

**U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT**

**UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM**

**POST-CONSTRUCTION INITIAL PERFORMANCE
EVALUATION REPORT (IPER)**

FOR

BANNER MARSH STATE FISH AND WILDLIFE AREA

**LA GRANGE POOL, ILLINOIS WATERWAY
RIVER MILES 138.5 THROUGH 143.9
FULTON AND PEORIA COUNTIES, ILLINOIS**

AUGUST 2002

FY2002

**INITIAL POST-CONSTRUCTION
PERFORMANCE EVALUATION REPORT**

FOR

BANNER MARSH STATE FISH AND WILDLIFE AREA

**CONSTRUCTION SUBSTANTIALLY COMPLETED
FY2001**

Preface

This project was authorized, designed, and constructed as part of the Upper Mississippi River Environmental Management Program (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 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. Principal Agencies involved include the Sponsor, the U.S. Fish and Wildlife Service, U.S. Geological Survey, State Resource Agencies, and the Corps of Engineers. Principal components of the Performance Evaluation Report 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.

The Post-Construction Performance Evaluation Reports are either published as separate reports or as addendums to previous reports. Addendums are utilized when monitoring / project data do not warrant full evaluations and analyses.

Previous Performance Evaluation Reports, including the Project Monitoring Plan, and other related project documents such as the Definite Project Report (DPR) and the Project Operation and Maintenance Manual with As-Built Construction Drawings are available at: <http://www.mvr.usace.army.mil/EMP/hrep.htm>.

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1. INTRODUCTION

a. Purpose. The purposes of this Performance Evaluation Report (PER) for the Banner Marsh State Fish and Wildlife Area Project, hereafter referred to as "the Banner Marsh project," are as follows:

- (1) Summarize the performance of the Banner Marsh project based on the project goals and objectives
- (2) Review the monitoring plan for possible revision
- (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 report summarizes available project monitoring data, inspection records, and observations made by the U.S. Army Corps of Engineers (Corps) and the Illinois Department of Natural Resources (ILDNR) for the period from May 2001 through May 2002, or one year after construction.

c. Previous Performance Evaluation Reports. No previous performance evaluation reports exists for the Banner Marsh project since this is the initial performance evaluation report.

2. PROJECT BACKGROUND

a. General. The Banner Marsh State Fish and Wildlife Area Project, hereafter referred to as "the Banner Marsh project," is a part of the Upper Mississippi River System (UMRS) Environmental Management Program (EMP). The Banner Marsh project is located in La Grange Pool on the right descending bank of the Illinois River between river miles 138.5 and 143.9. It is located in Fulton and Peoria Counties, approximately 1.5 miles west of Kingston Mines, Illinois, and 1 mile east of Banner, Illinois.

As stated in the Definite Project Report (DPR), the Banner Marsh project was initiated in response to restoration opportunities that existed after the land returned to the State of Illinois. The area was formerly a highly productive bottom land lake and marsh in the 1800s, providing valuable habitat for migratory waterfowl and local wildlife. However, agricultural then mining activities drastically changed the characteristics of the land before it was reclaimed by the State.

b. Goals and Objectives. Goals and objectives, formulated during the project design phase, are summarized in the following table entitled "Project Goals and Objectives."

Project Goals and Objectives		
Goals	Objectives	Project Features
enhance wetland habitat	increase littoral zone for ducks and fish	provide reliable water control / source for contiguous channels
	improve flood control reliability	clear and stabilize levee
enhance terrestrial habitat	increase food and cover for terrestrial birds and mammals	native warm season grasses
enhance aquatic habitat	increase diversity in aquatic habitat	littoral zone grading

c. Project Construction. The Stage I Contract or Illinois Capital Development Board Contract was awarded to D & M Earthmoving, Plymouth, IL, on January 29, 1998. The ILDNR supervised the construction contract. Construction was substantially complete for Stage I in April 1999. The Stage II Contract was awarded to D & M Earthmoving, Plymouth, IL, on September 30, 1999. Construction was substantially complete for Stage II in July 2001. Stage IIB, a pump station roof hatch, was awarded to Lamar Construction Inc, Edwardsville, IL on June 18, 2002. Construction was substantially complete for Stage IIB on July 15, 2002. Stage III, native grass planting, is still being planned.

d. Project Operation and Maintenance. Operation and maintenance of the Banner Marsh project is the responsibility of the ILDNR. Project operations are detailed in the Banner Marsh Operation and Maintenance (O&M) manual and generally consist of: (1) inspecting the levee during periods of high river stage; (2) activating the pump; (3) adding or removing stoplogs in the water control structure; (3) limiting trucks on the access road to dry periods; (4) inspecting planting sites and taking remedial actions to insure survival; (5) inspecting the littoral zone.

3. PROJECT FEATURES

The Banner Marsh project consists of wetland habitat enhancement by levee restoration, water control improvements, and littoral zone grading. It enhances terrestrial habitat through native grasses. It enhances aquatic habitat through littoral zone grading.

a. Levee. The existing levee slopes were restored to their original condition with a 2.5 horizontal feet on 1 vertical foot slope. Riprap was placed on selected reaches of the levee that have been historically vulnerable to scouring.

b. Pump Station. The pump rehabilitation station includes:

- new electrical transformers, service entrance, breakers, lighting
- new roof, siding, doors, and insulation

- repair of brick foundation
- new concrete cap
- new concrete floor overlay
- new decking and stairs over forebay
- new trashrack
- new 24-inch discharge pipe and flap gate for the existing 24-inch Couch pump.

After rehabilitation, a new 48-inch submersible pump manufactured by EBARA Corp. was installed with new controllers, a discharge can, and approximately 30 feet of new pipe. The new pipe was attached to the existing 48-inch pipe where it enters the levee. A new flap gate was installed on the existing pipe. This new pump is used primarily for backup pumping or during periods of extended precipitation, when the smaller pump is unable to evacuate the marsh.

The rated capacity of the 24-inch 100-horsepower pump is 13,600 gallons per minute at a 21.0-foot total hydraulic head with 885 revolutions per minute. The rated capacity of the 48-inch 265-horsepower pump is 39,000 gallons per minute at a 15.2-foot total dynamic head with 710 revolutions per minute. Primary pumping is performed with the 24-inch pump and backup pumping is performed with the 48-inch pump. Simultaneous pumping can be performed with both pumps, although they are electrically interlocked to prevent simultaneous start-up and early re-start. The pump station is operated automatically with manual override for both pumps. The electric service provided to the pump station building is 480-volt 800-amp three-phase power. Pump status for both pumps is signaled with visual alarm lights located on the exterior west wall of the pump station building. A chart recorder was provided to record pump operation and duration for both pumps.

The pump station was furnished with a new galvanized steel trash rack and platform grating. The trash rack bar openings are spaced at 2.5 inches center-to-center. The sump and location of the 48-inch pump were modified from the original plans due to an unforeseen submerged foundation footing and a formed suction intake from the original construction of the pump station.

Both pumps are located within a building that is refurbished steel framed, insulated, and sided. Discharge pipes slope downward through the levee section to a riprapped discharge apron. Each pipe is equipped with a flap gate and a combination air/vacuum relief valve. Staff gages were permanently installed on the riverside slope of the levee. The reference elevation for the forebay was marked to be the inside bottom steel channel of the floatwell, elevation 432.14 feet.

c. Service Road. Bell's Landing Road is at a constant elevation of 439.0 feet. A 30-foot wide shoulder extends out beyond the power poles to allow service trucks and personnel access to the power lines without having to reach across water.

d. Water Control Structures. There are two corrugated metal pipe stoplog structures. Each structure consists of a 48-inch horizontal inlet pipe, a 60-inch vertical riser pipe with 4-inch stoplog slots, and a 48-inch horizontal outlet pipe. Each structure is provided with 25 stoplogs, a lifting hook, and a lockable, hinged metal grating cover. Pipe bollards protect the

structures from vehicular damage. Staff gages installed upstream of each structure provide accurate water level measurement. The structures are designed to allow water levels to be varied within an 8-foot range between fully open and fully closed.

e. Littoral Zone/Contour Grading. Littoral zone grading occurred as a result of controlled borrow operations. Approximately 35 acres of borrow area were excavated to an elevation of 433.5 feet. When re-flooded to a water elevation of 435 feet, these areas provide the desired 18 inches of water depth.

f. Native Grass Planting. A planting site is planned for the southwest portion of the project area consisting of 208 acres. Species selected include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), sideoats gramma (*Bouteloua curtipendula*), and perennial rye grass (*Lolium perenne*) as a cover crop. Planting will begin in fall of 2002 and will be complete by November 15, 2002. Species will be intermixed to avoid solid blocks of individual species. Planting rates per acre are as follows:

Species	Pounds/Acre
Big bluestem (<i>Andropogon gerardii</i>)	3 pounds
Little bluestem (<i>Schizachyrium scoparium</i>)	3 pounds
Indian grass (<i>Sorghastrum nutans</i>)	2 pounds
Perennial rye grass (<i>Lolium perenne</i>)	20 pounds
Sideoats gramma (<i>Bouteloua curtipendula</i>)	2 pounds

4. PROJECT MONITORING

The Corps and the ILDNR will measure the success of the project relative to original project objectives. Appendix A presents the Post-Construction Performance Evaluation Plan. This plan was developed during the design phase and serves as a guide for measuring and documenting project performance. Appendix B contains the Resource Monitoring and Data Collection Summary. The Resource Monitoring and Data Collection Summary presents the types and frequency of data needed to meet the requirements of the Post-Construction Performance Evaluation Plan.

a. Corps of Engineers. The Corps has the overall responsibility to document project performance. The Corps is responsible for collecting field data as outlined in the Post-Construction Evaluation Plan. The Corps also will perform joint inspections with the ILDNR. The purpose of these inspections is to assure that adequate maintenance is being performed as presented in the DPR and O&M Manual. Joint inspections should also occur after any event that causes damage in excess of annual O&M costs.

b. Illinois Department of Natural Resources. The ILDNR is responsible for monitoring the project through field observations during inspections. Project inspections should be performed on an annual basis following the guidance presented in the O&M manual. It is recommended that the inspections be conducted in May or June, which is representative of

conditions after spring floods. Joint inspections with the Corps and ILDNR shall also be conducted as described above. During all inspections, the ILDNR should complete the checklist form as provided in the O&M Manual. The form should also include a brief summary of the overall condition of the project and any maintenance work completed since the last inspection. Once completed, a copy of the form shall be sent to the Corps.

5. EVALUATION OF AQUATIC REHABILITATION OBJECTIVES

Increase diversity in aquatic habitat. No inspections or monitoring of aquatic habitat was performed since construction, but conditions are favorable for continued development of aquatic habitat.

6. EVALUATION OF WETLAND HABITAT OBJECTIVES

a. Increase littoral zone for ducks and fish. While no inspections or monitoring of the littoral zone was performed since construction, abundant aquatic plant growth was visible in the summer of 2002. The plant growth would support continued development of duck and fish habitat. While conditions are promising, some features of the project have not been completed or are not operating correctly. The features could further improve duck and fish habitat beyond the habitat's current quality. Therefore, the full potential for duck and fish habitat has not yet been realized.

b. Improve flood control reliability. Flood control reliability has been unsatisfactory due to the inability to operate the pump station correctly. As a result, heavy rains in May and June of 2002 caused local flooding around the project site.

7. EVALUATION OF TERRESTRIAL REHABILITATION OBJECTIVES

Increase food and cover for terrestrial birds and mammals. The planting of native warm season grasses is scheduled for fall of 2002. At the current time, the project is dominated by cool season grasses. No inspections or monitoring of terrestrial habitat has been performed. Terrestrial rehabilitation will be better evaluated by the next Performance Evaluation Report.

8. OPERATION AND MAINTENANCE SUMMARY

a. Operation. The following observations have been made about operation procedures:

- (1) The stoplog structures have been difficult to operate.
- (2) The pump controller has failed twice due to condensation in the enclosure.

b. Maintenance. No inspections have been performed; therefore there are no maintenance issues to address in this PER.

9. CONCLUSIONS AND RECOMMENDATIONS

a. Project Goals, Objectives, and Management Plan. Based on data and observations collected since project completion, the project goals and objectives are being met (see the table entitled "Project Goals and Objectives"). Continued data collection will better define the levels to which these goals and objectives are being met.

Project Goals and Objectives			
Goals	Objectives	Project Features	Objective Status
enhance wetland habitat	increase littoral zone for ducks and fish	provide reliable water control / source for contiguous channels	not met
	improve flood control reliability	clear and stabilize levee	not met
enhance terrestrial habitat	increase food and cover for terrestrial birds and mammals	native warm season grasses	not met, construction not complete
enhance aquatic habitat	increase diversity in aquatic habitat	littoral zone grading	met

b. Post-Construction Evaluation and Monitoring Schedules. In general, project monitoring efforts have been performed according to the Post-Construction Performance Evaluation Plan (Appendix A) and the Monitoring and Performance Evaluation Matrix and Resource Monitoring and Data Collection Summary (Appendix B). The next comprehensive Post-Construction Performance Evaluation will be completed in fiscal year 2003, two years after construction.

c. Project Operation and Maintenance. There are no operation and maintenance recommendations or conclusions at this time.

10. PROJECT DESIGN ENHANCEMENT CONSIDERATIONS

Discussions with personnel involved with operation, maintenance, and monitoring activities at the Banner Marsh project have resulted in the following general conclusions regarding project features that may affect future project design:

Stoplog structures should have a gate installed to stop flow. This will facilitate placement and removal of stoplogs.

APPENDIX A

POST-CONSTRUCTION PERFORMANCE EVALUATION PLAN

**Banner Marsh Rehabilitation and Enhancement Project
Post-Construction Performance Evaluation Plan
Enhancement Potential**

Goal	Objective	Enhancement Feature	Unit	Year 0 (1995) Without Alternative	Year 0 (2001) With Alternative (As-Built)	Year 1 (2002) With Alternative	Year 50 Target With Alternative	Feature Measurement	Annual Field Observations by Site Manager
enhance aquatic habitat	increase diversity in aquatic habitat	littoral zone grading	acres of aquatic habitat less than 18 inches deep	0	35	35	106	hydrographic soundings	none
enhance wetland habitat	increase littoral zone for ducks and fish	provide reliable water control / source for contiguous channels littoral zone grading	acres of aquatic vegetation	200	>200	>200	350	aerial photography/land cover-land use mapping	estimation of effective acreage and wildlife use
	improve flood control reliability	levee restoration	linear feet of eroded levee	22,900	0	0	0	soundings	description of presence of snags, debris, channel sedimentation or vegetation
enhance terrestrial habitat	increase food and cover for terrestrial birds and mammals	native warm season grasses	acres of grass	0	0	0	208	aerial photography/land cover-land use mapping	estimation of area with established / regenerated vegetation

APPENDIX B

RESOURCE MONITORING AND DATA COLLECTION SUMMARY

**Banner Marsh Rehabilitation and Enhancement Project
Resource Monitoring and Data Collection Summary¹**

Type Measurement	Water Quality Data						Engineering Data			Natural Resource Data			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post-Const. Phase		Pre-Project Phase	Design Phase	Post-Const. Phase	Pre-Project Phase	Design Phase	Post-Const. Phase		
	Apr -Sep	Oct-Mar	Apr -Sep	Oct-Mar	Apr -Sep	Dec-Mar								
POINT MEASUREMENTS														
<i>Water Quality Stations</i>													Corps	
Turbidity	2W		2W											
Secchi Disk Transparency	2W		2W											
Suspended Solids	2W		2W											
Dissolved Oxygen	2W		2W											
Specific Conductance	2W		2W											
Water Temperature	2W		2W											
pH	2W		2W		2M	M								
Total Alkalinity	---		---		2M	M								
Chlorophyll	2W		2W											
Velocity	---		---											
Water Depth	2W		2W											
Water Elevation	2W		2W											
<i>Sedimentation Test Stations</i>													Corps	
Elutriate														
Bulk Sediment														
<i>Column Settling Stations</i>													Corps	
Column Settling Analysis								1						
<i>Boring Stations</i>													Corps	
Geotechnical Borings								1						

**Banner Marsh Rehabilitation and Enhancement Project
Resource Monitoring and Data Collection Summary (continued)**

Type Measurement	Water Quality Data						Engineering Data			Natural Resource Data			Sampling Agency	Remarks
	Pre-Project Phase		Design Phase		Post-Const. Phase		Pre-Project Phase	Design Phase	Post-Const. Phase	Pre-Project Phase	Design Phase	Post-Const. Phase		
	Apr-Sep	Oct-Mar	Apr-Sep	Oct-Mar	Apr-Sep	Oct-Mar								
TRANSECT MEASUREMENTS														
<i>Sedimentation Transects</i>													Corps	
Hydrographic Soundings							1		5Y					
<i>Vegetation Transects</i>													Corps	
Mast Tree Survey												5Y		
AREA MEASUREMENTS														
<i>Mapping¹</i>													Corps	
Aerial Photography										1		5Y		
LEGEND	W = weekly M = monthly Y = yearly						nY = n-year interval nW = n-week interval 1, 2, 3, ... = number of times data is collected within designated project phase							

¹Mapping (Post-Construction Phase)

July 12, 1993, Color Aerial Photography (Scale = 1000 ft/in)
 April 17, 1994, Color Aerial Photography (Scale = 1000 ft/in)
 1994 Color Infrared
 November 21, 1995, Black and White Aerial Photography (low flight - Scale = 1400 ft/in)
 November 24, 1995, Black and White (high flight - Scale = 2800 ft/in)