U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM

POST-CONSTRUCTION SUPPLEMENTAL PERFORMANCE EVALUATION REPORT (PERS1)

For

BAY ISLAND HABITAT REHABILITATION AND ENHANCEMENT

POOL 22, MISSISSIPPI RIVER MILES 311 - 312
MARION COUNTY, MISSOURI

APRIL 2002
8-YRS POST CONSTRUCTION

EXECUTIVE SUMMARY

This is supplement 1 (PERS1) to the Bay Island Habitat Rehabilitation and Enhancement Project (HREP), Post-Construction Initial Performance Evaluation Report (PER) dated December 1999. Supplement 1 is a continuation of the initial 1999 Bay Island PER, with additional data collected and observed from January 2000 through March 2002, a period of approximately 2-years.

Concerns listed in the initial December 1999 PER were addressed through a new construction contract substantially completed in the fall of 2000. The following new features and maintenance items added under the construction contract include: (1) overflow spillways to both the North and South Wetland Management Units; (2) riprap slope protection on the northwest corner of the perimeter levee; (3) bentonite lining installed in the existing water supply ditch; (4) clay fill to raise the water supply berm and a new gatewell on the water supply berm; (5) and a new sluice closure gate to seal off the intake of the existing pump station.

The new features and maintenance items mentioned above address the concerns and problems mentioned in the initial 1999 Bay Island PER. Overflow spillways on the North and South Wetland Management Units (WMUs) minimized levee damages resulting from the most recent 2001 flood event that was the third highest flood event recorded at this location. The spillways eliminate the need for timely removal of stoplog structures that proved historically problematic. Riprap protection along the corner of the northwest levee also functioned as planned, eliminating erosion problems stemming from Clear Creek and the South River Levee and Drainage District pump discharges. Initially after its construction, the bentonite lining in the water supply ditch appeared to have significantly reduced the seepage problem that existed in the South Wetland Management Unit however, subsequent filling has resulted in significant dropping of water levels in the South WMU during November and December of 2001. The pumping additional water in to the South WMU was tried but the end result was a continual drop in the water level. Clay fill and a new gatewell placed on the existing water supply berm now allow independent operation of the North and South WMUs. Installation of a new sluice closure gate at the pump station is preventing sediment build up in the intake area of the pump station that previously was problematic. Since installation of the new sluice closure gate, there have been no electrical problems operating the intake pump.

The majority of the maintenance items and construction of the new features appears to have been successful in remedying problems associated with the original construction of the project, with the exception of the bentonite lining. The bentonite lining now appears to not have been successful in preventing the water seepage that is occurring out of the South WMU and adjoining water supply ditch. Long-term results will continue to be monitored and evaluated, with the features incorporated on other EMPs if successful. Root pruned method (RPM) plantings continue to do very well. MDOC is continuing efforts to get other areas established in mast trees and vegetation as called out in the site manager's inspection reports. A good stand of smartweed and barnyard grass has been observed in the open areas of the South WMU.

Bay Island
Performance Evaluation
Points of Contact

[Please furnish any comments on this report to Kirk Sunderman]

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BAY ISLAND
REHABILITATION AND ENHANCEMENT

Construction Completed
November 1994

Preface

This project was authorized, designed, and constructed as part of the Upper Mississippi River Environmental Management Program (UMR-EMP, PL 99-662). The program, as administered by the U.S. Army Corps of Engineers, authorizes "… the planning, construction and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement…"

Once EMP projects are planned, designed, and constructed, they are operated and maintained by the Project Sponsor in accordance with Project Cooperation Agreements (for Non-Federal Sponsors) or Memorandums of Agreement (for Federal Sponsors).

Post-construction project monitoring was authorized by the EMP in efforts to validate project goals and objectives against physical, chemical, and biological aspects of the project. Post-construction monitoring also provides a systematic basis for project review of planning, design and construction principles, operation and maintenance considerations and natural resource management viewpoints.

Post-construction performance evaluations are performed each year and put out as a report, called a Post-Construction Performance Evaluation Report (PER). Principal agencies involved include the Sponsor, the U.S. Fish and Wildlife Service, U.S. Geological Survey, State Resource Agencies, and the U.S. Army Corps of Engineers. Principal components of the PER include inspections and observations, field sampling and evaluation of data relative to project goals and objectives. Field data is collected according to an established project monitoring plan presented in the PER.

The Post-Construction PER is either published as a separate report or as a supplement to previous reports. Supplements are utilized when monitoring/project data do not warrant full evaluations and analyses.

Previous Performance Evaluation Reports (PERs), including the project monitoring plan, and other related project documents such as the Definite Project Report (DPR) and the project Operation and Maintenance (O&M) Manual with as-built construction drawings are available at: http://www.mvr.usace.army.mil/EMP/hrep.htm.

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PROJECT BACKGROUND

1. INTRODUCTION

The Bay Island, Missouri, Habitat Rehabilitation and Enhancement project, hereafter referred to as "the Bay Island project" was completed as part of the ongoing Upper Mississippi River System (UMRS) Environmental Management Program (EMP). The Bay Island project is located approximately 1 mile north of Hannibal, Missouri. (see plate 1).

a. Purpose. The purposes of this report are as follows:

(1) Summarize the performance of the Bay Island HREP through a supplement to the initial 1999 report based on project goals and objectives.

(2) Review the monitoring plan for possible revisions.

(3) Summarize project operation and maintenance efforts to date.

(4) Review engineering performance criteria to aid in the design of future projects.

b. Scope. This supplemental report summarizes available project monitoring data, inspection records, and observations made by the U.S. Army Corps of Engineers (Corps) and the Missouri Department of Conservation (MDOC) for the period from March 1987 through March 2002. Initial project construction was completed in the fall of 1994.

c. Previous Performance Evaluation Reports. The Initial Performance Evaluation Report was completed in December 1999.

2. PROJECT GOALS AND OBJECTIVES

a. General. The Bay Island HREP was constructed to provide high quality, dependable wetland habitat for migratory waterfowl. Water level management capabilities were achieved through the construction of a levee system, pump station, and water control structures. Construction of the levee system created two independent wetland management units (WMUs). A pump station and multiple stoplog structures were built into the levee system to facilitate control of water levels. Mast producing trees were planted to provide additional food resources. Overflow spillways, riprap protection, bentonite lining to reduce seepage, and a gatewell structure were added to the wetland management units in the fall of 2000 to increase water control and reduce flood damage impacts. A new sluice closure gate at the pump station was added to reduce sediment build up in the pumping pit.

b. Goals and Objectives. Project goals and objectives were formulated during the project design phase and are summarized in Table 2-1.

Table 2-1 Project Goals and Objectives		
Goals	**Objectives**	**Project Features**
Enhance Wetland Habitat for Migratory Waterfowl	Provide controlled water levels during waterfowl migration—forested and non-forested. Increase reliable food production area (moist-soil species).	Earthen levee, pump station, stoplog structured, sluice gate, bentonite lining
	Increase mast tree dominance—forested wetland	Mast tree plantings including seedlings and acorns
	Increase total wetland values for migratory waterfowl	All project features are intended to enhance wetland values

c. Management Plan. No formal management plan was developed for this project. The project is generally operated as outlined in the *Bay Island Operation and Maintenance Manual* dated November 1995 (see references).

3. PROJECT DESCRIPTION

a. Project Features. New features and maintenance items were added to the original project through a construction contract substantially completed in the fall of 2000. New features include overflow spillways, a new gatewell on the water supply berm and a new sluice closure gate installed on the pump station. Maintenance items include the riprap slope protection added to the perimeter levee, bentonite lining installed in the water supply ditch, and clay fill added to raise the water supply berm. For original project features, see the Bay Island, December 1999 Post-Construction Initial Performance Evaluation Report (PER).

b. Project Construction. New features and maintenance items were addressed through a construction contract awarded on 18 April, 2000. The contract was awarded to Gunterman Brothers, Inc. for $372,724 under solicitation number DACW25-00-B-0007. The construction contract number was DACW25-00-C-0010. Construction was considered substantially completed in the fall of 2000.

c. Project Operation and Maintenance. No new information. See initial 1999 PER.

4. PROJECT MONITORING

a. General. No new information. See the Bay Island, December 1999 Post-Construction Initial Performance Evaluation Report for the Monitoring and Performance Evaluation and Data Collection Summary.

b. U.S. Army Corps of Engineers. No new information. See sections 5 & 6, below.

c. U.S. Fish and Wildlife Service. No new information.

d. Missouri Department of Conservation. No new information. See appendix A, Site Manager's Inspection Results and sections 5 & 6, below.

PROJECT MONITORING RESULTS

Project Goals and Objectives			
Goals	**Objectives**	**Project Features**	**Status**
Enhance Wetland Habitat for Migratory Waterfowl	Provide controlled water levels during waterfowl migration—forested and non-forested. Increase reliable food production area (moist-soil species).	Earthen levee, pump station, stoplog structures, sluice gate, bentonite lining	Most met with Lining being monitored Silt build up at pump station being monitored
	Increase mast tree dominance—forested wetland	Mast tree plantings including seedlings and acorns	Met
	Increase total wetland values for migratory waterfowl	All project features are intended to enhance wetland values	Met

5. EVALUATION OF PROJECT OBJECTIVES

a. Provide Controlled Water Levels During Waterfowl Migration and Increase Reliable Food Production Area. Concerns listed in the 1999 PER were addressed through a construction project in the fall of 2000. Limited water control occurred during the fall of 2000 as a result of the construction activities.

Construction activities resulted in the following: (1) the two wetland management units (WMUs) can now be independently operated; (2) silt build up in the pumping pit of the pump station was greatly reduced and all but eliminated; (3) seepage from the water supply ditch and the South WMU was initially reduced, but now appears to have not been successful due to significant drops in the water level in the South WMU during November and December of 2001; (4) and no activities took place to increase reliable food sources over this evaluation period, although considerable time was spent in mowing maple, cottonwood and willow invasion. It was noted that excellent stands of smartweed and barnyard grass exist in the open areas of the South WMU.

b. Increase Mast Tree Dominance – Forested Wetland. The Missouri Department of Conservation (MDOC) planted new trees in 2000. Tree berms in the South WMU were planted with root pruned method (RPM) trees, along side one hundred (100) two-year old bare root stock seedlings. This will provide a direct comparison between the two types of tree plantings under similar wetland planting situations. The flood of 2001 seemed to have not affected the South WMU tree berms, but the bare root stock seedlings seemed to have not fared as well. A better estimate of tree survival will be made after the spring 2002 growing season.

c. Increase Total Wetland Values for Waterfowl. Little waterfowl usage was observed in the fall of 2000, possibly due to construction delaying the filling of the WMUs. Very little waterfowl usage was observed in the fall of 2001, especially after mid-November.

d. Aquatic Habitat Objectives. Aquatic objectives were not monitored for this project.

6. EVALUATION OF PROJECT OPERATION AND MAINTENANCE

Observations and conclusions of the project's operation and maintenance based on annual and joint inspections are given below for a report period of January 2000 to March 2002. For observations and conclusions of the project's operation and maintenance for the period from March 1987 to January 1999, reference the Bay Island, December 1999 Post-Construction Initial Performance Evaluation Report.

a. Water Control Structures. Since the initial 1999 PER, two overflow spillways were added to the project in the fall of 2000 as recommended in the 1999 PER. The addition of overflow spillways has allowed controlled filling of the wetland management units and minimized damages from flooding on the Mississippi River. The 2001 flood caused little to no damage to the Bay Island EMP project.

(1) Challenges or Difficulties. The wood stoplog structures continue to be an operational problem. Many of the stoplogs have warped to the point of being unusable. Also, it was noted that the transition from the levee crest down to the overflow spillway crest was too abrupt of a transition at a 10% slope. A passenger car may not have enough clearance to pass over the transition without getting hung up.

(2) Actions and Recommendations. MDOC desires to retrofit each of the two perimeter water control structures with one sluice gate and to permanently close off the remaining three bays at each water control structure. The retrofit would entail placement of a 5-foot wide sluice gate in one of the existing four stoplog bays. If MDOC desires to permanently close off the remaining three stoplog bays, it is recommended that the wood stoplogs be replaced with a more permanent, yet still removable material, such as steel plates. Consideration should be given to leaving the existing wood stoplogs in place until they become deteriorated to the point of having significant leakage. The addition of the overflow spillways was a success during the flood of 2001 and will continue to be monitored. Nothing will be done about the 10% slope transition from the levee crest to the spillway crest.

b. Pump Station. Since the initial 1999 PER, the pump station has operated with no reported electrical problems. As recommended in the 1999 PER, a sluice closure gate was placed on the intake opening of the pump station in the fall of 2000 to seal off the pumping pit from sediment that historically built up during most of the year, when the pump station is not being operated. A ladder and platform were also added in the fall of 2000 to facilitate the cleaning out of any sediment that may develop in the pumping pit.

(1) Challenges or Difficulties. Concern remains about not having a guard in front of the pump intake to prevent the build up of leaves. Also, there is some concern about the build up of sediment that will collect on the outside of the sluice closure gate.

(2) Actions and Recommendations. Recommend that the pump station be operated under the present conditions for the next few years to see if these conditions create an operational problem. Sealing off the pump pit should prevent the impellers of the pump from getting locked in by silt. Once the pump is started, it should be able to agitate nearby sediment and small debris. The pump is designed to operate under heavy sediment conditions. Leaves should be monitored and cleaned out as needed if they continue to build up and block off water to the intake.

c. Wetland Management Units (WMU). Since the initial PER, the water supply ditch in the South WMU was lined with bentonite, additional height was added to the water supply berm, and a new gatewell was placed on the water supply berm. The added height to the supply berm and new gatewell has allowed separate operation of the WMUs.

(1) Challenges or Difficulties. Prior to the bentonite lining, significant seepage was occurring in the South WMU. Initial operation of the South WMU after the addition of bentonite appeared to have greatly reduced the amount of water loss, but a substantial drop of water level was noted during November and December of 2001 with the unit essentially dry at the time of inspection.

(2) Actions and Recommendations. Continue to monitor and record seepage rates out of the South WMU. Try to identify where water is seeping out. Over time, it is hoped that sediment deposition in the WMU will begin to seal off the seepage areas.

d. Perimeter Levee. Since the initial PER, riprap was placed along the northwestern edge of the perimeter levee to protect against erosion that was occurring from Clear Creek. The installation of riprap has proven successful, sustaining no damage from the flood of 2001.

(1) Challenges or Difficulties. The South River Levee and Drainage District claims that the perimeter levee of the Bay Island project creates higher discharge heads for their pump station. This claim has been reported several times during annual levee inspections since 1993. The South River Levee and Drainage District has provided no data to substantiate this claim.

(2) Actions and Recommendations. Continue to monitor the perimeter levee for erosion problems. Coordination is ongoing for the Corps of Engineers to review South River Levee and Drainage District's claims. A site investigation was made in November 2001 that resulted in a memorandum of record that is going through review at the Rock Island District. Once it is determined, a formal statement on the Rock Island District's position will be documented and provided to the South River Levee and Drainage District.

e. Mast-Tree Plantings and Permanent Vegetative Cover. Since the initial PER, construction activities have stripped vegetative cover from portions of the levee, water supply ditch, berm and areas around the overflow spillways that were subsequently reseeded. See Appendix A for ongoing MDOC efforts in the site manager's report.

(1) Challenges or Difficulties. Flooding events have hampered the overall success of mast-tree plantings and vegetative covers. Weed control mats placed by the MDOC collected excessive sediment during the 2001 flood event, thus eliminating their usefulness.

(2) Actions and Recommendations. Efforts by the MDOC to establish more mast-trees and permanent vegetative cover are encouraged.

7. GENERAL CONCLUSIONS AND RECOMMENDATIONS

a. Level of Protection. The perimeter levee, as originally built, protected against a 2-year flood event, even though recommendations have been made for other projects to increase the level of protection to a 5-year flood event to reduce the rate of siltation that slowly fills in the protected managed areas. The addition of overflow spillways lowered the level of protection of the perimeter levee at Bay Island by 1-foot, however, the spillways installed have proved to be successful in preventing damage that historically occurred during previous overtopping events. It is recommended that performance of these spillways be monitored for their effectiveness of preventing damage during future overtopping events. Consideration should be given to utilization of overflow spillways in future projects while using a 5-year level of protection. Overflow spillways require no operation efforts to be effective, unlike stoplog structures.

b. Water Supply System. The sluice closure gate installed at the pump station has assisted in keeping silt levels in the pumping pit at a minimum, thus allowing the pump to operate more efficiently. Monitoring through inspections of this feature will continue.

c. Water Control Structures. The clay fill and gatewell place on the water supply berm have assisted in the control of water levels in the WMUs, although seepage from the South WMU due to the failure of the bentonite lining will need to be addressed. Monitoring through inspections of these features will continue.

d. Mast Tree Plantings. Existing mast-tree plantings will continue to be monitored with the MDOC continuing to prepare for additional mast-tree plantings.

e. Site Access. Options for elevating the access bridge were investigated and it was determined raising the bridge would not be feasible. At one time, stoplogs needed to be removed from the water control structures before floodwaters overtopped the access bridge. Construction of the overflow spillways have alleviated the need for timely removal of the stoplogs in the water control structures and thus have eliminated the need to access the perimeter levee and water control structures by vehicle during a flood event.

APPENDIX A

Cooperating Agency Correspondence

BAY ISLAND REHABILITATION AND ENHANCEMENT
OPERATION AND MAINTENANCE MANUAL

UPPER MISSISSIPPI RIVER ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 22, RIVER MILES 311 THROUGH 312
MARION COUNTY, MISSOURI

SITE MANAGER"S PROJECT INSPECTION AND MONITORING RESULTS

Inspected By Keith Jackson Date 3-15-2001

Type of Inspection: (XX) annual ( ) emergency-disaster ( ) other

1. PROJECT INSPECTION

Item	Condition
a. Perimeter Levee	
(XX) Settlement, sloughs or loss of section	Fine, none noted
(XX) Wavewash, scouring	Erosion noted in earlier report, **
(XX) Overtopping erosion	No
(XX) Vegetative cover (mowing)	Mowed, plan to reseed this spring or fall
(XX) Burrowing animals	No
(XX) Unauthorized grazing or traffic	No
(XX) Encroachments	No
(XX) Unfavorable tree/shrub growth	No
	**rip rap placed along this area this summer by COE contractor.
b. Intermediate Levee	
(XX) Settlement, sloughs or loss of section	No
(XX) Wavewash, scouring	None noted
(XX) Overtopping erosion	No
(XX) Vegetative cover (mowing)	Mowed, plan to reseed due to lack of perennial grass
(XX) Burrowing animals	No
(XX) Unauthorized grazing or traffic	No
(XX) Encroachments	No
(XX) Unfavorable tree/shrub growth	No
c. Water Control Structure-North Perimeter Levee	
(XX) Stoplogs, stoplog keepers, stoplog slots	Okay, stoplogs are warping–some need replacing
(XX) Concrete	Good
(XX) Steel rails, rail posts, grating, fasteners	Good
(XX) Displaced/missing riprap	No
(XX) Inlet and outlet channels	Fine, little evidence of erosion.
(XX) Erosion adjacent to structure	Very little
(XX) Sedimentation (culverts/approaches)	Very little, mostly by beavers

Item	Condition
d. Water Control Structure-South Perimeter Levee	
(XX) Stoplogs, stoplog keepers, stoplog slots	Good, same as item 'c.'
(XX) Concrete	Okay
(XX) Steel rails, rail posts, grating, fasteners	Okay
(XX) Displaced/missing riprap	No
(XX) Inlet and outlet channels	Fine
(XX) Erosion adjacent to structure	No
(XX) Sedimentation (culverts/approaches)	Little, mostly by beavers
e. Water Control Structure-Intermediate Levee	
(XX) Stoplogs, stoplog keepers, stoplog slots	Good. Smaller logs holding up better than others
(XX) Concrete	Fine
(XX) Steel rails, rail posts, grating, fasteners	Fine
(XX) Displaced/missing riprap	No
(XX) Inlet and outlet channels	Fine
(XX) Erosion adjacent to structure	No
(XX) Sedimentation (culverts/approaches)	No
f. Flood/Drainage Ditch	
(XX) Debris	Little, requires annual removal here and along levees
(XX) Unauthorized structures	No
(XX) Bank erosion	No
g. Pump Station	
(XX) Structure - steel	Okay
(XX) Structure - concrete	Good
(XX) Structure - wood	Okay, but wobbly
(XX) Displaced/missing riprap	No
(XX) Electrical controls	Fine, no problems this year
(XX) Steel discharge pipe/flapgate	Fine
(XX) Forebay/sump (sedimentation)	Considerable, both in sump and in front.
h. Vegetation	
(XX) Mast Trees	Very good. Mowed for weed control
(XX) Seeding	Acorn planting failed, seedling planting in poor shape. Considerable maple/cottonwood invasion
i. Access	
(XX) Bridge	Good
(XX) Road - granular surfacing, etc.	Fine
(XX) Piers - riprap	Fine

2. COMMENTS.

Installation of gate at pump sump, coupled with ladder and platform within the sump, should greatly reduce the sedimentation problem within the sump. If it does occur, the platform will greatly ease the process of removal. The front of the sump will continue to be something of a problem, but no easy solutions and may be able to operate with little or no clean-out.

Ran the pump a limited amount this year due to contractor delays with the rehab project due to weather. No problems reported with electrical connections. Guard to prevent the buildup of leaves was not constructed, but still needed. Pump was operated a total of 340.1 hours.

Excellent stand of smartweed in the open areas of the south management unit (SMU). Little waterfowl usage observed in the fall–mainly due to late timing of flooding. Tree berms in the SMU were planted to root pruned method (RPM) trees this fall. We also planted 100 two-year old bare root stock seedlings as a comparison between these "super-seedlings" from our state nursery with RPM seedlings under similar wetland planting situations.

It appears that the bentonite blanket installed in the water supply ditch has greatly reduced water loss noted in previous years for the SMU.

Management plans for 2001 include reseeding levees with redtop, including the recently constructed water supply berm; using a heavy brush-cutter to reduce woody competition in the original seedling planting, and also to knock back buttonbush/willow invasion around some of the wooded sloughs; establishing/maintaining ladino/alsike clover plantings; and hopefully establishing around five acres of corn/milo food plots.

Site Manager

BAY ISLAND REHABILITATION AND ENHANCEMENT
OPERATION AND MAINTENANCE MANUAL

UPPER MISSISSIPPI RIVER ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 22, RIVER MILES 311 THROUGH 312
MARION COUNTY, MISSOURI

SITE MANAGER"S PROJECT INSPECTION AND MONITORING RESULTS

Inspected By Keith Jackson Date 3-1-2002

Type of Inspection: (XX) annual ( ) emergency-disaster ( ) other

1. PROJECT INSPECTION

Item	Condition
a. Perimeter Levee	
(XX) Settlement, sloughs or loss of section	Fine, none noted
(XX) Wavewash, scouring	Minor, from overtopping this year
(XX) Overtopping erosion	No
(XX) Vegetative cover (mowing)	Mowed, plan to reseed this spring or fall
(XX) Burrowing animals	No
(XX) Unauthorized grazing or traffic	No
(XX) Encroachments	No
(XX) Unfavorable tree/shrub growth	No
b. Intermediate Levee	
(XX) Settlement, sloughs or loss of section	No
(XX) Wavewash, scouring	None noted
(XX) Overtopping erosion	No
(XX) Vegetative cover (mowing)	Mowed, plan to reseed due to lack of perennial grass
(XX) Burrowing animals	No
(XX) Unauthorized grazing or traffic	No
(XX) Encroachments	No
(XX) Unfavorable tree/shrub growth	No
c. Water Control Structure-North Perimeter Levee	
(XX) Stoplogs, stoplog keepers, stoplog slots	Okay, stoplogs are warping–some need replacing
(XX) Concrete	Good
(XX) Steel rails, rail posts, grating, fasteners	Good
(XX) Displaced/missing riprap	No
(XX) Inlet and outlet channels	Fine, little evidence of erosion.
(XX) Erosion adjacent to structure	Very little
(XX) Sedimentation (culverts/approaches)	Very little, mostly by beavers.

Item	Condition
d. Water Control Structure-South Perimeter Levee	
(XX) Stoplogs, stoplog keepers, stoplog slots	Good, same as item 'c.'
(XX) Concrete	Okay
(XX) Steel rails, rail posts, grating, fasteners	Okay
(XX) Displaced/missing riprap	No
(XX) Inlet and outlet channels	Fine
(XX) Erosion adjacent to structure	No
(XX) Sedimentation (culverts/approaches)	Little, mostly by beavers
e. Water Control Structure-Intermediate Levee	
(XX) Stoplogs, stoplog keepers, stoplog slots	Good. Smaller logs holding up better than others
(XX) Concrete	Fine
(XX) Steel rails, rail posts, grating, fasteners	Fine
(XX) Displaced/missing riprap	No
(XX) Inlet and outlet channels	Fine
(XX) Erosion adjacent to structure	No
(XX) Sedimentation (culverts/approaches)	No
f. Flood/Drainage Ditch	
(XX) Debris	Little, requires annual removal here and along levees
(XX) Unauthorized structures	No
(XX) Bank erosion	No
g. Pump Station	
(XX) Structure - steel	Okay
(XX) Structure - concrete	Good
(XX) Structure - wood	Okay, but wobbly
(XX) Displaced/missing riprap	No
(XX) Electrical controls	Fine, no problems this year.
(XX) Steel discharge pipe/flapgate	Fine
(XX) Forebay/sump (sedimentation)	Entry into sump getting shallow, but sump okay.
h. Vegetation	
(XX) Mast Trees	Very good. Mowed for weed control
(XX) Seeding	Acorn planting failed, seedling planting in poor shape. Considerable maple/cottonwood invasion.
i. Access	
(XX) Bridge	Good
(XX) Road - granular surfacing, etc.	Fine
(XX) Piers - riprap	Fine

2. COMMENTS.

Installation of gate at pump sump achieved desired result of all but eliminating sedimentation problems within the sump (pumping pit). The front of the sump seems to be getting shallower, but has not yet resulted in a major impediment to pumping operations. Riprap and emergency spillways functioned as planned this year during the third highest river flood recorded at this location.

Due to a mild winter, the pump was used into December. No problems were experienced with the electrical connections or phase converter. The planned guard to prevent the buildup of leaves was not constructed, but still needed. The pump was operated a total of 669 hours.

Public use did not seem to recover to levels experienced in the past. However, waterfowl use of the area also appeared to be reduced–perhaps due to the extensive flooding. Archery deer usage also appears to be declining. Two trappers were authorized for the area, and between the two harvested 23 raccoons, four muskrats, three beavers, one red fox, one coyote, and one river otter.

Considerable time was spent this year in mowing maple/cottonwood/willow invasion–primarily in the acorn and bare-root seedling plantings. We salvaged as many of the few surviving seedlings, and our plan is to establish RPM seedlings at a light stocking rate (around 10-15/acre), planted on individual elevated mounds. We also set back willow invasion along field edges in the south management unit (SMU). The original RPM planting is doing very well, and we completed some fieldwork in the north management unit (NMU) just south of this planting in preparation for additional RPM plantings of hard mast trees.

We had a good stand of smartweed and barnyard grass in the open areas of the SMU. Little waterfowl usage observed in the fall, especially later in the season (after mid-November). Tree berms in the SMU that were planted prior to the 2001 flood appear to have survived in good numbers, but the weed control mats collected enough sediment to eliminate their usefulness. A better estimate of tree survival will be made after leaf-out this spring. The large bare root stock seedlings planted as a comparison between these “super-seedlings” from our state nursery with RPM seedlings did not fare as well through the flood, but may go ahead and re-sprout from the roots this spring.

The bentonite blanket that showed so much promise last year has apparently failed. A substantial drop in water in the SMU was noted in November-December (dropped 0.06 feet/day), and the area pumped up again. Water levels declined again. A final pump-up was initiated, and the new water control gate closed to isolate the SMU from the water distribution channel–with the end result being a continued drop in water levels. At the time of inspection, the unit was essentially dry, except for low-lying areas. This is disturbing, and certainly complicates (if not eliminate) the option of doing moist-soil management work in this unit.

Management plans for 2002 include reseeding levees with redtop/brome; using a heavy brush-cutter to knock back buttonbush/willow invasion around some of the wooded sloughs; establishing/maintaining ladino/alsike clover plantings; and hopefully establishing around five acres of corn/milo food plots. As mentioned earlier, we also plan to construct mounds near the original RPM tree planting site in preparation of additional mast tree plantings–possibly even this fall if trees can be obtained.

Site Manager

APPENDIX B

References

REFERENCES:

a. *Definite Project Report (R-8) with Integrated Environmental Assessment, Bay Island Rehabilitation and Enhancement Project, Pool 22, River Miles311-312, Upper Mississippi River, Marion County, Missouri,* March 1990. This report presents a detailed evaluation of alternatives to enhance wetland habitat for resident species and migratory waterfowl. Recommended alternatives include low elevation levees, stoplog structures, pump station, mast tree planting and access improvements. This report marks the conclusion of the planning process and serves as a basis for approval of the preparation of final plans and specifications and subsequent project construction

b. *Plans and Specifications, Bay Island, Pool 22, River Mile 311, Upper Mississippi River System, Environmental Management Program, Marion County, Missouri,* Contract No. DACW25-91-C-0057. These documents were prepared to provide sufficient detail to allow construction. Project features include two wetland management units surrounded by a 2-year event perimeter levee, water supply pump station, stoplog control structures, mast tree planting and an access road with bridge.

c. *Plans and Specifications, Post Flood Tree Replanting, Bay Island, Pool 22, River Mile 311, Upper Mississippi River System, Environmental Management Program, Marion County, Missouri,* Contract No. DACW25-94-C-0073.

d. *Operation and Maintenance Manual, Bay Island Rehabilitation and Enhancement Project, Upper Mississippi River Environmental Management Program, Pool 22, River Miles 311-312, Marion County, Missouri,* November 1995 (O&M Manual). This manual was prepared to serve as a guide for the operation and maintenance of the Bay Island project. Operation and maintenance instructions for major features of the project are presented.

e. *Post-Construction Initial Performance Evaluation Report (IPER4F), Bay Island Rehabilitation and Enhancement Project, Upper Mississippi River System Environmental Management Program, Pool 22, Mississippi River Miles 311-312, Marion County, Missouri,* December 1999.

APPENDIX C

Distribution List

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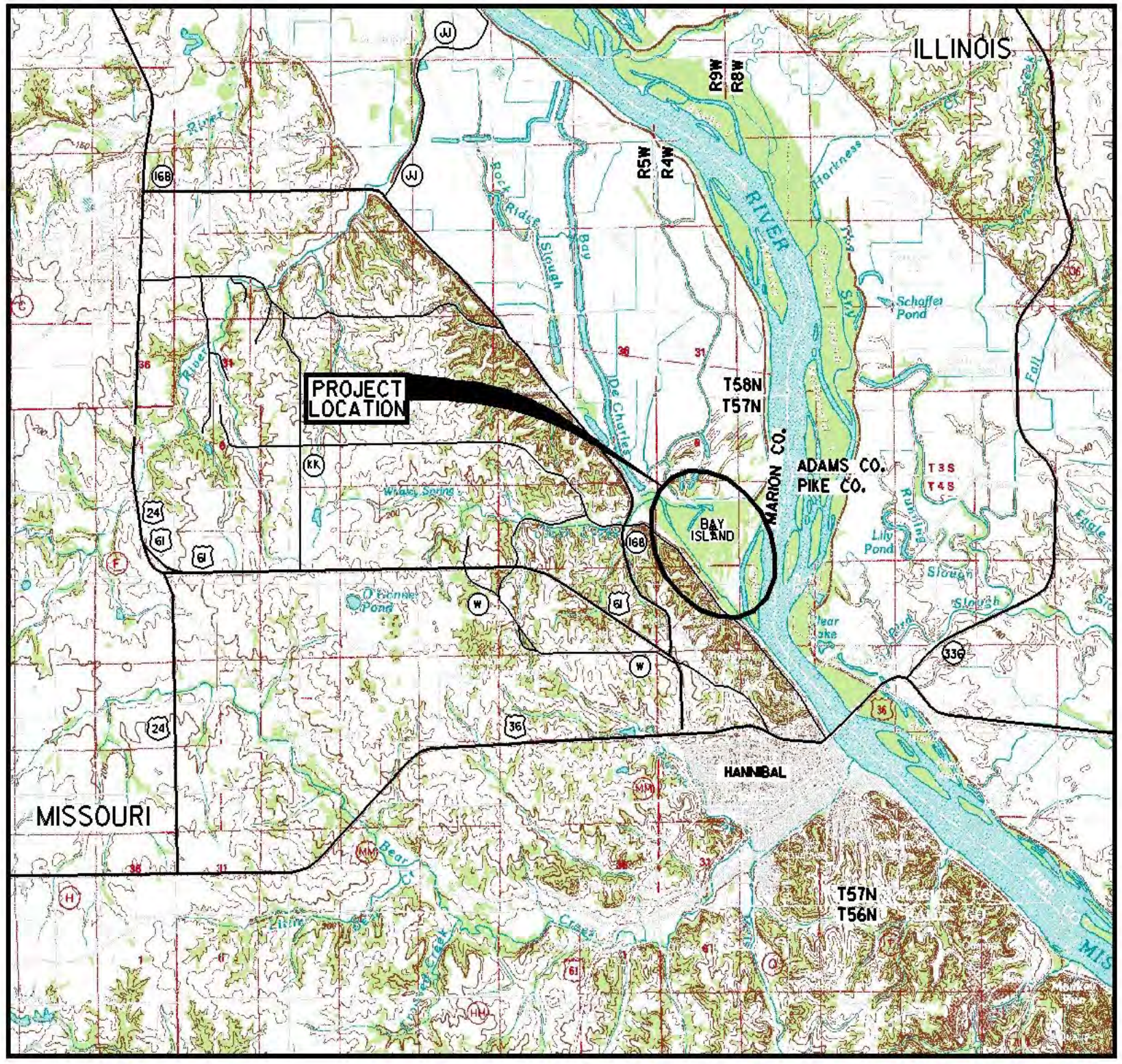
APPENDIX D

Plates



LOCATION PLAN

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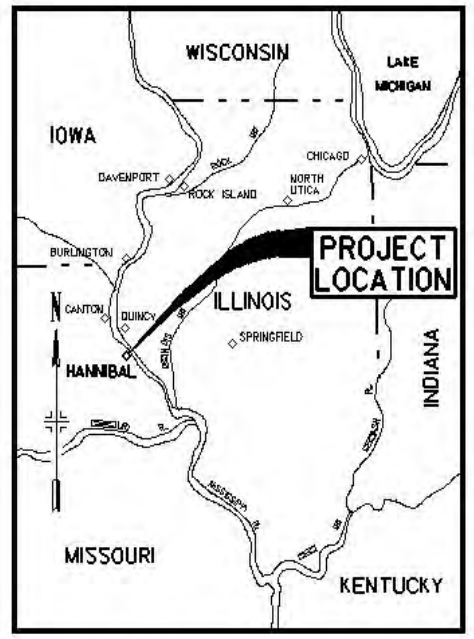
SCALE IN MILES



VICINITY MAP

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SCALE IN MILES

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PLATE I

SOUTH RIVER DRAINAGE DISTRICT PUMP STATION

SOUTH RIVER DRAINAGE DISTRICT

P.I. STA. 38+59.47
STA. 0+00D

SHAPE AND PLACE RIPRAP ON ERODED LEVEE SLOPE

NORTH WETLAND MANAGEMENT UNIT

P.I. STA. 11+56.98D

MISSOURI HWY. 168

CONSTRUCT 200' OVERFLOW SPILLWAY

SOUTH WETLAND MANAGEMENT UNIT

ADD BENTONITE LINER TO TOP 1 ' OF DITCH

REPLACE EXISTING CULVERT WITH GATEWELL STRUCTURE AND ADD TURNAROUND TO WATER SUPPLY BERM. TURNOVER EXISTING CMP TO MDOC.

BORROW AREAS FOR WATER SUPPLY BERM. SEE NOTE 3. SEE SHEET C6 FOR DETAILS

CHISELED "□" ON TOP LT. UPSTREAM. BACK WALL OF NEW BRIDGE OVER CLEAR CREEK (TBM EL. 466.35)

RAISE, SHAPE, AND SEED WATER SUPPLY BERM

EXISTING SITE ACCESS ROAD

ADD SLIDE GATE, PLATFORM, AND MODIFY EXISTING TRASHRACK AT EXISTING PUMP STATION

EXISTING PUMP STATION

P.I. STA. 124+74.37=
STA. 6+03.98B

R-310.9 FND. CONC. MONO. W/BRASS CAP 16" DEEP 22.77' FROM ℄ RR.

CONSTRUCT 150' OVERFLOW SPILLWAY

MILE 312

MILE 311

MISSISSIPPI RIVER

ZIEGLER CHUTE

CLEAR CREEK

C1 C2 C3 C4

NOTES:

1. ELEVATION CONTOURS SHOWN ON THESE SHEETS ARE OF LIMITED ACCURACY.
2. DELINEATED RECTANGLES INDICATE PLAN AND PROFILE AREAS SHOWN WITH THE DESIGNATED SHEET REFERENCE NUMBER.
3. COORDINATE EXACT LOCATIONS OF BORROW AREAS WITH C.O.

LEGEND:

- EXISTING LEVEE
- EXISTING WATER CONTROL STRUCTURE
- EXISTING WATER SUPPLY BERM
- BORROW AREAS
- BENCH MARK

SITE PLAN

0 500 1000
SCALE IN FEET

US Army Corps of Engineers
Rock Island District

Symbol	Description	Date	Approved
	Revisions		

Designed By:	HLW/KJS	Date:	24 FEB 00
Drawn By:	PLC	Scale:	AS SHOWN
Checked By:	KJS	Project Code:	ep53
Reviewed By:	BLK	Solicitation Number:	DACW25-00-B-0007

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

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POOL 22, RIVER MILE 311
BAY ISLAND, MISSOURI

SITE PLAN

PLATE 2

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