 Environment-Regulatory Activity		0	0	0	5,000	5,000	
3008 Plans and Specifications		0	0	0	364,000	364,000	
3010 Engineering During Construction		0	0	0	25,000	25,000	
3013 Cost Engineering		0	0	0	20,000	20,000	
3014 Const-Supply Contract Award Acty		0	0	0	10,000	10,000	
3024 Value Engineerng Analysis Docmnt	1.00 EA	0	0	0	25,000	25,000	25000
3026 Miscellaneous Activities		0	0	0	5,000	5,000	
TOTAL Planning, Engineering and Design		0	0	0	1,015,000	1,015,000	
31 Construction Management (S&I)							
3101 Project Office S&A		0	0	0	280,800	280,800	
3102 Area Office S&A		0	0	0	25,300	25,300	
3103 District Office S&A		0	0	0	184,500	184,500	
3126 Programs/Project Managmnt Docmnt		0	0	0	22,000	22,000	
TOTAL Construction Management (S&I)		0	0	0	512,600	512,600	

** PROJECT DIRECT SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL CALHOUN POINT - *REVISED* DPR			875,800	402,900	847,700	2,458,400	4,584,800	
Field Off. Overhead, Mob, & Haul Road							221,900	
SUBTOTAL							4,806,700	
Home Office Overhead							150,500	
SUBTOTAL							4,957,200	
Profit							263,200	
SUBTOTAL							5,220,400	
Bond							43,000	
TOTAL INCL INDIRECTS							5,263,300	
Contingency							654,000	
TOTAL INCL OWNER COSTS							5,917,300	

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
01 Lands and Damages								
0120 Definite Project Report (DPR)								
012003 Real Estate Analysis Documents								
012003_07 All Other Real Estate Analy/Docs			0	0	0	18,000	18,000	
TOTAL Real Estate Analysis Documents			0	0	0	18,000	18,000	
TOTAL Definite Project Report (DPR)			0	0	0	18,000	18,000	
TOTAL Lands and Damages			0	0	0	18,000	18,000	
02 Relocations								
0201 Roads, Construction Activities								
020139 Road Surfacing								
020139_01 Crushed Stone Road Ramps	110.00	TON	500	200	300	0	1,000	9.42
020139_02 Crushed Stone Parking Lots (2ea)	250.00	TON	1,900	900	1,700	0	4,500	17.88
TOTAL Road Surfacing			2,400	1,100	2,000	0	5,500	
020199 Associated General Items								
020199_01 12" CMP Culverts (3ea)	66.00	LF	600	0	1,300	0	2,000	30.64
TOTAL Associated General Items			600	0	1,300	0	2,000	
TOTAL Roads, Construction Activities			3,000	1,100	3,400	0	7,500	
TOTAL Relocations			3,000	1,100	3,400	0	7,500	
06 Fish and Wildlife Facilities								
0601 Water Control/Fish Passage								
060101 Water Control/Fish Passage Struc								
060101_01 Excavation	1750.00	CY	1,000	1,600	0	0	2,600	1.48
060101_02 Backfill	560.00	CY	400	600	0	0	1,000	1.82
060101_03 Concrete Slabs	92.00	CY	1,700	200	4,800	0	6,700	72.90
060101_04 Concrete Walls	80.00	CY	20,200	700	12,000	0	32,900	410.64
060101_05 Reinforcing Steel	18500	LB	3,400	0	3,700	0	7,200	0.39
060101_06 Stop Logs	136.00	LF	500	0	700	0	1,200	9.02

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060101_07	Sluice Gates - 42"	2.00	EA	2,500	700	11,600	0	14,700	7356.96
060101_08	Gate Operators	2.00	EA	0	0	13,800	0	13,800	6890.00
060101_09	Steel Grating	17400	LB	3,700	200	16,400	0	20,300	1.16
060101_10	Jib Crane w/Trolly Hoist	1.00	EA	0	0	0	1,000	1,000	1000.00
060101_11	Staff Gages	2.00	EA	0	0	0	3,000	3,000	1500.00
060101_12	Concrete Boat Ramp			1,500	400	1,000	0	2,900	
060101_13	Riprap	670.00	TON	4,700	3,300	3,700	0	11,700	17.41
060101_14	Bedding	200.00	TON	1,400	1,000	1,000	0	3,300	16.62
060101_15	Security Gates	200.00	TON	500	100	1,300	100	2,000	9.82
TOTAL	Water Control/Fish Passage Struc	1.00	EA	41,500	8,700	69,900	4,100	124,100	124142
060102	Fish Passage Structure at Pump S								
060102_01	Excavation	50.00	CY	0	0	0	0	100	1.48
060102_02	Backfill	25.00	CY	0	0	0	0	0	1.82
060102_03	Concrete Slabs	43.00	CY	900	100	2,300	0	3,300	77.48
060102_04	Concrete Walls	59.00	CY	4,600	300	4,600	0	9,500	161.64
060102_05	Reinforcing Steel	15300	LB	2,800	0	3,100	0	5,900	0.38
060102_06	Miscellaneous Metal			1,400	200	4,300	300	6,200	
060102_07	Miscellaneous Fiberglass			400	0	4,700	0	5,000	
TOTAL	Fish Passage Structure at Pump S	1.00	EA	10,100	700	19,000	300	30,100	30092
TOTAL	Water Control/Fish Passage			51,500	9,500	88,800	4,400	154,200	
0602	Concrete Stoplog Structures								
060201	8' Stoplog Structures								
060201_01	Excavation	3300.00	CY	1,900	2,900	0	0	4,900	1.48
060201_02	Concrete Slabs	105.00	CY	2,300	300	5,500	0	8,100	77.16
060201_03	Concrete Walls	75.00	CY	10,900	500	7,900	0	19,300	257.02
060201_04	Reinforcing Steel	17100	LB	3,100	0	3,400	0	6,600	0.38
060201_05	Steel Grating (location 7 only)	12000	LB	2,500	200	11,300	0	13,900	1.16
060201_06	Stop Logs	300.00	LF	200	0	300	0	500	1.69
060201_07	Jib Crane w/Trolly Hoist	3.00	EA	0	0	0	3,000	3,000	1000.00
060201_08	Bedding - 3" minus	630.00	TON	4,400	3,100	3,000	0	10,500	16.62
060201_09	C Stone	60.00	TON	400	300	300	0	1,000	17.41
060201_10	Geogrid	300.00	SY	100	0	1,800	0	1,900	6.39
060201_11	Geotextile	630.00	SY	400	0	800	0	1,100	1.81
060201_12	Staff Gage	6.00	EA	0	0	0	9,000	9,000	1500.00
TOTAL	8' Stoplog Structures	3.00	EA	26,200	7,300	34,400	12,000	79,800	26616
060202	3' Stoplog Structures								
060202_01	Excavation	220.00	CY	100	200	0	0	300	1.48

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060202_02	Concrete Slabs	24.00	CY	600	100	1,300	0	1,900	80.51
060202_03	Concrete Walls	22.00	CY	2,600	100	2,100	0	4,800	218.80
060202_04	Reinforcing Steel	4600.00	LB	800	0	900	0	1,800	0.39
060202_06	Stop Logs	200.00	LF	100	0	200	0	300	1.69
060202_07	Jib Crane w/Trolly Hoist	2.00	EA	0	0	0	2,000	2,000	1000.00
TOTAL	3' Stoplog Structures	2.00	EA	4,300	400	4,500	2,000	11,200	5594.59
TOTAL	Concrete Stoplog Structures			30,500	7,700	38,800	14,000	91,000	
0603	Forest Management Plan								
0603 A	Mast Tree Plantings (disposal ar								
0603 A_01	Herbicide Application	20.00	ACR	0	0	0	600	600	30.00
0603 A_02	Seedlings - Bare Root	20.00	ACR	0	0	0	6,800	6,800	340.00
0603 A_03	Seedlings - 2 Gal containers	20.00	ACR	0	0	0	17,000	17,000	850.00
TOTAL	Mast Tree Plantings (disposal ar			0	0	0	24,400	24,400	
0603 B	Mast Tree Plantings (cropland)								
0603 B_01	Establish Ground Cover	90.00	ACR	0	0	0	7,200	7,200	80.00
0603 B_02	Seedlings - Bare Root	60.00	ACR	0	0	0	20,400	20,400	340.00
0603 B_03	Seedlings - 2 Gal containers (11	30.00	ACR	0	0	0	25,500	25,500	850.00
0603 B_04	Seedlings - 2 Gal containers (22	60.00	ACR	0	0	0	10,200	10,200	170.00
0603 B_05	Tree Shelters	60.00	ACR	0	0	0	9,900	9,900	165.00
TOTAL	Mast Tree Plantings (cropland)			0	0	0	73,200	73,200	
0603 C	Mast Tree Plantings (forest)								
0603 C_01	Establish Ground Cover	60.00	ACR	0	0	0	4,800	4,800	80.00
0603 C_02	Mechanized Clearing	60.00	ACR	0	0	0	30,000	30,000	500.00
0603 C_03	Seedlings - 2 Gal containers (11	115.00	ACR	0	0	0	97,800	97,800	850.00
0603 C_04	Herbicide Application	115.00	ACR	0	0	0	3,500	3,500	30.00
TOTAL	Mast Tree Plantings (forest)			0	0	0	136,000	136,000	
0603 D	Woody Vegetation Control w/aeria								
0603 D_02	Vegetation Removal	169.00	ACR	0	0	0	16,900	16,900	100.00
TOTAL	Woody Vegetation Control w/aeria			0	0	0	16,900	16,900	
TOTAL	Forest Management Plan			0	0	0	250,500	250,500	

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
0604 Channels								
060401 Squaw Island								
060401_02 Excavation - Dragline	4400.00	CY	3,600	7,100	0	0	10,700	2.42
060401_03 Clearing	0.20	ACR	200	100	0	0	300	1664.66
060401_04 Seeding	0.20	ACR	0	0	200	0	200	1204.99
TOTAL Squaw Island			3,900	7,200	200	0	11,200	
060402 Royal to Chickahominy								
060402_02 Excavation - Dragline	6300.00	CY	5,200	10,100	0	0	15,300	2.42
060402_03 Clearing	0.30	ACR	300	200	0	0	500	1664.66
060402_04 Seeding	0.30	ACR	0	0	300	0	400	1204.99
TOTAL Royal to Chickahominy			5,500	10,300	300	0	16,100	
060403 Pohlman								
060403_01 Remove Existing Control Struct.	1.00	EA	2,100	1,400	0	0	3,400	3446.51
060403_02 Excavation - Dredging	87400	CY	0	0	0	262,200	262,200	3.00
060403_03 Clearing	0.40	ACR	400	200	0	0	700	1664.66
060403_04 Seeding	0.40	ACR	100	0	400	0	500	1204.99
TOTAL Pohlman			2,600	1,600	400	262,200	266,800	
060404 Silver Lake to Chickahominy								
060404_02 Excavation - Dredging	12600	CY	0	0	0	37,800	37,800	3.00
TOTAL Silver Lake to Chickahominy			0	0	0	37,800	37,800	
060405 Dredge Disposal Areas								
060405_02 Embankment - Disposal Retainment	25000	CY	0	0	0	75,000	75,000	3.00
060405_03 Stripping/Clearing	29.00	ACR	2,400	5,600	0	0	8,000	274.77
060405_04 Seeding	4.00	ACR	600	0	4,200	0	4,800	1204.99
TOTAL Dredge Disposal Areas			2,900	5,600	4,200	75,000	87,800	
060406 Borrow Areas								
060406_03 Stripping/Clearing	26.00	ACR	2,100	5,000	0	0	7,100	274.77

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL	Borrow Areas			2,100	5,000	0	0	7,100	
TOTAL	Channels			17,100	29,600	5,200	375,000	426,900	
0605	Levees								
060501	Dike/Levee, RS Only								
060501_02	Clearing(Includes Salvage Value)	51.00	ACR	56,600	28,300	0	-7,600	77,200	1514.66
060501_03	Embankment - Levee	28800	CY	37,300	67,700	0	0	105,000	3.65
060501_04	Crushed Stone - Levee Crown	10000	TON	43,800	20,300	29,800	0	93,900	9.39
060501_05	Remove Existing Culverts			1,300	900	0	0	2,200	
060501_06	B Stone - Overflow	11900	TON	82,600	58,400	94,600	0	235,600	19.80
060501_07	Stone - 3" minus	680.00	TON	4,700	3,300	3,200	0	11,300	16.62
060501_08	Access Gate	1.00	EA	0	0	0	2,500	2,500	2500.00
060501_09	Seeding	20.00	ACR	2,800	100	21,200	0	24,100	1204.99
060501_10	Timber Piles			16,000	4,800	0	0	20,800	
060501_11	Fish Habitat @ Polhman Slough			6,600	1,700	0	0	8,300	
TOTAL	Dike/Levee, RS Only			251,800	185,400	148,900	-5,100	580,900	
060502	Interior Levees (2 structures)								
060502_01	Clearing	1.00	ACR	1,100	600	0	0	1,700	1664.66
060502_02	Embankment - Levee	2000.00	CY	2,600	4,700	0	0	7,300	3.65
060502_03	Stone - 6" minus	10.00	TON	100	0	0	0	200	16.62
060502_04	Seeding	19.00	ACR	2,600	100	20,100	0	22,900	1204.99
TOTAL	Interior Levees (2 structures)			6,400	5,400	20,200	0	32,000	
060503	42" Dia. CMP Gravity Drain Str.								
060503_02	Excavation	530.00	CY	400	600	0	0	1,100	2.01
060503_03	Semi-Compacted Fill	150.00	CY	100	200	0	0	300	1.82
060503_04	42" CMP Culvert	40.00	LF	500	100	2,000	0	2,600	65.72
060503_05	42" CMP End Section	2.00	EA	300	0	1,700	0	2,000	1001.83
060503_06	42" Sluice Gate	1.00	EA	1,200	300	5,800	0	7,400	7356.96
060503_07	72' Dia Riser Pipe	12.00	LF	400	100	1,300	1,500	3,300	271.18
060503_08	Concrete Slab	2.00	CY	100	0	100	0	200	118.99
060503_09	Fiberglass Ladders	12.00	LF	0	0	0	1,200	1,200	100.00
060503_10	Fiberglass Grating	30.00	SF	0	0	500	0	500	18.27
060503_11	Bedding - 3" minus	340.00	TON	2,400	1,700	1,600	0	5,600	16.62
060503_12	Bedding - 6" minus	230.00	TON	1,600	1,100	1,100	0	3,800	16.62
060503_13	C Stone	250.00	TON	1,700	1,200	1,400	0	4,400	17.41
060503_14	Geotextile	230.00	SY	100	0	300	0	400	1.81
060503_15	Staff Gage	2.00	EA	0	0	0	3,000	3,000	1500.00

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

		QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL 42" Dia. CMP Gravity Drain Str.			8,900	5,400	15,900	5,700	35,800	
TOTAL Levees			267,000	196,200	184,900	600	648,700	
0606 Pumping Plant								
060601 Pump Station, Location No. 2								
060601_02	Care and Diversion of Water		32,200	1,600	25,200	0	59,100	
060601_03	Excavation	1320.00 CY	1,100	1,600	0	0	2,700	2.01
060601_04	Backfill	3100.00 CY	2,300	3,400	0	0	5,600	1.82
060601_05	Bedding Material	240.00 TON	1,700	1,200	1,100	0	4,000	16.62
060601_06	Riprap	730.00 TON	5,100	3,600	4,100	0	12,700	17.41
060601_07	Concrete	17.00 CY	3,000	100	2,100	0	5,200	306.24
060601_08	Reinforcing Steel	1700.00 LB	300	0	300	0	600	0.37
060601_09	Sheet Pile	7200.00 SF	40,600	21,300	68,000	0	129,800	18.03
060601_10	H-Pile	17200 LB	2,100	900	3,700	0	6,700	0.39
060601_11	42" Discharge Pipe	60.00 LF	1,800	600	3,400	0	5,900	97.71
060601_12	42" Dresser Coupling	1.00 EA	200	0	800	0	1,000	1005.83
060601_13	42" Flap Gate	1.00 EA	400	100	2,300	0	2,800	2798.68
060601_14	Pump - 48000 GPM	1.00 EA	0	0	0	60,000	60,000	60000
060601_15	Jack Shaft Assembly	1.00 EA	0	0	0	15,000	15,000	15000
060601_16	Staff Gage	2.00 EA	0	0	0	3,000	3,000	1500.00
TOTAL Pump Station, Location No. 2			90,700	34,400	111,000	78,000	314,100	
060602 Pump Station, Location No. 3								
060602_02	Care and Diversion of Water		32,200	1,600	25,200	0	59,100	
060602_03	Excavation	600.00 CY	500	700	0	0	1,200	2.01
060602_04	Backfill	1600.00 CY	1,200	1,700	0	0	2,900	1.82
060602_05	Bedding Material	70.00 TON	500	300	300	0	1,200	16.62
060602_06	Riprap	210.00 TON	1,500	1,000	1,200	0	3,700	17.41
060602_07	Concrete	800.00 CY	132,700	4,900	90,700	0	228,300	285.35
060602_08	Reinforcing Steel	80400 LB	67,000	600	73,400	0	141,000	1.75
060602_09	Sheet Pile	8220.00 SF	46,300	24,300	77,600	0	148,200	18.03
060602_10	H-Pile	6410.00 LB	800	300	1,400	0	2,500	0.39
060602_11	42" Discharge Pipe	60.00 LF	1,800	600	3,400	0	5,900	97.71
060602_12	42" Dresser Coupling	1.00 EA	200	0	800	0	1,000	1005.83
060602_13	42" Elbow (90)	1.00 EA	1,100	200	5,400	0	6,600	6640.34
060602_14	42" Flap Gate	1.00 EA	400	100	2,300	0	2,800	2798.68
060602_15	42" Slide Gate	2.00 EA	1,100	300	3,300	0	4,700	2372.66
060602_16	Gate Operators	2.00 EA	0	0	13,800	0	13,800	6890.00
060602_17	Steel Grating	22500 LB	4,100	200	15,500	0	19,800	0.88
060602_18	Stop Logs	136.00 LF	900	0	2,300	400	3,700	26.87
060602_19	Pump - 48000 GPM	1.00 EA	0	0	0	60,000	60,000	60000
060602_20	Portable Drive Unit For Pump	1.00 EA	0	0	0	25,000	25,000	25000
060602_21	Jib Crane w/Trolly Hoist	1.00 EA	0	0	0	1,000	1,000	1000.00
060602_22	Jack Shaft Assembly	1.00 EA	0	0	0	15,000	15,000	15000

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY	UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060602_23 Staff Gage	2.00	EA	0	0	0	3,000	3,000	1500.00
TOTAL Pump Station, Location No. 3			292,300	37,100	316,500	104,400	750,300	
060603 Portable Pump Units								
060603_01 Pump and Drive Unit - 5000 GPM	2.00	EA	0	0	0	54,000	54,000	27000
060603_02 Portable Fuel Tank (1000 gal)	1.00	EA	0	0	0	14,000	14,000	14000
060603_03 Portable Fuel Tank (500 gal)	2.00	EA	0	0	0	18,000	18,000	9000.00
TOTAL Portable Pump Units			0	0	0	86,000	86,000	
TOTAL Pumping Plant			383,000	71,400	427,500	268,400	1,150,400	
0607 Bank Stabilization								
060701 Revetment, N.E. Corner								
060701_01 C Stone	17800	TON	123,500	87,300	99,100	0	309,900	17.41
TOTAL Revetment, N.E. Corner			123,500	87,300	99,100	0	309,900	
TOTAL Bank Stabilization			123,500	87,300	99,100	0	309,900	
TOTAL Fish and Wildlife Facilities			872,800	401,700	844,400	912,900	3,031,700	
30 Planning, Engineering and Design								
3001 PED Prior to Completion of DPR								
300101 PED Prior to Completion of DPR			0	0	0	561,000	561,000	
TOTAL PED Prior to Completion of DPR			0	0	0	561,000	561,000	
3004 Environment-Regulatory Activity								
300401 Environment-Regulatory Activity			0	0	0	5,000	5,000	
TOTAL Environment-Regulatory Activity			0	0	0	5,000	5,000	
3008 Plans and Specifications								
300801 Plans and Specifications			0	0	0	364,000	364,000	
TOTAL Plans and Specifications			0	0	0	364,000	364,000	

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
3010 Engineering During Construction							
301001 Engineering During Construction		0	0	0	25,000	25,000	
TOTAL Engineering During Construction		0	0	0	25,000	25,000	
3013 Cost Engineering							
301301 Cost Engineering		0	0	0	20,000	20,000	
TOTAL Cost Engineering		0	0	0	20,000	20,000	
3014 Const-Supply Contract Award Acty							
301401 Const-Supply Contract Award Acty		0	0	0	10,000	10,000	
TOTAL Const-Supply Contract Award Acty		0	0	0	10,000	10,000	
3024 Value Engineerng Analysis Docmnt							
302401 Value Engineerng Analysis Docmnt	1.00 EA	0	0	0	25,000	25,000	25000
TOTAL Value Engineerng Analysis Docmnt	1.00 EA	0	0	0	25,000	25,000	25000
3026 Miscellaneous Activities							
302601 Miscellaneous Activities		0	0	0	5,000	5,000	
TOTAL Miscellaneous Activities		0	0	0	5,000	5,000	
TOTAL Planning, Engineering and Design		0	0	0	1,015,000	1,015,000	
31 Construction Management (S&I)							
3101 Project Office S&A							
310101 Project Office S&A		0	0	0	280,800	280,800	
TOTAL Project Office S&A		0	0	0	280,800	280,800	
3102 Area Office S&A							
310201 Area Office S&A		0	0	0	25,300	25,300	
TOTAL Area Office S&A		0	0	0	25,300	25,300	

** PROJECT DIRECT SUMMARY - Item (Rounded to 100's) **

	QUANTY UOM	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
3103 District Office S&A							
310301 District Office S&A		0	0	0	184,500	184,500	
TOTAL District Office S&A		0	0	0	184,500	184,500	
3126 Programs/Project Managmnt Docmnt							
312601 Programs/Project Managmnt Docmnt		0	0	0	22,000	22,000	
TOTAL Programs/Project Managmnt Docmnt		0	0	0	22,000	22,000	
TOTAL Construction Management (S&I)		0	0	0	512,600	512,600	
TOTAL CALHOUN POINT - *REVISED* DPR		875,800	402,900	847,700	2,458,400	4,584,800	
Field Off. Overhead, Mob, & Haul Road						221,900	
SUBTOTAL						4,806,700	
Home Office Overhead						150,500	
SUBTOTAL						4,957,200	
Profit						263,200	
SUBTOTAL						5,220,400	
Bond						43,000	
TOTAL INCL INDIRECTS						5,263,300	
Contingency						654,000	
TOTAL INCL OWNER COSTS						5,917,300	

Project Distributed Costs

001. Prime Contractor	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT

001. Prime Contractor

001 0. Overhead Items - PM

It is assumed that this project will be accomplished with three contracts. The first contract will include all stuctures excluding the pump stations. The second contract will be for the pump stations and the third contract will include all remaining work. For estimating of overhead assume a single contract duration. Profit is calculated based on the largest of the three contracts.

	Duration
Contract No. 1	6 months
Contract No. 2	9 months
Contract No. 3	9 months

001 0_01. Field Office Overhead

USR	Project Engineer				0.00	0.00	0.00	4500.00	4500.00	
		24.00	MO	0.00	0	0	0	108,000	108,000	4500.00
USR	Survey Crew - assume 1wk/3mo				0.00	0.00	0.00	4000.00	4000.00	
		8.00	WK	0.00	0	0	0	32,000	32,000	4000.00
USR	Field Office Trailer				0.00	0.00	0.00	400.00	400.00	
		24.00	MO	0.00	0	0	0	9,600	9,600	400.00
USR	Temporary Hookup				0.00	0.00	0.00	500.00	500.00	
		3.00	EA	0.00	0	0	0	1,500	1,500	500.00
USR	Utilities				0.00	0.00	0.00	150.00	150.00	
		24.00	MO	0.00	0	0	0	3,600	3,600	150.00
USR	Sanitary Facilities				0.00	0.00	0.00	150.00	150.00	
		24.00	MO	0.00	0	0	0	3,600	3,600	150.00
USR	Pickup Truck				0.00	0.00	0.00	400.00	400.00	
		24.00	MO	0.00	0	0	0	9,600	9,600	400.00
USR	Safety Equipment				0.00	0.00	0.00	500.00	500.00	
		3.00	EA	0.00	0	0	0	1,500	1,500	500.00
USR	Project/Safety Sign				0.00	0.00	0.00	400.00	400.00	
		3.00	EA	0.00	0	0	0	1,200	1,200	400.00
USR	Environmental Protection				0.00	0.00	0.00	1000.00	1000.00	
		3.00	EA	0.00	0	0	0	3,000	3,000	1000.0(
USR	Skiff And Outboard (4hrs/wk)				0.00	8.24	0.00	0.00	8.24	
		416.00	HR	0.00	0	3,428	0	0	3,428	8.24

Project Distributed Costs

001. Prime Contractor	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL Skiff Operator (4hrs/wk)					26.29	0.00	0.00	0.00	26.29	
	416.00	HR	X-EQOPRLT	1.00	10,938	0	0	0	10,938	26.29
TOTAL Field Office Overhead					10,938	3,428	0	173,600	187,966	

001 0_02. Mob and Demob

Assume the following for mobilization and demobilization:

- Allow 1hr operating time for each piece of equipment, each way.
- Allow 2hrs drive time each way for trucks.

Cycle Time per Trip -		
	Load Equip.	.5hr
	Mob. to Jobsite	2.0hr
	Unload Equip.	.5hr
	Return	2.0hr
		5.0hrs/trip

Mob = 10trips x 5hrs/ea = 50hrs
Demob = Use the same as mob
Total = 100 hrs

MIL	GRADER,MOTOR,CAT12-G, ARTIC				0.00	29.49	0.00	0.00	29.49	
	ARTICULATED FRAME, POWERSHIF T	2.00	HR	G15CA003	1.00 0	59	0	0	59	29.49
MIL	HYD EXCAV,CRWLR,3 CY BKT				0.00	130.71	0.00	0.00	130.71	
	3.00 CY BUCKET	2.00	HR	H25KO007	1.00 0	261	0	0	261	130.71
MIL	ROLLER,STATIC,SELF,15T, 11 T				0.00	12.68	0.00	0.00	12.68	
	IRE	2.00	HR	R30IG003	0.00 0	25	0	0	25	12.68
	15 TON, 11 TIRES, HYDROSTATIC									
MIL	ROLL,VIB,TOWED,STL,PAD,58"D,				0.00	10.02	0.00	0.00	10.02	
	60"W	2.00	HR	R40HY004	0.00 0	20	0	0	20	10.02
	58" DIAMETER X 60" WIDE									
MIL	BLADE, ANGLE, HYDR, FOR D6				0.00	4.04	0.00	0.00	4.04	
	BLADE, ANGLE, HYDRAULIC, FOR D6	2.00	HR	T10CA010	1.00 0	8	0	0	8	4.04
MIL	BLADE, UNIVERSAL,HYDR,FOR D8				0.00	7.36	0.00	0.00	7.36	
	BLADE, UNIVERSAL,HYDRAULIC,F OR D	2.00	HR	T10CA017	1.00 0	15	0	0	15	7.36
MIL	DOZER,CWLR,D-6H,PS,(ADD BLAD				0.00	39.58	0.00	0.00	39.58	
	E)	2.00	HR	T15CA010	1.00 0	79	0	0	79	39.58
	POWERSHIFT, (ADD BLADE)									

Project Distributed Costs

001. Prime Contractor	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL DOZER,CWLR,CAT D-8L, (ADD BL					0.00	78.77	0.00	0.00	78.77	
ADE)	2.00	HR	T15CA015	1.00	0	158	0	0	158	78.77
POWERSHIFT, (ADD BLADE)										
MIL CRANE,HYD,SELF 14T ROUGH TER					0.00	27.60	0.00	0.00	27.60	
RAIN	2.00	HR	C75BD003	1.00	0	55	0	0	55	27.60
13.6 TON ROUGH TERRAIN, 4WD										
MIL LDR,FE,CRWLR, 3.75 CY, 973					0.00	75.41	0.00	0.00	75.41	
3.75 CY	2.00	HR	L35CA007	1.00	0	151	0	0	151	75.41
MIL TRUCK OPT,REAR DUMP BODY, 12					0.00	2.69	0.00	0.00	2.69	
CY	8.00	HR	T40XX010	1.00	0	22	0	0	22	2.69
12 CY, 36000 AND UP GVW, AIR GAT										
MIL WATER TANK, 3000 GAL (ADD TR					0.00	3.23	0.00	0.00	3.23	
UCK)	2.00	HR	T40XX033	1.00	0	6	0	0	6	3.23
3000 GAL (ADD 29000-40000 GVW TR										
MIL TRK TRLR,LOWBOY, 60 TON, 3 A					0.00	7.47	0.00	0.00	7.47	
XLE	100.00	HR	T45XX017	1.00	0	747	0	0	747	7.47
60 TON, 3 AXLE										
MIL TRK,HWY,48,000/64,000 GVW,3					0.00	40.91	0.00	0.00	40.91	
AXLE	100.00	HR	T50FO020	1.00	0	4,091	0	0	4,091	40.91
64,000 GVW, 3 AXLE										
MIL TRK, HWY, 3 AXLE, 41000 GVW,					0.00	27.17	0.00	0.00	27.17	
6X4	10.00	HR	T50GM015	1.00	0	272	0	0	272	27.17
6X4, 3 AXLE, 41000 GVW										
UPB SCRAPER,SELF, 21-31CY, 37.5T					0.00	120.75	0.00	0.00	120.75	
, PS	8.00	HR	S15CA002	1.00	0	966	0	0	966	120.75
REF. EP 1110-1-8										
21-31 CY, 37.5 TON, POWERSHIFT										
UPB PILE HAMMER,SNG, 19,500 FT-L					0.00	15.40	0.00	0.00	15.40	
BS	2.00	HR	P25VU002	1.00	0	31	0	0	31	15.40
REF. EP 1110-1-8										
19,500 FT-LBS (ADD COMPRESSOR)										
UPB PILE HAMMER,VIB,116T FORCE D					0.00	73.16	0.00	0.00	73.16	
RIVE	2.00	HR	P30MK003	1.00	0	146	0	0	146	73.16
REF. EP 1110-1-8										
MAXIMUM DRIVING FORCE 116 TON										
MIL Misc. Power Tools					0.00	5.90	0.00	0.00	5.90	
	100.00	HR	XMIXX010	1.00	0	590	0	0	590	5.90

Project Distributed Costs

001. Prime Contractor	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL Small Tools					0.00	1.45	0.00	0.00	1.45	
	100.00	HR	XMIXX020	1.00	0	145	0	0	145	1.45
MIL Outside Equip. Op. Heavy					32.79	0.00	0.00	0.00	32.79	
	100.00	HR	X-EQOPRHVY	1.00	3,279	0	0	0	3,279	32.79
MIL Outside Laborer (Semi-Skille					27.65	0.00	0.00	0.00	27.65	
d)	100.00	HR	X-LABORER	1.00	2,765	0	0	0	2,765	27.65
MIL Outside Truck Dr. Heavy					27.57	0.00	0.00	0.00	27.57	
	100.00	HR	X-TRKDVRHV	1.00	2,757	0	0	0	2,757	27.57
MIL Outside Truck Dr. Heavy					27.57	0.00	0.00	0.00	27.57	
	100.00	HR	X-TRKDVRHV	1.00	2,757	0	0	0	2,757	27.57
TOTAL Mob and Demob					11,557	7,846	0	0	19,404	
001 0_03. Construct Haul Roads										
MIL GRADER,MOTOR,CAT12-G, ARTIC					0.00	29.49	0.00	0.00	29.49	
ARTICULATED FRAME, POWERSHIF	80.00	HR	G15CA003	1.00	0	2,359	0	0	2,359	29.49
T										
MIL BLADE, UNIVERSAL,HYDR,FOR D8					0.00	7.36	0.00	0.00	7.36	
BLADE, UNIVERSAL,HYDRAULIC,F	80.00	HR	T10CA017	1.00	0	589	0	0	589	7.36
OR D										
MIL DOZER,CWLR,CAT D-8L, (ADD BL					0.00	78.77	0.00	0.00	78.77	
ADE)	80.00	HR	T15CA015	1.00	0	6,301	0	0	6,301	78.77
POWERSHIFT, (ADD BLADE)										
MIL Outside Equip. Op. Heavy (2e					32.79	0.00	0.00	0.00	32.79	
a)	160.00	HR	X-EQOPRHVY	1.00	5,246	0	0	0	5,246	32.79
TOTAL Construct Haul Roads					5,246	9,249	0	0	14,495	
TOTAL Overhead Items - PM					27,741	20,523	0	173,600	221,864	

01. Lands and Damages

0120. Definite Project Report (DPR)	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
01. Lands and Damages										
0120. Definite Project Report (DPR)										
012003. Real Estate Analysis Documents										
TOTAL All Other Real Estate Analy/					0	0	0	18,000	18,000	
TOTAL Real Estate Analysis Documen					0	0	0	18,000	18,000	
TOTAL Definite Project Report (DPR					0	0	0	18,000	18,000	
TOTAL Lands and Damages					0	0	0	18,000	18,000	

02. Relocations

0201. Roads, Construction Activities	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
02. Relocations										
0201. Roads, Construction Activities										
020139. Road Surfacing										
020139_01. Crushed Stone Road Ramps										
02611 2000 Basic Cost Items										
M MIL PM Graded Crushed Agg Rdwy Base					7.01	3.25	4.77	0.00	15.02	
Crs	69.00	CY	XSABA	31.25	483	224	329	0	1,036	15.02
TOTAL Crushed Stone Road Ramps	110.00	TON			483	224	329	0	1,036	9.42
020139_02. Crushed Stone Parking Lots (2ea)										
02611 1000 Prepare And Roll Subbase										
MIL PM Crushed Stone Paving, Small					0.88	0.38	0.53	0.00	1.79	
Area	938.00	SY	XSGRA	187.50	824	353	497	0	1,674	1.79
Prepare and Roll Subbase										
02611 2100 Grade And Compact Base Courses Includes Grader,										
M MIL PM 6"(15cm) Crushed Agg Base Co					1.17	0.54	1.27	0.00	2.98	
urse	938.00	SY	XSABA	187.50	1,095	507	1,193	0	2,796	2.98
Grader, Roller and Water Truck										
TOTAL Crushed Stone Parking Lots (	250.00	TON			1,919	861	1,690	0	4,470	17.88
TOTAL Road Surfacing					2,403	1,085	2,019	0	5,506	
020199. Associated General Items										
020199_01. 12" CMP Culverts (3ea)										
02458 2000 Basic Cost Items										
M MIL PM 12"(31cm) 16 Ga Corr Metal P					6.06	0.47	13.90	0.00	20.42	
ipe	66.00	LF	CODEK	27.50	400	31	917	0	1,348	20.42
Galv Or Alum, Plain										
02458 2600 Corrugated Metal Pipe End Sections										
CIV PM 12"(31cm) Corr Metal Pipe En					38.07	2.93	63.05	0.00	104.04	
ds	6.00	EA	CODEK	4.38	228	18	378	0	624	104.04

02. Relocations

0201. Roads, Construction Activities	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
02458 2800 Galvanized Couplings For Corrugated Metal Pipe										
CIV PM 12" Dia Galv Corr Metal Coup					0.00	0.00	5.60	0.00	5.60	
ling	9.00	EA	N/A	0.00	0	0	50	0	50	5.60
(31cm) Diameter										
TOTAL 12" CMP Culverts (3ea)	66.00	LF			628	48	1,346	0	2,022	30.64
TOTAL Associated General Items					628	48	1,346	0	2,022	
TOTAL Roads, Construction Activiti					3,031	1,133	3,365	0	7,529	
TOTAL Relocations					3,031	1,133	3,365	0	7,529	

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage

060101. Water Control/Fish Passage Structure at Site 1.

060101_01. Excavation

02225 2140 3 Cy Capacity

CIV PM	Exc & Load,3 CY Hyd Exc,Med				0.59	0.89	0.00	0.00	1.48	
	Matl	1750.00	CY	XXQHK	147.00	1,028	1,558	0	0	2,586	1.48
	147 CY/Hr (112M3)									
TOTAL	Excavation	1750.00	CY			1,028	1,558	0	0	2,586	1.48

060101_02. Backfill

02212 1010 By Towed Roller Assume Following Cond. 6Ft

L MIL PM	Spread/Compact w/Sheepsft Ro				0.50	0.65	0.00	0.00	1.16	
	ller	560.00	CY	COFCO	150.00	283	364	0	0	647	1.16
	6"(15cm) Lift, 366 CY/HR									

02222 4100 Backfilling Foundation Without Compaction 6 In

L MIL PM	Foundation Backfill, w/Dozer				0.23	0.43	0.00	0.00	0.66	
	6" Lift without Compaction	560.00	CY	CODTG	150.00	128	243	0	0	371	0.66
TOTAL	Backfill	560.00	CY			411	607	0	0	1,018	1.82

060101_03. Concrete Slabs

03110 1610 Slab On Grade Edge Forms (4 Uses)

MIL PM	Slab on Gr Edge Forms,7" to				2.08	0.04	0.72	0.00	2.84	
	12"H	200.00	LF	ACARJ	54.38	415	9	144	0	568	2.84
	(18cm to 31cm)H, Based on 4 Uses									

03305 0000 Concrete Curing

MIL PM	Conc Curing, Sprayed Membran				5.86	0.03	3.13	0.00	9.02	
	e	17.00	CSF	ULABB	11.88	100	1	53	0	153	9.02
	Curing Compound									

03311 1160 Slab On Grade

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	92.00	CY	ALABI	41.25	500	188	4,598	0	5,286	57.46
>= (15 cm) Place 3000 PSI Conc										
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	1700.00	SF	ACMAC	84.38	669	30	0	0	699	0.41
TOTAL Concrete Slabs	92.00	CY			1,684	227	4,795	0	6,707	72.90
060101_04. Concrete Walls										
03110 1420 Over 8 Ft (2.4M) High Wall										
MIL PM Wall Forms, Over 8'H Wall, 1					3.90	0.09	1.77	0.00	5.76	
Use	4300.00	SF	ACARL	35.00	16,791	373	7,612	0	24,776	5.76
(Below Gr) Plywd Forms,F&S w/Acc										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	43.00	CSF	ULABB	11.88	252	1	134	0	388	9.02
Curing Compound										
03311 1240 Walls										
MIL PM Pour Conc Walls,12"Tk, Conc					9.44	3.55	49.98	0.00	62.97	
Pump	80.00	CY	ALABI	23.75	755	284	3,998	0	5,037	62.97
(31cm) 3000 PSI Conc										
03311 4200 Wall Finishes										
MIL PM Wall Finishes,Break Ties & P					0.56	0.00	0.05	0.00	0.62	
atch	4300.00	SF	ACMAA	67.50	2,411	11	228	0	2,650	0.62
TOTAL Concrete Walls	80.00	CY			20,210	669	11,973	0	32,851	410.64
060101_05. Reinforcing Steel										
03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					387.40	3.16	417.64	0.00	808.20	
3-#6	4.95	TON	SIWRC	0.31	1,918	16	2,067	0	4,001	808.20

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
03210 2000 Basic Cost Items										
L MIL PM Gr 60 Resteel,Bm,Clmn,Wall,#					345.90	2.82	390.08	0.00	738.79	
7-Up	4.30	TON	SIWRC	0.35	1,487	12	1,677	0	3,177	738.79
TOTAL Reinforcing Steel	18500	LB			3,405	28	3,745	0	7,177	0.39
060101_06. Stop Logs										
06132 4000 Douglas Fir Columns										
MIL PM Columns, 8x8					0.73	0.02	0.94	0.00	1.69	
Mill Framed Structures	725.00	BF	ACARD	87.50	526	17	684	0	1,226	1.69
TOTAL Stop Logs	136.00	LF			526	17	684	0	1,226	9.02
060101_07. Sluice Gates - 42"										
05651 1100 Heavy Duty Sluice Gates Self Contained										
CIV PM 42"x 42"Heavy Duty Sluice Ga					1238.69	333.85	5784.42	0.00	7356.96	
tes	2.00	EA	SIWSE	0.09	2,477	668	11,569	0	14,714	7356.96
Self Contained w/Crank Oper Gate										
TOTAL Sluice Gates - 42"	2.00	EA			2,477	668	11,569	0	14,714	7356.96
060101_08. Gate Operators										
USR PM Hydraulic Gate Operators					0.00	0.00	6890.00	0.00	6890.00	
	2.00	EA		0.00	0	0	13,780	0	13,780	6890.00
TOTAL Gate Operators	2.00	EA			0	0	13,780	0	13,780	6890.00
060101_09. Steel Grating										
05530 2200 Galvanized (2 Oz Per Sf)										
MIL PM 1-1/4"x 1/8"Galv Steel Grati					1.32	0.08	5.94	0.00	7.34	
ng	2762.00	SF	SIWSC	93.75	3,652	218	16,395	0	20,266	7.34
Welded Steel,6.3 #/SF(2 Oz /SF)										
TOTAL Steel Grating	17400	LB			3,652	218	16,395	0	20,266	1.16

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060101_10. Jib Crane w/Trolly Hoist										
USR PM Crane w/Hoist					0.00	0.00	0.00	1000.00	1000.00	
	1.00	EA		0.00	0	0	0	1,000	1,000	1000.00
TOTAL Jib Crane w/Trolly Hoist	1.00	EA			0	0	0	1,000	1,000	1000.00
060101_11. Staff Gages										
USR PM Staff Gages					0.00	0.00	0.00	1500.00	1500.00	
	2.00	EA		0.00	0	0	0	3,000	3,000	1500.00
TOTAL Staff Gages	2.00	EA			0	0	0	3,000	3,000	1500.00
060101_12. Concrete Boat Ramp										
Use crew and equipment to slide boat ramp into place.										
UPB PM BLADE, STRAIGHT, HYDR (FOR					0.00	3.66	0.00	0.00	3.66	
D6	8.00	HR	T10CA009	1.00	0	29	0	0	29	3.66
REF. EP 1110-1-8										
BLADE, STRAIGHT,HYDRAULIC, FOR D										
6										
UPB PM DOZER,CWLR, D-6H,PS (ADD BL					0.00	39.58	0.00	0.00	39.58	
ADE)	8.00	HR	T15CA010	1.00	0	317	0	0	317	39.58
REF. EP 1110-1-8										
POWERSHIFT (ADD BLADE)										
MIL PM Outside Equip. Op. Heavy					32.79	0.00	0.00	0.00	32.79	
	8.00	HR	X-EQOPRHVY	1.00	262	0	0	0	262	32.79
MIL PM Outside Laborer (2ea)					27.65	0.00	0.00	0.00	27.65	
	16.00	HR	X-LABORER	1.00	442	0	0	0	442	27.65
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms,7" to					2.08	0.04	0.72	0.00	2.84	
12"H	100.00	LF	ACARJ	54.38	208	4	72	0	284	2.84
(18cm to 31cm)H, Based on 4 Uses										
03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					0.19	0.00	0.21	0.00	0.41	
3-#6	840.00	LB	SIWRC	625.00	163	1	178	0	342	0.41
03305 0000 Concrete Curing										

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	7.60	CSF	ULABB	11.88	45	0	24	0	69	9.02
Curing Compound										
03311 1160 Slab On Grade										
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	14.00	CY	ALABI	41.25	76	29	700	0	804	57.46
>= (15 cm) Place 3000 PSI Conc										
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	760.00	SF	ACMAC	84.38	299	14	0	0	312	0.41
TOTAL Concrete Boat Ramp					1,495	394	974	0	2,862	
060101_13. Riprap										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Rip Rap, 25# to 400# Pieces					6.94	4.91	5.57	0.00	17.41	
Random, Dumped from Truck	670.00	TON	COETE	20.00	4,650	3,287	3,729	0	11,666	17.41
TOTAL Riprap	670.00	TON			4,650	3,287	3,729	0	11,666	17.41
060101_14. Bedding										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Bedding Material					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	200.00	TON	COETE	20.00	1,388	981	954	0	3,323	16.62
TOTAL Bedding	200.00	TON			1,388	981	954	0	3,323	16.62
060101_15. Security Gates										
These gates will be fabricated to slip into the stoplog slots.										
USR PM Miscellaneous					0.00	0.00	0.00	100.00	100.00	
	1.00	LS		0.00	0	0	0	100	100	100.00
05120 1150 Rolled C, MC Steel Channels										
MIL PM C7 x 14.5 (2ea @ 32'/ea)					0.32	0.08	1.33	0.00	1.73	
	928.00	LB	SIWSM	750.00	299	77	1,230	0	1,606	1.73

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
05120 2710 Fillet Welds - Vertical Position, Welded Up										
CIV PM 1/4"Vert Fillet Welds,Welded					5.37	0.24	0.31	0.00	5.92	
Up	18.70	LF	SIWWA	7.50	100	5	6	0	111	5.92
Based on Std Oper Factor of 50%										
09910 2130 Misc. Steel Items - Spray Work										
MIL PM Paint Steel Channels,1 Coat					0.14	0.00	0.02	0.00	0.16	
Spry	928.00	LB	APTRA	250.00	127	1	20	0	148	0.16
TOTAL Security Gates	200.00	TON			526	83	1,255	100	1,965	9.82
TOTAL Water Control/Fish Passage S	1.00	EA			41,452	8,738	69,852	4,100	124,142	124142
060102. Fish Passage Structure at Pump S tation, Site No. 2.										
060102_01. Excavation										
02225 2140 3 Cy Capacity										
CIV PM Exc & Load,3 CY Hyd Exc,Med					0.59	0.89	0.00	0.00	1.48	
Matl	50.00	CY	XXQHK	147.00	29	45	0	0	74	1.48
147 CY/Hr (112M3)										
TOTAL Excavation	50.00	CY			29	45	0	0	74	1.48
060102_02. Backfill										
02212 1010 By Towed Roller Assume Following Cond. 6Ft										
L MIL PM Spread/Compact w/Sheepsft Ro					0.50	0.65	0.00	0.00	1.16	
ller	25.00	CY	COFCO	150.00	13	16	0	0	29	1.16
6"(15cm) Lift, 366 CY/HR										
02222 4100 Backfilling Foundation Without Compaction 6 In										
L MIL PM Foundation Backfill, w/Dozer					0.23	0.43	0.00	0.00	0.66	
6" Lift without Compaction	25.00	CY	CODTG	150.00	6	11	0	0	17	0.66
TOTAL Backfill	25.00	CY			18	27	0	0	45	1.82

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060102_03. Concrete Slabs										
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms,7" to					2.08	0.04	0.72	0.00	2.84	
12"H	200.00	LF	ACARJ	54.38	415	9	144	0	568	2.84
(18cm to 31cm)H, Based on 4 Uses										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	6.00	CSF	ULABB	11.88	35	0	19	0	54	9.02
Curing Compound										
03311 1160 Slab On Grade										
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	43.00	CY	ALABI	41.25	234	88	2,149	0	2,471	57.46
>= (15 cm) Place 3000 PSI Conc										
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	580.00	SF	ACMAC	84.38	228	10	0	0	238	0.41
TOTAL Concrete Slabs	43.00	CY			913	107	2,312	0	3,332	77.48
060102_04. Concrete Walls										
03110 1420 Over 8 Ft (2.4M) High Wall										
MIL PM Wall Forms, Over 8'H Wall, 1					3.90	0.09	1.77	0.00	5.76	
Use	900.00	SF	ACARL	35.00	3,514	78	1,593	0	5,186	5.76
(Below Gr) Plywd Forms,F&S w/Acc										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	9.00	CSF	ULABB	11.88	53	0	28	0	81	9.02
Curing Compound										
03311 1240 Walls										
MIL PM Pour Conc Walls,12"Tk, Conc					9.44	3.55	49.98	0.00	62.97	
Pump	59.00	CY	ALABI	23.75	557	209	2,949	0	3,715	62.97
(31cm) 3000 PSI Conc										
03311 4200 Wall Finishes										

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL PM Wall Finishes,Break Ties & P					0.56	0.00	0.05	0.00	0.62	
atch	900.00	SF	ACMAA	67.50	505	2	48	0	555	0.62
TOTAL Concrete Walls	59.00	CY			4,629	290	4,618	0	9,537	161.64
060102_05. Reinforcing Steel										
03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					386.79	3.15	417.64	0.00	807.58	
3-#6	3.23	TON	SIWRC	0.31	1,247	10	1,347	0	2,604	807.58
03210 2000 Basic Cost Items										
L MIL PM Gr 60 Resteel,Bm,Clmn,Wall,#					345.90	2.82	390.08	0.00	738.79	
7-Up	4.43	TON	SIWRC	0.35	1,531	12	1,726	0	3,269	738.79
TOTAL Reinforcing Steel	15300	LB			2,778	23	3,073	0	5,874	0.38
060102_06. Miscellaneous Metal										
USR PM Miscellaneous					0.00	0.00	0.00	300.00	300.00	
	1.00	LS		0.00	0	0	0	300	300	300.00
05120 1000 Beams, Girders and Columns for 1 and 2 Story										
MIL PM W18 x 45 (1ea @ 25')					0.11	0.03	0.99	0.00	1.12	
	1125.00	LB	SIWSM	2250.00	121	31	1,109	0	1,261	1.12
05120 1150 Rolled C, MC Steel Channels										
MIL PM C8 x 18.75 (12ea @ 10.5'/ea)					0.32	0.08	1.33	0.00	1.73	
	2363.00	LB	SIWSM	750.00	761	197	3,131	0	4,089	1.73
09910 2130 Misc. Steel Items - Spray Work										
MIL PM Paint Steel Channels,1 Coat					0.14	0.00	0.02	0.00	0.16	
Spry	3488.00	LB	APTRA	250.00	477	6	74	0	557	0.16
TOTAL Miscellaneous Metal					1,359	234	4,314	300	6,207	

06. Fish and Wildlife Facilities

0601. Water Control/Fish Passage	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060102_07. Miscellaneous Fiberglass										
06510 1100 Isophthalic Resin System For Moderately										
L CIV PM 1-1/2"Fib Grate,1-1/2"Mesh,G					1.29	0.02	16.96	0.00	18.27	
reen	275.00	SF	SIWSB	62.50	354	6	4,664	0	5,025	18.27
For Mod Corrosive Environment										
TOTAL Miscellaneous Fiberglass					354	6	4,664	0	5,025	
TOTAL Fish Passage Structure at Pu	1.00	EA			10,080	731	18,981	300	30,092	30092
TOTAL Water Control/Fish Passage					51,532	9,469	88,833	4,400	154,234	
0602. Concrete Stoplog Structures										
060201. 8' Stoplog Structures										
These structures are located at Sites 6, 7, & 11. Only Site 7 will have steel grating.										
060201_01. Excavation										
02225 2140 3 Cy Capacity										
CIV PM Exc & Load,3 CY Hyd Exc,Med					0.59	0.89	0.00	0.00	1.48	
Matl	3300.00	CY	XXQHK	147.00	1,938	2,938	0	0	4,876	1.48
147 CY/Hr (112M3)										
TOTAL Excavation	3300.00	CY			1,938	2,938	0	0	4,876	1.48
060201_02. Concrete Slabs										
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms,7" to					2.08	0.04	0.72	0.00	2.84	
12"H	225.00	LF	ACARJ	54.38	467	10	162	0	639	2.84
(18cm to 31cm)H, Based on 4 Uses										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	28.50	CSF	ULABB	11.88	167	1	89	0	257	9.02
Curing Compound										
03311 1160 Slab On Grade										
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	105.00	CY	ALABI	41.25	571	214	5,248	0	6,033	57.46
>= (15 cm) Place 3000 PSI Conc										

0602. Concrete Stoplog Structures	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	2850.00	SF	ACMAC	84.38	1,121	51	0	0	1,172	0.41
TOTAL Concrete Slabs	105.00	CY			2,326	276	5,499	0	8,101	77.16
060201_03. Concrete Walls										
03110 1420 Over 8 Ft (2.4M) High Wall										
MIL PM Wall Forms, Over 8'H Wall, 1					3.90	0.09	1.77	0.00	5.76	
Use	2250.00	SF	ACARL	35.00	8,786	195	3,983	0	12,964	5.76
(Below Gr) Plywd Forms,F&S w/Acc										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	22.50	CSF	ULABB	11.88	132	1	70	0	203	9.02
Curing Compound										
03311 1240 Walls										
MIL PM Pour Conc Walls,12"Tk, Conc					9.44	3.55	49.98	0.00	62.97	
Pump	75.00	CY	ALABI	23.75	708	266	3,748	0	4,723	62.97
(31cm) 3000 PSI Conc										
03311 4200 Wall Finishes										
MIL PM Wall Finishes,Break Ties & P					0.56	0.00	0.05	0.00	0.62	
atch	2250.00	SF	ACMAA	67.50	1,262	6	119	0	1,387	0.62
TOTAL Concrete Walls	75.00	CY			10,888	468	7,921	0	19,276	257.02
060201_04. Reinforcing Steel										
03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					386.79	3.15	417.64	0.00	807.58	
3-#6	4.85	TON	SIWRC	0.31	1,876	15	2,026	0	3,917	807.58
03210 2000 Basic Cost Items										
L MIL PM Gr 60 Resteel,Bm,Clmn,Wall,#					345.90	2.82	390.08	0.00	738.79	
7-Up	3.60	TON	SIWRC	0.35	1,245	10	1,404	0	2,660	738.79

0602. Concrete Stoplog Structures	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Reinforcing Steel	17100	LB			3,121	25	3,430	0	6,576	0.38
060201_05. Steel Grating (location 7 only)										
05530 2200 Galvanized (2 Oz Per Sf)										
MIL PM 1-1/4"x 1/8"Galv Steel Grati					1.32	0.08	5.94	0.00	7.34	
ng	1900.00	SF	SIWSC	93.75	2,512	150	11,278	0	13,941	7.34
Welded Steel,6.3 #/SF(2 Oz /SF)										
TOTAL Steel Grating (location 7 on	12000	LB			2,512	150	11,278	0	13,941	1.16
060201_06. Stop Logs										
06132 4000 Douglas Fir Columns										
MIL PM Columns, 8x8					0.73	0.02	0.94	0.00	1.69	
Mill Framed Structures	300.00	BF	ACARD	87.50	218	7	283	0	508	1.69
TOTAL Stop Logs	300.00	LF			218	7	283	0	508	1.69
060201_07. Jib Crane w/Trolly Hoist										
USR PM Crane w/Hoist					0.00	0.00	0.00	1000.00	1000.00	
	3.00	EA		0.00	0	0	0	3,000	3,000	1000.00
TOTAL Jib Crane w/Trolly Hoist	3.00	EA			0	0	0	3,000	3,000	1000.00
060201_08. Bedding - 3" minus										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Bedding Material					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	630.00	TON	COETE	20.00	4,372	3,091	3,005	0	10,469	16.62
TOTAL Bedding - 3" minus	630.00	TON			4,372	3,091	3,005	0	10,469	16.62
060201_09. C Stone										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Graded Stone C					6.94	4.91	5.57	0.00	17.41	
Random, Dumped from Truck	60.00	TON	COETE	20.00	416	294	334	0	1,045	17.41

06. Fish and Wildlife Facilities

0602. Concrete Stoplog Structures	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL C Stone	60.00	TON			416	294	334	0	1,045	17.41
060201_10. Geogrid										
02264 1000 Vinyl Mats										
MIL PM Erosion Control,Webbed Reveg					0.24	0.00	6.15	0.00	6.39	
Mat	300.00	SY	ULABB	287.50	73	0	1,844	0	1,917	6.39
TOTAL Geogrid	300.00	SY			73	0	1,844	0	1,917	6.39
060201_11. Geotextile										
02535 1010 Non-Woven Polypropylene Geotextiles For										
CIV PM Geotextile Fabric, 120 Mil T					0.56	0.03	1.22	0.00	1.81	
hick	630.00	SY	ULABJ	150.00	353	18	768	0	1,139	1.81
Non-Woven Polypropylene										
TOTAL Geotextile	630.00	SY			353	18	768	0	1,139	1.81
060201_12. Staff Gage										
USR PM Staff Gages					0.00	0.00	0.00	1500.00	1500.00	
	6.00	EA		0.00	0	0	0	9,000	9,000	1500.00
TOTAL Staff Gage	6.00	EA			0	0	0	9,000	9,000	1500.00
TOTAL 8' Stoplog Structures	3.00	EA			26,218	7,268	34,363	12,000	79,848	26616

060202. 3' Stoplog Structures

These structures are located at Sites 9 & 10.

060202_01. Excavation										
02225 2140 3 Cy Capacity										
CIV PM Exc & Load,3 CY Hyd Exc,Med					0.59	0.89	0.00	0.00	1.48	
Matl	220.00	CY	XXQHK	147.00	129	196	0	0	325	1.48
147 CY/Hr (112M3)										
TOTAL Excavation	220.00	CY			129	196	0	0	325	1.4

06. Fish and Wildlife Facilities

0602. Concrete Stoplog Structures	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060202_02. Concrete Slabs										
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms,7" to					2.08	0.04	0.72	0.00	2.84	
12"H	80.00	LF	ACARJ	54.38	166	4	58	0	227	2.84
(18cm to 31cm)H, Based on 4 Uses										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	6.50	CSF	ULABB	11.88	38	0	20	0	59	9.02
Curing Compound										
03311 1160 Slab On Grade										
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	24.00	CY	ALABI	41.25	130	49	1,199	0	1,379	57.46
>= (15 cm) Place 3000 PSI Conc										
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	650.00	SF	ACMAC	84.38	256	12	0	0	267	0.41
TOTAL Concrete Slabs	24.00	CY			590	64	1,277	0	1,932	80.51
060202_03. Concrete Walls										
03110 1420 Over 8 Ft (2.4M) High Wall										
MIL PM Wall Forms, Over 8'H Wall, 1					3.90	0.09	1.77	0.00	5.76	
Use	530.00	SF	ACARL	35.00	2,070	46	938	0	3,054	5.76
(Below Gr) Plywd Forms,F&S w/Acc										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.13	0.00	9.02	
e	5.30	CSF	ULABB	11.88	31	0	17	0	48	9.02
Curing Compound										
03311 1240 Walls										
MIL PM Pour Conc Walls,12"Tk, Conc					9.44	3.55	49.98	0.00	62.97	
Pump	22.00	CY	ALABI	23.75	208	78	1,100	0	1,385	62.97
(31cm) 3000 PSI Conc										
03311 4200 Wall Finishes										

0602. Concrete Stoplog Structures	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL PM Wall Finishes,Break Ties & P					0.56	0.00	0.05	0.00	0.62	
atch	530.00	SF	ACMAA	67.50	297	1	28	0	327	0.62
TOTAL Concrete Walls	22.00	CY			2,606	126	2,082	0	4,814	218.80
060202_04. Reinforcing Steel										
03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					0.19	0.00	0.21	0.00	0.41	
3-#6	2400.00	LB	SIWRC	626.00	464	4	509	0	977	0.41
03210 2000 Basic Cost Items										
L MIL PM Gr 60 Resteel,Bm,Clmn,Wall,#					0.17	0.00	0.19	0.00	0.37	
7-Up	2200.00	LB	SIWRC	700.00	380	3	420	0	803	0.37
TOTAL Reinforcing Steel	4600.00	LB			845	7	929	0	1,780	0.39
060202_06. Stop Logs										
06132 4000 Douglas Fir Columns										
MIL PM Columns, 8x8					0.73	0.02	0.94	0.00	1.69	
Mill Framed Structures	200.00	BF	ACARD	87.50	145	5	189	0	338	1.69
TOTAL Stop Logs	200.00	LF			145	5	189	0	338	1.69
060202_07. Jib Crane w/Trolly Hoist										
USR PM Crane w/Hoist					0.00	0.00	0.00	1000.00	1000.00	
	2.00	EA		0.00	0	0	0	2,000	2,000	1000.00
TOTAL Jib Crane w/Trolly Hoist	2.00	EA			0	0	0	2,000	2,000	1000.00
TOTAL 3' Stoplog Structures	2.00	EA			4,315	397	4,477	2,000	11,189	5594.59
TOTAL Concrete Stoplog Structures					30,533	7,665	38,840	14,000	91,037	

0603. Forest Management Plan	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT

0603. Forest Management Plan

Costs for the forest clearings and reforestation were provided to the Corps by the Illinois Department of Conservation (IDOC). It is assumed that this work will be accomplished with there own personnel or local labor hired by IDOC. Based on the information provided, all costs associated with this measure appear to be reasonable. (Reference Cuivre Island DPR)

0603 A. Mast Tree Plantings (disposal ar
eas)

0603 A_01. Herbicide Application

USR	Herbicide Application		0.00	0.00	0.00	30.00	30.00	
		20.00 ACR 0.00	0	0	0	600	600	30.00
TOTAL	Herbicide Application	20.00 ACR	0	0	0	600	600	30.00

0603 A_02. Seedlings - Bare Root

USR	Plant Seedlings - Bare Root		0.00	0.00	0.00	340.00	340.00	
		20.00 ACR 0.00	0	0	0	6,800	6,800	340.00
TOTAL	Seedlings - Bare Root	20.00 ACR	0	0	0	6,800	6,800	340.00

0603 A_03. Seedlings - 2 Gal containers

USR	Plant Seedlings - Containers		0.00	0.00	0.00	850.00	850.00	
		20.00 ACR 0.00	0	0	0	17,000	17,000	850.00
TOTAL	Seedlings - 2 Gal containers	20.00 ACR	0	0	0	17,000	17,000	850.00
TOTAL	Mast Tree Plantings (disposa		0	0	0	24,400	24,400	

0603 B. Mast Tree Plantings (cropland)

0603 B_01. Establish Ground Cover

USR	Establish Ground Cover		0.00	0.00	0.00	80.00	80.00	
		90.00 ACR 0.00	0	0	0	7,200	7,200	80.00
TOTAL	Establish Ground Cover	90.00 ACR	0	0	0	7,200	7,200	80.00

0603. Forest Management Plan	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
0603 B_02. Seedlings - Bare Root										
USR Plant Seedlings - Bare Root					0.00	0.00	0.00	340.00	340.00	
	60.00	ACR		0.00	0	0	0	20,400	20,400	340.00
TOTAL Seedlings - Bare Root	60.00	ACR			0	0	0	20,400	20,400	340.00
0603 B_03. Seedlings - 2 Gal containers (110/acre) Lower Area										
USR Plant Seedlings - 110/acre					0.00	0.00	0.00	850.00	850.00	
	30.00	ACR		0.00	0	0	0	25,500	25,500	850.00
TOTAL Seedlings - 2 Gal containers	30.00	ACR			0	0	0	25,500	25,500	850.00
0603 B_04. Seedlings - 2 Gal containers (22 /acre) Upper Area										
USR Plant Seedlings - 22/acre					0.00	0.00	0.00	170.00	170.00	
	60.00	ACR		0.00	0	0	0	10,200	10,200	170.00
TOTAL Seedlings - 2 Gal containers	60.00	ACR			0	0	0	10,200	10,200	170.00
0603 B_05. Tree Shelters - 30 per acre for bare root seedlings only										
USR Install Tree Shelters					0.00	0.00	0.00	5.50	5.50	
	1800.00	EA		0.00	0	0	0	9,900	9,900	5.50
TOTAL Tree Shelters	60.00	ACR			0	0	0	9,900	9,900	165.00
TOTAL Mast Tree Plantings (croplan					0	0	0	73,200	73,200	
0603 C. Mast Tree Plantings (forest)										
0603 C_01. Establish Ground Cover										
USR Establish Ground Cover					0.00	0.00	0.00	80.00	80.00	
	60.00	ACR		0.00	0	0	0	4,800	4,800	80.00
TOTAL Establish Ground Cover	60.00	ACR			0	0	0	4,800	4,800	80.00

06. Fish and Wildlife Facilities

0603. Forest Management Plan	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
0603 C_02. Mechanized Clearing								
USR Mechanized Clearing			0.00	0.00	0.00	500.00	500.00	
	60.00 ACR	0.00	0	0	0	30,000	30,000	500.00
TOTAL Mechanized Clearing	60.00 ACR		0	0	0	30,000	30,000	500.00
0603 C_03. Seedlings - 2 Gal containers (110/acre)								
USR Plant Seedlings - 110/acre			0.00	0.00	0.00	850.00	850.00	
	115.00 ACR	0.00	0	0	0	97,750	97,750	850.00
TOTAL Seedlings - 2 Gal containers	115.00 ACR		0	0	0	97,750	97,750	850.00
0603 C_04. Herbicide Application								
USR Herbicide Application			0.00	0.00	0.00	30.00	30.00	
	115.00 ACR	0.00	0	0	0	3,450	3,450	30.00
TOTAL Herbicide Application	115.00 ACR		0	0	0	3,450	3,450	30.00
TOTAL Mast Tree Plantings (forest)			0	0	0	136,000	136,000	
0603 D. Woody Vegetation Control w/aerial herbicide								

To control woody encroachment in moist-soil management areas.

0603 D_02. Vegetation Removal								
USR Vegetation Removal			0.00	0.00	0.00	100.00	100.00	
	169.00 ACR	0.00	0	0	0	16,900	16,900	100.00
TOTAL Vegetation Removal	169.00 ACR		0	0	0	16,900	16,900	100.00
TOTAL Woody Vegetation Control w/a			0	0	0	16,900	16,900	
TOTAL Forest Management Plan			0	0	0	250,500	250,500	

0604. Channels	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
0604. Channels										
060401. Squaw Island										
060401_02. Excavation - Dragline										
02225 1460 5 Cy Bucket										
CIV PM Bulk Site Excavation, Unclas					0.59	1.24	0.00	0.00	1.82	
s	4400.00	CY	UOEDO	100.00	2,582	5,441	0	0	8,023	1.82
5 CY Bucket Drag Line										
02225 4160 Dozer W/U-Blade, 335Hp, (D-8L)										
CIV PM Mass Exc,D-8L Dozer, Medium					0.23	0.37	0.00	0.00	0.60	
Matl	4400.00	CY	XXQNE	235.00	1,031	1,613	0	0	2,644	0.60
335 HP w/U-Blade, 235 CY/Hr 150'										
TOTAL Excavation - Dragline	4400.00	CY			3,613	7,053	0	0	10,666	2.42
060401_03. Clearing										
02102 1100 Cut Trees - Grub Roots And Stump										
L MIL PM Clear and Grub Med Trees to					1110.33	554.33	0.00	0.00	1664.66	
10"D	0.20	ACR	COMCA	0.15	222	111	0	0	333	1664.66
(25cm) Dia, Cut and Chip										
TOTAL Clearing	0.20	ACR			222	111	0	0	333	1664.66
060401_04. Seeding										
02810 1000 Mechanical Seeding										
B MIL PM Mechanical Seeding					139.27	5.71	1060.00	0.00	1204.99	
	0.20	ACR	ULABE	0.25	28	1	212	0	241	1204.99
TOTAL Seeding	0.20	ACR			28	1	212	0	241	1204.99
TOTAL Squaw Island					3,863	7,165	212	0	11,240	

06. Fish and Wildlife Facilities

0604. Channels	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060402. Royal to Chickahominy										
060402_02. Excavation - Dragline										
02225 1460 5 Cy Bucket										
CIV PM Bulk Site Excavation, Unclas					0.59	1.24	0.00	0.00	1.82	
s	6300.00	CY	UOEDO	100.00	3,697	7,790	0	0	11,487	1.82
5 CY Bucket Drag Line										
02225 4160 Dozer W/U-Blade, 335Hp, (D-8L)										
CIV PM Mass Exc,D-8L Dozer, Medium					0.23	0.37	0.00	0.00	0.60	
Matl	6300.00	CY	XXQNE	235.00	1,476	2,309	0	0	3,785	0.60
335 HP w/U-Blade, 235 CY/Hr 150'										
TOTAL Excavation - Dragline	6300.00	CY			5,174	10,099	0	0	15,272	2.42
060402_03. Clearing										
02102 1100 Cut Trees - Grub Roots And Stump										
L MIL PM Clear and Grub Med Trees to					1110.33	554.33	0.00	0.00	1664.66	
10"D	0.30	ACR	COMCA	0.15	333	166	0	0	499	1664.66
(25cm) Dia, Cut and Chip										
TOTAL Clearing	0.30	ACR			333	166	0	0	499	1664.66
060402_04. Seeding										
02810 1000 Mechanical Seeding										
B MIL PM Mechanical Seeding					139.27	5.71	1060.00	0.00	1204.99	
	0.30	ACR	ULABE	0.25	42	2	318	0	361	1204.99
TOTAL Seeding	0.30	ACR			42	2	318	0	361	1204.99
TOTAL Royal to Chickahominy					5,548	10,267	318	0	16,133	
060403. Pohlman										
060403_01. Remove Existing Control Struct.										
02112 8000 Sewer & Water Pipe Removal No Excavation, W/										
CIV PM Demo Pipe to 36" Dia (2ea @					8.46	1.74	0.00	0.00	10.20	
75')	150.00	LF	XXPLA	18.75	1,268	261	0	0	1,530	10.20
Sewer/Water Pipe, No Excavation										

06. Fish and Wildlife Facilities

0604. Channels	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
02221 1700 By Hydr. Excav 2-1/2 ,3,4 & 5 Cy										
L CIV PM Trench, 3 CY Hyd Excav, Med					1.73	2.62	0.00	0.00	4.34	
Soil	350.00	CY	XXQHK	50.00	604	916	0	0	1,520	4.34
02225 3100 Select Distance Or Cycle Time Assumes Average										
L MIL PM Haul,12CY (91M3) Trk, 6 Mi(1					27.57	21.97	0.00	0.00	49.54	
0Km)	8.00	HR	COEID	1.00	221	176	0	0	396	49.54
40 MPH (60 Km/Hr), 2.1 Cycles/Hr										
2.1 Cycles/Hr										
TOTAL Remove Existing Control Stru	1.00	EA			2,093	1,353	0	0	3,447	3446.51
060403_02. Excavation - Dredging										
USR PM Dredging					0.00	0.00	0.00	3.00	3.00	
	87400	CY		0.00	0	0	0	262,200	262,200	3.00
TOTAL Excavation - Dredging	87400	CY			0	0	0	262,200	262,200	3.00
060403_03. Clearing										
02102 1100 Cut Trees - Grub Roots And Stump										
L MIL PM Clear and Grub Med Trees to					1110.33	554.33	0.00	0.00	1664.66	
10"D	0.40	ACR	COMCA	0.15	444	222	0	0	666	1664.66
(25cm) Dia, Cut and Chip										
TOTAL Clearing	0.40	ACR			444	222	0	0	666	1664.66
060403_04. Seeding										
02810 1000 Mechanical Seeding										
B MIL PM Mechanical Seeding					139.27	5.71	1060.00	0.00	1204.99	
	0.40	ACR	ULABE	0.25	56	2	424	0	482	1204.99
TOTAL Seeding	0.40	ACR			56	2	424	0	482	1204.99
TOTAL Pohlman					2,593	1,577	424	262,200	266,794	

06. Fish and Wildlife Facilities

0604. Channels	QUANTY UOM CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060404. Silver Lake to Chickahominy								
060404_02. Excavation - Dredging								
USR PM Dredging			0.00	0.00	0.00	3.00	3.00	
	12600 CY	0.00	0	0	0	37,800	37,800	3.00
TOTAL Excavation - Dredging	12600 CY		0	0	0	37,800	37,800	3.00
TOTAL Silver Lake to Chickahominy			0	0	0	37,800	37,800	
060405. Dredge Disposal Areas								
060405_02. Embankment - Disposal Retainment								
USR PM Dredging			0.00	0.00	0.00	3.00	3.00	
	25000 CY	0.00	0	0	0	75,000	75,000	3.00
TOTAL Embankment - Disposal Retain	25000 CY		0	0	0	75,000	75,000	3.00
060405_03. Stripping/Clearing								
02210 1000 Site Grading								
L MIL PM Rough Terrain Clearing w/Doz			82.47	192.30	0.00	0.00	274.77	
er	29.00 ACR CODTK	0.50	2,392	5,577	0	0	7,968	274.77
300 HP								
Soil Material								
TOTAL Stripping/Clearing	29.00 ACR		2,392	5,577	0	0	7,968	274.77
060405_04. Seeding								
02810 1000 Mechanical Seeding								
B MIL PM Mechanical Seeding			139.27	5.71	1060.00	0.00	1204.99	
	4.00 ACR ULABE	0.25	557	23	4,240	0	4,820	1204.99
TOTAL Seeding	4.00 ACR		557	23	4,240	0	4,820	1204.99
TOTAL Dredge Disposal Areas			2,949	5,600	4,240	75,000	87,788	

06. Fish and Wildlife Facilities

0604. Channels	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060406. Borrow Areas										
060406_03. Stripping/Clearing										
02210 1000 Site Grading										
L MIL PM Rough Terrain Clearing w/Doz					82.47	192.30	0.00	0.00	274.77	
er	26.00	ACR	CODTK	0.50	2,144	5,000	0	0	7,144	274.77
300 HP										
Soil Material										
TOTAL Stripping/Clearing	26.00	ACR			2,144	5,000	0	0	7,144	274.77
TOTAL Borrow Areas					2,144	5,000	0	0	7,144	
TOTAL Channels					17,097	29,609	5,194	375,000	426,900	
0605. Levees										
060501. Dike/Levee, RS Only										
060501_02. Clearing(Includes Salvage Value)										
USR PM Salvage Value for Trees					0.00	0.00	0.00	-150.00	-150.00	
	51.00	ACR		0.00	0	0	0	-7,650	-7,650	-150.00
02102 1100 Cut Trees - Grub Roots And Stump										
L MIL PM Clear and Grub Med Trees to					1110.33	554.33	0.00	0.00	1664.66	
10"D	51.00	ACR	COMCA	0.15	56,627	28,271	0	0	84,898	1664.66
(25cm) Dia, Cut and Chip										
TOTAL Clearing(Includes Salvage Va	51.00	ACR			56,627	28,271	0	-7,650	77,248	1514.66
060501_03. Embankment - Levee										
02212 1010 By Towed Roller Assume Following Cond. 6Ft										
L MIL PM Spread/Compact w/Sheepsft Ro					0.76	0.98	0.00	0.00	1.73	
ller	28800	CY	COFCO	100.00	21,813	28,094	0	0	49,908	1.73
6"(15cm) Lift, 100 CY/HR										
02226 2400 Sp Scraper Cap. 25 Bcy (19 Bm3)										
L MIL PM Excav w/Push Loaded SP Scrap					0.54	1.38	0.00	0.00	1.91	
er	28800	CY	CODSG	100.00	15,471	39,635	0	0	55,106	1.9
25 BCY, 4 Cycles Per Hour										

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Embankment - Levee	28800	CY			37,284	67,729	0	0	105,013	3.65
060501_04. Crushed Stone - Levee Crown										
02611 2000 Basic Cost Items										
M MIL PM Graded Crushed Agg Rdwy Base					7.01	3.25	4.77	0.00	15.02	
Crs	6250.00	CY	XSABA	31.25	43,786	20,281	29,813	0	93,879	15.02
TOTAL Crushed Stone - Levee Crown	10000	TON			43,786	20,281	29,813	0	93,879	9.39
060501_05. Remove Existing Culverts										
1ea - 36" single culvert to be removed										
1ea - 36" double/gated culvert to be removed										
02112 8000 Sewer & Water Pipe Removal No Excavation, W/										
CIV PM Demo Pipe to 36" Dia (3ea @					8.46	1.74	0.00	0.00	10.20	
30')	90.00	LF	XXPLA	18.75	761	157	0	0	918	10.20
Sewer/Water Pipe, No Excavation										
02221 1700 By Hydr. Excav 2-1/2 ,3,4 & 5 Cy										
L CIV PM Trench, 3 CY Hyd Excav, Med					1.73	2.62	0.00	0.00	4.34	
Soil	200.00	CY	XXQHK	50.00	345	523	0	0	869	4.34
02225 3100 Select Distance Or Cycle Time Assumes Average										
L MIL PM Haul,12CY (91M3) Trk, 6 Mi(1					27.57	21.97	0.00	0.00	49.54	
0Km)	8.00	HR	COEID	1.00	221	176	0	0	396	49.54
40 MPH (60 Km/Hr), 2.1 Cycles/Hr										
2.1 Cycles/Hr										
TOTAL Remove Existing Culverts					1,327	856	0	0	2,183	
060501_06. B Stone - Overflow										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM B Stone					6.94	4.91	7.95	0.00	19.80	
Random, Dumped from Truck	11900	TON	COETE	20.00	82,590	58,390	94,605	0	235,584	19.80
TOTAL B Stone - Overflow	11900	TON			82,590	58,390	94,605	0	235,584	19.80

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060501_07. Stone - 3" minus										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Stone, 3" Minus					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	680.00	TON	COETE	20.00	4,719	3,337	3,244	0	11,300	16.62
TOTAL Stone - 3" minus	680.00	TON			4,719	3,337	3,244	0	11,300	16.62
060501_08. Access Gate										
USR PM Access Gate					0.00	0.00	0.00	2500.00	2500.00	
	1.00	EA		0.00	0	0	0	2,500	2,500	2500.00
TOTAL Access Gate	1.00	EA			0	0	0	2,500	2,500	2500.00
060501_09. Seeding										
02810 1000 Mechanical Seeding										
B MIL PM Mechanical Seeding					139.27	5.71	1060.00	0.00	1204.99	
	20.00	ACR	ULABE	0.25	2,785	114	21,200	0	24,100	1204.99
TOTAL Seeding	20.00	ACR			2,785	114	21,200	0	24,100	1204.99
060501_10. Timber Piles										
The remaining timber is to be windrowed in piles every 500' along the RS Levee. Piles shall be tied down with cables and anchored to the ground. Approximate length of levee segment = 18500'. Assume 37 piles. Assume three hours/pile to windrow, tie down and anchor. (37x3=111hrs)										
MIL PM BLADE, STRAIGHT,HYDR,FOR D6					0.00	3.66	0.00	0.00	3.66	
BLADE, STRAIGHT,HYDRAULIC,FOR D6	111.00	HR	T10CA009	1.00	0	406	0	0	406	3.66
MIL PM DOZER,CWLR,D-6H,PS,(ADD BLADE) POWERSHIFT, (ADD BLADE)					0.00	39.58	0.00	0.00	39.58	
	111.00	HR	T15CA010	1.00	0	4,393	0	0	4,393	39.58
MIL PM Outside Equip. Op. Heavy					32.79	0.00	0.00	0.00	32.79	
	111.00	HR	X-EQOPRHVY	1.00	3,639	0	0	0	3,639	32.79
MIL PM Outside Laborer - Foreman					28.65	0.00	0.00	0.00	28.65	
	111.00	HR	X-LABORER	1.00	3,180	0	0	0	3,180	28.65
MIL PM Outside Laborer (3ea)					27.65	0.00	0.00	0.00	27.65	
	333.00	HR	X-LABORER	1.00	9,208	0	0	0	9,208	27.65

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Timber Piles					16,028	4,799	0	0	20,827	

060501_11. Fish Habitat @ Polhman Slough
This item considers dumping 50 treetops in Polhman Slough. The treetops are to be placed every 100' over 5000' and are assumed to come from the timber to be cleared along the RS Levee.
Use 40hrs to haul and place tree tops in the slough. Tree tops are assumed to be hauled from the RS Levee area to the Poulhman Slough area.

MIL PM TRUCK OPT,REAR DUMP BODY, 12					0.00	2.69	0.00	0.00	2.69	
CY	40.00	HR	T40XX010	1.00	0	108	0	0	108	2.69
12 CY, 36000 AND UP GVW, AIR GAT										
MIL PM TRK, HWY, 44,300 GVW, 3 AXLE					0.00	30.41	0.00	0.00	30.41	
44,300 GVW, 3 AXLE	40.00	HR	T50FO012	1.00	0	1,216	0	0	1,216	30.41
MIL PM Outside Truck Dr. Heavy					27.57	0.00	0.00	0.00	27.57	
	40.00	HR	X-TRKDVRHV	1.00	1,103	0	0	0	1,103	27.57
MIL PM Outside Laborer - Foreman					28.65	0.00	0.00	0.00	28.65	
	40.00	HR	X-LABORER	1.00	1,146	0	0	0	1,146	28.65
MIL PM Outside Laborer (3ea)					27.65	0.00	0.00	0.00	27.65	
	120.00	HR	X-LABORER	1.00	3,318	0	0	0	3,318	27.65
USR PM Skiff And Outboard					0.00	8.24	0.00	0.00	8.24	
	40.00	HR		0.00	0	330	0	0	330	8.24
MIL PM Outside Equip. Oper Light					26.29	0.00	0.00	0.00	26.29	
	40.00	HR	X-EQOPRLT	1.00	1,052	0	0	0	1,052	26.29
TOTAL Fish Habitat @ Polhman Sloug					6,619	1,654	0	0	8,272	
TOTAL Dike/Levee, RS Only					251,765	185,430	148,861	-5,150	580,906	

060502. Interior Levees (2 structures)

060502_01. Clearing

02102 1100 Cut Trees - Grub Roots And Stump

L MIL PM Clear and Grub Med Trees to					1110.33	554.33	0.00	0.00	1664.66	
10"D	1.00	ACR	COMCA	0.15	1,110	554	0	0	1,665	1664.66
(25cm) Dia, Cut and Chip										
TOTAL Clearing	1.00	ACR			1,110	554	0	0	1,665	1664.66

06. Fish and Wildlife Facilities

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060502_02. Embankment - Levee										
02212 1010 By Towed Roller Assume Following Cond. 6Ft										
L MIL PM Spread/Compact w/Sheepsft Ro					0.76	0.98	0.00	0.00	1.73	
ller	2000.00	CY	COFCO	100.00	1,515	1,951	0	0	3,466	1.73
6"(15cm) Lift, 100 CY/HR										
02226 2400 Sp Scraper Cap. 25 Bcy (19 Bm3)										
L MIL PM Excav w/Push Loaded SP Scrap					0.54	1.38	0.00	0.00	1.91	
er	2000.00	CY	CODSG	100.00	1,074	2,752	0	0	3,827	1.91
25 BCY, 4 Cycles Per Hour										
TOTAL Embankment - Levee	2000.00	CY			2,589	4,703	0	0	7,293	3.65
060502_03. Stone - 6" minus										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Stone, 6" Minus					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	10.00	TON	COETE	20.00	69	49	48	0	166	16.62
TOTAL Stone - 6" minus	10.00	TON			69	49	48	0	166	16.62
060502_04. Seeding										
02810 1000 Mechanical Seeding										
B MIL PM Mechanical Seeding					139.27	5.71	1060.00	0.00	1204.99	
	19.00	ACR	ULABE	0.25	2,646	109	20,140	0	22,895	1204.99
TOTAL Seeding	19.00	ACR			2,646	109	20,140	0	22,895	1204.99
TOTAL Interior Levees (2 structure					6,415	5,415	20,188	0	32,018	
060503. 42" Dia. CMP Gravity Drain Str. This structure is located at Site 4.										
060503_02. Excavation										
02225 2140 3 Cy Capacity										
CIV PM Exc & Load,3 CY Hyd Exc,Med					0.59	0.89	0.00	0.00	1.48	
Matl	530.00	CY	XXQHK	147.00	311	472	0	0	783	1.[illegible]
147 CY/Hr (112M3)										

06. Fish and Wildlife Facilities

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
02226 1000 Excavation By Dozer Moved 150 Ft (45M) And										
L MIL PM Exc & Fill, D-6D Dozer w/S-B					0.23	0.30	0.00	0.00	0.53	
lade	530.00	CY	CODTE	147.00	124	157	0	0	281	0.53
TOTAL Excavation	530.00	CY			435	629	0	0	1,064	2.01
060503_03. Semi-Compacted Fill										
02212 1010 By Towed Roller Assume Following Cond. 6Ft										
L MIL PM Spread/Compact w/Sheepsft Ro					0.50	0.65	0.00	0.00	1.16	
ller	150.00	CY	COFCO	150.00	76	98	0	0	173	1.16
6"(15cm) Lift, 366 CY/HR										
02222 4100 Backfilling Foundation Without Compaction 6 In										
L MIL PM Foundation Backfill, w/Dozer					0.23	0.43	0.00	0.00	0.66	
6" Lift without Compaction	150.00	CY	CODTG	150.00	34	65	0	0	99	0.66
TOTAL Semi-Compacted Fill	150.00	CY			110	163	0	0	273	1.82
060503_04. 42" CMP Culvert										
02458 2000 Basic Cost Items										
M CIV PM 42"(106cm) 12Ga Corr Metal P					12.11	2.72	48.64	0.00	63.48	
ipe	40.00	LF	UOEHC	13.75	485	109	1,946	0	2,539	63.48
Galv Or Alum, Plain										
02458 2800 Galvanized Couplings For Corrugated Metal Pipe										
CIV PM 42" Dia Galv Corr Metal Coup					0.00	0.00	17.92	0.00	17.92	
ling	5.00	EA	N/A	0.00	0	0	90	0	90	17.92
(106cm) Diameter										
TOTAL 42" CMP Culvert	40.00	LF			485	109	2,035	0	2,629	65.72
060503_05. 42" CMP End Section										
02458 2600 Corrugated Metal Pipe End Sections										
CIV PM 42"(106cm) Corr Metal Pipe E					66.62	5.12	429.17	0.00	500.91	
nds	4.00	EA	CODEK	2.50	266	20	1,717	0	2,004	500.91

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL 42" CMP End Section	2.00	EA			266	20	1,717	0	2,004	1001.83
060503_06. 42" Sluice Gate										
05651 1100 Heavy Duty Sluice Gates Self Contained										
CIV PM 42"x 42"Heavy Duty Sluice Ga					1238.69	333.85	5784.42	0.00	7356.96	
tes	1.00	EA	SIWSE	0.09	1,239	334	5,784	0	7,357	7356.96
Self Contained w/Crank Oper Gate										
TOTAL 42" Sluice Gate	1.00	EA			1,239	334	5,784	0	7,357	7356.96
060503_07. 72' Dia Riser Pipe										
USR PM Fabrication of Riser Section					0.00	0.00	0.00	1500.00	1500.00	
s	1.00	EA		0.00	0	0	0	1,500	1,500	1500.00
Galv Or Alum, Plain										
02458 2000 Basic Cost Items										
M CIV PM 72"(183cm) 10Ga Corr Metal P					30.28	6.81	109.10	0.00	146.18	
ipe	12.00	LF	UOEHC	5.50	363	82	1,309	0	1,754	146.18
Galv Or Alum, Plain										
TOTAL 72' Dia Riser Pipe	12.00	LF			363	82	1,309	1,500	3,254	271.18
060503_08. Concrete Slab										
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms,7" to					2.08	0.04	0.72	0.00	2.84	
12"H	32.00	LF	ACARJ	54.38	66	1	23	0	91	2.84
(18cm to 31cm)H, Based on 4 Uses										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					0.06	0.00	0.03	0.00	0.09	
e	64.00	SF	ULABB	1187.50	4	0	2	0	6	0.09
Curing Compound										
03311 1160 Slab On Grade										
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	2.00	CY	ALABI	41.25	11	4	100	0	115	57.46
>= (15 cm) Place 3000 PSI Conc										

06. Fish and Wildlife Facilities

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	64.00	SF	ACMAC	84.38	25	1	0	0	26	0.41
TOTAL Concrete Slab	2.00	CY			106	7	125	0	238	118.99
060503_09. Fiberglass Ladders										
USR PM Fiberglass Ladders					0.00	0.00	0.00	100.00	100.00	
	12.00	LF		0.00	0	0	0	1,200	1,200	100.00
TOTAL Fiberglass Ladders	12.00	LF			0	0	0	1,200	1,200	100.00
060503_10. Fiberglass Grating										
06510 1100 Isophthalic Resin System For Moderately										
L CIV PM 1-1/2"Fib Grate,1-1/2"Mesh,G					1.29	0.02	16.96	0.00	18.27	
reen	30.00	SF	SIWSB	62.50	39	1	509	0	548	18.27
For Mod Corrosive Environment										
TOTAL Fiberglass Grating	30.00	SF			39	1	509	0	548	18.27
060503_11. Bedding - 3" minus										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Bedding Material					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	340.00	TON	COETE	20.00	2,360	1,668	1,622	0	5,650	16.62
TOTAL Bedding - 3" minus	340.00	TON			2,360	1,668	1,622	0	5,650	16.62
060503_12. Bedding - 6" minus										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Bedding Material					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	230.00	TON	COETE	20.00	1,596	1,129	1,097	0	3,822	16.62
TOTAL Bedding - 6" minus	230.00	TON			1,596	1,129	1,097	0	3,822	16.62

06. Fish and Wildlife Facilities

0605. Levees	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060503_13. C Stone										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Graded Stone C					6.94	4.91	5.57	0.00	17.41	
Random, Dumped from Truck	250.00	TON	COETE	20.00	1,735	1,227	1,391	0	4,353	17.41
TOTAL C Stone	250.00	TON			1,735	1,227	1,391	0	4,353	17.41
060503_14. Geotextile										
02535 1010 Non-Woven Polypropylene Geotextiles For										
CIV PM Geotextile Fabric, 120 Mil T					0.56	0.03	1.22	0.00	1.81	
hick	230.00	SY	ULABJ	150.00	129	7	280	0	416	1.81
Non-Woven Polypropylene										
TOTAL Geotextile	230.00	SY			129	7	280	0	416	1.81
060503_15. Staff Gage										
USR PM Staff Gages					0.00	0.00	0.00	1500.00	1500.00	
	2.00	EA		0.00	0	0	0	3,000	3,000	1500.00
TOTAL Staff Gage	2.00	EA			0	0	0	3,000	3,000	1500.00
TOTAL 42" Dia. CMP Gravity Drain S					8,863	5,374	15,870	5,700	35,807	
TOTAL Levees					267,043	196,219	184,919	550	648,731	

0606. Pumping Plant

060601. Pump Station, Location No. 2

060601_02. Care and Diversion of Water

060601_0210. Install Dewatering (Sq. or Rect) (25010)
This dewatering installation smart assembly is for the calculation of the installation costs (the first cost). This is valid for an inscribed square or retangular area.

THIS SMART ASSEMBLY IS LINKED TO THE OPERATIONAL ITEM 20 AND THE REMOVAL ITEM 30 TO GIVE ONE THE COMPLETE CAPABILITY OF CALCULATING DEWATERING COSTS.

USR PM Wellpoints Jetting - 10 VLF					63.53	5.07	18.18	0.00	86.77	
	217.00	EA	XPLUD	1.45	13,785	1,100	3,945	0	18,830	86.77

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
USR PM Header Pipe Installation - 8					2.30	0.18	12.72	0.00	15.21	
"	1127.00	LF	XPLUD	40.00	2,595	207	14,335	0	17,138	15.21
USR PM Pump Installation					184.22	14.70	0.00	0.00	198.92	
	6.00	DAY	XPLUD	0.50	1,105	88	0	0	1,194	198.92
USR PM Discharge Pipe Installation					4.10	0.21	1.19	0.00	5.50	
	87.00	LF	XLABA	6.75	356	19	103	0	478	5.50
TOTAL Install Dewatering (Sq. or R	40000	SF			17,842	1,414	18,384	0	37,640	0.94

060601_0220. Dewater Operation Expense Per/Mo (25020)
This smart assembly is for the calculation of the Monthly Costs of operation of the Dewatering System calculated in the Install operation of the first Smart Assembly in this Section of the database.
NOTE: This Smart Assembly is Linked to the First assembly to Properly calculate the monthly costs.

USR PM Pump Rental					716.80	0.00	0.00	0.00	716.80	
	2.00	MO	COELA	0.05	1,434	0	0	0	1,434	716.80
USR PM Wellpoint Rental - 10 VLF					0.46	0.04	9.01	0.00	9.51	
Quantity Represents Unit Mon ths	434.00	E/M	XPLUD	200.00	200	16	3,910	0	4,126	9.51
USR PM Header Pipe Rental - 8"					0.18	0.01	1.22	0.00	1.42	
Pipe Months Needed	2254.00	'MO	XPLUD	500.00	415	33	2,748	0	3,196	1.42
USR PM Discharge Pipe Rental					0.14	0.01	0.69	0.00	0.83	
	226.00	LF	XLABA	200.00	31	2	156	0	189	0.83
MIL PM Outside Electrician					4923.52	0.00	0.00	0.00	4923.52	
	0.04	MO	X-ELECTRN	1.00	197	0	0	0	197	4923.52
MIL PM Outside Laborer (Semi-Skille d)					4793.09	0.00	0.00	0.00	4793.09	
	0.04	MO	X-LABORER	1.00	192	0	0	0	192	4793.09
MIL PM Outside Plumber					5524.19	0.00	0.00	0.00	5524.19	
	0.04	MO	X-PLUMBER	1.00	221	0	0	0	221	5524.19
MIL PM Outside Equip. Op. Medium					4727.80	0.00	0.00	0.00	4727.80	
	2.00	MO	X-EQOPRMED	1.00	9,456	0	0	0	9,456	4727.80
TOTAL Dewater Operation Expense Pe	2.00	MO			12,145	51	6,814	0	19,010	9504.80

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060601_0230. Remove Dewatering Equipment (25030) This dewatering installation smart assembly is for the calculation of the Removal costs.										
USR PM Wellpoint Removal - 10 VLF					6.14	0.49	0.00	0.00	6.63	
Other Represents Miscellaneous Expenses.	217.00	EA	XPLUD	15.00	1,333	106	0	0	1,439	6.63
USR PM Header Pipe Removal - 8"					0.58	0.05	0.00	0.00	0.62	
	1127.00	LF	XPLUD	160.00	649	52	0	0	701	0.62
USR PM Pump Disconnect & Removal					46.06	3.68	0.00	0.00	49.73	
	6.00	EA	XPLUD	2.00	276	22	0	0	298	49.73
TOTAL Remove Dewatering Equipment	40000	SF			2,258	180	0	0	2,438	0.06
TOTAL Care and Diversion of Water					32,245	1,645	25,197	0	59,087	
060601_03. Excavation										
02225 2140 3 Cy Capacity										
CIV PM Exc & Load,3 CY Hyd Exc,Med Matl					0.59	0.89	0.00	0.00	1.48	
147 CY/Hr (112M3)	1320.00	CY	XXQHK	147.00	775	1,175	0	0	1,950	1.48
02226 1000 Excavation By Dozer Moved 150 Ft (45M) And										
L MIL PM Exc & Fill, D-6D Dozer w/S-Blade					0.23	0.30	0.00	0.00	0.53	
	1320.00	CY	CODTE	147.00	308	392	0	0	700	0.53
TOTAL Excavation	1320.00	CY			1,084	1,567	0	0	2,650	2.01
060601_04. Backfill										
02212 1010 By Towed Roller Assume Following Cond. 6Ft										
L MIL PM Spread/Compact w/Sheepsft Roller					0.50	0.65	0.00	0.00	1.16	
6"(15cm) Lift, 366 CY/HR	3100.00	CY	COFCO	150.00	1,565	2,016	0	0	3,581	1.16
02222 4100 Backfilling Foundation Without Compaction 6 In										
L MIL PM Foundation Backfill, w/Dozer					0.23	0.43	0.00	0.00	0.66	
6" Lift without Compaction	3100.00	CY	CODTG	150.00	710	1,344	0	0	2,053	0.66

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Backfill	3100.00	CY			2,275	3,359	0	0	5,635	1.82
060601_05. Bedding Material										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Bedding Material					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	240.00	TON	COETE	20.00	1,666	1,178	1,145	0	3,988	16.62
TOTAL Bedding Material	240.00	TON			1,666	1,178	1,145	0	3,988	16.62
060601_06. Riprap										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Rip Rap, 25# to 400# Pieces					6.94	4.91	5.57	0.00	17.41	
Random, Dumped from Truck	730.00	TON	COETE	20.00	5,066	3,582	4,062	0	12,711	17.41
TOTAL Riprap	730.00	TON			5,066	3,582	4,062	0	12,711	17.41
060601_07. Concrete										
03110 1410 Up To 8 Ft (2.4M) High Wall										
MIL PM Wall Forms,Up To 8'H Wall, 1					2.96	0.07	1.59	0.00	4.61	
Use	750.00	SF	ACARL	46.25	2,216	49	1,193	0	3,458	4.61
(Below Gr) Plywd Forms,F&S w/Acc										
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms,7" to					2.08	0.04	0.72	0.00	2.84	
12"H	40.00	LF	ACARJ	54.38	83	2	29	0	114	2.84
(18cm to 31cm)H, Based on 4 Uses										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					0.06	0.00	0.03	0.00	0.09	
e	100.00	SF	ULABB	1187.50	6	0	3	0	9	0.09
Curing Compound										
MIL PM Conc Curing, Sprayed Membran					0.06	0.00	0.03	0.00	0.09	
e	750.00	SF	ULABB	1187.50	44	0	24	0	68	0.09
Curing Compound										
03311 1160 Slab On Grade										

06. Fish and Wildlife Facilities

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	3.00	CY	ALABI	41.25	16	6	150	0	172	57.46
>= (15 cm) Place 3000 PSI Conc										
03311 1240 Walls										
MIL PM Pour Conc Walls,12"Tk, Conc					9.44	3.55	49.98	0.00	62.97	
Pump	14.00	CY	ALABI	23.75	132	50	700	0	882	62.97
(31cm) 3000 PSI Conc										
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					0.39	0.02	0.00	0.00	0.41	
om	100.00	SF	ACMAC	84.38	39	2	0	0	41	0.41
03311 4200 Wall Finishes										
MIL PM Wall Finishes,Break Ties & P					0.56	0.00	0.05	0.00	0.62	
atch	750.00	SF	ACMAA	67.50	421	2	40	0	462	0.62
TOTAL Concrete	17.00	CY			2,958	111	2,138	0	5,206	306.24

060601_08. Reinforcing Steel

03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					0.19	0.00	0.21	0.00	0.41	
3-#6	300.00	LB	SIWRC	625.00	58	0	64	0	122	0.41
03210 2000 Basic Cost Items										
L MIL PM Gr 60 Resteel,Bm,Clmn,Wall,#					0.17	0.00	0.19	0.00	0.37	
7-Up	1400.00	LB	SIWRC	700.00	242	2	267	0	511	0.37
TOTAL Reinforcing Steel	1700.00	LB			300	2	331	0	633	0.37

060601_09. Sheet Pile

02411 1000 Basic Cost Items										
MIL PM Shoring for 20'(6M) Exc, 27					0.21	0.11	0.35	0.00	0.67	
PSF	194400	LB	CPIDV	1125.00	40,571	21,267	68,001	0	129,840	0.67
Steel Sheeting, Pull and Salvage										

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Sheet Pile	7200.00	SF			40,571	21,267	68,001	0	129,840	18.03
060601_10. H-Pile										
02315 1000 Basic Cost Items										
MIL PM 12 x 12 x 53#/Ft Stl H-Sect					6.48	2.76	11.24	0.00	20.47	
Pile	325.00	VLF	CPIDC	36.25	2,105	897	3,652	0	6,654	20.47
Rolled Steel										
TOTAL H-Pile	17200	LB			2,105	897	3,652	0	6,654	0.39
060601_11. 42" Discharge Pipe										
02456 1200 5/16" To 1/2" Wall Thickness										
CIV PM 42"(106cm) Dia Uncoat Steel					29.99	10.23	57.49	0.00	97.71	
Pipe	60.00	LF	XXPLC	11.25	1,799	614	3,450	0	5,863	97.71
1/2" Wall Thickness, PE, Welded										
TOTAL 42" Discharge Pipe	60.00	LF			1,799	614	3,450	0	5,863	97.71
060601_12. 42" Dresser Coupling										
02456 5000 Dresser Couplings										
CIV PM 42"(106cm) Dia Dresser Coupl					213.19	30.50	762.14	0.00	1005.83	
ing	1.00	EA	XXPLB	1.00	213	30	762	0	1,006	1005.83
For Plain End Welded Steel Pipe										
TOTAL 42" Dresser Coupling	1.00	EA			213	30	762	0	1,006	1005.83
060601_13. 42" Flap Gate										
05651 1400 Flap Gates										
CIV PM 42" Dia (106cm) Alum Flap Ga					431.06	116.18	2251.44	0.00	2798.68	
tes	1.00	EA	SIWSE	0.25	431	116	2,251	0	2,799	2798.68
TOTAL 42" Flap Gate	1.00	EA			431	116	2,251	0	2,799	2798.68

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060601_14. Pump - 48000 GPM										
USR PM Pump - 48000 GPM					0.00	0.00	0.00	50000.00	50000.00	
	1.00	EA		0.00	0	0	0	50,000	50,000	50000
USR PM Moter Control & Misc. Connec tion					0.00	0.00	0.00	10000.00	10000.00	
	1.00	LS		0.00	0	0	0	10,000	10,000	10000
TOTAL Pump - 48000 GPM	1.00	EA			0	0	0	60,000	60,000	60000
060601_15. Jack Shaft Assembly										
USR PM Supply & Install Jack Shaft Ass.					0.00	0.00	0.00	15000.00	15000.00	
	1.00	EA		0.00	0	0	0	15,000	15,000	15000
TOTAL Jack Shaft Assembly	1.00	EA			0	0	0	15,000	15,000	15000
060601_16. Staff Gage										
USR PM Staff Gages					0.00	0.00	0.00	1500.00	1500.00	
	2.00	EA		0.00	0	0	0	3,000	3,000	1500.00
TOTAL Staff Gage	2.00	EA			0	0	0	3,000	3,000	1500.00
TOTAL Pump Station, Location No. 2					90,713	34,368	110,989	78,000	314,071	

060602. Pump Station, Location No. 3

060602_02. Care and Diversion of Water

060602_0210. Install Dewatering (Sq. or Rect) (25010)

This dewatering installation smart assembly is for the calculation of the installation costs (the first cost). This is valid for an inscribed square or retangular area.

THIS SMART ASSEMBLY IS LINKED TO THE OPERATIONAL ITEM 20 AND THE REMOVAL ITEM 30 TO GIVE ONE THE COMPLETE CAPABILITY OF CALCULATING DEWATERING COSTS.

USR PM Wellpoints Jetting - 10 VLF					63.53	5.07	18.18	0.00	86.77	
	217.00	EA	XPLUD	1.45	13,785	1,100	3,945	0	18,830	86.77
USR PM Header Pipe Installation - 8 "					2.30	0.18	12.72	0.00	15.21	
	1127.00	LF	XPLUD	40.00	2,595	207	14,335	0	17,138	15.21

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
USR PM Pump Installation					184.22	14.70	0.00	0.00	198.92	
	6.00	DAY	XPLUD	0.50	1,105	88	0	0	1,194	198.92
USR PM Discharge Pipe Installation					4.10	0.21	1.19	0.00	5.50	
	87.00	LF	XLABA	6.75	356	19	103	0	478	5.50
TOTAL Install Dewatering (Sq. or R	40000	SF			17,842	1,414	18,384	0	37,640	0.94

060602_0220. Dewater Operation Expense Per/Mo (25020)
This smart assembly is for the calculation of the Monthly Costs of operation of the Dewatering System calculated in the Install operation of the first Smart Assembly in this Section of the database.
NOTE: This Smart Assembly is Linked to the First assembly to Properly calculate the monthly costs.

USR PM Pump Rental					716.80	0.00	0.00	0.00	716.80	
	2.00	MO	COELA	0.05	1,434	0	0	0	1,434	716.80
USR PM Wellpoint Rental - 10 VLF					0.46	0.04	9.01	0.00	9.51	
Quantity Represents Unit Mon ths	434.00	E/M	XPLUD	200.00	200	16	3,910	0	4,126	9.51
USR PM Header Pipe Rental - 8"					0.18	0.01	1.22	0.00	1.42	
Pipe Months Needed	2254.00	'MO	XPLUD	500.00	415	33	2,748	0	3,196	1.42
USR PM Discharge Pipe Rental					0.14	0.01	0.69	0.00	0.83	
	226.00	LF	XLABA	200.00	31	2	156	0	189	0.83
MIL PM Outside Electrician					4923.52	0.00	0.00	0.00	4923.52	
	0.04	MO	X-ELECTRN	1.00	197	0	0	0	197	4923.52
MIL PM Outside Laborer (Semi-Skille d)					4793.09	0.00	0.00	0.00	4793.09	
	0.04	MO	X-LABORER	1.00	192	0	0	0	192	4793.09
MIL PM Outside Plumber					5524.19	0.00	0.00	0.00	5524.19	
	0.04	MO	X-PLUMBER	1.00	221	0	0	0	221	5524.19
MIL PM Outside Equip. Op. Medium					4727.80	0.00	0.00	0.00	4727.80	
	2.00	MO	X-EQOPRMED	1.00	9,456	0	0	0	9,456	4727.80
TOTAL Dewater Operation Expense Pe	2.00	MO			12,145	51	6,814	0	19,010	9504.80

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060602_0230. Remove Dewatering Equipment (25030)										
This dewatering installation smart assembly is for the calculation of the Removal costs.										
USR PM Wellpoint Removal - 10 VLF					6.14	0.49	0.00	0.00	6.63	
Other Represents Miscellaneo us Expenses.	217.00	EA	XPLUD	15.00	1,333	106	0	0	1,439	6.63
USR PM Header Pipe Removal - 8"					0.58	0.05	0.00	0.00	0.62	
	1127.00	LF	XPLUD	160.00	649	52	0	0	701	0.62
USR PM Pump Disconnect & Removal					46.06	3.68	0.00	0.00	49.73	
	6.00	EA	XPLUD	2.00	276	22	0	0	298	49.73
TOTAL Remove Dewatering Equipment	40000	SF			2,258	180	0	0	2,438	0.06
TOTAL Care and Diversion of Water					32,245	1,645	25,197	0	59,087	
060602_03. Excavation										
02225 2140 3 Cy Capacity										
CIV PM Exc & Load,3 CY Hyd Exc,Med					0.59	0.89	0.00	0.00	1.48	
Matl 147 CY/Hr (112M3)	600.00	CY	XXQHK	147.00	352	534	0	0	887	1.48
02226 1000 Excavation By Dozer Moved 150 Ft (45M) And										
L MIL PM Exc & Fill, D-6D Dozer w/S-B					0.23	0.30	0.00	0.00	0.53	
lade	600.00	CY	CODTE	147.00	140	178	0	0	318	0.53
TOTAL Excavation	600.00	CY			493	712	0	0	1,205	2.01
060602_04. Backfill										
02212 1010 By Towed Roller Assume Following Cond. 6Ft										
L MIL PM Spread/Compact w/Sheepsft Ro					0.50	0.65	0.00	0.00	1.16	
ller 6"(15cm) Lift, 366 CY/HR	1600.00	CY	COFCO	150.00	808	1,040	0	0	1,848	1.16
02222 4100 Backfilling Foundation Without Compaction 6 In										
L MIL PM Foundation Backfill, w/Dozer					0.23	0.43	0.00	0.00	0.66	
6" Lift without Compaction	1600.00	CY	CODTG	150.00	366	693	0	0	1,060	0.66

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Backfill	1600.00	CY			1,174	1,734	0	0	2,908	1.82
060602_05. Bedding Material										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Bedding Material					6.94	4.91	4.77	0.00	16.62	
Random, Dumped from Truck	70.00	TON	COETE	20.00	486	343	334	0	1,163	16.62
TOTAL Bedding Material	70.00	TON			486	343	334	0	1,163	16.62
060602_06. Riprap										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Rip Rap, 25# to 400# Pieces					6.94	4.91	5.57	0.00	17.41	
Random, Dumped from Truck	210.00	TON	COETE	20.00	1,457	1,030	1,169	0	3,657	17.41
TOTAL Riprap	210.00	TON			1,457	1,030	1,169	0	3,657	17.41
060602_07. Concrete										
03110 1420 Over 8 Ft (2.4M) High Wall										
MIL PM Wall Forms, Over 8'H Wall, 1					3.90	0.09	1.77	0.00	5.76	
Use	27000	SF	ACARL	35.00	105,432	2,341	47,795	0	155,569	5.76
(Below Gr) Plywd Forms,F&S w/Acc										
03110 1610 Slab On Grade Edge Forms (4 Uses)										
MIL PM Slab on Gr Edge Forms, Over					2.70	0.06	0.53	0.00	3.28	
12"H	880.00	SF	ACARJ	41.88	2,374	50	466	0	2,890	3.28
(Over 31cm)High, Based on 4 Uses										
03305 0000 Concrete Curing										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.18	0.00	9.08	
e	40.00	CSF	ULABB	11.88	235	1	127	0	363	9.08
Curing Compound										
MIL PM Conc Curing, Sprayed Membran					5.86	0.03	3.18	0.00	9.08	
e	270.00	CSF	ULABB	11.88	1,583	9	859	0	2,451	9.08
Curing Compound										
03311 1160 Slab On Grade										

06. Fish and Wildlife Facilities

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
MIL PM Pour Slab on Gr,>= 6", Conc					5.44	2.04	49.98	0.00	57.46	
Pump	300.00	CY	ALABI	41.25	1,631	612	14,994	0	17,237	57.46
>= (15 cm) Place 3000 PSI Conc										
03311 1240 Walls										
MIL PM Pour Conc Walls,12"Tk, Conc					9.44	3.55	49.98	0.00	62.97	
Pump	500.00	CY	ALABI	23.75	4,722	1,773	24,990	0	31,484	62.97
(31cm) 3000 PSI Conc										
03311 4100 Floor Finishes										
MIL PM Concrete Floor Finishes, Bro					39.32	1.78	0.00	0.00	41.10	
om	40.00	CSF	ACMAC	0.84	1,573	71	0	0	1,644	41.10
03311 4200 Wall Finishes										
MIL PM Wall Finishes,Break Ties & P					56.07	0.26	5.30	0.00	61.63	
atch	270.00	CSF	ACMAA	0.68	15,139	70	1,431	0	16,640	61.63
TOTAL Concrete	800.00	CY			132,689	4,927	90,662	0	228,278	285.35

060602_08. Reinforcing Steel

03210 1000 Footings And Slabs										
L MIL PM Gr 60 Resteel,Ftgs & Slabs,#					0.19	0.00	0.21	0.00	0.41	
3-#6	301150	LB	SIWRC	625.00	58,333	482	63,844	0	122,658	0.41
03210 2000 Basic Cost Items										
L MIL PM Gr 60 Resteel,Bm,Clmn,Wall,#					0.17	0.00	0.19	0.00	0.37	
7-Up	50250	LB	SIWRC	700.00	8,688	70	9,588	0	18,346	0.37
TOTAL Reinforcing Steel	80400	LB			67,021	552	73,432	0	141,005	1.75

060602_09. Sheet Pile

02411 1000 Basic Cost Items										
MIL PM Shoring for 20'(6M) Exc, 27					0.21	0.11	0.35	0.00	0.67	
PSF	221940	LB	CPIDV	1125.00	46,319	24,280	77,635	0	148,234	0.67
Steel Sheeting, Pull and Salvage										

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Sheet Pile	8220.00	SF			46,319	24,280	77,635	0	148,234	18.03
060602_10. H-Pile										
02315 1000 Basic Cost Items										
MIL PM 12 x 12 x 53#/Ft Stl H-Sect					6.48	2.76	11.24	0.00	20.47	
Pile	121.00	VLF	CPIDC	36.25	784	334	1,360	0	2,477	20.47
Rolled Steel										
TOTAL H-Pile	6410.00	LB			784	334	1,360	0	2,477	0.39
060602_11. 42" Discharge Pipe										
02456 1200 5/16" To 1/2" Wall Thickness										
CIV PM 42"(106cm) Dia Uncoat Steel					29.99	10.23	57.49	0.00	97.71	
Pipe	60.00	LF	XXPLC	11.25	1,799	614	3,450	0	5,863	97.71
1/2" Wall Thickness, PE, Welded										
TOTAL 42" Discharge Pipe	60.00	LF			1,799	614	3,450	0	5,863	97.71
060602_12. 42" Dresser Coupling										
02456 5000 Dresser Couplings										
CIV PM 42"(106cm) Dia Dresser Coupl					213.19	30.50	762.14	0.00	1005.83	
ing	1.00	EA	XXPLB	1.00	213	30	762	0	1,006	1005.83
For Plain End Welded Steel Pipe										
TOTAL 42" Dresser Coupling	1.00	EA			213	30	762	0	1,006	1005.83
060602_13. 42" Elbow (90)										
02455 1100 90 Degree Elbow										
CIV PM 42"Dia 90 Deg Elbow					1065.96	152.48	5421.90	0.00	6640.34	
(106cm) Diameter	1.00	EA	XXPLB	0.20	1,066	152	5,422	0	6,640	6640.34
TOTAL 42" Elbow (90)	1.00	EA			1,066	152	5,422	0	6,640	6640.34

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060602_14. 42" Flap Gate										
05651 1400 Flap Gates										
CIV PM 42" Dia (106cm) Alum Flap Ga					431.06	116.18	2251.44	0.00	2798.68	
tes	1.00	EA	SIWSE	0.25	431	116	2,251	0	2,799	2798.68
TOTAL 42" Flap Gate	1.00	EA			431	116	2,251	0	2,799	2798.68
060602_15. 42" Slide Gate										
05651 1200 Steel Slide Gates Self Contained Including And										
CIV PM 42" x 42" Steel Slide Gates					574.75	154.91	1643.00	0.00	2372.66	
Self Contained Incl AB & Gro	2.00	EA	SIWSE	0.19	1,150	310	3,286	0	4,745	2372.66
ut										
TOTAL 42" Slide Gate	2.00	EA			1,150	310	3,286	0	4,745	2372.66
060602_16. Gate Operators										
USR PM Hydraulic Gate Operators					0.00	0.00	6890.00	0.00	6890.00	
	2.00	EA		0.00	0	0	13,780	0	13,780	6890.00
TOTAL Gate Operators	2.00	EA			0	0	13,780	0	13,780	6890.00
060602_17. Steel Grating										
05530 2200 Galvanized (2 Oz Per Sf)										
MIL PM 1-1/4"x3/16"Galv Steel Grati					1.65	0.10	6.25	0.00	8.01	
ng	2473.00	SF	SIWSC	75.00	4,087	245	15,466	0	19,798	8.01
Welded Steel,9.1 #/SF(2 Oz /SF)										
TOTAL Steel Grating	22500	LB			4,087	245	15,466	0	19,798	0.88
060602_18. Stop Logs										
06132 6000 Spruce And Hemlock Columns										
MIL PM Columns, 8x8					0.73	0.02	1.91	0.00	2.66	
Mill Framed Structures	725.00	BF	ACARD	87.50	526	17	1,383	0	1,926	2.66
USR PM Miscellaneous Metals					0.73	0.02	1.91	0.80	3.46	
Mill Framed Structures	500.00	LB		0.00	365	10	954	400	1,729	3.46

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Stop Logs	136.00	LF			891	27	2,337	400	3,655	26.87
060602_19. Pump - 48000 GPM										
USR PM Pump - 48000 GPM					0.00	0.00	0.00	50000.00	50000.00	
	1.00	EA		0.00	0	0	0	50,000	50,000	50000
USR PM Moter Control & Misc. Connection					0.00	0.00	0.00	10000.00	10000.00	
	1.00	LS		0.00	0	0	0	10,000	10,000	10000
TOTAL Pump - 48000 GPM	1.00	EA			0	0	0	60,000	60,000	60000
060602_20. Portable Drive Unit For Pump										
USR PM Drive Unit					0.00	0.00	0.00	25000.00	25000.00	
	1.00	EA		0.00	0	0	0	25,000	25,000	25000
TOTAL Portable Drive Unit For Pump	1.00	EA			0	0	0	25,000	25,000	25000
060602_21. Jib Crane w/Trolly Hoist										
USR PM Crane w/Hoist					0.00	0.00	0.00	1000.00	1000.00	
	1.00	EA		0.00	0	0	0	1,000	1,000	1000.00
TOTAL Jib Crane w/Trolly Hoist	1.00	EA			0	0	0	1,000	1,000	1000.00
060602_22. Jack Shaft Assembly										
USR PM Supply & Install Jack Shaft Ass.					0.00	0.00	0.00	15000.00	15000.00	
	1.00	EA		0.00	0	0	0	15,000	15,000	15000
TOTAL Jack Shaft Assembly	1.00	EA			0	0	0	15,000	15,000	15000
060602_23. Staff Gage										
USR PM Staff Gages					0.00	0.00	0.00	1500.00	1500.00	
	2.00	EA		0.00	0	0	0	3,000	3,000	1500.00
TOTAL Staff Gage	2.00	EA			0	0	0	3,000	3,000	1500.00
TOTAL Pump Station, Location No. 3					292,304	37,052	316,542	104,400	750,299	

06. Fish and Wildlife Facilities

0606. Pumping Plant	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
060603. Portable Pump Units										
060603_01. Pump and Drive Unit - 5000 GPM										
These units are located at Sites 5 & 8.										
USR PM Pump - 5000 GPM w/Drive unit					0.00	0.00	0.00	27000.00	27000.00	
	2.00	EA		0.00	0	0	0	54,000	54,000	27000
TOTAL Pump and Drive Unit - 5000 G	2.00	EA			0	0	0	54,000	54,000	27000
060603_02. Portable Fuel Tank (1000 gal)										
USR PM 1000 Gal Fuel Tank					0.00	0.00	0.00	14000.00	14000.00	
	1.00	EA		0.00	0	0	0	14,000	14,000	14000
TOTAL Portable Fuel Tank (1000 gal	1.00	EA			0	0	0	14,000	14,000	14000
060603_03. Portable Fuel Tank (500 gal)										
USR PM 500 Gal Fuel Tank					0.00	0.00	0.00	9000.00	9000.00	
	2.00	EA		0.00	0	0	0	18,000	18,000	9000.00
TOTAL Portable Fuel Tank (500 gal)	2.00	EA			0	0	0	18,000	18,000	9000.00
TOTAL Portable Pump Units					0	0	0	86,000	86,000	
TOTAL Pumping Plant					383,018	71,421	427,531	268,400	1,150,370	
0607. Bank Stabilization										
060701. Revetment, N.E. Corner										
060701_01. C Stone										
02261 1000 Random - Filter Stone Dumped From Trucks -										
B USR PM Graded Stone C					6.94	4.91	5.57	0.00	17.41	
Random, Dumped from Truck	17800	TON	COETE	20.00	123,537	87,339	99,057	0	309,934	17.41
TOTAL C Stone	17800	TON			123,537	87,339	99,057	0	309,934	17.41
TOTAL Revetment, N.E. Corner					123,537	87,339	99,057	0	309,934	
TOTAL Bank Stabilization					123,537	87,339	99,057	0	309,934	
TOTAL Fish and Wildlife Facilities					872,761	401,722	844,373	912,850	3,031,706	

30. Planning, Engineering and Design

3001. PED Prior to Completion of DPR	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
30. Planning, Engineering and Design										
3001. PED Prior to Completion of DPR										
Includes the Preperation of the DPR										
TOTAL PED Prior to Completion of D					0	0	0	561,000	561,000	
TOTAL PED Prior to Completion of D					0	0	0	561,000	561,000	
3004. Environment-Regulatory Activity										
TOTAL Environment-Regulatory Activ					0	0	0	5,000	5,000	
TOTAL Environment-Regulatory Activ					0	0	0	5,000	5,000	
3008. Plans and Specifications										
SUMMARY										
ED-G, Geotech	$ 15,000									
ED-DC, Civil	120,000									
ED-D, Specs	9,000									
ED-DA, Structures	75,000									
ED-DM, Mech/Elect	10,000									
ED-HE, Hydraulics	11,000									
ED-HG, Surveys	75,000									
PD-AE, Environmental	5,000									
PM-M, Project Management	44,000									
TOTAL P & S	$ 364,000									
TOTAL Plans and Specifications					0	0	0	364,000	364,000	
TOTAL Plans and Specifications					0	0	0	364,000	364,000	
3010. Engineering During Construction										
TOTAL Engineering During Construct					0	0	0	25,000	25,000	
TOTAL Engineering During Construct					0	0	0	25,000	25,000	
3013. Cost Engineering										
TOTAL Cost Engineering					0	0	0	20,000	20,000	
TOTAL Cost Engineering					0	0	0	20,000	20,000	
3014. Const-Supply Contract Award Acty										
TOTAL Const-Supply Contract Award					0	0	0	10,000	10,000	

30. Planning, Engineering and Design

3014. Const-Supply Contract Award Acty	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
TOTAL Const-Supply Contract Award					0	0	0	10,000	10,000	
3024. Value Engineerng Analysis Docmnt										
TOTAL Value Engineerng Analysis Do	1.00	EA			0	0	0	25,000	25,000	25000
TOTAL Value Engineerng Analysis Do	1.00	EA			0	0	0	25,000	25,000	25000
3026. Miscellaneous Activities										
TOTAL Miscellaneous Activities					0	0	0	5,000	5,000	
TOTAL Miscellaneous Activities					0	0	0	5,000	5,000	
TOTAL Planning, Engineering and De					0	0	0	1,015,000	1,015,000	

31. Construction Management (S&I)

3101. Project Office S&A	QUANTY	UOM	CREW ID	OUTPUT	LABOR	EQUIPMNT	MATERIAL	UNIT PRC	TOTAL COST	UNIT
31. Construction Management (S&I)										
3101. Project Office S&A										
$75,000 added for surveys										
TOTAL Project Office S&A					0	0	0	280,760	280,760	
TOTAL Project Office S&A					0	0	0	280,760	280,760	
3102. Area Office S&A										
TOTAL Area Office S&A					0	0	0	25,300	25,300	
TOTAL Area Office S&A					0	0	0	25,300	25,300	
3103. District Office S&A										
TOTAL District Office S&A					0	0	0	184,500	184,500	
TOTAL District Office S&A					0	0	0	184,500	184,500	
3126. Programs/Project Managmnt Docmnt										
TOTAL Programs/Project Managmnt Do					0	0	0	22,000	22,000	
TOTAL Programs/Project Managmnt Do					0	0	0	22,000	22,000	
TOTAL Construction Management (S&I					0	0	0	512,560	512,560	
TOTAL CALHOUN POINT - *REVISED* DP					875,792	402,855	847,738	2,458,410	4,584,795	

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	ACARD	2 B-carpnter + Misc Power Tools			PROD =	100%			CREW HOURS =	22
MIL	B-CARPNTERF	Carpenters	0.25	HR	29.10	0.25	7.27			7.27
MIL	B-CARPNTERL	Carpenters	2.00	HR	28.10	2.00	56.20			56.20
MIL	XMIXX010 E	Misc. Power Tools	0.19	HR	5.90			0.19	1.12	1.12
MIL	XMIXX020 E	Small Tools	0.61	HR	1.45			0.61	0.88	0.88
	TOTAL					2.25	63.47	0.80	2.01	65.48
	ACARJ	3 B-carpnter + Misc Power Tools			PROD =	100%			CREW HOURS =	37
MIL	B-CARPNTERF	Carpenters	1.00	HR	29.10	1.00	29.10			29.10
MIL	B-CARPNTERL	Carpenters	2.00	HR	28.10	2.00	56.20			56.20
MIL	B-LABORER L	Laborer (Semi-Skilled)	1.00	HR	27.65	1.00	27.65			27.65
MIL	XMIXX010 E	Misc. Power Tools	0.25	HR	5.90			0.25	1.48	1.48
MIL	XMIXX020 E	Small Tools	0.63	HR	1.45			0.63	0.91	0.91
	TOTAL					4.00	112.95	0.88	2.39	115.34
	ACARL	4 B-carpnter + Misc Power Tools			PROD =	100%			CREW HOURS =	1016
MIL	B-CARPNTERL	Carpenters	2.00	HR	28.10	2.00	56.20			56.20
MIL	B-CARPNTERF	Carpenters	1.00	HR	29.10	1.00	29.10			29.10
MIL	B-CARPNTERA	Carpenters	1.00	HR	23.72	1.00	23.72			23.72
MIL	B-LABORER L	Laborer (Semi-Skilled)	1.00	HR	27.65	1.00	27.65			27.65
MIL	XMIXX010 E	Misc. Power Tools	0.32	HR	5.90			0.32	1.89	1.89
MIL	XMIXX020 E	Small Tools	0.79	HR	1.45			0.79	1.15	1.15
	TOTAL					5.00	136.67	1.11	3.03	139.71
	ACMAA	1 B-cemtfinr + Small Tools			PROD =	100%			CREW HOURS =	529
MIL	B-CEMTFINRF	Cement Finishers	0.25	HR	31.08	0.25	7.77			7.77
MIL	B-CEMTFINRL	Cement Finishers	1.00	HR	30.08	1.00	30.08			30.08
MIL	XMIXX020 E	Small Tools	0.12	HR	1.45			0.12	0.17	0.17
	TOTAL					1.25	37.85	0.12	0.17	38.02
	ACMAC	1 B-cemtfinr + Misc Power Tools			PROD =	100%			CREW HOURS =	127
MIL	B-CEMTFINRF	Cement Finishers	0.10	HR	31.08	0.10	3.11			3.11
MIL	B-CEMTFINRL	Cement Finishers	1.00	HR	30.08	1.00	30.08			30.08
MIL	XMIXX010 E	Misc. Power Tools	0.21	HR	5.90			0.21	1.24	1.24
MIL	XMIXX020 E	Small Tools	0.18	HR	1.45			0.18	0.26	0.26
	TOTAL					1.10	33.19	0.39	1.50	34.69
	ALABI	6 B-laborer + 2 Electric Concrete Vibrators			PROD =	100%			CREW HOURS =	46
MIL	B-CEMTFINRL	Cement Finishers	1.00	HR	30.08	1.00	30.08			30.08
MIL	B-LABORER F	Laborer (Semi-Skilled)	1.00	HR	28.65	1.00	28.65			28.65
MIL	B-LABORER L	Laborer (Semi-Skilled)	5.00	HR	27.65	5.00	138.27			138.27
MIL	B-FQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	C55SC005 E	CONC PUMP,117CY/HR,75'BOOM,TRK	1.00	HR	71.89			1.00	71.89	71.8
MIL	C65MS001 E	CONCRETE VIBRATOR, 2.5"	2.00	HR	0.86			2.00	1.72	1.72
MIL	XMIXX020 E	Small Tools	0.68	HR	1.45			0.68	0.99	0.99
MIL	A15XX009 E	AIR COMPR, 250 CFM, 100 PSI	1.00	HR	9.21			1.00	9.21	9.21

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
MIL	A20XX002	E AIR HOSE, 1", 50', HARDROCK	1.00	HR	0.40			1.00	0.40	0.40
	TOTAL					8.00	224.28	5.68	84.21	308.50
	APTRA	1 B-paintord + Small Tools			PROD = 100%				CREW HOURS =	18
MIL	B-PAINTORDL	Painters, Ordinary	1.00	HR	27.17	1.00	27.17			27.17
MIL	B-PAINTORDF	Painters, Ordinary	0.25	HR	28.17	0.25	7.04			7.04
MIL	XMIXX020	E Small Tools	0.27	HR	1.45			0.27	0.39	0.39
	TOTAL					1.25	34.21	0.27	0.39	34.60
	CODEK	5 B-laborer + 1 Backhoe Loader, 55 Hp			PROD = 100%				CREW HOURS =	5
MIL	B-LABORER L	Laborer (Semi-Skilled)	4.00	HR	27.65	4.00	110.62			110.62
MIL	B-LABORER F	Laborer (Semi-Skilled)	1.00	HR	28.65	1.00	28.65			28.65
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	L50CS002	E LDR,W/BH,WH,1.0CY FE BKT/24"DIP	1.00	HR	12.11			1.00	12.11	12.11
MIL	XMIXX020	E Small Tools	0.48	HR	1.45			0.48	0.70	0.70
	TOTAL					6.00	166.55	1.48	12.80	179.35
	CODSG	1 B-eqoprmed + 1 Scraper, 25 Cy, 450 Hp			PROD = 100%				CREW HOURS =	308
MIL	B-LABORER L	Laborer (Semi-Skilled)	0.25	HR	27.65	0.25	6.91			6.91
MIL	B-EQOPRCRNF	Eq Oper, Crane/Shovl	0.25	HR	33.79	0.25	8.45			8.45
MIL	B-EQOPRCRNL	Eq Oper, Crane/Shovl	1.17	HR	32.79	1.17	38.36			38.36
MIL	S15CA002	E SCRAPER,SELF,21-31CY,37.5T,PWRS	1.00	HR	120.75			1.00	120.75	120.75
MIL	T10CA022	E BLADE, UNIVERSAL,HYDR,FOR D9	0.17	HR	9.73			0.17	1.65	1.65
MIL	T15CA017	E DOZER,CWLR,CAT D-9N, (ADD BLADE	0.17	HR	89.52			0.17	15.22	15.22
	TOTAL					1.67	53.72	1.34	137.62	191.34
	CODTE	1 B-eqoprmed + 1 Dozer, Cat D-6h, 165 Hp			PROD = 100%				CREW HOURS =	17
MIL	B-EQOPRMEDF	Eq Oper, Medium	0.25	HR	28.28	0.25	7.07			7.07
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	T10CA010	E BLADE, ANGLE, HYDR, FOR D6	1.00	HR	4.04			1.00	4.04	4.04
MIL	T15CA010	E DOZER,CWLR,D-6H,PS,(ADD BLADE)	1.00	HR	39.58			1.00	39.58	39.58
	TOTAL					1.25	34.34	2.00	43.62	77.96
	CODTG	1 B-eqoprmed + 1 Dozer, Cat D-7h, 215 Hp			PROD = 100%				CREW HOURS =	36
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	B-EQOPRMEDF	Eq Oper, Medium	0.25	HR	28.28	0.25	7.07			7.07
MIL	T10CA013	E BLADE, UNIVERSAL,HYDR,FOR D7	1.00	HR	5.70			1.00	5.70	5.70
MIL	T15CA013	E DOZER,CWLR,D-7H,PS,(ADD BLADE)	1.00	HR	59.31			1.00	59.31	59.31
	TOTAL					1.25	34.34	2.00	65.01	99.36
	CODTK	1 B-eqoprmed + 1 Dozer, Cat D-8l, 335 Hp			PROD = 100%				CREW HOURS =	110
MIL	B-EQOPRCRNF	Eq Oper, Crane/Shovl	0.25	HR	33.79	0.25	8.45			8.45
MIL	B-EQOPRCRNL	Eq Oper, Crane/Shovl	1.00	HR	32.79	1.00	32.79			32.79
MIL	R40HY004	E ROLL,VIB,TOWED,STL,PAD,58"D,60"	1.00	HR	10.02			1.00	10.02	10.02
MIL	T10CA017	E BLADE, UNIVERSAL,HYDR,FOR D8	1.00	HR	7.36			1.00	7.36	7.36

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
MIL	T15CA015	E DOZER,CWLR,CAT D-8L, (ADD BLADE	1.00	HR	78.77			1.00	78.77	78.77
	TOTAL					1.25	41.23	3.00	96.15	137.38
	COEID	1 B-trkdvrhv + 1 Dump Truck, 12 Cy			PROD = 100%				CREW HOURS =	16
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	27.57	1.00	27.57			27.57
MIL	T40XX010	E TRUCK OPT,REAR DUMP BODY, 12 CY	1.00	HR	2.69			1.00	2.69	2.69
MIL	T50GM016	E TRK, HWY, 3 AXLE, 41000 GVW, 6X	1.00	HR	19.28			1.00	19.28	19.28
	TOTAL					1.00	27.57	2.00	21.97	49.54
	COELA	1 B-eqoprlt +			PROD = 100%				CREW HOURS =	87
MIL	B-EQOPRLT L	Eq Oper, Light	1.00	HR	26.29	1.00	26.29			26.29
MIL	B-EQOPRLT F	Eq Oper, Light	0.25	HR	27.29	0.25	6.82			6.82
	TOTAL					1.25	33.12	0.00	0.00	33.12
*	COETE	3 B-laborer + 1 Dump Truck, 12 Cy			PROD = 100%				CREW HOURS =	1701
MIL	B-LABORER F	Laborer (Semi-Skilled)	1.00	HR	28.65	1.00	28.65			28.65
MIL	B-LABORER L	Laborer (Semi-Skilled)	2.00	HR	27.65	2.00	55.31			55.31
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	27.57	1.00	27.57			27.57
MIL	XMIXX020	E Small Tools	0.52	HR	1.45			0.52	0.75	0.75
MIL	T40XX010	E TRUCK OPT,REAR DUMP BODY, 12 CY	1.00	HR	2.69			1.00	2.69	2.69
MIL	T50GM016	E TRK, HWY, 3 AXLE, 41000 GVW, 6X	1.00	HR	19.28			1.00	19.28	19.28
MIL	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00	HR	75.41			1.00	75.41	75.41
MIL	B-EQOPRMEDL	Equip. Oper. Medium	1.00	HR	27.28	1.00	27.28			27.28
	TOTAL					5.00	138.81	3.52	98.13	236.94
	COFCO	1 B-eqoprmed + 1 Dozer, Cat D-7h, 215 Hp			PROD = 100%				CREW HOURS =	344
MIL	B-LABORER L	Laborer (Semi-Skilled)	0.50	HR	27.65	0.50	13.83			13.83
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	B-EQOPRMEDF	Eq Oper, Medium	0.25	HR	28.28	0.25	7.07			7.07
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	27.57	1.00	27.57			27.57
MIL	R40HY004	E ROLL,VIB,TOWED,STL,PAD,58"D,60"	1.00	HR	10.02			1.00	10.02	10.02
MIL	T10CA013	E BLADE, UNIVERSAL,HYDR,FOR D7	1.00	HR	5.70			1.00	5.70	5.70
MIL	T15CA013	E DOZER,CWLR,D-7H,PS,(ADD BLADE)	1.00	HR	59.31			1.00	59.31	59.31
MIL	T40XX033	E WATER TANK, 3000 GAL (ADD TRUCK	1.00	HR	3.23			1.00	3.23	3.23
MIL	T50GM016	E TRK, HWY, 3 AXLE, 41000 GVW, 6X	1.00	HR	19.28			1.00	19.28	19.28
	TOTAL					2.75	75.74	5.00	97.55	173.28
	COMCA	5 B-laborer + 1 Front End Ldr, 3-3/4 Cy, Cwlr			PROD = 100%				CREW HOURS =	353
MIL	B-LABORER L	Laborer (Semi-Skilled)	4.00	HR	27.65	4.00	110.62			110.62
MIL	B-LABORER F	Laborer (Semi-Skilled)	1.00	HR	28.65	1.00	28.65			28.65
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	B20CI006	E CHIPPER, 16" CAPACITY, TRLR-MTD	1.00	HR	6.67			1.00	6.67	6.67
MIL	L35CA007	E LDR,FE,CRWLR, 3.75 CY, 973	1.00	HR	75.41			1.00	75.41	75.4
MIL	XMIXX020	E Small Tools	0.74	HR	1.45			0.74	1.07	1.07
	TOTAL					6.00	166.55	2.74	83.15	249.70

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	LABOR HOURS	LABOR COST	EQUIP HOURS	EQUIP COST	TOTAL COST
	CPIDC	5 B-piledrvr + 1- 40 Ton Crane, Truck Mounted			PROD = 100%				CREW HOURS =	12
MIL	A15XX014 E	AIR COMPR, 900 CFM, 100 PSI	1.00	HR	25.12			1.00	25.12	25.12
MIL	B-EQOPRCRNL	Eq Oper, Crane/Shovl	2.00	HR	32.79	2.00	65.57			65.57
MIL	B-EQOPROILL	Eq Oper, Oilers	1.00	HR	25.91	1.00	25.91			25.91
MIL	B-PILEDRVRF	Pile Drivers	1.00	HR	31.40	1.00	31.40			31.40
MIL	B-PILEDRVRA	Pile Drivers	2.00	HR	25.56	2.00	51.13			51.13
MIL	B-PILEDRVRL	Pile Drivers	2.00	HR	30.40	2.00	60.81			60.81
MIL	C80PH004 E	CRANE,HYD,TRKMTD, 40T W/106'BOO	1.00	HR	47.98			1.00	47.98	47.98
MIL	P10XX002 E	PILE LEADS, 8"X26", 60' LENGTH	1.00	HR	6.24			1.00	6.24	6.24
MIL	XMIXX020 E	Small Tools	0.90	HR	1.45			0.90	1.31	1.31
MIL	P25VU002 E	PILE HAMR,SNG,19500FT-#,ADD COM	1.00	HR	15.40			1.00	15.40	15.40
MIL	A20XX007 E	AIR HOSE, 3.0", 50', HARDROCK	2.00	HR	2.00			2.00	4.00	4.00
	TOTAL					8.00	234.82	6.90	100.05	334.87
	CPIDV	5 B-piledrvr + 1 Vibratory Pile Hammer,			PROD = 100%				CREW HOURS =	370
MIL	B-EQOPRCRNL	Eq Oper, Crane/Shovl	2.00	HR	32.79	2.00	65.57			65.57
MIL	B-EQOPROILL	Eq Oper, Oilers	1.00	HR	25.91	1.00	25.91			25.91
MIL	B-PILEDRVRF	Pile Drivers	1.00	HR	31.40	1.00	31.40			31.40
MIL	B-PILEDRVRA	Pile Drivers	2.00	HR	25.56	2.00	51.13			51.13
MIL	B-PILEDRVRL	Pile Drivers	2.00	HR	30.40	2.00	60.81			60.81
MIL	C80PH004 E	CRANE,HYD,TRKMTD, 40T W/106'BOO	1.00	HR	47.98			1.00	47.98	47.98
MIL	XMIXX020 E	Small Tools	1.35	HR	1.45			1.35	1.96	1.96
MIL	P30MK003 E	PILE HAMMER,VIB,MAX DRIVE 116TO	1.00	HR	73.16			1.00	73.16	73.16
	TOTAL					8.00	234.82	3.35	123.09	357.91
*	SIWRC	3 B-rodman + Small Tools			PROD = 100%				CREW HOURS =	641
MIL	B-RODMAN F	Rodmen (reinforcing)	1.00	HR	31.02	1.00	31.02			31.02
MIL	B-RODMAN L	Rodmen (reinforcing)	3.00	HR	30.02	3.00	90.05			90.05
MIL *	XMIXX020 E	Small Tools	0.68	HR	1.45			0.68	0.99	0.99
	TOTAL					4.00	121.06	0.68	0.99	122.05
*	SIWSB	2 B-strsteel + Small Tools			PROD = 100%				CREW HOURS =	5
MIL	B-STRSTEELL	Struct Stl Workers	2.00	HR	32.00	2.00	63.99			63.99
MIL	B-STRSTEELF	Struct Stl Workers	0.50	HR	33.00	0.50	16.50			16.50
MIL *	XMIXX020 E	Small Tools	1.00	HR	1.45			1.00	1.45	1.45
	TOTAL					2.50	80.49	1.00	1.45	81.94
	SIWSC	4 B-strsteel + 1 Gasoline Welding Machine			PROD = 100%				CREW HOURS =	83
MIL	B-STRSTEELA	Struct Stl Workers	1.00	HR	26.97	1.00	26.97			26.97
MIL	B-STRSTEELL	Struct Stl Workers	2.00	HR	32.00	2.00	63.99			63.99
MIL	B-STRSTEELF	Struct Stl Workers	1.00	HR	33.00	1.00	33.00			33.00
MIL	XMIXX020 E	Small Tools	0.72	HR	1.45			0.72	1.04	1.04
MIL	W35XX002 E	WELDER, 200 AMP W/1 AXLE TRLR	1.00	HR	6.37			1.00	6.37	6.37
	TOTAL					4.00	123.95	1.72	7.41	131.37

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	SIWSE	2 B-strsteel + 1- 12.5 Ton Crane, Hydraulic			PROD = 100%				CREW HOURS =	53
MIL	C75BD003 E	CRANE,HYD,SELF 14T ROUGH TERRAI	1.00	HR	27.60			1.00	27.60	27.60
MIL	XMIXX020 E	Small Tools	1.00	HR	1.45			1.00	1.45	1.45
MIL	B-STRSTEELF	Struct Stl Workers	0.50	HR	33.00	0.50	16.50			16.50
MIL	B-STRSTEELL	Struct Stl Workers	2.00	HR	32.00	2.00	63.99			63.99
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
	TOTAL					3.50	107.77	2.00	29.05	136.81
	SIWSM	6 B-strsteel + 1- 55 Ton Crane, Hydr. Trk Mtd			PROD = 100%				CREW HOURS =	5
MIL	B-STRSTEELL	Struct Stl Workers	3.00	HR	32.00	3.00	95.99			95.99
MIL	B-STRSTEELA	Struct Stl Workers	2.00	HR	26.97	2.00	53.93			53.93
MIL	B-STRSTEELF	Struct Stl Workers	1.00	HR	33.00	1.00	33.00			33.00
MIL	B-EQOPRCRNL	Eq Oper, Crane/Shovl	1.00	HR	32.79	1.00	32.79			32.79
MIL	B-EQOPROILL	Eq Oper, Oilers	1.00	HR	25.91	1.00	25.91			25.91
MIL	C80LI007 E	CRANE,HYD,TRKMTD, 60T W/110'BOO	1.00	HR	59.79			1.00	59.79	59.79
MIL	XMIXX020 E	Small Tools	1.86	HR	1.45			1.86	2.70	2.70
	TOTAL					8.00	241.61	2.86	62.49	304.10
	SIWWA	1 B-welders + 1 Electrical Welding Machine			PROD = 100%				CREW HOURS =	2
MIL	B-WELDERS L	Welders, Struct Steel	1.00	HR	32.00	1.00	32.00			32.00
MIL	B-WELDERS F	Welders, Struct Steel	0.25	HR	33.00	0.25	8.25			8.25
MIL	XMIXX020 E	Small Tools	0.21	HR	1.45			0.21	0.30	0.30
MIL	W35XX009 E	ELEC DRIVE,WELDER,300 AMP,SKID	1.00	HR	1.52			1.00	1.52	1.52
	TOTAL					1.25	40.25	1.21	1.82	42.07
	ULABB	2 B-laborer + Small Tools			PROD = 100%				CREW HOURS =	40
MIL	B-LABORER L	Laborer (Semi-Skilled)	2.00	HR	27.65	2.00	55.31			55.31
MIL	B-LABORER F	Laborer (Semi-Skilled)	0.50	HR	28.65	0.50	14.33			14.33
MIL	XMIXX020 E	Small Tools	0.27	HR	1.45			0.27	0.39	0.39
	TOTAL					2.50	69.64	0.27	0.39	70.03
*	ULABE	1 B-laborer + Misc. Power Tools			PROD = 100%				CREW HOURS =	176
MIL *	B-LABORER L	Laborer (Semi-Skilled)	1.00	HR	27.65	1.00	27.65			27.65
MIL	B-LABORER F	Laborer (Semi-Skilled)	0.25	HR	28.65	0.25	7.16			7.16
MIL	XMIXX010 E	Misc. Power Tools	0.22	HR	5.90			0.22	1.30	1.30
MIL	XMIXX020 E	Small Tools	0.09	HR	1.45			0.09	0.13	0.13
	TOTAL					1.25	34.82	0.31	1.43	36.25
	ULABJ	3 B-laborer + 1-3/4 Ton Pickup Truck			PROD = 100%				CREW HOURS =	6
MIL	B-LABORER L	Laborer (Semi-Skilled)	2.00	HR	27.65	2.00	55.31			55.31
MIL	B-LABORER F	Laborer (Semi-Skilled)	1.00	HR	28.65	1.00	28.65			28.65
MIL	XMIXX020 E	Small Tools	0.25	HR	1.45			0.25	0.36	0.36
MIL	T50GM008 E	TRK,HWY,4X2 3500 PICKUP, 8600GV	0.40	HR	9.77			0.40	3.91	3.91
	TOTAL					3.00	83.96	0.65	4.27	88.24

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	UOEDO	1 B-eqoprcrn + 1-165 Ton Crane, Dragline			PROD = 100%				CREW HOURS =	107
MIL	B-EQOPRCRNL	Eq Oper, Crane/Shovl	1.00	HR	32.79	1.00	32.79			32.79
MIL	B-EQOPROILL	Eq Oper, Oilers	1.00	HR	25.91	1.00	25.91			25.91
MIL	B35HE040 E	BUCKET, DRAGLINE, HVWT, 5.0 CY	1.00	HR	6.40			1.00	6.40	6.40
MIL	C85PH005 E	CRA,DRAG/CLAM,5CY,135'B,ADD BKT	1.00	HR	117.04			1.00	117.04	117.04
MIL	XMIXX020 E	Small Tools	0.15	HR	1.45			0.15	0.22	0.22
	TOTAL					2.00	58.69	2.15	123.65	182.35
	UOEHC	5 B-laborer + 1- 22 Ton Crane, Hydraulic			PROD = 100%				CREW HOURS =	5
MIL	B-LABORER F	Laborer (Semi-Skilled)	1.00	HR	28.65	1.00	28.65			28.65
MIL	B-LABORER L	Laborer (Semi-Skilled)	4.00	HR	27.65	4.00	110.62			110.62
MIL	B-EQOPRMEDL	Eq Oper, Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	C75PH004 E	CRANE,HYD,SELF, 22 TON	1.00	HR	36.56			1.00	36.56	36.56
MIL	XMIXX020 E	Small Tools	0.60	HR	1.45			0.60	0.87	0.87
	TOTAL					6.00	166.55	1.60	37.43	203.98
	XLABA	1 X-laborer + Small Tools			PROD = 100%				CREW HOURS =	28
MIL	XMIXX020 E	Small Tools	1.00	HR	1.45			1.00	1.45	1.45
MIL	X-LABORER L	Outside Laborer	1.00	HR	27.65	1.00	27.65			27.65
	TOTAL					1.00	27.65	1.00	1.45	29.10
	XPLUD	2 X-plumber + Misc. Power Tools			PROD = 100%				CREW HOURS =	442
MIL	XMIXX010 E	Misc. Power Tools	1.00	HR	5.90			1.00	5.90	5.90
MIL	XMIXX020 E	Small Tools	1.00	HR	1.45			1.00	1.45	1.45
MIL	X-LABORER L	Outside Laborer	1.00	HR	27.65	1.00	27.65			27.65
MIL	X-PLUMBER L	Outside Plumber	1.00	HR	31.87	1.00	31.87			31.87
MIL	X-PLUMBER F	Outside Plumber	0.17	HR	32.87	0.17	5.59			5.59
MIL	X-PLUMBER A	Outside Plumber	1.00	HR	27.00	1.00	27.00			27.00
	TOTAL					3.17	92.11	2.00	7.35	99.46
	XSABA	3 X-eqoprmed + 1 Grader, Cat 12g, 135 Hp			PROD = 100%				CREW HOURS =	207
MIL	G15CA003 E	GRADER,MOTOR,CAT12-G, ARTIC	1.00	HR	29.49			1.00	29.49	29.49
MIL	XMIXX020 E	Small Tools	2.00	HR	1.45			2.00	2.90	2.90
MIL	R30IG003 E	ROLLER,STATIC,SELF,15T, 11 TIRE	1.00	HR	12.68			1.00	12.68	12.68
MIL	R30IG008 E	ROLLER,SM-DR,SELF,12T,3WHL,3"OV	1.00	HR	14.40			1.00	14.40	14.40
MIL	T40XX012 E	TRUCK OPT,FLATBED, 8' x 9.0'	1.00	HR	0.50			1.00	0.50	0.50
MIL	T40XX018 E	TRUCK OPT,FLATBED, 8' x 20.0'	1.00	HR	0.78			1.00	0.78	0.78
MIL	T50GM008 E	TRK,HWY,4X2 3500 PICKUP, 8600GV	1.00	HR	9.77			1.00	9.77	9.77
MIL	T50GM012 E	TRK, HWY, 2 AXLE, 24000 GVW, 4X	1.00	HR	11.60			1.00	11.60	11.60
MIL	T50GM016 E	TRK, HWY, 3 AXLE, 41000 GVW, 6X	1.00	HR	19.28			1.00	19.28	19.28
MIL	X-LABORER L	Outside Laborer	3.00	HR	27.65	3.00	82.96			82.96
MIL	X-EQOPRMEDF	Outside Equip. Op. Medium	1.00	HR	28.28	1.00	28.28			28.28
MIL	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00	HR	27.28	2.00	54.55			54.55
MIL	X-TRKDVRLTL	Outside Truck Dr. Light	2.00	HR	26.57	2.00	53.14			53.14
	TOTAL					8.00	218.93	10.00	101.41	320.34

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	XSGRA	2 X-eqoprmed + 1 Sheepsfoot Roller, 210 Hp			PROD = 100%				CREW HOURS =	5
MIL	G15CA003	E GRADER,MOTOR,CAT12-G, ARTIC	1.00	HR	29.49			1.00	29.49	29.49
MIL	XMIXX020	E Small Tools	2.00	HR	1.45			2.00	2.90	2.90
MIL	R30CA001	E ROLLER,STATIC,SELF,84"W,11 TIRE	1.00	HR	15.72			1.00	15.72	15.72
MIL	T40XX033	E WATER TANK, 3000 GAL (ADD TRUCK	1.00	HR	3.23			1.00	3.23	3.23
MIL	T50GM016	E TRK, HWY, 3 AXLE, 41000 GVW, 6X	1.00	HR	19.28			1.00	19.28	19.28
MIL	X-LABORER	L Outside Laborer	2.00	HR	27.65	2.00	55.31			55.31
MIL	X-EQOPRMEDL	Outside Equip. Op. Medium	2.00	HR	27.28	2.00	54.55			54.55
MIL	X-EQOPRMEDF	Outside Equip. Op. Medium	1.00	HR	28.28	1.00	28.28			28.28
MIL	X-TRKDVRLTL	Outside Truck Dr. Light	1.00	HR	26.57	1.00	26.57			26.57
	TOTAL					6.00	164.70	6.00	70.62	235.33
	XXPLA	3 X-laborer + 1-14 Ton Crane, Hydraulic			PROD = 100%				CREW HOURS =	13
MIL	C75GV001	E CRANE,HYD,SELF,ROUGH TER,4WD,18	1.00	HR	31.23			1.00	31.23	31.23
MIL	XMIXX020	E Small Tools	1.00	HR	1.45			1.00	1.45	1.45
MIL	X-LABORER	L Outside Laborer	3.00	HR	27.65	3.00	82.96			82.96
MIL	X-EQOPRMEDL	Outside Equip. Op. Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	X-PLUMBER	F Outside Plumber	0.50	HR	32.87	0.50	16.44			16.44
MIL	X-PLUMBER	L Outside Plumber	1.00	HR	31.87	1.00	31.87			31.87
	TOTAL					5.50	158.54	2.00	32.68	191.22
	XXPLB	4 X-laborer + 1- 12.5 Ton Crane, Hydraulic			PROD = 100%				CREW HOURS =	7
MIL	C75BD003	E CRANE,HYD,SELF 14T ROUGH TERRAI	1.00	HR	27.60			1.00	27.60	27.60
MIL	XMIXX020	E Small Tools	2.00	HR	1.45			2.00	2.90	2.90
MIL	X-LABORER	L Outside Laborer	4.00	HR	27.65	4.00	110.61			110.61
MIL	X-EQOPRMEDL	Outside Equip. Op. Medium	1.00	HR	27.28	1.00	27.28			27.28
MIL	X-PLUMBER	F Outside Plumber	0.50	HR	32.87	0.50	16.44			16.44
MIL	X-PLUMBER	A Outside Plumber	1.00	HR	27.00	1.00	27.00			27.00
MIL	X-PLUMBER	L Outside Plumber	1.00	HR	31.87	1.00	31.87			31.87
	TOTAL					7.50	213.19	3.00	30.50	243.69
	XXPLC	8 X-Plumber + 1- 40 Ton Crane, 1 Semi Truck,			PROD = 100%				CREW HOURS =	11
MIL	A15XX011	E AIR COMPR, 450 CFM, 100 PSI	1.00	HR	16.08			1.00	16.08	16.08
MIL	C85LB002	E CR,ME,CWLR,LIFTING,40T,W/50'BOO	1.00	HR	40.49			1.00	40.49	40.49
MIL	XMIXX020	E Small Tools	2.50	HR	1.45			2.50	3.63	3.63
MIL	T45XX019	E TRK TRLR,LOWBOY, 75 TON, 3 AXLE	1.00	HR	9.12			1.00	9.12	9.12
MIL	T50GM008	E TRK,HWY,4X2 3500 PICKUP, 8600GV	1.00	HR	9.77			1.00	9.77	9.77
MIL	T50KE004	E TRK,HWY,3AXLE,50000GVW, 85000GC	1.00	HR	32.14			1.00	32.14	32.14
MIL	W35XX009	E ELEC DRIVE,WELDER,300 AMP,SKID	2.00	HR	1.52			2.00	3.03	3.03
MIL	A20XX005	E AIR HOSE, 2.0", 50', HARDROCK	1.00	HR	0.81			1.00	0.81	0.81
MIL	X-PLUMBER	F Outside Plumber	1.00	HR	32.87	1.00	32.87			32.87
MIL	X-PLUMBER	A Outside Plumber	1.00	HR	27.00	1.00	27.00			27.00
MIL	X-PLUMBER	L Outside Plumber	6.00	HR	31.87	6.00	191.22			191.22
MIL	X-EQOPRHVYL	Outside Equip. Op. Heavy	1.00	HR	32.79	1.00	32.79			32.79
MIL	X-EQOPROILL	Outside Oiler	1.00	HR	25.91	1.00	25.91			25.91
MIL	X-TRKDVRHVL	Outside Truck Dr. Heavy	1.00	HR	27.57	1.00	27.57			27.57
	TOTAL					11.00	337.35	10.50	115.06	452.42

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	XXQHK	1 X-eqoprhvy + 1 Hydr. Excavator, 3 Cy, Cwlr			PROD = 100%				CREW HOURS =	64
MIL	H25K0007 E	HYD EXCAV,CRWLR,3 CY BKT	1.00	HR	130.71			1.00	130.71	130.71
MIL	XMIXX020 E	Small Tools	0.11	HR	1.45			0.11	0.16	0.16
MIL	X-LABORER L	Outside Laborer	1.00	HR	27.65	1.00	27.65			27.65
MIL	X-EQOPRHVYL	Outside Equip. Op. Heavy	1.00	HR	32.79	1.00	32.79			32.79
MIL	X-EQOPROILL	Outside Oiler	1.00	HR	25.91	1.00	25.91			25.91
	TOTAL					3.00	86.35	1.11	130.86	217.21
	XXQNE	1 X-eqoprhvy + 1 Dozer, Cat D-81, 335 Hp			PROD = 100%				CREW HOURS =	46
MIL	T10CA017 E	BLADE, UNIVERSAL,HYDR,FOR D8	1.00	HR	7.36			1.00	7.36	7.36
MIL	T15CA015 E	DOZER,CWLR,CAT D-8L, (ADD BLADE	1.00	HR	78.77			1.00	78.77	78.77
MIL	X-LABORER L	Outside Laborer	0.50	HR	27.65	0.50	13.83			13.83
MIL	X-EQOPRHVYL	Outside Equip. Op. Heavy	1.00	HR	32.79	1.00	32.79			32.79
MIL	X-EQOPRHVYF	Outside Equip. Op. Heavy	0.25	HR	33.79	0.25	8.45			8.45
	TOTAL					1.75	55.06	2.00	86.13	141.19

** LABOR BACKUP **

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	DEFAULT	**** TOTAL **** HOURS
MIL	B-CARPNTER	Carpenters	18.55	0.0%	18.0%	6.21	0.00	28.10	HR	02/24/95	0.00	4224
MIL	B-CEMTFINR	Cement Finishers	20.05	0.0%	17.0%	6.62	0.00	30.08	HR	02/24/95	0.00	847
MIL	B-EQOPRCRN	Equip. Oper. Heavy	22.45	0.0%	17.0%	6.52	0.00	32.79	HR	02/24/95	0.00	1452
MIL	B-EQOPRLT	Equip. Oper. Light	16.90	0.0%	17.0%	6.52	0.00	26.29	HR	02/24/95	0.00	108
MIL	B-EQOPRMED	Equip. Oper. Medium	17.74	0.0%	17.0%	6.52	0.00	27.28	HR	02/24/95	0.00	2659
MIL	B-EQOPROIL	Oiler	16.57	0.0%	17.0%	6.52	0.00	25.91	HR	02/24/95	0.00	494
MIL	B-LABORER	Laborer (Semi Skilled)	23.25	0.0%	17.0%	0.45	0.00	27.65	HR	02/24/95	0.00	8832
MIL	B-PAINTORD	Painters, Ordinary	19.80	0.0%	16.0%	4.20	0.00	27.17	HR	02/24/95	22.76	22
MIL	B-PILEDRVR	Pile Drivers	19.05	0.0%	27.0%	6.21	0.00	30.40	HR	02/24/95	27.07	1912
MIL	B-RODMAN	Rodman (Reinf.)	19.80	0.0%	17.0%	6.85	0.00	30.02	HR	02/24/95	0.00	2565
MIL	B-STRSTEEL	Structural Steel Workers	19.80	0.0%	27.0%	6.85	0.00	32.00	HR	02/24/95	0.00	505
MIL	B-TRKDVRHV	Truck Driver Heavy	17.98	0.0%	17.0%	6.53	0.00	27.57	HR	02/24/95	0.00	2061
MIL	B-WELDERS	Welders, Struct Stl	19.80	0.0%	27.0%	6.85	0.00	32.00	HR	02/24/95	28.05	3
MIL	X-ELECTRN	Outside Electrician	20.75	0.0%	14.0%	4.75	0.00	28.41	HR	02/27/95	27.28	14
MIL	X-EQOPRHVY	Outside Equip. Op. Heavy	22.45	0.0%	17.0%	6.52	0.00	32.79	HR	02/27/95	24.33	510
MIL	X-EQOPRLT	Outside Equip. Oper Light	16.90	0.0%	17.0%	6.52	0.00	26.29	HR	02/27/95	23.21	456
MIL	X-EQOPRMED	Outside Equip. Op. Medium	17.74	0.0%	17.0%	6.52	0.00	27.28	HR	02/27/95	24.03	1350
MIL	X-EQOPROIL	Outside Oiler	16.57	0.0%	17.0%	6.52	0.00	25.91	HR	02/27/95	18.51	75
MIL	X-LABORER	Outside Laborer (Semi-Skilled)	23.25	0.0%	17.0%	0.45	0.00	27.65	HR	02/27/95	21.01	1989
MIL	X-PLUMBER	Outside Plumber/Pipefitter	21.36	0.0%	14.0%	7.52	0.00	31.87	HR	04/29/94	27.57	1095
MIL	X-TRKDVRHV	Outside Truck Dr. Heavy	17.98	0.0%	17.0%	6.53	0.00	27.57	HR	02/27/95	22.09	251
MIL	X-TRKDVRLT	Outside Truck Dr. Light	17.13	0.0%	17.0%	6.53	0.00	26.57	HR	02/27/95	21.86	419

** EQUIPMENT BACKUP **

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
UPB	A15XX009	AIR COMPR, 250 CFM, 100 PSI	2.20	0.66	3.18	0.88	0.04	0.01	2.24	9.21 HR	46
UPB	A15XX011	AIR COMPR, 450 CFM, 100 PSI	4.10	1.24	5.02	1.39	0.13	0.02	4.17	16.08 HR	11
MIL	A15XX014	AIR COMPR, 900 CFM, 100 PSI	5.94	1.79	8.70	2.41	0.19	0.03	6.05	25.12 HR	12
UPB	A20XX002	AIR HOSE, 1.00", 100',HARDROCK	0.14	0.01					0.24	0.40 HR	46
UPB	A20XX005	AIR HOSE, 2.00", 100',HARDROCK	0.29	0.03					0.49	0.81 HR	11
UPB	A20XX007	AIR HOSE, 3.00", 100',HARDROCK	0.72	0.07					1.21	2.00 HR	25
UPB	B20CI006	B-CHIPPER, 16" DIA LOG, TRLR-MTD	1.40	0.31	2.54	0.71	0.03	0.01	1.66	6.67 HR	353
UPB	B35HE040	BUCKET,DRAGLINE, 5.0CY, HVWT	2.99	0.74					2.66	6.40 HR	107
UPB	C55SC005	CONC PUMP,117CY/HR,75'BM,W/TRUCK	22.14	4.54	13.24	3.67	0.75	0.11	27.43	71.89 HR	46
MIL	C65MS001	CONC VIBRATOR, 2.5"D, AIR	0.19	0.02		0.06			0.59	0.86 HR	91
MIL	C75BD003	CRANE,HYD,S/P,RT,4WD,14T/49'BOOM	5.91	2.03	9.76	3.09	0.60	0.09	6.12	27.60 HR	62
MIL	C75GV001	CRANE,HYD,S/P,RT,4WD,18T/70'BOOM	10.22	3.54	4.10	1.22	1.34	0.20	10.61	31.23 HR	13
UPB	C75PH004	CRANE,HYD,S/P,RT,4WD,22T/72'BOOM	11.94	4.12	5.08	1.51	1.34	0.20	12.38	36.56 HR	5
MIL	C80LI007	CRANE,HYD,TRK MTD, 60T /110'BOOM	21.15	8.12	8.04	2.07	1.10	0.16	19.15	59.79 HR	5
MIL	C85LB002	CR,ME,CWLR,LIFTING, 40T/ 50'BOOM	16.16	5.75	2.46	0.49			15.64	40.49 HR	11
UPB	C85PH005	CRANE,DRAG/CLAM, 5.0CY /135'BOOM	41.79	15.79	6.77	1.47			51.22	117.04 HR	107
UPB	G15CA003	GRADER,MOTOR, ARTIC, CAT 12-G	9.87	3.55	4.14	1.39	0.65	0.10	9.79	29.49 HR	294
MIL	H25KO007	HYD EXCAV, CRWLR, 3.00 CY BKT	43.28	12.54	12.89	2.81			59.18	130.71 HR	66
UPB	L35CA007	LDR,FE, CRWLR, 3.75 CY	21.31	5.75	7.62	2.87			37.87	75.41 HR	2056
UPB	L50CS002	LDR,BH,WH, 1.00CY FE BKT, 24"DIP	3.61	1.12	2.11	0.67	0.50	0.07	4.03	12.11 HR	5
UPB	P10XX002	PILE LEADS, 8"X 26", 60' LENGTH	1.70	0.39		2.00			2.15	6.24 HR	12
UPB	P25VU002	PILE HAMMER,SNG, 19,500 FT-LBS	5.30	1.21		0.51			8.39	15.40 HR	14
UPB	P30MK003	PILE HAMMER,VIB,116T FORCE DRIVE	20.53	4.69	11.72	3.71			32.51	73.16 HR	372
UPB	R30CA001	ROLLR,STATIC,S/P,13T,84"W,11TIRE	5.31	1.26	2.58	0.61	0.97	0.14	4.85	15.72 HR	5
UPB	R30IG008	ROLLER,STATIC,3WHL,S/P, 12T,84"W	4.90	1.32	2.54	0.60			5.03	14.40 HR	207
UPB	S15CA002	SCRAPER,SELF, 21-31CY, 37.5T, PS	41.11	11.01	13.81	4.38	14.64	2.17	33.64	120.75 HR	316
UPB	T10CA009	BLADE, STRAIGHT, HYDR (FOR D6	1.54	0.42		0.08			1.62	3.66 HR	119
UPB	T10CA010	BLADE, ANGLE, HYDR (FOR D6	1.71	0.46		0.08			1.80	4.04 HR	19
UPB	T10CA013	BLADE, UNIVERSAL, HYDR (FOR D7	2.42	0.65		0.08			2.55	5.70 HR	380
UPB	T10CA017	BLADE, UNIVERSAL, HYDR (FOR D8	3.11	0.84		0.13			3.28	7.36 HR	238
UPB	T10CA022	BLADE, UNIVERSAL, HYDR (FOR D9	4.11	1.11		0.19			4.32	9.73 HR	52
UPB	T15CA010	DOZER,CWLR, D-6H,PS (ADD BLADE)	10.55	3.13	5.98	2.13			17.78	39.58 HR	138
UPB	T15CA013	DOZER,CWLR, D-7H,PS (ADD BLADE)	16.34	4.85	7.80	2.78			27.54	59.31 HR	380
UPB	T15CA015	DOZER,CWLR, D-8L,PS (ADD BLADE)	24.46	6.60	12.15	3.37			32.19	78.77 HR	238
UPB	T15CA017	DOZER,CWLR, D-9N,PS (ADD BLADE)	27.99	7.55	13.42	3.72			36.84	89.52 HR	52
UPB	T40XX010	REAR DUMP BODY,12 CY,(36,000 GVW	1.22	0.27		0.09			1.12	2.69 HR	1765
MIL	T40XX012	FLATBED, 8'x 9.0' (ADD TRK)	0.25	0.06					0.20	0.50 HR	207
UPB	T40XX018	FLATBED, 8'x 20.0' (ADD TRK)	0.39	0.09					0.31	0.78 HR	207
UPB	T40XX033	WATER TANK, 3000 GAL (ADD TRK	1.61	0.36					1.27	3.23 HR	351
MIL	T45XX017	TRLR,LOWBOY, 60T, 3 AXLE(ADD TRK	2.68	1.04		0.13	1.30	0.19	2.12	7.47 HR	100
UPB	T45XX019	TRLR,LOWBOY, 75T, 3 AXLE(ADD TRK	3.48	1.30		0.13	1.30	0.19	2.72	9.12 HR	11
MIL	T50FO012	TRK,HWY, 44,300 GVW, 6X4, 3 AXLE	4.95	1.16	14.29	4.53	1.03	0.15	4.30	30.41 HR	40
UPB	T50FO020	TRK,HWY, 64,000 GVW, 6X4, 3 AXLE	10.53	2.43	13.33	3.69	1.58	0.23	9.11	40.91 HR	100
MIL	T50GM008	TRK,HWY, 8,600GVW,4X2, 1T-PICKUP	1.37	0.31	5.06	1.40	0.23	0.03	1.37	9.77 HR	220
UPB	T50GM012	TRK,HWY, 24,000 GVW, 4X2, 2 AXLE	2.71	0.69	4.05	1.04	0.51	0.08	2.52	11.60 HR	207
MIL	T50GM015	TRK,HWY, 41,000 GVW, 6X4, 3 AXLE	3.78	0.92	13.42	4.25	1.29	0.19	3.31	27.17 HR	10
UPB	T50GM016	TRK,HWY, 41,000 GVW, 6X4, 3 AXLE	4.29	1.03	6.83	1.89	1.29	0.19	3.75	19.28 HR	2273
UPB	T50KE004	TRK,HWY, 50,000 GVW, 6X4, 3 AXLE	9.67	2.16	9.00	2.49	0.43	0.06	8.32	32.14 HR	11
UPB	W35XX002	WELDER, 200 AMP, W/1 AXLE TRLR	0.48	0.13	4.18	0.99	0.03	0.01	0.55	6.37 HR	83
UPB	W35XX009	WELDER, 300 AMP, SKID,ELEC DRIVE	0.36	0.07	0.60	0.24			0.25	1.52 HR	24
UPB	XMIXX010	MISC. POWER TOOLS	2.00	0.70	0.55	0.25			2.40	5.90 HR	946

** EQUIPMENT BACKUP **

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL HOURS
UPB	XMIXX020	SMALL TOOLS	0.46	0.20	0.15	0.06			0.58	1.45 HR	4286

ESTIMATE OF ANNUAL OPERATING AND MAINTENANCE COSTS
(OCTOBER 1994 PRICE LEVELS) 1/, 2/, 3/

NOTES:
1. Mow once per year for 6 years, Apply herbicide twice a year for 6 years.
2. Mow twice for first 3 years, release seedings for once a year.

Item	Interval				Average Annualized Cost				
	Years	Quantity	Unit	U.Cost ($)	Operation ($)	Maintenace ($)	Annualized Cost ($)	Replacement ($)	Annualized Cost ($)
48,000 GPM Pump Operation (Fuel) CHICKAHOMINY	Annual	360	Hours	5	1,800				1800
48,000 GPM Pump Operation (Fuel) SILVER	Annual	120	Hours	5	600				600
5,000 GPM Pump Operation (Fuel) SQUAW ISLAND	Annual	384	Hours	2	768				768
5,000 GPM Pump Operation (Fuel) GOOSE FIELD	Annual	120	Hours	2	240				240
48,000 GPM Pump Operation (Labor) CHICKAHOMINY	Annual	120	Hours	18	2,160				2160
48,000 GPM Pump Operation (Labor) SILVER	Annual	40	Hours	18	720				720
48,000 GPM Pump Operation (Maint.) CHICKAHOMINY	3					5000			1535
48,000 GPM Pump Operation (Maint.) SILVER	3					5000			1535
5,000 GPM Pump Operation (Labor) SQUAW ISLAND	Annual	128	Hours	18	2,304				2304
5,000 GPM Pump Operation (Labor) GOOSE FIELD	Annual	40	Hours	18	720				720
5,000 GPM Pump Operation (Maint.) SQUAW ISLAND	3					3000			921
5,000 GPM Pump Operation (Maint.) GOOSE FIELD	3					3000			921
48,000 GPM Pump (Replacement) CHICKAHOMINY	25							200,000	2388
48,000 GPM Pump (Replacement) SILVER	25							200,000	2388
5,000 GPM Pump (Replacement) SQUAW ISLAND	25							64,000	764
5,000 GPM Pump (Replacement) GOOSE FIELD	25							64,000	764
Gauge Maintenace	5					6000			1012
Gauge Replacement	25							24,000	286
Control Structure Repair (Cleaning)	5					2000			337
Control Structure Operation	Annual	100	Hours	18	1,800				1800
Gates Replacement	25							32,000	382
Ditch Redredging	25							250,000	2984
Riprap Repair	5					37,500			6327
Embakment Repair	5					22,500			3796
Gatewell Maintenace	5					3,000			506
Tree Planted Cropland (Maint.) See Note 1	For 6 Yrs.					13,200			4988
Tree Planted Forest Clearigs (Maint.) See Note 2	For 3 Yrs.					25,300			5330
Road Resurfacing	5					20,000			3374
TOTALS					$11,112	$145,600		$834,000	$51,650

1/ Maintenance costs are defined as those costs of repair and replacement associated events (including minor storm and flood events) that do not exceed the level of design for the project. For example at Calhoun Point, this level of design has been designated as the top elevation of the dike levee structure. In the project reach of reveres, river stages would remain at or below the top of these structures about 95 percent of the time. On this basis, at least some rock material and earthen dike/levee material is expected to be lost during minor flood events and from ice damages.

2/ Consistent with other UMRS-EMP projects, no estimates of rehabilitation cost are provided in this table. Any costs presented would be based on so little historical data as to be highly unreliable and misleading. Any mutually agreed rehabilitation work would be cost shared (75 percent Federal, 25 percent non-Federal). Rehabilitation is here defined as a reconstruction work needed in excess of estimated annual O&M, as a result of specific storm or flood events. For the Calhoun Point project, elevations above 424 NGVD occur less than 5 percent of the time. Any interior ditch filling is expected to occur this time period. Also during this period, most of the dike/levee damages are expected from currents overtopping the structures.

3/ Annualization based on an 8.0 percent interest rate, and 50-year project life.

APPENDIX DPR-Q

BIOLOGICAL DATA

FOREWORD

APPENDIX DPR-Q provides the following biological data for the Calhoun Point project area, grouped by source:

Long Term Resource Monitoring Program
(1) 1989 land cover/land use, with management area boundaries
(2) areal extent (hectares) of 1989 land cover/land use by management area
(3) percentage distribution of 1989 land cover/land use by management area
(4) areal extent (acres) of 1989 land cover/land use by management area
(5) 1989 land cover/land use
(6) 1975 land cover/land use
(7) 1930 land cover/land use
(8) 1903 land cover/land use
(9) 1890's land cover/land use
(10) 1817 land cover/land use

Nelson et al. (1994)
(11) area of study - floodplain vegetation changes
(12) percent distribution of land cover types over time
(13) mean annual hydrographs - predam and postdam periods at Grafton, Illinois
(14) presettlement and present floodplain forest composition

Illinois Natural History Survey
(15) waterfowl census - Swan Lake (2 pages)
(16) waterfowl census - Stump Lake (2 pages)

Illinois Department of Conservation
(17) Calhoun Point waterfowl management area

Calhoun Point

Confluence of the Mississippi and Illinois Rivers

1989 Land Cover/ Land Use

- Open Water
- Submergents
- Sub/Rooted Floating
- Sub/Rooted/Emerg
- Rooted Floating
- Rooted Float/Emerg
- Emergents
- Emerg/Grass/Forbs
- Grass & Forbs
- Trees & Shrubs
- Agriculture
- Urban/Developed
- Sand/Mud

Management Areas

A = Goose Field
B = Pohlman Slough
C = South Royal Lake
D = Silver Lake
E = Chickahominy Lake
F = Squaw Island
G = North Royal Lake

Acreage Report

A	264
B	412
C	315
D	579
E	207
F	254
G	124
Total	2,153

Data Source:

The management areas coverage was created from sketches provided by the U.S. Army Corps of Engineers, St. Louis, Missouri. The data were interpreted and computerized by the Long Term Resource Monitoring Program. The data are displayed on top of a 1989 land cover/land use (LCU) coverage. The LCU coverage was created from 1:15,000 color infrared aerial photography using a genus-level classification scheme and minimum mapping unit of <1 acre, 10% vegetation cover. The LCU data interpreted by the National Ecology Research Center for the Long Term Resource Monitoring Program.

Table 1. Calhoun Point HREP site (Pool 26 - UMR). Areal extent (Ha) of 1989 landuse/cover types presented by management area.

Landcover Type	Management Area A	B	C	D	E	F	G
Open Water		14.10	1.52	27.70	7.66	0.33	17.25
Submergents		8.75	1.06	5.59	0.16		
Sub/Rooted Floating				0.76			
Rooted Floating				5.69			
Emergent	0.61	4.54	3.94	42.04	11.44		1.46
Grass & Forbs	0.73	12.40	1.78	3.06	0.11	2.82	1.50
Trees	27.52	112.82	103.73	145.21	64.34	98.00	29.82
Agriculture	77.55	4.51	10.80	4.06			
Urban Developed	0.25	9.60	0.48	0.07	0.14		
Sand/Mud			4.00			1.61	
TOTAL	106.66	166.72	127.31	234.18	83.85	102.76	50.03

Table 2. Calhoun Point HREP site (Pool 26 - UMR). Percentage distribution of 1989 landuse/cover types presented by management area.

Landcover Type	Management Area A	B	C	D	E	F	G
Open Water		8.46	1.19	11.83	9.14	0.32	34.48
Submergents		5.25	0.83	2.39	0.19		
Sub/Rooted Floating				0.32			
Rooted Floating				2.43			
Emergent	0.57	2.72	3.10	17.95	13.64		2.92
Grass & Forbs	0.68	7.44	1.40	1.31	0.13	2.74	3.00
Trees	25.80	57.66	81.48	62.01	76.73	95.37	59.60
Agriculture	72.72	2.71	8.48	1.73			
Urban Developed	0.23	5.76	0.38	0.03	0.17		
Sand/Mud			3.14			1.57	
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Area (acres) of 1989 landuse/cover types by proposed management area at Calhoun Point EMP project site (data provided by Anjela Redmond, INHS, LTRMP Pool 26).

LANDCOVER TYPE	GOOSE FIELD A	POHLMAN LAKE B	SOUTH ROYAL LAKE C	SILVER LAKE D	CHICKAHOMINY LAKE E	SQUAW ISLAND F	NORTH ROYAL LAKE G	Subtotal by Landcover Type
NONFORESTED WETLAND								
Open water*		35	4	68	19	1	43	170
Submergents*		22	3	14				39
Sub/rooted floating*				2				2
Rooted floating*				14				14
Emergent*	2	11	10	104	28		4	159
Grass & Forbs	2	6 (-25)	4	8		7	4	31
Subtotal NONFORESTED	4	74	31	210	47	12	51	415
FORESTED WETLAND								
Trees	68	279	256	359	159	242	74	1,437
CROPLAND WETLAND								
Agriculture	192	36 (+25)	27	10				265
Subtotal WETLAND	264	389	314	579	206	254	125	2,117
NONWETLAND								
Urban developed	1	24	1					26
Sand/mud (disposal area)			10			4		14
Total LANDCOVER TYPES	265	413	315	579	206	254	125	2,157
* aquatic	2	68	17	202	47	1	47	384

Calhoun Point

Confluence of the Mississippi and Illinois Rivers

1989 Land Cover/ Land Use

- Open Water
- Submergents
- Sub/Rooted Floating
- Sub/Rooted/Emerg
- Rooted Floating
- Rooted Float/Emerg
- Emergents
- Emerg/Grass/Forbs
- Grass & Forbs
- Trees & Shrubs
- Agriculture
- Urban/Developed
- Sand/Mud

Acreage Report

Open Water	2,079
Submergents	52
Sub/Rooted Floating	5
Rooted Floating	22
Emergents	170
Grass & Forbs	206
Trees & Shrubs	2,342
Agriculture	1,306
Urban/Developed	219
Sand/Mud	28
Total	6,430

Data Source:

The 1989 land cover/land use coverage was created from 1:15,000 color infrared aerial photography using a genus-level classification scheme and minimum mapping unit of <1 acre, 10% vegetation cover. The data were interpreted by the National Ecology Research Center for the Long Term Resource Monitoring Program.

Calhoun Point

Confluence of the Mississippi and Illinois Rivers

1975 Land Cover/ Land Use

- Open Water
- Submergents
- Sub/Rooted Floating
- Sub/Rooted/Emerg
- Rooted Floating
- Rooted Float/Emerg
- Emergents
- Emerg/Grass/Forbs
- Grass & Forbs
- Trees & Shrubs
- Agriculture
- Urban/Developed
- Sand/Mud

Acreage Report

Open Water	2,235
Rooted Floating	10
Emergents	20
Grass & Forbs	237
Trees & Shrubs	2,251
Agriculture	917
Urban/Developed	240
Sand/Mud	109
Total	6,018

Data Source

The 1975 land cover/land use coverage was created as part of the Great River Environmental Action Team (GREAT) project. The data were interpreted from 1:15,000 scale color infrared aerial photography. Copies of the photographic mylars were rectified and computerized in the early 1990's by the Nationl Ecology Research Center for the Long Term Resouce Monitoring Program.

Calhoun Point

Confluence of the Mississippi and Illinois Rivers

1930 Land Cover/ Land Use

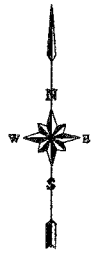
- Open Water
- Marsh
- Grass & Forbs
- Trees & Shrubs
- Agriculture
- Urban/Developed
- Sand/Mud

Acreage Report

Open Water	1,489
Marsh	223
Grass & Forbs	20
Trees & Shrubs	2,417
Agriculture	1,575
Urban/Developed	85
Sand/Mud	219
Total	6,028

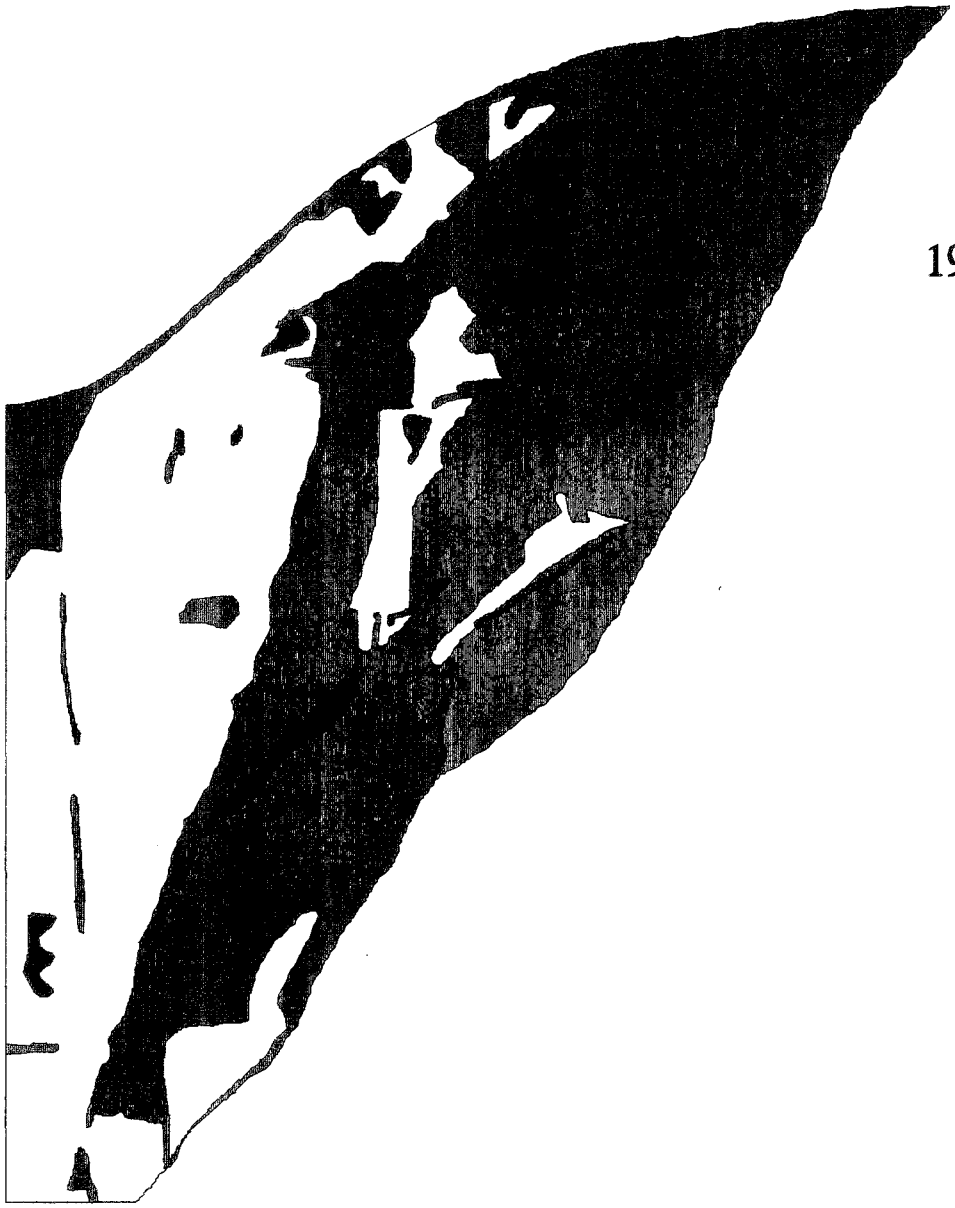
Data Source:

This coverage was created from a composite of aerial photographs collected between 1927 and 1936. The photographs were interpreted by the U.S. Geological Survey, Rolla, Missouri for inclusion in the U.S. Army Corps of Engineers, St. Louis District's report titled 'Terrestrial and aquatic land use and habitat change as a result of the nine-foot channel project' released March 1980. These data were then computerized by the Long Term Resource Monitoring Program from project mylars. Original data interpretation was performed at a 1:24,000 scale and 50% vegetation cover. The original minimum mapping unit is unknown.



Calhoun Point

Confluence of the Mississippi and Illinois Rivers



1903 Land Cover/ Land Use

- Water
- Prairie (wet/dry)
- Forest
- Agriculture

Acreage Report

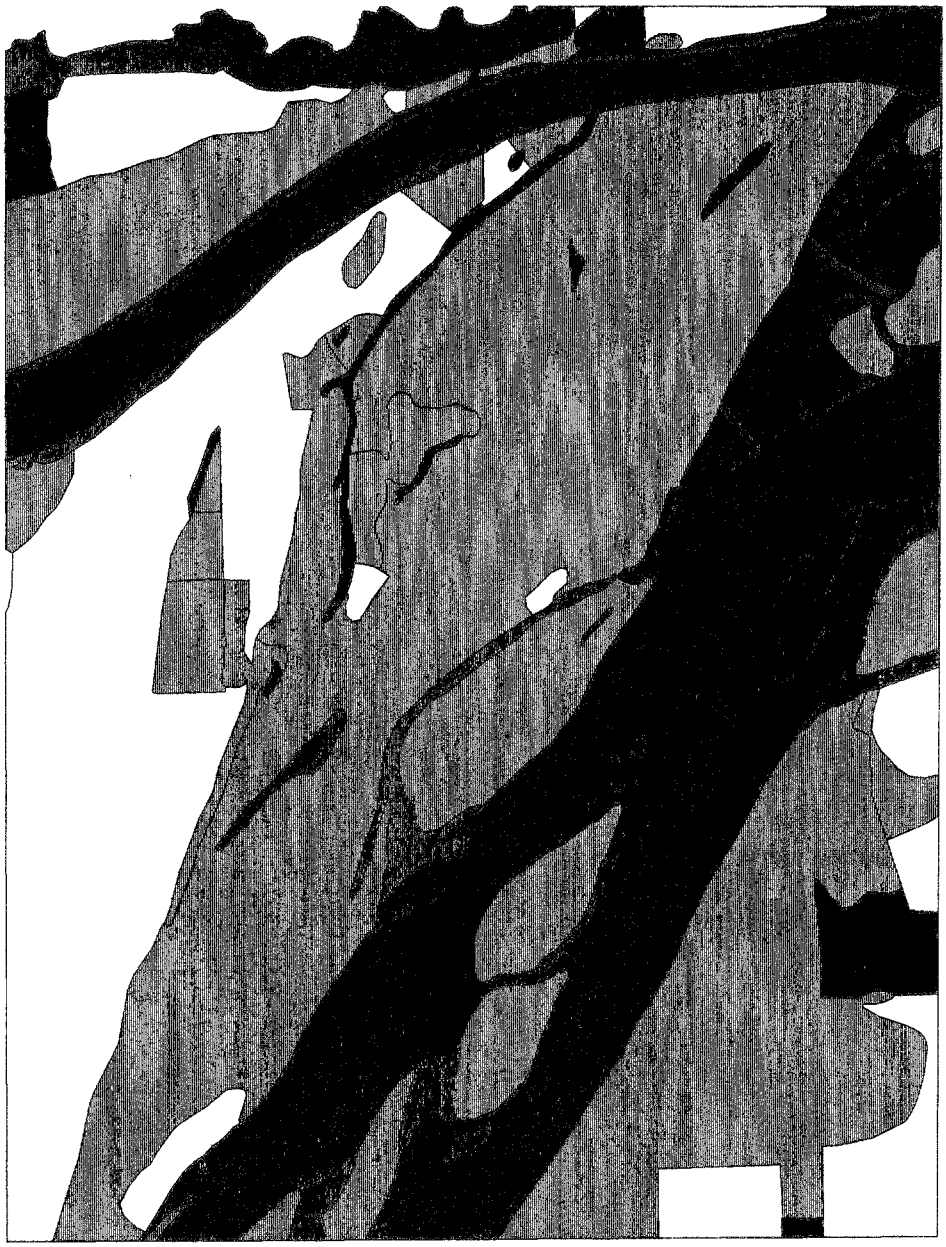
Water	90
Prairie (Wet/Dry)	1,707
Forest	1,159
Agriculture	18
	2,975

Data Source:

The 1903 land cover/land use data were created from J.W. Woermann's 1902-1904 map of secondary triangulation system of the Illinois and DesPlaines Rivers from Chicago, Illinois. Copies of the maps were computerized by the Pool 25 Field Station, Long Term Resource Monitoring Program. The minimum unit, minimum vegetation mapping cover, method of data aquistion, original mapping scale, and the scale of the map computerized are unknown.

Calhoun Point

Confluence of the Mississippi and Illinois Rivers



1890's Land Cover/ Land Use

- Open Water
- Marsh
- Grass & Forbs
- Trees & Shrubs
- Agriculture
- Urban/Developed
- Sand/Mud

Acreage Report

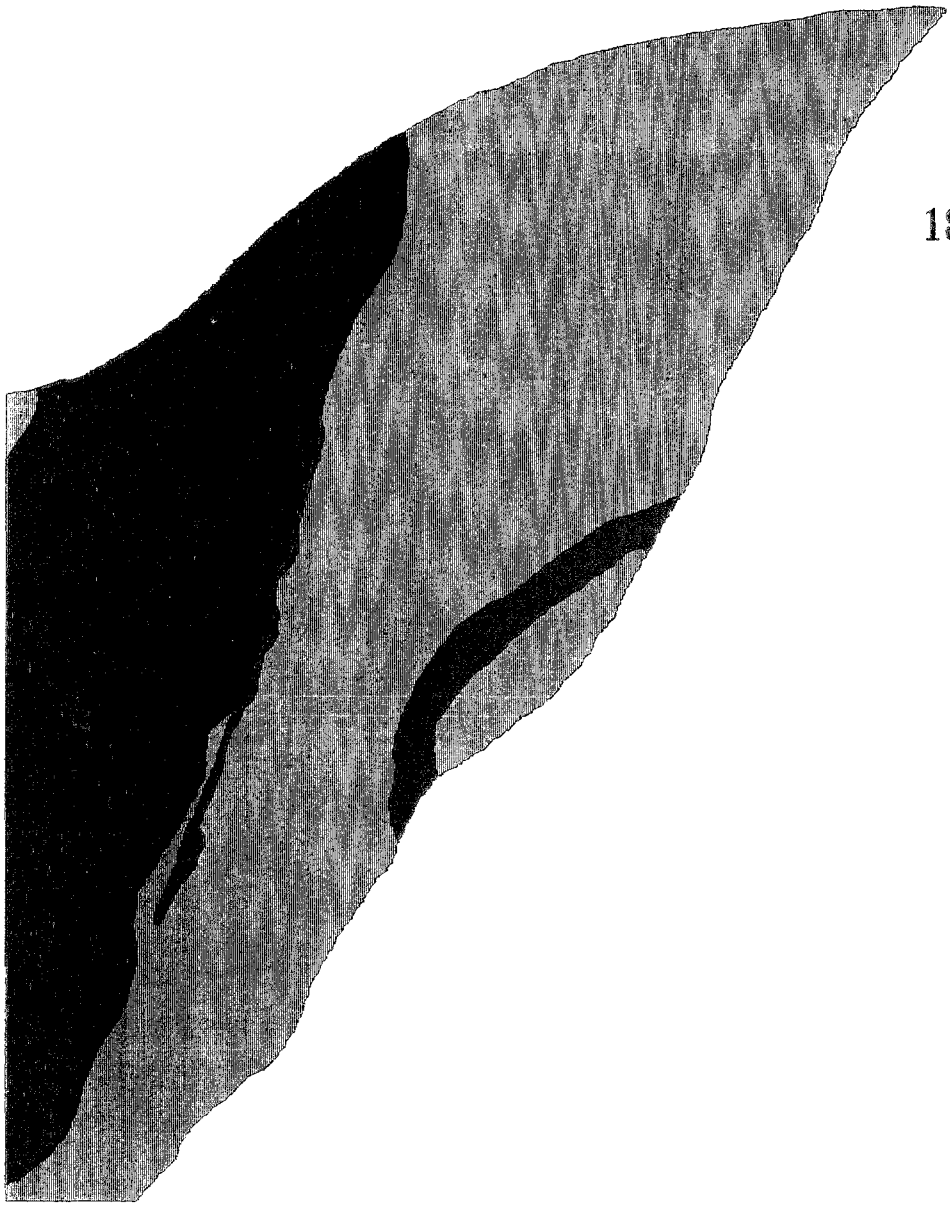
Open Water	1,709
Grass & Forbs	112
Trees & Shrubs	3,055
Agriculture	1,298
Urban/Developed	18
Sand/Mud	421
Total	6,614

Data Source:

The 1890's land cover/land use data were collected by the Mississippi River Commission survey. The data were collected through a series of ground surveys and tower observations, then drafted using a plane table. The minimum mapping unit and some of the classification description are unknown. The data were then computerized in the 1990's by the Long Term Resource Monitoring Program.

Calhoun Point

Confluence of the Mississippi and Illinois Rivers



1817 Land Cover/ Land Use

- Water
- Prairie (wet/dry)
- Forest
- Agriculture

Acreage Report

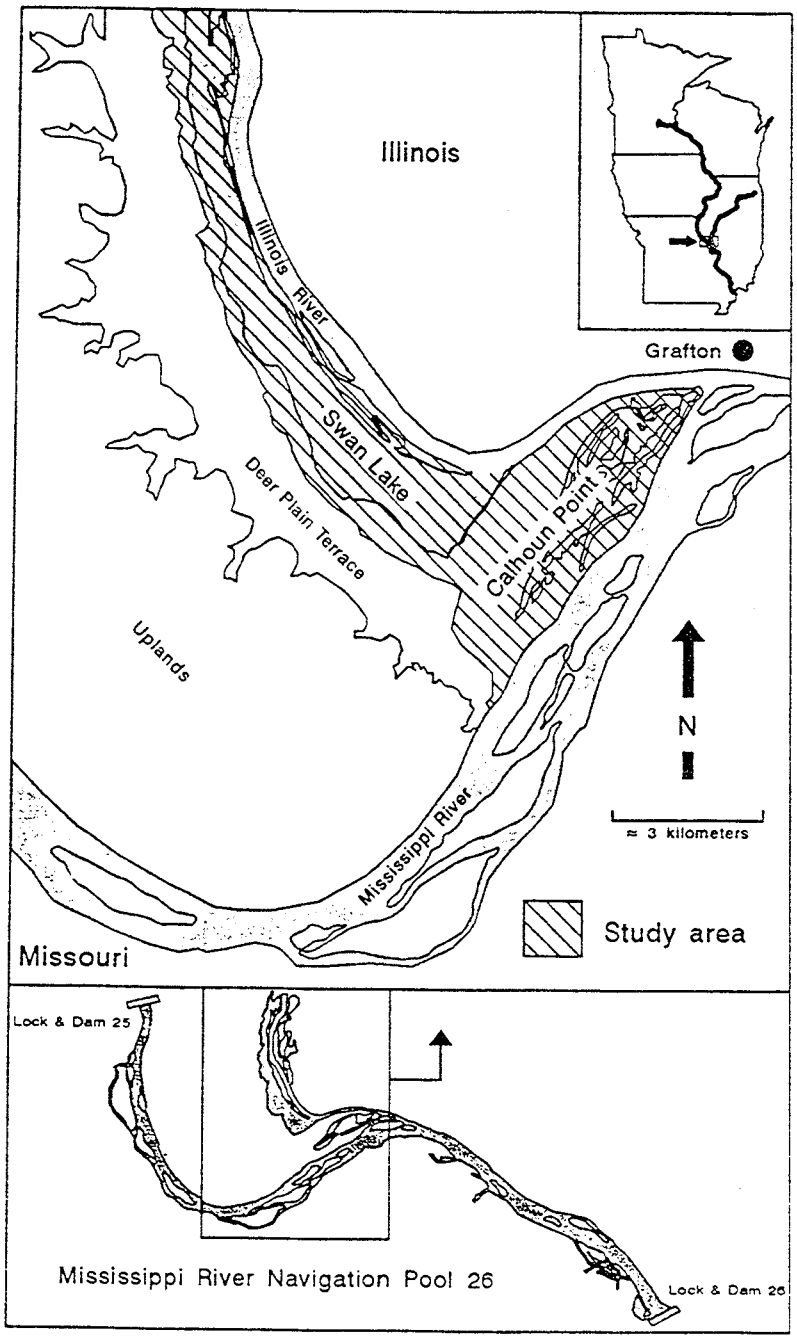
Water	119
Forest	1,868
Prairie (wet/dry)	1,022
Total	3,009

Data Source:

The 1817 land cover/land use data were created from a 1817 federal land surveyor's plat map. Copies of the maps were provided by the Illinois state archives (vol. 24-3) then their data were computerized by the Pool 26 Field Station, Long Term Resource Monitoring Program. The minimum mapping unit, minimum vegetative mapping cover, method of data acquistition, original mapping scale, and the scale of the map computerized are unknown.

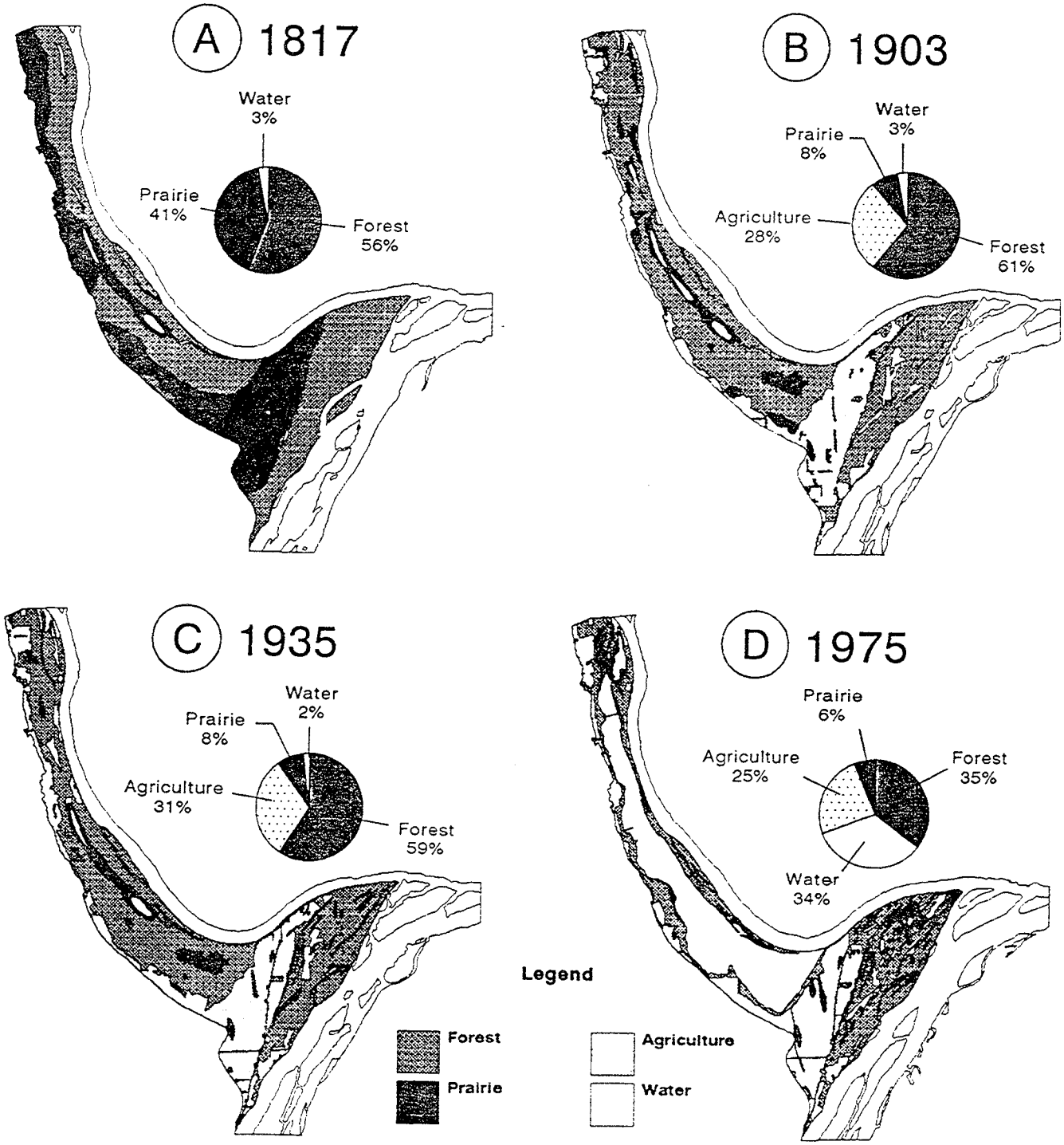
from Nelson, J.C., A. Redmond, and R.E. Sparks. 1994. Impacts of settlement on floodplain vegetation at the confluence of the Illinois and Mississippi Rivers. Transactions of the Illinois State Academy of Science, 87(3 and 4):117-133.

Fig 1. Map of study area at the confluence of the Illinois and Mississippi rivers and its location within Navigation Pool 26.



from Nelson, J.C., A. Redmond, and R.E. Sparks. 1994. Impacts of settlement on floodplain vegetation at the confluence of the Illinois and Mississippi Rivers. Transactions of the Illinois State Academy of Science, 87(3 and 4):117-133.

Fig 2. Geographic information system maps showing the percent distribution of several land cover types in 1817, 1903, 1935, and 1975



from Nelson, J.C., A. Redmond, and R.E. Sparks. 1994. Impacts of settlement on floodplain vegetation at the confluence of the Illinois and Mississippi Rivers. Transactions of the Illinois State Academy of Science, 87(3 and 4):117-133.

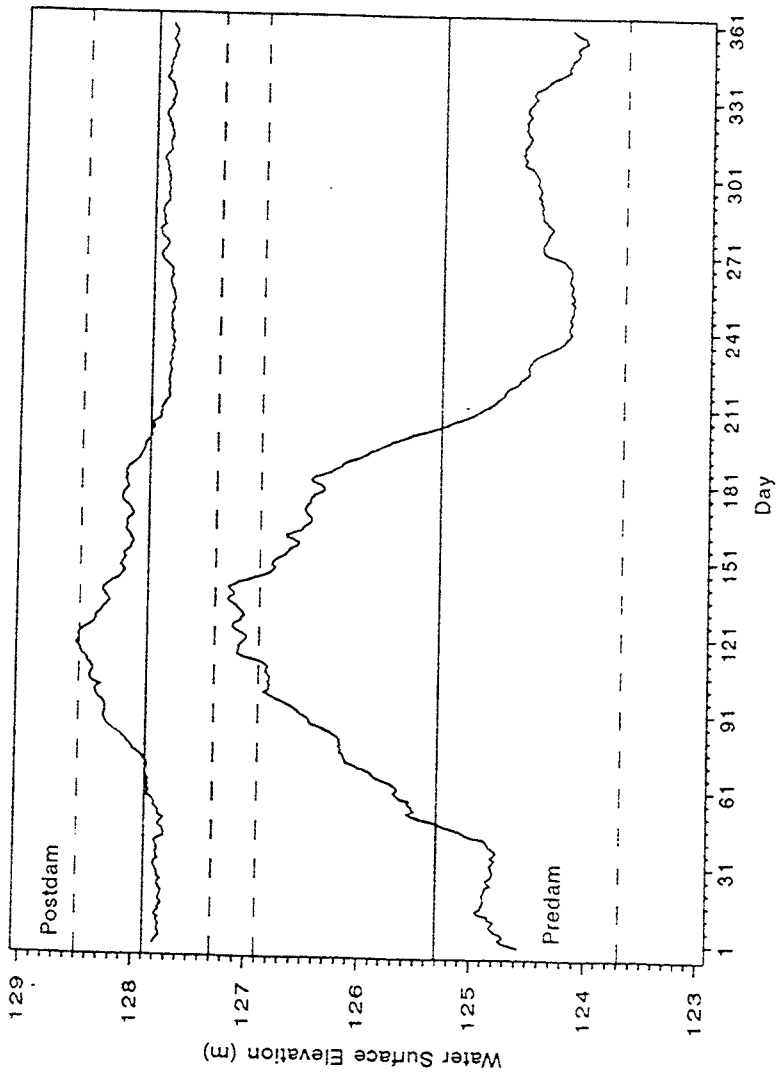


Fig 3. Mean annual hydrographs from predam (n=23 yr) and postdam (n=50 yr) periods at the Grafton, Illinois, gage. Solid horizontal lines indicate overall means; dashed lines directly above and below each indicate ± 1 SD.

from Nelson, J.C., A. Redmond, and R.E. Sparks. 1994. Impacts of settlement on floodplain vegetation at the confluence of the Illinois and Mississippi Rivers. Transactions of the Illinois State Academy of Science, 87(3 and 4):117-133.

Table 1. Presettlement and present floodplain forest composition at the confluence of the Illinois and Mississippi rivers.[1] Mean diameter breast height (dbh), relative density, relative dominance, and importance value (Rel. Dens. + Rel. Dom.) and importance value of all stems 10.0 cm or greater dbh in 1817 and 1992. Species ranked by imporatnce value in 1817.

Genus/species/surveyors common name	Mean dbh(cm)		Rel. Density		Rel. Dominance		Importance Value		
	1817	1992	1817	1992	1817	1992	1817	1992	▲
Celtis occidentalis (Hackberry)	29.6	17.0	17.5	15.0	12.9	4.7	30.4	19.7	- 10.7
Carya illinoensis (Peckon)	49.1	48.9	9.3	2.6	20.7	6.5	30.0	9.1	- 20.9
Ulmus spp. (Elm)	50.1	17.5	9.3	6.6	12.8	2.1	22.1	8.7	- 13.4
Salix spp. (Willow)	24.5	30.5	12.4	6.4	8.3	6.5	20.7	12.9	- 7.8
Populus deltoides (Cottonwood)	30.5	59.9	10.3	2.9	10.1	10.2	20.4	13.1	- 7.3
Acer saccharinum (Maple)	21.8	29.7	10.3	41.4	5.8	44.9	16.1	86.3	+ 70.2
Quercus palustris (Pin oak)	50.8	41.3	3.1	3.2	8.4	6.3	11.5	9.5	- 2.0
Fraxinus spp. (Ash)	36.4	32.9	6.2	8.2	4.8	9.7	11.0	17.9	+ 6.9
Quercus velutina (B. oak)	37.2	----	3.1	----	4.6	----	7.7	----	- 7.7
Acer negundo (Boxelder)	19.7	23.6	4.1	9.1	1.7	5.6	5.8	14.7	+ 8.9
Gleditsia spp. (Locust)	23.7	22.1	3.1	0.2	2.1	0.1	5.2	0.3	- 4.9
Morus spp. (Mulberry)	25.4	13.9	2.1	0.3	1.4	0.1	3.5	0.4	- 3.1
Quercus alba (W. oak)	38.1	----	2.1	----	1.0	----	3.1	----	- 3.1
Cercis canadensis (Redbud)	19.0	----	2.1	----	1.0	----	3.1	----	- 3.1
Platanus occidentalis (Sickimore)	40.6	37.6	1.0	0.6	1.8	1.3	2.8	1.9	- 0.9
Crataegus spp. (Red haw)	30.5	12.9	1.0	1.0	0.8	0.1	1.8	1.1	- 0.7
Quercus macrocarpa (Burr oak)	25.4	49.9	1.0	0.3	0.7	0.8	1.7	1.1	- 0.6
Asimina triloba (Paw paw)	22.9	----	1.0	----	0.5	----	1.5	----	- 1.5
Betula nigra (Birch)	20.3	29.2	1.0	0.3	0.4	0.3	1.4	0.6	- 0.8
Diospyros virginiana	----	18.5	----	1.4	----	0.5	----	1.9	+ 1.9
Maclura pomifera	----	18.8	----	0.3	----	0.1	----	0.4	+ 0.4
Juglans nigra	----	10.5	----	0.2	----	0.0	----	0.2	+ 0.2
Totals			99.0	99.4	98.0	98.5	197.0	198.0	0.0

Sample size: 1817 n = 96 stems, 1992 n = 628 stems. ▲ = change.

Average weekly count of waterfowl species aerially inventoried from 1967-1989 by Illinois Natural History Survey during fall migration (September 1 - December 15) on the Illinois River at Swan Lake, river miles 5 - 12, Calhoun County, Illinois. Counts rounded to nearest whole number. Number of weekly counts = n.

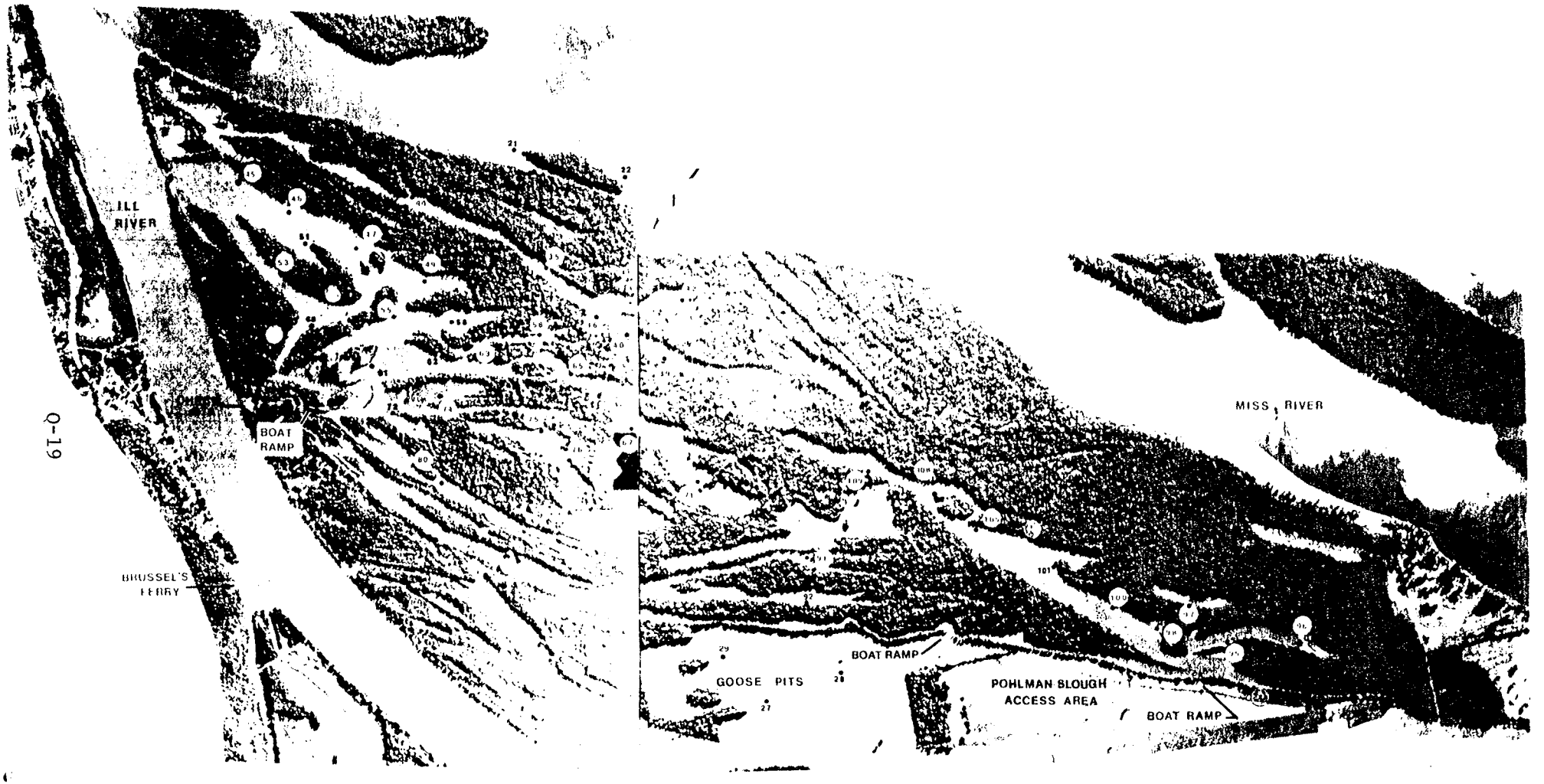
n	10	10	13	11	11	9	10	13	14	13	14
species	1967	1968	1969	1970	1971	1972	1973	1975	1976	1977	1978
mallard	5,962	5,567	10,973	5,008	22	17,821	6,272	17,012	18,096	18,001	16,445
black	36	87	48	37		511	144	448	203	268	207
pintail	21	1,410	1,176	27	6	1,334	118	445	235	956	1,622
blue-winged teal	46	16	57	11	27	71	196	231	393	669	521
green-winged teal	244	1,701	779	127	10	143	272	396	323	296	459
wigeon	5,712	6,316	2,973	549	54	318	398	385	859	816	3,104
gadwall	248	174	562	32		46	132	55	36	138	186
shoveler	2	4	9	5	<1	6		52	15	32	13
DABBLERS	12,271	15,275	16,577	5,796	119	20,250	7,532	19,024	20,160	21,177	22,558
scaup	1,026	3,592	438	405		1,361	140	179	105	444	524
ring-necked	790	1,400	2,042	136		197	36	67	42	236	350
canvasback	50	43	276	32		11	20	25	16	115	134
redhead	12	4	6	13		1		4		31	23
ruddy	212	940	829	266				32	11	26	30
goldeneye				2		17	12	11	105	79	179
bufflehead	2	2	6			8		7		6	51
DIVERS	2,092	5,981	3,597	854	0	1,595	208	325	279	937	1,291
common merganser			73	3		22	2	6	41	44	72
red-breasted merganser											3
hooded merganser	1		5					2	2	3	16
ALL DUCKS	14,364	21,256	20,252	6,653	119	21,867	7,742	19,357	20,482	22,161	23,940
Canada goose	348	10	77	100	10	13	76	290	267	408	1,576
blue & snow goose	3,850	4,286	1,169	454	<1	756	1,085	2,652	1,781	2,260	3,440
ALL GEESE	4,198	4,296	1,246	554	10	769	1,161	2,942	2,048	2,718	5,016
coot	9,810	9,280	2,512	1,836		439	1,044	756	925	3,190	8,648

n	14	14	14	12	14	9	7	8	11	12	12
species	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
mallard	13,964	9,366	7,848	5,958	7,828	7,922	9,714	9,750	20,727	23,062	25,617
black	204	100	151	139	106	107	98	145	327	336	464
pintail	1,498	922	277	242	436	630	3,628	2,538	2,682	1,690	2,980
blue-winged teal	405	191	136	188	323	353	1,088	944	418	426	236
green-winged teal	593	398	214	158	275	392	2,100	850	849	563	1,159
wigeon	2,660	1,351	898	452	520	1,221	1,725	3,309	3,454	1,681	2,654
gadwall	198	114	87	51	83	171	457	356	1,068	229	706
shoveler	40	15	20	25	34	20	277	120	372	114	834
DABBLERS	**19,562**	**12,455**	**9,628**	**7,214**	**9,606**	**10,818**	**22,089**	**18,012**	**29,898**	**28,102**	**34,651**
scaup	561	393	312	210	193	362	1,807	656	1,200	1,077	1,940
ring-necked	194	355	186	60	93	88	918	284	616	426	1,258
canvasback	98	75	91	72	55	135	454	189	320	281	896
redhead	16	26	16	16	21	26	96	42	150	79	148
ruddy	21	35	30	13	42	80	265	274	514	271	339
goldeneye	175	44	166	38	60	58	422	232	131	269	279
bufflehead	47	13	16	16	26	33	161	116	127	86	72
DIVERS	**1,113**	**941**	**818**	**425**	**490**	**832**	**4,124**	**1,793**	**3,060**	**2,490**	**4,932**
common merganser	51	13	56	12	19	22	115	76	45	76	76
red-breasted merganser	3				4		8	5			
hooded merganser	13	4	26	3	8	8	38	14	13	19	26
ALL DUCKS	**20,743**	**13,414**	**10,528**	**7,654**	**10,126**	**11,679**	**26,374**	**19,899**	**33,015**	**30,687**	**39,686**
Canada goose	664	470	607	478	265	500	1,264	488	1,154	1,200	2,821
blue & snow goose	2,176	2,531	1,106	1,462	344	828	589	594	1,070	776	1,110
ALL GEESE	**2,840**	**3,001**	**1,713**	**1,940**	**609**	**1,328**	**1,853**	**1,082**	**2,224**	**1,976**	**3,931**
coot	3,829	1,923	1,788	426	1,196	1,728	13,332	7,070	10,877	4,896	4,586

Average weekly count of waterfowl species aerially inventoried from 1967-1989 by Illinois Natural History Survey during fall migration (September 1 - December 15) on the Illinois River at Stump Lake, river miles 7 - 12, Jersey County, Illinois. Counts rounded to nearest whole number. Number of weekly counts = n.

n	10	10	13	11	11	9	10	14	14	13	14
species	1967	1968	1969	1970	1971	1972	1973	1975	1976	1977	1978
mallard	371	13	183		37	349	21	49	132	213	453
black	4		<1			49		5	5	9	10
pintail		135			34	114	10	2	8	38	17
blue-winged teal	13	6	13	4	45	30	51	108	55	158	59
green-winged teal	175				45	67	30	36	20	78	56
wigeon	3,572	2,610	1,102		40	68	188	21	4	37	54
gadwall	1,074	253	82			10	5	3		16	1
shoveler		4						3		2	1
DABBLERS	5,209	3,021	1,380	4	201	687	305	227	224	551	652
scaup			6								
ring-necked											
canvasback											
redhead											
ruddy											
goldeneye											9
bufflehead	<1										
DIVERS	<1	0	6	0	0	0	0	0	0	0	9
common merganser											3
red-breasted merganser											
hooded merganser											
ALL DUCKS	5,209	3,021	1,386	4	201	687	305	227	224	551	664
Canada goose				3		4		1	5	17	76
blue & snow goose						178					54
ALL GEESE	0	0	0	3	0	182	0	1	5	17	130
coot	1,320	509	1,362	<1		132	26	31	77	842	284

n	14	14	14	12	14	9	7	8	11	12	12
species	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
mallard	412	1,093	812	640	514	461	950	628	954	734	2,194
black	11	10	15	12	7	9	14	12	18	12	18
pintail	32	235	198	62	103	81	163	128	273	173	936
blue-winged teal	88	302	116	95	227	130	420	312	184	146	97
green-winged teal	104	461	226	108	131	144	728	259	330	231	306
wigeon	72	399	498	156	178	156	443	329	538	320	1,014
gadwall	4	58	78	14	21	14	97	38	268	31	164
shoveler		16	20	3	15	9	100	41	134	33	233
DABBLERS	724	2,573	1,963	1,091	1,197	1,004	2,915	1,747	2,700	1,680	4,963
scaup					6		61	32	10		12
ring-necked							21	5			
canvasback							50				
redhead							4				
ruddy							12		21		<1
goldeneye	10		21	9		12	76	39	23	17	17
bufflehead							6	3			
DIVERS	10	0	21	9	6	12	231	79	54	17	29
common merganser	2		7	2		3	28	12	4	3	5
red-breasted merganser											
hooded merganser						1	10				<1
ALL DUCKS	736	2,573	1,991	1,102	1,203	1,020	3,184	1,839	2,759	1,700	4,998
Canada goose	11	20	28	25	17		298	19	46	32	27
blue & snow goose	3	11	8	15			168	8	9	3	3
ALL GEESE	14	31	36	40	17		466	27	55	35	30
coot	646	4,322	1,242	375	568	592	5,332	1,284	4,852	1,902	1,530



CALHOUN POINT WATERFOWL MANAGEMENT AREA

APPENDIX DPR-R

CUMULATIVE IMPACT ASSESSMENT

FOREWORD

APPENDIX DPR-R provides a cumulative impact assessment for the Calhoun HREP in the context of the overall UMRS-EMP.

APPENDIX R

CUMULATIVE IMPACT ASSESSMENT OF THE UMRS-EMP HABITAT REHABILITATION AND ENHANCEMENT PROGRAM

Prepared by the Planning Division,
St. Louis District, Corps of Engineers
August 1995

This document attempts to assess the readily quantifiable cumulative impacts of habitat projects implemented under the Habitat Rehabilitation and Enhancement component of the Environmental Management Program for the Upper Mississippi River System (UMRS). Cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (Council on Environmental Quality, 1987).

Background. The EMP program was authorized by the Water Resource Development Acts of 1986 and 1990, and involves the expenditure of $189.6 million over a 15-year period (1988-2002) for habitat rehabilitation and enhancement (EMP-HREP) projects on public lands that lie in and along the Mississippi River from St. Paul, Minnesota, to Cairo, Illinois, and several of its major tributaries, including the Minnesota and Illinois Rivers. The habitat projects are proposed by the states of Minnesota, Wisconsin, Iowa, Illinois, and Missouri and the U.S. Fish and Wildlife Service (FWS), developed and designed by interagency planning teams, and engineered and constructed by the Corps of Engineers (St. Paul, Rock Island, and St. Louis Districts). The Corps' North Central Division is responsible for administration of the EMP-HREP program.

Because the most pervasive environmental problem on the Upper Mississippi River System is sedimentation, most of the projects are designed to counteract side channel and backwater sedimentation. The project designs generally involve dredging and alteration of flow patterns with riverine structures, construction of enclosed berm systems with pumping facilities for water level control, or island construction.

Existing NEPA documentation for EMP-HREP projects. For every EMP-HREP project, a site-specific planning document is prepared which includes NEPA documentation. An environmental assessment (EA) is prepared to determine if an EIS is needed. Probable impacts of project alternatives on all significant physical, biological, cultural, social, and economic resources are described. Cumulative impacts are addressed, but often briefly.

A programmatic environmental impact assessment or EIS has not been prepared for the entire EMP-HREP program. Such a document would describe the existing Upper Mississippi River System (including existing habitat goals and objectives), habitat deficiencies, problems, or opportunities (both existing and future), alternative ways to address these deficiencies, problems, and opportunities, a recommended plan, and that plan's probable impacts on the system's resources. The focus of a programmatic document's assessment of cumulative impacts would not be site-specific but system-wide.

Limitations/observations concerning this cumulative impact assessment. Because of a number of factors, the scope and degree of detail contained in this assessment are limited.

1. Cumulative impacts on physical and biological resources within the UMRS will be addressed in this assessment. Effects on cultural, social, and economic resources, which are not the focus of the EMP-HREP program, are not addressed.

2. This assessment is based primarily upon EMP-HREP data maintained and provided by North Central Division. The data consists of a list of projects by status as of the end of 1994, as well as a summary of project outputs for each District. This information was used to prepare TABLES 1A-1C.

3. It was not possible to assess some cumulative impacts for all three Districts, because either the necessary information is not consolidated, or what is readily available is of limited usefulness. For example, the St. Louis District's collection of project planning reports for Rock Island and St. Paul projects, which include detailed information on site-specific impacts, is incomplete. Also, information collected systematically concerning EMP-HREP impacts is limited, and consists of the summary data maintained by North Central Division. There are inconsistencies in this data among the Districts. For example, the description or classification of habitats improved by EMP-HREP projects is not uniform. In contrast, the collection of administrative and budgetary data for the EMP-HREP program is standardized.

4. This assessment was prepared by the St. Louis District, with limited input from the St. Paul and Rock Island Districts. Full participation from all three Districts, although desirable, was not possible given other priorities.

5. The "past, present, and reasonably foreseeable future" EMP-HREP projects correspond to the three project status categories used in the tables in this assessment. Past projects are those already constructed (category A), present projects are those under construction (category B), and future projects are those awaiting approval or in the planning/design phase (category C).

6. The scope of this assessment is limited to the EMP-HREP program. A full assessment of cumulative impacts in the UMRS could very well include other Corps of Engineer programs, such as maintenance and operation of the navigation system,

management of Corps lands adjacent to the navigation project, and the permitting of construction activities in waters of the United States through the regulatory program, but this is not feasible at this time. Likewise, this assessment could include habitat management and restoration activities in the UMRS by others such as the FWS and states, but this too was not feasible.

7. The assessment of cumulative impacts is very compatible with an ecosystem approach to resource monitoring, project planning, and resource management. The ecosystem perspective is new to the Federal government and others, and implementation of this approach is still in its infancy.

8. This assessment will appear initially in the St. Louis District's Final Definite Project Report for the Calhoun Point EMP-HREP project, which is scheduled to be released in August 1995. The St. Louis District intends to include this assessment in all future planning reports for St. Louis EMP-HREP projects. This assessment will undergo periodic updates to reflect the change in status of projects. The District also intends to coordinate periodically with the Rock Island and St. Paul Districts to make further improvements in the description of cumulative impacts, and to include information on cultural, social, and economic impacts not covered in this initial evaluation.

Summary of projects. As of December 31, 1994, a total of 45 EMP-HREP projects in the St. Paul, Rock Island, and St. Louis Districts were either already constructed, under construction, or still in the planning or design phase. There are 21, 16, and 8 projects for the three Districts, respectively (TABLES 1A, 1B, and 1C). Two of St. Paul's projects are phased or divided into two parts, and these phases have been treated as separate project sites in this assessment. The Mississippi River Bank Stabilization project, which expands across pools 6 through 10 in the St. Paul District, was treated as one site because no details were available for each pool. Therefore, this assessment treats a total of 47 project sites.

The St. Paul District tends to have the smallest sites (average about 600 acres), and the Rock Island District the largest (average about 2,800 acres). Sites in the St. Louis District average about 1,700 acres (TABLE 2). However, sites in all three Districts range widely in size, from as small as 20 acres to as large as 7,700 acres. TABLE 2 shows the tendency within each District that sites already constructed (category A) are the smallest, sites under construction (category B) are intermediate in size, and sites awaiting approval or under development are the largest.

There are 72,079 acres of aquatic and terrestrial habitats within the 47 EMP-HREP project sites, for which habitat conditions are expected to improve. Of these floodplain habitats, the proportion of area affected by each District is 0.20 for St. Paul, 0.62 for Rock Island, and 0.19 for St. Louis (TABLES 1A, 1B, and 1C).

TABLE 3 presents total area within the study boundaries for each of St. Louis' EMP-HREP projects. This table is presented because adverse effects of these projects, such as

loss of bottomland forest (discussed later in this assessment), cannot be addressed using the data in TABLES 1A-1C. Data in TABLE 3 present existing conditions by broad land use/land cover types. Note that the area improved at each of St. Louis' project sites, as shown in TABLE 1C, is a subset of the area in TABLE 3. Some St. Louis projects, such as Swan Lake and Batchtown, include features in adjacent upland areas for the control of soil erosion. These upland areas are not reflected in TABLE 3. Information summarizing existing conditions for St. Paul and Rock Island projects is not included in this assessment.

Cumulative impacts. Cumulative impacts addressed in this assessment include: habitats affected, target animal groups, distribution of project sites within the UMRS, proportion of UMRS floodplain affected by projects, bottomland forest affected, and effects of project berms.

Habitats affected. Over all, most habitats affected by EMP-HREP projects are aquatic. In the St. Paul District, almost all project sites consist of backwater slough, backwater lake, side channel, river lake, and marsh (TABLE 1A). Consequently, almost all acres affected at St. Paul's projects are aquatic. Over half the habitats and acres improved by the Rock Island and St. Louis Districts are aquatic, and include the same or similar types (TABLES 1B and 1C). About 45 percent of acres improved at St. Louis project sites are terrestrial, and consist of bottomland forest and cropland. A consolidated summary by habitat type is not possible because no standardized system to classify or describe these habitats was used by the three Districts. For example, impacts to "wetlands," whether forested or nonforested, are not easily identified.

Target animal groups. Animal species are typically chosen as the targets or recipients of intended habitat improvements. Waterfowl and fish have been the focus of many EMP-HREP projects, mainly because the public lands to which these projects are confined are already under management by state or Federal natural resource agencies. In many instances the primary management responsibilities of these agencies as mandated by law are focused upon waterfowl and fish, with waterfowl often times receiving a greater emphasis in practice. Threatened and endangered species such as the bald eagle usually are included in management directives also, as are migratory birds.

The waterfowl-fish dichotomy is reflected in TABLES 1A-1C. A count of the number of project sites targeted toward one group or the other shows an even balance between fish and waterfowl. Forty-four, or about 94 percent, of the 47 project sites include measures targeted toward improving habitat conditions for fish. Forty-three sites also have measures to improve habitat conditions for waterfowl. Animals other than waterfowl and fish have been the targets of project objectives. For example, TABLE 1C includes additional species that were included as targets at St. Louis projects. This information is not included in TABLES 1A and 1B for St. Paul and Rock Island.

The habitat analyses conducted by the St. Louis District for the Pharrs, Stump, Swan, Cuivre, Calhoun and Batchtown projects reflect a net positive gain in fisheries and wildlife

habitat value. These analyses quantify the habitat benefit to target groups or species listed in TABLE 1C. Benefits are expressed in terms of habitat units, which are a unit of measure that combines the effects of changes in habitat quantity and quality. For these five projects, the cumulative impact to target fisheries groups or species (including mussels) is +2,024 average annual habitat units (AAHUs). For these same five projects, +3,206 AAHUs of habitat benefits will accrue to target wildlife species. Habitat benefits in terms of AAHUs were not computed for the Clarksville or Dresser projects because they predated the implementation of the habitat unit methodology. Similar data for the St. Paul and Rock Island Districts are not included.

Distribution of EMP-HREP project sites within the UMRS. TABLE 4 shows that EMP-HREP projects are distributed rather uniformly throughout the UMRS, but there are gaps in the system where projects are not located. The system as defined in this assessment (see TABLE 5) includes 847 miles of the Upper Mississippi River, 231 miles of the lower Illinois River, and 50 miles of the lower Minnesota River, for a total of 1,128 river miles. There are two project sites on the Minnesota River, five on the Illinois, and forty project sites on the Mississippi.

The most significant gap is the lower 201 miles of the Mississippi River, from Lock and Dam 26R at Alton, Illinois to Cairo. This reach includes pool 27 and the open river. The scarcity of existing public lands along this river segment is the main reason for the lack of EMP-HREP projects. Other gaps are to the north, and include pools 2-3, 12, 15, and 19-20 on the Mississippi. (From St. Paul to Alton - from mile 847 to mile 201 - there are 25 pools on the Upper Mississippi River, each one averaging about 26 river miles in length.) Like the open river, there are no projects in pool 2 because of a scarcity of public lands. The gap in pool 3 is due to the combination of a scarcity of Federal lands, and the current lack of interest by the Minnesota Department of Natural Resources to cost share EMP-HREP projects on a considerable amount of state-owned land. TABLE 4 also shows that the distribution of fish and waterfowl projects is similar, reflecting the fact that many project sites include measures for both major animal groups.

It is reasonable to expect that as EMP-HREP projects become more numerous and more closely distributed throughout the UMRS, synergistic effects will occur ("the whole is greater than the sum of its parts"). At the present time, there is no methodology available to quantify this anticipated effect.

Proportion of UMRS floodplain affected by EMP-HREP projects. The outline of the UMRS floodplain can be used as the boundary of the ecosystem in which EMP-HREP projects lie. TABLE 5 contrasts the 72,079 acres affected by habitat projects with the larger ecosystem, which covers about 3.3 million acres (or about 5,155 square miles). About two percent of the total UMRS floodplain, from bluff to bluff, has been or will be affected in terms of habitat improvements. Following Corps District boundaries, projects in the St. Paul and Rock Island Districts affect about three percent of the floodplain ecosystem, and St. Louis projects about one percent. If the floodplain ecosystem is broken down by broad land

use/land cover types, then about six percent of all "natural" habitats (forest, nonforested wetland, water) in the entire ecosystem are affected. Within each District, six to nine percent of the "natural" habitats are affected. These data indicate that the EMP-HREP program has affected a small area within the larger ecosystem.

The 72,079 acres affected by all projects represent the area that can be readily quantified. It is likely that some areas outside of but adjacent to project sites will also improve as a result of their proximity. Aquatic habitats are probably more likely to receive such "side benefits" than terrestrial ones. Project boundaries within aquatic areas are more often delimited artificially or arbitrarily, and not tied to any discrete environmental gradient, unlike terrestrial project sites which can be represented by islands or blocks of bottomland forest surrounded by cropland, for example. Although there is no methodology available to quantify these additional areas, it is unlikely that the cumulative total would approach the magnitude of the area already quantified.

Bottomland forest. Of the St. Louis District's 16,265 acres of total EMP-HREP project areas (of which 13,430 acres were or will be improved), 7,066 acres or about 43 percent consist of bottomland forest (see TABLES 3 and 6). These 7,066 acres comprise about four percent of the forested UMRS floodplain in the St. Louis District (TABLE 5), which is a small proportion.

Seven percent of the 7,066 forested acres were or will be mechanically cleared to construct project features. Another 252 acres of bottomland forest will be cleared by other methods. These 734 acres represent about four-tenths of one percent of the forested UMRS floodplain in the St. Louis District. In contrast, 618 acres of tree plantings are proposed at St. Louis sites. About half of these plantings will consist of converting floodplain cropland to bottomland forest, and the other half will involve planting trees within forest killed by the flood of 1993. Overall, area of forest cleared exceeds area of tree planting by 116 acres, or about two percent of the preproject forested area within project boundaries. The 116 acre difference represents about six-hundredths of one percent of the total bottomland forest within St. Louis' UMRS floodplain.

TABLE 6 does not reflect tree species composition of bottomland forest cleared at project sites. This varies within and among project sites, and consequently the value to wildlife of cleared forest varies. It has been useful in the St. Louis District to differentiate between bottomland forest supporting hard mast tree species, such as oaks and pecan, from bottomland forest that does not. The latter areas typically support silver maple, willow, and cottonwood, and they are lower in elevation with reference to the river than areas with mast trees. A rough estimate of the proportion of forest supporting hard mast species that is or will be cleared versus total forest cleared at St. Louis EMP-HREP project areas is 40 percent.

Fragmentation of bottomland forest has or will occur at six St. Louis projects, chiefly as a result of clearing for construction of a riverside berm. Forest fragmentation has

been viewed as a chief factor associated with the decline of interior forest nesting birds, including Neotropical migrants. However, the fragmentation at St. Louis sites is minor because the long relatively narrow band of trees removed is not located within the middle of a block of forest, but typically parallel to the river, and set back about 100-200 feet from the riverbank. The width of clearing usually varies from 75 to 180 feet, depending upon whether borrow areas are sited adjacent to the berm or not. At Stump Lake, clearing width in some segments has reached up to 215 feet. Project plans to convert cropland to bottomland forest by tree planting at Cuivre, Calhoun, and Batchtown will over time increase the extent and continuity of floodplain forest.

The cumulative impact of St. Louis' habitat projects on bottomland forest is minor. In the St. Paul District, less than 5 acres of bottomland forest have been cleared or adversely affected by EMP-HREP projects. Quantitative data describing bottomland forest impacts for the Rock Island District are not included here.

Effects of project berms. The Clarksville, Dresser, Stump, Swan, Calhoun, and Batchtown projects in the St. Louis District all involve the construction of a low riverside berm around the perimeter of the project area. This feature is typically built to the 3- or 4-year frequency flood elevation. The berm provides benefits to aquatic habitats in a variety of ways. It reduces the rate of sedimentation in the protected area, thus prolonging the life of existing backwater areas. By excluding minor flooding, interior water levels can be better managed, thereby increasing the predictability of providing food resources for wetland wildlife, such as migratory waterfowl and shorebirds. Also, low berms can protect young-of-the-year fish overwintering in backwater areas from the cold temperatures of winter floods, which can threaten survival. In the St. Louis District, about 7,350 acres of backwater lakes, backwater sloughs, side channels, and marshes are located behind such berms at these six project areas.

About 5,040 acres of bottomland forest and cropland are also located behind these low berms. Most of these areas lie below the elevation of the berm crown, but some are above it. Other than retarding the rate of sedimentation, the chief effect on the berm-protected terrestrial habitats is the creation of a slightly drier hydrologic regime, due to the prevention of minor flooding. Consequently, fewer small floods in EMP-HREP project areas may promote the natural regeneration of native oaks. In a survey of natural floodplain vegetation of pools 24-26, Klein et al. (1975) observed that pin oak was more often an important component of forested areas protected by agricultural berms than in unprotected forested areas. These agricultural berms generally provide 10 to 25-year protection.

An adverse impact of these low berms is that they isolate the floodplain from the river to some degree. These berms prevent the exchange of riverine fish and other aquatic organisms with backwater areas when river stages are below the berm's crown elevation. Likewise, they prevent the import of nutrients from the river into backwater and terrestrial areas, and the export of organic debris from these areas into the river. However, these processes still occur when the berm is overtopped by bigger floods. To minimize the

adverse effect to fish movement, which is most critical during the spring and fall, open topped fish passage/water control structures will be constructed at Stump Lake, Swan Lake, Calhoun Point, and Batchtown to connect fisheries and some waterfowl management units with the river. These four areas envelop 6,770 acres of aquatic habitat. Whether all kinds of fish will use these structures is unknown at the present time, and will be revealed only after field monitoring studies have been completed.

The District has assessed the cumulative impact of low berms at the Swan, Stump, and Calhoun projects, located at the low end of the Alton pool on the Illinois River, on upstream and downstream water surface profiles. A HEC-2 analysis was performed on the Illinois and Mississippi Rivers for conditions with and without the low berms for floods ranging from a 2-year to a 500-year recurrence interval. No significant increases in water surface elevations were projected.

Summary. All EMP-HREP project areas are monitored before and after construction to determine if project goals and objectives are met. Goals and objectives are often stated in terms of anticipated improvements to habitat conditions and water quality, and reductions in rates of sedimentation. Monitoring evidence to date suggests that EMP-HREP projects are achieving their site-specific environmental objectives.

The EMP-HREP projects can be characterized as demonstrations, and are very limited in scope. The program is working only a fraction of the total habitat area of the UMRS. If all planned program activities turn out to be a failure (and there is no evidence to indicate that this will be the case), it would not represent an irreversible, catastrophic impact on the river's ecosystem.

The program can be viewed as a possible 15 year long precursor to any future large scale habitat alteration attempts on the river system. If the program is funded by Congress to proceed beyond the 15-year authorized limit, for a broader application of the more viable habitat restoration techniques, then a systemic assessment of specific UMRS habitat restoration needs, objectives, measures, and plans is appropriate. Such a systemic assessment would also serve as a long-term cumulative impact assessment. Whether these projects represent a system-wide balancing of resource needs is less critical now, due to the small impact of these projects on the system at large, but this issue will become more critical if major UMRS habitat project installations are authorized following the close of the current EMP-HREP demonstration program.

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TABLE 1A. Habitat Benefits of UMRS-EMP Habitat Projects - St. Paul District (as of December 31, 1994).

PROJECT	POOL	BENEFITS		
		TARGET ANIMAL GROUPS	ACRES IMPROVED	HABITAT TYPE
A. CONSTRUCTION COMPLETED				
Indian Slough, WI	4	fish	122 75 15	backwater slough backwater lake side channel
Finger Lakes, MN	5	fish	113	backwater lake
Island 42, MN	5	fish	95	backwater slough
Lake Onalaska, WI	7	fish, waterfowl	300 15	river lake island nesting
Pool 8 Islands, WI	8	waterfowl, fish	1,000 15	river lake island nesting
Blackhawk Park, WI	9	fish	282	backwater slough
Cold Springs, WI	9	fish	35	backwater lake
Guttenberg Ponds, IA	11	waterfowl	35	marsh
Subtotal A.			2,102	
B. CONSTRUCTION UNDERWAY				
Spring Lake, WI	5	fish	50	backwater lake
Polander Lake, MN	5A	waterfowl, fish	1,200 5	backwater lake island nesting
Lansing Big Lake, IA	9	waterfowl, fish	150	backwater lake
Pool 9 Island, WI	9	waterfowl, fish	180	river lake
Bussey Lake, IA	10	fish, waterfowl	213 55	backwater lake marsh
Subtotal B.			1,853	
C. CONSTRUCTION OR APPROVAL PENDING/PLANNING AND DESIGN UNDERWAY IN FY 95				
Rice Lake, MN	Minnesota R.	waterfowl	170 70 40	backwater lake marsh bottomland forest
Long Meadow Lake, MN	Minnesota R.	waterfowl, fish	1,500	marsh
Peterson Lake, MN	4	fish, waterfowl	500	backwater lake
Spring Lake - Ph.2, WI	5	waterfowl	300	backwater lake

Trempealeau, MN	6	waterfowl, fish	3,500 700	marsh refuge lake
East Channel, WI/MN	8	fish	10 10	main channel bay bottomland forest
Pool 8 Islands - Ph.2, WI	8	fish, waterfowl	600	river lake
Pool Slough, IA/MN	9	waterfowl	700	marsh
Capoli Slough, WI	9	waterfowl	600	river lake
Mississippi River Bank, MN/WI/IA	6-10	waterfowl, fish	1,500	backwater lakes and sloughs
Subtotal C.			10,200	
TOTAL			499 2,680 35 5,860 2,806 15 700 1,500 50 10 14,155 total	backwater slough river lake island nesting marsh backwater lake side channel refuge lake back. lakes&sloughs bottomland forest main channel bay

TABLE 1B. Habitat Benefits of UMRS-EMP Habitat Projects - Rock Island District (as of December 31, 1994).

PROJECT	POOL	BENEFITS		
		TARGET ANIMAL GROUPS	ACRES IMPROVED	HABITAT TYPE
A. CONSTRUCTION COMPLETED				
Bertom/McCartney Lake, WI	11	fish, waterfowl, mussels	1,983	backwater complex
Browns Lake, IA	13	fish, waterfowl	450	backwater lakes
Andalusia Refuge, IL	16	waterfowl, fish	130	backwater slough
Big Timber, IA	17	fish, waterfowl	1,039	backwater complex
Monkey Chute, MO	21	fish	88	backwater slough
Bay Island, MO	22	waterfowl	650	forested wetland
Subtotal A.			4,340	
B. CONSTRUCTION UNDERWAY				
Potters Marsh, IL	13	fish, waterfowl	2,305	backwater slough, wetlands
Peoria Lake, IL	Peoria[1]	waterfowl, fish, mussels	2,782	riverine lake, forested wetlands, side channel
Lake Chautauqua, IL	La Grange[1]	waterfowl, fish	4,212	leveed lakes
Subtotal B.			9,299	
C. CONSTRUCTION OR APPROVAL PENDING/PLANNING AND DESIGN UNDERWAY IN FY 95				
Pool 11, WI	11	waterfowl, fish	7,701	open water
Spring Lake, IL	13	waterfowl, fish	3,560	leveed lake, wetland
Princeton, IA	14	waterfowl	1,190	leveed marsh complex
Lake Odessa, IA	17/18	waterfowl, fish	6,800	leveed backwater complex, forested wetlands
Gardner Division, IL	21	waterfowl, fish	6,000	backwater complex
Cottonwood, MO	21	fish, waterfowl	463	forested wetland, backwater slough
Banner Marsh, IL	La Grange[1]	waterfowl, fish	5,141	leveed wetland, backwater lake
Subtotal C.			30,855	
TOTAL			44,494 total	

[1] On the Illinois River.

TABLE 1C. Habitat Benefits of UMRS-EMP Habitat Projects - St. Louis District (as of December 31, 1994).

PROJECT	POOL	BENEFITS		
		TARGET ANIMAL GROUPS (OR SPECIES)[1]	ACRES IMPROVED	HABITAT TYPE
A. CONSTRUCTION COMPLETED				
Pharrs Island, MO[2]	24	riverine fish	210	backwater slough
Clarksville Refuge, MO	24	dabbling ducks	150	marsh
Dresser Island, MO	26	dabbling ducks, riverine fish	200 230 500	marsh side channel bottomland forest
Subtotal A.			1,290	
B. CONSTRUCTION UNDERWAY				
Stump Lake, IL	Alton[3]	dabbling ducks (mallard), large slackwater fish	970 130 1,370	backwater lake backwater slough bottomland forest
Swan Lake, IL	Alton[3]	dabbling ducks (mallard), diving ducks, large slackwater fish	3,100 570	backwater lake bottomland forest
Subtotal B.			6,140	
C. CONSTRUCTION OR APPROVAL PENDING/PLANNING AND DESIGN UNDERWAY IN FY 95				
Batchtown Management, IL	25	dabbling ducks (mallard, wood duck), diving ducks, Canada goose; large slackwater fish (smallmouth buffalo); mussels	400 1,700 900 220	side channel backwater slough bottomland forest cropland
Cuivre Island, MO	26	wetland wildlife (mallard, wood duck, least bittern, king rail); riverine fish (gizzard shad, channel catfish, carp, crappie)	530 160 30 110	bottomland forest side channel backwater slough cropland
Calhoun Point, IL	26	wetland wildlife (mallard, wood duck, Canada goose, green-backed heron, northern parula, prothonotary warbler); riverine fish (smallmouth buffalo, bluegill)	1,350 470 130	bottomland forest backwater slough cropland
Subtotal C.			6,000	
TOTAL			350 4,070 2,540 790 5,220 460 13,430 total	marsh backwater lake backwater slough side channel bottomland forest cropland

[1] For all projects except Clarksville and Dresser, habitat units were computed for all target groups/species, and used as project outputs.
[2] Phase 1 only (bullnose dike); phase 2 currently inactive (levee).
[3] On the Illinois River.

TABLE 2. Summary of UMRS-EMP Habitat Project Sites (as of December 31, 1994).[1]

DISTRICT	VARIABLE [2]	PROJECT SITES (BY CATEGORY) [3]			
		A	B	C	TOTAL
St. Paul	number sites	8	5	10	23
	average area (acres)	263	371	1,020	615
	area range (acres)	35-1,015	50-1,205	20-4,200	20-4,200
Rock Island	number sites	6	3	7	16
	average area (acres)	723	3,100	4,408	2,781
	area range (acres)	88-1,983	2,305-4,212	463-7,701	88-7,701
St. Louis	number sites	3	2	3	8
	average area (acres)	430	3,070	2,000	1,679
	area range (acres)	150-930	2,470-3,670	830-3,220	150-3,220

[1] For phased projects, phases treated as separate sites.
[2] Area represents area improved (from TABLES 1A-1C).
[3] Project categories defined in TABLE 1.

TABLE 3. Preproject Land Cover/Land Use of Entire Project Area at UMRS-EMP Habitat Project Sites - St. Louis District (as of December 31, 1994).

PROJECT	LAND COVER/LAND USE OF ENTIRE PROJECT AREA (ACRES)[1]							
	Urban	Agriculture	Nonwetland Forest	Forested Wetland	Nonforested Wetland	Water	Barren[2]	TOTAL
A. CONSTRUCTION COMPLETED								
Pharrs Island	0	0	0	265	101	160	0	526
Clarksville Refuge	0	0	0	175	150	0	0	325
Dresser Island	0	0	50	450	200	240	0	940
Subtotal A.	0	0	50	890	451	400	0	1,791
B. CONSTRUCTION UNDERWAY								
Stump Lake	30	0	215	1,314	969	129	0	2,657
Swan Lake	0	538	0	942	500	2,603	0	4,583
Subtotal B.	30	538	215	2,256	1,469	2,732	0	7,240
C. CONSTRUCTION OR APPROVAL PENDING/PLANNING AND DESIGN UNDERWAY IN FY 95								
Batchtown Management	0	224	0	989	1,174	940	0	3,327
Cuivre Island	0	188	0	1,287	45	190	40	1,750
Calhoun Point	28	269	100	1,279	296	170	15	2,157
Subtotal C.	28	681	100	3,555	1,515	1,300	55	7,234
Total EMP	58	1,219	365	6,701	3,435	4,432	55	16,265

[1] Data obtained from each project's Definite Project Report, and represent preproject conditions, which vary in time by project (from mid-1980s to early 1990s). Forest acres do not reflect effect of 1993 flood.
[2] Barren denotes land with little or no vegetative cover, and consists mostly of sandy areas in and along the Mississippi and Illinois Rivers.

TABLE 4. Distribution of UMRS-EMP Habitat Project Sites within Upper Mississippi River System (as of December 31, 1994).[1]

RIVER SEGMENT OR POOL	NUMBER OF PROJECT SITES (BY TARGET ANIMAL GROUP)					
	FISH (BY PROJECT CATEGORY) [2]			WATERFOWL (BY PROJECT CATEGORY)		
	A	B	C	A	B	C
Minnesota River			1			2
2						
3						
4	1		1			1
5	2	1				1
5A		1			1	
6			2			2
7	1		1	1		1
8	1		3	1		2
9	2	2	1		2	3
10		1	1		1	1
11	1 [3]		1	2		1
12						
13	1	1	1	1	1	1
14						1
15						
16	1			1		
17	1		1	1		1
18			1			1
19						
20						
21	1		2			2
22				1		
24	1			1		
25			1 [3]			1
26	1		2	1		2
Peoria		1 [3]			1	
LaGrange		1	1		1	1
Alton		2			2	
27						
Open river						

[1] For phased projects, phases treated as separate sites.
[2] Project categories defined in TABLE 1.
[3] Fisheries project includes component for mussels.

TABLE 5. Land Use/Land Cover of UMRS-EMP Project Sites and UMRS Floodplain (as of December 31, 1994). [1]

AREA [2]	LAND USE/LAND COVER TYPE (ACRES)						
	URBAN	AGRICULTURE	FOREST	NONFORESTED WETLAND	WATER	BARREN	TOTAL
St. Paul District							
UMRS Floodplain [3]	54,980 (.11)	156,410 (.31)	66,330 (.13)	65,280 (.13)	154,690 (.31)	410 (<.01)	498,100
All EMP project sites			50	14,105			14,155
All EMP project sites/UMRS Floodplain			<.01	.06			.03
Rock Island District							
UMRS Floodplain [4]	87,260 (.06)	831,510 (.60)	198,420 (.14)	55,390 (.04)	238,140 (.17)	700 (<.01)	1,411,410
All EMP project sites			44,494				44,494
All EMP project sites/UMRS Floodplain			.09				.03
St. Louis District							
UMRS Floodplain [5]	83,630 (.06)	910,880 (.66)	179,210 (.13)	96,580 (.07)	114,160 (.08)	4,430 (<.01)	1,388,890
All EMP project sites		460	5,220	350	7,400		13,430
All EMP project sites/UMRS Floodplain		<.01	.03	<.01	.06		.01
All Districts							
UMRS Floodplain	225,870 (.07)	1,898,800 (.58)	443,960 (.13)	217,250 (.06)	506,990 (.15)	5,540 (<.01)	3,298,410
All EMP project sites		460	71,619				72,079
All EMP project sites/UMRS Floodplain		<.01	.06				.02

[1] Project sites represent area improved (from TABLES 1A-1C).

[2] UMRS data sources: COE (1995) and Laustrup and Lowenberg (1994). Data from COE (1995) represent a broad classification based on 1990-1992 satellite imagery, supplemented with National Wetland Inventory data for forested and nonforested wetlands. Data from Laustrup and Lowenberg (1994) based on 1989 imagery; used for Peoria and LaGrange pools only. Land use/land cover categories for COE (1995) and Laustrup and Lowenberg (1994) paired as follows: urban - urban/developed; agriculture - agriculture; forest - trees/brush; nonforested wetland - aquatic vegetation and grasses/forbs; water - open water; barren - sand. In each cell for UMRS floodplain, acres are followed by proportion of that land use/land cover type within the floodplain (within parentheses).

[3] Floodplain defined as area from bluff to bluff along the Mississippi River from St. Paul, Minnesota, to Guttenberg, Iowa (river miles 847 to 614), and along the lower 50 miles of the Minnesota River (from Henderson to St. Paul).

[4] Floodplain defined as area from bluff to bluff along the Mississippi River from Guttenberg, Iowa, to Hannibal, Missouri (river miles 614 to 301), and along the Illinois River for the Peoria and LaGrange pools (river miles 231 to 80).

[5] Floodplain defined as area along the Mississippi River from Hannibal, Missouri, to Cairo, Illinois (river miles 301 to 0), and along the Illinois River for the Alton pool (river miles 80 to 0).

TABLE 6. Impacts of UMRS-EMP Habitat Projects on Bottomland Forest - St. Louis District (as of December 31, 1994).

PROJECT	Bottomland Forest (Acres)							Recommended Plan	
	Pre-project[1]	Clearing[2]		Tree Planting[2]			Net Change	Review of forest impacts	Accepted by FWS/EPA
		Mechanical[3]	Other	Cleared Area	Cropland[4]	Forest[5]			
A. CONSTRUCTION COMPLETED									
Pharrs	265	0	0	0	0	0	0	no net change	yes
Clarksville	175	-32	0	0	0	0	-32	acre based; tradeoff	yes
Dresser	500	-67	0	0	0	0	-67	acre based; tradeoff	yes
Subtotal A.	940	-99	0	0	0	0	-99		
B. CONSTRUCTION UNDERWAY									
Stump	1,529	-101	0	+15	0	0	-86	habitat unit based; future with project > future without	yes
Swan	942	-106	-33[6]	0	0	+33	-106	habitat unit based; future with project > future without	yes
Subtotal B.	2,471	-207	-33	+15	0	+33	-192		
C. CONSTRUCTION OR APPROVAL PENDING/PLANNING AND DESIGN UNDERWAY IN FY 95									
Batchtown	989	-~75	-50[6]	0	0	+~150	+25	acre based	pending
Cuivre	1,287	-50	0	0	+110	+80	+140	acre based	yes
Calhoun	1,379	-51	-169[7]	0	+110	+120	+5	acre based	yes
Subtotal C.	3,655	-176	-219	0	+220	+350	+170		
Total EMP	7,066	-482	-252	+15	+220	+383	-116		

[1] Acres reflect all bottomland forest within project study areas, not just acres of forest improved (as in TABLE 1C). Effects of 1993 flood not reflected in preproject acres for project categories B and C.

[2] Over 50-year project life, and as described in each project's Definite Project Report.

[3] Mechanical clearing necessary to construct project features.

[4] Plant mast trees to restore cropland to bottomland forest.

[5] Plant mast trees in bottomland forest killed by 1993 flood.

[6] At Swan Lake, 33 acres of tree stand improvements (creation of small, scattered tree clearings) will be implemented, in which mast trees will be planted. Likewise, for Batchtown, such clearings and plantings are planned for about 50 acres.

[7] Kill young trees with herbicide that are encroaching into moist-soil management areas.