



**UPPER MISSISSIPPI RIVER RESTORATION
ENVIRONMENTAL MANAGEMENT PROGRAM
POST-CONSTRUCTION
INITIAL PERFORMANCE EVALUATION REPORT
2012
FOR
LONG ISLAND DIVISION (GARDNER DIVISION)
HABITAT REHABILITATION AND ENHANCEMENT PROJECT**



**US Army Corps
of Engineers** ®
Rock Island District

POOL 21

RIVER MILES: 332.5-340.2

ADAMS COUNTY, ILLINOIS

ACKNOWLEDGEMENTS

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POINTS OF CONTACT

Many individuals of the Rock Island District, U.S. Army Corps of Engineers and U.S Fish and Wildlife Service contributed to the development of this Post-Construction Performance Evaluation for the Long Island Division Habitat Rehabilitation and Enhancement Project. These individuals are listed below:

U.S. Army Corps of Engineers, Rock Island District				
Name	Position	Address	Phone	Email
Laura St. Louis	Environmental Engineer/ Report Preparer	P.O. Box 2004 Rock Island, IL 61204-2004	309-794-5150	Laura.R.St.Louis@usace.army.mil
Steve Gustafson	Environmental Protection Specialist	P.O. Box 2004 Rock Island, IL 61204-2004	309-794-5202	Stephen.J.Gustafson@usace.army.mil
Charles Theiling	Biologist/Report Preparer	P.O. Box 2004 Rock Island, IL 61204-2004	309-794-5636	Charles.H.Theiling@usace.army.mil
U.S. Fish and Wildlife Service, Great River & Clarence Cannon Refuge				
Name	Position	Address	Phone	Email
Jason Wilson	Wildlife Refuge Manager	PO Box 88 Annada, MO 63330	573-847-2333	jason_wilson@fws.gov

EXECUTIVE SUMMARY

General. The design goal of the Long Island Division Habitat and Restoration Project (HREP) was to provide the physical conditions necessary to improve and enhance wetland habitat quality. As stated in the Definite Project Report, the Long Island Division HREP was undertaken to address the following primary problem: decline in backwater areas and side chutes due to siltation and vegetation encroachment. This problem was contributing to the direct loss of off channel deep aquatic habitat, and decreasing migratory bird wetland and terrestrial habitat.

Purpose. The purposes of this Performance Evaluation Report (PER) are as follows:

1. Document the pre- and post-construction monitoring activities for the Long Island Division HREP.
2. Summarize and evaluate project performance on the basis of project goals and objectives as stated in the Definite Project Report (DPR).
3. Summarize project operation and maintenance efforts, to date.
4. Provide recommendations concerning future project performance evaluation.
5. Share lessons learned and provide recommendations concerning the planning and design of future HREP projects.

Project Goals and Objectives. The specific goals and objectives as stated in the DPR were to:

1. Restore and Protect Wetland and Terrestrial Habitat.
 - a. Maintain existing terrestrial habitat.
 - b. Increase bottomland hardwood diversity and reduce forest fragmentation through reforestation.
2. Enhance Aquatic Habitat
 - a. Increase habitat for overwintering fish.
 - b. Increase habitat diversity.
 - c. Reduce sedimentation in side channels.

Project Performance Monitoring. Pre- and post-project monitoring, both qualitative and quantitative, was performed in accordance with Section 10 from the original DPR. Monitoring and performance evaluation was conducted by the U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service. The period of data collection covered in this report includes the quantitative and qualitative post-project monitoring from 2002 through 2012, and anecdotal information from 2002 through 2012.

Evaluation of Project Objectives. For the evaluation period of 2003 to 2012, observations were made with regard to the efficacy of the objectives in meeting project goals. In addition, general conclusions were drawn regarding project measures that may affect future project design.

1. Enhance Aquatic Habitat
 - a. Improve habitat for overwintering fish.

- i. Evaluation Criteria: Dissolved oxygen greater than 5 mg/L. Fish surveys. Minimum of 39 acres of O'Dell chute 6 feet or more in depth.
- ii. General Observation: Dissolved oxygen concentrations have remained above the target level of 5 mg/L. No fish surveys were conducted. Sedimentation observed in the upstream end of the O'Dell chute, with scour occurring in the downstream end.
- iii. Results: Average concentration of dissolved oxygen over the evaluation period is 11.03 mg/L. Sedimentation rate of 0.2 feet/year observed in upstream end of O'Dell Chute.
- iv. Success: No fish survey data to determine success of objective. The target of 5 mg/L or greater of dissolved oxygen has been met, no indications of water quality impacts from emergent closure structure. Moderate success in maintaining deepwater side channel habitat.
- v. Conclusion: Project appears moderately successful in meeting objective, but no certain determination can be made without fish survey data.
- vi. Lessons Learned & Recommendations: Fish surveys should be conducted to the success of the objective.

b. Reduce sedimentation in side channels

- i. Evaluation Criteria: Sediment transects indicating no significant sedimentation relative to year 0.
- ii. General Observation: Sedimentation observed in the upstream end of the O'Dell chute, with scour occurring in the downstream end.
- iii. Results: Sedimentation rate of 0.2 feet/year observed in upstream end of O'Dell Chute.
- iv. Success: Moderately successful at maintaining 6 foot depth below flat pool elevation.
- v. Conclusion: It appears that some areas may be experiencing sufficient scouring to maintain desired depth, while others may be undergoing sedimentation at a rate that the minimum target depth will be reached in 5 years or less.
- vi. Lessons Learned & Recommendations: Additional transects in other chutes may be needed to determine if sedimentation is occurring at the same rate observed in O'Dell Chute.

c. Increase aquatic habitat diversity

- i. Evaluation Criteria: Fish surveys-number and species of fish.
- ii. General Observation: No information could be obtained for the specified time period.
- iii. Conclusion: No information could be obtained for the specified time period.
- iv. Lessons Learned & Recommendations: Fish surveys must be conducted to ascertain the effectiveness of the project feature.

2. Enhance Wetland and Terrestrial Habitat

a. Maintain terrestrial habitat

- i. Evaluation Criteria: Maintain 3765 linear feet of riprapped shoreline.
- ii. General Observation: No surveys were conducted. Site visits do not indicate areas of riprap loss or erosion.
- iii. Results: No apparent riprap loss.
- iv. Success: No data to confirm that objective is successful, although it appears successful based on site visits.
- v. Conclusion: The project appears successful in meeting the objective.
- vi. Lessons Learned & Recommendations: Surveys should be completed to accurately determine if objective is being met, although it appears current operation and maintenance methods have been successful in maintain the as-constructed length of protected shoreline.

b. Increase bottomland hardwood diversity and reduce forest fragmentation

- i. Evaluation Criteria: 50% survival rate by Year 25 of mast trees.
- ii. General Observation: Numerous environmental factors have led to low tree survivability, although the upstream portion of the planting area has had the best tree viability. Some natural regeneration is occurring.
- iii. Results: No tree surveys were conducted, but observations were made during site visits and maintenance activities.
- iv. Success: Tree survival percentage is estimated to be low based on Corps personnel observations.
- v. Conclusion: The tree plantings appear to be marginally successful based on maintenance visits.
- vi. Lessons Learned & Recommendations: Future activities should include tree surveys. More efforts may be needed to control the weed population. Weed barriers proved largely ineffective.

Evaluation of Project Operation and Maintenance. The O&M manual was completed in June 2006. Periodic Maintenance is required on the shoreline protection feature, emergent closure structure, reforested areas and dredge areas. O&M costs through 2012 are not available. Regular site inspections by the HREP Manager have resulted in proper coordination and corrective maintenance actions.

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
POST-CONSTRUCTION
PERFORMANCE EVALUATION REPORT

2012

LONG ISLAND DIVISION (GARDNER DIVISION)

HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 21
MISSISSIPPI RIVER MILES 332.5-340.2
ADAMS COUNTY, ILLINOIS

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ENVIRONMENTAL MANAGEMENT PROGRAM
POST-CONSTRUCTION
PERFORMANCE EVALUATION REPORT**

2012

LONG ISLAND DIVISION (GARDNER DIVISION)

HABITAT REHABILITATION AND ENHANCEMENT PROJECT

POOL 13

MISSISSIPPI RIVER MILES 532-536

CARROLL COUNTY, ILLINOIS

INTRODUCTION

The Upper Mississippi River Restoration Environmental Management Program (UMRR-EMP) is a Federal-State partnership to manage, restore and monitor the UMR ecosystem. The UMRR-EMP was authorized by Congress in Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662) and reauthorized in 1999. Subsequent amendments have helped shape the two major components of EMP – the Habitat Rehabilitation and Enhancement Projects (HREPs) and Long Term Resource Monitoring (LTRM). Together, HREPs and LTRM are designed to improve the environmental health of the UMR and increase our understanding of its natural resources.

Habitat Rehabilitation and Enhancement Project (HREP) construction is one element of the UMRR-EMP. In general, the projects provide site-specific ecosystem restoration, and are intended and designed to counteract the adverse ecological effects of impoundment and river regulation through a variety of modifications, including flow introductions, modification of channel training structures, dredging, island construction, and water level management. Interagency, multi-disciplinary teams work together to plan and design these projects.

The Long Island Division/Gardner Division (Long Island) HREP is part of the UMRR-EMP. This project consisted of side channel dredging, closure structures, shoreline and island protection and reforestation that were designed to enhance aquatic and wetland habitat.

1. Purpose of Project Evaluation Reports

The purposes of this Project Evaluation Report for the Long Island HREP are to:

1. Document the pre- and post-construction monitoring activities for the Long Island HREP.
2. Summarize and evaluate project performance on the basis of project goals and objectives as stated in the Definite Project Report (DPR).

3. Summarize project operation and maintenance efforts, to date.
4. Provide recommendations concerning future project performance evaluation.
5. Share lessons learned and provide recommendations concerning the planning and design of future HREP projects.

2. Scope

This report summarizes available monitoring data, operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) information, and project observations made by the U.S. Army Corps of Engineers (USACE), and the U.S. Fish and Wildlife Service (USFWS). The period of data collection covered in this report includes the pre-construction monitoring year 1991 to post-construction monitoring as of 2012.

3. Project References

Published reports which relate to the Long Island HREP are presented below.

1. Definite Project Report with Integrated Environmental Assessment, Long Island Division/Gardner Division Habitat Rehabilitation and Enhancement Project, Rock Island District Corps of Engineers, September 2000.
2. Long Island Division/Gardner Division HREP Operation and Maintenance Manual, Rock Island District Corps of Engineers, August 2003.
3. Performance Evaluation Report, Long Island Division/Gardner Division, Habitat Rehabilitation and Enhancement Project, Rock Island District Corps of Engineers, July 2003.

4. Project Location

The Long Island HREP is located in Adams County, Illinois, on the left descending bank of the Mississippi River, between river miles 332.5 and 340.2 (Figure 1 – Long Island Division/Gardner Division HREP project area). The project is operated by the Great River National Wildlife and Fish Refuge, U.S. Fish and Wildlife Service. Long Island is a 6,300-acre backwater/island complex with a major lake and side chutes, located approximately five miles north of Quincy, Illinois.

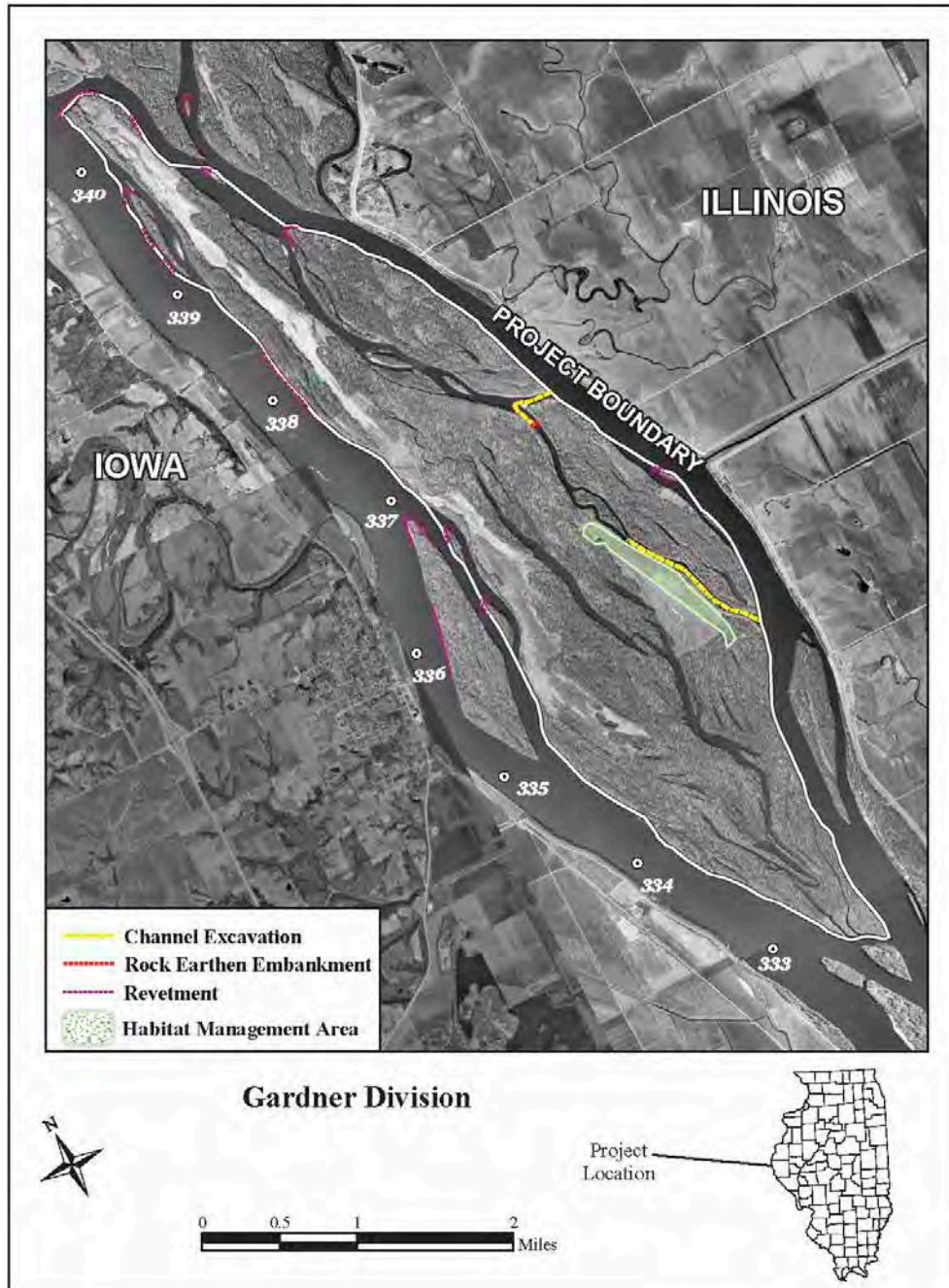


Figure 1. Long Island Division/Gardner Division HREP project area

PROJECT PURPOSE

1. Overview

The design of the Long Island HREP was to provide the physical conditions necessary to improve and enhance aquatic, terrestrial and wetland and habitat quality. The specific goals as stated in the Definite Project Report (DPR) were to: improve habitat for overwintering fish, reduce side channel sedimentation, increase aquatic habitat diversity, maintain terrestrial habitat, increase bottomland hardwood diversity and reduce forest fragmentation. In order to achieve these goals, siltation and vegetation encroachment at the site needed to be addressed. These

problems were contributing to the direct loss of off channel deep aquatic habitat, migratory bird wetland and terrestrial habitat. The problems, opportunities, goal, objectives and measures implemented to address the goals and objectives are listed in Table 1.

Table 1. Problems, opportunities, goals, objectives, and measures

PROBLEMS	GOALS	OBJECTIVES	RESTORATION MEASURES
Loss of off channel deep aquatic habitat	Enhance aquatic habitat	Improve habitat for overwintering fish	Side channel dredging Emergent closure structure Shore and island protection
Decreasing migratory bird wetland	Enhance wetland habitat	Maintain terrestrial habitat	Shoreline and island protection
Decreasing terrestrial habitat	Enhance terrestrial habitat	Increase bottomland hardwood diversity and reduce forest fragmentation	Reforestation

PROJECT DESCRIPTION

1. Project Measures

The Long Island HREP included a combination of side channel dredging, tree planting, riprap placement and construction of an emergent closure structure (see Figure 1 for locations of measures). A detailed description of each of these measures is provided below.

1. Side Channel Dredging. The O’Dell Chute was dredged to a depth of 7.5 feet below flat pool for a length of 5000 linear feet with a 50 foot width. The Canton Chute was dredged to a depth of 7.5 feet below flat pool for a length of 1250 feet with a 35 foot width.
2. Emergent Closure Structure. The closure structure spans 271 feet (width of O’Dell channel). The structure is on average four feet emergency above flat pool elevation of 470 feet, with approximately six feet of the structure submerged. The closure structure was designed to be emergent 90% of the time. The top of the structure is 14 feet wide, and is keyed into the upstream side of each bank. The upstream slope measures 2 horizontal to 1 vertical, and the downstream slope measures 3 horizontal to 1 vertical.
3. Shoreline and Island Protection. Approximately 3765 linear feet of shoreline are protected with a two-foot thick riprap layer on top of a one –foot thick bedding

stone layer. Areas protected include the heads of islands A, B, C, D, E and Shandrew Island. The slope of this protection has a maximum slope of 2 horizontal to 1 vertical.

4. Reforestation. Mast tree planting was conducted on 67 acres of Long Island's 184 acre eastern agricultural field. This planting occurred on an area where the O'Dell Chute dredge disposal was deposited and incorporated into the soil. Trees specified to be planted included 1005 pin oaks, 670 swamp white oaks, 670 bur oaks, 670 northern pecans, and 536 sycamores, for a total of 3,551 trees. The trees were planted in at 30 foot intervals on berms parallel to the O'Dell Chute. Additionally planting of approximately 600 trees was conducted in three periods; October 2004 (340 trees), 2006-2007 (100 trees) and November 2011 (160 trees).

2. Project Construction

The Long Island HREP project was approved for construction in March 2001 at an estimated cost of \$3,985,054.50 (equivalent to \$4,915,827.63 in FY10). Bankline protection, dredging, closure structure construction and some tree planting was completed by 2001. Additional tree planting took place in 2002 and 2003.

3. Project Operation and Maintenance

General. In the original DPR it was estimated that the Long Island HREP would require little or no maintenance. Operation and maintenance responsibilities for the Long Island HREP were originally outlined in the DPR. The acceptance of these responsibilities was formally recognized by an agreement signed by the U.S Fish and Wildlife Service and the Rock Island District, USACE.

A detailed description of all operation and maintenance requirements can be found in the Project Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual (OMRR&R Manual). The OMRR&R Manual for the project delegated responsibilities and procedures for post project activities. Project operation and maintenance generally consists of the following:

1. Observe side channels for evidence of sedimentation.
2. Ensure structural integrity of the closure structure.
3. Maintain the shoreline and island protection features.
4. Inspect planting sites and ensure their survival.
5. Advance measures ensuring availability of labor and materials.
6. Inspection during periods of high water.
7. Project inspections conducted annually.

Project Measures Requiring Operation and Maintenance. Maintenance of the project measures was to be completed on an as needed basis to maintain their structural integrity and continued function in the manner for which they were designed. The predominant feature of concern is

the survivability of the mast tree plantings. Flooding, extreme weather, weeds and poor soils have lead to a lower than anticipated survivability of plantings.

PROJECT PERFORMANCE MONITORING

1. General

Performance monitoring of the Long Island HREP has been conducted by USACE to help determine the extent to which the design meets the habitat improvement objectives. Information from this monitoring will also be used, if required, for adaptive management.

The monitoring and performance evaluation matrix is outlined in Table 2. Pre- and post-project monitoring, both qualitative and quantitative by each of the involved agencies is summarized below.

1. U.S. Army Corps of Engineers: The success of the project relative to original project objectives shall be measured utilizing data, field observations, and project inspections provided by USFWS and USACE. The Corps of Engineers was responsible for post-project analyses of water quality, sedimentation, tree surveys, and fish communities. The Corps of Engineers has overall responsibility to measure and document project performance.
2. U.S. Fish and Wildlife Service: The USFWS is responsible for operating and maintaining the Long Island HREP. USFWS was responsible for post-project annual field inspections.

Table 2. Monitoring and Performance Evaluation Matrix

Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
Sedimentation Problem Analysis	System-wide problem definition. Evaluates planning assumptions	USFWS	USFWS (EMTC)	LTRMP	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 feature	Sponsor	Sponsor	Sponsor	Attempts to begin defining baseline. See DPR.
Baseline monitoring	Establishes baselines for performance evaluation	USACE	Field station or sponsor thru Cooperative Agreements or Corps	LTRMP	See DPR for location and sites for data collection and baseline information. Actual data collection will be accomplished during Plans & Specification phase.
Data Collection for Design	Includes identification of project objectives, design of project, and development of performance evaluation plan	USACE	USACE	HREP	Comes after fact sheet. This data aids in defining the baseline
Construction Monitoring	Assesses construction impacts; assess permit conditions are met	USACE	USACE	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	Determine success of project as related to objectives	USACE (quantitative), sponsor (field observations)	Field station or sponsor thru Cooperative Agreements or Corps	LTRMP Cooperative	Comes after construction phase of project
Analysis of Biological Responses to Project	Evaluates predictions and assumptions of habitat unit analysis. Determine critical impact levels, cause-effect relationships, and effect on long-term losses of significant habitat	USFWS	USFWS (EMTC)	LTRMP	Problem Analysis and Trend Analysis studies of habitat projects

2. Project-Induced Habitat Changes

Long Island Division habitat conditions have experienced some changes since the pre-project monitoring. More native species of mast producing trees have been introduced, although overall survivability of the stock has been low. Current velocity in the chutes has decreased, from a pre-construction average of 32.5 centimeters/second (cm/sec) to a post construction average of 11.73 cm/sec.

PROJECT EVALUATION

1. Construction and Engineering

Construction began in March 2001 and was initially completed at the end of 2001, except for completion of mast tree plantings. Final construction was completed in 2004.

2. Costs

In the original DPR, cost estimates for the entirety of the project were \$3,766,072. Initial construction costs were \$3,956,833.10. As of the 2003 Operation and Maintenance Manual, the total cost of the Long Island HREP was \$4,809,495.99.

No information regarding costs incurred after construction due to items such as flood damage was available.

3. Operation and Maintenance

In the original DPR, over the 50-year project life the estimated cost was \$197,800. From the estimate, an average annual operation and maintenance cost was calculated to be \$3,956. This amount included shoreline protection inspection, 34 tons of rock replacement each year and 67 acres of planting maintenance annually. No information regarding operations and maintenance costs were available at the time of this report.

4. Ecological Effectiveness

A. Improve habitat for overwintering fish

General. One of the specific project objectives for the Long Island HREP was to improve habitat for overwintering fish. The assessment target for this objective is data indicative of desirable fish diversity through post construction Year 50. Water quality monitoring was also conducted to determine the success of this objective. Dredging in O'Dell and Canton Chutes was conducted to ensure a minimum of 39 acres of habitat that is six feet deep or greater. Improving dissolved oxygen (DO) concentrations was not identified as an objective of the

project; however, there were concerns that the reduced flow into O'Dell Chute due to construction of the emergent closure dam could have a detrimental effect on downstream DO concentrations. The DO target is 5 mg/L or greater.

Pre- and Post-Project Conditions. Prior to the project, chutes in the Long Island Division were experiencing sedimentation that limited the availability of protected channel fisheries habitat. Dissolved oxygen measurements were collected from 1990 to 1994, indicating concentrations ranging from 6 to 17 mg/L. The predominant method of assessment has been water quality monitoring at Station W-M336.6S (see Plate 3 in Appendix B for station location). Post-project water quality monitoring commenced on June 18, 2002 and ended on September 13, 2005, then began again on June 2, 2010 and continues currently. The minimum DO concentration observed was 6.03 mg/L on June 8, 2005, the maximum was 19.47 mg/L on February 13, 2003, and the average of the 51 measurements was 11.01 mg/L.

No fish survey data has been collected since 2002. Areas outside of the dredge cut areas do not appear to have returned to pre-project elevations. Insufficient data has been collected to determine if 39 acres of habitat with depth six feet or greater is present (Elevation 464 feet MSL).

Conclusion. The project measures were successful in providing the ability to meet the DO target level of 5 mg/L. DO concentrations during the 2003-2012 evaluation period were sufficient to support aquatic life. Comparisons to pre-project data suggest that the construction of an emergent closure structure across the upper end of O'Dell Chute has not had an adverse impact on downstream DO concentrations. No assessment can be given regarding fish diversity.

B. Reduce sedimentation in side channels

General. The emergent closure structure was constructed to reduce sedimentation in the O'Dell Chute. The assessment target for this objective is the depth of the side channels no less than eight feet below flat pool elevation (470 feet MSL) by post construction Year 1, seven feet below flat pool elevation by Year 25, and six feet below flat pool elevation by Year 50.

Pre- and Post-Project Conditions. Prior to the project, chutes in the Long Island Division were experiencing sedimentation accumulation that limited the availability of protected channel fisheries habitat. Maximum depth observed in the downstream transect was 8.5 feet (below flat pool elevation 470 feet MSL). Maximum depth observed in the upstream transect was 6.25 feet.

Conclusion. The project measures were moderately successful in providing the ability to maintain sufficient depth of the side channels. It appears that some areas may be experiencing sufficient scouring to maintain depth.

C. Increase aquatic habitat diversity

General. Shoreline and island riprap protection was constructed in order to increase aquatic habitat diversity. The assessment target for this objective is data indicate of desirable fish diversity through post construction Year 50. Presences of fish and fish kills have been utilized in the past as ancillary data.

Pre- and Post-Project Conditions. Pre project conditions consisted of highly eroded slopes on island shorelines. The majority of the slopes were nearly vertical and 12 feet in length. Aquatic habitat was being lost as the erosion of the shorelines and islands continued. In August 2002 an electrofishing survey was conducted, finding 18 different species and 7 sport species. No information on additional surveys since the 2002 survey was obtained.

Conclusion. No quantitative assessment can be made regarding the success of the project in meeting the objective. Future monitoring should include fish surveys in order to accurately determine how successful the project feature is.

D. Maintain terrestrial habitat

General. Shoreline and island riprap protection was constructed in order to maintain terrestrial habitat. The assessment target for this objective is maintaining 3,765 linear feet of shoreline protection through post construction Year 50.

Pre- and Post-Project Conditions. Pre project conditions consisted of highly eroded slopes on island shorelines. These slopes are unstable and are underlain by sand. The majority of the slopes were nearly vertical and 12 feet in length. Dominant tree species were silver maple, and the number of mast producing trees was in decline.

A post construction site visit was conducted in June 2003. Riprapped areas appeared in good condition, with the exception of the east side of Island D, where a scour hole was observed. No survey data regarding linear feet of remaining riprap protection has been gathered. No major loss was observed in the 2003 site visit. A site visit was conducted in May 2012. No areas of riprap loss, erosion, or vegetation falling into the river were observed in the 2012 visit.

Conclusion. The project measures were successful in providing the ability to meet maintain the terrestrial habitat. The lack of riprap loss combined with the lack of vegetation loss indicates that at least for the protected areas no further erosion is occurring. Future

activities should include close inspection for areas of potential vegetation loss (i.e. leaning trees, dislodged riprap, exposed native materials), and surveys of the linear feet of riprap.

E. Increase bottomland hardwood diversity and reduce forest fragmentation

General. One of the specific project objectives was to reverse the decline in mast producing tree species. Mast tree planting was conducted to repopulate the project area. The Year 25 target is 50% survival of plantings, and the Year 50 target is 20%.

Pre- and Post-Project Conditions. Dominant tree species were silver maple, and the number of mast producing trees was in decline. Pre-project tree plantings had low survivability, and invasive species came to dominate. Tree plantings occurred in 2004, 2011 and 2012 for a project total of approximately 4,150 trees. Due to flooding, extreme weather, weeds and invasive species, overall survival of these plantings is marginal. To combat ragweed smothering the plantings, Transline herbicide was applied to 68 acres of the planting area in 2010 and 2011. This application appears to have reduced the ragweed infestation. No official tree surveys have been conducted since project completion.

Conclusion. The project measures were minimally effective in providing the ability to increase bottomland diversity and reduce forest fragmentation. The combination of weeds, flooding, poor soils and extreme weather has deteriorated the planting stock. An accurate determination of tree survival is unknown due to the lack of tree surveys. The current state of the plantings is based on site visits and maintenance activities.

Future activities must include tree surveys to determine where best to focus maintenance efforts. Based on the experience of the three tree planting periods, it appears that weeds were more of a problem than anticipated, and the soils in which trees were planted was comprised of too much sand. Future management activities should include weed eradication activities.

Table 4 summarizes the performance evaluation plan and schedule for the Long Island HREP goals and objectives.

LESSONS LEARNED AND RECOMMENDATIONS FOR FUTURE SIMILAR PROJECTS

The goals and objectives set for in the DPR have been somewhat achieved. The dissolved oxygen water quality target level, while not a formal objective, has been met. No impact to water quality appears to be occurring from the emerged closure structures. Maintaining side channel depths sufficient for overwintering habitat has been moderately successful. A complete assessment on the remaining objectives (increase habitat diversity, maintain terrestrial habitat, increase bottomland hardwood diversity) cannot be conducted as field data has not been

gathered since project completion. Ancillary data indicates that these objectives are being achieved for the most part.

Obstacles hindering success include survival of the tree plantings and weed control. Recent efforts by the USFWS have made headway in dealing with these two issues. Sedimentation rates may present a problem, as the hydrographic survey indicates some areas of the project dredge cuts are being filled in. More data is needed to determine if the rate is accurate, and if sedimentation is occurring over the entire project area prior to enacting corrective action measures.

Considerations for future similar projects include further research into soils and landform structures that trees will be planted in, weed control methods, changes in survey technology, and ease of obtaining data.

Table 4. Performance Evaluation and Monitoring Schedule

Goal	Objective	Enhancement Measure	Units	Monitoring Target Values			Monitoring Schedule
				Year 0 without project	Year 25 with project	Year 50 target with project	
Enhance Wetland and Terrestrial Habitat	Increase bottomland hardwood diversity	Establish hardwood trees on suitable sites in existing agricultural fields	Percent survival	NA	50%	20%	Every 5 years
	Maintain existing terrestrial habitat	Shoreline and island protection	Linear feet of riprapped shoreline	0	3765	3765	Every 5 years
Enhance Aquatic Habitat	Increase habitat for over-wintering fish	Restore/protect O'Dell Chute closure structure	Acres with 6' depth or greater	39	39	39	Every 5 years
			Dissolved Oxygen (mg/L)	>5.0 at all times	>5.0 at all times	>5.0 at all times	April-September every 2 weeks, October-March every month
			Fish Surveys	Unknown	Data indicative of desirable fish populations	Data indicative of desirable fish populations	Annually
	Reduce sedimentation in side channels	Rock Placement along island tips and shorelines, Emergent Closure Structure	Depth below flat pool at L/D 21	Varies	-7	-6	Every 5 years
	Increase habitat diversity		Fish Surveys	Unknown	Data indicative of desirable fish populations	Data indicative of desirable fish populations	Annually

REFERENCES

U.S. Army Corps of Engineers: Upper Mississippi River System Environmental Management Program, Definite Project Report with integrated Environmental Assessment, Gardner Division HREP; Rock Island District, Rock Island, IL, September 2000.

U.S. Army Corps of Engineers: Upper Mississippi River System Environmental Management Program, Post-Construction Performance Initial Evaluation Report, Long Island Division (Gardner Division) HREP; Rock Island District, Rock Island, IL, July 2003.

U.S. Army Corps of Engineers: Upper Mississippi River System Environmental Management Program, Operation and Maintenance Manual, Gardner Division (Long Island Division) HREP; Rock Island District, Rock Island, IL, June 2006.

U.S. Army Corps of Engineers: Memorandum for Record; Gardner Division (Long Island Division HEP, 2004 Performance Evaluation Report; Rock Island District, Rock Island, IL, June 2004.

APPENDIX A

Water Quality Assessment

Long Island Division/Gardner Division Performance Evaluation Report, SEP 2012

Goal – Enhance Aquatic Habitat

Objective – Improve Water Quality for Overwintering Fish

Enhancement Feature – Side Channel Dredging/Emergent Closure Dam

(1) Overview. Side channel dredging and construction of an emergent closure dam were two methods chosen for accomplishing the objective. Improving dissolved oxygen (DO) concentrations was not identified as an objective of the project; however, there were concerns that the reduced flow into O'Dell Chute due to construction of the emergent closure dam could have a detrimental effect on downstream DO concentrations. The ability to distribute oxygenated water throughout the side channels, especially during periods of ice cover, is essential for the prevention of fish kills. In order to determine the effectiveness of the project in maintaining adequate dissolved oxygen levels, a water quality monitoring station (site W-M336.6S as shown in Plate 3 of Appendix B) was established in O'Dell Chute to measure DO and related parameters. Pre-project water quality monitoring covered the period April 14, 1990 through May 24, 1994. Post-project water quality monitoring commenced on June 18, 2002 and ended on September 13, 2005, then began again on June 2, 2010 and continues currently. This monitoring is performed by COE personnel. The 2003 Long Island Division Performance Evaluation Report discussed water quality data collected through 2002. This report discusses data collected during the 2003-2012 monitoring period.

(2) Monitoring. COE data were obtained through periodic grab samples. Grab samples were collected just below the surface on 51 occasions at site W-M336.6S. The sampling site was visited approximately every other week from June through mid-September of each year. The site was visited three times each during the winters of 2003 and 2004. Sampling was usually not performed during April, May, October and November.

The following variables were typically measured: water depth, velocity, wave height, air and water temperature, cloud cover, wind speed and direction, DO, pH, total alkalinity, specific conductance, Secchi disk depth, turbidity, total suspended solids (TSS), chlorophyll (a, b and c) and pheophytin a.

(3) Results and Discussion. The results from water quality monitoring at W-M336.6S are found in Appendix D. Table D-1 gives the monitoring results from grab samples collected from February 13, 2003 through September 18, 2012. The table includes the results from DO and ancillary parameters that are useful in the interpretation of DO data. DO concentrations ranged from 6.03 mg/L – 19.47 mg/L. All DO measurements were greater than 5 mg/L.

Supersaturated DO concentrations due to algal photosynthesis were observed on several occasions, during both the winter and summer seasons. High pH and chlorophyll *a* values

typically accompanied these events during the summer months. The minimum DO concentration observed was 6.03 mg/L on June 8, 2005, the maximum was 19.47 mg/L on February 13, 2003, and the average of the 51 measurements was 11.01 mg/L. The average water velocity during this period was 11.73 cm/s. This was considerably lower than the pre-project average of 32.50 cm/s.

Since 2010 DO concentrations have normally ranged from 6 to 10 mg/L during the summer months. The exception being the summer of 2012, where DO concentrations exceeded 10 mg/L regularly. This may be related to increase on the algal photosynthesis resulting from the abnormally high water temperatures, lack of rain and lack of cloud cover.

The results from the summer of 2012 are shown in Figure D-1. DO concentrations were more than sufficient to support aquatic life. Supersaturated values were often observed and the lowest concentration recorded during this sample period (June 12 – September 18, 2012) was 6.16 mg/L on September 5.

The latest complete winter sampling period was in 2003. The results from 2003 are shown in Figure D-2. DO concentrations were at supersaturated levels in the late winter/early spring, with pH roughly paralleling the DO levels. Over the summer, DO concentrations ranged between 8 and 13 mg/L, and pH displayed strong correlation to DO. The DO concentration was supersaturated (15.49 mg/L on December 23, 2003) at the start of winter.

(4) Conclusions. DO concentrations during the 2003-2012 evaluation period were sufficient to support aquatic life. These results were similar to those observed during the 2002 post-project monitoring period. Comparisons to pre-project data suggest that the construction of an emergent closure structure across the upper end of O'Dell Chute has not had an adverse impact on downstream DO concentrations.

Future water quality monitoring is recommended in order to determine the project's impact under varying hydrologic regimes.

(5) References.

U.S. Army Corps of Engineers. *Upper Mississippi River System Environmental Management Program Post-Construction Initial Performance Evaluation Report Long Island Division (Gardner Division) Habitat Rehabilitation and Enhancement Project*. U.S. Army Corps of Engineers, Rock Island District, July 2003.

Table D-1. Post-project water quality monitoring results from surface samples collected at site W-M336.6S

<u>DATE</u>	<u>WATER DEPTH (M)</u>	<u>VELOCITY (CM/SEC)</u>	<u>WATER TEMP. (°C)</u>	<u>DISSOLVED OXYGEN (MG/L)</u>	<u>pH (SU)</u>	<u>TOTAL SUSPENDED SOLIDS (MG/L)</u>	<u>CHLOROPHYLL a (MG/M³)</u>
2/13/2003	0.540	0.08	2.4	19.47	8.37	-	-
4/10/2003	0.630	1.97	13.5	17.92	9.00	-	-
6/10/2003	1.390	-	23.4	16.32	8.80	20.0	95.0
6/24/2003	0.860	4.65	29.4	18.36	8.60	55.0	111.0
7/8/2003	1.500	5.48	30.1	8.50	8.20	14.0	47.0
7/22/2003	1.470	1.44	28.3	9.16	8.20	17.0	24.0
8/5/2003	0.860	1.00	29.6	12.67	8.50	25.0	29.0
8/19/2003	0.325	0.96	32.6	9.89	8.10	18.0	19.0
9/2/2003	0.370	1.13	24.9	8.26	7.70	34.0	36.0
9/16/2003	0.620	2.56	24.6	9.36	8.20	58.0	60.0
12/23/2003	0.500	-	4.5	15.49	7.69	-	-
2/12/2004	0.460	0.52	1.4	17.79	7.40	-	-
3/23/2004	1.020	2.39	7.8	13.42	7.90	-	-
6/8/2004	3.860	78.61	23.0	7.51	7.20	210.0	13.0
6/22/2004	-	72.31	22.8	7.08	7.20	160.0	9.6
7/20/2004	1.600	3.64	30.0	9.80	8.20	4.0	13.0
8/3/2004	0.780	2.53	30.6	11.35	7.90	49.0	44.0
8/17/2004	0.790	0.69	27.5	17.66	8.60	30.0	67.0
8/31/2004	0.960	1.33	28.2	13.06	8.30	23.0	57.0
9/14/2004	0.750	0.46	27.2	14.20	8.30	35.0	64.0
6/8/2005	1.360	1.19	26.2	6.03	7.80	34.0	23.0
6/21/2005	1.455	1.74	30.1	9.14	8.20	10.0	16.0
7/6/2005	1.550	4.38	28.5	7.28	7.90	7.0	5.3
7/19/2005	0.680	2.92	32.8	16.65	8.50	7.0	56.0
8/2/2005	0.740	1.48	31.2	11.86	8.40	47.0	88.0
8/17/2005	0.750	2.40	27.8	14.33	8.50	47.0	160.0
8/30/2005	0.715	0.85	27.9	11.36	8.30	49.0	90.0
9/13/2005	0.740	0.92	27.0	8.68	8.40	61.0	60.0
6/2/2010	1.400	18.48	26.2	6.75	8.10	42.0	6.0
6/29/2010	4.145	-	26.3	7.15	7.80	184.0	4.0
7/13/2010	3.810	-	27.3	7.27	8.00	123.0	8.0
7/27/2010	4.005	-	28.3	6.92	7.80	209.0	20.0
8/11/2010	3.570	-	28.2	7.58	8.10	104.0	24.0
8/24/2010	3.310	-	27.1	7.70	7.90	134.0	21.0
9/8/2010	1.050	-	24.1	9.92	8.20	26.0	22.0
6/7/2011	2.850	60.21	25.0	8.42	8.10	115.0	35.0
6/21/2011	3.370	74.79	23.7	8.26	7.90	151.0	24.0
7/6/2011	2.710	60.67	28.6	8.39	-	35.0	85.0
7/19/2011	1.200	13.56	31.3	11.92	8.41	38.0	38.0
8/2/2011	2.810	53.17	29.6	6.84	7.70	233.0	20.0
8/16/2011	0.935	2.28	25.3	8.23	8.10	35.0	33.0
8/30/2011	0.235	1.47	24.3	7.35	7.90	80.0	71.0
9/13/2011	0.180	1.35	25.6	9.23	8.30	106.0	37.0
6/12/2012	0.920	3.39	26.5	8.22	7.9	40.4	13.6
6/26/2012	0.600	2.13	29.4	17.84	9	56.0	80.7
7/10/2012	0.555	1.36	31.9	12.27	8.7	45.3	77.0
7/24/2012	0.280	0.47	35.6	15.53	8.8	27.0	45.7
8/7/2012	0.315	0.41	32.4	14.75	8.8	33.7	113.0
8/21/2012	0.210	0.96	28.2	11.26	8.7	35.6	6.3
9/5/2012	0.280	0.40	25.2	6.16	8.20	22.0	9.8
9/18/2012	0.260	-	22.1	10.71	8.70	-	-
MIN.	0.180	0.08	1.4	6.03	7.20	4.0	4.0
MAX.	4.145	78.61	35.6	19.47	9.00	233.0	160.0
AVG.	1.326	11.73	25.6	11.01	-	64.2	44.0

**FIGURE D-1. POST-PROJECT DISSOLVED OXYGEN AND pH VALUES COLLECTED AT SITE
W-M336.6S FROM 6/12/12-9/18/12**

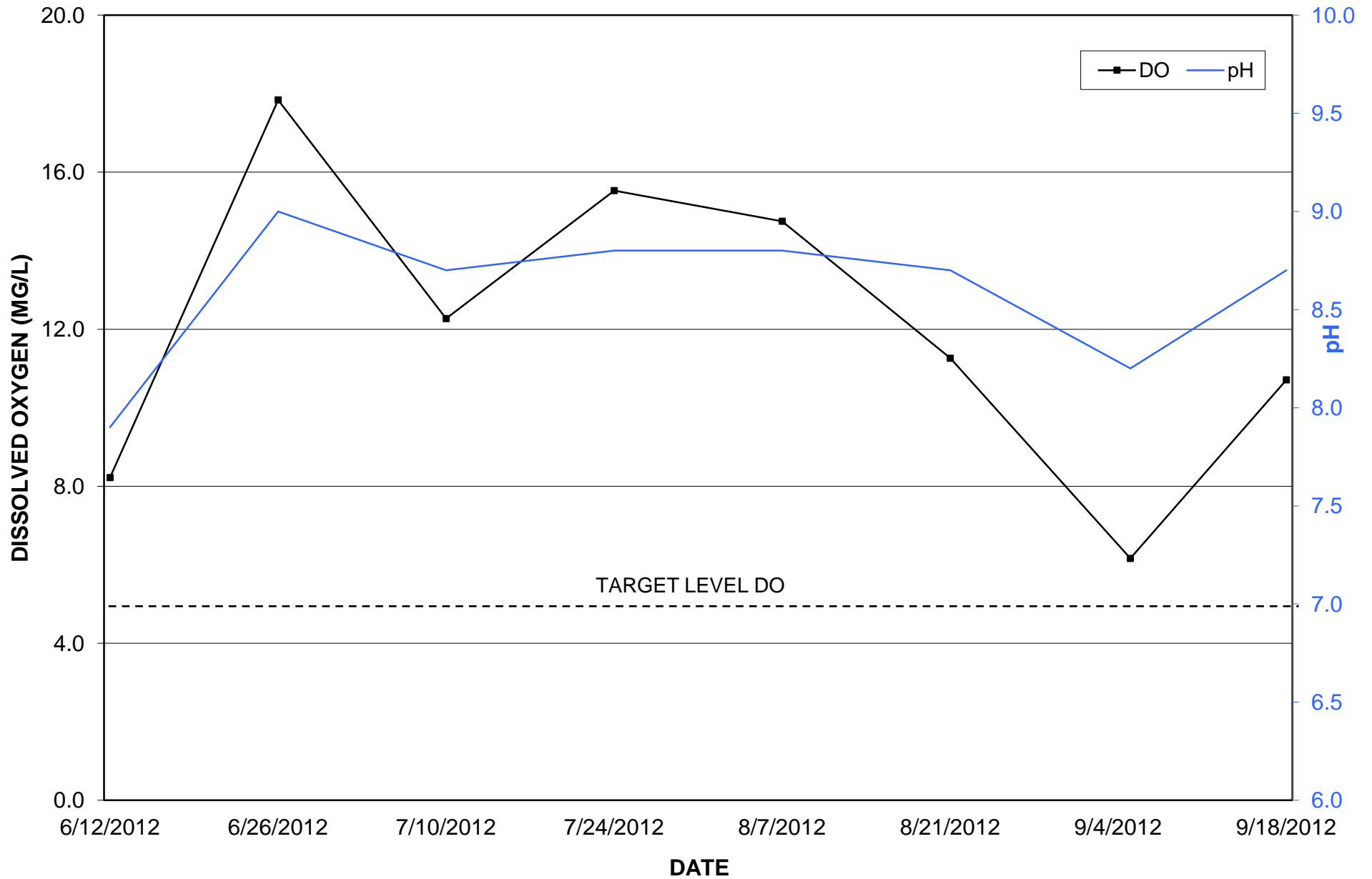
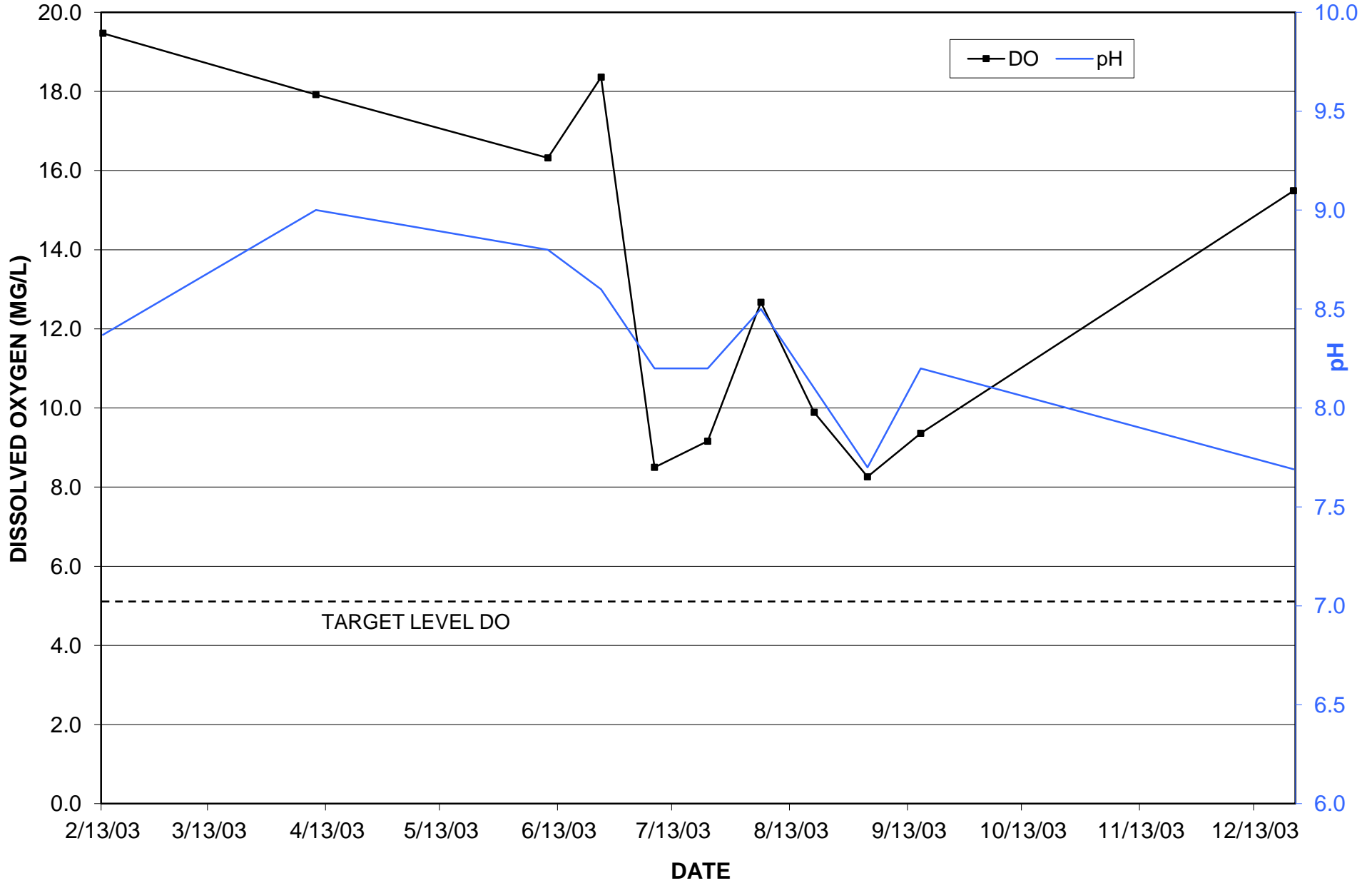
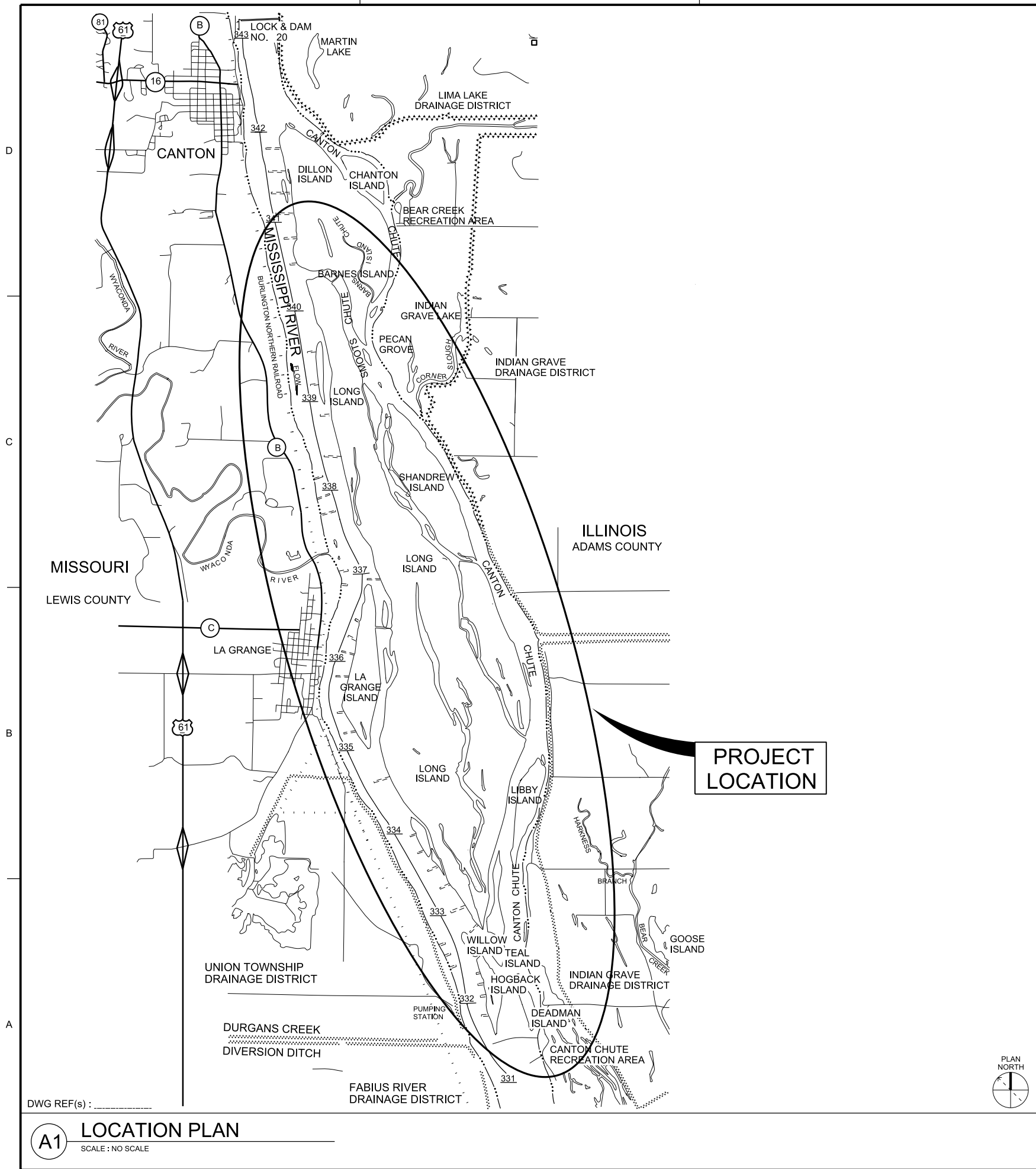


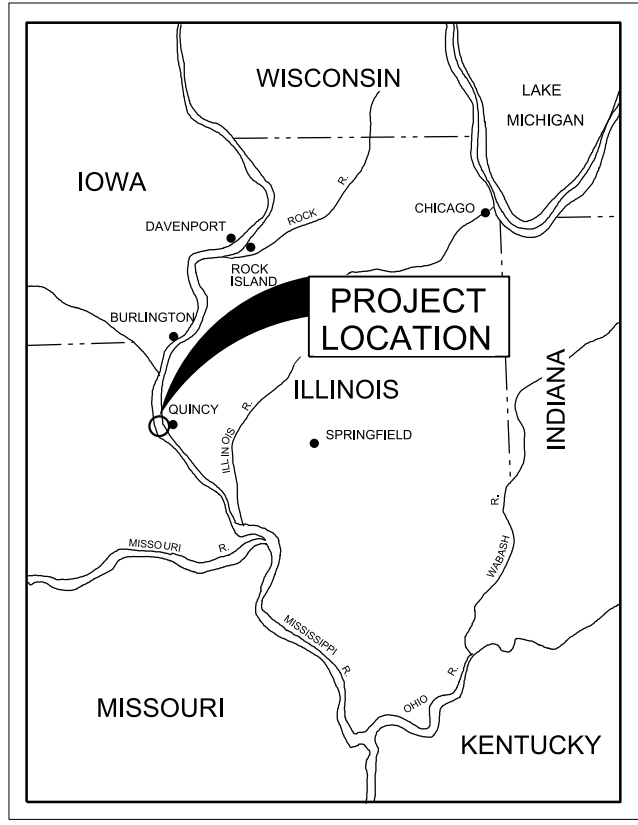
FIGURE D-2. POST-PROJECT DISSOLVED OXYGEN AND pH VALUES COLLECTED AT SITE W-M336.6S FROM 2/13/03-12/23/03



APPENDIX B
Project Plates



A1 LOCATION PLAN
SCALE: NO SCALE



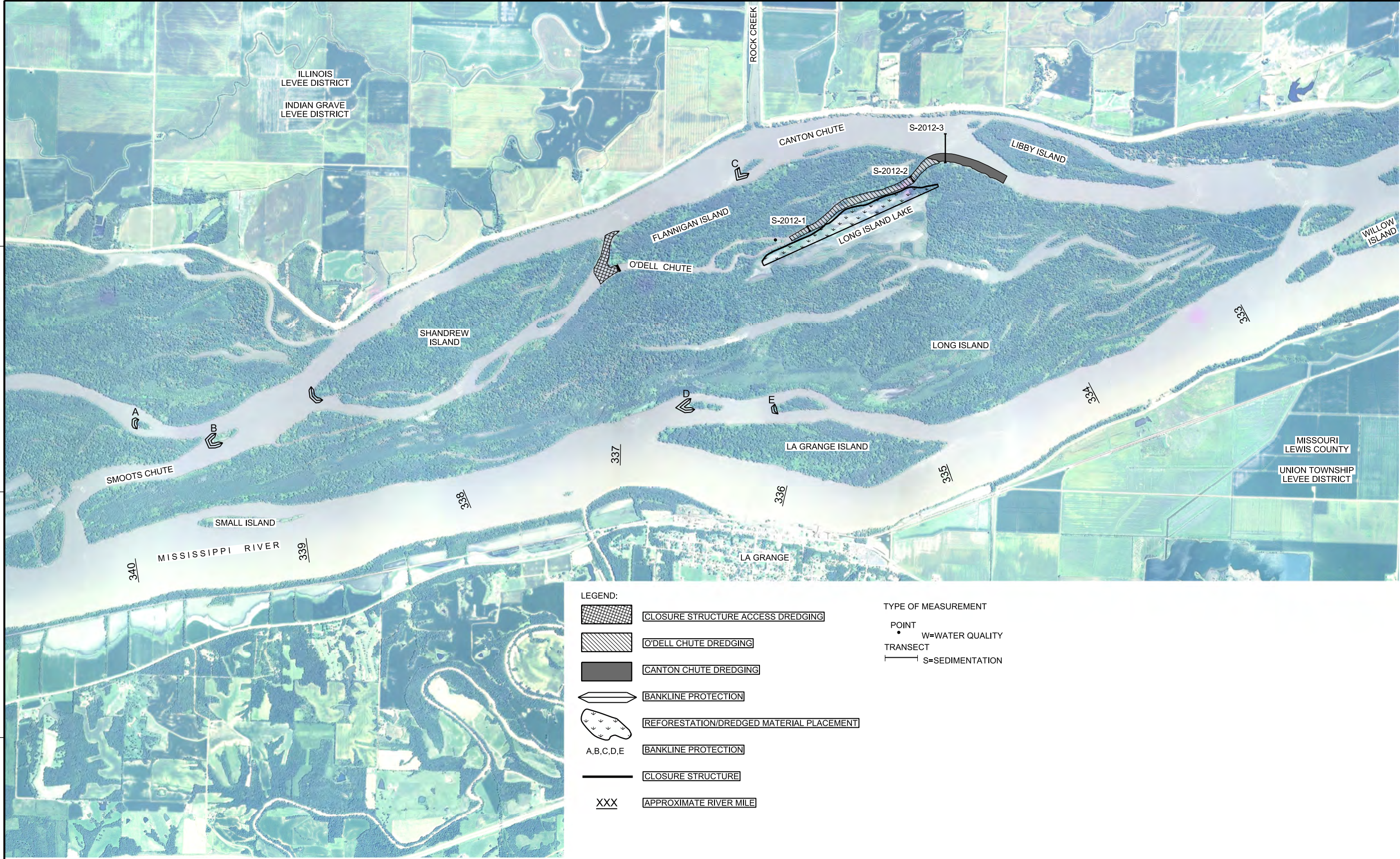
DWG REF(s): _____
C4 VICINITY MAP
SCALE: NO SCALE

US Army Corps of Engineers	
APPR. DATE	
DESCRIPTION	
MARK	









DESIGNED BY:	DATE:	SOLICITATION NO.:
DWN BY:	CHK BY:	CONTRACT NO.:
SUBMITTED BY:	PLOT SCALE:	PLOT DATE:
	PLOT DATE:	PROJECT CODE:
	SIZE:	PER
	FILE NAME:	
	ANSI D.	



MISSISSIPPI RIVER
ADAMS COUNTY
GARDNER DIVISION HREP
PERFORMANCE EVALUATION REPORT
LOCATION PLAN
AND VICINITY MAP
PLATE 1

Sheet ID
G-002



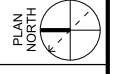
LEGEND:

-  CLOSURE STRUCTURE ACCESS DREDGING
-  O'DELL CHUTE DREDGING
-  CANTON CHUTE DREDGING
-  BANKLINE PROTECTION
-  REFORESTATION/DREDGED MATERIAL PLACEMENT
- A,B,C,D,E  BANKLINE PROTECTION
-  CLOSURE STRUCTURE
- XXX  APPROXIMATE RIVER MILE

- TYPE OF MEASUREMENT**
-  POINT
W=WATER QUALITY
 -  TRANSECT
S=SEDIMENTATION

DWG REF(s) : _____

A1 **SITE PLAN**
 SCALE: 1"=1500'-0"

MARK	DATE	DESCRIPTION

DESIGNED BY:	DATE:	SOLICITATION NO.:	CONTRACT NO.:
DWN BY:	CHK BY:		
SUBMITTED BY:	PLOT SCALE:	PLOT DATE:	PROJECT CODE:
	N.T.S.		PER
		FILE NAME:	
		ANSI D:	PERC-101.doc.dgn

MISSISSIPPI RIVER
 ADAMS COUNTY
 GARDNER DIVISION HREP
 PERFORMANCE EVALUATION REPORT
SITE PLAN
 PLATE 2

Sheet ID
C-101