DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

Programs and Project Management Division

Dear Sir or Madam:

You are receiving this letter because you may be interested in this project to solve an island erosion problem near Kampsville, IL. However, no action is required on your part. The U.S. Army Corps of Engineers, St. Louis District has prepared a draft report entitled "Project Implementation Report with Integrated Environmental Assessment Illinois River Restoration Program Alton Pool Islands Restoration". The project is in the Illinois River between the towns of Pearl and Kampsville in Pike and Greene Counties, IL. The draft report addresses the goals of reducing sediment, maintaining islands and their side channels, and restoring habitat. The report describes alternative ways to solve the island erosion problem and presents a tentatively selected restoration plan. The report also serves to notify the public of the environmental effects of the project as required by law. These environmental effects are summarized in the report's Draft Finding of No Significant Impact(s) (FONSI), which is unsigned. A signed FONSI is required before project construction can occur. The FONSI will not be signed into effect until all comments received as a result of this public review have been carefully considered.

An electronic version of the draft report is available online at the following link or you may request a copy be mailed to you either as a paper document or a CD-ROM.
http://www.mvs.usace.army.mil/Missions/ProgramsProjectManagement/PlansReports.aspx

You are welcome to comment on the content of the draft report. For questions, comments, or to request a printed copy or CD-ROM, please contact Mr. Brandon M. Schneider of our Planning and Environmental Branch at telephone (314) 331-8496, facsimile number (314) 331-8606, or email at brandon.schneider@usace.army.mil. Written comments may be sent to our address below.

US Army Corps of Engineers
ATTN: Planning and Environmental Branch (PD-P, Schneider)
1222 Spruce St.
St. Louis, MO 63103-2833

We will accept comments from July 1, 2013 to July 31, 2013. At the end of this time period, we will assume there are no further comments.

Sincerely,

Brian Johnson
Chief, Environmental Compliance Branch
Regional Planning and Environmental
Division North – St. Louis

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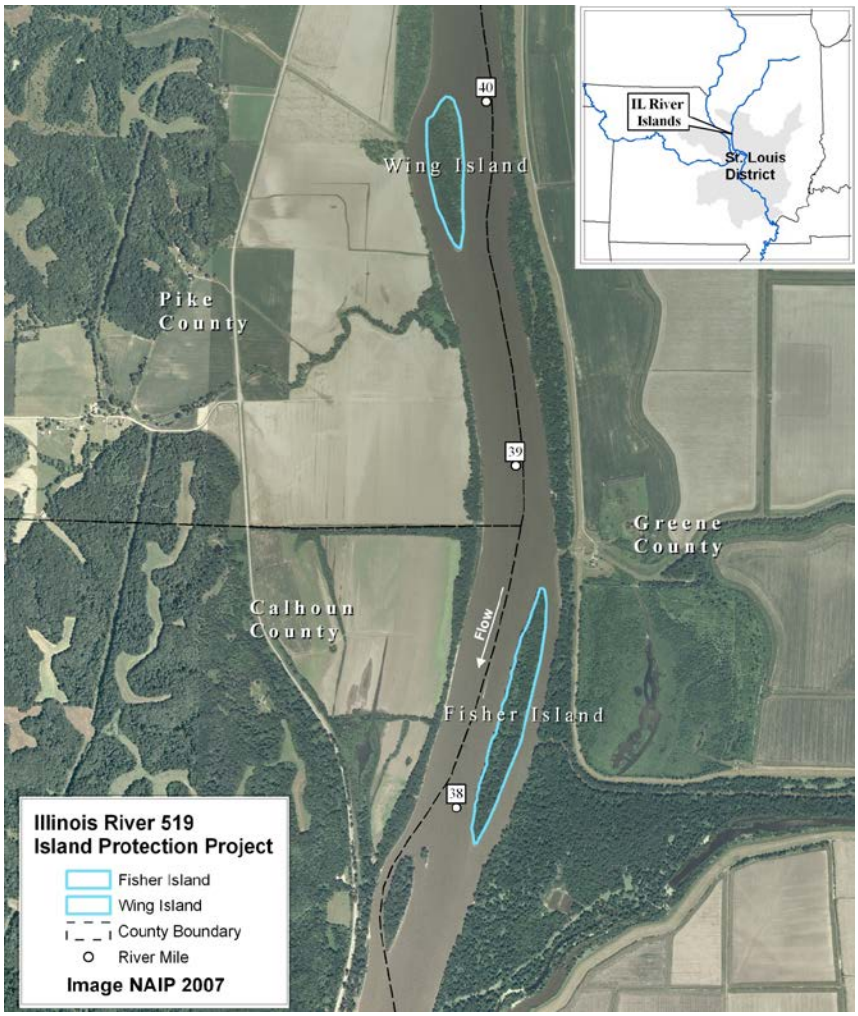
PROJECT IMPLEMENTATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS



Draft
June 2013

US Army Corps of Engineers ®
St. Louis District

Alton Pool
Illinois River
Miles 37.9 - 40.1
Pike and Greene County, IL

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PROJECT IMPLEMENTATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

EXECUTIVE SUMMARY

The Alton Pool Islands Restoration Project area is located in Pike and Greene Counties, Illinois, between River Miles (RM) 37.9 and 40.1. The islands are located between the cities of Kampsville and Pearl, Illinois.

The primary habitat problem in the area is loss of islands and associated side channel habitat due to excessive erosion. Existing side channel habitat throughout the Illinois Waterway and Upper Mississippi River System are gradually being lost due to sedimentation and erosion (Simons et al. 1974). Natural river processes which historically created new islands and side channel habitat are typically precluded by navigation and agricultural structures. An opportunity exists to restore and maintain the degraded Wing and Fisher Islands and their adjacent side channels, in order to increase the ecological integrity of the Illinois River.

The restoration of habitat diversity is widely recognized as critical to maintaining biological diversity as well as ecosystem function. Islands, in large rivers, provide increased aquatic habitat diversity due to the formation of side channels, backwaters, areas of reduced current velocity, shallow water habitat, and in some cases, scour holes (Schueller 1989, Johnson and Jennings 1998). Islands also provide fish with shelter and refuge from predators by supplying cover in the form of woody debris (Lehtinen et al. 1997), undercut banks, vegetation, or large rocks along the shoreline (Johnson and Jennings 1998). The shallow back waters or side channel habitats created by islands provide refuge from the swift currents and harsh environment of the thalweg (Barko and Herzog 2003). They are particularly beneficial as spawning, rearing, food production, feeding, and seasonal refuge areas for several species of fish (i.e. centrarchids, sturgeon) (Chipps et al. 1997, USFWS 2004). This diversity of habitat is more biologically desirable and should result in a more diverse biological community, while contributing to the long-term ecological integrity of the Illinois Waterway and Upper Mississippi River Systems in general.

Field surveys and habitat quantification procedures were completed to support the planning and assessment of proposed project alternatives. Hydrographic surveys were performed to document existing bathymetry and to estimate rock quantities. Surveys were conducted to characterize the fish species and unionid community and habitat surrounding Wing and Fisher Islands. Additionally, the U.S. Fish and Wildlife Service and the Illinois Department of Natural Resources are familiar with fish and wildlife

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communities within the study area. These observations, along with future studies and monitoring, will assist in evaluating project performance.

The Functional Assessment Score (FAS) methodology was utilized to evaluate the ecosystem benefits of seven alternatives in the Alton Pool Islands Restoration Project area. These evaluations looked at various dike configuration scenarios, the predicted scour and depositional patterns, and the benefits to aquatic organisms. Ecosystem benefits and project costs were then put through Cost Effectiveness and Incremental Cost Analysis. This incremental analysis identified which alternatives and associated environmental outputs (FAS) would be both cost efficient and cost effective. This analysis also showed the changes in cost for increasing levels of environmental output.

The Wing Island Alternatives consisted of the following:

- Alternative 1 – No Corps Action.
- Alternative 2 – Construct a single bullnose with revetment where the structure is tied into the island head.
- Alternative 3 – Install revetment along the existing island head.
- Alternative 4 – Construct an unrooted bullnose with revetment.

The Fisher Island Alternatives consisted of the following:

- Alternative 1 – No Corps Action.
- Alternative 2 – Install revetment along the existing island head and alternating hard points in the side channel.
- Alternative 3 – Construct a single bullnose and alternating hard points in the side channel.
- Alternative 4 – Construct a single bullnose with extended off-bank line revetment and alternating hard points in the side channel.

Ecosystem benefits analysis indicated that the alternatives would generate between 0 – 28 Net Average Annual Functional Assessment Score for the analyzed functions for Wing Island, and 0 – 46 Net Average Annual Functional Assessment Score for the analyzed functions for Fisher Island. Wing Alternative 3 generated 23 assessment score units and Fisher Alternative 2 generated 42 assessment score units at a cost of $368.76 and $701.95 per unit respectively. These two alternatives were also acceptable, complete, efficient and effective making them, when combined, the tentatively selected plan.

The tentatively selected plan proposes installation of revetment along the head of Fisher Island and along the head of Wing Island. It also proposes installation of five alternating hard points in the lower half of the Fisher Island side channel. The plan, if implemented, would result in long term benefits to the ecosystem including fish, birds, and other species that utilize the area around the islands. The project would increase scour and

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depositional diversity, and maintain valuable side channel and island habitat which is a dwindling resource in the Illinois River.

Implementation of the project features would result in the restoration of 168 acres of island and aquatic habitat. Ecosystem benefits analysis found that the tentatively selected plan would generate 65 Functional Analysis Score Units. The current estimated first cost of the project features is $859,000. This total estimated project cost includes construction of the project features; planning, engineering, and design; construction management; real estate; and monitoring. Implementation would be cost shared 65% by the Federal Government and 35% by the Illinois Department of Natural Resources (IDNR), the Non-Federal Sponsor. The Federal contribution is estimated at $558,350 and the non-Federal contribution is estimated at $300,650. In addition, all construction will be accomplished from the river and all work will be performed below ordinary high water thus eliminating the need for real estate acquisition. While the Non-Federal Sponsor is responsible for all operations, maintenance, repair, rehabilitation, or replacement (OMRR&R) associated with the project, no OMRR&R is anticipated for this project during the period of analysis. Similar projects with similar materials have been implemented on the Mississippi River and have required no OMRR&R. Nine years of post project monitoring sufficient to determine project success will cost approximately $44,000.

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PROJECT IMPLEMENTATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

TABLE OF CONTENTS
(*required by NEPA)

EXECUTIVE SUMMARY I

1. INTRODUCTION 1

1.1 Purpose of Report and Scope 1

1.2 Project Authority 1

1.3 Summary of Location, Habitat Problems, and Opportunities* 5

1.4 Project Selection – Prioritization Process 7
1.4.1 Prioritization of Critical Restoration Projects 7
1.4.2 Project Implementation Process 7

1.5 Resource Significance 8
1.5.1 Institutional Recognition 8
1.5.2 Public Recognition 9
1.5.3 Technical Recognition 10
1.5.4 Significance of the Alton Pool Islands Restoration Project 12

1.6 Discussion of Prior Studies, Reports, and Existing Water Projects. 12

2. ASSESSMENT OF EXISTING AND FUTURE WITHOUT CONDITIONS* 16

2.1 Summary of Historic and Current Project Area Conditions 16

2.2 Natural Resources. 17
2.2.1 Terrestrial Habitat 17
2.2.2 Aquatic Habitat 19
2.2.3 Wildlife 20
2.2.4 Fish 20
2.2.5 Hazardous, Toxic, and Radioactive Waste (HTRW) 21
2.2.6 Prime and Unique Farmland 21

2.3 Endangered and Threatened Species 21

2.4 Wetland Resources. 21

2.5 Socioeconomic Resources and Human Use. 22

2.6 Historic and Cultural Resources. 22

3. PROJECT GOALS AND OBJECTIVES* 22

DRAFT

3.1 Problems and Opportunities **22**

3.2 Constraints. **23**

3.3 Goals and Objectives. **24**

3.3.1 Project Goals 24

3.3.2 Project Objectives 24

4. POTENTIAL MEASURES **24**

4.1 General **24**

5. ALTERNATIVE PLANS* **26**

5.1 Formulation of Alternative Plans **26**

5.2 Description of Alternative Plans **27**

6. EVALUATION AND COMPARISON OF ALTERNATIVE PLANS* **32**

6.1 General **32**

6.2 Ecosystem Benefit Analysis **32**

6.2.1 Site Specific Aquatic Habitat Appraisal Guide (AHAG) 32

6.2.2 Site Specific Functional Assessment Score (FAS) 33

6.3 Model Certification **35**

6.4 Alternative Plan Evaluation and Comparison. **36**

6.4.1 Completeness, Effectiveness, Efficiency, Acceptability 36

6.4.2 National Ecosystem Restoration (NER) Plan 37

6.4.3 Navigation Impacts 37

6.4.4 Economics in Environmental Planning: Incremental Cost Analysis 37

6.4.5 Cost and Total Output (Net AAFAS) 38

6.4.6 Determining Cost Effective Alternatives 39

6.4.7 Incremental Cost Analysis 40

6.4.8 Conclusion 42

6.5 Risk and Uncertainty. **42**

6.6 Selection of Tentatively Selected Plan. **43**

6.7. Tentatively Selected Plan **43**

6.8. National Ecosystem Restoration (NER) Plan **43**

7. DESCRIPTION OF TENTATIVELY SELECTED PLAN* **44**

7.1 Design Considerations **44**

7.2 Project Implementation Timeline **44**

7.3 Land, Easements, Rights-of-Way, Relocation, and Disposal Site (LERRDS) Considerations. **44**

7.4 OMRR&R Considerations **44**

DRAFT

7.5 Cost Estimates. **44**

7.6 Monitoring and Adaptive Management **45**

7.7. Consistency with USACE Campaign Plan **45**

7.8. Consistency with USACE Environmental Operating Principles **47**

8. ENVIRONMENTAL EFFECTS* **47**

8.1 Summary of Effects. **47**

8.2 Natural Resources. **47**

8.3 Endangered Species – Biological Assessment. **48**

8.3.1 Indiana Bat – Endangered 49
8.3.2 Gray Bat – Endangered 50
8.3.3 Eastern Prairie Fringed Orchid – Threatened 50
8.3.4 Decurrent False Aster – Threatened 51
8.3.5 Spectaclecase Mussel – Proposed as Endangered 51
8.3.6 Higgins eye pearlymussel – Endangered 52

8.4 Wetland Resources **52**

8.5 Socioeconomic Resources and Human Use **52**

8.6 Historic Properties and Cultural Resources **52**

8.7 Cumulative Impacts **53**

8.7.1 Scoping: Past and present actions 53
8.7.2 Scoping: Geographic and spatial boundary 56
8.7.3 Determining the affected environment 56
8.7.4 Determining the environmental consequences 57

8.8 Probable Adverse Environmental Impacts Which Cannot Be Avoided. **58**

8.9 Relevant Laws and Regulations **59**

8.9.1 Executive Order 11282 60
8.9.2 Executive Order 11593 60
8.9.3 Executive Order 11988 60
8.9.4 Executive Order 11990 61
8.9.5 Executive Order 11991 61
8.9.6 Executive Order 12898 61
8.9.7 Executive Order 13112. 61
8.9.8 Executive Order 13186 62
8.9.9 Bald and Golden Eagle Protection Act of 1940 62
8.9.10 Clean Water Act and Rivers and Harbors Act 63

8.10 Short-Term Versus Long-Term Productivity. **63**

8.11 Irreversible Resource Commitments. **64**

8.12 Relationship of the Proposed Project to Other Planning Efforts. **64**

9. IMPLEMENTATION RESPONSIBILITIES **64**

DRAFT

9.1 Recommended Plan Cost Sharing 64

9.2 Federal Responsibilities 64

9.3 Non-Federal Responsibilities 65

10. COORDINATION AND VIEWS 67

10.1 Public Involvement. 67

10.2 Federal Agencies. 68

10.3 State Agencies 68

10.4 Native American Tribes. 68

LIST OF PREPARERS 69

REFERENCES 70

DRAFT RECOMMENDATIONS 78

DRAFT FINDING OF NO SIGNIFICANT IMPACT 80

TABLES

Table 1. Estimated number and length of historic islands/side channels by pool (USACE 2007). 12

Table 2. Wing Island Average Annual Functional Assessment Score* 35

Table 3. Fisher Island Average Annual Functional Assessment Score* 35

Table 4. Alton Pool Islands (Wing and Fisher) average annual costs, by alternative. 38

Table 5. Alton Pool islands (Wing and Fisher) total output benefits (AAFAS) and average annual cost, by alternative. 39

Table 6. Alton Pool Islands (Wing and Fisher) incremental values of “Best Buy” plans. 41

Table 7. Best Buy Evaluation Matrix for Wing Island 43

Table 8. Best Buy Evaluation Matrix for Fisher Island. 43

Table 9. Project implementation schedule for Wing and Fisher Islands. 44

Table 10. Alton Pool Islands Restoration Project fully funded estimate and current working estimate, October 2010 price level. 45

Table 11. Monitoring of the Alton Pool Islands Restoration Project, objectives, indicators, targets and time before project effects become apparent. 46

Table 12. Timing and cost of monitoring for the Alton Pool Islands Restoration Project. 46

Table 13. Threatened, Endangered, and Candidate species potentially occurring in the Alton Pool Islands Restoration Project area of Pike and Greene Counties, Illinois. 49

Table 14. Federal policy compliance status. 59

Table 15. Federal and non-federal share of current estimated project costs 64

FIGURES

DRAFT

Figure 1. Alton Pool Islands Restoration Project area; 6

Figure 2. Land cover classification for the Alton Pool Islands Restoration Project area; Pike and Greene Counties, Illinois; St. Louis District. 18

Figure 3. Bathymetric profile for the Wing Island; Pike County, Illinois; St. Louis District. 26

Figure 4. Bathymetric profile for the Fisher Island; Greene County, Illinois; St. Louis District. 27

Figure 5. Wing Island Alternative 2 – Single bullnose and revetment. 29

Figure 6. Wing Island Alternative 3 – Riprap shoreline. 29

Figure 7. Wing Island Alternative 4 – Unrooted bullnose with revetment. 30

Figure 8. Fisher Island Alternative 2 – Riprap shoreline and place alternating hard points in side channel 30

Figure 9. Fisher Island Alternative 3 – Single bullnose and alternating hard points constructed in the side channel. 31

Figure 10. Fisher Island Alternative 4 – Single bullnose with extended off-bank line revetment on riverside and alternating hard points constructed in the side channel. 31

Figure 11. Alton Pool Islands (Wing Island) average annual cost and total AAFAS (Average Annual Output Benefits). 39

Figure 12. Alton Pool Islands (Fisher Island) average annual cost and total AAFAS (Average Annual Output Benefits). 40

APPENDICES

A Correspondence
B Permits
C Hazardous, Toxic, and Radioactive Waste Documentation Report
D Appendix D Has Been Removed
E Habitat Evaluation and Quantification
F Incremental Cost Analysis
G Plates
H Monitoring Plan
I Real Estate Plan
J Distribution List
K Hydrology and Hydraulics

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1. INTRODUCTION

1.1 Purpose of Report and Scope. This Project Implementation Report (PIR) presents a detailed proposal for the restoration of Wing and Fisher Islands. The report is organized to follow a general problem-solving format following the Corps six-step planning process. Existing conditions and anticipated future conditions are reviewed. Project goals and objectives are identified. Restoration measures and alternatives are formulated to address the goals and objectives. Costs and benefits of the restoration alternatives are identified and the alternative plans are compared on this basis. The report also provides planning, engineering, and limited construction details for the tentatively selected restoration plan. This report is a feasibility level decision document, and approval of the report will allow the project to proceed to production of plans and specifications.

Specifically, the report provides: (1) a clear description of the tentatively selected plan; (2) demonstration of project justification based on reasonably maximizing net National Ecosystem Restoration (NER) benefits and demonstrating the selected plan is a cost effective project that is justified to achieve the desired level of outputs; (3) documentation of compliance with appropriate Federal, State, and local environmental and regulatory requirements; (4) a completed Real Estate Plan; (5) identification of the anticipated operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) activities, including estimated costs; and (6) a description of non-Federal OMRR&R responsibilities, as appropriate.

In addition, the PIR establishes ecosystem restoration goals and specific performance indicators; the without-project condition or baseline for each performance indicator; and for each separable element of the ecosystem restoration, identifies specific target goals for each performance indicator. Performance indicators and units of measure shall include specific measurable environmental outcomes, such as changes in hydrology or the population and distribution of indicator species which are representative of the abundance and diversity of ecosystem-dependent aquatic and terrestrial species. The PIR includes a monitoring plan for the performance indicators including timeline to achieve the identified target goals and a timeline for the demonstration of project completion. The PIR includes documentation that the project and monitoring plan have been developed in consultation with the Department of the Interior and the involved state.

1.2 Project Authority. Prior to initiating Federal involvement to address water resources problems, the Corps of Engineers (Corps) must have authority and demonstrate a federal interest in a water resources problem. Congress provided authority for Illinois River Basin Restoration in Section 519 of the Water Resources Development Act (WRDA) 2000. This authority granted the completion of a comprehensive plan which identified and evaluated critical restoration projects in the Illinois River Basin.

Authority was granted for the Alton Pools Island Restoration Project in Sections (b) & (c) of Section 519 of the WRDA 2000 (as amended by Section 5071, WRDA 2007). The authority as amended states:

SEC. 519. ILLINOIS RIVER BASIN RESTORATION.

(a) ILLINOIS RIVER BASIN DEFINED—In this section, the term ''Illinois River basin'' means the Illinois River, Illinois, its backwaters, its side channels, and all tributaries, including their watersheds, draining into the Illinois River.

(b) COMPREHENSIVE PLAN.—

(1) DEVELOPMENT—The Secretary shall develop, as expeditiously as practicable, a proposed comprehensive plan for the purpose of restoring, preserving, and protecting the Illinois River basin.

(2) TECHNOLOGIES AND INNOVATIVE APPROACHES.—The comprehensive plan shall provide for the development of new technologies and innovative approaches—

(A) to enhance the Illinois River as a vital transportation corridor;
(B) to improve water quality within the entire Illinois River basin;
(C) to restore, enhance, and preserve habitat for plants and wildlife; and
(D) to increase economic opportunity for agriculture and business communities.

(3) SPECIFIC COMPONENTS.—The comprehensive plan shall include such features as are necessary to provide for—

(A) the development and implementation of a program for sediment removal technology, sediment characterization, sediment transport, and beneficial uses of sediment;
(B) the development and implementation of a program for the planning, conservation, evaluation, and construction of measures for fish and wildlife habitat conservation and rehabilitation, and stabilization and enhancement of land and water resources in the basin;
(C) the development and implementation of a longterm resource monitoring program; and
(D) the development and implementation of a computerized inventory and analysis system.

(4) CONSULTATION.—The comprehensive plan shall be developed by the Secretary in consultation with appropriate Federal agencies, the State of Illinois, and the Illinois River Coordinating Council.

(5) REPORT TO CONGRESS.—Not later than 2 years after the date of enactment of this Act, the Secretary shall transmit to Congress a report containing the comprehensive plan.

(6) ADDITIONAL STUDIES AND ANALYSES.—After transmission of a report under paragraph (5), the Secretary shall continue to conduct such studies and analyses related to the comprehensive plan as are necessary, consistent with this subsection.

(c) CRITICAL RESTORATION PROJECTS.—

(1) IN GENERAL.—If the Secretary, in cooperation with appropriate Federal agencies and the State of Illinois, determines that a restoration project for the Illinois River basin will produce independent, immediate, and substantial restoration, preservation, and protection benefits, the Secretary shall proceed expeditiously with the implementation of the project.

(2) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out projects under this subsection $100,000,000 for fiscal years 2001 through 2010.

(3) FEDERAL SHARE.—The Federal share of the cost of carrying out any project under this subsection shall not exceed $20,000,000. (note: Section 5071 of WRDA 2007 authorized the per project limit to be raised from $5 million to $20 million.)

(d) GENERAL PROVISIONS.—

(1) WATER QUALITY.—In carrying out projects and activities under this section, the Secretary shall take into account the protection of water quality by considering applicable State water quality standards.

(2) PUBLIC PARTICIPATION.—In developing the comprehensive plan under subsection (b) and carrying out projects under subsection (c), the Secretary shall implement procedures to facilitate public participation, including providing advance notice of meetings, providing adequate opportunity for public input and comment, maintaining appropriate records, and making a record of the proceedings of meetings available for public inspection.

(e) COORDINATION.—The Secretary shall integrate and coordinate projects and activities carried out under this section with ongoing Federal and State programs, projects, and activities, including the following:

(1) Upper Mississippi River System-Environmental Management Program authorized under section 1103 of the Water Resources Development Act of 1986 (33 U.S.C. 652).

(2) Upper Mississippi River Illinois Waterway System Study.

(3) Kankakee River Basin General Investigation.

(4) Peoria Riverfront Development General Investigation.

(5) Illinois River Ecosystem Restoration General Investigation.

(6) Conservation Reserve Program (and other farm programs of the Department of Agriculture).
(7) Conservation Reserve Enhancement Program (State) and Conservation 2000 Ecosystem Program of the Illinois Department of Natural Resources.
(8) Conservation 2000 Conservation Practices Program and the Livestock Management Facilities Act administered by the Illinois Department of Agriculture.
(9) National Buffer Initiative of the Natural Resources Conservation Service.
(10) Nonpoint source grant program administered by the Illinois Environmental Protection Agency.

(f) JUSTIFICATION.—

(1) IN GENERAL.—Notwithstanding section 209 of the Flood Control Act of 1970 (42 U.S.C. 1962–2) or any other provision of law, in carrying out activities to restore, preserve, and protect the Illinois River basin under this section, the Secretary may determine that the activities—

(A) are justified by the environmental benefits derived by the Illinois River basin; and
(B) shall not need further economic justification if the Secretary determines that the activities are cost-effective.

(2) APPLICABILITY.—Paragraph (1) shall not apply to any separable element intended to produce benefits that are predominantly unrelated to the restoration, preservation, and protection of the Illinois River basin.

(g) COST SHARING.—

(1) IN GENERAL.—The non-Federal share of the cost of projects and activities carried out under this section shall be 35 percent.
(2) OPERATION, MAINTENANCE, REHABILITATION, AND REPLACEMENT.—The operation, maintenance, rehabilitation, and replacement of projects carried out under this section shall be a non-Federal responsibility.
(3) IN-KIND SERVICES.—The Secretary may credit the value of in-kind services provided by the non-Federal interest for a project or activity carried out under this section toward not more than 80 percent of the non-Federal share of the cost of the project or activity if such services are provided not more than 5 years before the date of initiation of the project or activity. In-kind services shall include all State funds expended on programs and projects that accomplish the goals of this section, as determined by the Secretary. The programs and projects may include the Illinois River Conservation Reserve Program, the Illinois Conservation 2000 Program, the Open Lands Trust Fund, and other appropriate programs carried out in the Illinois River basin.
(4) CREDIT.—

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(A) VALUE OF LANDS.—If the Secretary determines that lands or interests in land acquired by a non-Federal interest, regardless of the date of acquisition, are integral to a project or activity carried out under this section, the Secretary may credit the value of the lands or interests in land toward the non-Federal share of the cost of the project or activity. Such value shall be determined by the Secretary.

(B) WORK.—If the Secretary determines that any work completed by a non-Federal interest, regardless of the date of completion, is integral to a project or activity carried out under this section, the Secretary may credit the value of the work toward the non-Federal share of the cost of the project or activity. Such value shall be determined by the Secretary.

(h) MONITORING. – The Secretary shall develop an Illinois River basin monitoring program to support the plan developed under subsection (b). Data collected under the monitoring program shall incorporate data provided by the State of Illinois and shall be publicly accessible through electronic means, including on the Internet.

1.3 Summary of Location, Habitat Problems, and Opportunities*. Two islands in the Alton Pool, which stretches from River Mile 0 to 80 on the Illinois River, are being evaluated – Fisher Island (River Mile 38.8 L), and Wing Island (River Mile 40.3 R). Fisher Island is located in Greene County, Illinois; Wing Island is located in Pike County, Illinois. The islands are located between the cities of Kampsville and Pearl, Illinois. Figure 1 provides a vicinity and general location map for the Alton Pool Islands Restoration Project.

A dramatic loss in productive backwaters, side channels, and channel border areas due to excessive sedimentation and erosion is limiting ecological health and altering the character of this unique floodplain river system. In particular, the Illinois River has lost much of its critical spawning, nursery, and overwintering areas for fish, habitat for diving ducks and aquatic species, and backwater aquatic plant communities.

An opportunity exists to restore and maintain the degraded Wing and Fisher Islands and their associated side channels and increase the ecological integrity of the Illinois River.

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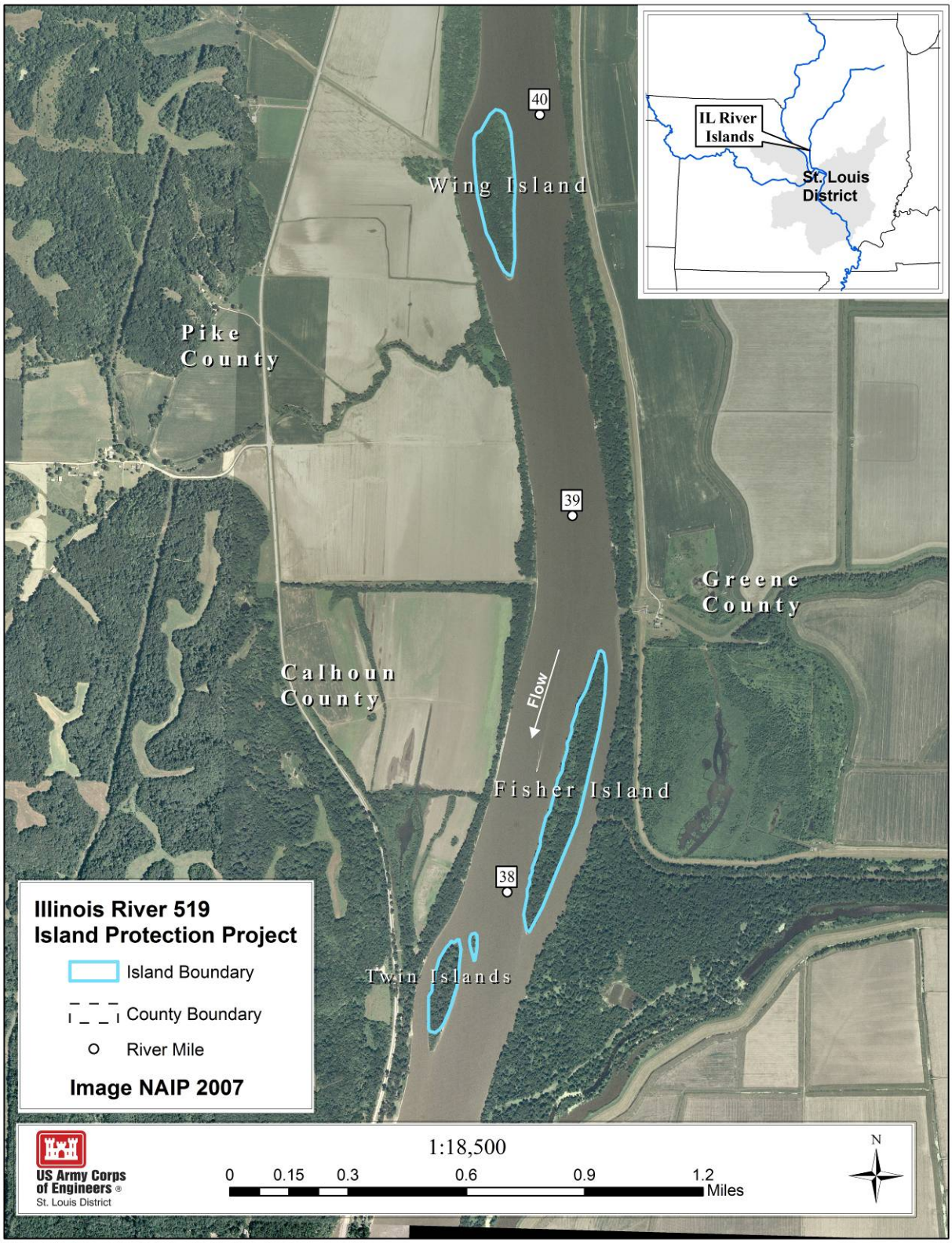

Figure 1. Alton Pool Islands Restoration Project area; Pike and Greene Counties, Illinois.

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1.4 Project Selection – Prioritization Process. The Illinois River Basin Comprehensive Plan identified four priority programs: (1) the development and implementation of a program for sediment removal technology, sediment characterization, sediment transport, and beneficial uses of sediment; (2) the development and implementation of a program for the planning, conservation, evaluation, and construction of measures for fish and wildlife habitat conservation and rehabilitation, and stabilization and enhancement of land and water resources in the basin; (3) the development and implementation of a long-term resource monitoring program; and (4) the development and implementation of a computerized inventory and analysis system. The study area for these programs is the entire Illinois River Basin. However, study and restoration initiatives place particular focus on the rivers, streams, floodplain, and adjacent riparian corridors.

1.4.1 Prioritization of Critical Restoration Projects. Section 519 currently authorizes the planning, design, and construction of Critical Restoration Projects with a per project limit of $20 million Federal. The specific criteria and prioritization process for Critical Restoration Projects are as follows:

- Section 519 of WRDA 2000 specifies that if a restoration project for the Illinois River basin will produce independent, immediate, and substantial restoration, preservation, and protection benefits, the Corps of Engineers shall proceed expeditiously with the implementation of the project.

- Additional criteria have been developed as part of the Plan, including giving priority to projects that improve quality and connectivity of habitats; providing habitat for regionally significant species; reducing sediment delivery; naturalizing hydrology; maximizing sustainability; considering and addressing threats; improving water quality; considering other agency activities; and having public support.

The ecological merits discussed above will be the most important selection factors. Other factors to be considered will include goal-specific factors, public interest and acceptability, and administrative issues.

1.4.2 Project Implementation Process. The project implementation process seeks to create a systemic, comprehensive approach that is accessible to project partners and stakeholders. It is important to emphasize that project implementation will not proceed rigidly in strict order of prioritization. Flexibility is essential, and the Corps of Engineers, working with sponsors and in consultation with agencies and stakeholders, will exercise reasonable judgment to resolve unexpected issues, respond to unforeseen opportunities, and ensure efficient program execution. Regulatory agencies will be included in the assessment and feasibility phases to better identify areas of concern as a watershed approach is taken during implementation of the program.

The four-part general project implementation process includes assessment, the feasibility study, implementation/construction of the project, and post-construction evaluation. The implementation process will have three separate decision phases –

initiation of assessments, initiation of project implementation reports (feasibility study phase); and identification of tentatively selected project and start of design/construction sequence. It is anticipated that decisions on which projects will proceed into each of these phases will be made annually, based on funding issues. Decisions to move forward with the program at each decision phase will be made by the Executive Committee. For the Corps, the Assistant Secretary of the Army has delegated approval of policy-consistent project implementation reports for projects which do not exceed a total Federal cost of $5 million to the Mississippi Valley Division Commander.

The proposed Alton Pool Islands Restoration Project of island and shoreline protection is consistent with the prioritization criteria for producing independent, immediate, and substantial restoration, preservation, and protection benefits; improving the quality and connectivity of habitats; considering and addressing threats; reducing sediment delivery; and maximizing sustainability.

1.5 Resource Significance. When determining Federal interest, it is important to clearly identify the significance of the resources being studied for restoration. The Corps of Engineers' *Principles and Guidelines* defines significance in terms of institutional, public, and technical recognition of the resources. The Illinois River begins at the point where the Des Plaines and Kankakee Rivers converge near the Will and Grundy County lines. The river flows for a distance of 273 miles, ultimately entering the Mississippi at Grafton, IL, about 40 miles north of St. Louis. The Illinois River is the largest tributary to the Mississippi River above the mouth of the Missouri River. The Illinois River is part of the Upper Mississippi River Basin which stretches from St. Paul, MN to Cairo, IL. Thus, its significance is often discussed in conjunction with the Upper Mississippi River and its Basin. For years, the Upper Mississippi River States (Illinois, Iowa, Minnesota, Missouri, and Wisconsin), non-governmental organizations, and other agencies have been engaged in activities that clearly demonstrate the institutional, public, and technical recognition of the resources of the Upper Mississippi River Basin.

<u>1.5.1 Institutional Recognition</u>. The formal recognition of the Upper Mississippi River Basin (including the Illinois River) in laws, adopted plans, and other policy statements of public agencies and private groups illustrate the significance of the basin to a variety of institutions. The U.S. Congress recognized the Upper Mississippi River System (UMRS) in Section 1103 of the Water Resources Development Act of 1986 as a unique, "…nationally significant ecosystem and a nationally significant commercial navigation system…" (WRDA 86). This Federal recognition of the UMR was not its first.

The importance of improving water quality in the UMRS was recognized by the creation and funding of the USDA Natural Resources Conservation Service (NRCS) Conservation Reserve Enhancement Program (CREP) in the Illinois and Minnesota River Basins. This has converted hundreds of thousands of acres of floodplain and highly erodible farmlands to native vegetation. NRCS has also improved water quality by restoring wetlands, through its Wetland Reserve Program (WRP).
Institutional recognition of the environmental importance of the Illinois River began to compete with economic recognition by the turn of the 20th Century (Carlander 1954,

Anfinson 2003). The Upper Mississippi River Fish and Wildlife Refuge was established in 1824 to protect fish. This refuge was established because the U.S. Bureau of Fisheries was concerned with the viability of commercial fish stocks. The Izaak Walton League, a prominent organization, was instrumental in generating Congressional support for this refuge. A second example of institutional recognition was the formation of the Upper Mississippi River Conservation Committee (UMRCC) composed of State and Federal biologists. Further, the Upper Mississippi River System - Environmental Management Program (UMRS-EMP) was established in 1986 in recognition of the environmental importance of the UMR. The program was authorized to conduct monitoring and habitat restoration activities along portions of the main stem of the Mississippi and Illinois Rivers. The EMP is one of the nation's first large scale restoration efforts bringing together the expertise of the U.S. Army Corps of Engineers, the U. S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey, the U.S. Environmental Protection Agency (EPA) and numerous state agencies. Congress reaffirmed the significance of the Upper Mississippi River System and the success of the program by reauthorizing the UMRS-EMP in 1999.

Several studies also emphasize the river's importance. The Great River Environmental Action Team (GREAT) Studies were the first regional assessment on channel management (GREAT I, II & III 1980). These studies helped stop environmentally damaging practices and recommended changes for better environmental management of the navigation system. The Comprehensive Master Plan for the Management of the Upper Mississippi River System prepared by the Upper Mississippi River Basin Commission (UMRBC 1982) included many recommendations that expanded assessments to other cumulative effects and made recommendations for future programs. The Upper Mississippi River and Illinois Waterway System Navigation Study effort was the latest evaluation of large scale navigation capacity and ecosystem restoration needs. It was a massive institutional effort involving many standing committees and significant coordination; for example one interagency committee met more than 50 times. Additionally, a large number of groups supported the effort: American Rivers, American Waterway Operators, Audubon Society, Illinois Stewardship Alliance, Midwest Area River Coalition 2000, Mississippi River Basin Alliance, National Corn Growers Association, The Izaak Walton League of America, The Nature Conservancy, The Sierra Club, Upper Mississippi, Illinois and Missouri River Association, and the Upper Mississippi River Conservation Committee and others. The ambitious tentatively selected plan seeks to improve navigation and the environment, and make system management more efficient and effective. The plan's authorization recommends $2.2 billion in navigation improvements and $1.7 billion in ecosystem restoration further demonstrating the strong institutional support and significance of the UMRS to the nation.

1.5.2 Public Recognition. The Upper Mississippi River System and associated environments have a rich record of human history spanning over 12,000 years and may be one of the most archeologically and historically significant regions in the country. The abundant diverse ecological resources found along the UMR have attracted and

sustained human populations for thousands of years, providing food, water, shelter, and transportation.

Currently, 30 million people occupy the region. Nearly 80 percent of the population lives in urban areas along the rivers: Minneapolis-St. Paul, La Crosse, Dubuque, Davenport-Bettendorf-Rock Island-Moline (Quad Cities), Muscatine, Quincy, St. Louis, Hannibal, Cape Girardeau, Chicago, and Peoria. These communities developed because of the transportation provided by the river; and they and their industry are sustained by the river's water supply, waste assimilation capabilities, and commerce transport capacity. Additionally, over $6.6 billion dollars in annual revenue is generated from people recreating on the river. People hunt, fish, boat, sightsee or otherwise visit the river approximately 12,000,000 visitor-days annually (Black et al. 1999). This recreation supports almost 150,000 jobs in the river corridor.

Additionally, the system is significant to the public because it supports key exports and the Nation's balance of trade. For example in 2000, the Upper Mississippi River System carried approximately 60 percent of the Nation's corn and 45 percent of the Nation's soybean exports shipped at roughly 60 to 70 percent of rail shipping cost. Other commodities shipped on the system include coal, chemicals, petroleum, materials (sand, gravel, iron ore, steel, and scrap), and manufactured goods. The existing navigation system generates an estimated $1 billion of annual transportation savings at an annual operation, maintenance, repair, replacement, and rehabilitation costs of approximately $115 million (USACE 2004b).

Public involvement in river related issues, programs, and studies has been very positive. The public have helped identify and prioritize important resources. In public opinion surveys and focus panels, the public has supported the multiple use nature of the river and emphasized water quality, sedimentation, and habitat degradation as continuing problems.

1.5.3 Technical Recognition. Numerous scientific analyses and long-term evaluations of the Upper Mississippi River Basin have documented its significant ecological resources and proposed ecosystem restoration. A few examples of the efforts to identify, quantify, and understand the ecological significance of the basin are described below.

In a 1995 report, the U.S. Department of the Interior (DOI) listed large streams and rivers as endangered ecosystems in the United States. The DOI documented an 85 to 98 percent decline in this ecosystem type since European settlement. Two of the world's largest floodplain-river ecosystems are within the UMRS, namely, the Upper Mississippi and Illinois Rivers. The UMRS is one of the few areas in the developed world where ecosystem restoration can be implemented on large floodplain-river ecosystems (Sparks 1995).

The UMRS ecosystem consists of hundreds of thousands of acres of bottomland forest, islands, backwaters, side channels and wetlands—all of which support more than 300

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species of birds, 57 species of mammals, 45 species of amphibians and reptiles, 150 species of fish, and nearly 50 species of mussels. More than 40 percent of North America's migratory waterfowl and shorebirds depend on the food resources and other life requisites (shelter, nesting habitats, etc.) that the system provides. The following is a sample of characteristics that are of particular importance in the UMRS or are rarely found in other areas.

- The Mississippi River System is the largest riverine ecosystem in North America and third largest in the world.
- 300,000 acres of the floodplain are within the National Wildlife Refuge System.
- It is a migratory flyway for 40 percent of all North American waterfowl.
- It is a globally important flyway for 60 percent of all bird species in North America.
- At least 25 percent of all fish species in North America are found in the UMRS
- The system includes a variety of scarce habitats
- The system is important habitat for 286 state-listed or candidate species and 36 Federally-listed or candidate species of plants and animals.

In addition to the numerous biological functions the river system provides, it also offers many ecosystem services to the nation and region (Lubinski et al. 2007). Ecosystem services are a state-of-the-art method to value and monitor the condition and trends of the world's ecosystems through the services they provide to humans (clean water, food, forest products, flood control, and natural resources). This is one way to assess the consequences of ecosystem change on human well-being and establish the need to restore ecosystem condition and practice sustainable use. Declining ecosystem services provide incentive to restore, conserve or enhance ecosystems. In recognition of the importance of establishing the value of the UMR, the UMRS Science Panel, along with national experts adopted the classification of ecosystem services proposed by the UN Millennium Assessment for the UMR (Farber et al. 2006; Millennium Ecosystem Assessment 2005). Some of the services the Mississippi River System provides include aesthetics, recreation, science, education, spiritual, historic, food, genetic resources, raw materials, water supply, biological regulation, flood regulation, nutrient regulation, soil retention, and waste regulation. These services show the wide range of river uses. Currently, only limited tools are available to quantify these benefits, but even rough assessments point to the tremendous value of the system.

The ecological health of the Illinois River system has declined significantly over time due to the combined effects of sedimentation, altered hydrology, and other modifications to the basin. Despite this decline, the Illinois River retains a seasonal flood pulse, and more than half of its original floodplain remains unleveed and open to the river (Sparks et al. 1998). The Illinois River Basin also represents one of the most productive resources in the Midwest, and has high potential for restoration (USACE 2007). The National Research Council identified the Illinois River as one of three large-floodplain river systems in the lower 48 states with the potential to be restored to an

approximation of their outstanding biological past. In recognition of the UMRS's need for restoration, stakeholders have identified over 2,600 restoration objectives in more than 1,000 separate sites. This gives an indication of the overall level of awareness and need for ecosystem restoration on the UMRS.

1.5.4 Significance of the Alton Pool Islands Restoration Project. Historically, the complexes of side channels along the main stem Illinois River have provided incredibly rich habitat for fish and wildlife. There has been a dramatic loss in side channel and island habitat due to excessive sedimentation within the side channel, as well as erosion of the islands themselves. A review of the 1903 Woermann Maps revealed estimates of 94 islands with a total length of approximately 75 miles (Table 1) (USACE 2007). However, length of side channel habitat calculated using recent Illinois River Navigation Charts revealed approximately 57 islands on the Illinois River that create approximately 54 miles of side channel (Table 1) (USACE 2007). The contemporary extent of islands and side channels represents a relatively dramatic decline from 1903. Using this observed rate of decline, the Illinois River Basin Restoration Comprehensive Plan calculated that without any action, side channel length would decrease at the rate of approximately 0.25 percent per year (USACE 2007). Another study conducted by IDNR and USACE personnel in 2001, found that 14 of 18 islands in Alton Pool, which extends from the mouth to Illinois River mile 80, required bank protection to reduce excessive island erosion and loss of island/side channel length. This loss of habitat is limiting the ecological health and altering the character of this unique floodplain river system. Additionally as the Illinois River becomes increasingly stabilized, the potential for natural island formation and associated off-channel habitat creation is diminished or eliminated. This loss emphasizes the need for the Alton Pool Island Restoration Project to restore the existing islands and prevent further loss.

Table 1. Estimated number and length of historic islands/side channels by pool (USACE 2007).

Pool	**Number of Islands* / Side Channels****		**Length in Miles**	
	1903*	**2007****	**1903**	**2007**
Dresden	4	3	1.5	1.9
Marseilles	12	6	4.5	4.7
Starved Rock	8	5	6.0	5.0
Peoria	23	12	14.5	7.6
La Grange	24	13	25.0	17.7
Alton	23	18	23.0	17.2
Total	**94**	**57**	**75.0**	**54.0**

1.6 Discussion of Prior Studies, Reports, and Existing Water Projects. The following studies or programs have applicability to the Illinois River and/or the Alton Pool Island Restoration Project:

Ecological Status and Trends of the Upper Mississippi River System, 1998: A report of the Long Term Resource Monitoring Program. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI. 1998.

In 1998, EMP produced a report on the status and trends of UMRS ecology (USGS 1999). This report summarizes monitoring data alongside historical observation and other scientific findings. This report also served as background material for the U.S. Army Corps of Engineers' Report to Congress that provided recommendations for future environmental management of the UMRS. The Status and Trends Report provided six criteria for a healthy ecosystem: 1) The ecosystem supports habitats and viable native animal and plant populations similar to those present prior to any disturbance; 2) The ecosystem is able to return to its pre-existing condition after a disturbance, whether natural or human-induced; 3) The ecosystem is able to sustain itself; 4) The river can function as part of a healthy basin; 5) The annual flood pulse "connects" the main channel to its floodplain; and 6) Infrequent natural events – floods and droughts – are able to maintain ecological structure and processes within the reach.

The Classification of Aquatic Communities in the Illinois River Watershed and Their Use in Conservation Planning, The Nature Conservancy, December 1998.

This report focuses on the aquatic conservation planning process, beginning with a description of the aquatic community classification system and the rationale for its development. The abiotic classification of stream and lake habitats is outlined, followed by a description of the biotic classification of fish alliances. The use of this classification system in conservation planning is discussed, followed by conclusions drawn from this work.

Threats to the Illinois River Ecosystem, The Nature Conservancy, December 1998.

The document summarizes the results of the threat assessment, which concludes that altered hydrology, habitat loss, sedimentation, and altered water quality are the four most critical stresses to the Illinois River.

Unified Watershed Assessment and Watershed Restoration Priorities for Illinois, Watershed Management Committee, 1998.

This report and the associated action plan list priority watersheds in the State of Illinois and call for coordination of activities and resources to help protect and/or restore water resources. The Illinois River Watershed and many of its tributary watersheds are listed as priority watersheds.

General Investigation Reconnaissance Study, Illinois River, Ecosystem Restoration, Section 905(b) Reconnaissance Analysis, U.S. Army Corps of Engineers, Rock Island District, IL, 1999a.

This report concludes that ecosystem restoration in the Illinois River Basin is within the Federal interest and that Corps of Engineers involvement is appropriate. Further, measures to address the loss of backwaters, changed hydrologic regimes and water fluctuations, and other impacts upon the system are identified and found to have no anticipated negative environmental impacts.

The resulting Project Study Plan and Cost Sharing Agreements with the Illinois DNR have resulted in the initiation of the Illinois River Ecosystem Restoration Feasibility Study.

Critical Trends in Illinois Ecosystems. Critical Trends Assessment Program (CTAP), Illinois Department of Natural Resources, Springfield, IL, 2001.

This report provides an overview of each of the 16 CTAP projects. The report summarizes the findings of each project, describes land cover, and provides initial ecosystem monitoring and regional assessment results, including resource rich areas.

A River That Works and a Working River: A Strategy for the Natural Resources of the Upper Mississippi River System. Upper Mississippi River Conservation Committee (UMRCC), Rock Island, IL, 2000.

This report describes the critical elements of a strategy for the operation and maintenance of the natural resources of the UMRS and its tributaries including the setting of restoration goals and objectives. The report calls for the restoration of 100,000 acres of sandbar, floodplain forest and island habitat benefits by 2010.

Upper Mississippi River System Habitat Needs Assessment: Summary Report 2000. U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO, 2000.

The summary report and its supporting technical report were the result of a system-wide analysis of historical, existing, and forecasted habitat conditions. The information in the report was developed to help guide future habitat projects on the UMRS.

Initial Assessment, Illinois River Basin Restoration, Section 519 of the Water Resources Development Act (WRDA) of 2000, U.S. Army Corps of Engineers, Rock Island District, IL, 2002.

The initial assessment served as a reconnaissance-level report outlining the Federal interest, work for future phases, relationship to the Illinois River Ecosystem Restoration Study, and summary of proposed Critical Restoration Projects and Long-Term Resource Monitoring.

Upper Mississippi and Illinois River Floodplain Forests Upper Mississippi River Conservation Committee, Wildlife Technical Section, 2002.

This report provides a historic context, current status and future outlook for the expansive floodplain forest of the Upper Mississippi River System, and recommended actions to sustain and improve the forest habitat on the river and the Refuge.

Conservation Priorities for Freshwater Biodiversity in the Upper Mississippi River Basin, R. Weitzell, E. McKhoury, P. Gagnon, B. Schreurs, D. Grossman, and J. Higgins, Nature Serve and The Nature Conservancy, July 2003.

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This study evaluates the components and patterns of the freshwater biodiversity of the UMR basin and identifies the most significant places to focus conservation opportunities to maintain it.

2004 Report to Congress, Upper Mississippi River System Environmental Management Program. U.S. Army Corps of Engineers (USACE), Rock Island District, Rock Island, IL, 2004.

This Report to Congress is the second formal evaluation of the Environmental Management Program (EMP). This report describes EMP's accomplishments, including development of a systemic habitat needs assessment; and identifies certain program adjustments.

Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study, Feasibility Report. U.S. Army Corps of Engineers (USACE), Rock Island District, Rock Island, IL, 2004.

The feasibility study (USACE 2004b) examines multiple navigation and environmental restoration alternatives, and contains the preferred integrated plan as a framework for modifications and operational changes to the Upper Mississippi River and Illinois Waterway System to provide for navigation efficiency and environmental sustainability.

2005 Master Plan for the Illinois River, Illinois River Miles 0 to 80, St. Louis District River Engineering. U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO 2005.

The St. Louis District's Master Plan for the Illinois River (USACE 2005) consists of a series of plates depicting existing and planned river regulating structures (i.e. dikes, revetment, chevrons, and bendway weirs). It also shows the locations of dredge cuts and dredge spoil during the past decade. Mussel bed locations are also depicted in these plates. The plan identifies proposed structures or modifications to existing structures for Illinois River miles 0-80 including erosion control and enhancement work on Wing and Fisher Islands.

Upper Mississippi River Comprehensive Plan - Draft Report. 2006. U.S. Army Corps of Engineers (USACE), Rock Island District, Rock Island, Illinois.

This report addresses water resource and related land resource problems and opportunities in the Upper Mississippi and Illinois River basins from Cairo, Illinois to the headwaters of the Mississippi River. The plan addresses systemic flood damage reduction by means of structural and non-structural flood control and floodplain management strategies; continued maintenance of the navigation project; management of bank caving and erosion; watershed nutrient and sediment management; habitat management; recreation needs; and other related purposes. The report also provides useful information for each Drainage and Levee District regarding: land cover acres, levee over-topping elevations, start of damages, average annual damages, design flood elevation, critical infra-structure, tributary feeders, number of landowners, percent floodplain below the 2-year flood elevation, the cross-sectional area of floodplain below the 2-yr flood elevation, and a measure of topographic variation. The Upper Mississippi River

Comprehensive Plan also assesses the environmental restoration opportunities with structural to non-structural Flood Damage Reduction plans. The plan determined that significant systemic ecosystem restoration opportunities exist within the Upper Mississippi River floodplain, but no cost-justified flood damage reduction projects were identified that would support inclusion of an ecosystem restoration component.

Illinois River Basin Restoration Comprehensive Plan With Integrated Environmental Assessment – Final Report. U.S. Army Corps of Engineers (USACE), Rock Island District, Rock Island, IL, March 2007.

The report assesses the total basin restoration needs and makes recommendations regarding continuing implementation under the existing authority and conducts evaluation of ways to improve implementation. One of the major concerns on the river system is the potential loss of connected off-channel areas. The desired future includes the restoration and maintenance of side channel habitats. The preferred comprehensive plan alternative calls for adding protection to 15 of the 56 existing islands on the Illinois River. Protecting islands from the effects of accelerated erosion caused by commercial and recreational navigation and wind-fetch is needed where important habitat, private property, or archeological resources are adversely impacted.

Environmental Science Panel Report: Establishing System-wide Goals and Objectives for the Upper Mississippi River System. Galat et al. 2007

The report presents suggested refinements to system-wide ecosystem goals and objectives and proposes steps to take in the further development of objectives for the system.

The information presented in these studies was considered during the planning of this project.

2. ASSESSMENT OF EXISTING AND FUTURE WITHOUT CONDITIONS*

This section is the National Environmental Policy Act (NEPA) equivalent of Affected Environment and Environmental Consequences of the No Action Alternative.

2.1 Summary of Historic and Current Project Area Conditions. A historical look at the main stem Illinois River in the project area, RM 40.2 down to RM 37.8, shows a wide floodplain extending from the left descending bank of the river to the bluffs approximately two miles to the east. Four island and side channel complexes (Wing, Spar, Fisher, and Twin) were present in this reach along with a large backwater lake in the meandering channel just above the mouth of Apple Creek. The 1904 Woerman maps and aerial imagery from 1938, 1975, 1995, and 2007, indicate that the islands have moved down river and towards shore due to sediment eroding at the head and channel side and depositing along the bank side and at the tail end. From 1938 to 1975 the rate of deposition was greater than the rate of erosion, and all the islands gained acreage and the side channels decreased in width. The increase in island size could be

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due to changes caused from impoundment. From 1975 to current, the side channels continued to decrease in width while the islands (except Little Twin) have maintained their size. Spar Island's side channel has almost completely filled in and the island is now part of the floodplain (Fig. 1). Additionally the floodplain has been disconnected from the river by the Hartwell and Keach levees along the left descending bank.

Wing, the uppermost island in the reach, and its associated side channel has been the least impacted over time. The island has significant erosion on the upstream island tip. Just across the river adjacent to the left descending bank, the Spar Island side channel now functions only at high river levels. Sedimentation has closed off the upper end of the side channel for nearly 100 yards, so the remnant channel now functions more like a backwater. This has taken place since 2003 when it was still a flowing side channel at most river levels. Further downstream along the left descending bank, Fisher Island is eroding along the upstream end of the island and the main channel border. Sedimentation from the channelized and relocated mouth of Apple Creek, which enters at the middle of the side channel, has greatly reduced the depth in the lower end of the side channel and provides a constant source of debris that hastens side channel sedimentation. The Twin Islands complex, along the right descending bank just across the main channel from the lower end of Fisher Island, has been severely modified. Older charts and imagery show big Twin Island to be smaller than it is today. Little Twin Island, however, has lost almost half its area and is in danger of disappearing due to severe erosion at the upstream island tip and along the main channel border. Vegetation has been virtually eliminated from the island because of the erosion.

2.2 Natural Resources. The Illinois River Basin includes 30,000 square miles (19 million acres) in Wisconsin, Indiana, and Illinois. The Illinois River arises at the confluence of the Des Plaines and Kankakee watersheds. The most northern stretch, the "Upper Illinois," has relatively swift currents due to a fairly steep incline in its narrow, young valley. The upper river ends at Hennepin in Putnam County. Here, the Illinois turns southward and develops a gentle gradient across a broad, 3 to 6 mile wide, shallow valley, the ancestral Mississippi River Valley. At Beardstown the middle river ends giving way to the lower river which extends to the mouth at Grafton (USACE 2007).

<u>2.2.1 Terrestrial Habitat</u>. The island land cover classification is woody wetland (Figure 2). The adjacent floodplain has areas of woody wetland, emergent herbaceous wetland, and deciduous forest (Figure 2). The forested areas are dominated by willow, cottonwood, and silver maple while the alluvial fan of Apple Creek contains bottomland hardwood forest. On the interior of the levee, the area is largely dominated by agricultural fields. The nearest island habitat upstream from the project site is at Van Geson Island, located on the left descending bank from approximately river mile 45.1 to 45.5. Spar Island, located on the left descending bank just upstream of Fisher Island and across from Wing Island, has already been lost to sedimentation and vegetation encroachment. The nearest island habitat downstream is at Twin Islands, located on the right descending bank from river mile 37.9 to 37.5.

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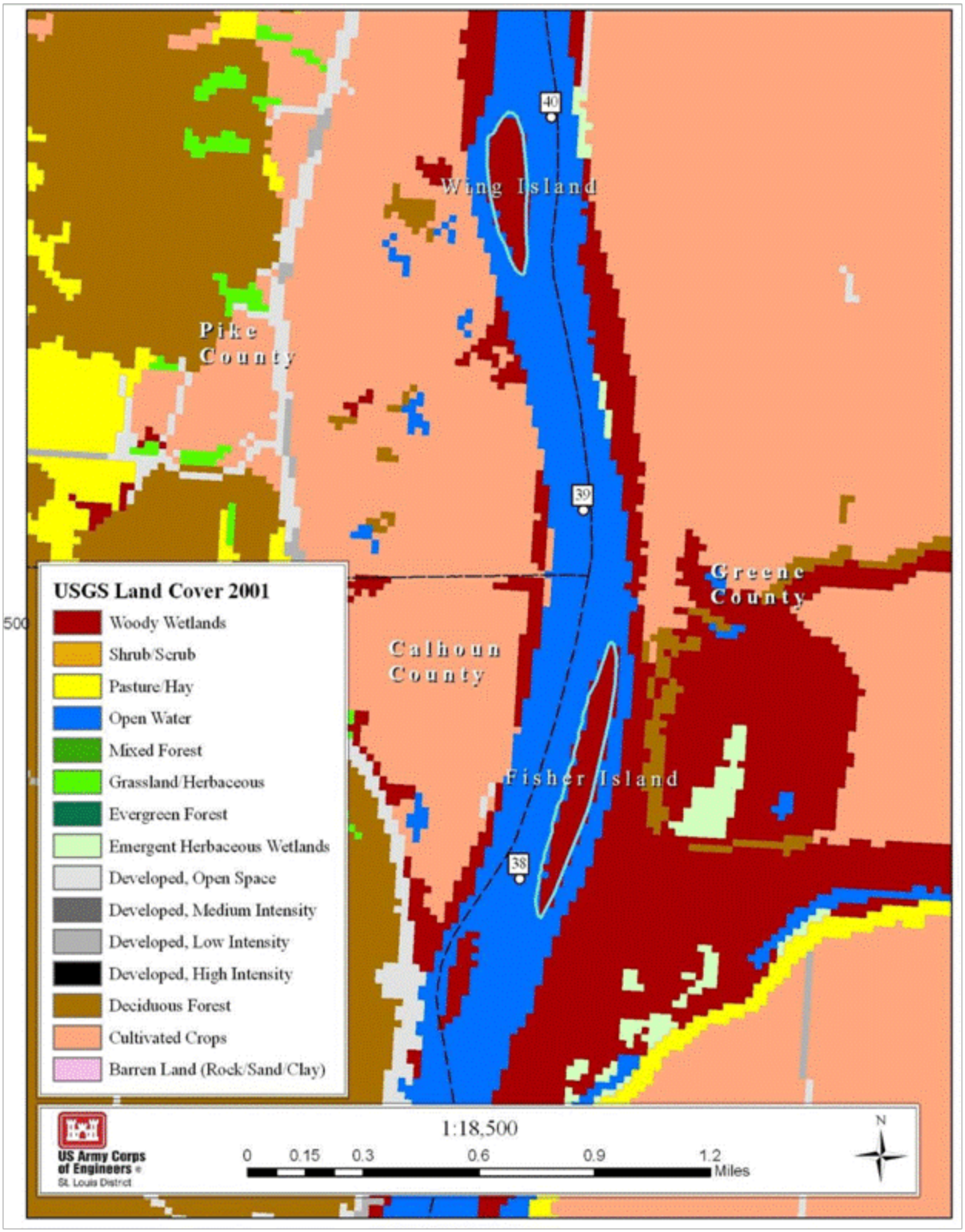

Figure 2. Land cover classification for the Alton Pool Islands Restoration Project area; Pike and Greene Counties, Illinois; St. Louis District.

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The upstream end and channel side of the Alton Pool Islands are currently experiencing significant erosion from boat traffic wave action and high flow currents. Deposition along the bank side of the island continues to narrow the side channel. Without action, the island heads will continue to erode and the side channel width will continue to decrease.

2.2.2 Aquatic Habitat. The aquatic habitat of the UMRS historically consisted of areas of aggrading and degrading sandbar and island complexes create by natural erosional/depositional processes resulting in a more diverse habitat assemblage. However, as rivers become increasingly stabilized, erosion is often accelerated, while sediment deposition in or near the main channel is often eliminated due to the requirement to maintain the navigation channel. Despite efforts to eliminate sediment deposition, most investigators of the Illinois River agree that significant sedimentation is occurring under current conditions filling in side channel and backwater areas and degrading water quality at a rate faster than the natural communities can respond. According to previous studies, by the year 2050, the Illinois River is predicted to lose a significant portion of its side channel and backwater areas which are expected to convert to mud flats. However, according to Demissie and Bhowmik (1986), equilibrium between the sediment supply and transport out of Peoria Lake, the largest and deepest pool along the Illinois River and upstream of the project area, will be reached within the next few years. Thus the rate of new sediment input may be slowing. The navigation channel has not changed significantly in plan form over the period of record. Higher flow velocities and maintenance dredging along the channel effectively prevent significant change along its length. The location and area of the main channel is expected to remain relatively constant with the exception that it will become more defined within the various pools along the Illinois River. Overall, the physical habitats (structure) and the processes that create and maintain those habitats (function) have been greatly altered, reducing populations of plant and animal species in the basin (USACE 2007). In total, these alterations have led to a decline in the ecological health to the point where aquatic plants beds have been virtually eliminated from the lower river (USACE 2007).

Currently, the aquatic resources within the project area of the Alton Pool Islands are main channel, main channel border open water habitat and side channel. The existing river conditions and predicted future conditions within the project area create circumstances which exacerbate island erosion and prevent island creation and associated aquatic habitat. For the project islands, current deposition seems to be maintaining the overall island acreage. However, the WEST 2000 study predicts that within Alton Pool 17% of side channel area is anticipated to be lost. Based on data collected as part of the WEST study, it is anticipated that without any action future loss of side channel length will occur at the rate of approximately 0.25 percent per year (WEST 2000). This would result in a loss of approximately 6.5 additional miles of side channel habitats with no action. In the future without, we anticipate that side channel quality will continue to remain at relatively low levels. In many areas, there will be further losses of depth diversity due to sedimentation. Ultimately, the island's side channels may fill in resulting in the islands becoming part of the mainland.

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2.2.3 Wildlife. Mussel diversity is high in the Illinois River, with approximately 35 recorded mussel species, representing 12 percent of the freshwater mussels found in North America. Many of these species require both riverine and backwater habitat as part of their life cycle. In 2006, USACE contracted Ecological Specialists Inc. to study the unionid species composition, relative abundance, and distribution around the heads of Wing, Fisher, Spar, and Twin Islands. Thirteen live species and twelve dead species (shells) were found. Live samples were dominated by Threeridge (*A. plicata*) and Mapleleaf (*Q. quadrula*). No live or fresh dead individuals of threatened or endangered species were collected. The twelve dead shell species included four Illinois threatened species (Butterfly (*E. lineolata*), Spike (*E.dilatata*), Ebonyshell (*F. ebena*), and Black Sandshell (*L. recta*)) and the federal/Illinois endangered Higgin's Eye (*L. higginsii*). Although semi-quantitative sampling often underestimates mussel density, the study's density estimate indicates generally marginal or poor conditions. Additionally, only 5.8% of the 382 mussels collected were juveniles suggesting that mussels are generally not capable of adequate reproduction in this area (ESI 2006). This study was conducted in order to assist USACE and natural resource managers in determining, mitigating, or avoiding deleterious impacts to unionid resources living near the proposed project sites.

Other wildlife within the basin is also declining. Macro-invertebrate numbers are declining within the basin due to the alteration of physical habitats and the processes that create and maintain those habitats (USACE 2007). The Illinois River valley is a major migration corridor for raptors, Neotropical songbirds, shorebirds, waterfowl and others. It is utilized by 40 percent of all North American waterfowl and 326 total bird species, representing 60 percent of all species in North America. A survey conducted by the Illinois Natural History Survey in the fall of 1994 found that 81 percent of the fall waterfowl migration in the Mississippi flyway used the Illinois River (USACE 2007).

With island erosion and backwater sedimentation, habitat becomes less suitable and the species that utilize the project area will decline.

2.2.4 Fish. Historically, the fishery in the Illinois River was exceptional, with a 200-mile reach producing 10 percent of the total U.S. catch of freshwater fish in 1908, more than any other river in North America (Sparks 1992). The river is home to 115 fish species, 95 percent are native species. A group of aquatic organisms that is particularly representative of the Illinois River is the "Ancient Fishes" such as the paddlefish and sturgeon. Ancient fish have existed since prehistoric times. While few of the ancient fishes found in the Illinois River watershed are threatened or endangered, they do represent several taxonomic families that are of special importance in the context of aquatic conservation. Today, the paddlefish is the sole representative of the family Polyodontidae in North America. The gar family is believed to be restricted to North and Central America. The bowfin family (Amiidae) is represented by only one species, *Amia calva*, which is regularly found in the Illinois River. The majority of these fish are migratory by nature. Paddlefish migrate upstream prior to spawning over gravel beds. Shovelnose sturgeon ascend tributaries to spawn. The ancient fish utilize a diversity of river habitats, flowing channel habitats, side channels, and backwater areas.

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Many native fish populations are considered limited in the Illinois River from the loss of backwater areas that provide sufficient depth for spawning, nursery and overwintering habitat and competition with non-native species (USACE 2007). Without the project, additional backwater habitat will be lost, negatively affecting native fish.

2.2.5 Hazardous, Toxic, and Radioactive Waste (HTRW). A Phase I HTRW Environmental Assessment was performed in conformance with the scope and limitations of ASTM Practice E 1527-05 for the project. This assessment has revealed no evidence of recognized environmental conditions in connection with the project. If any recognized environmental conditions are identified during the construction of the project features, the work should cease and the Environmental Quality office of the St. Louis District must be notified immediately to reassess the project area.

2.2.6 Prime and Unique Farmland. U.S. Department of Agriculture, Natural Resources Conservation Service classifies Fisher Island and the floodplain along the left descending bank as prime farmland if drained. Wing Island and the right descending bank line are not considered prime farmland. Without the project, the island heads would continue to erode.

2.3 Endangered and Threatened Species. The Fish and Wildlife Service as part of the Endangered Species Act consultation for the Illinois River Basin Restoration Comprehensive Plan with Integrated Environmental Assessment stated “the most effective and efficient way to accomplish compliance with the ESA for the Illinois River Ecosystem Restoration Studies is to complete site specific and species specific BAs when enough information on specific ecosystem restoration project locations and restoration measures have been finalized. These species specific BAs would be completed before any contract for construction is entered into and before construction is begun. These BAs would accompany future site specific Environmental Assessments.” Therefore, a Tier I Biological Assessment (BA) is required and can be found in Section 8.3.

2.4 Wetland Resources. The Illinois River is a large river floodplain ecosystem where biological productivity is enhanced by annual flood pulses that advance and retreat over the flood plain (Sparks and Lerczak, 1993). Even though the majority of the Illinois River floodplain is used for row-crop agriculture, the landscape is surprisingly diverse. However a large percentage of the wide variety of wetland types has been converted to agricultural land or covered in silt (Bell, 1981). By 1937, 50 percent of the Illinois River flood plain had been converted from wetland to agricultural land by drainage and levee districts (Bell 1981, Warner 1998). The remaining wetlands are important because they provide important nest sites, food, and cover for fish, waterfowl, and wildlife.

The island land cover classification is woody wetland (Figure 2) and the adjacent floodplain has areas of woody wetland and emergent herbaceous wetland. Without the project, the wooded wetland at the head of the island would continue to erode. In the future, the tail end deposition that is maintaining the overall island size could be

eliminated due to channel maintenance activities causing overall island acreage to decrease.

2.5 Socioeconomic Resources and Human Use. The Illinois River was once one of the most productive fishing and duck hunting areas in the country. Currently, the Alton Pools project area is used for limited commercial and recreational fishing. Commercial fishermen typically target common carp, bigmouth and smallmouth buffalo, channel and flathead catfish, and freshwater drum. Recreational fishermen typically target catfish.

The standard unit of analysis for environmental justice is the census-designated Block Group. The Alton Pool Islands Restoration Project is split by three separate Block Groups. Due to the rural nature of the area, the three Block Groups are approximately 273 square miles. The three Block Groups encompass all of the Alton Pool Islands Restoration Project and several surrounding areas including agricultural and conservation lands. The population within the Block Groups is approximately 98.4% white and from 2000 to 2005 the population decreased by approximately 5.7%. Without the project, the side channels would continue to lose depth and width causing the hunting and fishing in the area to decline.

2.6 Historic and Cultural Resources. Archaeological surveys conducted by the Center for American Archaeology in the late 1970's did not identify any potentially significant archaeological remains in the project area. Additionally, on site field inspections of the shoreline cut banks of the project islands in 2006 by Dr. F. Terry Norris, St. Louis District Archaeologist similarly did not reveal any potentially significant archaeological remains. Therefore in the short term, continuing erosion of the upper ends of the islands will have no effect upon potentially significant archaeological remains. However with time, it is possible that the erosion of these islands may damage or destroy presently unknown buried archaeological remains located well away from the present shoreline.

3. PROJECT GOALS AND OBJECTIVES*

3.1 Problems and Opportunities. The hydrologic regime and sedimentation patterns of the Illinois River have been altered as a result of navigation system development as well as levee construction for urban and agricultural flood damage reduction. This has brought about the stabilization of the channel, and has contributed to habitat homogenization through the loss of backwaters, islands, and secondary channels leading to reduced biodiversity. This lack of habitat diversity limits certain fish and wildlife populations which are more adapted to the historic river condition. Innovative dike configuration efforts and restoration projects by the St. Louis District, in conjunction with the Illinois Department of Natural Resources, can create a more diverse flow, scour, and depositional pattern, creating valuable habitat diversity without affecting navigation.

In 2001 side channels and islands in Alton Pool were evaluated. Many of the side channels still provided relatively good habitat value but 14 of the 18 islands in Alton

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Pool (approximately 80 percent) required bank protection to reduce excessive island erosion and loss of island/side channel length (USACE 2007). Furthermore, the Illinois River Basin Restoration Comprehensive Plan (USACE 2007) indicates that Alton Pool contained 35 backwaters in 1903, 21 in 1969, and 18 in 1989.

In the future if no project was constructed, the wooded wetland at the head of the islands would continue to erode. The tail end deposition that is currently maintaining the overall island size would likely be eliminated due to navigation channel maintenance activities causing overall island acreage to decrease. Side channel width and depth will continue to decrease due to sedimentation and habitat quality will remain at relatively low levels. Ultimately, the island's side channels may fill in resulting in the islands becoming part of the mainland. This has occurred at Spar Island, within the project area. From 2003 to 2011, Spar Island's side channel converted from a connected flowing channel to an isolated backwater. Further decline in side channel acreage and habitat will adversely affect the aquatic species that utilize the project area, some of which are already limited (USACE 2007).

Within the project site, sedimentation and erosion are causing a loss of productive backwaters, side channels, and channel border areas at Fisher Island and Wing Island, limiting ecological health and altering the character of this unique floodplain river system. The existing river conditions and predicted future conditions throughout the Alton Pool exacerbate island erosion and prevent island creation. A loss of backwater, side channel, and channel border habitat is significant because the WEST 2000 study predicts that within Alton Pool 6.5 miles of side channel habitat is anticipated to be lost. Loss of these side channels in combination with the decline of side channels throughout the Alton Pool would result in loss of critical spawning, nursery, and overwintering areas for fish; habitat for diving ducks and other aquatic species. An opportunity exists to restore and maintain the degraded Wing and Fisher Islands and their associated side channels, in order to increase the ecological integrity of the Illinois River. The project will prevent the further degradation and restore the aquatic habitat diversity of the selected side channels and islands to provide substrate diversity, maintain volume and depth to sustain native fish and wildlife communities, and improve water and sediment quality.

3.2 Constraints. The following constraints have been identified for the system and individual projects:

- Navigation - Avoid significant adverse effects on Navigation of the Upper Mississippi River and Illinois Waterway.

- Flood Elevations - Avoid increases in flood elevations that would require mitigation of adverse effects. Due to the potentially high costs associated with mitigation actions, efforts will be made to avoid this threshold.

- Legal Compliance - Comply with all Federal regulations pertaining to the activities undertaken by the Corps of Engineers.

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3.3 Goals and Objectives. Project goals were developed from the Illinois River Basin system wide ecosystem restoration goals and objectives in direct response to widely identified system limiting factors. The overarching goal of the program is to restore and maintain ecological integrity, including habitats, communities, and populations of native species, and the processes that sustain them (USACE 2005, 2007).

3.3.1 Project Goals. The primary goals of the Alton Pool Islands Restoration Project at Wing and Fisher Islands are to:

- For at least 50 years during all erosive events within the project area, reduce sediment delivery to the Illinois River from island shoreline erosion, with the aim of eliminating excessive sediment load

- Within the project area, restore and maintain side channel habitat and island acreage for at least 50 years

- Restore the aquatic habitat diversity of side channels within the project area in order to provide adequate volume and depth for sustaining native fish and wildlife communities throughout the year. This aquatic habitat diversity should persist for at least 50 years.

3.3.2 Project Objectives.

- Decrease the deposition of sediment from Apple Creek into the Fisher Island side channel for at least 50 years

- Decrease the amount of sediment eroding off the heads of Wing and Fisher Islands for at least 50 years

- Prevent the loss of Wing and Fisher Islands and their associated side channels for at least 50 years

4. POTENTIAL MEASURES

The proposed measures are designed specifically to maintain and enhance existing habitat.

4.1 General. Development and preliminary screening of potential measures took place early on in the planning process to eliminate measures that were infeasible, did not meet project goals and objectives, or were impractical. During this process the PDT discussed using geotubes and live plant stakes to stabilize the eroding island banks. Geotubes are a porous woven bag that can be filled with dredge material to provide bank protection. Live plant stakes are placed in eroding banks where there roots can stabilize the otherwise bare dirt. The PDT felt that geotubes and live stakes would not stand up to the large and frequent floods that occur on the Illinois River. Non-structural measures were also considered. However, there are no non-structural measures that would achieve the goals and objectives of the project and thus they were not discussed

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further. Therefore, an array of measures that involved island and side channel preservation with rock were considered.

Areas of island erosion were determined using bathymetric data and site visits. Length and position of offshore rock measures was set to match the historic island footprint evident in the bathymetry data (Fig. 3 & 4) and aerial photography. Elevation (which determines width) for offshore measures was set at a 5 yr flood event height sufficient to protect the low elevation islands from erosion. Secondary considerations in height determination were impacts, costs and constructability.

Onshore rock measures were proposed for areas of heavy erosion as determined from bathymetry and site visits. Elevation was determined by the height of the bank. Placing rock to the top of the bank ensures complete erosion protection.

Onshore and offshore rock measures included:

- Revetment. A layer of large stone (revetment) is placed along a bank line to halt erosion. As an environmental measure, any woody vegetation along the bank line is incorporated into the revetment.

- Off-bank line Revetment. Off-bank line revetments are created by placing a parallel structure of stone a small distance from the eroding bank line. In doing so, erosion is reduced and diverse habitats are maintained and created. In some areas, the revetment is notched allowing fish to move between the fast water in the river channel and the slow water behind the off-bank line revetment.

- Notched Dikes. Notched Dikes are essentially the same as a regular stone dike, but a section of the dike is constructed to a lower elevation to promote water conveyance. This is usually done for environmental reasons such as creating a side channel. The notch invert elevation can vary and is dictated by the purpose of the notch.

- Bullnose Protection. Bullnose protection is a horseshoe shaped line of rock. Frequently, notches are interspersed in the line of rock to promote fish passage. The bullnose is usually placed at the historic position of the island head. The bullnose is designed to allow floodwaters to overtop it. Overtopping water forms a plunge pool immediately downstream of the structure's tip and sediments settle out on the existing island head.

- Hard points. Hard points are very short rock dikes that are used to stabilize side channel river banks. These navigation structures extend from the riverbank into the river and do not cause a significant buildup of sediment. They improve fish habitat by creating downstream scour holes. In narrow side channel reaches, alternating hard points along both sides of the channel may create sinuosity and promote flow.

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5. ALTERNATIVE PLANS*

5.1 Formulation of Alternative Plans. Bathymetric profiles were generated for both Wing (Figure 3) and Fisher Islands (Figure 4). Mutually exclusive alternative plans were formulated by combining the measures discussed above.

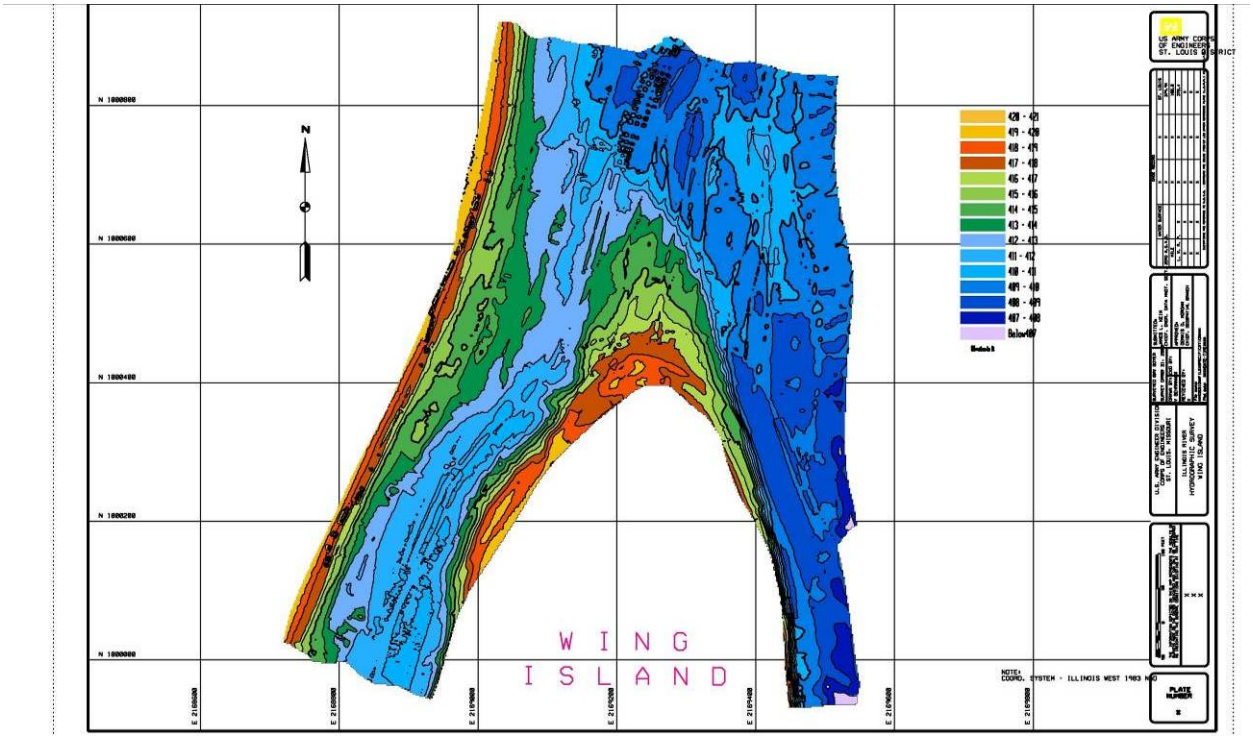

Figure 3. Bathymetric profile for the Wing Island; Pike County, Illinois; St. Louis District.

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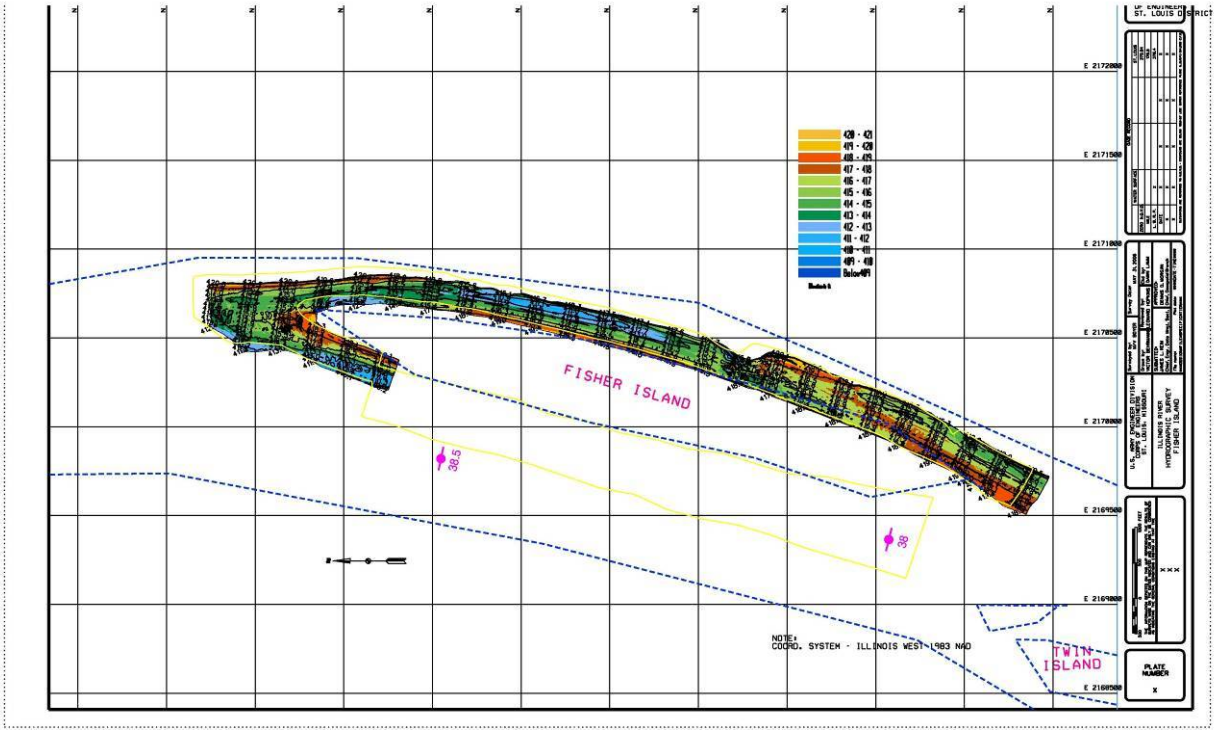

Figure 4. Bathymetric profile for the Fisher Island; Greene County, Illinois; St. Louis District.

5.2 Description of Alternative Plans. The four alternatives for Wing Island and the four alternatives for Fisher Island are summarized as follows:

The Wing Island Alternatives consist of the following:

- Alternative 1 – No Corps Action

- Alternative 2 – <u>Single Bullnose and Revetment</u>: Installation of a 750' long 434' NGVD tall stone structure along the historic location of the island head. The structure would tie into the side channel side of the island head and leave a fish passage channel along the river side of the island head. Revetment would be placed where the structure tied into the island head. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure (Figure 5).

- Alternative 3 – <u>Riprap Shoreline</u>: Installation of approximately 400' of revetment along the existing island head to an elevation of 434' NGVD. This would prevent the head of the island from eroding further (Figure 6).

- Alternative 4 – <u>Unrooted Bullnose with Revetment</u>: Installation of a 750' long 434' NGVD tall stone structure along the historic location of the island. The structure would not be tied into the island to allow fish passage along both sides of the island

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head. This alternative would prevent the head of the island from further eroding (Figure 7).

The Fisher Island Alternatives are described below. After reviewing historic photography, alternating hard points in the side channel were felt to be essential to keep the side channel open because:

- All side channels within the project area are narrowing with time
- Multiple islands within the Illinois River have lost their side channel becoming part of the shore
- Sediment deposition from Apple Creek is accelerating Fisher Island's side channel loss
- Side channels provide critical habitat to aquatic organisms: refuge from entrainment, protection from main channel current and cold winter temperatures, and abundant food.

Therefore, these features were included in all action alternatives. Five alternating 100' long hard points would be placed at the lower end of the side channel. These structures would be built to an elevation of 429' NGVD. They would promote sinuosity and depth at the lower end of the side channel and assist in passing the sediment load from Apple Creek.

- Alternative 1 – No Corps Action

- Alternative 2 – <u>Riprap Shoreline and Install Alternating Hard Points in Side Channel</u>: Installation of approximately 550' of revetment along the existing island head to an elevation of 429' NGVD. This would prevent the head of the island from eroding further (Figure 8).

- Alternative 3 – <u>Single Bullnose and Install Alternating Hard Points in Side Channel</u>: Installation of an 800' long 429' NGVD tall stone structure along the historic location of the island head. The structure would not be tied into the island to allow fish passage along both sides. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the structure's apex (Figure 9).

- Alternative 4 – <u>Single Bullnose with Extended Off-bank line Revetment on Riverside and Install Alternating Hard Points in Side Channel</u>: Installation of a 3,232' long 429' NGVD tall stone structure along the historic location of the island head and as off-bank line revetment along the riverside of the island. Notches would be placed at intervals in the off-bank line revetment. The structure would not be tied into the island to allow fish passage. This configuration would allow the head and riverside of the island to stabilize and accrete sediment while at the same time creating habitat for fish and wildlife in the plunge pool at the apex of the structure and behind the off-bank line revetment (Figure 10).

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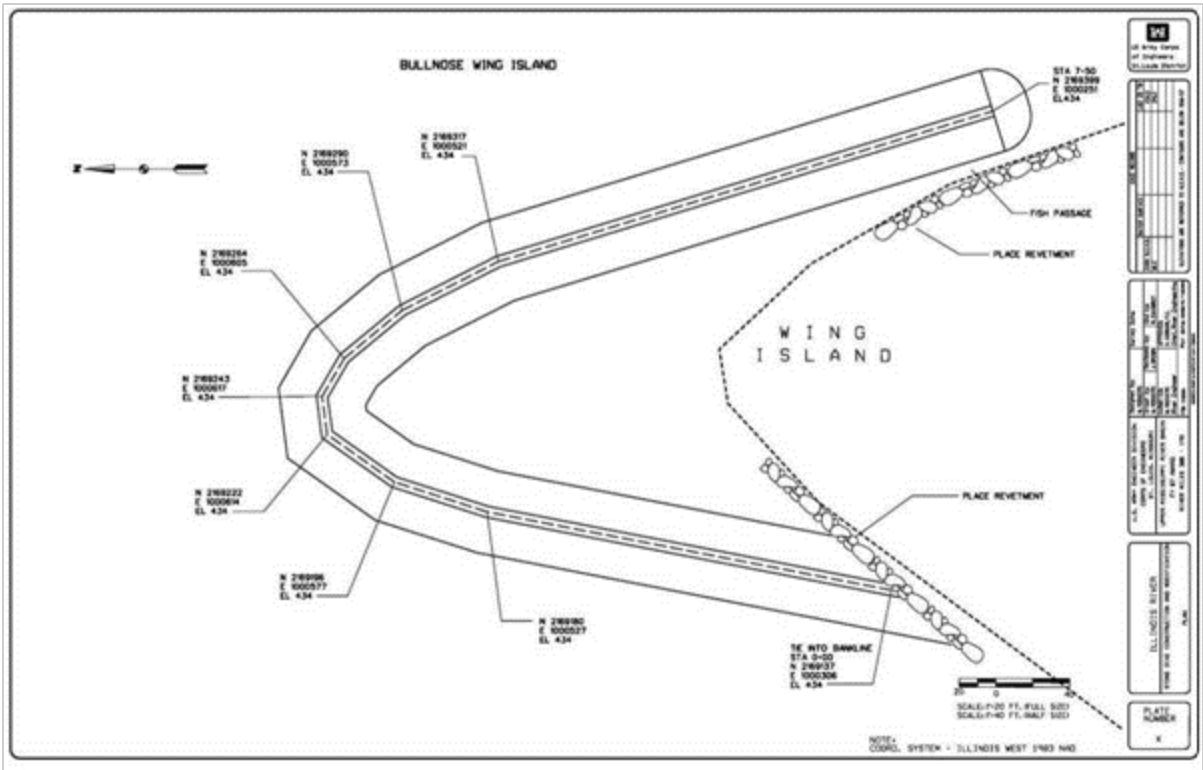

Figure 5. Wing Island Alternative 2 – Single bullnose and revetment.

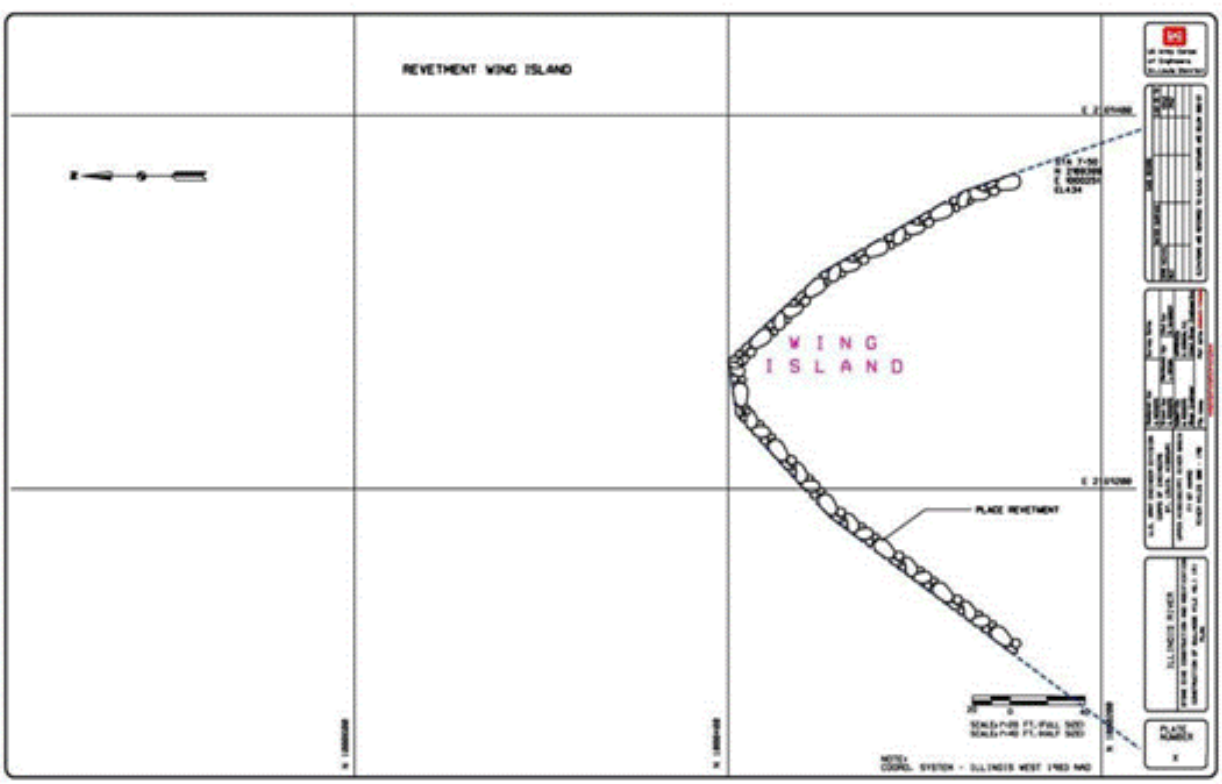

Figure 6. Wing Island Alternative 3 – Riprap shoreline.

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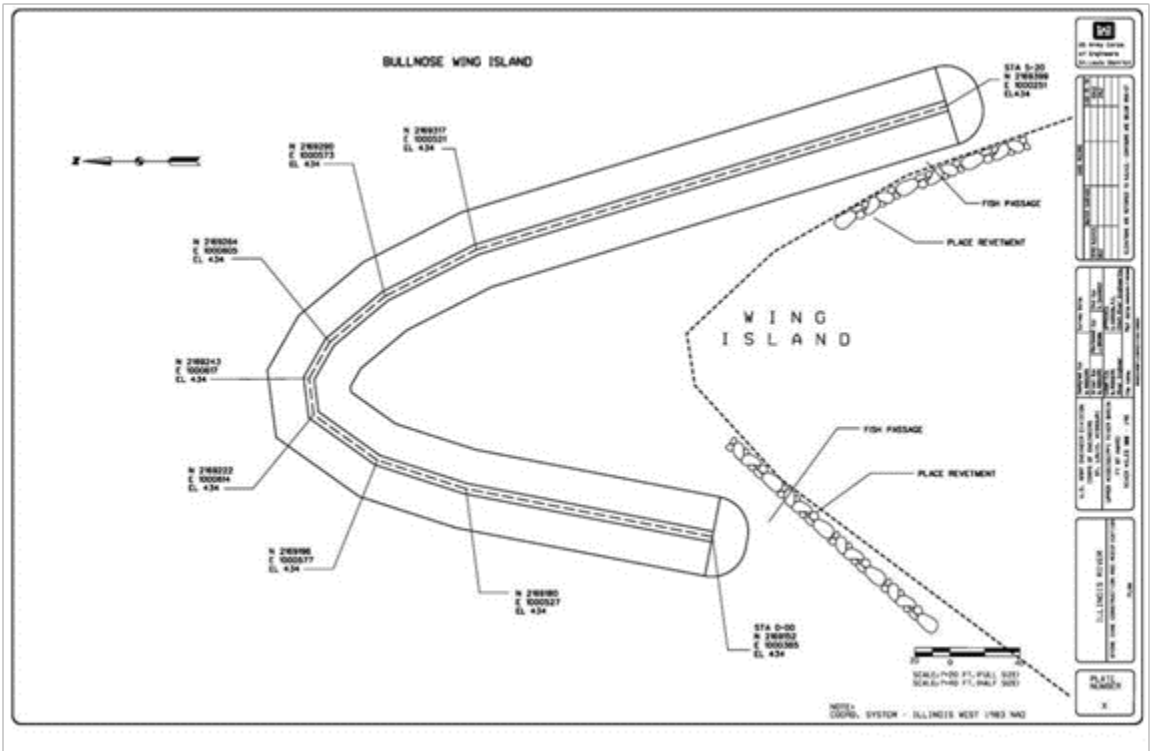

Figure 7. Wing Island Alternative 4 – Unrooted bullnose with revetment.

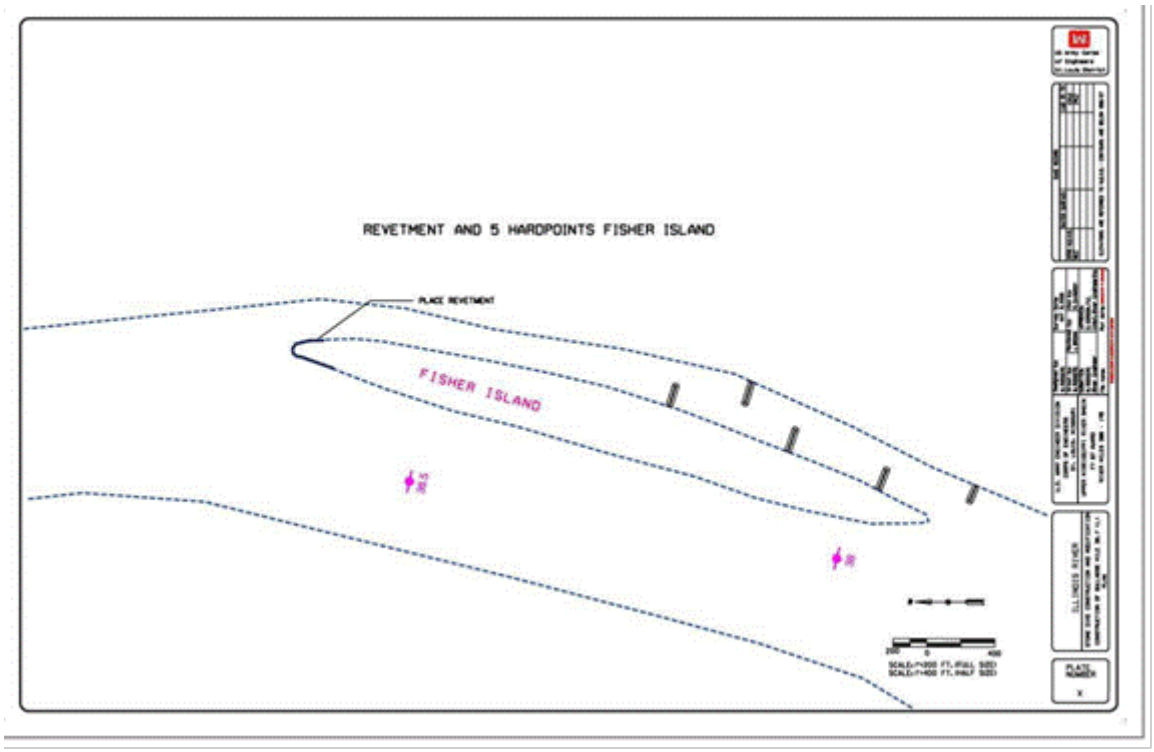

Figure 8. Fisher Island Alternative 2 – Riprap shoreline and place alternating hard points in side channel.

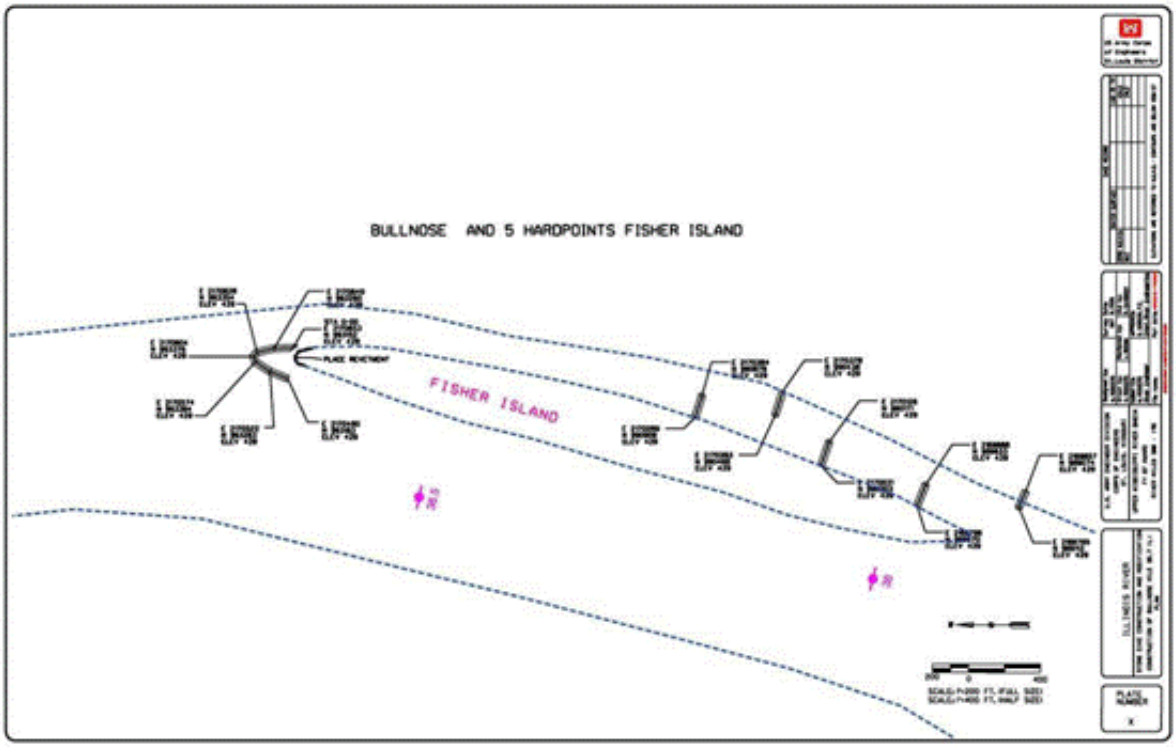

Figure 9. Fisher Island Alternative 3 – Single bullnose and alternating hard points constructed in the side channel.

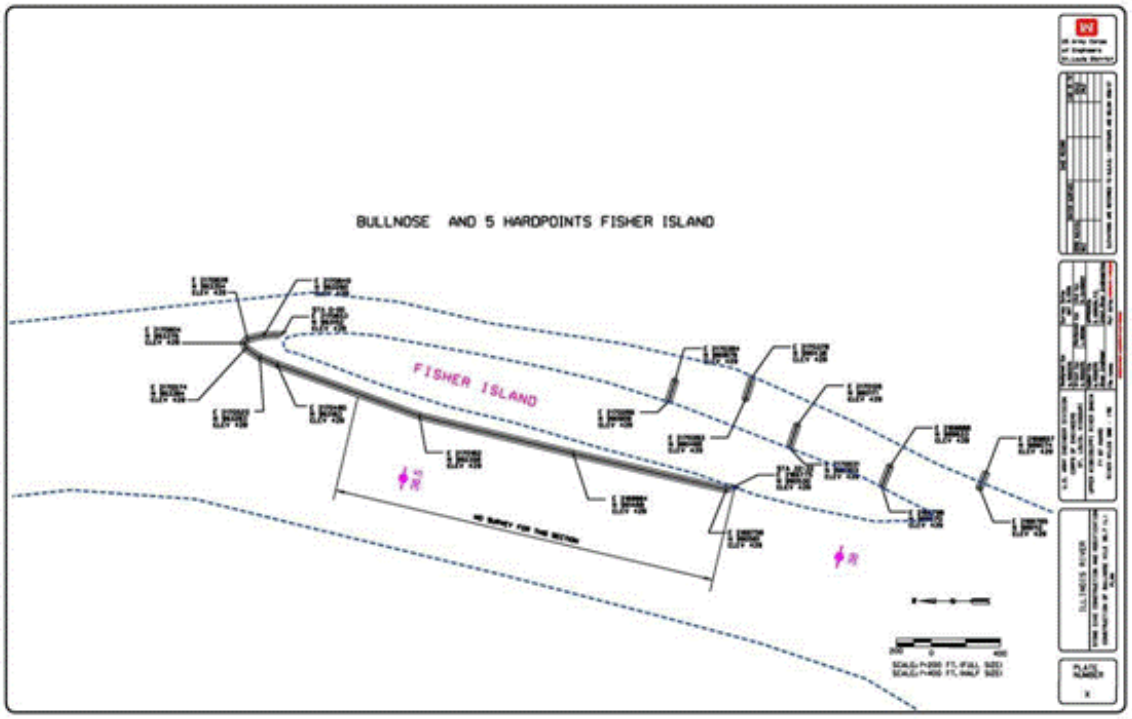

Figure 10. Fisher Island Alternative 4 – Single bullnose with extended off-bank line revetment on riverside and alternating hard points constructed in the side channel.

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6. EVALUATION AND COMPARISON OF ALTERNATIVE PLANS*

6.1 General. Each of the alternatives described in the previous section was put through an ecosystem benefits analysis. These benefits were combined with cost estimates in an incremental cost analysis in order to determine the cost effectiveness of each alternative plan.

6.2 Ecosystem Benefit Analysis. The ecosystem benefit analysis for the Alton Pool Islands Ecosystem Project utilized a panel of subject matter experts represented by a multi-agency team with representatives from U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and U.S. Army Corps of Engineers.

While the cost to create an acre of a particular habitat type can be measured, that acre's benefits (number of species and habitat quality) is difficult to ascertain. One way to measure habitat and quantify benefits is to use Habitat Evaluation Procedures (HEP). An analysis of existing conditions, future-without-project conditions, and future-with-project conditions was conducted using the 1992 and 1996 Aquatic Habitat Appraisal Guide (AHAG) and the Functional Assessment Score (FAS) methodology. The AHAG approach was developed by the Corps of Engineers' Waterways Experiment Station (Killgore and Hardy 1992) and Rock Island District (Mathias et al. 1996). The approach follows the format of the Wildlife Habitat Appraisal Guide (WHAG), developed by the Missouri Department of Conservation and the Natural Resources Conservation Service (1990). The WHAG is, in turn, based on the U.S. Fish and Wildlife Service's Habitat Evaluation Procedure (1980). The FAS was developed by the Institute for Water Resources (IWR).

<u>6.2.1 Site Specific Aquatic Habitat Appraisal Guide (AHAG)</u>. The AHAG methodology utilized for the Alton Pool Islands Restoration Project evaluates the benefits of each alternative plan by looking at the quality and quantity of habitat for fish species selected for evaluation by team members. The qualitative component of the analysis is known as the Habitat Suitability Index (HSI) and is rated on a 0 to 1.0 scale, with higher values indicating better habitat. The HSI for a particular habitat type is calculated by considering how each project alternative will affect various biotic and abiotic habitat characteristics important to the selected fish species. The quantitative component of the analysis is the number of acres of habitat that are available for the selected evaluation species. From the qualitative and quantitative determinations, the standard unit of measure, the Habitat Unit (HU), is calculated using the formula HSI x Acres = HUs. Changes in the quality and/or quantity of habitat, and therefore habitat units, can occur over time. In order to capture these changes, the project alternatives' effects on the habitat characteristics are estimated at selected target years for both with- and without-project conditions. Target years for the Alton Pool Islands Restoration Project were established at 0 (existing conditions), 2, 10, and 50 years. The habitat units for each target year are annualized and averaged to determine what is known as Average Annual Habitat Units (AAHUs). The difference in AAHUs between an action alternative and the without project alternative is the net AAHUs. Net AAHUs represent alternative

benefits and can be used to compare alternatives and to determine if the benefits of the project are worth the cost.

Several assumptions were made regarding current conditions, model performance, and changes in habitat conditions over time. The multi-agency team made the following assumptions during the habitat evaluation:

(1) Target years of 0, 2, 10, and 50 are sufficient to annualize HUs and to characterize habitat changes over the period of analysis;
(2) For the AHAG, all species were given equal consideration;
(3) The No Action Alternative assumed that no USACE project would occur;
(4) The AHAG team deleted all AHAG metrics with the exception of numbers four and six, because the team's evaluation found that only metrics four and six changed between the no action and action alternatives over the 50 years;
(5) The existing HSI values developed are a fair representation of the quality of habitat in all target years and for all future conditions with or without a project;
(6) No special management of the project area would take place;
(7) While some vegetated terrestrial habitat may develop over the period of analysis, its acreage would be so small as to contribute very little to habitat values.

The changes caused by the project alternatives were not measurable by the majority of the AHAG metrics. The multi-agency team determined that another approach would better capture the effects of the various project alternatives and provide a more valid comparison between alternatives. The full AHAG analysis is available upon request. However, the AHAG was not used in the incremental cost analysis or in determining the tentatively selected plan.

6.2.2 Site Specific Functional Assessment Score (FAS). The second methodology employed to assess the environmental benefits of each alternative was a "Functional Assessment Score" (FAS). Functional Assessment Score (FAS) is a model developed by the Institute for Water Resources (IWR). This method more appropriately addresses the geomorphic and biological goals of the project, where AHAG more specifically addresses the requirements of particular fish species or guilds.

The concept behind the functional assessment is to capture a range of beneficial functions provided by riverine islands and side channels, such as producing woody material to support aquatic food chains, and reducing shoreline erosion.

The subject matter experts from the AHAG analysis used their best professional judgment to determine nine important broad-category island functions based on the goals of the project. In turn, the goals were based primarily on the restoration priorities presented in the "Illinois River Basin Restoration Comprehensive Plan with Integrated Environmental Assessment" (USACE 2007). The broad functions considered included:

1. island protection
2. increased habitat diversity
3. production of overwintering habitat

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4. reduction of suspended sediment
5. reduction of shoreline erosion
6. production/maintenance of bottomland hardwood
7. maintenance of (Fisher) Island side channel
8. production or maintenance of spawning/rearing habitat
9. macroinvertebrate production

Because the functions differ in their importance or contribution to the project and the region (USACE 2007), each function was assigned a multiplying factor (0 – 1) by the team. Island protection was assigned a 1.0, increased habitat diversity was assigned a 1.0, production of overwintering habitat was assigned a 0.6, reduction of suspended sediment was assigned a 0.3, reduction of shoreline erosion was assigned a 0.8, production/maintenance of bottomland hardwood was assigned a 0.9, maintenance of (Fisher) Island side channel was assigned a 0.8, production or maintenance of spawning/rearing habitat was assigned a 0.8, and macroinvertebrate production was assigned a 0.6.

The expert panel determined a function score for the existing condition, the future condition without project, and the future condition with each alternative for each of the target years used in the AHAG analysis. These scores ranged from 0.0 (low) to 1.0 (high) and described how well the alternative performed the function. The score was then multiplied by its factor to give a modified score. The modified score was averaged for each alternative and then multiplied by appropriate acreage to reflect the fact that the functional benefits would accrue in the area affected by the project. This technique is analogous to the habitat unit concept, in which both quality (HSI) and quantity (acreage) are important factors in the determination of environmental outputs. The numerical functional assessment scores for each target year were converted to one average annual score to reflect the yearly benefits for each year of the 50 year period of analysis. Average annual functional scores for each alternative were compared to the expected future without-project score (and the difference calculated) to yield the net benefit for each alternative (Tables 2 and 3).

Differences among AAFAS and net AAFAS benefits for Wing Island are due to the following: Alternative 3, shoreline rip rap, scored highest in island protection, suspended sediment, and shoreline erosion protection. Rip rap has been placed on islands effectively stopping erosion for many years, thus it has the best potential to protect the islands. Alternative 4, unrooted bullnose, scored highest in habitat diversity, overwintering habitat, and spawning and rearing habitat. Alternative 2, single bullnose, and 4 scored equally in macroinvertebrate production and bottomland hardwood production/maintenance. Alternatives 2 and 4 produce diverse depth and flow conditions, trap aquatic debris (wood), and may cause sediment to accumulate at the head of the island. These conditions provide quality habitat for aquatic species.

For Fisher Island, Alternative 4, bullnose with extended off-bank revetment, scored highest in overwintering habitat, suspended sediment, shoreline erosion, spawning and rearing habitat, and macroinvertebrate production. Alternative 4 address both the island

head and riverside bank erosion producing a large quantity of habitat with diverse depth and flow. Alternative 2, rip rap, and 4, scored equally well in island protection, and bottomland hardwood (Appendix E) because rip rap may be more effective while the off-bank revetment addresses a larger area of erosion.

Table 2. Wing Island Average Annual Functional Assessment Score*

#	Alternative	AAFAS	Net AAFAS
1	No Corps Action	23	0
2	Single bullnose with revetment	50	27
3	Riprap only along the existing island head	46	23
4	Unrooted bullnose with revetment	51	28

*All habitat evaluation calculations are on file at the U. S. Army Corps of Engineers St. Louis District.

Table 3. Fisher Island Average Annual Functional Assessment Score*

#	Alternative	AAFAS	Net AAFAS
1	No Corps Action	39	0
2	Riprap island head and alternating hard points in side channel	81	42
3	Single bullnose and alternating hard points in side channel	80	41
4	Single bullnose with extended off-bank line revetment and alternating hard points in side channel	85	46

*All habitat evaluation calculations are on file at the U. S. Army Corps of Engineers St. Louis District.

6.3 Model Certification. Per EC 1105-2-412: Planning Models Improvement Program: Model Certification, planning models such as the AHAG and FAS models used for this Project are required to be certified. In the interim consistent with guidance from the Ecosystem Planning Center of Expertise (ECO-PCX), a technical review member conducted an assessment of the models used for the project. This process did not result in certification, but provided an assessment of the technical quality and appropriateness of the models utilized. On January 26, 2010, the technical reviewer determined that the models and their application were appropriate to evaluate the habitat benefits of this project. On July 7, 2011, we discussed the FAS model with the ECO-PCX. On September 13, 2011, the ECO-PCX completed their review of the Alton Pool Island Restoration ecosystem output evaluation and were satisfied with the technical quality of the model application and approved for single-use.

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6.4 Alternative Plan Evaluation and Comparison.

6.4.1 Completeness, Effectiveness, Efficiency, Acceptability. For all projects, the Corps of Engineers' Principles and Guidelines Engineering Regulation 1105-2-100 defines four broad criteria for the evaluation of all plans: completeness, effectiveness, efficiency, and acceptability. Definitions of these four criteria follow:

Acceptability is the workability and viability of the alternative plan with respect to acceptance by Federal and non-Federal entities and the public and compatibility with existing laws, regulations, and public policies (USWRC 1983). Two primary dimensions to acceptability are implementability and satisfaction. Implementability means that the alternative is feasible from technical, environmental, economic, financial, political, legal, institutional, and social perspectives. If it is not feasible due to any of these factors, then it cannot be implemented, and therefore is not acceptable. An infeasible plan should not be carried forward for further consideration. However, just because a plan is not the preferred plan of a non-Federal sponsor does not make it infeasible or unacceptable *ipso facto*. The second dimension to acceptability is the satisfaction that a particular plan brings to government entities and the public. Obviously, the extent to which a plan is welcome or satisfactory is a qualitative judgment. Nevertheless, discussions as to the degree of support (or lack thereof) enjoyed by particular alternatives from a community, state Department of Natural Resources, Ducks Unlimited, or other national or regional organizations, for example, are additional pieces of information that can help planners evaluate whether to carry forward or screen out alternative plans.

Completeness is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planning objectives. To establish the completeness of a plan, it is helpful to list those factors beyond the control of the planning team that are required to make the plan's effects (benefits) a reality.

Effectiveness is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities. An effective plan is responsive to the identified needs and makes a significant contribution to the solution of some problem or to the realization of some opportunity. It also contributes to the attainment of planning objectives. The most effective alternatives make significant contributions to all the planning objectives. Alternatives that make little or no contribution to the planning objectives can be rejected because they are relatively ineffective. Another factor that can impact the effectiveness of an alternative is whether there is substantial risk and uncertainty associated with the alternative. If the functioning or success of an alternative is uncertain, or less certain than another alternative, its effectiveness may be compromised and should be discussed.

Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment (P&G Section VI.1.6.2(c) (3)).

The Corps of Engineers' iterative six-step planning process of Identifying Problems and Opportunities, Inventorying and Forecasting Conditions, Formulating Alternative Plans, Evaluating Alternative Plans, Comparing Alternative Plans, and Selecting a Plan is designed to result in the formulation of complete, effective, efficient, acceptable plans. The Alton Pool Islands Restoration Project feasibility study followed this process in order to meet these four criteria. Information on selection of the tentatively selected plan based on these four criteria can be found in Section 6.6 below.

6.4.2 National Ecosystem Restoration (NER) Plan. Engineering Regulation 1105-2-100 directs that Corps of Engineers ecosystem restoration projects should contribute to national ecosystem restoration. Contributions to national ecosystem restoration are defined as increases in the net quantity and/or quality of desired ecosystem resources. These NER outputs are to be expressed quantitatively in non-monetary units based on habitat quality and/or quantity. The AAFAS utilized in the Alton Pool Islands Restoration Project plan formulation process quantify this contribution to the NER Plan. Refer to Section 6.2, Ecosystem Benefit Analysis, for a description of the habitat analysis process.

6.4.3 Navigation Impacts. Planned stabilization measures will be applied outside of the navigation channel and should not directly affect navigation. However, navigation could experience some disruptions during construction.

6.4.4 Economics in Environmental Planning: Incremental Cost Analysis. For traditional projects (flood damage reduction, navigation), the NED objective (maximization of the net benefits) ensures that the efficiency criterion has been met. The alternative which maximizes the net benefits of the project (total benefits less total cost) is the alternative which meets this criterion. However, such a selection criterion falls short for environmental projects because of the difficulties in quantifying project benefits in traditional monetary terms. Without a reliable monetary estimate of project benefits with which to compare monetary costs, it is not possible to determine the alternative plan which maximizes net monetary benefits. However, this does not mean the economic efficiency of environmental plans cannot be properly evaluated in accordance with the decision criteria outlined in the Water Resources Council's Principles and Guidelines.

The tool of cost effectiveness analysis enables planners to impose economic efficiency on the cost (production) side of the equation by assuring a range of cost effective plans are identified. This economic tool can ensure that either a set level of environmental output is produced for the least cost possible, or that for a set level of expenditures environmental output production is maximized. Although the cost analyses do not provide a discrete decision criterion, such as the maximization of net benefits in NED analysis, Incremental Cost Analysis (ICA) provides for the explicit comparison of the relevant changes in cost and output on which such decisions may be based.

Cost effectiveness analysis and ICA are rooted in economic production theory and utilize such economic principles as scarcity, choice and opportunity cost. The cost analysis examines changes in cost and output that result from decisions to implement

alternative plans and plan components. Cost effectiveness analysis can be used to identify the least-cost plan for producing every attainable level of environmental output, as well as identifying those plans where more output could be produced for the same or less cost. Environmental scale selection choices based on average, instead of incremental cost information can lead to misinformed and improper decision making. The rationale behind incremental cost analysis is to *reveal* the variation in cost between one plan and another, whereas average cost tends to *obscure* the variation in cost between plans. ICA is an invaluable tool in determining the appropriate scale of mitigation or restoration by revealing variations in cost between alternatives (plans); explicitly asking for each attainable increment of output, "Is it worth it?"

6.4.5 Cost and Total Output (Net AAFAS). To conduct the incremental cost analysis, construction first costs and all relevant OMRR&R costs are computed for all project alternatives (Table 4). Average annual construction first costs and average annual OMRR&R costs are calculated via cost stream analysis for each measure, assuming a 50-year project period of evaluation and an FY 2009 project discount rate of 4.125 percent (Table 4). No OMRR&R is anticipated for project measures during the period of analysis; similar projects implemented under the Avoid and Minimize Program on the Mississippi River have required minimal OMRR&R.

Table 4. Alton Pool Islands (Wing and Fisher) average annual costs, by alternative.

Island Alternative	Average Annual Construction First Costs	Average Annual OMRR&R Costs
Wing Island		
Wing 1 (No Action)	$ 0	$ 0
Wing 2	$51,355	$ 0
Wing 3	$8,559	$ 0
Wing 4	$51,831	$ 0
Fisher Island		
Fisher 1 (No Action)	$ 0	$ 0
Fisher 2	$29,482	$ 0
Fisher 3	$47,551	$ 0
Fisher 4	$122,206	$ 0

The ICA for both Wing Island and Fisher Island is performed in accordance with IWR-Plan, with reference to the Principles and Guidelines of Institute of Water Resources (IWR) Report #95-R-1, Evaluation of Environmental Investments Procedures Manual, Interim: Cost Effectiveness and Incremental Cost Analyses (Robinson 1995). Through incremental cost analysis in IWR-Plan, several progressive steps in the multi-step process are taken to identify the most cost-effective Alternatives to be considered in environmental restoration planning. These steps are described and computed below.

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Output benefits, measured as Net Average Annual Functional Assessment Score (AAFAS) (where Net AAFAS equal With Project AAFAS less Without Project AAFAS) is a measure of the average "annualized" net functional habitat preservation/improvement generated under each Alternative. Both the Net AAFAS and the Average Annual Cost for all Alternatives for both Wing Island and Fisher Island are presented in Table 5.

Table 5. Alton Pool islands (Wing and Fisher) total output benefits (AAFAS) and average annual cost, by alternative.

Island Alternative	Output Benefits (AAFAS)	Average Annual Cost
	Wing Island	
Wing 1 (No Action)	0.0	$0
Wing 2	27	$51,355
Wing 3	23	$8,559
Wing 4	28	$51,831
	Fisher Island	
Fisher 1 (No Action)	0.0	$ 0
Fisher 2	42	$29,482
Fisher 3	41	$47,551
Fisher 4	46	$122,206

6.4.6 Determining Cost Effective Alternatives. Prior to identifying cost effective Alternatives, all Alternatives are sorted by Total AAFAS (average annual output level), from lowest to highest. Average Annual Cost and Total AAFAS for all Alternatives are shown graphically in Figure 11 and Figure 12 for Wing Island and Fisher Island, respectively.

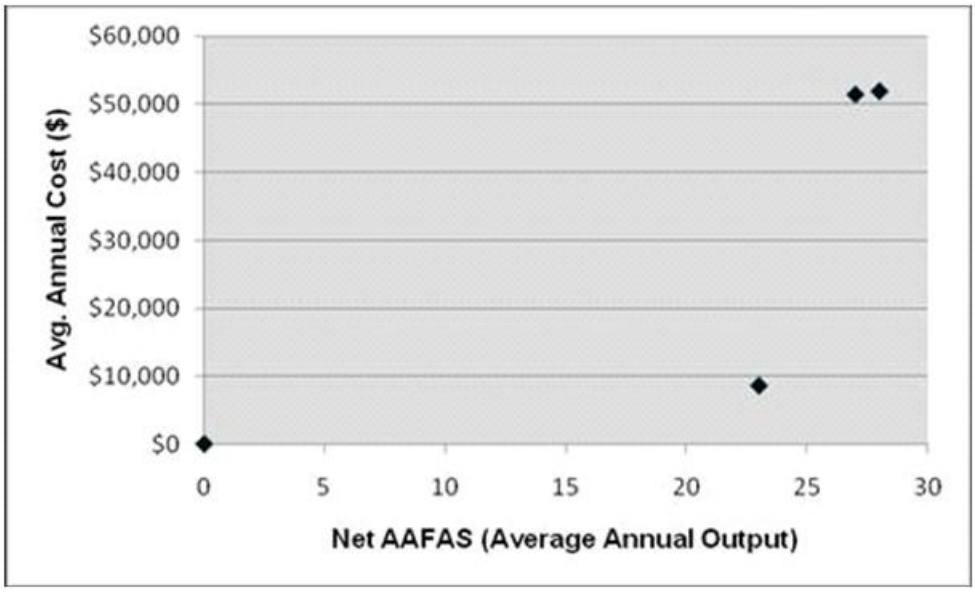

Figure 11. Alton Pool Islands (Wing Island) average annual cost and total AAFAS (Average Annual Output Benefits).

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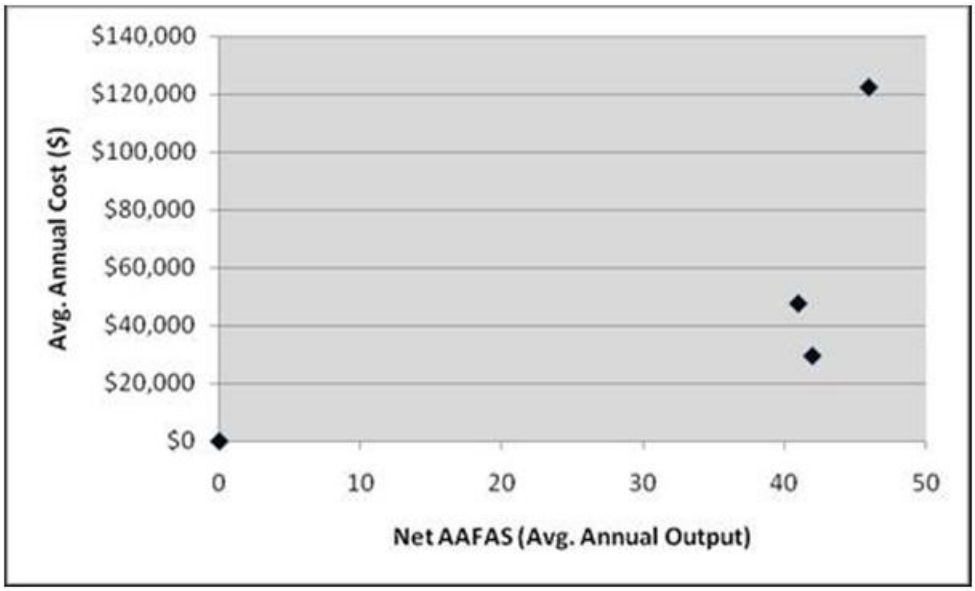

Figure 12. Alton Pool Islands (Fisher Island) average annual cost and total AAFAS (Average Annual Output Benefits).

After sorting by Total AAFAS (output benefits level), any non-cost effective Alternatives are identified as either *Inefficient in Production* or *Ineffective in Production*. *Inefficient in Production* is defined as any Alternative where the same output level can be generated at a lesser cost by another Alternative. The Alternatives are evaluated and wherever there are two or more Alternatives providing the same output level, aside from any other considerations (i.e., uncertainty about the reliability of cost or output estimates), the more costly Alternative(s) generating that same output level is eliminated. Next, any Alternatives that are *Ineffective in Production* are identified. *Ineffective in Production* is defined as any Alternative where a greater output level can be generated at a lesser or equal cost by another Alternative. With the Alternatives still sorted by output level (AAFAS), a pair-wise comparison of output level and average annual cost is made for all remaining Alternatives that 'passed' the *Inefficient in Production* screening in the previous step. The Alternatives are evaluated and any Alternative generating less output at an equal or greater cost is eliminated. These steps identify the least-cost Alternative for every level of output under consideration.

Alternative Fisher 3 generates less output (Net AAFAS) than Alternative Fisher 2; (41 < 42). However, Alternative Fisher 3 has a greater average annual cost than Alternative Fisher 2 ($47,551 > $29,482), and thus Alternative Fisher 3 is identified and eliminated as being *Ineffective in Production*. All remaining alternatives passed the "*in Production*" elimination criteria.

<u>6.4.7 Incremental Cost Analysis</u>. Incremental cost analysis (ICA) is conducted on the remaining alternatives. This consists of several iterative steps where the incremental difference in both cost and output (total AAFAS) are computed. Incremental cost is the additional cost incurred by selecting one alternative over another alternative, and is computed by subtracting the cost of one alternative under consideration from the cost of another alternative under consideration. Similarly, incremental output is the additional

output generated by selecting one alternative over another alternative, and is computed by subtracting the output of one alternative under consideration from the output of another alternative under consideration. The first step is to compute the incremental change in cost and incremental change in output from implementing each alternative over the No Action Alternative (i.e., Wing 1 for Wing Island, and Fisher 1 for Fisher Island), where the No Action Alternative is considered the baseline condition against which each remaining cost effective alternative is compared. Next, the alternative yielding the lowest incremental cost per unit over the No Action Alternative is identified. In other words, this identified alternative is the most cost effective remaining alternative for production of AAFAS over the No Action Alternative. After identifying this alternative with the lowest incremental cost per unit (i.e., the most cost efficient from a production perspective, producing output at the lowest unit cost), any alternatives generating a lower output level are removed from further consideration in the ICA process. The eliminated alternatives are less efficient in production, producing a lower level of output at a higher incremental unit cost. The remaining alternatives are further evaluated via repeated steps of this ICA process, where the most cost effective remaining alternative becomes the *new* baseline condition against which each remaining cost effective alternative is compared. This iterative process continues until only the most cost effective, production efficient alternatives remain. When the most cost effective remaining alternative is the last alternative evaluated; the ICA process is complete.

The final remaining cost effective and production efficient alternatives are presented in Table 6 for both Wing Island and Fisher Island. Also known as “Best Buy” Plans, these alternatives can be used to determine the desired project scale for environmental restoration planning. The alternatives are “Best Buy” Plans because the incremental average annual cost per unit increases for successively larger levels of incremental output (Total AAFAS).

Table 6. Alton Pool Islands (Wing and Fisher) incremental values of “Best Buy” plans.

Best Buy Plans	Output (Total AAFAS)	Average Annual Cost	Incremental Output (Total AAFAS)	Average Annual Incremental Cost	Average Annual Incremental Cost per Unit
Wing Island					
Wing 1	0	$ 0	N / A	N / A	N / A
Wing 3	23	$8,559	23	$8,559	$368.76
Wing 4	28	$51,831	5	$43,271	$8,637.13
Fisher Island					
Fisher 1	0.0	$ 0	N / A	N / A	N / A
Fisher 2	42	$29,482	42	$29,482	$701.95
Fisher 4	46	$122,206	4	$92,724	$23,181.00

6.4.8 Conclusion. The "best buy" alternatives presented in Table 6 provide the information necessary to make well-informed decisions regarding desired project scale. For example, progressing through the increasing levels of output for the Wing or Fisher Island alternatives helps determine whether the next level of output (additional AAFAS) is worth its additional cost (Table 6).

As long as decision makers consider a level of output to be "worth it", subsequent levels of output are considered. When a level of output is determined to be "not worth it", then subsequent levels of output will also likely be "not worth it", and the final decision regarding desired cost per habitat unit for environmental restoration planning will have been reached. To further aide in determining a tentatively selected plan the risk and uncertainty of the "best buy" alternatives are evaluated followed by an evaluation of the "best buy" alternatives against the four Planning and Guidance evaluation criteria.

6.5 Risk and Uncertainty. Risk is the chance that something negative could occur as the result of project implementation. Uncertainty is defined as the degree to which we are not sure that the expected results will actually occur. The following paragraphs describe the risk and uncertainty associated with the Alton Pool Islands Restoration Project.

Risk. The risk associated with the implementation of this project is low. The St. Louis District has extensive experience constructing the features in the "best buy" plans. The bank stabilization measures in these plans are simple and durable with a very low level of failure. The St. Louis District constructed the first set of alternating hard points in Santa Fe Chute in 1997. These hard points and others constructed since are successfully functioning. There is little risk of negative impacts to the navigation channel in the area from increased sedimentation and associated impediments to navigation because structures were designed to reduce sedimentation.

Uncertainty. A degree of uncertainty is inherently associated with the models used to generate estimates of benefits (habitat units) for this project. These models involve estimates of environmental conditions for the project site over the next 50 years. Given the dynamic nature of riverine ecosystems and biological populations in general, predictions 50 years into the future will always involve some degree of uncertainty. The best scientific judgment of biologists with extensive experience on the Illinois River was utilized in the development of restoration benefits for the Alton Pool Islands Restoration Project in order to minimize uncertainty as much as can reasonably be expected.

Some uncertainty also exists in the development of cost estimates for the various alternatives considered for this project. Costs associated with the rock needed for construction of the bullnoses, hard points and revetments proposed in the project have been particularly volatile recently due to increased demand for hurricane recovery efforts. Up-to-date cost estimates were generated for the Cost Effectiveness and Incremental Cost Analysis; however, these costs could change considerably prior to construction. This problem is mitigated from a plan formulation perspective by the fact that all of the alternatives considered utilize rock to a large degree and would, therefore,

be affected relatively equally by a change in rock prices. Changes in rock costs would change the magnitude of the costs for all alternatives, but should not change which projects are best buys

6.6 Selection of Tentatively Selected Plan. The Alton Pool Islands Restoration project incremental cost analysis "best buy alternatives" were each evaluated by the PDT against the four Principles and Guidelines evaluation criteria covered in Section 6.3.4 above. Definitions of the four evaluation criteria; acceptability, completeness, effectiveness, and efficiency; were provided to the PDT prior to evaluation.

To allow for easier comparison, the PDT prepared a matrix for ranking each of the "best buy" alternatives according to how well they addressed the four evaluation criteria (Tables 7 and 8).

Table 7. Best Buy Evaluation Matrix for Wing Island.

Evaluation Criteria	Best Buy Alternatives for Wing island		
	Alternative 1 (No Action)	Alternative 3 Riprap Shoreline	Alternative 4 Unrooted Bullnose with Revetment
Acceptability	L	M	H
Completeness	L	H	H
Effectiveness	L	M	H
Efficiency	L	H*	M
Tentatively Selected Plan		**X**	

* ICA most cost-effective alternative

Table 8. Best Buy Evaluation Matrix for Fisher Island.

Evaluation Criteria	Best Buy Alternatives for Fisher Island		
	Alternative 1 (No Action)	Alternative 2 Riprap Shoreline	Alternative 4 Single Bullnose w/ Off-bank line Revetment
Acceptability	L	M	H
Completeness	L	H	H
Effectiveness	L	H	H
Efficiency	L	H*	M
Tentatively Selected Plan		**X**	

* ICA most cost-effective alternative

6.7. Tentatively Selected Plan. The result of the PDT evaluation was the identification of Wing Island Alternative 3 and Fisher Island Alternative 2 as the alternatives that best addressed the four evaluation criteria. Therefore, Wing Island Alternative 3 and Fisher Island Alternative 2 were selected by the PDT as the tentatively selected plans. These plans meet the study objectives and have the approval of the USFWS and the IDNR. The plans restore the bank line at the top of each of the islands, reduce erosion and subsequent sedimentation, and restore flow, and depth in the Fisher Island Side Channel.

6.8. National Ecosystem Restoration (NER) Plan. Engineering Regulation 1105-2-100 directs that Corps of Engineers ecosystem restoration projects should contribute to

national ecosystem restoration. The NER plan reasonably maximizes ecosystem restoration benefits compared to costs, considering the cost effectiveness and incremental cost of implementing other restoration options. The functional assessment score units utilized in the plan formulation process quantify the ecosystem restoration benefits. Refer to Appendix D, Habitat Evaluation and Quantification, for a detailed description of the habitat analysis process. Wing Island Alternative 3 and Fisher Island Alternative 2 are also the NER Plans. They are best buy alternatives that yield 23 units and 42 units at a cost of $368.76 and $701.95 per unit respectively.

7. DESCRIPTION OF TENTATIVELY SELECTED PLAN*

7.1 Design Considerations. The main design considerations for Alton Pool Islands Restoration Project were that the proposed designs could not impede or negatively affect the navigation channel. Designs were also not permitted to restrict the flow of the Illinois River. Post construction monitoring of these islands will produce valuable data about habitat response and physical characteristics that can be used to design future critical restoration project elements and provide information to aide in adaptive management for the project, if required.

7.2 Project Implementation Timeline. The following is an estimated project implementation timeline (Table 9). However, the actual schedule will be influenced by available funding and resolution of project specific issues.

Table 9. Project implementation schedule for Wing and Fisher Islands.

Requirement	Scheduled Date
Distribute Draft PIR	Oct 2009
Complete Agency Technical Review of Draft PIR	Dec 2010
Submit PIR for Public and Agency Review	Jun 2013
Submit Final PIR to MVD	Jul 2013
Initiate Plans and Specifications	Jan 2014
Complete Plans And Specifications	Jun 2014
Advertise Contract	Jul 2014
Award Contract	Sep 2013
Construction Complete	Feb 2015

7.3 Land, Easements, Rights-of-Way, Relocation, and Disposal Site (LERRDS) Considerations. There is no fee title, permanent easement, or temporary easement required to implement the proposed project. The project area lies below the ordinary high water mark in the main Illinois River channel and is therefore within navigational servitude limits.

7.4 OMRR&R Considerations. Similar projects implemented under the Avoid and Minimize Program on the Mississippi River have required minimal OMRR&R. Thus, there is no OMRR&R anticipated during the 50 year period of analysis.

7.5 Cost Estimates. The current working estimate for the tentatively selected plan for Wing Island and Fisher Islands is $859,000. There are negligible OMRR&R costs anticipated for this project. Detailed project cost estimates can be found in Appendix D.

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Table 10. Alton Pool Islands Restoration Project fully funded estimate and current working estimate, October 2010 price level.

Account	Feature	Fully Funded Estimate[1]		Contingency	Current Working Estimate	
	COST SHARE	65%[2]	35%[2]		65%[2]	35%[2]
1	Lands and Damages[3]	0	0	-	0	0
2	Relocations	0	0	-	0	0
6	Channels and Canals	444,600	239,400	34.4%	427,050	229,950
30	Planning, Engineering and Design	328,900	177,100	25%	61,750	33,250
31	Construction Management	42,900	23,100	25%	40,300	21,700
	Post Construction Monitoring	31,850	17,150	28%	28,600	15,400
	Total Project Costs	**$848,250**	**456,750**	**32%**	**$558,350**	**$300,650**

1 Fully funded estimate is marked up to midpoint of construction. Markup equals 9.5%.
2 Project costs are shared 65% federal and 35% non-federal sponsor (IDNR)
3 Project features are below the ordinary high water mark and do not require LERRDs.

7.6 Monitoring and Adaptive Management. Monitoring for gauging success or failure of the project focuses on geomorphic diversity and fish habitat in the area (Table 11 & 12)(Appendix H). Monitoring will utilize standard geomorphic/bathymetric survey techniques used regularly on the Illinois River.

Adaptive management is not anticipated for this project. Projects similar to this have been successfully implemented numerous times by MVS on the Mississippi River.

7.7. Consistency with USACE Campaign Plan. The USACE has developed a Campaign Plan with a mission to "provide vital public engineering services in peace and war to strengthen our Nation's security, energize the economy, and reduce risk from disasters." This study is consistent with the USACE Campaign Plan. The second goal of the USACE Campaign Plan "Deliver enduring and essential water resource solutions…" is addressed by this study which collaborated with partners to develop a solution to the habitat degradation that has occurred from island erosion and side channel sedimentation. This solution should produce lasting benefits for the nation with the proper OMRR&R. The tentatively selected plan is also consistent with the third goal "Deliver innovative, resilient, sustainable solutions…". This study addresses the goal through the application of the planning process to formulate, analyze, and evaluate alternative designs in pursuit of a sustainable, environmentally beneficial, and cost-effective ecosystem restoration design.

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Table 11. Monitoring of the Alton Pool Islands Restoration Project, objectives, indicators, targets and time before project effects become apparent.

Goal	Objective	Performance Indicator	Targets	Time of Effect
Reduce sediment delivery to the Illinois River from island shorelines and a tributary channel (Apple Creek), with the aim of eliminating excessive sediment load	Decrease the amount of sediment eroding off the heads of Wing and Fisher Islands	Island head location monitored using aerial photography	Banks will be maintained at the revetment location.	Construction completion
Restore and maintain side channel and island habitats	Prevent the loss of Wing and Fisher Islands and their associated side channels	Island size using aerial photography	Banks will be maintained at the revetment location.	Construction Completion
		Side channel depth using bathymetry data	Side channel depth will be maintained and enhanced.	2 years post-construction
Restore the aquatic habitat diversity of side channels in order to provide adequate volume and depth for sustaining native fish and wildlife communities.	Decrease the deposition of sediment from Apple Creek into the Fisher Island side channel	Side channel depth using bathymetry data	Side channel depth will be maintained and enhanced.	2 year post-construction

* Full realization of results is highly dependent upon river levels in the project area after construction; several high water events may be necessary before benefits from the hard points are realized and a state of relative equilibrium is reached.

Table 12. Timing and cost of monitoring for the Alton Pool Islands Restoration Project.

	Pre-project Samples	Construction Phase	**Post-project Samples**	**Completion**	**Cost**
Aerial Photography	4 years (2004, 2006, 2007, 2009)		Once every 3 years	After 9 years	$1,600/sample
Bathymetry	1 year (2006)		Once every 3 years	After 9 years	$9,650/sample

Three sampling periods (9 years post-construction) may be necessary to demonstrate ecological success. After each sample is complete, the project will be evaluated for ecological success demonstrated by achievement of project targets (Table 11). The final determination of ecological success will be made by the Division Commander in consultation with the Federal and State resource agencies.

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7.8. Consistency with USACE Environmental Operating Principles. The U.S. Army Corps of Engineers has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" applicable to all its decision-making and programs. The formulation of all alternatives considered for implementation met all of the principles. However, as a function of the entire Illinois River 519 Program, the only principle not met fully is EOP #1 – Foster sustainability as a way of life throughout the organization. Sustainability is a goal of any Corps project. This project, as a part of Illinois River restoration, is just one part of many pieces that in their entirety, or cumulatively, lead to a more sustainable end result. Therefore, as a standalone project, in the context of Illinois River restoration, this project arguably falls short of EOP #1 because it does not address the entire river, but when added to other near-term, long-term, and other ongoing efforts, it provides its share of reaching sustainability.

8. ENVIRONMENTAL EFFECTS*

The following section is the National Environmental Policy Act (NEPA) equivalent of the Environmental Consequences of the action alternative, the tentatively selected plan. The effects of the tentatively selected plan are, in essence, the same as the other “best buy” alternatives (with the exception of No Action).

8.1 Summary of Effects. The proposed project would result in positive long-term benefits to fish and wildlife species within and around the Alton Pool Islands Restoration Project area. The project would increase scour and depositional diversity in the reach and maintain valuable side channel and island habitat in the lower Illinois River. No Federally protected species are expected to be negatively affected. The project would likely result in minor short-term decreases in water quality due to localized increases in turbidity resulting from construction activities. No significant social or economic impacts are expected to result. No impacts to historic properties are anticipated.

8.2 Natural Resources. Impacts of the project on natural resources were evaluated using the Aquatic Habitat Appraisal Guide (AHAG) and Functional Assessment Score (FAS). Section 6.2 and Appendix E contain details regarding this process.

8.2.1 Terrestrial Habitat. The proposed project would not negatively impact any terrestrial habitat. The proposed project would protect the bank line from erosion preventing the loss of terrestrial habitat. Additionally, upstream terrestrial habitat may accrue over time. All project features would be placed in the main river channel below the ordinary high water line.

8.2.2 Aquatic Habitat. The proposed project is designed to improve aquatic habitat by diversifying the homogeneous flow, scour, and depositional patterns within the project area. The project would also reduce island erosion decreasing turbidity in the vicinity of the islands. The increase in habitat diversity should result in an increase in fish and wildlife population diversity around the islands.

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8.2.3 Wildlife. Maintaining the Alton Pool islands would restore habitat that benefits many species of shorebirds, wading birds, raptors, songbirds, mammals, reptiles, amphibians, invertebrates, and fish.

8.2.4 Fish. The proposed enhancement measures of the project are designed to positively impact river fish populations. The increase in flow, scour, and depositional diversity in the project area would add much-needed habitat diversity to the site. The project would provide high quality nursery, feeding, and overwintering habitat for fishes. The ecosystem benefits analysis concluded that the tentatively selected plan would positively affect fish populations.

8.2.5 Hazardous, Toxic, and Radioactive Waste. A Phase I HTRW Environmental Assessment revealed no evidence of recognized environmental conditions in connection with the project. Additionally, the HTRW sediment screening investigation concluded that contaminant levels present would not adversely impact downstream environments (human or ecological receptors). Therefore, the proposed project is not anticipated to have any impacts on HTRW.

If any recognized environmental conditions are identified during project construction, the work will cease and the Environmental Quality office of the St. Louis District will be notified immediately to reassess the project area.

8.2.6 Prime and Unique Farmland. No prime and unique farmland would be impacted by the proposed project.

8.3 Endangered Species – Biological Assessment. In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested that the U.S. Fish and Wildlife Service (USFWS) provide a listing of federally threatened or endangered species currently classified or proposed for classification that may occur in the vicinity of Kampsville in Greene and Pike Counties, Illinois. The U.S. Fish and Wildlife Service (Marion, IL Ecological Services Field Office) provided a species list in the Draft Coordination Act Report received on June 16, 2011. Six federally listed species and no federally designated critical habitat may be present in the project area (Table 13). During public review, the USFWS will review this biological assessment and provide their opinion of the effect determinations.

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Table 13. Threatened, Endangered, and Candidate species potentially occurring in the Alton Pool Islands Restoration Project area of Pike and Greene Counties, Illinois.

Common Name	Scientific Name	Status	Habitat
Indiana bat	*Myotis sodalis*	FE, SE	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
Gray bat	*Myotis grisescens*	FE, SE	Caves and mines; rivers and reservoirs adjacent to forests
Eastern prairie fringed orchid	*Platanthera leucophaea*	FT	Mesic to wet prairies
Decurrent false aster	*Boltonia decurrens*	FT	Disturbed alluvial soils
Spectaclecase mussel	*Cumberlandia monodonta*	FPE	Shallow areas in larger rivers and streams
Higgins eye pearlymussel	*Lampsilis higginsii*	FE	Mississippi River; Rock River to Steel Dam

FPE – Federal proposed endangered, FE – Federally endangered, FT – Federally threatened, SE – State endangered, ST – State threatened

8.3.1 Indiana Bat – Endangered. The endangered Indiana bat has been recorded in several Illinois counties. Potential habitat occurs statewide, therefore, Indiana bats are considered to potentially occur in any forested habitat. Indiana bats migrate seasonally between cave/mine winter hibernacula and summer roosting habitat. During the summer, the Indiana bat frequents small stream corridors with well-developed riparian woods, as well as mature upland forests. They forage for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds.

Female bats emerge from hibernation in late March or early April. They form nursery colonies under loose bark or in tree cavities (dead or alive), where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. Some males remain in the area near the winter hibernacula during summer months. Others disperse throughout the species' range and roost individually or in small numbers in the same types of trees as females. Both male and female bats may utilize a number of roost trees during the summer. They appear to choose trees based on bark structure not tree species. However, tree choice may be influenced by weather conditions, such as temperature and precipitation.

To avoid impacting this species, the USFWS recommends avoiding tree clearing from 1 April to 30 September. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from 1 April to 15 November. If it is necessary to clear trees during this time, mist net surveys may be necessary to determine if Indiana bats are present.

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The St. Louis District has determined the proposed project will have “no effect” on the Indiana bat since no trees will be disturbed and all construction activities will occur on the river.

8.3.2 Gray Bat – Endangered. The gray bat (*Myotis grisescens*) is listed as endangered in Pike County, Illinois. This species occupies a limited geographic range in limestone karst areas of the southeastern United States.

Gray bats roost in caves year round. Winter caves are deep and vertical, and provide a large volume below the lowest entrance to act as cold air traps. A much wider variety of cave types are used during spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer of rivers or reservoirs over which the bats feed on a variety of flying aquatic and terrestrial insects.

Gray bats are endangered largely because they live in very large numbers in a few caves. As a result, they are extremely vulnerable to disturbance. Many important caves were flooded and submerged by reservoirs. Other caves are in danger of natural flooding. Bats displaced by flooding have difficulty finding a new suitable cave. Additionally, alteration of the cave environment, such as gating which prevents access or alters the air flow, temperature, humidity, and amount of light is often harmful. Furthermore, arousing bats while they are hibernating can cause them to use up energy lowering their energy reserves. If a bat runs out of reserves, it may leave the cave too soon and die. In June and July, when flightless young are present, human disturbance can cause frightened females to drop their young in the panic to flee from intruders.

The St. Louis District has determined the proposed project will have “no effect” on the gray bat since no caves are known in the proposed project area and all construction activities will take place from the river.

8.3.3 Eastern Prairie Fringed Orchid – Threatened. The eastern prairie fringed orchid occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, and bogs. It requires full sun and a grassy habitat with little or no woody encroachment for optimum growth and flowering. This orchid is a perennial herb that grows from an underground tuber. Flowering begins from late June to early July, and lasts for 7 to 10 days. Blossoms often rise just above the height of the surrounding grasses and sedges. Seed capsules mature over the growing season and are dispersed by the wind from late August through September.

Early species decline was due to habitat loss, mainly habitat conversion to cropland and pasture. The current decline is mainly due to habitat loss from wetland drainage and development. Other reasons for the current decline include succession to woody vegetation; competition from non-native species; and over-collection. In September 1999 a recovery plan was completed by the U.S. Fish and Wildlife Service which

delineates reasonable actions needed to recover and/or protect this orchid. Recovery plan actions include: habitat protection and management, increase population size and number, survey known populations, and conduct additional research.

The St. Louis District has determined the proposed project will have “no effect” on the eastern prairie fringed orchid since no mesic prairie, sedge meadows, marsh edges, and/or bogs occur in the proposed project area.

8.3.4 Decurrent False Aster – Threatened. The decurrent false aster (*Boltonia decurrens*) is a threatened floodplain plant species found in Madison and St. Clair Counties, Illinois. *Boltonia decurrens'* natural habitat is wet prairies, shallow marshes, and shores of open rivers, creeks, and lakes (Schwegman and Nyboer 1985). It is an early successional species that requires natural or human disturbance to create and maintain suitable habitat. In the past, the annual flood/drought cycle of the Illinois River created this suitable open, high-light, disturbed habitat (Smith *et al.* 1993, Smith *et al.* 1995). For example, Smith *et al.* (1998) found that populations of *B. decurrens* increased in size at three sites studied on the Illinois River following the flood of 1993, with the greatest increase occurring at the two sites which had the most severe flooding. The annual spring flooding also reduced competition from less flood-tolerant species. Field observations indicate that in “weedy” areas without disturbance, the species is eliminated by competition within 3 to 5 years (USFWS 1990).

The project islands are outside the counties where *B. decurrens* occurs and are heavily forested. The St. Louis District has determined the proposed project will have “no effect” on decurrent false aster since none has been found on the islands.

8.3.5 Spectaclecase Mussel – Proposed as Endangered. The spectaclecase (*Cumberlandia monodonta*) most often inhabits riverine microhabitats sheltered from the main force of current. It occurs in substrates including mud, sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with slow to swift current (Buchanan 1980, Parmalee and Bogan 1998, Baird 2000). Unlike most species, the spectaclecase may seldom, if ever, move except to burrow deeper. They may die from stranding during droughts (Oesch 1984). It filter-feeds by siphoning phytoplankton, diatoms, and other microorganisms from the water column (Fuller 1974). For their first several months, juvenile mussels employ foot (pedal) feeding consuming algae and detritus (Yeager et al. 1994).

The spectaclecase is thought to be a short-term brooder of its young. The larvae (glochidia) are released from early April to late May in Missouri streams (Baird 2000). These glochidia must come into contact with a specific host fish(es) to survive. The host(s) for the spectaclecase is unknown. The fact that spectaclecase populations are oftentimes highly aggregated with apparently many even-aged individuals indicates that glochidia may excyst simultaneously from a host (Gordon and Layzer 1989). Thus, any component of its complex life history may limit the population.

The spectaclecase has declined significantly relative to its historic distribution of at least 45 streams in 15 states. It is now known to occur in only 20 streams in 10 states. Of the 20 extant populations, seven are represented by only a single specimen each and are likely not viable. The decline of the spectaclecase in the Illinois River system is primarily the result of habitat loss and degradation (Neves 1991). Additional threats include exotic species, especially zebra mussels; sedimentation; small population sizes; population isolation; livestock grazing; wastewater effluents; chemical contaminants; mine runoff; unstable and coldwater flows downstream of dams; gravel mining; channel dredging; impoundments; and channelization.

The USACE contracted Ecological Specialists Inc. in 2006 to characterize the unionid community near the heads of Twin Islands, Fisher Island, and Wing Island. This study found no spectaclecase mussels in the project area. The St. Louis District has determined the proposed project will have “no effect” on the spectaclecase mussel.

8.3.6 Higgins eye pearlymussel – Endangered. The endangered Higgins eye pearlymussel (*Lampsilis higginsii*) is listed as occurring in the Mississippi River north of Lock and Dam 20, which includes Jo Daviess, Henderson and Rock Island Counties, Illinois. Potentially, it may also occur upstream of Lock and Dam 22 on the Mississippi River. This species prefers sand/gravel substrates with a swift current and is most often found in the main channel border or an open, flowing side channel.

The Ecological Specialists Inc. study found no Higgins eye mussels in the project area. The St. Louis District has determined that the proposed project will have “no effect” on the Higgins eye mussel since they were not present at the Fisher or Wing Island project sites.

8.4 Wetland Resources. The wooded wetlands on the islands would be protected by the proposed project.

8.5 Socioeconomic Resources and Human Use. The tentatively selected plan is not anticipated to adversely affect any socioeconomic resources, including public facilities or services, or nearby communities or businesses. No differential impacts to minority or low income populations are expected. Some short-term increases in employment could be realized during construction of the project. Additionally benefits could be realized for commercial and recreational fishing and waterfowl hunting due to the project’s anticipated benefits to aquatic resources.

8.6 Historic Properties and Cultural Resources. Archaeological surveys, conducted by the Center for American Archaeology in the 1970’s and on site field inspections in 2006 by Dr. F. Terry Norris, MVS Archaeologist did not observe any potentially significant archaeological remains. Additionally, all construction activities would be performed from a floating barge/work platform, and no equipment would work from or be parked on the islands. Therefore, the proposed project and associated construction activities should have no effect upon potentially significant archaeological remains. To

the contrary, it is possible that the project could preserve presently unknown, buried archaeological sites.

The MVS has a verbal agreement with the Illinois State Historic Preservation Officer (SHPO) that coordination on minor projects will occur during the public review period. Because two surveys have found no significant archeological remains within the project area, we believe this project is minor and will coordinate with the SHPO during the public review period.

8.7 Cumulative Impacts. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR Section 1508.7). Cumulative effects are defined as, "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the actions."

The Council on Environmental Quality (CEQ) issued a manual entitled "Considering Cumulative Effects under the National Environmental Policy Act". The manual details an 11 step procedure for addressing cumulative impact analysis. The 11 step procedure is broken down into three main components – scoping, describing the affected environment and determining the environmental consequences. Scoping entails identifying potential cumulative effects associated with the proposed project, defining the assessment goals, establishing spatial and temporal boundaries and identifying other actions affecting the resources, ecosystems and human communities of concern. The second main component, describing the affected environment, is directly related to the scoping component. To describe the affected environment, the baseline condition, response to change, and the capacity of resources, ecosystems and human communities identified in the scoping component to withstand stress must be characterized. The stresses must then be characterized along with their relation to regulatory thresholds. The third and possibly most important component of the cumulative impact analysis is determining the environmental consequences. Four key steps are recognized in determining the environmental consequences. First, the important effects of activities on the resources, ecosystems and human communities must be identified. Then the magnitude and significance of these cumulative effects must be determined. If significant cumulative effects occur, then project alternatives must be modified or new alternatives proposed that avoid, minimize or mitigate the effects or an environmental impact statement must be completed. Lastly, a monitoring plan must be constructed to appropriately monitor the cumulative effects of the selected alternative and establish adaptive management, if necessary. The following paragraphs will address the 11 step procedure for the Alton Pool Islands Restoration Project.

<u>8.7.1 Scoping: Past and present actions</u>. A detailed description of the Upper Mississippi River Basin and System in terms of formation over geological time; physical, environmental, and cultural characteristics; social and economic conditions; and multi-purpose management is included in several studies which are summarized below.

DRAFT

A Cumulative Effects Study (WEST 2000) was undertaken as part of the Corps of Engineers' Upper Mississippi River/Illinois Waterway (UMR-IWW) System Navigation Feasibility Study. This study was undertaken to assess the cumulative impacts of past, present, and reasonably foreseeable future actions associated with the continued operation of the 9-foot navigation channel on both the channel morphology and ecological characteristics of the river system. By analyzing past changes in the channel morphology and ecology of the river system and causative factors for those changes, predictions were developed for the geomorphic and ecological conditions of the basin through the year 2050. These past changes and future predictions can be used to establish the cumulative impacts of past and current actions on the project.

Prior to widespread European settlement, the Upper Mississippi River ecosystem, which includes the Illinois River, supported a diverse 2.6 million-acre landscape of tall grass prairie, wetlands, savannas, and forests (Kuchler 1964 *in* Gowda 1999). The historic ecosystem exhibited natural gradients in habitat among river reaches. Northern river reaches were more forested and were composed of mixed bottomland forests, river channels, seasonally flooded backwaters, floodplain lakes, marsh, and prairie. Beginning around the northern Iowa border and along the lower Illinois River, grasslands and oak savanna dominated floodplain plant communities. Historic surveys revealed a high proportion of oaks and other mast trees in the forest community.
European settlement brought many changes. The river provided efficient transportation and was the focal point of commerce and colonization. As the Midwest economy and population grew, so did the demand for water transportation. In the early 1800s, the Illinois and Michigan Canal was built connecting the Illinois River to the Chicago River and Lake Michigan to promote commerce. In the early 1900s, the Sanitary District of Chicago reversed the flow of the Chicago River to carry Chicago wastewater down the Illinois River away from the city's Lake Michigan beaches. To further improve navigation, the State of Illinois began providing funding for locks and dams on the river. In 1929, the U.S. Army Corps of Engineers was authorized to construct a 9-foot navigation channel and took over the lock and dam construction. The Upper Mississippi River-Illinois Waterway Navigation System was operational by 1940. The lock and dam construction resulted in an elevated water table and frequent maintenance dredging. In addition to these impacts, market hunting, commercial fishing, clamming, and more recently exotic species introductions have directly impacted the aquatic system.

Many indirect impacts have occurred due to activities in the river basin. Logging, agriculture, and urban development over the past 150 years have resulted in the present basin-wide landscape that is more than 80 percent developed (Gowda 1999). Runoff to the main stem rivers has been accelerated by the draining of millions of acres of wetland, and construction of thousands of miles of field tiles, road ditches, channelized streams, and urban storm water sewers (Demissie and Kahn 1993). A draft of the Fish and Wildlife Coordination Act Report for the Upper Mississippi River and Illinois Waterway System Navigation Study reported that the current hydrology of the Illinois River is highly altered, with increased frequency and amplitude of changes in river discharge in some river reaches (USFWS 2002). Dams and reservoirs in the basin and river regulation in the main stem also modify river flows. The modern basin

DRAFT

landscape delivers large amounts of sediment (WEST 2000; Bhowmik and Demissie 1989), nutrients (Interagency Hypoxia Committee 2000), and contaminants (Meade 1995) to the river. Since impoundment, sediment accumulation and littoral (i.e., wind and wave) processes in the navigation pools have greatly altered aquatic habitats (Rogala et al. 2003).

Cumulative Effects Study: Geomorphic Assessment – The future without geomorphic conditions were also evaluated. Land use, water regulation, dredging and other human activities influence the rate at which sediment is supplied and deposited. Additionally, the geologic history of the Illinois River created conditions where sedimentation is and will continue to be the predominant geomorphic process. These factors result in more sediment from tributary areas being deposited within the river valley than transported through it.

Cumulative Effects Study: Ecological Integrity – According to the Illinois River Basin Restoration Comprehensive Plan (USACE 2007), intensive human development in the basin over the last 150 years has and continues to cause a loss of ecological integrity due to:

- sedimentation of backwaters and side channels
- degradation of tributary streams
- increased water level fluctuations
- reduction of floodplain and tributary connectivity

The following areas have been identified as the physical factors that limit system ecological integrity: excessive sedimentation; loss of productive backwaters, side channels, and islands; loss of floodplain, riparian, and aquatic habitats and functions; loss of aquatic connectivity (fish passage) on the Illinois River and its tributaries; altered hydrologic regime; water and sediment quality, and invasive species.

The general ecosystem integrity, or health, of the Illinois River Basin is still declining in spite of the dramatic water quality improvements made as a result of the Clean Water Act. Pressure on the remaining habitats will continue to increase as the human population increases. Scientists and natural resource professionals believe that the Illinois River Basin will continue to see a decline in system ecological integrity and populations of native species, resulting from continued habitat loss and fragmentation, altered natural disturbance regimes, and continued invasive species colonization (USACE 2007).

Habitat Needs Assessment – As part of the Upper Mississippi River System Environmental Management Program (EMP), a study was undertaken in 2000 to identify historical, existing, forecasted, and desired future conditions of habitats within the Upper Mississippi River system. The Habitat Needs Assessment (HNA; Theiling et al. 2000) used the UMR-IWW Navigation Feasibility Study's Cumulative Effects Study, workshops with natural resource managers, and a floodplain vegetation successional model to forecast future conditions of Upper Mississippi River System habitat out to the year 2050.

DRAFT

The workshops with natural resource managers looked at 15 different geomorphic processes responsible for change:

- Delta formation
- Filling between wing dams
- Island dissection
- Island formation
- Loss of isolated backwaters
- Loss of secondary channels
- Tributary delta formation
- Wind-wave erosion of islands
- Channel formation
- Island migration
- Loss of contiguous impounded area
- Loss of bathymetric diversity
- Loss of contiguous/isolated backwaters
- Loss of tertiary channels
- Shoreline erosion

The workshops looked at potential changes in the river system due to these processes at a much finer scale than the Cumulative Effects Study due to the resource managers' intimate knowledge of specific areas of the river. For the Illinois River, in general, the geomorphic processes cited by resource managers as responsible for change were sedimentation of backwaters and side channel habitat. Illinois River needs included restoring existing backwaters so that 25 percent of backwater lakes (19,000 acres) have an average depth of 6 feet; increasing depth diversity and connectivity throughout the river; and restoring hydrologic variability needed to restore and maintain existing backwater habitats.

8.7.2 Scoping: Geographic and spatial boundary. The Alton Pool Islands Restoration Project is located between Illinois RM 37.9 and 40.1. Various inlets from creeks, such as Apple Creek and Hurricane Creek, and side channels exist throughout this stretch of the Illinois River. According to the Habitat Needs Assessment, resource managers believe that secondary channels or contiguous backwater habitat should occur every 5 to 7 miles in the river to provide essential fish overwintering habitat (Theiling et al. 2000). This 5 mile minimum spacing is also applicable to create the geographic scope for the project impacts since similar habitat exists within 5 miles upstream and downstream of the proposed project location. To establish the temporal frame for analysis, the most commonly used practice is the period of analysis for the project. The period of analysis is 50 years.

8.7.3 Determining the affected environment. The essential components of determining the affected environment is the characterization of stressors and defining the baseline of the environment. Stressors result from natural events or human actions that cause a subsequent population, community or ecosystems level response. The goal of characterizing stressors is to determine whether the resources, ecosystems and human communities of concern are approaching conditions where additional stresses will have an important cumulative effect (CEQ 1997). Generally, those occurring for a short duration at a localized site, such as the Alton Pool Islands Restoration Project, are of less concern than those occurring for an extended time over a wide geographical region. Stressors in the Illinois River Basin are discussed in section 2.5.1.

For the Alton Pool Islands Project the Illinois River Master Plan Miles 0 to 80 (USACE 2005) is used to identify all known plans for new channel improvement structures or

modifications to existing structures within the St. Louis District through the year 2012 or at any other yet-to-be-determined time. The nearest project is the NESP Twin Islands Ecosystem Restoration Project, located between River Miles (RM) 37.5 and 37.8 along the right descending bank. The project is in the feasibility phase. There are no other plans in the vicinity of the project area. Large scale system wide stressors remain. Stressors of concern include changes in: land cover/land use, river/side channel/floodplain connectivity, water quality, sediment transport, and hydrologic regime. The baseline for these stressors is discussed throughout 2.5.1. To summarize, land cover along the river is converting to more water tolerant disturbance adapted species while the floodplain is being leveed and developed resulting in more severe and frequent floods. Water quality has improved since the passing of the Clean Water Act but remains impaired. The influx of sediment exceeds the transport capacity resulting in sediment filled back waters and channels. Many factors combine to create an altered hydrologic regime with more frequent floods and fewer to no low water periods. Very little contiguous off-channel aquatic habitat remains and what does remain is greatly affected by sedimentation (WEST 2000).

8.7.4 Determining the environmental consequences. The most crucial step in cumulative impact analysis is determining the environmental consequences. Many cumulative effects that have and are occurring are discussed in the Navigation Study by WEST (2000) and will not be repeated here. In summary, the assessment acknowledges the tremendous changes brought about by construction of the 9-Foot Channel Project in conjunction with other impacts occurring throughout the watershed resulting in declines in fish, submerged aquatic vegetation, and backwaters/secondary channels. However with the exception of fish, these impacts were predicted to be minor. For fisheries, the 9-foot navigation channel would continue to contribute to degradation. In general, these impacts could be offset by an adaptive environmental restoration approach that focuses on the re-creation or enhancement of key processes (periodic drawdown, connectivity) and habitat features such as island/side channel creation or restoration. Several restoration programs have been initiated to achieve this goal. However, current management and restoration levels have not prevented system-wide habitat degradation in the past and will likely not meet existing habitat needs in the future. Increased efforts to reverse impounded effects on aquatic habitats, vegetation succession and forest health will be required to sustain ecosystem values such as the restoration of island habitat and side channels in the Illinois River.

For the Alton Pool Islands Project, key stressors of concern include changes in: land cover/land use, river/side channel/floodplain connectivity, water quality, sediment transport, and hydrologic regime. These stressors act to increase sedimentation in the Alton Pool Island backwaters and increase flood heights and frequency in the project area. The proposed project is designed to reduce the effects of these impacts on the islands and associated side channels. In conjunction with other environmental management and restoration projects, this project could help offset the system wide impacts caused by these stressors.

There have been concerns expressed that placing additional rock structures within the Upper Mississippi River System will raise flood heights. However, research on river

DRAFT

stage trends over time found that river structures do not impact flood heights. Additionally, the Alton Pool project proposes the addition of 950' of bank line revetment and five 100' long hard points (small dikes). These structures are approximately 35 river miles from the next rock structure. Thus, this project will not have cumulative impacts on flood heights. The project will likely cause minor short-term construction-related impacts to local fish and wildlife populations. After completion, the rock will provide unique habitat for fish and wildlife resulting in an overall positive effect.

8.8 Probable Adverse Environmental Impacts Which Cannot Be Avoided.
Temporary impacts during construction such as noise, aesthetic impacts, and increased turbidity would likely occur. Also, an increase in manmade structures would occur as part of the tentatively selected plan. These adverse environmental impacts are considered minor as compared to the gains in fish and wildlife habitat that are anticipated with the project.

DRAFT

8.9 Relevant Laws and Regulations

Table 14 summarizes the Project's compliance status with respect to applicable statutes.

Table 14. Federal policy compliance status.

Federal Policy	Compliance Status	Location in Document
National Environmental Policy Act, 42 USC 4321-4347	Partial[1]	EA & FONSI
Water Resources Development Acts of 1986, 1990, 2000 and 2007	Full	Sec. 1.2, 1.4.2, 1.5.1 & FONSI Sec. II
Migratory Bird Treaty Act of 1918, 16 USC 703-712	Full	Sec. 2.2.3, & 8.2.3
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	Full	Sec. 2.2.5, 8.2.5 & FONSI Sec. III (g)
Resource Conservation and Recovery Act, 42 USC 6901-6987	Full	Sec. 2.2.5, & 8.2.5
Farmland Protection Policy Act, 7 USC 4201-4208	Full	Sec. 2.2.6, 8.2.6 & FONSI Sec. III (e)
Endangered Species Act, 16 USC 1531-1543	Partial[2]	Sec. 2.3 & 8.3
Food Security Act of 1985, 7 USC varies	N/A	N/A
Land and Water Conservation Fund Act, 16 USC 460d-461	N/A	N/A
National Historic Preservation Act, 16 USC 470 et seq.	Partial[3]	Sec. 2.6, 8.6 & FONSI Sec. III (g)
Noise Control Act, 42 USC 7591-7642	Full	Sec. 8.8 & FONSI Sec III (d)
Clean Air Act, 42 USC 7401-7542	Full	Sec. 8.9.1 & FONSI Sec. III (d)
Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities (EO 11282 as amended by EO's 11288 and 11507)	Full	Sec. 8.9.1
Protection and Enhancement of the Cultural Environment (EO 11593)	Partial[3]	Sec. 8.9.2
Floodplain Management (EO 11988 as amended by EO 12148)	Full	Sec. 8.9.3
Protection of Wetlands (EO 11990 as amended by EO 12608)	Full	Sec. 8.9.4
Protection and Enhancement of Environmental Quality (EO 11991)	Full	Sec. 8.9.5
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	Full	Sec. 2.5, 8.5, & 8.9.6
Invasive Species (EO 13112)	Full	Sec. 8.9.7
Protection of Migratory Birds (EO 13186)	Full	Sec. 8.9.8
Bald and Golden Eagle Protection Act, 42 USC 4151-4157	Full	Sec. 8.9.9
Clean Water Act, 33 USC 1251-1375	Partial[2]	Sec. 8.9.10 & Appendix B
Rivers and Harbors Act, 33 USC 401-413	Partial[2]	Sec. 8.9.10, Appendix B
Fish and Wildlife Coordination Act, 16 USC 661-666c	Partial[2]	Sec. 10.2 & 10.3

1 Full compliance after submission for public comment and signing of FONSI
2 Required permits, coordination will be sought during document review
3 Full compliance to be achieved with SHPO's concurrence with conclusions

DRAFT

8.9.1 Executive Order 11282. Prevention, Control, and Abatement of Air and Water Pollution at Federal Facilities - Under this Executive Order federal agencies shall ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency.

An initial Phase I HTRW Environmental Assessment was performed in the project area and found no evidence of recognized environmental conditions in the project area. If any recognized environmental conditions are identified during project construction, the work will cease and the Environmental Quality office of the St. Louis District will be notified immediately to reassess the project area.

While this Executive Order instructs federal agencies to prevent, control, and abate air pollution, the Clean Air Act of 1963 sets stricter standards requiring the U.S. Environmental Protection Agency (EPA) to designate measurable targets for various air pollutants: National Ambient Air Quality Standards (NAAQS). They have identified standards for seven pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter, and particulate matter less than 2.5 microns. Greene County and Pike County, Illinois currently meet all EPA air quality standards.

Because no HTRW was found and the project area meets air quality standards, project construction activities are not expected to significantly contribute to air and water pollution. The project would result in dust and exhaust from equipment and slight increases in turbidity within the waters adjacent to the islands. Therefore, a minor short-term reduction in air and water quality would occur. After project construction is completed, air and water quality would return to existing conditions. By preventing, controlling and abating for any environmental pollution in regards to construction activities, this proposed project is in full compliance with this Executive Order.

8.9.2 Executive Order 11593. Protection and Enhancement of the Cultural Environment - Under this Executive Order, federal agencies “shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation”.

Without protection of the islands, river induced erosion may damage or destroy presently unknown buried archaeological remains located well away from the shoreline. The 1970s and 2006 archaelogical surveys indicated that the proposed project location and construction areas do not contain any known archaeological remains.

The proposed project is in full compliance with this Executive Order once concurrence is received from the Illinois State Historic Preservation Officer.

8.9.3 Executive Order 11988. Floodplain Management - Under this Executive Order, federal agencies are to "provide leadership and take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains".

This project will reduce erosion on two islands in the Illinois River. If protection of the islands was not provided, the islands would continue to erode.

By minimizing the impacts on existing vegetation and preserving the natural and beneficial values served by the islands, this proposed project is in full compliance with this Executive Order.

8.9.4 Executive Order 11990. Protection of Wetlands - Under this Executive Order, federal agencies shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

All construction activities would be performed from a floating barge / work platform and no equipment would work from or be parked on the islands. Providing stone protection would slow or prevent the erosion of the wooded wetlands on the islands. Therefore, the proposed project is in full compliance with this Executive Order.

8.9.5 Executive Order 11991. Protection and Enhancement of Environmental Quality - Under this Executive Order, federal agencies shall take action to provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals."

The proposed project is designed to restore islands and associated side channels in the Illinois River. Thus the project will protect and enhance the Nation's environment. Therefore, the proposed project is in full compliance with this Executive Order.

8.9.6 Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations - Under this Executive Order, federal agencies "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States."

Environmental justice is covered in sections 2.6 and 8.6. The proposed project is located in a small rural community that is predominately white. Minor disturbances from construction activities (increased noise, water turbidity, and air pollution) are expected. These will cease upon construction completion. Therefore, no long-term adverse impacts to human health or environment are expected for minority or low-income populations. Some short-term increases in employment for construction could be realized. Long-term increases in commercial and recreational fishing and waterfowl hunting could occur due to the project's protection and creation of suitable habitat. The proposed project is in full compliance with this Executive Order.

8.9.7 Executive Order 13112. Invasive Species - This executive order aims "to prevent the introduction of invasive species and provide for their control and to minimize the

economic, ecological, and human health impacts that invasive species cause". Asian Carp, one of the primary invasive species of concern in the area, prefer off channel areas with little flow for spawning and rearing. This project aims to restore and maintain flow through two island side channels.

8.9.8 Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds - Under this Executive Order, federal agencies "taking actions that have, or likely to have, a measurable negative effect on migratory bird populations are directed to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations."

Migratory birds are recognized as being of great ecological and economic value. Millions of Americans study, watch, feed, or hunt migratory birds throughout the United States. Construction equipment and activities would cause temporary noise affecting and potentially disrupting waterfowl and other birds near the proposed project area. The impact from noise would be temporary and cease following construction completion. In the long term, the proposed project would restore forested island habitat and shallow backwater habitat. Migratory birds utilize the nesting, feeding, and resting areas provided by these habitats: forest islands provide nesting habitat that is near food but isolated from terrestrial predators. Because the proposed project protects important migratory bird habitat, the proposed project is in full compliance with this Executive Order.

8.9.9 Bald and Golden Eagle Protection Act of 1940. Bald Eagles (*Haliaetus leucocephalus)* range over most of North America. They build large nests in the tops of large trees near rivers, lakes, marshes, or other aquatic areas. The staple food of most bald eagle diets is fish, but they will also feed on waterfowl, rabbits, snakes, turtles, other small animals, and carrion. In winter, eagles that nest in northern areas migrate south and gather in large numbers near open water areas where fish or other prey are plentiful (USFWS 2006).

On August 9, 2007, the bald eagle was removed from the federal list of threatened and endangered species. It remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The Bald and Golden Eagle Protection Act prohibits unregulated take of bald eagles. The Fish and Wildlife Service recently finalized a rule defining "take" that includes "disturb." "Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." (USFWS 2007). Based on this rule, the FWS developed the National Bald Eagle Management Guidelines in 2007. These guidelines indicate that in undisturbed areas no construction activities should occur within 660 feet of a visible eagle's nest and 330 feet of a non-visible nest during breeding season.
There are no known active nests within 660 feet of the proposed repairs. The nearest

known eagle sightings have occurred approximately .5 miles west of Fisher Island. The Illinois Natural Heritage Database lists a 2001 record of a bald eagle nest, approximately 4 miles north of Wing Island in Greene County. Because the distance exceeds 660 feet, it is unlikely that construction activities would disturb the bald eagle

8.9.10 Clean Water Act and Rivers and Harbors Act. In compliance with the Clean Water Act and Rivers and Harbors Act, activities proposed under the Alton Pool Islands Restoration Project meet the terms and conditions of Nationwide Permit 13 (Bank Stabilization) and Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities). The Illinois Environmental Protection Agency has issued blanket water quality certification for projects meeting the requirements of these permits. The Nationwide Permit Summary, General Conditions, and Section 401 special conditions are in Appendix B. These permits expire March 12, 2012 and projects meeting the terms and conditions of these permits must be re-evaluated upon the permits' expiration unless under construction. Projects under construction have a one year grace period after permit expiration. All permits will be acquired prior to the initiation of project construction.

Rivers and Harbors Act Section 10
This provides the Chief of Engineers and Secretary of the Army the authority to permit construction or modification of structures in or over a navigable waterway. Activities proposed under this project meet the terms and conditions of Nationwide Permit 13 and 27.

Clean Water Act Section 404
Section 404 of the Clean Water Act regulates the placement of fill, such as rock, in waters of the United States. This project meets the terms and conditions of Nationwide Permit 13 and 27.

Clean Water Act Section 401
Section 401 requires the state to set water quality standards including designating water use and pollutant levels. The program is administered by the State of Illinois which reviews applications to ensure that the proposed project will not degrade water quality. The Illinois Environmental Protection Agency (IEPA) has issued Section 401 water quality certification for all projects that meet the terms and conditions of Nationwide Permit 13 and 27. Therefore, individual certification is not required.

Clean Water Act Section 402
Land disturbances of greater than 1 acres associated with this project require a National Pollutant Discharge Elimination System (NPDES) permit, or Section 402, for storm water discharges. The construction contractor would be responsible for this permit.

8.10 Short-Term Versus Long-Term Productivity. Construction activities may temporarily disrupt fish, wildlife, and human use in the immediate vicinity of the project area. However, the long-term health and productivity of fish and wildlife in the area are anticipated to increase with the project. Therefore short-term human use impacts would

be offset by long-term fish and wildlife habitat gains and their associated benefits to human use.

8.11 Irreversible Resource Commitments. This proposed project is in the planning stage. Money has been expended to complete the planning document and conduct pre-project monitoring. No construction dollars which are considered irreversible have been expended for the proposed project.

8.12 Relationship of the Proposed Project to Other Planning Efforts. The proposed project is not in conflict with any other planning efforts in the project area.

9. IMPLEMENTATION RESPONSIBILITIES

9.1 Tentatively Selected Plan Cost Sharing. Federal and non-Federal cost sharing for the Tentatively Selected Plan is in accordance with Section 519 of the Water Resources Development Acts of 2000, as amended. Ecosystem restoration projects require that the non-Federal share of the first cost of the project or the separable element be 35%. Although no land, easements, rights-of-way, relocations, and disposal areas (LERRDs) are currently required for this project, the Non-Federal Sponsor would provide 100% of any LERRDs, if LERRDs should be required in the future. The value of LERRDs would be included in the non-Federal 35% share. Where the LERRDs exceed the non-Federal sponsor's 35% share, the sponsor would be reimbursed for the value of the LERRDs that exceed the 35% non-Federal share. All operations, maintenance, repair, rehabilitation, or replacement (OMRR&R) of the project is a non-Federal responsibility. However, no OMRR&R is anticipated for this project during the period of analysis.

Table 15. Federal and non-federal share of current estimated project costs.

Project Feature	Wing and Fisher Island Cost	Non-Federal %	Non-Federal Cost	Federal %	Federal Cost
First Cost of Construction	$815,000	35%	$285,250	65%	$529,750
Monitoring and Adaptive Management	$44,000	35%	$15,400	65%	$28,600
Project Cost	$859,000	35%	$300,650	65%	$558,950
LERRD Credit	$0	100%	$0	0%	$0
Cash	$0	35%	$300,650	65%	$558,950
OMRR&R (average annual) Maintenance	$0	100%	$0	0%	$0

9.2 Federal Responsibilities. The Federal Government would provide 65% of the first cost of implementing the Tentatively Selected Plan including Preconstruction Engineering and Design (PED), construction, and construction management. In addition to its financial responsibility, the Federal Government would:

Design and prepare plans and specifications for construction of the Tentatively Selected Plan; and Administer and manage contracts for construction and supervision of the project after funding and execution of a Project Partnership Agreement with the IDNR.

9.3 Non-Federal Responsibilities. The IDNR would be responsible for providing 35% of the First Cost of implementing the Tentatively Selected Plan. All operations, maintenance, repair, rehabilitation, or replacement (OMRR&R) of the project is a non-Federal responsibility. However, no OMRR&R is anticipated for this project during the period of analysis. Similar projects with similar materials have been implemented on the Mississippi River and have required no OMRR&R.

The IDNR also would be required to provide certain local cooperation items based on Federal law and policies. The items of local cooperation are:

(a). Provide a minimum of 35 percent of total project costs as further specified below:

(1) Provide, during the first year of construction, any additional funds needed to cover the non-Federal share of design costs;

(2) All work will be performed below the ordinary high water, thus no LERRDs are currently required. However, if any LERRDs are required in the future; provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material that the Government determines to be necessary for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project;

(3) Provide, during construction, any additional funds necessary to make its total contribution equal to 35 percent of the total project costs allocated to the project;

(b). Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project;

(c). Not use funds provided by a Federal agency under any other Federal program, to satisfy, in whole or in part, the non-Federal share of the cost of the project unless the Federal agency that provides the funds determines that the funds are authorized to be used to carry out the study or project;

(d). Not use project or lands, easements, and rights-of-way required for the project as a wetlands bank or mitigation credit for any other project;

(e). For as long as the project remains authorized, operate, maintain, repair, replace, and rehabilitate the project, or functional portion of the project, including mitigation, at no cost to the Federal Government, in a manner compatible with the project's

authorized purposes and in accordance with applicable Federal and state laws and regulations and any specific directions prescribed by the Federal Government;

(f). Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

(g). Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

(h). Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;

(i). Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project;

(j). Agree that, as between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that would not cause liability to arise under CERCLA;

(k). Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstruction or encroachments) which might reduce ecosystem restoration benefits, hinder operation, maintenance, repair, replacement, and rehabilitation, or interfere with the project's proper function, such as

any new developments on project lands or the addition of facilities which would degrade the benefits of the project;

(l). Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as would properly reflect total costs of construction of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

(m). Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5), and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

(n). Comply with all applicable Federal and state laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army," and all applicable Federal labor standards and requirements, including but not limited to 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying, and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 et seq.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c et seq.); and

(o). Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way necessary for the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

10. COORDINATION AND VIEWS

10.1 Public Involvement.

The public will be provided an opportunity to comment on a draft version of this PIR. The draft PIR with integrated Environmental Assessment and draft FONSI will be distributed to Federal, State, and interested agencies, elected officials, and the general

public as part of the 30-day public review process. District responses to public and agency comments on the draft PIR will be included as part of the final PIR.

We expect the public to be generally supportive of this project as it will improve fish and wildlife habitat in the area. As mentioned in Section 8.7.4, there have been concerns expressed to the St. Louis District that placing additional rock structures within the Upper Mississippi River System will raise flood heights. Currently, no one has made this comment on this project. The tentatively selected plan proposes the addition of 950' of bank line revetment and five 100' long hard points (small dikes). These structures are approximately 35 river miles from the next rock structure. Additionally research on river heights over time using stage data, has found that the addition of rock structures in the river does not increase flood heights. The tentatively selected plan will not increase flood heights.

10.2 Federal Agencies.

The U.S. Fish and Wildlife Service (FWS) has been involved throughout the planning and design process for the Alton Pool Islands Restoration Project and was a member of the environmental benefits analysis team. Under the authority of the Fish and Wildlife Coordination Act, the FWS provided a Draft Coordination Act Report (CAR) for the Alton Pool Islands Restoration Project on June 16, 2011 (Appendix A). The report indicates the FWS's support for the project and approval of the tentatively selected plan. Throughout project planning, the FWS has been supportive of the project.

10.3 State Agencies

The Illinois Department of Natural Resources has been involved throughout the planning and design process for the Alton Pool Islands Restoration Project. The IDNR continues to be supportive of this project as indicated by their letter of intent located in Appendix A.

10.4 Native American Tribes.

Coordination with affiliated Native American Tribes will be conducted during the public review process. Should any human remains or other culturally sensitive items be discovered during project construction activities, work will be halted immediately and consultation with appropriate officials will be initiated.

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ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

DRAFT RECOMMENDATIONS

The following recommendations are tentative and will not be finalized until after public review. Any comments received will be carefully considered and may lead to revision of the document.

I have weighed the outputs to be obtained from the full implementation of this ecosystem restoration project against its estimated cost and have considered the various alternatives proposed, impacts identified, and overall scope. In my judgment, this project, as proposed, justifies expenditure of Federal funds. I recommend that the Mississippi Valley Division Commander approve the proposed Alton Pool Islands Restoration Project.

The tentatively selected plan includes placing revetment along the top of Wing Island to prevent high river flows from eroding the island. The Project also involves placing revetment along the top of Fisher Island to reduce erosion caused by high river flows. Additionally, five alternating small rock dikes will be placed in Fisher Island's side channel to concentrate flow and add depth. These features will maintain existing island and side channel habitat and provide spawning and rearing opportunities for a wide variety of aquatic life.

Implementation of the project features would restore 168 acres of island and aquatic habitat and generate 65 Functional Analysis Score Units. The estimated first cost is $859,000 and includes construction of the project features; planning, engineering, and design; construction management; and monitoring. Implementation would be cost shared 65% ($558,350) by the Federal Government and 35% ($300,650) by the Illinois Department of Natural Resources (IDNR), the Non-Federal Sponsor. All construction will be accomplished from the river below ordinary high water eliminating the need for real estate acquisition. All operations, maintenance, repair, rehabilitation, or replacement (OMRR&R) is a non-Federal responsibility; however, no OMRR&R is anticipated during the period of analysis. Additionally, no adaptive management is anticipated to be required. Post project monitoring sufficient to determine success will cost approximately $44,000.

The project is consistent with and fully supports the overall goals and objectives of The 2005 Master Plan for the Illinois River, Illinois River Miles 0 to 80. Construction of this project will produce independent, immediate and substantial restoration, preservation and protection benefits. Upon construction completion, Wing and Fisher Island will be preserved and protected from further erosion. Overtime, the structures in Fisher Island side channel will restore depth, and preserve the side channel. These independent benefits will also restore habitat for the aquatic community in the project area.

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The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

_____ _____

Date:

CHRISTOPHER G. HALL
COL , EN
Commanding

DRAFT

DRAFT FINDING OF NO SIGNIFICANT IMPACT

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

The following text is tentative and will not be finalized until after public review. Any comments received will be carefully considered and may lead to revision of the document.

I. I have reviewed and evaluated the documents concerning the proposed Alton Pool Islands Restoration Project. Two islands in the Alton Pool are being considered for this study, Fisher Island (River Mile 38.8 L), and Wing Island (River Mile 40.3 R). Fisher Island is located in Greene County, Illinois; Wing Island is located in Pike County, Illinois. The islands are located between the cities of Kampsville and Pearl, Illinois.

II. Congress provided an authority to specifically address Illinois River Basin Restoration in Section 519 of the Water Resources Development Act (WRDA) of 2000, as amended. This authority calls for the completion of a comprehensive plan and critical restoration projects. Efforts under Section 519 were initiated following the provision of funds in the Energy and Water Development Appropriations Act of 2002.

III. The primary habitat problem in the project area is a dramatic loss of productive backwaters, side channels, and channel border areas due to excessive sedimentation and erosion. This is limiting ecological health and altering the character of this unique floodplain river system. In particular, the Illinois River has lost much of its critical spawning, nursery, and overwintering areas for fish, habitat for diving ducks and aquatic species, and backwater aquatic plant communities. An opportunity exists to restore and maintain the degraded Wing and Fisher Islands and their associated side channels, in order to increase the ecological integrity of the Illinois River. The project will restore aquatic habitat diversity and provide adequate depth to sustain native fish and wildlife communities, and improve water and sediment quality.

IV. As part of this evaluation, I have considered the following alternatives:

- Wing 1 - No Action
- Wing 2 - Single Bullnose with Revetment
- Wing 3 - Riprap Shoreline Only
- Wing 4 - Unrooted Bullnose with Revetment

- Fisher 1 - No Action
- Fisher 2 - Riprap Shoreline and Alternating Hard points in Side Channel
- Fisher 3 - Single Bullnose and Alternating Hard points in Side Channel
- Fisher 4 - Single Bullnose with Extended Off-bank Line Revetment on Riverside and Alternating Hard points in Side Channel

DRAFT

The tentatively selected plan for Wing Island involves the construction of riprap along the shoreline (Alt. 3). The tentatively selected plan for Fisher Island involves the construction of riprap along the shoreline with alternating hard points in the side channel (Alt. 2).

V. The possible consequences of these alternatives have been studied for physical, environmental, cultural, social and economic effects, and engineering feasibility. Significant factors evaluated as part of my review included:

a. The project would not impact existing and potential water supplies, water conservation; currents, circulation, special aquatic sites, or wetlands; drainage patterns; commercial fisheries; commercial navigation; national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, research sites, etc. in the project area.

b. The project would be expected to have a positive impact on aquatic resources; terrestrial resources; wildlife habitat; physiography-topography of the area; turbidity; levels of suspended particulates; storm, wave, and erosion buffers; erosion and accretion patterns; habitat for fish and other aquatic organisms; recreational resources; recreational fisheries; and aesthetic value.

c. There would be no long-term adverse impacts to the physical environment (e.g., noise, air quality, and water quality); safety; traffic/transportation patterns; or socio-economic benefits.

d. The project would not impact agricultural lands.

e. Federally- and/or state-listed endangered, threatened, or candidate species would not be adversely impacted.

f. No cultural resource issues, or hazardous and toxic waste issues are expected.

g. No adverse significant cumulative impacts are anticipated.

h. The "No Action" Alternatives were evaluated and would be unacceptable to recommend as they do not meet the project purpose of protecting islands and shoreline along the Illinois River.

VI. This project meets the terms and conditions of Nationwide Permit 13 (Bank Stabilization) and Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities). The Illinois Environmental Protection Agency has issued blanket water quality certification for projects meeting the requirements of these permits. Compliance with Section 106 of the National Historic Preservation Act (NHPA) will be achieved with the State Historic Preservation Officer’s concurrence during public review that this project is not likely to impact any historic sites. The Fish and Wildlife Service

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will review the document during public review to ensure compliance with the Endangered Species Act and Fish and Wildlife Coordination Act. Compliance with the National Environmental Policy Act will be achieved with the signing of this document. The project is in compliance with all other applicable laws and regulations as documented in Table 12 of the Environmental Assessment.

V. Based on the disclosure of the Tentatively Selected Plan impacts contained within the Environmental Assessment, no significant impacts to the environment are anticipated. The proposed action has been coordinated with the appropriate resource agencies, and there are no significant unresolved issues. Therefore, an Environmental Impact Statement will not be prepared prior to proceeding with the construction of project features for Wing and Fisher Islands located in the Illinois River, Pike and Greene Counties, Illinois.

_____ _____

Date

Christopher G. Hall
Colonel, U.S. Army
District Engineer

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APPENDIX A

CORRESPONDENCE

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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APPENDIX A
CORRESPONDENCE

IDNR to Mrs. Teri Allen, St. Louis District, U.S. Army Corps of Engineers regarding state listed species associated with Fisher Island.....A-1

IDNR to Mrs. Teri Allen, St. Louis District, U.S. Army Corps of Engineers regarding state listed species associated with Wing Island.....A-3

Mrs. Teri Allen, St. Louis District, U.S. Army Corps of Engineers, to Mr. Jon Duyvenjonck, U.S. Fish and Wildlife Service, November 7, 2007 regarding Federally listed species.....A-5

Mr. Jon Duyvenjonck, U.S. Fish and Wildlife Service to Mrs. Teri Allen, St. Louis District, U.S. Army Corps of Engineers regarding Section 7 determination of Federally listed species.....A-6

Draft Fish and Wildlife Coordination Act Report from Ms. Joyce A. Collins, Assistant Field Supervisor, U.S. Fish and Wildlife Service, to Colonel Thomas E. O'Hara, Jr., St. Louis District, U.S. Army Corps of Engineers, June 16, 2011.....A-16

Mr. Steven L. Stockton, Director of Civil Works to Commander, U.S. Army Corps of Engineers, Mississippi Valley Division regarding approval of exclusion for the Alton Pool Islands Restoration Project from Independent External Peer Review A-27

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EcoCAT
Ecological Compliance Assessment Tool

Applicant: U.S. Army Corps of Engineers
Contact: Teri Allen
Address: 1222 Spruce Street
St. Louis, MO 63103

IDNR Project #: 0902672
Date: 09/25/2008

Project: Fisher Island
Address: Illinois River, Hardin

Description: Island head protection, side channel protection

Natural Resource Review Results

This project was submitted for information only. It is not a consultation under Part 1075.

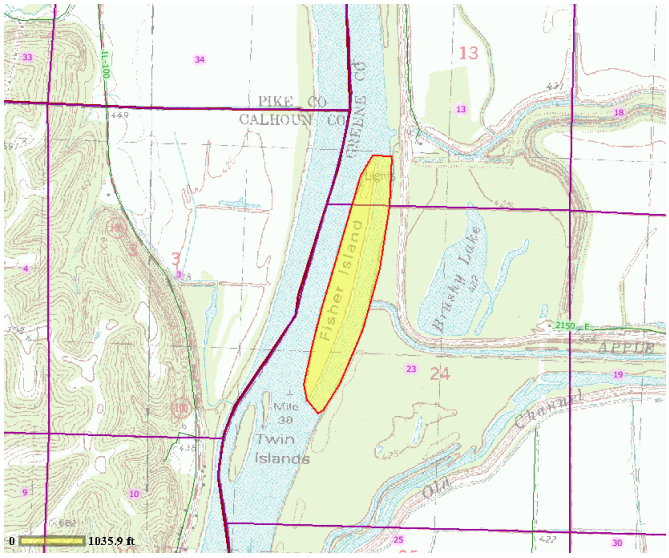
The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: Greene

Township, Range, Section:
11N, 14W, 13 11N, 14W, 23



IL Department of Natural Resources Contact
Impact Assessment Section
217-785-5500
Division of Ecosystems & Environment

Local or State Government Jurisdiction
Other

, Illinois

Disclaimer

The Illinois Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of natural resources in Illinois. This review reflects the information existing in the Database at the time of this inquiry, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, compliance with applicable statutes and regulations is required.

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EcoCAT
Ecological Compliance Assessment Tool

Applicant:	U.S. Army Corps of Engineers	*IDNR Project #:*	0902675
Contact:	Teri Allen	Date:	09/25/2008
Address:	1222 Spruce Street St. Louis, MO 63103		

Project: Wing Island
Address: Illinois River, Hardin

Description: Island head protection

Natural Resource Review Results

This project was submitted for information only. It is not a consultation under Part 1075.

The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

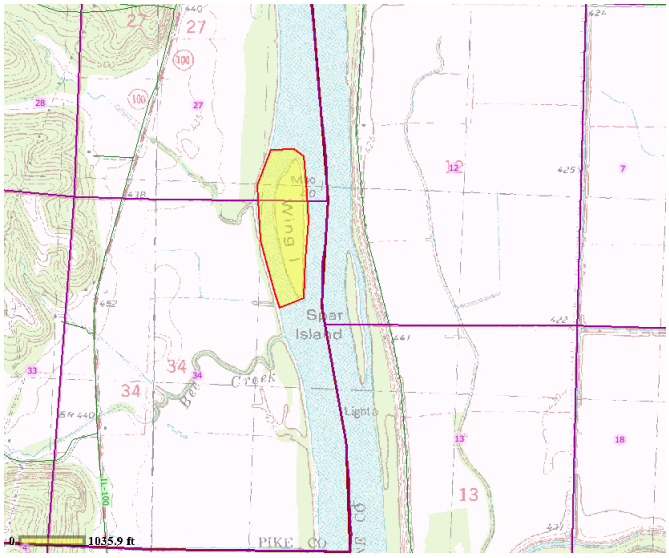
Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: Pike

Township, Range, Section:

7S, 2W, 27 7S, 2W, 34



IL Department of Natural Resources Contact
Impact Assessment Section
217-785-5500
Division of Ecosystems & Environment

Local or State Government Jurisdiction
Other

, Illinois

Disclaimer

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:
Teri Allen
Planning, Programs, and Project Management Division
Environmental Branch (CEMVS-PM-E)

7 November 2007

Mr. Jon Duyvejonck,
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Rock Island Field Office
1511 47th Avenue
Moline, IL 61265

Mr. Duyvejonck,

On behalf of the U.S. Army Corps of Engineers, St. Louis District, I am requesting that the U.S. Fish and Wildlife Service provide a listing of Federally threatened or endangered species, currently classified or proposed for classification, which could be present in the area of the proposed Illinois River Basin Restoration Program - Alton Pool Island Restoration. (Fisher and Wing Islands).

Two islands in the Alton pool of the Illinois River are considered for this study – Fisher Island (river mile 38.8 L), and Wing Island (river mile 40.3 R). Fisher Island is located in Greene County, IL; Wing Island is located in Pike County, IL. The project involves investigating and implementing methods to restore the degraded islands and side channels. Potential measures include riprap, bullnose construction, hardpoint construction, on or off-bankline revetment, and enrichment of upstream island tips.

Enclosed is a map identifying the project site. Please feel free to contact me at 314-331-8084 if you need additional information.

Sincerely,

Teri Allen
Aquatic Ecologist

Enclosure

Endangered Species Act Section 7 Determination

Project (include state): Alton Pool Island Restoration; Illinois River Basin Restoration Program Section 519; Illinois River, Pike And Greene Counties, Illinois

Project Manger:	Tom Kirkeeng (Rock Island)	Phone: 309-794-5410
	Dawn Lamm (St. Louis)	Phone: 314-331-8354
F&WS Contact:	Jon Duyvejonck	Phone: 309-757-5800 ext. 207
COE Envir. POC:	Teri Allen	Phone: 314-331-8084

Project Authority:

The project modifications contained in this report are proposed under the authority of Section 519 of the Water Resources Development Act (WRDA) of 2000 (as amended).

Project Location:

Two islands in the Alton pool of the Illinois River are being considered for this study – Fisher Island (river mile 38.8 L), and Wing Island (river mile 40.3 R) (Figure 1). Fisher Island is located in Greene County, Illinois; Wing Island is located in Pike County, Illinois. The islands are located between the cities of Kampsville and Pearl, Illinois.

Brief Description of Project:

The primary objective of the Alton Pool Island Restoration project is to restore and maintain the degraded Wing and Fisher Islands and their associated side channels, in order to increase the ecological health of the Illinois river. Potential measures include bullnose construction, revetment, riprap, hardpoint construction, and enrichment of upstream island tips. The expected ecological outcomes of this project include reduction in island erosion; improvement in vegetation on the upstream island tips; protection and creation of deep water, maintenance of off-channel aquatic habitat; and improvement in overall habitat diversity in the area. Selection of a preferred alternatives are awaiting completion of incremental cost analyses, thus a description of all potential project alternatives is included.

Wing Island

- Alternative 1 – No Corps Action

- Alternative 2 – Single Bullnose and Revetment: Installation of a 750 foot long stone structure along the historical location of the island head to an elevation of 434 NGVD. The structure would tie into the sidechannel side of the island head and leave a fish passage channel along the river side of the island head. Revetment would be placed where the structure tied into the island head. This configuration would allow the head of the island to stabilize and accrete

sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure.

- Alternative 3 – Riprap Shoreline: Installation of approximately 400 ft of revetment along the existing island head to an elevation of 434 NGVD. This will prevent the head of the island from further eroding.

- Alternative 4 – Unrooted Bullnose with Revetment: Installation of approximately 400 ft of revetment along the existing island head to an elevation of 434 NGVD. The structure would not be tied into the island as to allow fish passage along both sides of the island head. This alternative would prevent the head of the island from further eroding.

Fisher Island

- Alternative 1 – No Corps Action

- Alternative 2 – Riprap Shoreline: Installation of approximately 550 ft of revetment along the existing island head to an elevation of 429 ft NGVD. This will prevent the head of the island from further eroding.

- Alternative 3 – Single Bullnose: Installation of an 800 foot long stone structure along the historical location of the island head to an elevation of 429 NGVD. The structure would not be tied into the island as to allow fish passage along both sides of the island head. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure.

- Alternative 4 – Single Bullnose with Extended Off Bankline Revetment on Riverside: Installation of a 3,232 foot long stone structure along the historical location of the island head and as off bankline revetment along the riverside of the island to an elevation of 429 NGVD. Notches will be placed at intervals along the off bankline revetment and the structure would not be tied into the island as to allow fish passage along all sides of the island. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure and behind the off bankline revetment.

- Alternative 5 – Alternating Hardpoints in Side Channel: Installation of five alternating 100 ft long hardpoints placed at the lower end of the side channel. These structures will be built to an elevation of 429 ft NGVD. These structures will promote sinuosity and depth at the lower end of the side channel and assist in passing an increased sediment load from Apple Creek.

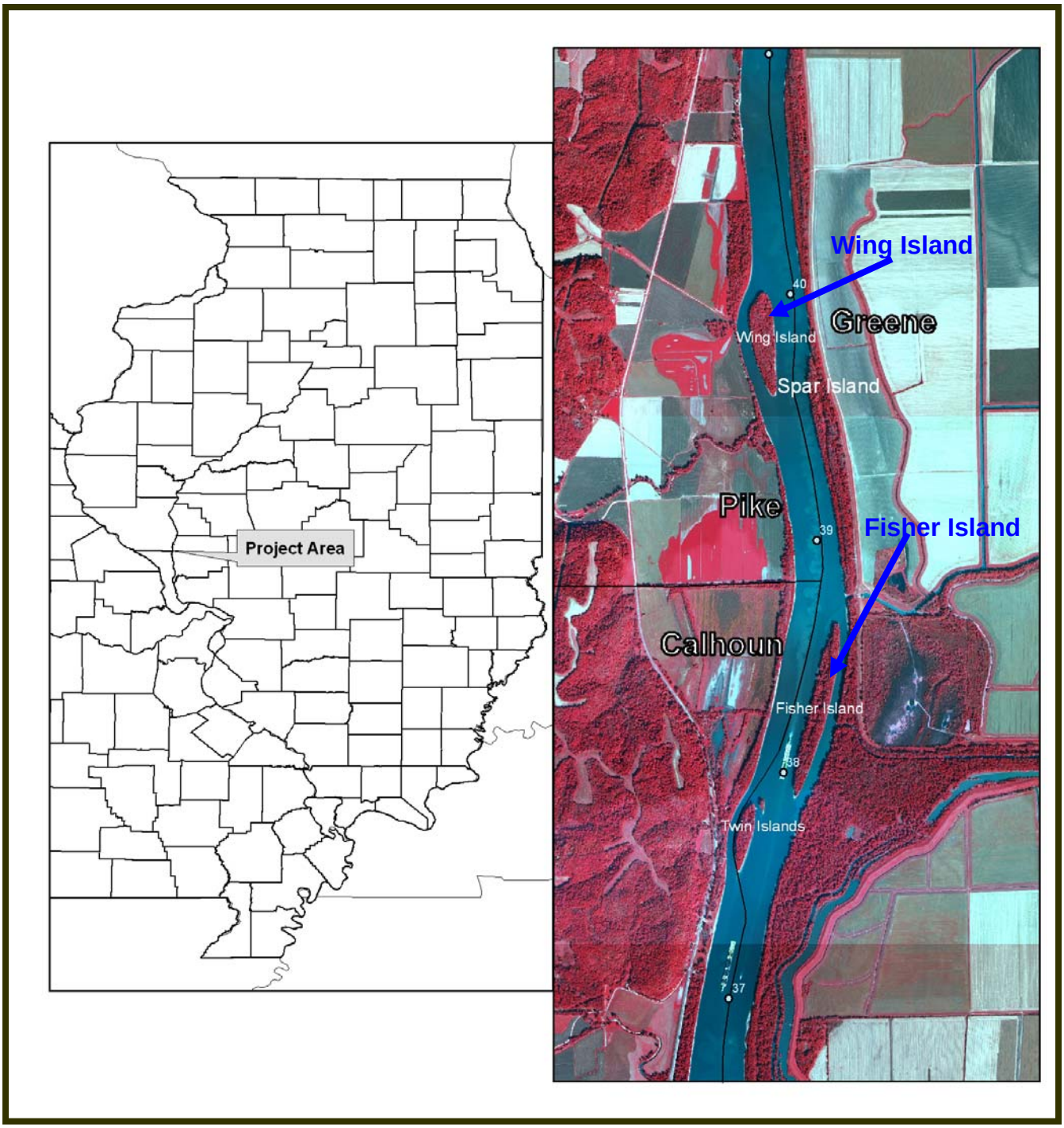

Figure 1. Location of Alton Pool Island Restoration – Wing and Fisher Islands; Illinois River Basin Restoration Program Section 519; Illinois River, Pike And Greene Counties, Illinois

Threatened and Endangered Species Determination:

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District requested that the U.S. Fish and Wildlife Service provide a listing of federally threatened or endangered species, currently classified or proposed for classification, that may occur in the vicinity of Kampsville in Pike and Greene Counties, Illinois. The U.S. Fish and Wildlife Service (Moline, IL Ecological Services Field Office) stated in an e-mail dated 4 December 2007, that The Service has a web page (http://www.fws.gov/midwest/endangered/section7/index.html) that lists federally endangered species for each county, and that the Corps should use the web site to identify potential federally threatened or endangered species, currently classified or proposed for classification, that may occur in Pike and Greene Counties, Illinois. According to the web site, four federally listed species may be present in Greene County, and seven federally listed species may be present in Pike County (Table 1). There is no federally designated critical habitat in the proposed project area.

Table 1. Endangered and Threatened Species of Greene and Pike Counties, Illinois

Common Name	Scientific Name	Status	County	Habitat
Indiana bat	*Myotis sodalis*	FE, SE	Greene, Pike	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
Gray bat	*Myotis grisescens*	FE, SE	Pike	
Eastern prairie fringed orchid	*Platanthera leucophaea*	FT	Greene, Pike	Mesic to wet prairies
Prairie bush clover	*Lespedeza leptostachya*	FT	Greene, Pike	Dry to mesic prairies with gravelly soil
Decurrent false aster	*Boltonia decurrens*	FT	Pike	Disturbed alluvial soils
Spectaclecase mussel	*Cumberlandia monodonta*	FCa	Greene, Pike	Large rivers
Sheepnose mussel	*Plethobasus cyphyus*	FCa	Pike	Large rivers

FE – Federally endangered, FT – Federally threatened, SE – State endangered, ST – State threatened
Information on state species obtained from http://dnr.state.il.us/ORC/list_tande_bycounty.pdf

INDIANA BAT

The endangered Indiana bat has been noted as occurring in several Illinois counties. Potential habitat for this species occurs statewide, therefore, Indiana bats are considered to potentially occur in any area with forested habitat. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area neat the winter hibernacula during summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of tree does not appear to influence whether Indiana bats utilize a tree for roosting, provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions, such as temperature and precipitation.

During the summer, the Indiana bat frequents the corridors of small streams with well-developed riparian woods, as well as mature upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures.

A recent review of Indiana bat literature and data indicates that the home range of an Indiana bat maternity colony could be as large as approximately 50,000 acres. The amount of habitat needed for any given colony is dependent upon a number of factors, including size of the colony, quality of foraging and roosting habitat, and intra-specific and inter-specific competition. The estimated home range of male Indiana bats is much smaller, but may be as large as approximately 3100 acres. Again the amount of habitat needed would depend upon many factors. To avoid impacting this species, tree clearing activities should not occur during the period of 1 April to 30 September. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from 1 April to 15 November. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine of Indiana bats are present.

The St. Louis District has determined the proposed project will have “no effect” on the Indiana bat since no trees will be disturbed and all construction activities will take place from the river.

GRAY BAT

The gray bat (*Myotis grisescens*) is listed as endangered in Pike County, Illinois. This species occupies a limited geographic range in limestone karst areas of the southeastern United States.

Gray bats roost in caves year round. Winter caves are deep and vertical, and provide a large volume below the lowest entrance to act as cold air traps. A much wider variety of cave types are used during spring and fall transient periods. In summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer of rivers or reservoirs over which the bats feed on a variety of flying aquatic and terrestrial insects. Except for brief periods of inclement weather in early spring and possibly late fall, adult gray bats feed almost exclusively over water along river or reservoir edges. Females give birth to a single young in late May or early June.

Gray bats are endangered largely because of their habit of living in very large numbers in only a few caves. As a result, they are extremely vulnerable to disturbance. Many important caves were flooded and submerged by reservoirs. Other caves are in danger of natural flooding. Even if the bats escape the flood, they have difficulty finding a new cave that is suitable. Additionally, alteration of the cave environment, such as gating which prevents access or alters the air flow, temperature, humidity, and amount of light is often harmful. Furthermore, arousing bats while they are hibernating can cause them to use up a lot of energy, which lowers their energy reserves. If a bat runs out of reserves, it may leave the cave too soon and die. In June and July, when flightless young are present, human disturbance can lead to mortality as frightened females drop their young in the panic to flee from intruders.

The St. Louis District has determined the proposed project will have “no effect” on the Gray bat since no caves exist in the proposed project area and all construction activities will take place from the river.

EASTERN PRAIRIE FRINGED ORCHID

The eastern prairie fringed orchid occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, even bogs. It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment.

This orchid is a perennial herb that grows from an underground tuber. Flowering begins from late June to early July, and lasts for 7 to 10 days. Blossoms often rise just above the height of the surrounding grasses and sedges. The more exposed flower clusters are more likely to be visited by the hawkmoth pollinators, though they are also at greater risk of being eaten by deer.

Seed capsules mature over the growing season and are dispersed by the wind from late August through September.

The eastern prairie fringed orchid was added to the U.S. List of Endangered and Threatened Species on September 28, 1989. In September 1999 a recovery plan was completed by the U.S. Fish and Wildlife Service which delineates reasonable actions needed to recover and/or protect this orchid. Recovery Plan Actions include: habitat protection and management, increase size and numbers of populations, conduct surveys on known populations, and conduct additional research.

Early decline of the species was due to the loss of habitat, mainly conversion of natural habitats to cropland and pasture. Current decline is mainly due to habitat loss from the drainage and development of wetlands. Other reasons for the current decline include succession to woody vegetation; competition from non-native species; and over-collection.

The St. Louis District has determined the proposed project will have “no effect” on the eastern prairie fringed orchid since no mesic prairie, sedge meadows, marsh edges, and/or bogs occur in the proposed project area..

PRAIRIE BUSH CLOVER

Prairie bush clover (*Lespedeza leptostachya*) is a prairie legume found only in tallgrass prairie regions of four midwestern states, including Illinois. Prairie bush clover was listed as federally threatened in February 1987, and is protected by the 1988 reauthorization of the 1973 Endangered Species Act (PL 100-478).

Prairie bush clover's rarity is likely due to the loss of its tall-grass prairie habitat. Historically, native prairie covered almost all of Illinois. Unfortunately, the mesic moderately damp to dry prairie favored by prairie bush clover was considered prime cropland, and today only scattered remnants of prairie can be found. Many existing prairie bush clover populations occur in sites that are too steep or rocky to be used for agriculture.

Current decline of the prairie bush clover is due to conversion of pasture to cropland; overgrazing; agricultural expansion; herbicide application; urban expansion; rock quarrying; and right-of-way maintenance and rerouting.

The St. Louis District has determined the proposed project will have “no effect” on the prairie bush clover since no tallgrass prairie occurs in the proposed project area.

DECURRENT FALSE ASTER

The decurrent false aster (*Boltonia decurrens*) is a threatened floodplain species (USFWS 2001) in Madison and St. Clair Counties, Illinois. *Boltonia decurrens* is an early successional species that requires either natural or human disturbance to create and maintain suitable habitat. Its natural habitat is wet prairies, shallow marshes, and shores of open rivers, creeks, and lakes (Schwegman and Nyboer 1985). In the past, the annual flood/drought cycle of the

Illinois River provided the natural disturbance required by this species. Annual spring flooding created open, high-light habitat and reduced competition by killing other less flood-tolerant, early successional species. Field observations indicate that in "weedy" areas without disturbance, the species is eliminated by competition within 3 to 5 years (USFWS 1990).

Smith *et al.* (1998) found that populations of *B. decurrens* increased in size at three sites studied on the Illinois River following the flood of 1993, with the greatest increase occurring at the two sites which had the most severe flooding. These results suggest that the removal of competing species by flood waters may be an important factor in maintaining populations of *B. decurrens* in the floodplain. *Boltonia decurrens* has high light requirements for growth and achene germination (Smith *et al.* 1993, Smith *et al.* 1995), and shading from other vegetation is thought to contribute to its decline in undisturbed areas.

The St. Louis District has determined the proposed project will have "no effect" on decurrent false aster since none has been found on the islands.

SPECTACLECASE MUSSEL

The spectaclecase (*Cumberlandia monodonta*) occurs in large rivers and is a habitat-specialist, relative to other mussel species. It most often inhabits riverine microhabitats that are sheltered from the main force of current. It occurs in substrates from mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with slow to swift current (Buchanan 1980, Parmalee and Bogan 1998, Baird 2000). Unlike most species that move about to some degree, the spectaclecase may seldom, if ever, move except to burrow deeper; they may die from stranding during droughts (Oesch 1984).

Adult freshwater mussels are filter-feeders, siphoning phytoplankton, diatoms, and other microorganisms from the water column (Fuller 1974). For their first several months, juvenile mussels employ foot (pedal) feeding, and are thus suspension feeders that feed on algae and detritus (Yeager et al. 1994). Mussels tend to grow relatively rapidly for the first few years, then slow appreciably at sexual maturity, when energy is being diverted from growth to reproductive activities (Baird 2000).

Most mussels, including the spectaclecase, generally have separate sexes. Age at sexual maturity was estimated to be 4-5 years for males and 5-7 years for females (Baird 2000). Males expel clouds of sperm into the water column, which are drawn in by females through their incurrent siphons. Fertilization takes place internally, and the resulting zygotes develop into specialized larvae (glochidia) within the gills. The spectaclecase is thought to be a short-term brooder, with glochidial release occurring from early April to late May in Missouri streams (Baird 2000).

Glochidia must come into contact with a specific host fish(es) for their survival to be ensured. Without the proper host fish, the glochidia will perish. The host(s) for the spectaclecase is unknown. The fact that spectaclecase populations are oftentimes highly aggregated with apparently many even-aged

individuals indicates that glochidia may excyst simultaneously from a host (Gordon and Layzer 1989). Thus, the complex life history of the spectaclecase has many weak links that may prevent successful reproduction and/or recruitment of juveniles into existing populations.

The spectaclecase has declined significantly relative to its historical distribution. Known historically from at least 45 streams in 15 states in several major river systems, it is now known to occur in only 20 streams in 10 states. The species evidently is absent from hundreds of river miles and from numerous reaches of habitat in which it occurred historically. Of the 20 extant populations, seven are represented by only a single specimen each and are likely not viable. Although many populations have been extirpated for decades, most surviving populations face significant threats.

The decline of the spectaclecase in the Mississippi River system is primarily the result of habitat loss and degradation (Neves 1991). Additional threats include exotic species, especially zebra mussels; sedimentation; small population sizes; isolation of populations; livestock grazing; wastewater effluents; chemical contaminants; mine runoff; unstable and coldwater flows downstream of dams; gravel mining; channel dredging; impoundments; channelization; In addition, the fish host of spectaclecase is unknown.

A study was conducted by Ecological Specialists, Inc. (2007) in order to characterize the unionid community near the heads of Twin Islands, Fisher Island, and Wing Island. Unionid species composition, relative abundance, and distribution were assessed, as well as general substrate composition and other habitat conditions in order to assist USACE and natural resource managers in determining potential impacts; and to mitigate or avoid deleterious impacts to unionid resources living near the proposed project sites.

The St. Louis District has determined the proposed project will have “no effect” on the spectaclecase mussel since they were not present at the Twin Island project site.

SHEEPNOSE MUSSEL

The sheepnose (*Plethobasus cyphyus*) is a large river species. It frequents shallow shoal habitats with moderate to swift currents over coarse sand and gravel (Oesch 1984). Habitats with sheepnose may also have mud, cobble, and boulders. Specimens in larger rivers may occur in deep runs (Parmalee and Bogan 1998). Strayer (1999a) demonstrated in field trials that mussels in streams occur chiefly in flow refuges, or relatively stable areas that displayed little movement of particles during flood events. Flow refuges conceivably allow relatively immobile mussels to remain in the same general location throughout their entire lives.

The decline of the sheepnose in the Mississippi River system and other mussel species in the eastern United States (described by Butler 2002) is primarily the result of habitat loss and degradation (Neves 1991). These losses have been well documented since the mid-19th century (Higgins 1858). Chief

among the causes of decline are impoundments, channelization, chemical contaminants, mining, and sedimentation (Williams et al. 1993; Neves 1991, 1993; Neves et al. 1997; Watters 2000). Bourgeoning human populations will invariably increase the likelihood that many if not all of the factors in this section will continue to impact extant sheepnose populations.

Historically, the sheepnose was fairly widespread in many Mississippi River system streams, although rarely very common. Archaeological evidence on relative abundance indicates that it has been an uncommon or even rare species in many streams for centuries (Morrison 1942; Patch 1976; Parmalee et al. 1980, 1982; Parmalee and Bogan 1986; Parmalee and Hughes 1994), and relatively common in only a few (Bogan 1990). This species is known from the Mississippi, Ohio, Cumberland, Tennessee, and Ohio main stems, and scores of tributary streams rangewide. The sheepnose has been eliminated from two-thirds of the total number of streams from which it was historically known (26 streams currently compared to 77 streams historically). This species has also been eliminated from long reaches of former habitat in hundreds of miles of rivers such as the Illinois and Cumberland, and from several reaches of the Mississippi and Tennessee Rivers.

The majority of the remaining populations of sheepnose are small and geographically isolated. The patchy distributional pattern of populations in short river reaches makes them much more susceptible to extirpation from single catastrophic events, such as toxic chemical spills. Furthermore, this level of isolation makes natural repopulation of any extirpated population virtually impossible without human intervention. Population isolation prohibits the natural interchange of genetic material between populations, and small population size reduces the reservoir of genetic diversity within populations, which can lead to inbreeding depression. The likelihood is high that some populations of the sheepnose are below the effective population size required to maintain long-term genetic and population viability. Recruitment reduction or failure is a potential problem for many small sheepnose populations rangewide, a potential condition exacerbated by its reduced range and increasingly isolated populations. If these trends continue, further significant declines in total sheepnose population size and consequent reduction in long-term viability may soon become apparent.

The St. Louis District has determined that the proposed project will have “no effect” on the sheepnose mussel since they were not present at the Fisher or Wing Island project sites.

Conservation Measures

Construction will be conducted from the river in order to avoid impacting the adjacent shoreline and riparian habitat.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Sub-Office (ES)
8588 Rout 148
Marion, IL 62959
(618) 997-3344

June 16, 2011

Colonel Thomas E. O'Hara, Jr.
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attn: Mrs. Amanda J. Oliver, CEMVS-PM-E

Dear Colonel O'Hara:

This letter constitutes our Draft Fish and Wildlife Coordination Act Report (Report) for the Alton Pool Islands (Wing and Fisher Islands) Restoration Project located between Illinois River Miles 37.9 and 40.1 in Pike and Greene Counties, Illinois. This report is intended to provide partial compliance with Subsection 2(b) of the Fish and Wildlife Coordination Act, (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); Section 7 of the Endangered Species Act of 1973, as amended; and, the National Environmental Policy Act. This Report has been reviewed by the Illinois Department of Natural Resources and their concurrence is noted.

INTRODUCTION

The Alton Pool Islands Restoration Project is a component of the Illinois River Basin Restoration Program authorized by Section 519 the Water Resources Development Act (WRDA) of 2000 (as amended by Section 5071, WRDA 2007). Sections (b) and (c) of Section 519 granted authority to complete a comprehensive plan and identify, evaluate, and implement critical restoration projects in the Illinois River Basin. The Illinois River Basin Restoration Comprehensive Plan was completed in March 2007 and identified 16 critical restoration projects including Alton Pool Side Channels and Islands (USACE 2007).

Priority was given to projects that improve quality and connectivity of habitats; provide habitat for regionally significant species; reduce sediment delivery; naturalize hydrology; maximize sustainability; consider and address threats; improve water quality; consider other agency activities; and have public support. The Alton Pool Islands Restoration Project involving island and shoreline protection meets the criteria of improving the quality and connectivity of habitats, providing habitat for regionally significant species, reducing sediment delivery, and maximizing sustainability.

THREATENED AND ENDANGERED SPECIES

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the Fish and Wildlife Service (Service) information concerning any species, listed or proposed to be listed which may be present in the area of a proposed action. Therefore, we are furnishing you with the following updated list of species which have ranges that include the concerned area:

Classification	Common Name (Scientific Name)	Habitat
Endangered	Gray bat (*Myotis grisescens*)	Caves and mines; rivers and reservoirs adjacent to forests
Endangered	Indiana bat (*Myotis sodalis*)	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland and bottomland forests
Endangered	Higgins eye pearlymussel (*Lampsilis higginsii*)	Mississippi River; Rock River to Steel Dam
Proposed as Endangered	Spectaclecase (*Cumberlandia monodonta*)	Shallow areas in larger rivers and streams
Threatened	Decurrent false aster (*Boltonia decurrens*)	Disturbed alluvial soils
Threatened	Eastern prairie fringed orchid *(Platanthera leucophaea*)	Mesic to wet prairies

There is no designated critical habitat in the project area at this time. To assist in evaluating the impacts of the proposed project on listed species, we have provided additional information regarding these species in Appendix A. A biological assessment or evaluation should be prepared for this proposed action. The purpose of the assessment is to identify listed or proposed species likely to be adversely affected by the action and to assist in making a decision as to whether formal consultation should be initiated.

RESOURCE PROBLEMS AND OPPORTUNITIES

The Illinois River historically had numerous backwater and side channel areas that provided productive habitats for fish and wildlife resources. Today, a significant portion of these areas have been lost or degraded due to excessive sedimentation. Overall, the estimated number of side channels in the Illinois River has declined from 94 in 1903 to 57 in 2007 and the estimated length of side channels in miles has decreased from 75.0 in 1903 to 54.0 in 2007 (USACE 2007). It is anticipated, that without action, the loss of side channel length will continue at a rate of

approximately 0.25 percent per year and result in loss of approximately 6.5 additional miles of side channel throughout the Illinois River for the study period (USACE 2007). In the Alton Pool, the estimated number of side channels has declined from 23 in 1903 to 18 in 2007 and the estimated length of side channels in miles has decreased from 23.0 in 1903 to 17.2 in 2007 (USACE 2007). In addition, a detailed evaluation of the side channels and islands in Alton Pool found that 14 of the 18 islands required bank protection to reduce excessive island erosion and loss of island/side channel length and 3 of 18 side channels were filling with sediment to the point of being closed off completely (USACE 2007).

At Wing and Fisher Islands, excessive bank erosion at the head of the islands and sediment deposition within the side channels is causing the loss of island and side channel habitat. Continued loss of island and side channel habitat and degradation of the side channel due to sedimentation will limit the availability of these habitats for large river fish and other aquatic organisms. The potential loss of additional habitat; however, provides an opportunity to protect and enhance the remaining island and side channel habitat for the benefit of fish and other wildlife resources.

GOALS AND OBJECTIVES

Project goals were developed from the Illinois River Basin systemwide ecosystem restoration goals and objectives (USACE 2007).

Goals:

- Reduce sediment delivery to the Illinois River from island shoreline erosion and tributary channel (Apple Creek) input, with the aim of eliminating excessive sediment load;
- Restore and maintain side channel and island habitats; and,
- Restore the aquatic habitat diversity of side channels in order to provide adequate volume and depth for sustaining native fish and wildlife communities.

Objectives:

- Decrease the deposition of sediment from Apple Creek into the Fisher Island side channel.
- Decrease the amount of sediment eroding off the heads of Wing and Fisher Islands.
- Prevent the loss of Wing and Fisher Islands and their associated side channels.

Although the Alton Pool Islands Restoration Project is a component of the 519 program, the project also fits well into the higher order goals established for the Upper Mississippi River System Navigation and Ecosystem Sustainability Program (NESP). It is important to note that in this program the Upper Mississippi River System includes the Illinois River. The program neutral goals, provided to the Army Corps of Engineers by the Environmental Science Panel, are as follows (Lubinski and Barko 2003):

First Tier Goal (Sustainability Goal):

"The balance of economic, environmental, and social conditions so as to meet the current and future needs of the Upper Mississippi River System without compromising the ability of future generations to meet their needs."

Second Tier Goals:

1. Maintain viable populations of native species in situ.
2. Represent all native ecosystems types across their natural range of variation.
3. Restore and maintain evolutionary and ecological processes (e.g., disturbance regimes, hydrologic regime, nutrient cycles, etc.).
4. Integrate human uses and occupancy within these constraints.

In addition to the development of higher order goals for the Upper Mississippi River System, the Science Panel worked initially to condense over 2,600 ecosystem objectives into 81 objectives (Lubinski and Barko 2003). These 81 objectives have been further refined, deleted, and combined into more practical and quantifiable objectives (program neutral) by the Science Panel Goals and Objectives Team (Barko et al. 2006).

Since 2006, the Science Panel has further worked to develop systemwide Goals and Objectives for the UMRS. In Galat et al. (2007), the Science Panel proposed the following ecosystem-wide goal:

"to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System to achieve the vision of the Navigation and Ecosystem Sustainability Program."

Further, the science panel proposed the five systemwide objectives framed within essential ecosystem characteristics discussed in Galat et al. (2007). They include management for:

1. a more natural hydrologic regime (hydrology and hydraulics).
2. processes that shape a diverse and dynamic river channel (geomorphology).
3. processes that input, transport, assimilate, and output materials within UMR basin river-floodplains: water quality, sediments, and nutrients (biogeochemistry).
4. a diverse and dynamic pattern of habitats to support native biota (habitat).
5. viable populations of native species and diverse plant and animal communities (biota).

The Alton Pool Islands Restoration Project fits well into the higher order goals (program neutral) developed by the Science Panel and will meet the following specific objectives identified in Barko et al. 2006:

- Objective 1.5: Reduce sediment loadings to rivers.
- Objective 1.8: Maintain adequate DO concentrations for fishes.
- Objective 2.1: Enhance channel geomorphic diversity.
- Objective 4.8: Modify channels to provide suitable habitat for fishes.

- Objective 5.1: Maintain viable populations of native species throughout their range in the UMRS at levels of abundance in keeping with their biotic potential.
- Objective 5.2: Maintain the diversity and extent of native communities throughout their range in the UMRS.

PROPOSED PROJECT FEATURES

To achieve the project objectives, a number of project plans/features were evaluated. The recommended plan consists of the following:

Wing Island (Alternative 3)
- Installing riprap at the head of the existing island.

Fisher Island (Alternative 2)
- Installing riprap at the head of the existing island and installing alternating hard points in the side channel.

METHODOLOGY TO EVALUATE ALTERNATIVES

The Alton Pool Islands Restoration Project was initially evaluated using the Aquatic Habitat Appraisal Guide (AHAG). This analysis was conducted with team members representing the Corps, IDNR, and Service. Because the changes caused by the project alternatives were not measurable by the majority of the AHAG metrics, the multi-agency team determined that another approach, Functional Assessment Score (FAS), would better capture the effects of the various project alternatives and provide a more valid comparison between alternatives.

The FAS approach describes how well an alternative performs a specific function and produces a rating of habitat quality analogous to the Habitat Suitability Index (HSI) used in the AHAG. The rating ranges from 0.0 to 1.0 and measures the existing condition, the future condition without project, and the future condition with each alternative. The rating is multiplied by the weight given to each specific function and then multiplied by the appropriate acreage to provide a measure of available habitat quantity and quality described as a habitat unit equivalent. The habitat unit equivalents are converted to an average annual function assessment score (AAFAS) to reflect the yearly benefits for each year of the 50 year project life.

EXISTING, FUTURE WITHOUT AND FUTURE WITH PROJECT CONDITIONS

A number of general assumptions were made about what the project area and vicinity would be like 50 years in the future with and without the project. These assumptions can be found in Appendix B of this report.

Habitat suitability at Wing Island improved with the project over existing conditions, while without the project the habitat suitability declined (Table 1). With the proposed project, habitat suitability is predicted to improve primarily due to increased island protection, reduced suspended sediment and reduced shoreline erosion. Under the existing conditions the score for these functions was 0.00. Habitat diversity, overwintering habitat, production of bottomland

hardwoods, spawning/rearing habitat, and macroinvertebrate production also increased slightly with the project. Without the project, habitat suitability is predicted to decline slightly due to reduced production of bottomland hardwoods and reduced production of macroinvertebrates.

Habitat suitability at Fisher Island improved with the project over existing conditions, while without the project the habitat suitability declined (Table 1). With the proposed project, habitat suitability is predicted to improve primarily due to increased island protection, reduced suspended sediment, and reduced shoreline erosion. Under the existing conditions the score for these functions was 0.00. Maintaining the side channel was also a primary factor in the improved score. Habitat diversity, production of bottomland hardwoods, and macroinvertebrate production also increased slightly with the project. Without the project, habitat suitability is predicted to decline slightly due to reduced overwintering habitat and reduced spawning/rearing habitat.

Overall, the FAS analysis indicates that the selected alternative results in a net increase of 20.43 AAFAS at Wing Island and 24.59 AAFAS at Fisher Island over the future without project condition (Table 2).

TABLE 1: Weighted Habitat Suitability Index (HSI) Equivalent scores for Existing, Future Without Project (Year 50) and Future With Project (Year 50), Alton Pool Islands Restoration Project. Net change is the difference between Future With Project and Future Without Project.

Function	Existing	Future Without	Future With	Net Change
Wing	0.30	0.27	0.58	0.31
Fisher	0.41	0.39	0.68	0.29

TABLE 2: Average Annual Functional Assessment Scores (AAFAS) for Future Without Project (Year 50) and Future With Project (Year 50), Alton Pool Islands Restoration Project. Net change is the difference between Future With Project and Future Without Project.

Island	Future Without	Future With	Net Change
Wing	20.63	41.06	20.43
Fisher	40.14	64.73	24.59
Total	**60.77**	**105.79**	**45.02**

CONCLUSIONS AND RECOMMENDATIONS

According to the Incremental Cost Analysis, the selected alternatives for Wing Island (Alternative 3) and Fisher Island (Alternative 2) were cost effective and preferred to the no action alternative. The other alternatives that produced additional AAFAS at both islands included the construction of a single bullnose. The single bullnose configuration allows the head of the island to stabilize and accrete sediment and the plunge pool that forms behind the structure provides additional habitat for fish and wildlife resources. Although these other alternatives were more acceptable to the Service, they were not considered cost effective, i.e., there is an increase in AAFAS but at a significantly higher cost. Given the significantly higher incremental cost of these alternatives, the Service approved the alternatives that were more cost effective.

Overall, the selected alternatives will be beneficial to the Illinois River and biota dependent upon the river. The riprap will protect the head of each island and help reduce sedimentation in the side channel. The alternating hard points in Fisher side channel will help reduce sedimentation in the side channel and improve habitat quality in this portion of river. Large river fish and other aquatic organisms will continue to have access to important habitats for several life stages, such as spawning, rearing and potentially over wintering. These areas will also provide an important feeding area for aquatic organisms and serve as a production area for small fish and invertebrates that other terrestrial organisms feed upon.

In order to ensure the project meets the stated objectives, post-project monitoring should be completed. The monitoring program should be implemented across seasons and in multiple years for a complete evaluation. Once data are collected, the interagency planning team should then review both the pre-project and post-project physical and biological data to determine if objectives have been met and/or where adjustments should be made for this project.

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. If you have questions, please contact Matt Mangan of my staff at (618) 997-3344, ext. 345.

Sincerely,

/s/ Joyce A. Collins

Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Atwood, Carney)
USFWS (Duyvejonck)

Attachments: Appendix A – Listed Species Information
Appendix B - Assumptions
Appendix C - Literature Cited

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APPENDIX A
FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES INFORMATION FOR GREENE AND PIKE COUNTIES, ILLINOIS

The **gray bat** (*Myotis grisescens*) is listed as endangered and occurs in several Illinois counties where it inhabits caves both during summer and winter. This species forages over rivers and reservoirs adjacent to forests. A search for this species should be made prior to any cave impacting activity.

The endangered **Indiana bat** (*Myotis sodalis*) has been noted as occurring in several Illinois counties. Potential habitat for this species occurs statewide, therefore, Indiana bats are considered to potentially occur in any area with forested habitat. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula include caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or in cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females. The species or size of tree does not appear to influence whether Indiana bats utilize a tree for roosting provided the appropriate bark structure is present. However, the use of a particular tree does appear to be influenced by weather conditions, such as temperature and precipitation.

During the summer, Indiana bats frequent the corridors of small streams with well-developed riparian woods, as well as mature bottomland and upland forests. It forages for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old fields), along the borders of crop lands, along wooded fence rows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age and sex and ranges up to 81 acres (33 ha). To avoid impacting the species, tree clearing activities should not occur during the period of April 1 to September 30. If a proposed action occurs within a 5-mile radius of a winter hibernacula, tree clearing should be prohibited from April 1 to November 15. If it is necessary to clear trees during this time frame, mist net surveys may be necessary to determine if Indiana bats are present. A search for this species should be made prior to cave impacting activities.

The endangered **Higgins eye pearlymussel** (*Lampsilis higginsii*) is listed as occurring in the Mississippi River north of Lock and Dam 20, which includes Jo Daviess, Henderson and Rock Island Counties, Illinois. In addition, it is known from the Rock River downstream of the Steel Dam, Rock Island County. Potentially, it may also occur in Adams, Carroll, Hancock, Pike and Whiteside Counties upstream of Lock and Dam 22 on the Mississippi River. This species prefers sand/gravel substrates with a swift current and is most often found in the main channel border or an open, flowing side channel.

The **spectaclecase** (*Cumberlandia monodonta*) is a proposed as endangered and is known to occur in shallow areas in larger rivers and streams.

The **decurrent false aster** (*Boltonia decurrens*) is listed as threatened and is known to occur in several Illinois counties in the floodplain of the Illinois and Mississippi River. It is considered to potentially occur in any county bordering the Illinois River and Jersey, Madison and St. Clair Counties bordering the Mississippi River. It occupies disturbed alluvial soils in the floodplains of these rivers. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law.

The **eastern prairie fringed orchid** (*Platanthera leucophaea*) is listed as threatened and occurs in several Illinois counties. It occupies wet grassland habitats. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever wet prairie remnants are encountered.

APPENDIX B
ASSUMPTIONS

Certain assumptions were made regarding existing and future conditions during the habitat analysis. Taken from Appendix E (Habitat Evaluation and Quantification) of the Pre-Draft Project Implementation Report (USACE 2010).

1. Target years of 0 (baseline condition), 2, 10, and 50 (future "without-project" and future "with-project" conditions) are sufficient to analyze HUs and characterize habitat changes over the estimated project life.
2. Evaluation of the aquatic restoration features assumed that under "without-project" conditions, shoreline erosion would continue throughout the 50-year span of the project. Under "with-project" conditions, shoreline stabilization would occur, along with possible accretion of sediment, thereby maintaining the islands and side channel habitat over the 50-year life of the project.
3. No special management of the project area would take place. While some vegetated terrestrial habitat may develop over the life of the project, its acreage would be so small as to contribute very little to habitat values.

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APPENDIX C
LITERATURE CITED

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF

SEP 23 2011

CECW-MVD

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, Mississippi Valley Division (ATTN: CEMVD-PD-SP)

SUBJECT: Request for Independent External Peer Review (IEPR) Exclusion for the Alton Pool Islands Restoration Project in the Illinois River Basin Restoration (519) Program

1. HQUSACE has reviewed the IEPR exclusion request for the Alton Pool Islands Restoration Project. Based on applicable laws and policy, this project study is not subject to Type I IEPR as it does not meet any of the mandatory requirements. The project has a cost estimate of less than $45 million; does not represent a threat to health and safety; is not controversial; and has not had a request for IEPR from a Governor or the head of a Federal or state agency.

2. Approval of the exclusion request was based on the following information. The project will maintain two existing islands and their side channels resulting in long-term benefits to fish, birds and other species that utilize the area. Project features include construction of a rock revetment along the top of Wing Island to prevent erosion; a rock revetment along the top and channel side of Fisher Island to prevent erosion caused by wave wash and river flows; and installation of five alternating small rock dikes in Fisher Island side channel to concentrate flow and maintain depth. The formulation of this project is not based on novel methods and does not present complex challenges for interpretation or conclusions that are likely to change prevailing practices. Precedent-setting methods or models were not used in the evaluation. The total cost is approximately $1.5 million and an Environmental Impact Statement (EIS) is not required.

3. Questions or concerns should be directed to Mr. Zoltan Montvai, Deputy Chief, Mississippi Valley Division Regional Integration Team, at 202-761-4495.

FOR THE COMMANDER:

STEVEN L. STOCKTON, P.E.
Director of Civil Works

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APPENDIX B

PERMITS

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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ILLINOIS EPA WATER QUALITY CERTIFICATION
CONDITIONS FOR NATIONWIDE PERMIT 13

The Illinois Environmental Protection Agency (IEPA) has issued Section 401 water quality certification for this permit subject to the following conditions:

a. The bank stabilization activities shall not exceed 500 linear feet.

b. Asphalt, bituminous material and concrete with protruding material such as reinforcing bars or mesh shall not be:
1. used for backfill;
2. placed on shorelines/streambanks; or
3. placed in waters of the State.

c. Any spoil material excavated, dredged or otherwise produced must not be returned to the waterway but must be deposited in a self-contained area in compliance with all state statues, as determined by the Illinois EPA.

d. Any backfilling must be done with clean material and placed in a manner to prevent violation of applicable water quality standards.

e. The applicant shall consider installing bioengineering practices in lieu of structural practices of bank stabilization to minimize impacts to the lake, pond, river or stream and enhance aquatic habitat. Bioengineering techniques may include, but are not limited to:

1. adequately sized riprap or A-Jack structures keyed into the toe of the slope with native plantings on the banks above;
2. vegetated geogrids;
3. coconut fiber(coir) logs;
4. live, woody vegetative cuttings, fascines or stumps;
5. brush layering; and
6. soil lifts.

Furthermore, to ensure projects authorized by this Nationwide Permit will result in minimal adverse effects to the aquatic environment, the following Regional Conditions were developed for projects proposed within the state of Illinois:

1. Bank stabilization projects involving armoring of the streambank with riprap or the construction of retaining walls within High Value Subwatersheds exceeding 250 feet will require a PCN to the Corps of Engineers in accordance with General Condition No. 27.

2. A proposed activity to be authorized under Nationwide Permits 12 or 14 within the Cache River Wetlands Areas (Alexander and Pulaski Counties), Kaskaskia River (Clinton, St. Clair, and Washington Counties), or Wabash River (Gallatin and White Counties) will require a PCN to the Corps of Engineers in accordance with General Condition No. 27.

3. Stormwater management facilities shall not be located within an intermittent

stream, except of NWPs 21, 49, or 50.

4. For newly constructed channels through areas that are unvegetated, native grass filter strips, or a riparian buffer with native trees or shrubs a minimum of 25 feet wide from the top of bank must be planted along both sides of the new channel.

ILLINOIS EPA WATER QUALITY CERTIFICATION
CONDITIONS FOR NATIONWIDE PERMIT 27

The Illinois Environmental Protection Agency (IEPA) has issued Section 401 water quality certification for this permit subject to the following conditions:

a. All activities conducted under NWP 27 shall be in accordance with the provisions of 35 11. Adm. Code 405.108. Work in reclaimed surface coal mine areas are required to obtain prior authorization from the Illinois EPA for any activities that result in the use of acid-producing mine refuse.

Furthermore, to ensure projects authorized by this Nationwide Permit will result in minimal adverse effects to the aquatic environment, the following Regional Conditions were developed for projects proposed within the state of Illinois:

1. Bank stabilization projects involving armoring of the streambank with riprap or the construction of retaining walls within High Value Subwatersheds exceeding 250 feet will require a PCN to the Corps of Engineers in accordance with General Condition No. 27.

2. A proposed activity to be authorized under Nationwide Permits 12 or 14 within the Cache River Wetlands Areas (Alexander and Pulaski Counties), Kaskaskia River (Clinton, St. Clair, and Washington Counties), or Wabash River (Gallatin and White Counties) will require a PCN to the Corps of Engineers in accordance with General Condition No. 27.

3. Stormwater management facilities shall not be located within an intermittent stream, except for NWPs 21, 49, or 50.

4. For newly constructed channels through areas that are unvegetated, native grass filter strips, or a riparian buffer with native trees or shrubs a minimum of 25 feet wide from the top of bank must be planted along both sides of the new channel.

No. 13, BANK STABILIZATION
(NWP Final Notice, 72 FR 11183)

Bank stabilization activities necessary for erosion prevention, provided the activity meets all of the following criteria:

(a) No material is placed in excess of the minimum needed for erosion protection;

(b) The activity is no more than 500 feet in length along the bank, unless this criterion is waived in writing by the district engineer;

(c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line, unless this criterion is waived in writing by the district engineer;

(d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless this criterion is waived in writing by the district engineer;

(e) No material is of the type, or is placed in any location, or in any manner, to impair surface water flow into or out of any water of the United States;

(f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and,

(g) The activity is not a stream channelization activity.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the bank stabilization activity: (1) involves discharges into special aquatic sites; (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot along the bank below the plane of the ordinary high water mark or the high tide line. (See general condition 27.) (Sections 10 and 404)

No. 27, AQUATIC HABITAT RESTORATION, ESTABLISHMENT, AND ENHANCEMENT ACTIVITIES
(NWP Final Notice, 72 FR 11185)

Activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas and the restoration and enhancement of non-tidal streams and other non-tidal open waters, provided those activities result in net increases in aquatic resource functions and services.

To the extent that a Corps permit is required, activities authorized by this NWP include, but are not limited to: the removal of accumulated sediments; the installation, removal, and maintenance of small water control structures, dikes, and berms; the installation of current deflectors; the enhancement, restoration, or establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to restore or establish stream meanders; the backfilling of artificial channels and drainage ditches; the removal of existing drainage structures; the construction of small nesting islands; the construction of open water areas; the construction of oyster habitat over unvegetated bottom in tidal waters; shellfish seeding; activities needed to reestablish vegetation, including plowing or discing for seed bed preparation and the planting of appropriate wetland species; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; and other related activities. Only native plant species should be planted at the site.

This NWP authorizes the relocation of non-tidal waters, including non-tidal wetlands and streams, on the project site provided there are net increases in aquatic resource functions and services.

Except for the relocation of non-tidal waters on the project site, this NWP does not authorize the conversion of a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa) or uplands. This NWP does not authorize stream channelization. This NWP does not authorize the relocation of tidal waters or the conversion of tidal waters, including tidal wetlands, to other aquatic uses, such as the conversion of tidal wetlands into open water impoundments.

Reversion. For enhancement, restoration, and establishment activities conducted: (1) In accordance with the terms and conditions of a binding wetland enhancement, restoration, or establishment agreement between the landowner and the U.S. Fish and Wildlife Service (FWS), the Natural Resources Conservation Service (NRCS), the Farm Service Agency (FSA), the National Marine Fisheries Service (NMFS), the National Ocean Service (NOS), or their designated state cooperating agencies; (2) as voluntary wetland restoration, enhancement, and establishment actions documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or (3) on reclaimed surface coal mine lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the OSM or the applicable state agency, this NWP also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or establishment activities). The reversion must occur within five years after expiration of a limited term wetland restoration or establishment agreement or permit, and is authorized in these circumstances even if the discharge occurs after this NWP expires. The five-year reversion limit does not apply to agreements without time limits reached between the landowner and the FWS, NRCS, FSA, NMFS, NOS, or an appropriate state cooperating agency. This NWP also authorizes discharges of dredged or fill material in waters of the United States for the reversion of wetlands that

were restored, enhanced, or established on prior-converted cropland that has not been abandoned or on uplands, in accordance with a binding agreement between the landowner and NRCS, FSA, FWS, or their designated state cooperating agencies (even though the restoration, enhancement, or establishment activity did not require a section 404 permit). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate state agency executing the agreement or permit. Before conducting any reversion activity the permittee or the appropriate Federal or state agency must notify the district engineer and include the documentation of the prior condition. Once an area has reverted to its prior physical condition, it will be subject to whatever the Corps Regulatory requirements are applicable to that type of land at the time. The requirement that the activity result in a net increase in aquatic resource functions and services does not apply to reversion activities meeting the above conditions. Except for the activities described above, this NWP does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases a separate permit would be required for any reversion.

Reporting: For those activities that do not require pre-construction notification, the permittee must submit to the district engineer a copy of: (1) The binding wetland enhancement, restoration, or establishment agreement, or a project description, including project plans and location map; (2) the NRCS or USDA Technical Service Provider documentation for the voluntary wetland restoration, enhancement, or establishment action; or (3) the SMCRA permit issued by OSM or the applicable state agency. These documents must be submitted to the district engineer at least 30 days prior to commencing activities in waters of the United States authorized by this NWP.

Notification. The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 27), except for the following activities:

(1) Activities conducted on non-Federal public lands and private lands, in accordance with the terms and conditions of a binding wetland enhancement, restoration, or establishment agreement between the landowner and the U.S. FWS, NRCS, FSA, NMFS, NOS, or their designated state cooperating agencies;

(2) Voluntary wetland restoration, enhancement, and establishment actions documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or

(3) The reclamation of surface coal mine lands, in accordance with an SMCRA permit issued by the OSM or the applicable state agency.

However, the permittee must submit a copy of the appropriate documentation. (Sections 10 and 404)

Note: This NWP can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee programs. However, this NWP does not authorize the reversion of an area used for a compensatory mitigation project to its prior condition, since compensatory mitigation is generally intended to be permanent.

NATIONWIDE PERMIT CONDITIONS

General Conditions: Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP

1. **Navigation**. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. **Aquatic Life Movements**. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

3. **Spawning Areas**. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. **Migratory Bird Breeding Areas**. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. **Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

6. **Suitable Material**. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. **Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. **Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. **Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may

alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. **Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. **Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. **Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. **Removal of Temporary Fills**. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. **Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

15. **Wild and Scenic Rivers**. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

16. **Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

17. **Endangered Species**. (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

18. **Historic Properties**. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required.

19. **Designated Critical Resource Waters**. Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

20. **Mitigation**. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

21. **Water Quality**. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

22. **Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

23. **Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

24. **Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

25. **Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: “When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.”

26. **Compliance Certification**. Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

27. **Pre-Construction Notification**. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district

engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) Forty-five calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

(4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring pre-construction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

(5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

(e) District Engineer's Decision: In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or

detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

28. **Single and Complete Project**. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

FURTHER INFORMATION

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

DEFINITIONS

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration, establishment (creation), enhancement, or preservation of aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects waterbodies with their adjacent uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 20.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete project: The term “single and complete project” is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete project must have independent utility (see definition). For linear projects, a “single and complete project” is all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States that, during a year with normal patterns of precipitation, has water flowing or standing above ground to the extent that an ordinary high water mark (OHWM) or other indicators of jurisdiction can be determined, as well as any wetland area (see 33 CFR 328.3(b)). If a jurisdictional wetland is adjacent--meaning bordering, contiguous, or neighboring--to a jurisdictional waterbody displaying an OHWM or other indicators of jurisdiction, that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of “waterbodies” include streams, rivers, lakes, ponds, and wetlands.

APPENDIX C

HAZARDOUS, TOXIC AND RADIOACTIVE WASTE DOCUMENTATION REPORT

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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PHASE I

ENVIRONMENTAL SITE ASSESSMENT

FOR

ILLINOIS RIVER ALTON POOL ISLANDS

SEPTEMBER 28, 2006

US Army Corps of Engineers
St. Louis District

HTRW PHASE I – INITIAL SITE ASSESSMENT
Illinois River Alton Pool Islands

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Table of Contents

I. Introduction

1.1 Purpose
1.2 Special Terms and Conditions

II. Project/Site Description

2.1 Location Description
2.2 Site/Vicinity Characteristics
2.3 Terrain and Land Use
2.4 Soils

III. Environmental Concerns

3.1 Past Site Use
3.2 Current and Future Impact of Environmental Concerns

IV. Assessment Procedures

4.1 Description of Resources
4.2 Assessment Objectives
4.3 Assessment Methods Employed
4.3.1 Land Use Studies
4.3.2 Topographic and Land Use Maps
4.3.3 Interviews
4.3.4 Historical Records
4.3.5 Government Agency Records
4.3.6 Federal Agencies
4.3.7 State Agencies
4.4 Site Visit

V. Assessment Results

5.1 Land Use Studies
5.2 Aerial Photographs
5.3 Personal Interview
5.4 Historical Documents
5.5 Government Records
5.6 Site Visit Results

VI. Assessment Findings

6.1 Summary of Findings
6.2 Recommendations

VII. Limitations

Appendices

Appendix A – Site Maps
Appendix B – Environmental Records
Appendix C – Historical Data
Appendix D – Photographs

I. Introduction

1.1 Purpose

The purpose of a Phase I – Initial Site Assessment (IA) is to identify, to the extent feasible in the absence of sampling and analysis, the potential for encountering hazardous, toxic, or radioactive waste (HTRW) problems at a real estate site. This is a report of the Phase I Environmental Site Assessment conducted in Pike and Greene Counties, Illinois. The scope of this Phase I – Initial Site Assessment consists of the following four components:

a. Records review
b. Site reconnaissance
c. Historical data
d. Report

1.2 Special Terms and Conditions

This report was prepared in accordance with accepted industry practices and conform to published ASTM guidelines for Phase I Assessments, ASTM E 1527-97 and E 1528-96.

II. Project/Site Description

2.1 Location Description

The project is located in Pike and Greene Counties, Illinois on the Illinois River between river mile 37.7 and 40.3. The project involves four islands within the Illinois River. The following islands are included in the project: Twin, Fisher, Spar and Wing. Fisher Island is located in Walkerville Township, T11N, R14W, S13/24. Spar Island is located in Walkerville Township, T11N, R14W, S12/13. Wing Island is located in Pearl Township, T7S, R2W, S27/34. The goal of the project is to slow erosion of the islands by re-vegetation.

2.2 Site/Vicinity Characteristics

This area is a rural area consisting of un-inhabited islands in the Illinois River.

2.3 Terrain and Land Use

The topography of the subject project consists of flat heavily vegetated islands. No evidence was discovered during the historical research that would indicate that previous land use represents a significant environmental liability.

2.4 Soils

Soils component name is Wakeland Silt Loam. The Wakeland series consists of very deep, somewhat poorly drained, moderately permeable soils that formed in silty alluvium. These soils are on flood plains and flood-plain steps. Slopes are from 0 to 2 percent.

III. Environmental Concerns

3.1 Past Site Use

The islands do not indicate any signs of being inhabited now or in the past probably do to the fact of frequent flooding and lack of access.

3.2 Current and Future Impact of Environmental Concerns

The environmental impact for the migration of off-site contaminants onto the project property is negligible. A Site Health and Safety Plan, and a Quality Control Plan should be required, discussed and implemented to avoid any environmental hazards.

IV Assessment Procedures

4.1 Description of Resources

Resource material used to perform the assessment were as follows:

a. Government Agency Database Records Search:
b. Historical Data
c. Photographs
d. Topographic Maps

4.2 Assessment Objective

The assessment objective is to determine the impact of erosion control projects for environmental concerns in the project area.

4.3 Assessment Methods Employed

4.3.1 Land Use Studies

The land uses were determined for the project area by utilizing historical data, observations made during the site visit, and review of readily available government records for the project area.

4.3.2 Topographic and Land Use Maps

Topographic and land use maps were examined which covered the project area.

4.3.3 Interviews

Interviews are used to obtain information indicating recognized environmental conditions in connection with the subject property.

4.3.4 Historical Records

Government records, land use maps, and historical ownership data were reviewed to determine HTRW impacts on the subject property and are enclosed in Appendix C.

4.3.5 Government Agency Records

The governmental agency database records were accessed for the property surrounding the project area. The results of the record search are enclosed as Appendix B. A summary of the findings is presented in the following sections.

4.3.6 Federal Agencies

The following information sources (databases) were consulted and searched as a part of the federal agency review process:

a. United States Environmental Protection Agency's (USEPA) National Priorities List (NPL database – current and deleted sites);
b. USEPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS);
c. USEPA No Further Remedial Action Planned Sites (NFRAP);
d. USEPA Resource Conservation and Recovery Information System (RCRIS-LG)
e. USEPA Emergency Response Notification System (ERNS);
f. USEPA Corrective Action Report (CORRACTS);
g. USEPA Biennial Reporting System (BRS);
h. USEPA Superfund (CERCLA) Consent Decrees (CONSENT);
i. USEPA Facility Index System/Facility Identification Initiative Program Summary Report (FINDS);
j. USDOT hazardous Materials Information Reporting System (HMIRS);
k. USNRC Material Licensing Tracking System (MLTS);
l. USEPA Federal Superfund Liens (NPL LIENS);
m. USEPA PCB Activity Database System (PADS);
n. USEPA RECRA Administrative Action Tracking System (RAATS);
o. USNTIS Records of Decision (ROD);
p. USEPA Toxic Chemical Release Inventory System (TRIS);
q. USEPA Toxic Substances Control Act (TSCA);
r. USDOL, MSHA Mines Master Index File (MINES).

4.3.7 State Agencies

The following information sources were consulted and searched as a part of the

state agency review process:

a. Illinois Registry of Abandoned or Uncontrolled Hazardous Waste Sites (SHWS);
b. Illinois Leaking Underground Storage Tank Report (LUST);
c. Illinois Solid Waste Disposal Facilities (LF);
d. Illinois Underground Storage Tank Facility List (UST);
e. Illinois Site Remediation Program Database (SRP),
f. Illinois Solid Waste Landfill Inventory (IL NIPC),
g. Illinois Radon,
h. Illinois County Well Data

4.4 Site Visit

A site visit was conducted on 27 July 2006 as part of the project. Mr. Kevin Slattery of CEMVS-HQ participated in the site visit. In addition, the surrounding adjacent properties were also inspected as part of this survey. Photographs documenting the site visit are enclosed in Appendix D.

V. Assessment Results

5.1 Land Use Studies

Land use investigations revealed that the project is comprised of islands within the Illinois River between river mile 37.7 and 40.3.

5.2 Photographs and Land Use Maps

Historical aerial photographs of the project area were available for 1998. Topographic maps from the year 1985 were reviewed.

5.3 Personal Interview

The United States Coast Guard was interviewed on October 10, 2006 concerning the historical environmental response actions in the past in the proposed area of the project. Commander Valley indicated that information regarding spills could be obtained from the National Response Center (NRC) website. Information from the website is in Appendix C.

5.4 Historical Documents

Photographs and land use maps discussed in Section 5.2 above and Governmental Agency Records discussed in Section 5.5 below were the historical documents reviewed for the purpose of this assessment. Sanborn maps were not available for this assessment.

5.5 Governmental Records

No manufacturing facilities in Pike or Greene County reported environmental releases to EPA's Toxic Release Inventory.

5.6 Site Visit Results

A site visit was conducted on 27 July 2006 as part of the project. Mr. Kevin Slattery from CEMVS-ED-HQ participated in the site visit. Photographs documenting the site visit are enclosed in Appendix D.

VI. Assessment Findings

6.1 Summary of Findings

Generally, the project area contains no major sites of interest, which pose significant environmental concerns. The environmental records search as well as the site visit found minimal data suggesting environmental concerns to be present in this project area, therefore no Phase II Environmental Site Assessment for samples and analyses is necessary for the proposed project.

6.2 Recommendations

A Phase I Environmental Site Assessment was conducted in conformance with the scope and limitations of ASTM Practice E for the Illinois River Alton Pool Islands/Side Channel Restoration Project. This assessment has revealed no evidence of recognized environmental conditions in connection with the property. Therefore, no Phase II Environmental Site Assessment is necessary for the proposed project.

VII. Limitations

U.S. Army Corps of Engineers, Environmental Quality Section, should be contacted with any known or suspected variations from the conditions described herein. If future development of the property indicates the presence of hazardous or toxic materials, USACE should be notified to perform a re-evaluation of the environmental conditions.

The scope of this assessment did not include any additional environmental investigation, not outlined herein, or analyses for the presence or absence of hazardous or toxic materials in the soil, ground water, surface water, or air, in on, under or above the subject tract.

This site assessment was performed in accordance with generally accepted practices of consultants undertaking similar studies at the same time and in the same geographical area, and USACE observed that degree of care and skill generally exercised by consultants under similar circumstances and conditions. The findings and conclusions stated herein must be considered not as scientific certainties, but rather as professional opinions concerning the significance of the limited data gathered during the course of the environmental site assessment. No other warranty, express or implied, is made.

Specifically, USACE does not and cannot represent that the site contains no hazardous waste or material, oil (including petroleum products), or other latent condition beyond that observed by USACE during its site assessment.

The observations described in this report were made under the conditions stated herein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedure beyond the scope of described services or the time and budgetary constraints imposed by the client. Furthermore, such conclusions are based solely on site condition, and rules and regulations, which were in effect, at the time of the study.

In preparing this report, USACE relied on certain information provided by state and local officials and other parties referenced therein, and on information contained in the files of state and/or local agencies available to USACE at the time of the site assessment. Although there may have been some degree of overlap in the information provided by these various sources, an attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this site assessment was not made.

Observations were made of the site and of structures on the site as indicated within the report. Where access to portions of the site or to structures on the site was unavailable or limited, USACE renders no opinion as to the presence of indirect evidence relating to hazardous waste or material or oil, or other petroleum products in that portion of the site or structure. In addition, USACE renders no opinion as to the presence of hazardous waste or material, oil or other petroleum products or to the presence of indirect evidence relating to hazardous material, oil, or petroleum products where direct observation of the interior walls, floor, roof, or ceiling of a structure on a site was obstructed by objects or coverings on or over these surfaces.

Unless otherwise specified in the report, USACE did not perform testing or analyses to determine the presence or concentration of asbestos, radon, formaldehyde, lead-based paint, lead in drinking water, electromagnetic fields (EMFs) or polychlorinated biphenyls (PCBs) at the site or in the environment at the site.

The purpose of this report was to assess the physical characteristics of the subject site with respect to the presence in the environment of hazardous waste or material, oil, or petroleum products. No specific attempt was made to check on the compliance of present or past owners or operators of the site with federal, state, or local laws and regulations, environmental or otherwise.

Prepared by: Richard D. Archeski Date: 10/19/06
Richard D. Archeski
Environmental Engineer

Approved by: Donald Coleman Date: 10/26/06
Donald M. Coleman
Chief, Water Control & Environmental Quality
Engineering Division

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APPENDIX A

SITE MAPS

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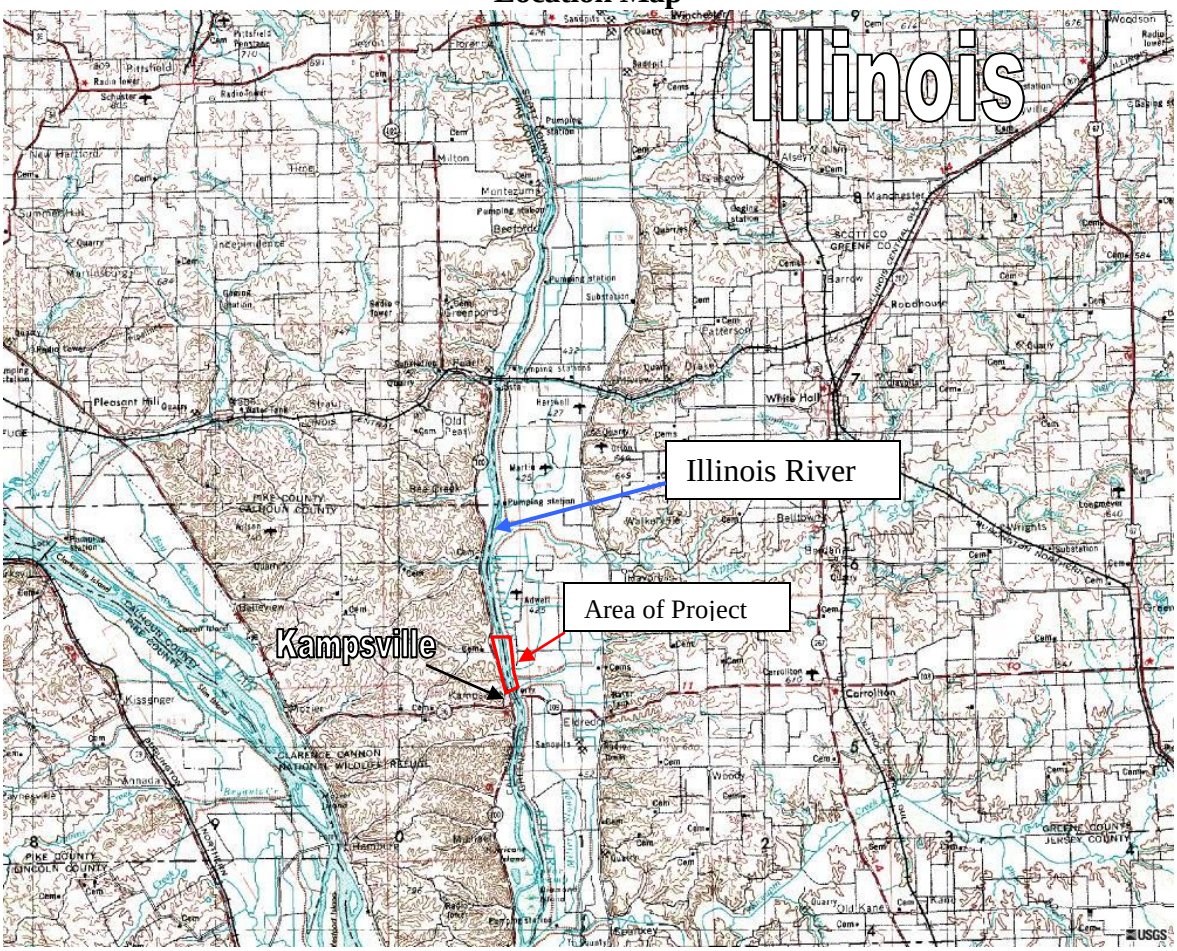
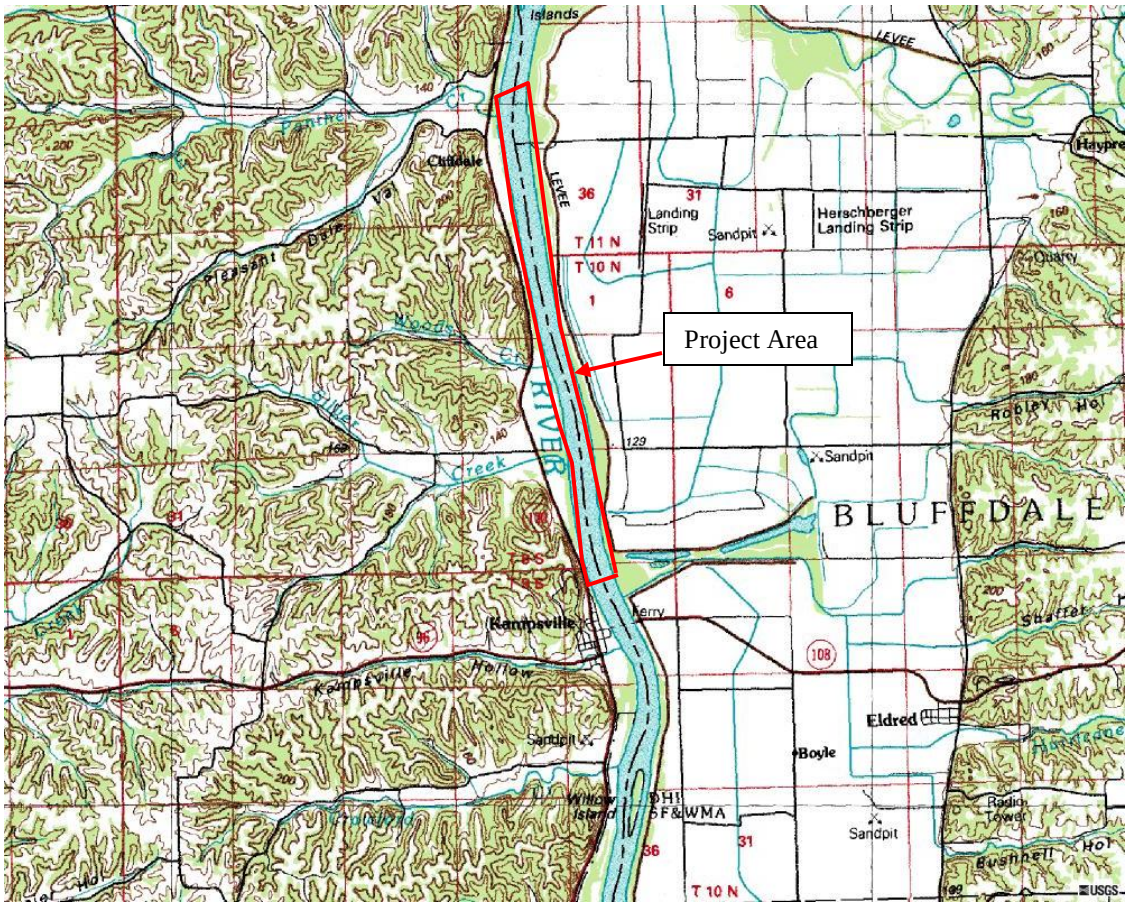
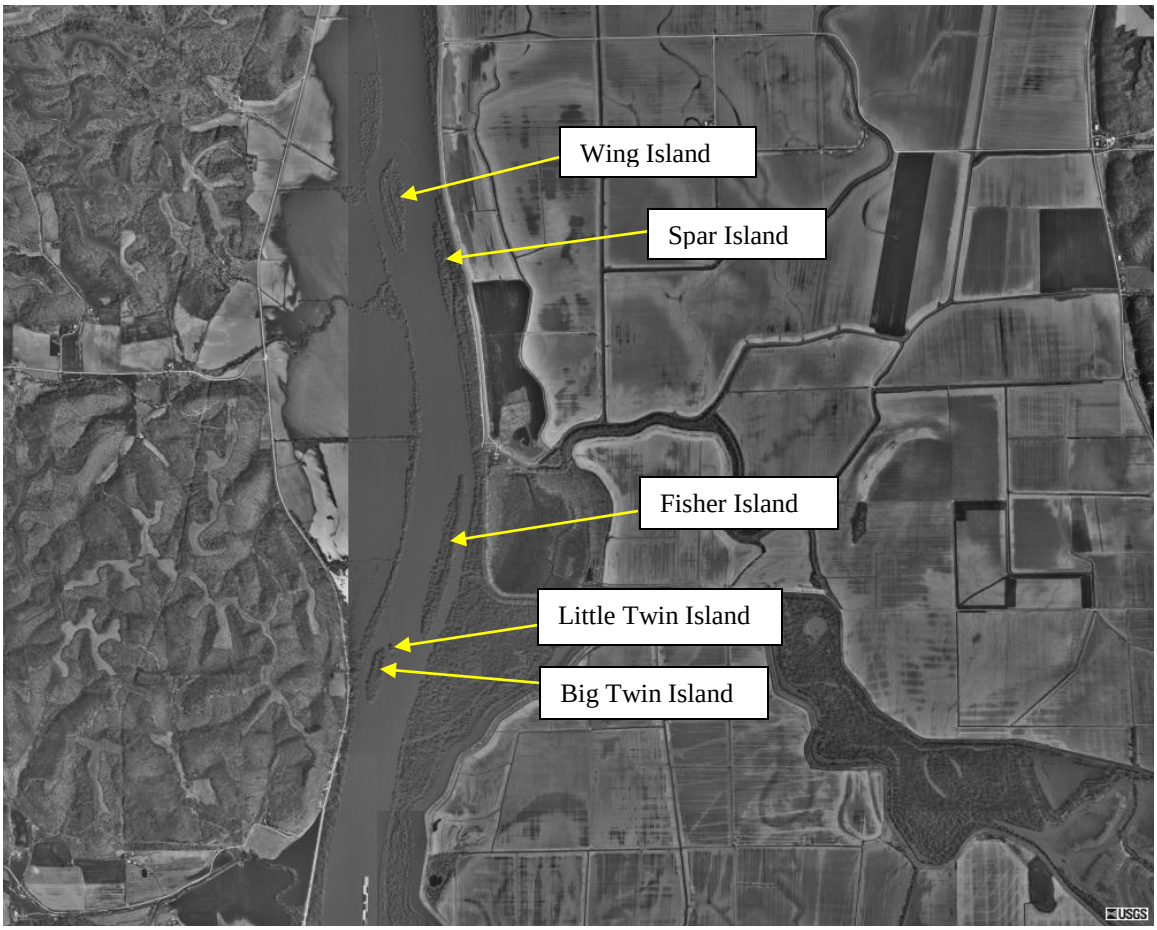
Location Map



1985 topographic map indicating location of the Project Area



July 1985 topographic map indicating location of project site



July 1998 topographic map of project site

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APPENDIX B

ENVIRONMENTAL RECORDS

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LIST OF EPA-REGULATED FACILITIES IN ENVIROFACTS
Environmental EPA listed sites in the immediate area of the project

FACILITY NAME/ADDRESS	Permitted Discharges to Water?	Toxic Releases Reported?	Hazardous Waste Handler?	Active or Archived Superfund Report?	Air Releases Reported?
ILDOT KAMPSVILLE FERRY RT 108 KAMPSVILLE, IL 62053	NO	NO	**YES**	NO	NO
KAMPSVILLE STP ILLINOIS ROUTE 100 SOUTH KAMPSVILLE, IL 62053	**YES**	NO	NO	NO	NO
RICHTER FERT CO RR 1 KAMPSVILLE, IL 62053	NO	NO	NO	NO	**YES**

No manufacturing facilities in Calhoun or Green County reported environmental releases to EPA's Toxic Release Inventory.

There were no CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) sites in this area.

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APPENDIX C

HISTORICAL DATA

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National Response Center Query Results for Calhoun County Illinois

NRC Report #	Incident Date	Street	Location County	City	State	ZIP	Suspected Responsible Company	Type of Incident	Medium Affected	Material Name
121025	06/08/1992	UPPER MISSISSIPPI RIVERMILE 228.6	CALHOUN	ST. LOUIS	IL	(null)	CALHOUN ST CHARLES FERRY	VESSEL	WATER	HYDRAULIC OIL
179836	06/25/1993	(null)	CALHOUN	NEBO	IL	62355	(null)	FIXED	LAND	PESTICIDES
185619	07/10/1993	(null)	CALHOUN	HARDIN	IL	(null)	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL
263953	10/05/1994	MILE 23	CALHOUN	HARDIN	IL	(null)	COASTAL TOWING INC	VESSEL	WATER	OIL, FUEL: NO. 2-D
293142	05/26/1995	MM 4.5 ON LDB OF ILLINOIS RIVER	CALHOUN	GRUTES AREA	IL	(null)	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL
319183	01/06/1996	RT BOX 54MM 226 ON MISSISSIPPI RIVER	CALHOUN	GOLDEN EAGLE	IL	62036	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL
382702	04/04/1997	7 MILES SOUTH OF PLEASANTHILL ON HWY 96	CALHOUN	NEBO	IL	62355	FARMER	MOBILE	LAND	LIQUID FERTILIZER MIXTURE
382703	04/04/1997	RP'S FARM IN NEBO	CALHOUN	NEBO	IL	(null)	(null)	MOBILE	LAND	LIQUID FERTILIZER
430148	03/28/1998	MILE 43.2 ON THE ILLINOIS RIVER BRIDGE: AD 250.40	CALHOUN	CAMPSVILLE	IL	(null)	GATEWAY WESTERN RR	RAILROAD	RAIL REPORT (N/A)	(null)
471565	01/23/1999	MILE 28 ON THE ILLINOIS RIVER	CALHOUN	HARDIN	IL	(null)	WESTERN KY NAVIGATION	VESSEL	WATER	(null)
534462	07/06/2000	UNKNOWN SHEEN INCIDEN TRT 16	CALHOUN	HARDIN	IL	(null)	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL
543047	09/23/2000	UNKNOWN SHEEN INCIDENT	CALHOUN	HARDIN	IL	(null)	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL
543056	09/23/2000	CALLER STATED A FEW MILES SOUTH OF HARDIN BRIDGE	CALHOUN	HARDIN	IL	(null)	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL

617448	07/20/2002	MILE 241.6 ON THE UPPER MISSISSIPPI RIVER	CALHOUN	WINFIELD	IL	(null)	WEST POINT MARINE	VESSEL	WATER	(null)
650022	07/06/2003	MILE 55 ON THE ILLINOIS RIVER	CALHOUN	FLOURENCE	IL	(null)	B&H TOWING	VESSEL	WATER	BILGE SLOPS
723236	05/26/2004	U.S. POWER SQUADRON POINT LIGHT, (LLNR 16210) MI 207.1 LDB UMR. ATONIS NR:26050SITE TYPE: TERRESTRIAL	CALHOUN	(null)	IL	(null)	(null)	FIXED	WATER	DELCO SOLAR BATTERY SERIAL NR 08-13979
805162	07/22/2006	MILE 232 ON UPPER MISSISSIPPI RIVER RIGHT BY THE CUIVRE RIVER.	CALHOUN	GRAFTON	IL	(null)	MADE FOR LIFE	VESSEL	WATER	OIL, FUEL: NO. 2

National Response Center Query Results for Greene County Illinois

NRC eport #	Incident	Street	Loc Cou	City	S	Z	Suspected Responsible Company	Type of Incident	Medium Affected	Material Name
62801	03/08/19	MP 237.2	GR E	ROOD SE	I	(	(null)	RAILROAD	RAIL PORT (N/A)	(null)
13703 0	09/16/19	(null)	GR E	ROODHO	I	(	(null)	RAILROAD	RAIL PORT (N/A)	(null)
19074 1	08/04/19	NW CORNER OF GREEN COUNTY	GR E	HILLVIE	I	(	CENTRAL IL PUBLIC SERVICE	FIXED	WATER	OIL, MISC: MINERAL
20184 9	10/08/19	MILE MARKER 21	GR E	HARDIN	I	(	(null)	UNKNOWN SHEEN	WATER	UNKNOWN OIL
22100 5	02/09/19	DOT NO. 294603J	GR E	WHITEH	I	(	(null)	RAILROAD ON-RELEASE	RAIL PORT (N/A)	(null)
23450 8	04/12/19	901 CHESTNUT STREET	GR E	GREENFI	I	6	(null)	UNKNOWN SHEEN	WATER	OIL: DIESEL
25584 5	08/16/19	RR 1 BOX 147	GR E	HILLVIE	I	6	(null)	FIXED	UNKNOWN	ARSENIC
25665 7	08/22/19	MILEPOST 52.5	GR E	WILMING	I	(	SOUTHERN PACIFIC	RAILROAD	LAND	OIL: DIESEL
33266 4	03/22/19	DOT #294589RMP 53.35 PRIVATE CROSSING	GR E	CARROL N	I	(	(null)	RAILROAD ON-RELEASE	RAIL PORT (N/A)	(null)
35766 6	08/20/19	132 WEST PRAIRE	GR E	RUDHOU	I	6	CITY OF ROODHOUSE	FIXED	LAND	UNKNOWN OIL AND ER MATERIAL
38070 7	03/18/19	218 BRUCE DR	GR E	WHITE L	I	(	(null)	PIPELINE	AIR	NATURAL GAS
45492 3	09/11/19	WHITE STREET	GR E	WHITE L	I	6	(null)	FIXED	AIR	UNKNOWN MATERIAL
45725 5	09/26/19	319 WEST CLAY	GR E	ROODHO	I	(	GREEN SCAPES AND LAWN	MOBILE	LAND	FERTILIZER AND TICIDES
49582	08/20/19	EAST CARLINVILLE	GR	WHITE	I	(	CROPMATE COMPANY	FIXED	AIR	AMMONIA,

9		STREET	E	L						YDROUS
559691	02/22/20	GILLINGHAM OIL COMPANY, INC 510 4TH ST	GRE	CARROLN	]	(	THOMACZEK OIL COMPANY	STORAGE TANK	OTHER	OIL, FUEL: NO. 2-D
569878	06/18/20	WITHIN YARD LIMITS 1700 S 20TH STREET	GRE	ROODHO	]	(	(null)	RAILROAD ON-RELEASE	RAIL PORT (N/A)	(null)
599534	04/13/20	RURAL CARROLTON	GRE	(null)	]	(	(null)	MOBILE	AIR	AMMONIA, YDROUS
626878	10/21/20	KANSAS CITY SOUTHERN RAIL ROAD MILE POST 237	GRE	ROODHO	]	(	KANSAS CITY OUTHERN RAIL ROAD	RAILROAD	RAIL PORT (N/A)	(null)
750471	02/18/20	EAST CARLINVILLE ST	GRE	WHITEL	]	(	UAP RICHTER	STORAGE TANK	OTHER	LIQUID FERTILIZER

APPENDIX D

PHOTOGRAPHS

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South side of Twin Island looking north

East side of Twin Islands

West side of Twin Islands

Fisher Island

Fisher Island

Fisher Island

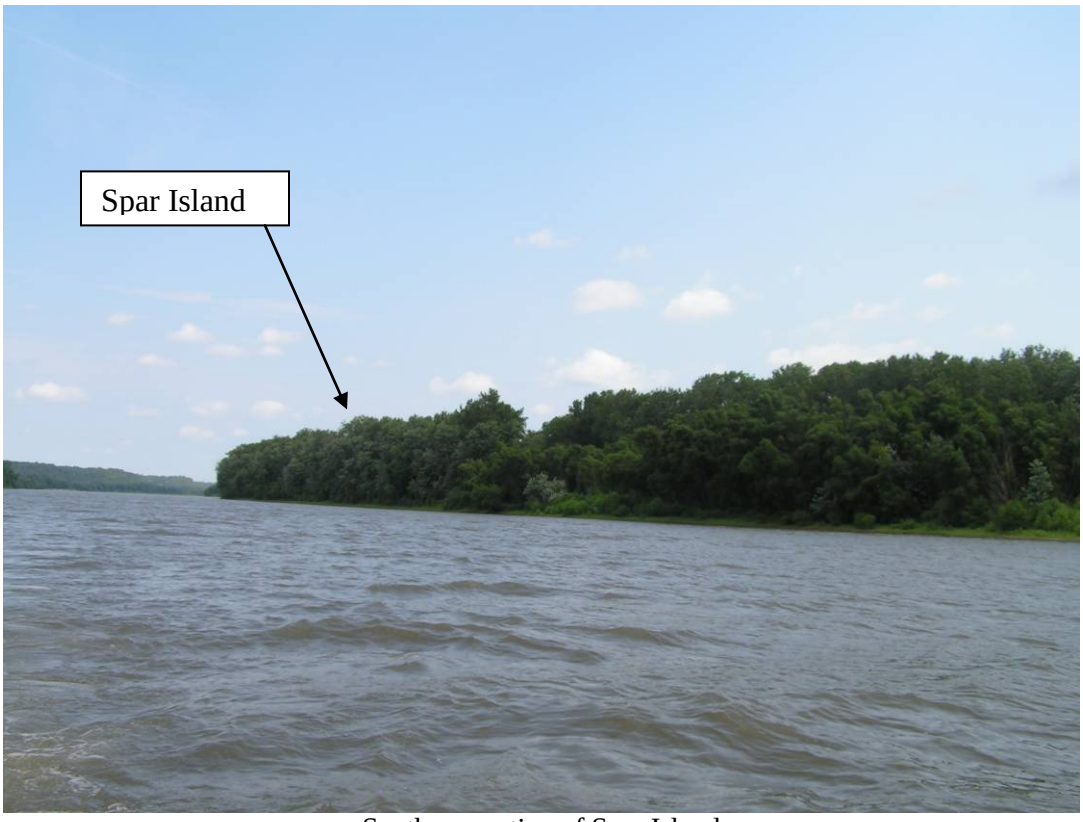
Wing Island

Wing Island

Wing Island

Northern portion of Spar Island

Spar Island



Southern portion of Spar Island

APPENDIX E

HABITAT EVALUATION AND QUANTIFICATION

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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APPENDIX E
HABITAT EVALUATION AND QUANTIFICATION
WING AND FISHER ISLANDS

Contents

1. Introduction 2
2. Analyzed Alternative Features 3
3. Habitat Evaluation Methodology 4
4. Assumptions 5
   a. Current Conditions 5
   b. Changes in Habitat Conditions Over Time 6
5. Model Performance. 7
   a. AHAG 7
   b. FAS 7
6. Results of Habitat Analysis. 13

List of Tables

Table E-1. Habitat metrics utilized for ecosystem benefit analysis. Rows highlighted in gray are the variables that changed between the no action and action alternatives. 7

Table E-2. Functional Assessment Score multiplying factors. 9

Table E-3. Functional Assessment Score values for Wing Island. 10

Table E-4. Functional Assessment Score values for Fisher Island. 11

Table E-5. Wing Island Average Annual Functional Assessment Score. 13

Table E-6. Fisher Island Average Annual Functional Assessment Score. 13

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APPENDIX E
HABITAT EVALUATION AND QUANTIFICATION
WING AND FISHER ISLANDS

1. INTRODUCTION

A habitat analysis was conducted for the Alton Pool Islands Restoration Project to evaluate the potential benefits of alternative habitat improvement features at Wing and Fisher Islands in the Illinois River. The ecosystem benefit analysis utilized a multi-agency team approach with representatives from U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and U.S. Army Corps of Engineers.

The benefits of habitat restoration projects are not readily convertible to actual monetary units as is customarily required for traditional projects utilizing benefit-cost analyses. A method of quantification is needed to adequately evaluate the benefits of project features. Quantification of habitat restoration project benefits can then be utilized as a project performance evaluation tool, a project-ranking tool, and/or a project-planning tool. This application for project output quantification was used as a project-planning tool.

While the cost to create an acre of a particular habitat type can be measured, that acre's benefits (number of species and habitat quality) is difficult to ascertain. One way to measure habitat and quantify benefits is to use Habitat Evaluation Procedures (HEP). An analysis of existing conditions, future-without-project conditions, and future-with-project conditions was conducted using the 1992 and 1996 Aquatic Habitat Appraisal Guide (AHAG) and the Functional Assessment Score (FAS) methodology. The AHAG approach was developed by the Corps of Engineers' Waterways Experiment Station (Killgore and Hardy 1992) and Rock Island District (Mathias et al. 1996). The approach follows the format of the Wildlife Habitat Appraisal Guide (WHAG), developed by the Missouri Department of Conservation and the Natural Resources Conservation Service (1990). The WHAG is, in turn, based on the U.S. Fish and Wildlife Service's Habitat Evaluation Procedure (1980). The FAS was developed by the Institute for Water Resources (IWR).

Once construction begins and as a project matures, habitat changes occur, and

therefore habitat benefits may change. Many features (e.g., tree planting/growth) may not begin to show significant benefits until well into the period of analysis. The particular dynamics of the ecosystem under study then help determine the target years chosen for analysis. With or without a project, habitat conditions generally change over time; therefore, the overall value of a proposed project depends upon the comparison of "with-project" benefits to the "without-project" benefits.

2. ANALYZED ALTERNATIVE FEATURES

Alternatives within this benefits analysis for Wing Island include:

- Alternative 1 – No Corps Action.

- Alternative 2 – Single Bullnose and Revetment: Installation of a 750 foot long stone structure along the historical location of the island head to an elevation of 434 NGVD. The structure **would be tied into the island** to allow fish passage.

- Alternative 3 – Riprap Shoreline: Installation of approximately 400 foot of revetment along the existing island head to an elevation of 434 NGVD.

- Alternative 4 – Unrooted Bullnose with Revetment: Installation of a 750 foot long stone structure along the historical location of the island head to an elevation of 434 NGVD. The structure **would not be tied into the island** to allow fish passage.

Initially, the hard points in the Fisher Island side channel were included as a separate alternative. However, the historic imagery acquired late in project planning indicated the side channel was narrowing with time in addition to the Apple Creek sedimentation. Therefore, the PDT felt that this feature was essential to project success and it was included in all Fisher Island alternatives. Thus the hard points were crucial to project success because:

- All side channels within the project area are narrowing with time
- Multiple islands within the Illinois River have lost their side channel and become part of the shore
- Sediment deposition from Apple Creek is accelerating Fisher Island's side channel loss
- Side channels provide critical habitat to aquatic organisms: refuge from

entrainment, protection from main channel current and cold winter temperatures, and abundant food.

Alternatives within this benefits analysis for Fisher Island include:

- Alternative 1 – No Corps Action.

- Alternative 2 – Riprap Shoreline and Alternating Hardpoints in Side Channel: Installation of approximately 550 foot of revetment along the existing island head to an elevation of 429 foot NGVD. Installation of five alternating 100 foot long hardpoints placed at the lower end of the side channel. These structures will be built to an elevation of 429 foot NGVD.

- Alternative 3 – Single Bullnose and Alternating Hardpoints in Side Channel: Installation of an 800 foot long stone structure along the historical location of the island head to an elevation of 429 NGVD. The structure would not be tied into the island to allow fish passage. Installation of five alternating 100 foot long hardpoints.

- Alternative 4 – Single Bullnose with Extended Riverside Off-bank Revetment and Alternating Hardpoints in Side Channel: Installation of a 3,232 foot long stone structure along the historical location of the island head and riverside bank to an elevation of 429 NGVD. Notches will be place d at intervals along the off-bank revetment and the structure would not be tied into the island. Installation of five alternating 100 foot long hardpoints.

3. HABITAT EVALUATION METHODOLOGY

For the evaluation process, the study team reviewed aerial photography, GIS land cover files, topographic data, and preliminary design drawings. The members of the team were also familiar with the project area and most had direct knowledge of existing conditions. During the evaluation process, assumptions were developed regarding existing conditions and probable post-project conditions relative to limiting factors and/or proposed management practices. These assumptions are discussed below.

4. ASSUMPTIONS

Several assumptions were made regarding current conditions, model performance, and changes in habitat conditions over time. The multi-agency team made the following assumptions during the habitat evaluation:

(1) Target years of 0, 2, 10, and 50 are sufficient to annualize HUs and to characterize habitat changes over the period of analysis for with and with-out project conditions;

(2) For the AHAG, all species were given equal consideration;

(3) The No Action Alternative assumed that no USACE project would occur;

(4) The AHAG team deleted all AHAG metrics with the exception of numbers four and six, because the team's evaluation found that only metrics four and six changed between the no action and action alternatives over the 50 years;

(5) The existing HSI values developed are a fair representation of the quality of habitat in all target years and for all future conditions with or without a project;

(6) No special management of the project area would take place;

(7) While some vegetated terrestrial habitat may develop over the period of analysis, its acreage would be so small as to contribute very little to habitat values.

a. Current Conditions. Current conditions within the Illinois River include the loss of islands and associated side channel habitat due to excess erosion. Most of the investigators of the Illinois River agree that significant sedimentation is occurring under current conditions and most backwater areas will be filled with fine sediment within the foreseeable future. According to previous studies, by the year 2050 the Illinois River is predicted to lose a significant portion of its off-main channel backwater areas under current conditions of sediment supply. The affected contiguous and isolated backwater areas are expected to convert to mud flats.

Historically, the complexes of side channels along the main stem Illinois River have provided incredibly rich habitat for fish and wildlife. The fishery was exceptional, with a 200-mile reach of the Illinois River producing 10 percent of the total U.S. catch of freshwater fish in 1908, more than any other river in North America (Sparks 1992). Dramatic loss in side channel and island habitat is due to excessive sedimentation within the side channel, as well as erosion of the islands themselves. This loss of habitat is limiting the ecological health and altering the character of this unique floodplain river system. In particular, the Illinois River has lost much of its critical spawning, nursery, and overwintering areas for fish, as well as habitat for diving ducks

and aquatic species.

A review of the 1903 Woermann Maps revealed estimates of 94 islands with a total length of approximately 75 miles (USACE 2007). However, length of side channel habitat calculated using recent Illinois River Navigation Charts revealed approximately 57 islands on the Illinois River that create approximately 54 miles of side channel (USACE 2007). While the size and shape vary considerably, the average side channel in the Illinois River is approximately 1 mile long with a width of roughly 100 feet. The contemporary extent of islands and side channels represents a relatively dramatic decline from the 94 islands with a total length of approximately 75 miles which were present in 1903. While increases in water level elevations associated with impoundments and diversion are likely a primary cause, the current situation does point to concerns over continued loss of island habitat. The Illinois River Basin Restoration Comprehensive Plan suggested that without any action, continued loss of side channel length would occur at the rate of approximately 0.25 percent per year, if it follows trends from 1903 to the present (USACE 2007). This would result in a loss of approximately 6.5 additional miles of side channel habitats throughout the Illinois River. Additionally, in 2001, IDNR and USACE personnel conducted a detailed evaluation of the side channels and islands in Alton Pool, the 80 mile reach upstream of the mouth. They found that 14 of 18 islands in Alton Pool (approximately 80 percent) required bank protection to reduce excessive island erosion and loss of island/side channel length.

b. Changes in Habitat Conditions Over Time. Environmental habitat conditions are not typically static. Either through natural processes or human activity, habitat types generally undergo transformation and may change in quality and/or quantity. Imbedded in each evaluation, change has been added to the model. To assess the change over the period of analysis, target years have been defined. At each target year, a change in the habitat variables may be noticed. Noticeable changes can be characterized by a change in habitat benefit output.

Evaluation of the aquatic restoration features assumed that under “without-project” conditions, shoreline erosion would continue throughout the 50-year analysis period. Under “with-project” conditions, shoreline stabilization would occur, along with possible accretion of sediment, thereby maintaining the islands and side channel habitat over the 50-year period of analysis.

5. MODEL PERFORMANCE.

a. AHAG. The AHAG was designed to be applied to both lentic (slack-water) and lotic (flowing-water) habitats, as well as to spawning, rearing, and juvenile/adult life stages. In order to evaluate potential project aquatic benefits, a field data sheet was prepared using 14 metrics contained in the 1992 and 1996 AHAG models (Table E-1). For all of the alternatives considered, potential changes in HSI values and therefore AAHUs were realized due to differences in only two of the fourteen metrics examined in the analysis: 4) Percent of shoreline riprapped; and 6) Percent surface area w/ visible logs, inundated timber, undercut banks, and/or brush. Therefore, the AHAG team scored only AHAG metrics 4 and 6, because the alternatives considered were not anticipated to cause a change in the other metrics during the 50 year period of analysis. The AHAG evaluation process was performed independently for each alternative for both Wing and Fisher Islands.

Table E-1. Habitat metrics utilized for ecosystem benefit analysis. Rows highlighted in gray are the variables that changed between the no action and action alternatives.

AHAG Habitat Metrics
1. Average water temp ^{o}C
2. Average turbidity (NTU)
3. Minimum daily dissolved oxygen (mg/l)
4. Percent of shoreline rip rapped
5. Dominant substrate type
6. Percent surface area w/ visible logs, inundated timber, undercut banks, and/or brush
7. Water level fluctuation during spawning and egg incubation
8. Variation in water depth, coefficient of variation, percent
9. Average Water Velocity, cm/sec
10. Average depth of thalweg
11. Distance to nearest backwater with average depth > 1 m
12. Percent of backwater/sidechannel area suitable as overwintering habitat from Nov.-Feb.
13. Distance to gravel bar with flowing water
14. Average conductivity

b. FAS. Because of the broad nature of the AHAG model, it was not sensitive enough to account for natural resource benefits that the proposed project is anticipated

to provide. Therefore, the AHAG scores were not used and an additional habitat evaluation model, the **site specific Functional Assessment Score (FAS)** was used. The FAS methodology taught by Shana Heisy-Olig in the FY04 Planner Core Curriculum course entitled " Economic Analysis in Planning under the subsection Cost Effectiveness and Incremental Cost Analysis was used for the analysis. The existing and future conditions were evaluated at the same points in time as the AHAG analysis.
The FAS methodology was employed because it more appropriately **addresses the environmental rehabilitation goals** of the project, where AHAG more specifically addresses the purported requirements of particular fish species. In this project, we are not modifying the environment to benefit a specific species.

The concept behind the functional assessment is to capture a range of beneficial functions provided by riverine islands and side channels, such as producing woody material to support aquatic food chains, and reducing shoreline erosion.

A panel of subject matter experts (composed of biologists from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the Illinois Department of Natural Resources) developed a functional numerical index in which the values recorded for each of eight or nine broad-category island functions were assigned a score between 0.0 (low) and 1.0 (high) to describe how well each alternative was anticipated to perform a specific function. The broad functions considered included:

1) island protection –The alternative would protect the head of the island
2) increased habitat diversity – The alternative would increase habitat diversity in the proposed project site
3) production of overwintering habitat – The alternative would create overwintering habitat in the proposed project site
4) reduction of suspended sediment – The alternative would reduce sediment suspension in the proposed project site
5) reduction of shoreline erosion – The alternative would reduce shoreline erosion in the proposed project site
6) production/maintenance of bottomland hardwood – The alternative would promote production and maintain bottomland hardwood in the proposed project site
7) maintenance of (Fisher) Island side channel – The alternative would help to maintain the Fisher Island side channel downstream of Apple Creek
8) production or maintenance of spawning/rearing habitat – The alternative would

promote production or maintenance of spawning/rearing habitat in the proposed project site

9) macroinvertebrate production – The alternative would promote macroinvertebrate production or maintenance in the proposed project site

The team then assigned each function a numerical multiplying factor (1 or less), based on the importance of the functions contribution to the riverine ecosystem (Table E-2). This multiplying factor is analogous to the multiplier function used in WHAG.

Table E-2. Functional Assessment Score multiplying factors.

Function	**Multiplying Factor**
Island Protection	1.00
Habitat Diversity	1.00
Overwintering Habitat	0.60
Suspended Sediment	0.30
Shoreline Erosion	0.80
BL Hardwood	0.90
Maintain Fisher Island Side Channel (N/A for Wing)	0.80
Spawning/Rearing Habitat	0.80
Macroinvertebrate Production	0.60
Total	**6.80**

The expert panel assigned a score, on a scale of 0.0 to 1.0, to each function for existing condition and expected future with and without condition for the four (Wing Island) or four (Fisher Island) alternatives. The highest possible score (a 1.0 for all functions) would be a score of 8.0 or 9.0 without multiplying factors. However with the multiplying factors the highest score was 6.0 or 6.8 respectively. Once each function score was multiplied by its respective multiplying factor (Table E-2), function scores were summed for each alternative for each year. These summations were divided by 6.0 or 6.8 to give the average functional score per alternative per target year of analysis. Functional scores for each alternative were then multiplied by acreage to reflect the fact that the functional benefits provided would be proportional to the size of the conditions created by the alternative. This proportionality technique is analogous to the habitat unit concept, in which both quality (functional score) and quantity (acres) are important factors in the determination of environmental outputs. Expected functional scores under

each alternative were compared to the expected future without-project score (and the difference calculated) to yield an overall Net FAS, a measure of riverine island improvement or benefit. The numerical functional assessment scores were converted to an average annual equivalent to reflect the fact that full ecosystem benefits would not occur immediately.

Acreage for the FAS included the same aquatic area included in the AHAG. Unlike the AHAG, the vegetated area of the island was also included. The island provides and contributes to the functions analyzed in the FAS. Thus the team felt that it was justified to include this acreage in addition to the aquatic acreage.

Table E-3 displays FAS calculations for Wing Island, while Table E-4 displays FAS calculations for Fisher Island.

Table E-3. Functional Assessment Score values for Wing Island.

Present (Year 0) Score	**No Action**	**Alt. 2**	**Alt. 3**	**Alt. 4**
Island Protection	0.00	0.00	0.00	0.00
Habitat Diversity	0.30	0.30	0.30	0.30
Overwintering Habitat	0.50	0.50	0.50	0.50
Suspended Sediment	0.00	0.00	0.00	0.00
Shoreline Erosion	0.00	0.00	0.00	0.00
BL Hardwood	0.70	0.70	0.70	0.70
Spawning/Rearing Habitat	0.60	0.60	0.60	0.60
Macroinvertebrate Production	0.50	0.50	0.50	0.50
Year 2 Score	**No Action**	**Alt. 2**	**Alt. 3**	**Alt. 4**
Island Protection	0.00	0.80	0.90	0.80
Habitat Diversity	0.30	0.70	0.40	0.80
Overwintering Habitat	0.50	0.70	0.60	0.80
Suspended Sediment	0.00	0.50	0.60	0.40
Shoreline Erosion	0.00	0.60	0.70	0.50
BL Hardwood	0.70	0.70	0.70	0.70
Spawning/Rearing Habitat	0.60	0.80	0.70	0.90
Macroinvertebrate Production	0.50	0.70	0.60	0.70

Year 10 Score	No Action	Alt. 2	Alt. 3	Alt. 4
Island Protection	0.00	0.80	0.90	0.80
Habitat Diversity	0.30	0.70	0.40	0.80
Overwintering Habitat	0.50	0.70	0.60	0.80
Suspended Sediment	0.00	0.50	0.60	0.40
Shoreline Erosion	0.00	0.60	0.70	0.50
BL Hardwood	0.70	0.70	0.70	0.70
Spawning/Rearing Habitat	0.60	0.80	0.70	0.90
Macroinvertebrate Production	0.50	0.70	0.60	0.70

Year 50 Score	No Action	Alt. 2	Alt. 3	Alt. 4
Island Protection	0.00	0.80	0.90	0.80
Habitat Diversity	0.30	0.70	0.40	0.80
Overwintering Habitat	0.50	0.70	0.60	0.70
Suspended Sediment	0.00	0.50	0.60	0.40
Shoreline Erosion	0.00	0.60	0.70	0.50
BL Hardwood	0.60	0.80	0.70	0.80
Spawning/Rearing Habitat	0.60	0.80	0.70	0.90
Macroinvertebrate Production	0.40	0.70	0.60	0.70

Table E-4. Functional Assessment Score values for Fisher Island.

Present (Year 0) Score	No Action	Alt. 2	Alt. 3	Alt. 4
Island Protection	0.00	0.00	0.00	0.00
Habitat Diversity	0.70	0.70	0.70	0.70
Overwintering Habitat	0.60	0.60	0.60	0.60
Suspended Sediment	0.00	0.00	0.00	0.00
Shoreline Erosion	0.00	0.00	0.00	0.00
BL Hardwood	0.60	0.60	0.60	0.60
Maintain Fisher Island Side Channel	0.30	0.30	0.30	0.30
Spawning/Rearing Habitat	0.70	0.70	0.70	0.70
Macroinvertebrate Production	0.60	0.60	0.60	0.60

Year 2	No Action	Alt. 2	Alt. 3	Alt. 4
Island Protection	0.00	0.80	0.70	0.80

Habitat Diversity	0.70	1.00	1.00	1.00
Overwintering Habitat	0.60	0.70	0.75	0.90
Suspended Sediment	0.00	0.75	0.70	0.80
Shoreline Erosion	0.00	1.00	1.00	1.00
BL Hardwood	0.60	0.70	0.70	0.70
Maintain Fisher Island Side Channel	0.30	1.00	1.00	1.00
Spawning/Rearing Habitat	0.70	0.90	0.95	1.00
Macroinvertebrate Production	0.60	0.80	0.80	0.90

Year 10	**No Action**	**Alt. 2**	**Alt. 3**	**Alt. 4**
Island Protection	0.00	0.80	0.70	0.80
Habitat Diversity	0.70	1.00	1.00	1.00
Overwintering Habitat	0.60	0.70	0.75	0.90
Suspended Sediment	0.00	0.35	0.30	0.40
Shoreline Erosion	0.00	1.00	1.00	1.00
BL Hardwood	0.60	0.70	0.70	0.70
Maintain Fisher Island Side Channel	0.30	0.90	0.90	0.90
Spawning/Rearing Habitat	0.70	0.90	0.95	1.00
Macroinvertebrate Production	0.70	0.80	0.80	0.90

Year 50	**No Action**	**Alt. 2**	**Alt. 3**	**Alt. 4**
Island Protection	0.00	0.80	0.70	0.80
Habitat Diversity	0.70	1.00	1.00	1.00
Overwintering Habitat	0.50	0.70	0.75	0.90
Suspended Sediment	0.00	0.35	0.30	0.40
Shoreline Erosion	0.00	1.00	1.00	1.00
BL Hardwood	0.60	0.80	0.70	0.80
Maintain Fisher Island Side Channel	0.30	0.90	0.90	0.90
Spawning/Rearing Habitat	0.60	0.90	0.95	1.00
Macroinvertebrate Production	0.70	0.80	0.80	0.90

6. RESULTS OF HABITAT ANALYSIS.

The average annual functional assessment score (AAFAS) and net AAFAS benefits of each of the alternatives are displayed in Tables E-5 and E-6.

Table E-5. Wing Island Average Annual Functional Assessment Score.

#	Alternative	AAFAS	Net AAFAS
1	No Corps Action	23	0
2	Single bullnose with revetment	50	27
3	Riprap shoreline along existing island head	46	23
4	Unrooted bullnose with revetment	51	28

Table E-6. Fisher Island Average Annual Functional Assessment Score.

#	Alternative	AAFAS	Net AAFAS
1	No Corps Action	39	0
2	Riprap shoreline and alternating hardpoints	81	42
3	Single bullnose and alternating hardpoints	80	41
4	Single bullnose, extended off-bank line revetment, and hardpoints	85	46

Changes over time in the aquatic reaches of the project were also accounted for in the AHAG and FAS models. Side channel sedimentation will continue with or without the project. However, island orientation and configuration were considered to provide the most sustainable channel options with the most favorable aquatic habitat for the entire period of analysis. Because the FAS accounts for aquatic and terrestrial acreage, acreage does not change with time. Thus changes in FAS score are due solely to changes in function value over time.

Differences among AAFAS and net AAFAS benefits for Wing Island are due to the following: Alternative 3, shoreline rip rap, scored highest in island protection, suspended sediment, and shoreline erosion protection functions. Rip rap has been placed on islands effectively stopping erosion for many years, thus it has the best potential to protect the islands. Alternative 4, unrooted bullnose, scored highest in habitat diversity, overwintering habitat, and spawning and rearing habitat. Alternative 2,

single bullnose, and 4 scored equally in macroinvertebrate production and bottomland hardwood production/maintenance. Alternatives 2 and 4 produce diverse depth and flow conditions, trap aquatic debris (wood), and may cause sediment to accumulate at the head of the island. These conditions provide quality habitat for aquatic species.

For Fisher Island, Alternative 4, bullnose with extended off-bank revetment, scored highest in overwintering habitat, suspended sediment, shoreline erosion, spawning and rearing habitat, and macroinvertebrate production. Alternative 4 address both the island head and riverside bank erosion producing a large quantity of habitat with diverse depth and flow. Alternative 2, rip rap, and 4, scored equally well in island protection, and bottomland hardwood (Appendix E) because rip rap may be more effective while the off-bank revetment addresses a larger area of erosion.

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APPENDIX F

INCREMENTAL COST ANALYSIS

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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APPENDIX F
ECONOMICS IN ENVIRONMENTAL PLANNING
INCREMENTAL COST ANALYSIS

Contents

1. Description of Measures and Alternatives 2
2. Cost and Net Output (Net AAFAS) 2
3. Determining Cost Effective Alternatives 4
4. Incremental Cost Analysis 6

List of Tables

Table 1: Alton Pool Islands (Wing Island and Fisher Island) Alternatives and Description of Alternatives 2

Table 2: Alton Pool Islands (Wing and Fisher) Construction Costs and Average Annual Costs, By Alternative 3

Table 3: Alton Pool Islands (Wing and Fisher) Net AAFAS and Average Annual Cost, By Alternative 3

Table 4: Alton Pool Islands (Wing and Fisher) Net AAFAS and Average Annual Cost, By Alternative Sorted by Net AAFAS 4

Table 5: Alton Pool Islands (Wing and Fisher) Incremental Values of Remaining “Best Buy” Plans 7

List of Figures

Figure 1: Alton Pool Islands (Wing Island) Average Annual Cost and Net AAFAS (Average Annual Output) 5

Figure 2: Alton Pool Islands (Fisher Island) Average Annual Cost and Net AAFAS (Average Annual Output) 5

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APPENDIX F
ECONOMICS IN ENVIRONMENTAL PLANNING
INCREMENTAL COST ANALYSIS

For all projects, the Corps of Engineers' Principles and Guidelines (P&G) define four broad criteria for the evaluation of all plans: completeness; effectiveness; efficiency; and acceptability. Completeness is the extent to which an alternative plan provides and accounts for all necessary investments and other actions to ensure the realization of the planned effects. Effectiveness is the extent to which an alternative plan accomplishes its planning objectives. Efficiency is the extent to which an alternative plan is the most cost-effective means of accomplishing its planning objectives. Acceptability is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations and public policies.

For traditional projects (flood damage reduction, navigation), the NED objective (maximization of the net benefits) ensures that the efficiency criterion has been met. The alternative which maximizes the net benefits of the project (total benefits less total cost) is the alternative which meets this criterion. However, such a selection criterion is inadequate for environmental projects because of the difficulties in quantifying project benefits in traditional monetary terms. Without a reliable monetary estimate of project benefits with which to compare monetary costs, it is not possible to determine the alternative plan which maximizes net monetary benefits. However, this does not mean the economic efficiency of environmental plans cannot be properly evaluated in accordance with the decision criteria outlined in the Corps of Engineers' P&G.

The tool of cost effectiveness analysis enables planners to impose economic efficiency on the cost (production) side of the equation by assuring a range of cost effective plans are identified. This economic tool can ensure that either a set level of environmental output is produced for the least cost possible, or that for a set level of expenditures environmental output production is maximized. Although the cost analyses do not provide a discrete decision criterion, such as the maximization of net benefits in NED analysis, Incremental Cost Analysis (ICA) provides for the explicit comparison of the relevant changes in cost and output on which such decisions may be based.

Cost effectiveness analysis and ICA are rooted in economic production theory and utilize such economic principles as scarcity, choice and opportunity cost. The cost analysis examines changes in cost and output that result from decisions to implement alternative plans and plan components. Cost effectiveness analysis can be used to identify the least-cost plan for producing every attainable level of environmental output, as well as identifying those plans where more output could be produced for the same or less cost. Environmental scale selection choices based on average, instead of incremental cost information can lead to misinformed and improper decision making. The rationale behind

incremental cost analysis is to *reveal* the variation in cost between one plan and another, whereas average cost tends to *obscure* the variation in cost between plans. ICA is an invaluable tool in determining the appropriate scale of mitigation or restoration by revealing variations in cost between alternatives (plans); explicitly asking for each attainable increment of output, “Is it worth it?”

1. Description of Measures and Alternatives

NESP – Illinois River - Alton Pool Islands. A brief description of all project measures is presented in Table 1. For this analysis of the Alton Pool Islands, Wing Island and Fisher Island are evaluated via ICA separately. More detailed descriptions of the Alternatives are presented in Section 5.2 of the main report.

Table 1: Alton Pool Islands (Wing Island and Fisher Island) Alternatives and Description of Alternatives

Island	Alternative	Description of Alternative
WING Island		
	WING 1	No Action
	WING 2	Single Bullnose with Revetment
	WING 3	Riprap Shoreline Only
	WING 4	Unrooted Bullnose with Revetment
FISHER Island		
	FISHER 1	No Action
	FISHER 2	Riprap Shoreline and Alternating Hardpoints in Side Channel
	FISHER 3	Single Bullnose and Alternating Hardpoints in Side Channel
	FISHER 4	Single Bullnose with Extended Off-bank Line Revetment on Riverside and Alternating Hardpoints in Side Channel

2. Cost and Net Output (Net AAFAS)

Construction costs and all relevant operations, maintenance, repair, rehabilitation and replacement (OMRR&R) costs are computed for all project Alternatives. Average annual construction costs and average annual OMRR&R costs are calculated via cost stream analysis for each measure, assuming a 50-year period of evaluation and an FY 2011 project discount rate of 4.125 percent. Construction Costs as well as all Average Annual Costs are presented in Table 2.

Table 2: Alton Pool Islands (Wing and Fisher) Construction Costs and Average Annual Costs, By Alternative

Island Alternative	Construction Costs	Average Annual Construction Costs	Average Annual OMRR&R Costs	Average Annual Cost
WING Island				
Wing 1 (No Action)	$0	$0	$0	$0
Wing 2	$1,080,000	$51,355	$0	$51,355
Wing 3	$180,000	$8,559	$0	$8,559
Wing 4	$1,090,000	$51,831	$0	$51,831
FISHER Island				
Fisher 1 (No Action)	$0	$0	$0	$0
Fisher 2	$620,000	$29,482	$0	$29,482
Fisher 3	$1,000,000	$47,551	$0	$47,551
Fisher 4	$2,570,000	$122,206	$0	$122,206

The ICA for both Wing Island and Fisher Island is performed in accordance with IWR-Plan, with reference to the Principles and Guidelines of Institute of Water Resources (IWR) Report #95-R-1, Evaluation of Environmental Investments Procedures Manual, Interim: Cost Effectiveness and Incremental Cost Analyses (May 1995). Through incremental cost analysis in IWR-Plan, several progressive steps in the multi-step process are taken to identify the most cost-effective Alternatives to be considered in environmental restoration planning. These steps are described and computed below.

Output, measured as Net Average Annual Functional Assessment Score (AAFAS), is computed in Appendix E. Net AAFAS (where Net AAFAS equal With Project AAFAS less Without Project AAFAS) is a measure of the average “annualized” net functional habitat preservation/improvement generated under each Alternative. Both the Net AAFAS and the Average Annual Cost for all Alternatives for both Wing Island and Fisher Island are presented in Table 3.

Table 3: Alton Pool Islands (Wing and Fisher) Net AAFAS and Average Annual Cost, By Alternative

Island Alternative	Net AAFAS	Average Annual Cost
WING Island		
Wing 1 (No Action)	0	$ 0
Wing 2	27	$51,355
Wing 3	23	$8,559
Wing 4	28	$51,831

FISHER Island		
Fisher 1 (No Action)	0	$ 0
Fisher 2	42	$29,482
Fisher 3	41	$47,551
Fisher 4	46	$122,206

3. Determining Cost Effective Alternatives

Prior to identifying cost effective Alternatives, all Alternatives are sorted by Net AAFAS (average annual output level), from lowest to highest. Sorted Average Annual Cost and Net AAFAS for all Alternatives are shown in Table 4 as well as graphically in Figure 1 and Figure 2 for Wing Island and Fisher Island, respectively.

Table 4: Alton Pool Islands (Wing and Fisher) Net AAFAS and Average Annual Cost, By Alternative Sorted by Net AAFAS

Island Alternative	Net AAFAS	Average Annual Cost
WING Island		
Wing 1 (No Action)	0	$ 0
Wing 3	23	$8,559
Wing 2	27	$51,355
Wing 4	28	$51,831
FISHER Island		
Fisher 1 (No Action)	0.0	$ 0
Fisher 3	41	$47,551
Fisher 2	42	$29,482
Fisher 4	46	$122,206

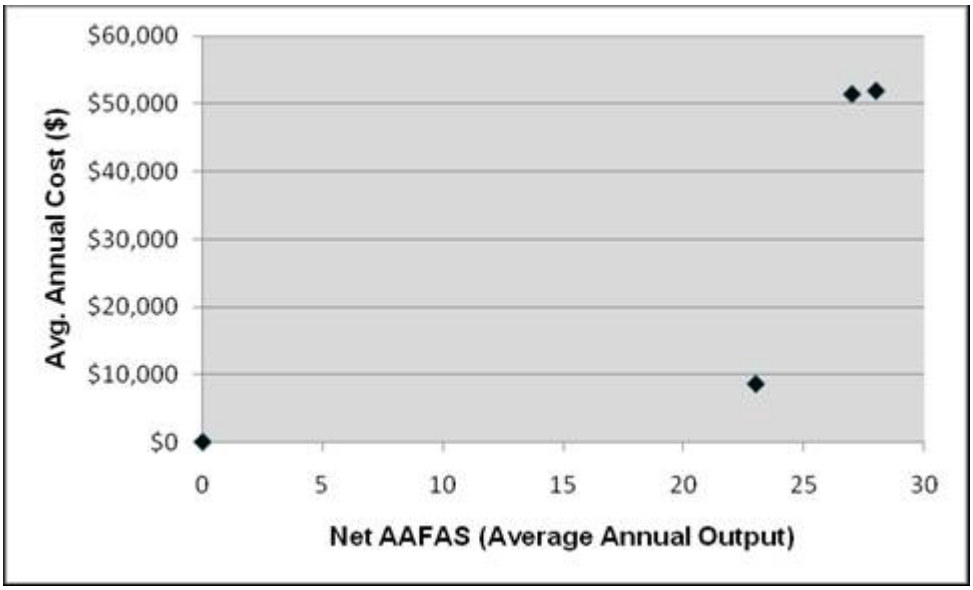

Figure 1: Alton Pool Islands (Wing Island) Average Annual Cost and Net AAFAS (Average Annual Output)

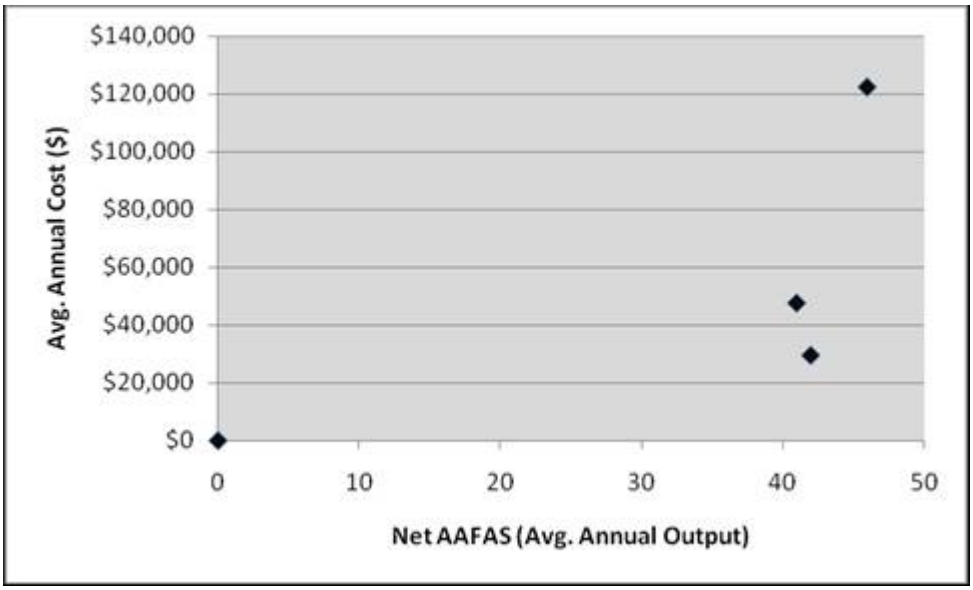

Figure 2: Alton Pool Islands (Fisher Island) Average Annual Cost and Net AAFAS (Average Annual Output)

After sorting by Net AAFAS, any and all non-cost effective Alternatives are identified first as *Inefficient in Production*, if applicable, then as *Ineffective in Production*, if applicable. *Inefficient in Production* is defined as any Alternative where the <u>same</u> output level can be generated at a <u>lesser</u> cost by another Alternative. The Alternatives are evaluated and wherever there are two or more Alternatives providing the same output level, aside from any other considerations (i.e., uncertainty about the reliability of cost or output estimates), the more costly

Alternative(s) generating that same output level are eliminated. For this analysis, no Alternatives are eliminated as being *Inefficient in Production*.

Next, any Alternatives that are *Ineffective in Production* are identified. *Ineffective in Production* is defined as any Alternative where a greater output level can be generated at a lesser or equal cost by another Alternative. With the Alternatives still sorted by output level (AAFAS), a pair-wise comparison of output level and average annual cost is made for all remaining Alternatives that 'passed' the *Inefficient in Production* screening in the previous step. The Alternatives are evaluated and any Alternative(s) generating less output at an equal or greater cost are eliminated. These steps identify the least-cost Alternative for every level of output under consideration.

Noting Table 5, Alternative Fisher 3 generates less output (Net AAFAS) than Alternative Fisher 2; (41 < 42). However, Alternative Fisher 3 has a greater average annual cost than Alternative Fisher 2 ($47,551 > $29,482), and thus Alternative Fisher 3 is identified and eliminated as being *Ineffective in Production*.

4. Incremental Cost Analysis

Incremental cost analysis (ICA) is conducted on the remaining Alternatives. This consists of several iterative steps where the incremental difference in both cost and output (Net AAFAS) are computed. Incremental cost is the additional cost incurred by selecting one Alternative over another Alternative, and is computed by subtracting the cost of one Alternative under consideration from the cost of another Alternative under consideration. Similarly, incremental output is the additional output generated by selecting one Alternative over another Alternative, and is computed by subtracting the output of one Alternative under consideration from the output of another Alternative under consideration. The first step is to compute the incremental change in cost and incremental change in output from implementing each Remaining Alternative over the No Action Alternative (i.e., Wing 1 for Wing Island, and Fisher 1 for Fisher Island), where the No Action Alternative is considered the baseline condition against which each remaining cost effective Alternative is compared. Next, the Alternative yielding the lowest incremental cost per unit over the No Action Alternative is identified. In other words, this identified Alternative is the most cost effective remaining Alternative for production of AAFAS over the No Action Alternative. After identifying this Alternative with the lowest incremental cost per unit (i.e., the most cost efficient from a production perspective, producing output at the lowest unit cost), any Alternatives generating a lower output level are removed from further consideration in the ICA process. The eliminated Alternatives are less efficient in production, producing a lower level of output at a higher incremental unit cost. The remaining Alternatives are further evaluated via repeated steps of this ICA process, where the most cost effective remaining Alternative becomes the *new* baseline condition against which each remaining cost effective Alternative is compared. This iterative process continues until only the most cost effective,

production efficient Alternatives remain. When the most cost effective remaining Alternative is the last Alternative evaluated, there is no need for further incremental cost analysis; the ICA process is complete.

These final remaining cost effective and production efficient Alternatives are presented in Table 5 for both Wing Island and Fisher Island. Also known as "Best Buy" Plans, these Alternatives can be used to determine the desired project scale for environmental restoration planning. Characteristic of "Best Buy" Plans, the incremental average annual cost per unit increases for successive larger levels of incremental output (Net AAFAS).

Table 5: Alton Pool Islands (Wing and Fisher) Incremental Values of Remaining "Best Buy" Plans

"Best Buy" Plans	Construction Cost	Output (Net AAFAS)	Average Annual Cost	Incremental Output (Net AAFAS)	Average Annual Incremental Cost	Average Annual Incremental Cost per Unit
WING Island						
Wing 1 (No Action)	$ 0	0	$0	N / A	N / A	N / A
Wing 3	$180,000	23	$8,559	23	$8,559	$368.76
Wing 4	$1,090,000	28	$51,831	5	$43,272	$8,637.13
FISHER Island						
Fisher 1 (No Action)	$ 0	0	$0	N / A	N / A	N / A
Fisher 2	$620,000	42	$29,482	42	$29,482	$701.95
Fisher 4	$2,570,000	46	$122,206	4	$92,724	$23,181

Conclusion: The "Best Buy" Alternatives presented in Table 5 provide the information necessary to make well-informed decisions regarding desired project scale. For example, progressing through the increasing levels of output for the Alternatives in Table 5 for either Wing Island or Fisher Island help determine whether the habitat value of the additional AAFAS in the next level of output is worth its additional cost.

For Wing Island, if it is determined Alternative Wing 3, generating an AAFAS of 23 at an incremental cost of $368.76 per unit, is "worth it"; i.e., preferred to the No Action Alternative, then one would proceed to the next level of output to determine if it is also worth its additional cost. Proceeding to the next level of output reveals Alternative Wing 4 generates an increase in AAFAS of 5, for a Net AAFAS of 28. This is an increase in AAFAS of 17.9 percent over Alternative Wing 3, however at a significantly higher incremental cost of $8,637.13 per unit. In other words, it can be stated that for Alternative Wing 3, the first 23 units are

generated at a cost of $368.76 per unit, whereas Alternative Wing 4 generates an additional 5 units, albeit at a cost of $8,637.13 per additional unit.

For Fisher Island, if it is determined Alternative Fisher 2, generating an AAFAS of 42 at an incremental cost of $701.95 per unit, is “worth it”; i.e., preferred to the No Action Alternative, then one would proceed to the next level of output to determine if it is also worth its additional cost. Proceeding to the next level of output reveals Alternative Fisher 4 generates an increase in AAFAS of 4, for a Net AAFAS of 46. This is an increase in AAFAS of 8.7 percent over Alternative Fisher 2, however at a significantly higher incremental cost of $23,181.00 per unit. In other words, it can be stated that for Alternative Fisher 2, the first 42 units are generated at a cost of $701.95 per unit, whereas Alternative Fisher 4 generates an additional 4 units, albeit at a cost of $23,181.00 per additional unit.

As long as decision makers consider a level of output to be “worth it”, subsequent levels of output are considered. When a level of output is determined to be “not worth it”, then subsequent levels of output will also likely be “not worth it”, and the final decision regarding desired project scale for environmental restoration planning will have been reached.

APPENDIX G

PLATES

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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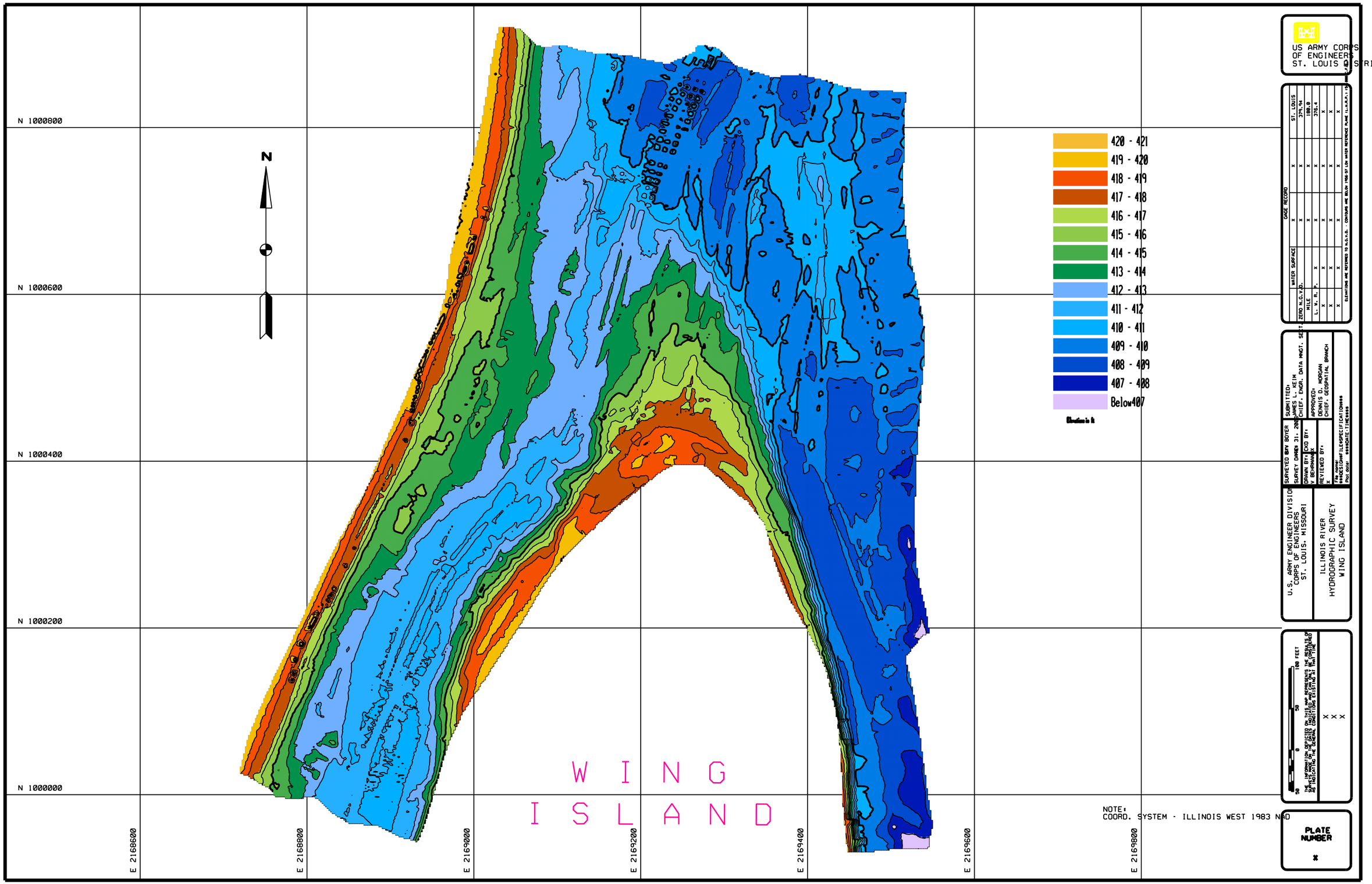

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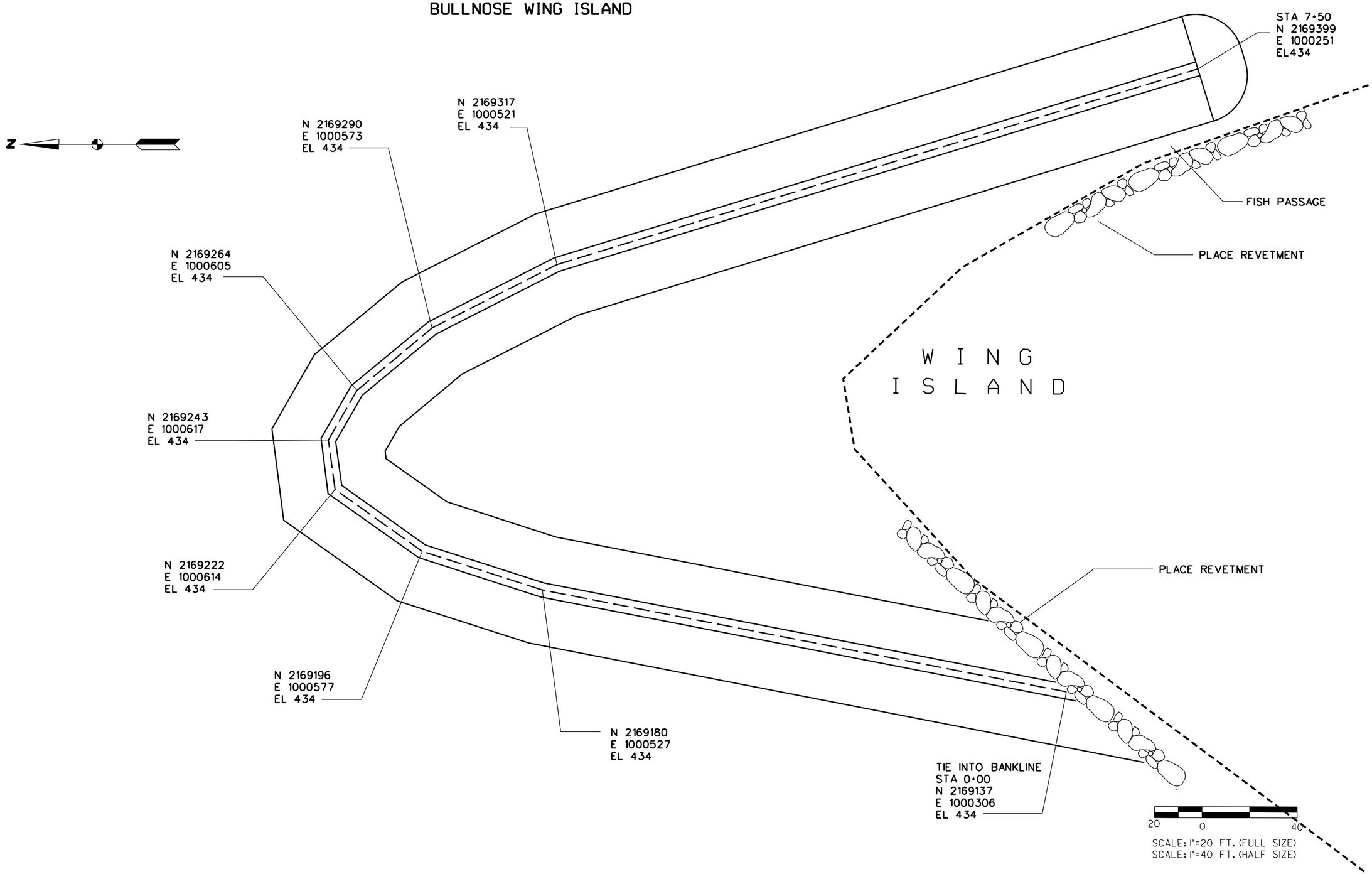
BULLNOSE WING ISLAND



NOTE:
COORD. SYSTEM - ILLINOIS WEST 1983 NAD

US Army Corps of Engineers
St. Louis District

GAGE RECORD

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MILE	241.2

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 1956-57

Designed by: M. RODGERS
Drawn by: M. RODGERS
Reviewed by: J. BROWN
Ckd by: R. DAVINROY
Survey Date:
SUBMITTED: M. RODGERS, River Engineer
APPROVED: D. GORDON, P.E., Chief, River Engineering
File name:
Plot date: $$$DATE-TIME$$$
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UPPER MISSISSIPPI RIVER BASIN
FY 07 AWARD
RIVER MILES 300 - 195

ILLINOIS RIVER

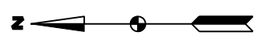
STONE DIKE CONSTRUCTION AND MODIFICATION

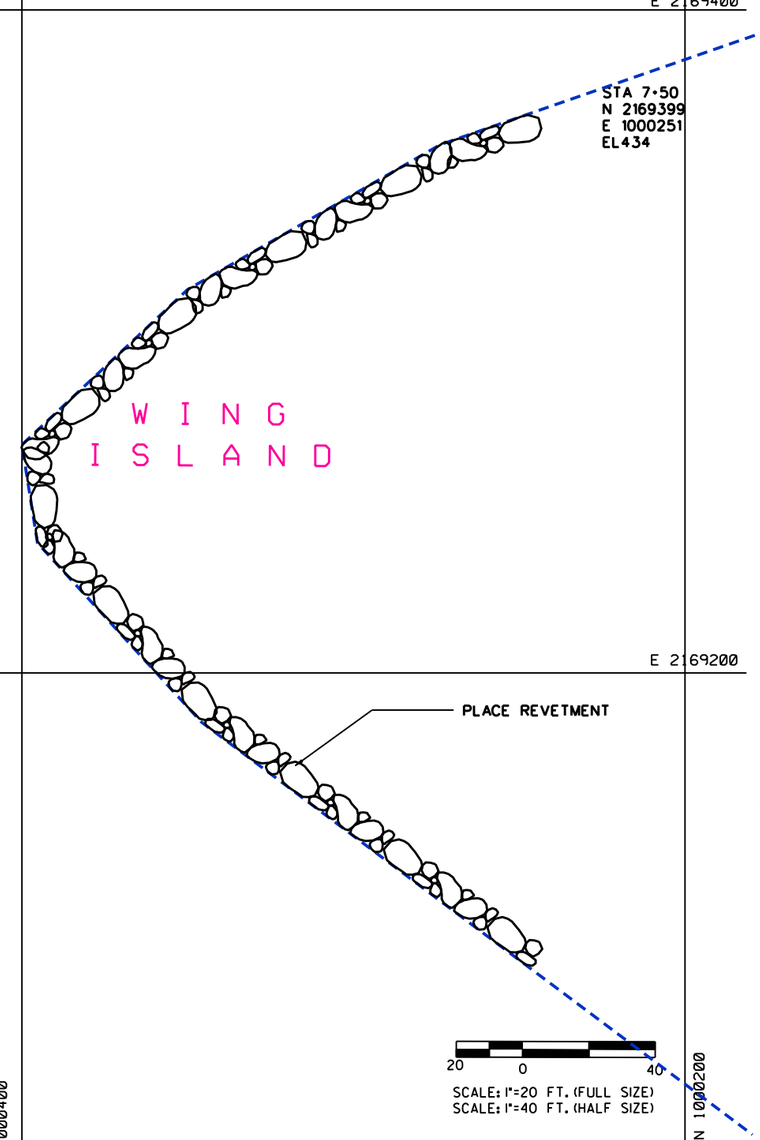
PLAN

PLATE NUMBER

X

REVETMENT WING ISLAND





NOTE:
COORD. SYSTEM - ILLINOIS WEST 1983 NAD

US Army Corps of Engineers
St. Louis District

GAGE RECORD		
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WATER SURFACE		
ZERO N.G.V.D.		
MILE		

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 1956-57

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Reviewed by: J. BROWN
Survey Date:
Ckd by: R. DAVINROY

UPPER MISSISSIPPI RIVER BASIN
FY 07 AWARD
RIVER MILES 300 - 195

SUBMITTED: M. RODGERS, River Engineer
APPROVED: D. GORDON, P.E., Chief, River Engineering

File name:
Plot date: 9/30/2008 TIME 9:59:00
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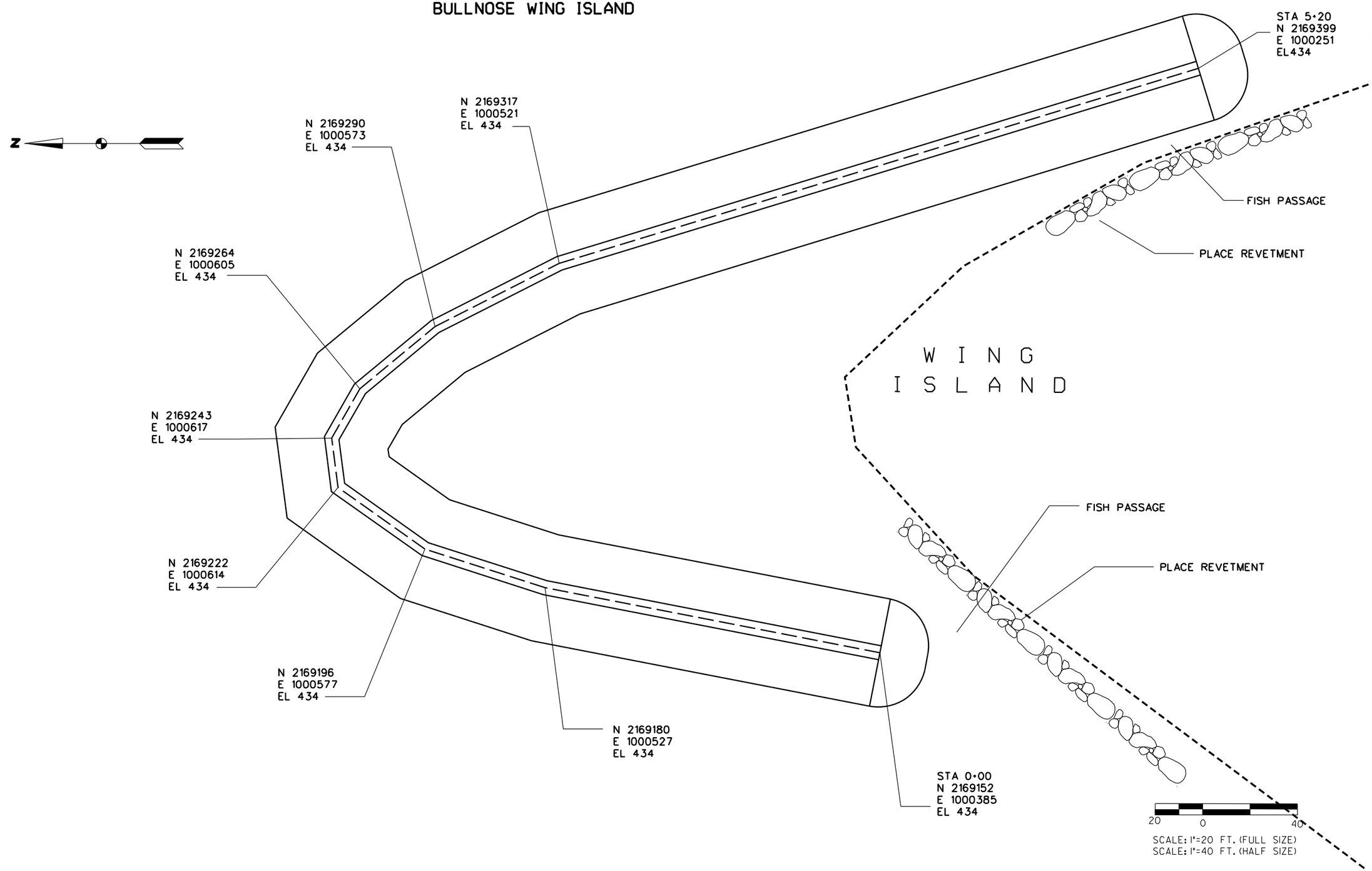
ILLINOIS RIVER

STONE DIKE CONSTRUCTION AND MODIFICATION
CONSTRUCTION OF BULLNOSE MILE 40.1 (R)
PLAN

PLATE NUMBER
X

RIVER MILES 300 - 195

BULLNOSE WING ISLAND



NOTE:
COORD. SYSTEM - ILLINOIS WEST 1983 NAD

US Army Corps of Engineers
St. Louis District

GAGE RECORD

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MILE		434.0
		241.2

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 1956-57

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UPPER MISSISSIPPI RIVER BASIN
FY 07 AWARD
RIVER MILES 300 - 195

Designed by: M. RODGERS
Drawn by: M. RODGERS
Reviewed by: J. BROWN
Ckd by: R. DAVINROY
SUBMITTED: M. RODGERS, River Engineer
APPROVED: D. GORDON, P.E., Chief, River Engineering
Survey Date:
File name:
Plot date: $$$DATE-TIME$$$
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ILLINOIS RIVER
STONE DIKE CONSTRUCTION AND MODIFICATION
PLAN

PLATE NUMBER
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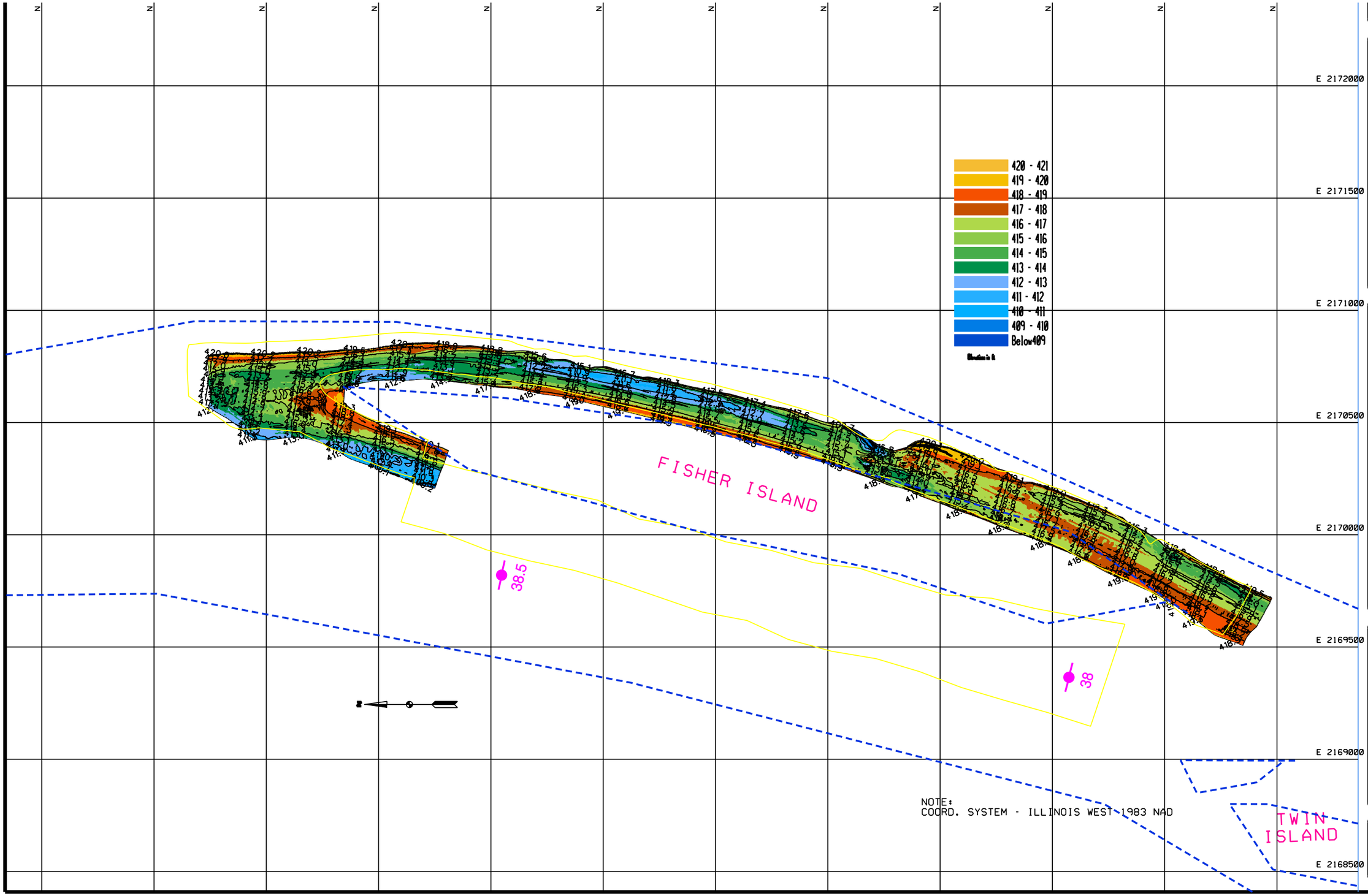

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ST. LOUIS, MISSOURI

ILLINOIS RIVER
HYDROGRAPHIC SURVEY
FISHER ISLAND

Surveyed by: MAV BOYER
Survey Date: MAY 31, 2006
Drawn by: WAYNE BERHMANN
Reviewed by: LEONARD HOPKINS
Cad by: DAVID L. LAMM
SUBMITTED: JAMES L. FLEM, Chief, Engr. Data Mngt. Sect.
APPROVED: DENNIS D. MORGAN, Chief, Geospatial Branch
File name: ###DESIGNFILES\SPECIFICATIONS###
Plot date: ###DATE-TIME###

GAGE RECORD			
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WATER SURFACE			X
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M.L.T.			
L.W.R.P.	X	X	X
DATE	X	X	X
X	X	X	X
X	X	X	X

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 1986-87 LOW WATER REFERENCE PLANE (L.W.R.P.) 15,000 C.F.S.

500 0 500 1000 FEET

THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF A HYDROGRAPHIC SURVEY WHICH WAS CONDUCTED AT THE TIME AS INDICATED. THE GENERAL CONDITIONS EXISTING AT THAT TIME.

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PLATE NUMBER
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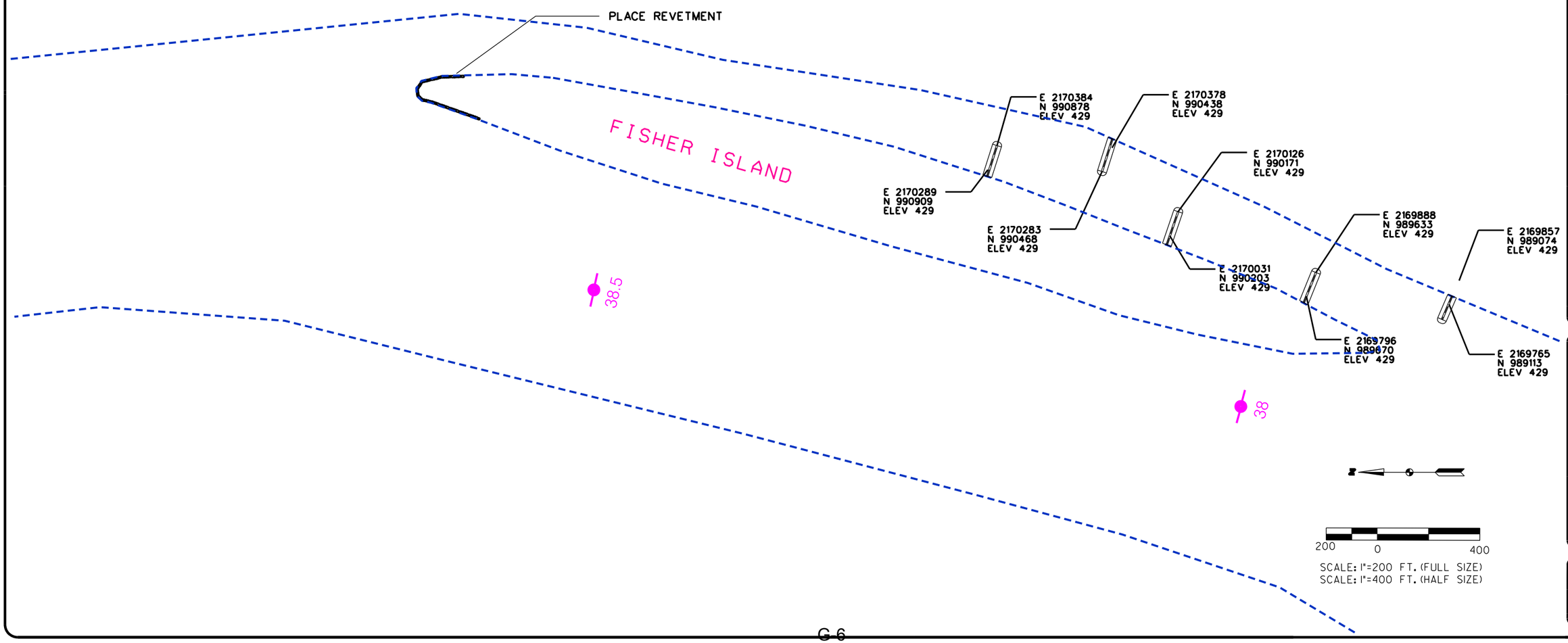
REVETMENT AND 5 HARDPOINTS FISHER ISLAND



US Army Corps
of Engineers
St. Louis District

GAGE RECORD

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MILE					241.2

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 1956-57

Designed by: M. RODGERS
Drawn by: M. RODGERS
Reviewed by: J. BROWN
Ckd by: R. DAVINROY
SUBMITTED: M. RODGERS, River Engineer
APPROVED: D. GORDON, P.E., Chief, River Engineering
Survey Date: MAY 31, 2006
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UPPER MISSISSIPPI RIVER BASIN
FY 07 AWARD
RIVER MILES 300 - 195

ILLINOIS RIVER

STONE DIKE CONSTRUCTION AND MODIFICATION
CONSTRUCTION OF BULLNOSE MILE 38.7 (L)
PLAN

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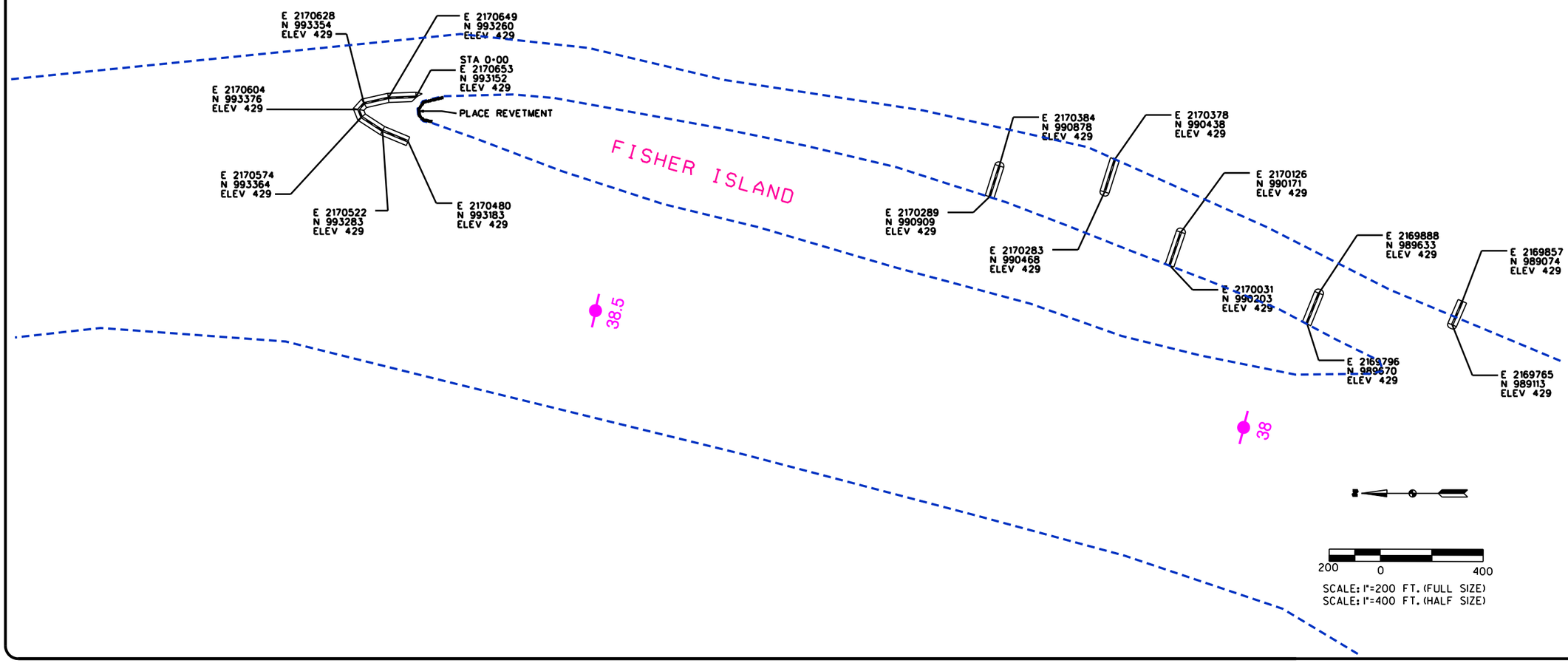
BULLNOSE AND 5 HARDPOINTS FISHER ISLAND



US Army Corps of Engineers
St. Louis District

GAGE RECORD		
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ZERO N.G.V.D.		24.2
MILE		

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 956-57

Designed by: N. RODGERS	Survey Date: MAY 3, 2006
Drawn by: W. ROGERS	Reviewed by: J. BROWN / Checked by: B. DAYHOFF
SUBMITTED: N. RODGERS, River Engineer	APPROVED: D. CORDON, P.E., Chief, River Engineering
File name:	Plot date: 5/8/2008 TIME:5:58

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CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

UPPER MISSISSIPPI RIVER BASIN
FY 07 AWARD
RIVER MILES 300 - 195

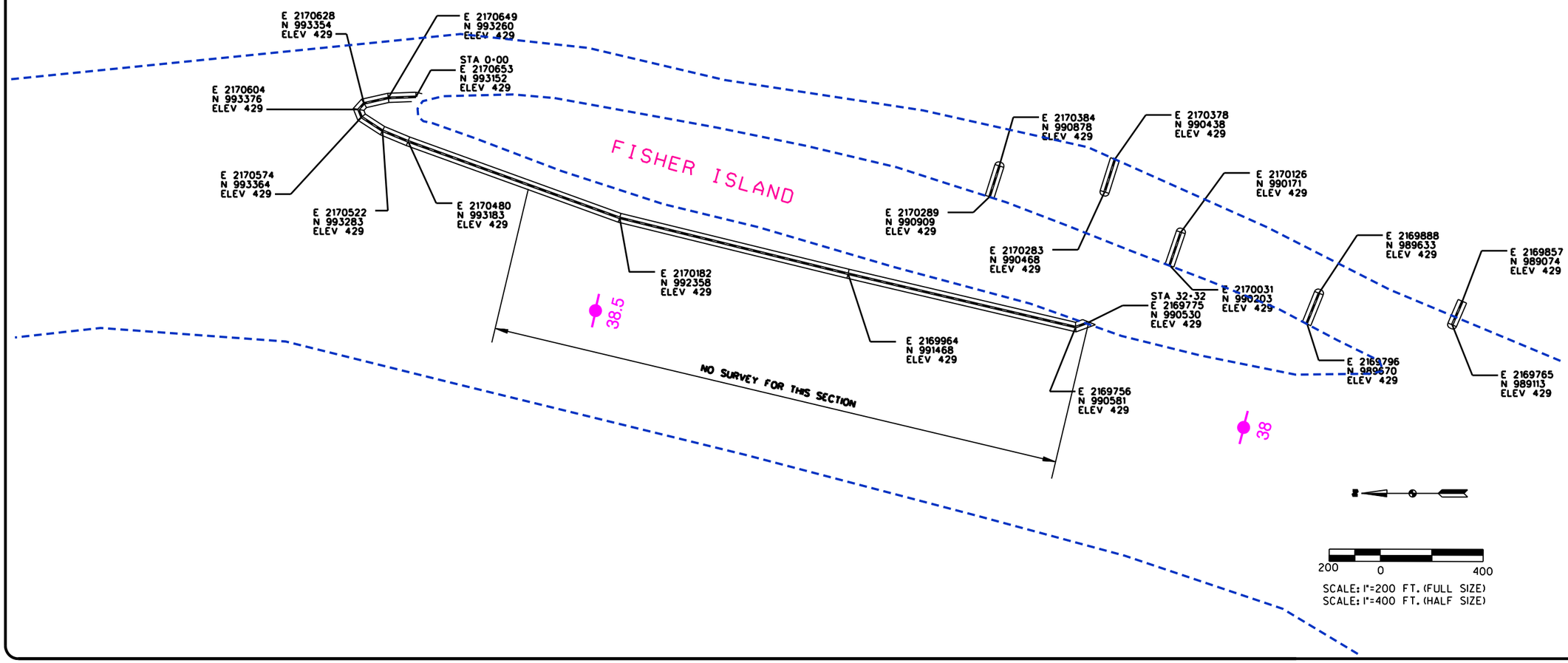
ILLINOIS RIVER

STONE DIKE CONSTRUCTION AND MODIFICATION
CONSTRUCTION OF BULLNOSE MILE 38.7 (L)
PLAN

PLATE NUMBER
X

RIVER MILES 300 - 195

BULLNOSE AND 5 HARDPOINTS FISHER ISLAND



US Army Corps of Engineers
St. Louis District

GAGE RECORD		
		L&D 25 TW
	WATER SURFACE	434.0
ZERO N.G.V.D.		24.2
MILE		

ELEVATIONS ARE REFERRED TO N.G.V.D. - CONTOURS ARE BELOW 956-57

Designed by: M. RODGERS
Drawn by: W. ROGERS
SUBMITTED: M. RODGERS
River Engineer

Survey Date: MAY 3, 2006
Reviewed by: J. BROWN
Rev by: B. DAYHOFF
APPROVED: D. CORDON, P.E.
Chief, River Engineering

File name:
Plot date: 99999DATE-TIME999
99999DESIGNFILE99SPECIFICATION999

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

UPPER MISSISSIPPI RIVER BASIN
FY 07 AWARD
RIVER MILES 300 - 195

ILLINOIS RIVER

STONE DIKE CONSTRUCTION AND MODIFICATION
CONSTRUCTION OF BULLNOSE MILE 38.7 (L)
PLAN

PLATE NUMBER
X

RIVER MILES 300 - 195

APPENDIX H

MONITORING PLAN

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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APPENDIX H
DRAFT MONITORING PLAN

SECTION 519 ILLINOIS RIVER BASIN RESTORATION
ALTON POOL ISLANDS RESTORATION PROJECT

INTRODUCTION

A Reconnaissance Study identifying a Federal interest in Illinois River restoration was completed in February of 1999. Congress provided additional authority for Illinois River Basin Restoration in Section 519 of the Water Resources Development Act (WRDA) 2000 (as amended by Section 5071, WRDA 2007). Under Section 519, the "Illinois River Basin" encompasses the Illinois River, its backwaters, its side channels, and all tributaries, including their watersheds, draining into the Illinois River. The St. Louis District is responsible for the portions of the Illinois River below the La Grange Lock and Dam.

Along with this authorization came requirements for monitoring ecosystem restoration project performance and success. An excerpt from Title VIII, Section 8004 of WRDA 2007 states:

(d) ECOSYSTEM RESTORATION PRECONSTRUCTION ENGINEERING AND DESIGN.—

(1) RESTORATION DESIGN.—Before initiating the construction of any individual ecosystem restoration project, the Secretary shall—

(A) establish ecosystem restoration goals and identify specific performance measures designed to demonstrate ecosystem restoration;

(B) establish the without-project condition or baseline for each performance indicator; and

(C) for each separable element of the ecosystem restoration, identify specific target goals for each performance indicator.

(2) OUTCOMES.—Performance measures identified under paragraph (1)(A) shall include specific measurable environmental outcomes, such as changes in water quality, hydrology, or the well being of indicator species the population and distribution of which are representative of the abundance and diversity of ecosystem-dependent aquatic and terrestrial species.

(3) RESTORATION DESIGN.—Restoration design carried out as part of ecosystem restoration shall include a monitoring plan for the performance measures identified under paragraph (1)(A), including—

(A) a timeline to achieve the identified target goals; and

(B) a timeline for the demonstration of project completion.

This Appendix outlines the St. Louis District's plans for monitoring to assess performance indicators and designate targets and timelines for the Alton Pool Islands Project's ecological success.

GOALS AND OBJECTIVES

The focus of the Alton Pool Islands Restoration Project is to maintain and restore island and side channel habitat. Side channel habitats provide refuge from the swift currents and harsh environment of the thalweg. This habitat may be particularly beneficial as spawning, rearing, food production, feeding, and seasonal refuge areas for several species of fish and birds (Chipps et al., 1997). An additional project objective is to improve habitat diversity. The Project Implementation Report (PIR) outlines in detail the existing Alton Pool Islands' problems and opportunities, the associated goals and objectives, and the recommended features for achieving objectives. The following are goals and objectives for the Alton Pool Islands Project along with the features of the recommended plan designed to meet the objectives (Table H-1):

Table H-1. Alton Pool Islands Restoration Project goals, objectives, and recommended features:

Goal	Objective	Recommended Features
For at least 50 years during all erosive events within the project area, reduce sediment delivery to the Illinois River from island shoreline erosion and Apple Creek, with the aim of eliminating excessive sediment load	Decrease the amount of sediment eroding off the heads of Wing and Fisher Islands for at least 50 years	Restoration of connectivity and enhancement of habitat diversity involves: Wing Island o Revetment at the head of the island
Within the project area, restore and maintain side channel habitat and island acreage for at least 50 years	Prevent the loss of Wing and Fisher Islands and their associated side channels for at least 50 years	Fisher Island o Revetment at the head of the island
Restore the aquatic habitat diversity of side channels within the project area in order to provide adequate volume and depth for sustaining native fish and wildlife communities throughout the year. This aquatic habitat diversity should persist for at least 50 years	Decrease the deposition of sediment from Apple Creek into the Fisher Island side channel for at least 50 years	o Five alternating hard points in the side channel adjacent to the island

PERFORMANCE INDICATORS

This monitoring plan was developed with input from state and federal resource agencies. The alternating hard points and the island revetments are designed to physically alter the bathymetry, flows, and geomorphology around the islands to achieve the aforementioned objectives. Although not an objective, fish community diversity and extent will also benefit from the habitat created by the project features. These communities will benefit indirectly from the project features by "reacting" to the enhanced geomorphic diversity and suitable habitat that the features provide. The monitoring proposed in this report will be used to measure the achievement of objectives and could suggest potential avenues for adaptive management. However, given the simplicity of the project, we do not expect the need for adaptive management. Monitoring will help ensure long-term positive effects of the project on the biological processes and communities of the Illinois River. Performance indicators selected for use in the Alton Pool Islands Restoration Project are detailed below.

Table H-2. Project objectives, indicators, and time before the effects of the Alton Pool Islands Restoration Project begin to become apparent.

Goal	Objective	Performance Indicator	Targets	Time of Effect
Reduce sediment delivery to the Illinois River from island shorelines and a tributary channel (Apple Creek), with the aim of eliminating excessive sediment load	Decrease the amount of sediment eroding off the heads of Wing and Fisher Islands	Island head location monitored using aerial photography	Banks will be maintained at the revetment location.	Construction completion
Restore and maintain side channel and island habitats	Prevent the loss of Wing and Fisher Islands and their associated side channels	Island size using aerial photography	Banks will be maintained at the revetment location.	Construction Completion
		Side channel depth using bathymetric data	Side channel depth will be maintained and enhanced.	2 years post-construction
Restore the aquatic habitat diversity of side channels in order to provide adequate volume and depth for sustaining native fish and wildlife communities.	Decrease the deposition of sediment from Apple Creek into the Fisher Island side channel	Side channel depth using bathymetry data	Side channel depth will be maintained and enhanced.	2 year post-construction

* Full realization of results is highly dependent upon river levels in the project area after construction; several high water events may be necessary before benefits from the hard points are realized and a state of relative equilibrium is reached.

Objective 1: Decrease the amount of sediment eroding off the heads of Wing and Fisher Islands.

Performance Indicator: Aerial photography of Wing and Fisher Islands.

Rationale: Aerial imagery indicates each island is losing between 3.8 ft/yr (Wing Island) to 4.2 ft/yr (Fisher Island) from the island head. The revetment on the head of the island should stabilize the bank. This should minimize erosion from the heads of the island.

Monitoring and Measurement: The National Agriculture Imagery Program acquires one meter resolution aerial imagery of the United States every 3 years. This imagery will be compared to determine if erosion at the heads of Fisher Island and Wing Island has been minimized.

Expected Outcome: Aerial photography will indicate that the vegetated island head is no longer retreating. During years with above average hydrograph, erosion may still occur if water reaches above the revetments.

Objective 2: Prevent the loss of Wing and Fisher Islands and their associated side channels

Performance Indicator 2: Bathymetric surveys and aerial photography of Wing and Fisher Islands.

Rationale: Currently the heads of the islands and channel side of Fisher Island are eroding. Additionally, aerial imagery from 1939 to present indicates that the island's side channel bank is migrating toward shore. With the recommended plan, the revetments will create stable bank lines that will minimize erosion. A decrease in erosion will prevent the loss of the islands and decrease sedimentation into the associated side channels and Illinois River.

Expected Outcome: The erosion of Fisher and Wing Island will be reduced and island size should be maintained. The decrease in erosion will decrease sedimentation in the associated side channels. During years with an above average hydrograph, erosion may still occur if water reaches above the revetments.

Monitoring and Measurement: Pre-project bathymetric surveys have been completed for Fisher and Wing Island (Fig. H-1 and H-2). Post-project bathymetric surveys will be compared to pre-project surveys to determine changes in depth. Pre and post-project aerial photography will be compared to determine if island size is being maintained.

Objective 3: Decrease the deposition of sediment from Apple Creek into the Fisher Island side channel

Rationale: Baseline bathymetric surveys indicate that the Fisher Island side channel looses depth below Apple Creek (Fig H-1). This suggests that Apple Creek is depositing sediment into the lower portion of the Fisher Island side channel (Fig. H-1). This

sedimentation could result in the side channel and island being incorporated into the mainland. Upstream of Fisher Island, Spar Island is an example of excess sedimentation resulting in island incorporation in the mainland (Fig. H-3). The proposed alternating hard point structures will constrict the channel and increase water velocity.

Expected Outcome: Velocities should be enhanced in the lower part of the side channel. Consequently sedimentation should be reduced in this area. Additionally, scour should occur in the immediate vicinity of the hard points. Bathymetric surveys will be used to indicate that depth is being maintained in the channel and deep areas have formed around the hard points. Several high water events may be necessary before the benefits of the hard points are evident.

Monitoring and Measurement: Fisher Island side channel pre-project and post-project bathymetric surveys will be compared to determine if depth is being maintained.

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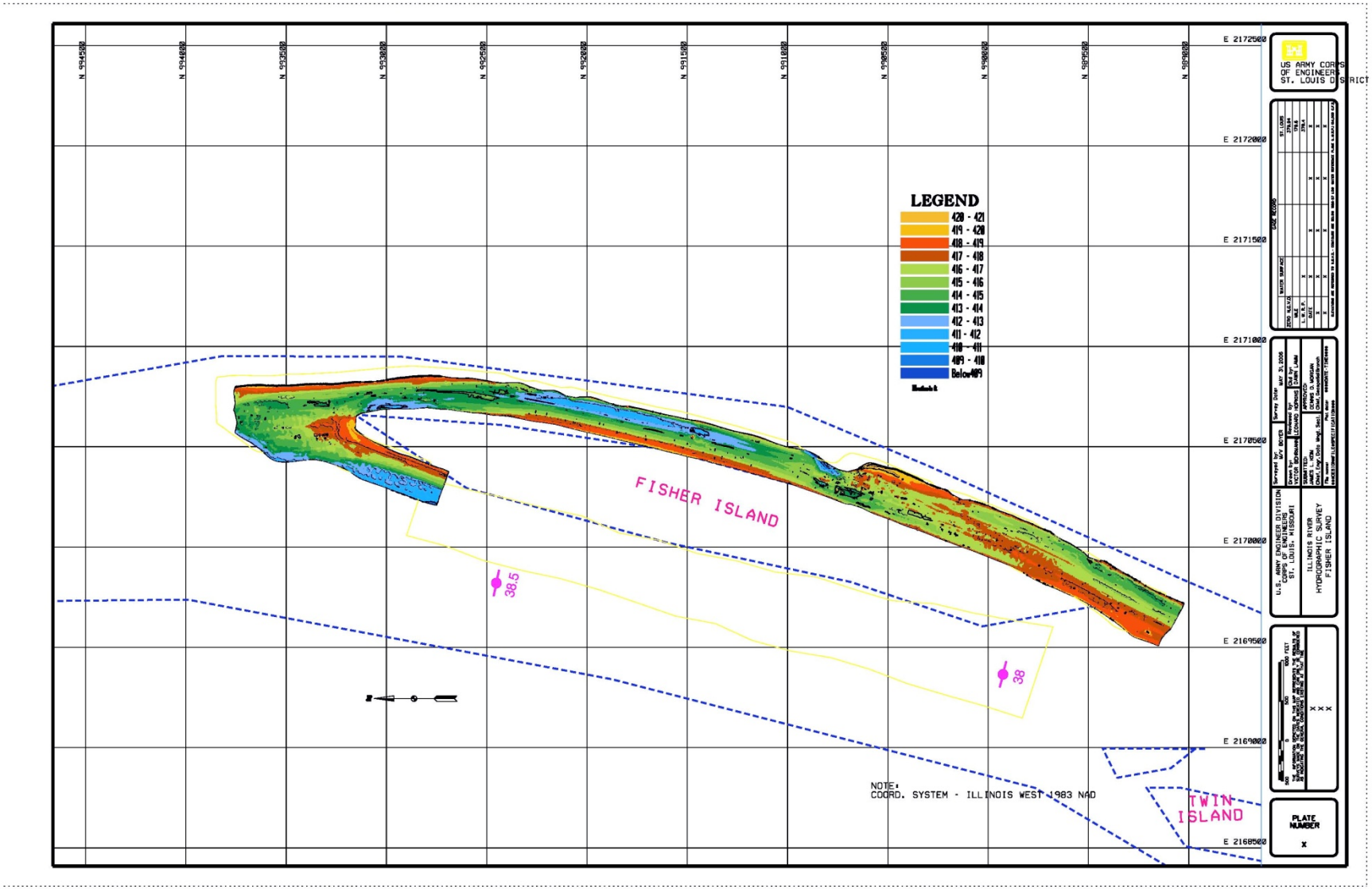

Figure H-1. Bathymetric survey for Fisher Island.

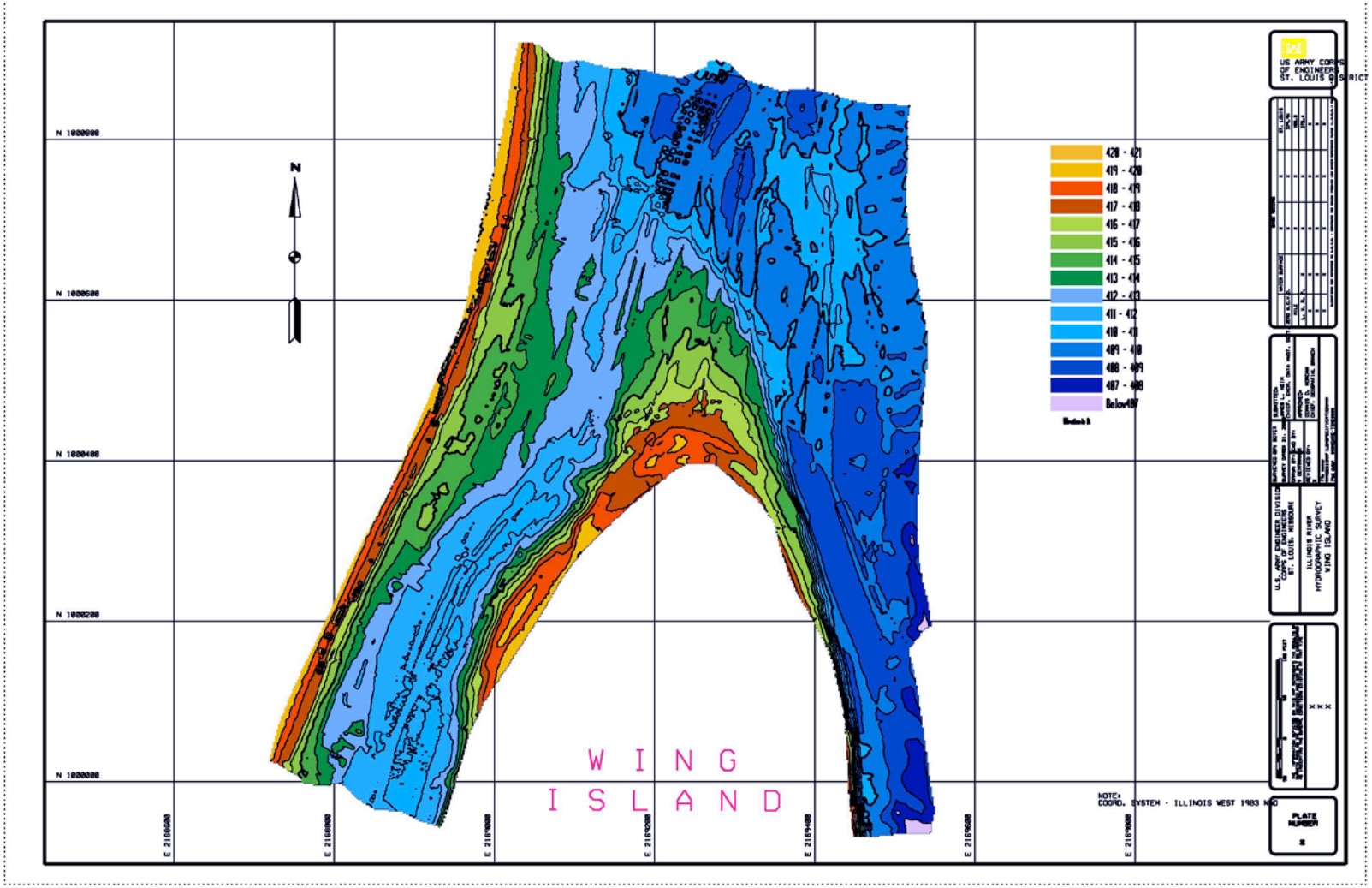

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Figure H-2. Bathymetric survey for Wing Island

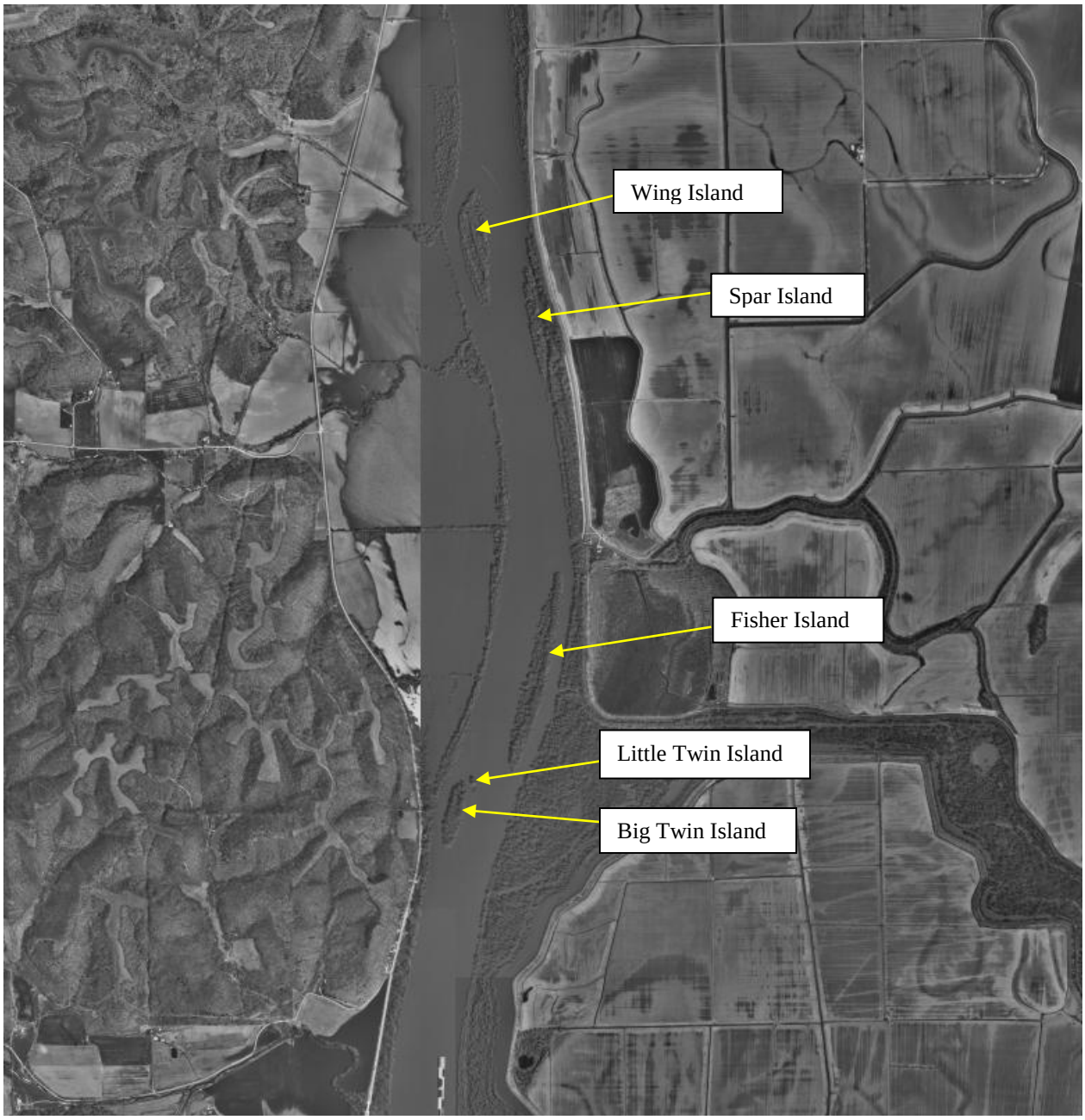

Figure H-3. July 1998 imagery of the Alton Pool Island Restoration Project site

Table H-2. Alton Pool Islands Restoration and Protection Project physical monitoring summary.

	Pre-project Samples		Post-project Samples	Completion	Cost
Aerial Photography	4 years (2004, 2006, 2007, 2009)	**Construction Phase**	Once every 3 years	After 9 years	$1,600/sample
Bathymetry	1 year (2006)		Once every 3 years	After 9 years	$9,650/sample

Three sampling periods (9 years post-construction) may be necessary to demonstrate ecological success. After each sample is complete, the project will be evaluated for ecological success demonstrated by achievement of project targets (Table H-2). The final determination of ecological success will be made by the Division Commander in consultation with the Federal and State resource agencies.

References

Chipps, S.R., D.H. Bennett, and T.J. Dresser, Jr. 1997. Patterns of fish abundance associated with a dredge disposal island: implications for fish habitat enhancement in a large reservoir. North American Journal of Fisheries Management 17:378-386.

APPENDIX I

REAL ESTATE PLANNING REPORT

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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Real Estate Planning Report
Illinois River Basin Restoration
Section 519
Fisher Island

Table of Contents

Project Location and Description....2

Project Authorization....2

1. Purpose....2

2. Lands, Easements and Right-of-Way (LER) Required for Project Development....3

3. LER Required that is Owned by Sponsor....3

4. Proposed Non-standard Estates....3

5. Existing Federal Project within the LER Required for the Project....3

6. Federally Owned Land Required for the Project....3

7. Navigation Servitude....3

8. Map Depicting the Area....3

9. Possibility of Induced Flooding Due to Project....3

10. Baseline Cost Estimate....3

11. Relocation Assistance Benefits under Public Law 91-646....3

12. Mineral Activity in Project Area....4

13. Sponsor Legal and Professional Capability to Acquire LER....4

14. Zoning Ordinances Proposed....4

15. Schedule of Land Acquisition Milestones....4

16. Facility and/or Utility Relocations....4

17. Impacts of Suspected or Known Contaminants....4

18. Landowner Support or Opposition to the Project....4

19. Notification to the Non-Federal Sponsor Regarding Risks Associated with Acquiring Land before Execution of the PPA....4

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Real Estate Plan
Illinois River Basin Restoration
Section 519
Fisher Island

Project Location and Description

The Fisher Island project is conducted under Section 519 of the Water Resources Development Act (WRDA) of 2000.

The project area is located on the Illinois River at River Mile 38.8(L) in Greene County, Illinois, and is situated in close proximity to the navigation channel.

The upstream tip of the island has suffered severe erosion resulting from wave wash and ice flows, especially on the channel side. Consequently much of the vegetation on the upper end of the island has been destroyed. Project construction will protect the island from erosion impacts and will allow it to re-vegetate.

The recommended plan consists of installing revetment along the head of Fisher Island. The revetment would serve to protect the island from further erosion. In addition, multiple hardpoint structures will be placed in the Fisher Island side channel to utilize the water's energy in reducing sediment deposit within the side channel.

From a Real Estate perspective, construction of the proposed structures is not anticipated to alter any adjacent privately-owned land or any current access points.

Project Authorization

Authority for the proposed project is contained in the WRDA 2000. Section 519 authorizes (1) Comprehensive Plan to develop and implement a restoration program, long-term resource monitoring program, and evaluate new technologies and innovative approaches, and (2) construction of critical restoration projects.

1. Purpose

This Real Estate Plan (REP) has been prepared to present the real estate requirements and support the Illinois River Basin Restoration program for the above captioned project. Information contained within this report is based on preliminary data and is subject to change.

2. Lands, Easements and Right-of-Way (LER) Required for Project Development

There is no fee title, permanent easement, or temporary easement, borrow sites, or disposal areas required to implement the proposed plan for protecting Fisher Island in the Illinois River. The project area lies within the main Illinois River Channel within navigational servitude.

3. LER Required that is Owned by Sponsor

The Non-Federal Sponsor (NFS) for this project is the Illinois Department of Natural Resources (IDNR). The NFS does not own any LER required for this project.

4. Proposed Non-standard Estates

No non-standard estates are required.

5. Existing Federal Project within the LER Required for the Project

The Illinois Waterway Nine-Foot Channel Navigation Project is within the project area.

6. Federally Owned Land Required for the Project

The Federal Government does not own any land within the project area.

7. Navigation Servitude

Navigation Servitude does apply for this project. Because the ecosystem restoration measures proposed for the project address environmental impacts associated with navigation, and because the project lies below the ordinary high water mark of the navigable watercourse, navigation servitude will be asserted for this project.

8. Map Depicting the Area

Refer to Exhibit A.

9. Possibility of Induced Flooding Due to Project

There will be no induced flooding as a result of the project.

10. Baseline Cost Estimate

There are no anticipated real property costs for this project.

11. Relocation Assistance Benefits under Public Law 91-646

Not applicable, since there will be no Real Estate acquisition associated with this project.

12. Mineral Activity in Project Area

There are no known mineral activities that will be impacted because of this project.

13. Sponsor Legal and Professional Capability to Acquire LER

There is no LER, above the ordinary high-water mark, required for the project. All project features will be placed on submerged lands.

14. Zoning Ordinances Proposed

There are no known zoning ordinances proposed in connection with this project.

15. Schedule of Land Acquisition Milestones

Not applicable.

16. Facility and/or Utility Relocations

There are no utility and/or infrastructure relocations anticipated for this project.

17. Impacts of Suspected or Known Contaminants

There are no suspected or known contaminants within the project area.

18. Landowner Support or Opposition to the Project

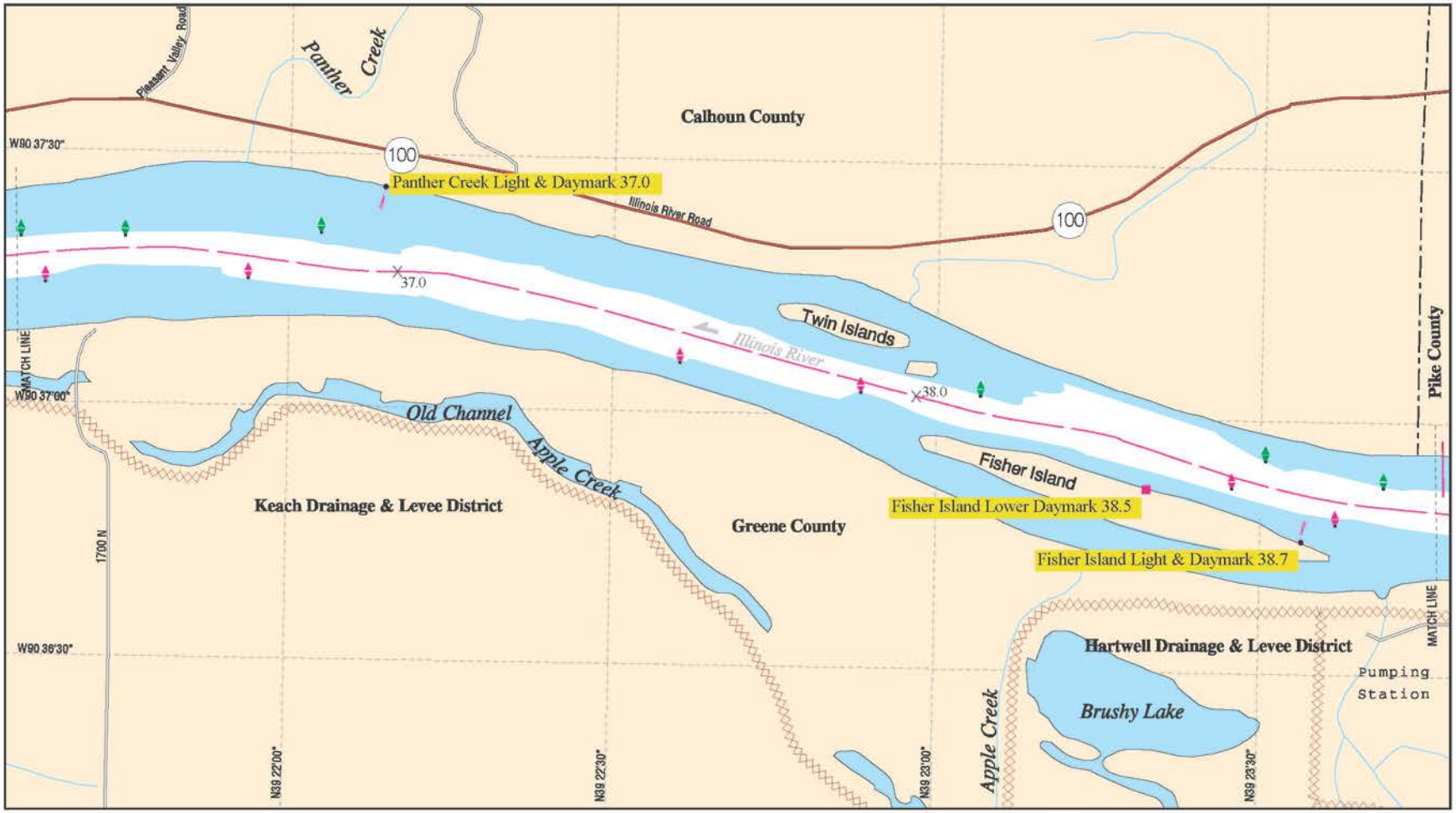
There is no known landowner opposition to this project. Members of the St. Louis District project delivery team (PDT) met with the owners of Fisher Island on-site. They expressed only support for this project and any measures that could be taken to preserve the ecosystem in this area.

19. Notification to the Non-Federal Sponsor Regarding Risks Associated with Acquiring Land before Execution of the PPA

There is no land acquisition associated with this project. Therefore, no notification of risk will be provided to the NFS.

TIMOTHY J. NELSON
Chief, Real Estate Division
USACE, St. Louis District

US ARMY CORPS OF ENGINEERS ILLINOIS WATERWAY MILE 36.5 TO 38.9



1998

1) The legend is located immediately preceding map No. 1
2) Barge Facility information and submerged cable and pipeline clearances are located in appendices A and B respectively.

Scale 1:12000 Scale 1" = 1000 Feet
0 1150 2300 ft

MAP NO. 15

Exhibit A

Real Estate Planning Report
Illinois River Basin Restoration
Section 519
Wing Island

Table of Contents

Project Location and Description....2

Project Authorization....2

1. Purpose....2

2. Lands, Easements and Right-of-Way (LER) Required for Project Development....2

3. LER Required that is Owned by Sponsor....2

4. Proposed Non-standard Estates....3

5. Existing Federal Project within the LER Required for the Project....3

6. Federally Owned Land Required for the Project....3

7. Navigation Servitude....3

8. Map Depicting the Area....3

9. Possibility of Induced Flooding Due to Project....3

10. Baseline Cost Estimate....3

11. Relocation Assistance Benefits under Public Law 91-646....3

12. Mineral Activity in Project Area....3

13. Sponsor Legal and Professional Capability to Acquire LER....3

14. Zoning Ordinances Proposed....3

15. Schedule of Land Acquisition Milestones....4

16. Facility and/or Utility Relocations....4

17. Impacts of Suspected or Known Contaminants....4

18. Landowner Support or Opposition to the Project....4

19. Notification to the Non-Federal Sponsor Regarding Risks Associated with Acquiring Land before Execution of the PPA....4

Real Estate Plan
Illinois River Basin Restoration
Section 519
Wing Island

Project Location and Description

The Wing Island project is conducted under Section 519 of the Water Resources Development Act (WRDA) of 2000.

The project area is located on the Illinois River at River Mile 40.3(R) in Pike County, Illinois, and is situated in close proximity to the navigation channel.

The upper two-thirds of the island is severely eroded on the channel side as a result of wave wash and ice flows. This has caused loss of vegetation, tree root exposure, and tree morbidity. The right descending bank has also been denuded of trees. Project construction will protect the island from erosion impacts and will allow it to re-vegetate.

The recommended plan consists of installing revetment along the head of Wing Island. The revetment would serve to protect the island from further erosion, resulting in benefits to fish, birds and other species that utilize the area.

From a Real Estate perspective, construction of the proposed structure is not anticipated to alter any adjacent privately-owned land or any current access points.

Project Authorization

Authority for the proposed project is contained in the WRDA 2000. Section 519 authorizes (1) Comprehensive Plan to develop and implement a restoration program, long-term resource monitoring program, and evaluate new technologies and innovative approaches, and (2) construction of critical restoration projects.

1. Purpose

This Real Estate Plan (REP) has been prepared to present the real estate requirements and support the Illinois River Basin Restoration program for the above captioned project. Information contained within this report is based on preliminary data and is subject to change.

2. Lands, Easements and Right-of-Way (LER) Required for Project Development

There is no fee title, permanent easement, or temporary easement, borrow sites, or disposal areas required to implement the proposed plan for protecting Fisher Island in the Illinois River. The project area lies within the main Illinois River Channel within navigational servitude.

3. LER Required that is Owned by Sponsor

The Non-Federal Sponsor (NFS) for this project is the Illinois Department of Natural Resources (IDNR). The NFS does not own any LER required for this project.

4. Proposed Non-standard Estates

No non-standard estates are required.

5. Existing Federal Project within the LER Required for the Project

The Illinois Waterway Nine-Foot Channel Navigation Project is within the project area.

6. Federally Owned Land Required for the Project

The Federal Government does not own any land within the project area.

7. Navigation Servitude

Navigation Servitude does apply for this project. Because the ecosystem restoration measures proposed for the project address environmental impacts associated with navigation, and because the project lies below the ordinary high water mark of the navigable watercourse, navigation servitude will be asserted for this project.

8. Map Depicting the Area

Refer to Exhibit A.

9. Possibility of Induced Flooding Due to Project

There will be no induced flooding as a result of the project.

10. Baseline Cost Estimate

There are no anticipated real property costs for this project.

11. Relocation Assistance Benefits under Public Law 91-646

Not applicable, since there will be no Real Estate acquisition associated with this project.

12. Mineral Activity in Project Area

There are no known mineral activities that will be impacted because of this project.

13. Sponsor Legal and Professional Capability to Acquire LER

There is no LER, above the ordinary high-water mark, required for the project. All project features will be placed on submerged lands.

14. Zoning Ordinances Proposed

There are no known zoning ordinances proposed in connection with this project.

15. Schedule of Land Acquisition Milestones

Not applicable.

16. Facility and/or Utility Relocations

There are no utility and/or infrastructure relocations anticipated for this project.

17. Impacts of Suspected or Known Contaminants

There are no suspected or known contaminants within the project area.

18. Landowner Support or Opposition to the Project

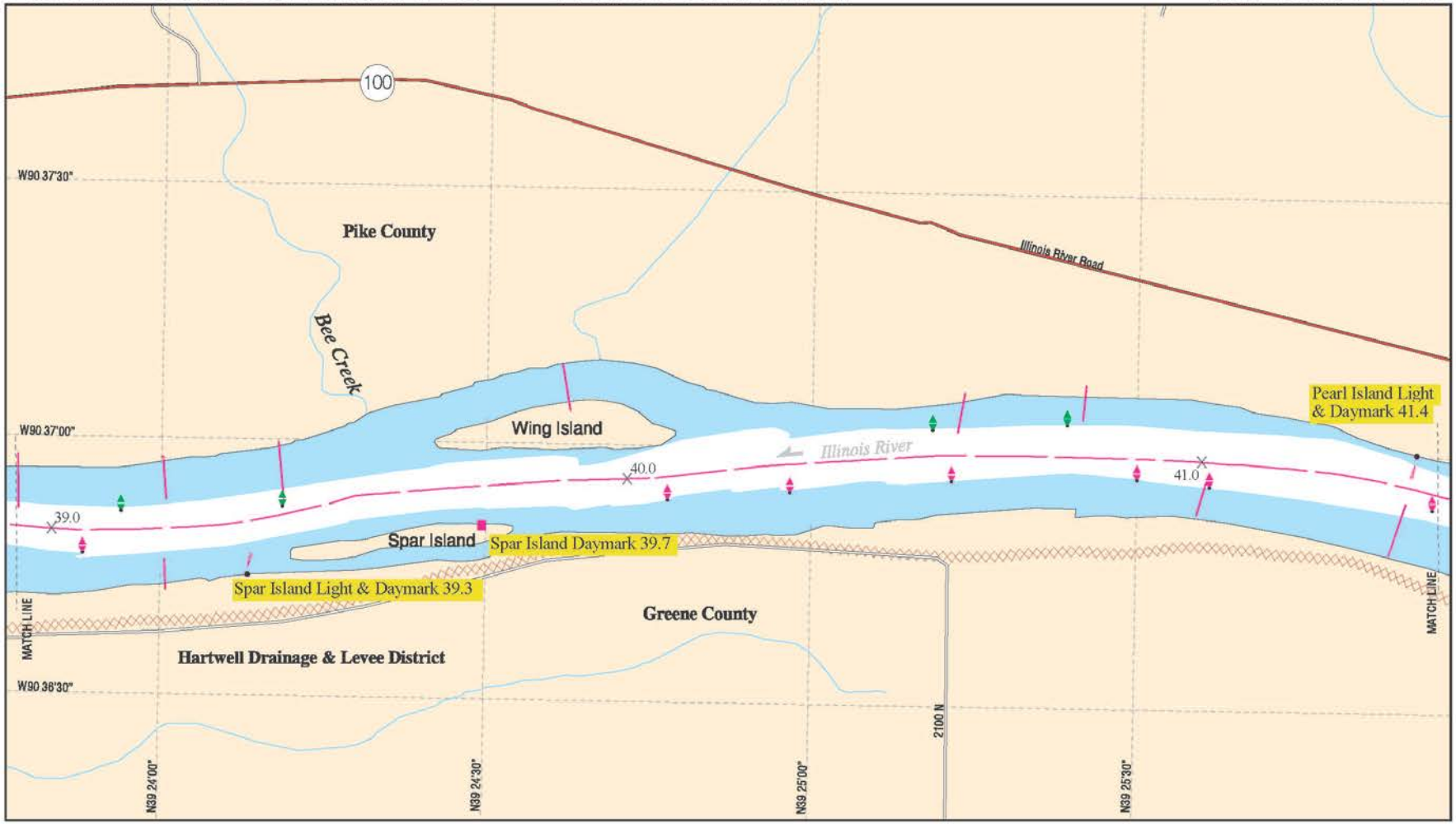
There is no known landowner opposition to this project. The landowners of Wing Island have been contacted regarding this project. They expressed only support for this project and any measures that could be taken to preserve the ecosystem in this area.

19. Notification to the Non-Federal Sponsor Regarding Risks Associated with Acquiring Land before Execution of the PPA

There is no land acquisition associated with this project. Therefore, no notification of risk will be provided to the NFS.

TIMOTHY J. NELSON
Chief, Real Estate Division
USACE, St. Louis District

US ARMY CORPS OF ENGINEERS ILLINOIS WATERWAY MILE 38.9 TO 41.6



1998

1) The legend is located immediately preceding map No. 1
2) Barge Facility information and submerged cable and pipeline clearances are located in appendices A and B respectively.

Scale 1:12000 Scale 1" = 1000 Feet
0 1150 2300 ft

MAP NO. 16

Exhibit A

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APPENDIX J

DISTRIBUTION LIST

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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Great Rivers Field Station, ILNHS
Attn: John Chick
1005 East Edwardsville Road
Wood River, IL 62095

Kathy Andria
American Bottoms Conservancy
P.O. Box 4242
Fairview Heights, IL 62208

U.S. EPA Region 5
Attn: Ken Westlake
77 West Jackson Blvd
Chicago, IL 60604-3507

U.S. Fish and Wildlife Service
Attn: Matt Mangan
Marion Illinois Sub-Office (ES)
8588 Rte 148
Marion, IL 62959

Missouri Department of Conservation
Attn: Janet Sternburg
P.O. Box 180
Jefferson City MO 65102

Illinois Department of Natural Resources
Attn: Debbie Bruce
1 Natural Resources Way
Springfield, IL 62702-1271

United States Post Office
105 N Front St
Pearl, IL 62361-9998

Pike County Chamber of Commerce
224 W. Washington
P.O. Box 283
Pittsfield, IL 62363

The Nature Conservancy
Illinois River Project Office
11304 N. Prairie Road
Lewistown, Illinois 61542

Illinois Department of Natural Resources
Attn: Randy Holbrook
4521 Alton Commerce Parkway
Alton, IL 62002

U.S. Fish and Wildlife Service
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Moline, IL 61265

U.S. Fish and Wildlife Service
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1511 47th Avenue
Moline, IL 61265

Illinois Department of Natural Resources
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Greenville, IL 62246

Carrollton Chamber of Commerce
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Carrollton, IL 62016

United States Post Office
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Kampsville, IL 62053

North Greene County Area
Chamber of Commerce
P.O. Box 257
White Hall, IL 62092

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Washington, D.C. 20510

Honorable Richard J. Durbin
525 South 8th St.
Springfield, IL 62703

Honorable Mark Kirk
United States Senator
524 Hart Senate Office Building
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Honorable Mark Kirk
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Peoria, IL 61603

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207 State House
Springfield, IL 62706

Office of the Lt. Governor
214 State House
Springfield, IL 62706

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617 D Capitol Building
Springfield, IL 62706

Honorable Jennifer Bertino-Tarrant
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Plainfield, IL 60544

Honorable Tom Cross
State Representative District 97
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Springfield, IL 62706

Honorable Tom Cross
State Representative District 97
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David A. Hoover
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Raymond Luken
R.L. Trust
4716 D'Adrian Court
Godfrey IL 62035

Ducks Unlimited
229 North Third Ave, Suite B
Canton, IL 61520

Migratory Waterfowl Hunters Inc.
2404 E. Broadway
Alton, IL 62002

Sierra Club
Piasa Palisades Group
223 Market Street
Alton, IL 62002

Sierra Club
Illinois Chapter Main Office
70 East Lake Street, Suite 1500
Chicago, IL 60601

Illinois Audubon Society
PO Box 2547
Springfield, IL 62708

Mike Jilg,
Stag Land Inc
Rt. #1 Box 122
Eldred IL 62027

Izaak Walton League of America
8669 E. Morning Star Highway
Astoria, IL 61501-9009

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APPENDIX K

HYDROLOGY AND HYDRAULICS

ILLINOIS RIVER BASIN RESTORATION PROGRAM
ALTON POOL ISLANDS RESTORATION
WING AND FISHER ISLANDS
ILLINOIS RIVER, PIKE AND GREENE COUNTIES, ILLINOIS

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APPENDIX K
HYDROLOGY AND HYDRAULICS

1. INTRODUCTION AND LOCATION OF SITE

The Alton Pool Islands Restoration project is located on the Illinois River and consists of two separate island habitats. Fisher Island (River Mile 38.8 L) is located in Greene County, Illinois and Wing Island (River Mile 40.3 R) is located in Pike County, Illinois. The islands are located between the cities of Kampsville and Pearl, Illinois.

This appendix presents a hydrologic assessment of the area and summarizes the hydrologic and hydraulic evaluation of various project features considered as part of this project. This includes all alternatives, including those not chosen under the tentatively selected plan.

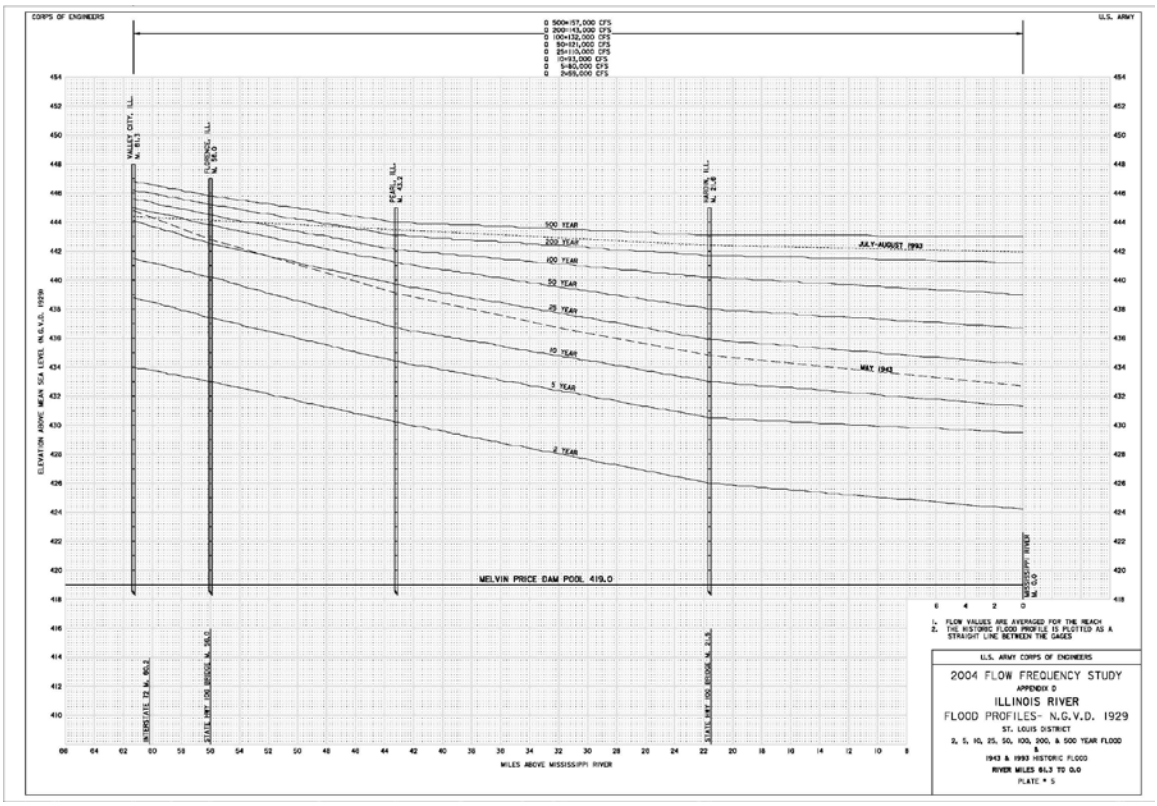
2. ILLINOIS RIVER

The closest Illinois River gage to the project area is the Pearl, IL gage at river mile 43.2, however this is a manually read gage. The closest automatic gages are upstream at Florence, IL at river mile 56.0 and downstream at Hardin, IL at river mile 21.5. Table 1 shows the Illinois River flood frequency elevations for the project area. Table 2 shows the flow frequency profiles.

Table 1. Illinois River Flood Frequency Elevations

Mile	***2 Year***	***5 Year***	***10 Year***	***25 Year***	***50 year***	***100 Year***	***500 Year***
	50%	***20%***	***10%***	***4%***	***2%***	***1%***	***0.2%***
36.3	428.9	433.2	435.5	438.5	440.2	441.5	443.7
37.1	429.0	433.3	435.7	438.6	440.3	441.6	443.7
37.75	429.1	433.4	435.8	438.7	440.4	441.6	443.8
38.7	429.3	433.6	435.9	438.9	440.5	441.7	443.8
39.3	429.4	433.7	436.0	439.0	440.6	441.8	443.8
39.66	429.5	433.8	436.1	439.1	440.7	441.8	443.9
40.04	429.6	433.8	436.2	439.1	440.7	441.8	443.9
40.8	429.7	434.0	436.3	439.3	440.8	441.9	443.9
41.8	429.9	434.1	436.5	439.5	441.0	442.0	443.9

Table 2. Illinois River Flow Frequency Profile



3. EXISTING CONDITIONS AND CONSIDERATIONS

The goal of this project is to protect the islands from further erosion and to provide increased habitat diversity. Alternatives were based on proven protection methods used within the St. Louis District.

Wing Island

The head of Wing Island has eroded approximately 250 feet from its historical location. This is evident by a sediment shelf at the head of the island that was observed on a bathymetry survey of the channel surrounding the upper portion of the island. Design configurations mimicked the original location of the Island head. Wing Island's side channel is self maintaining and was not a project component. See Figure 3.

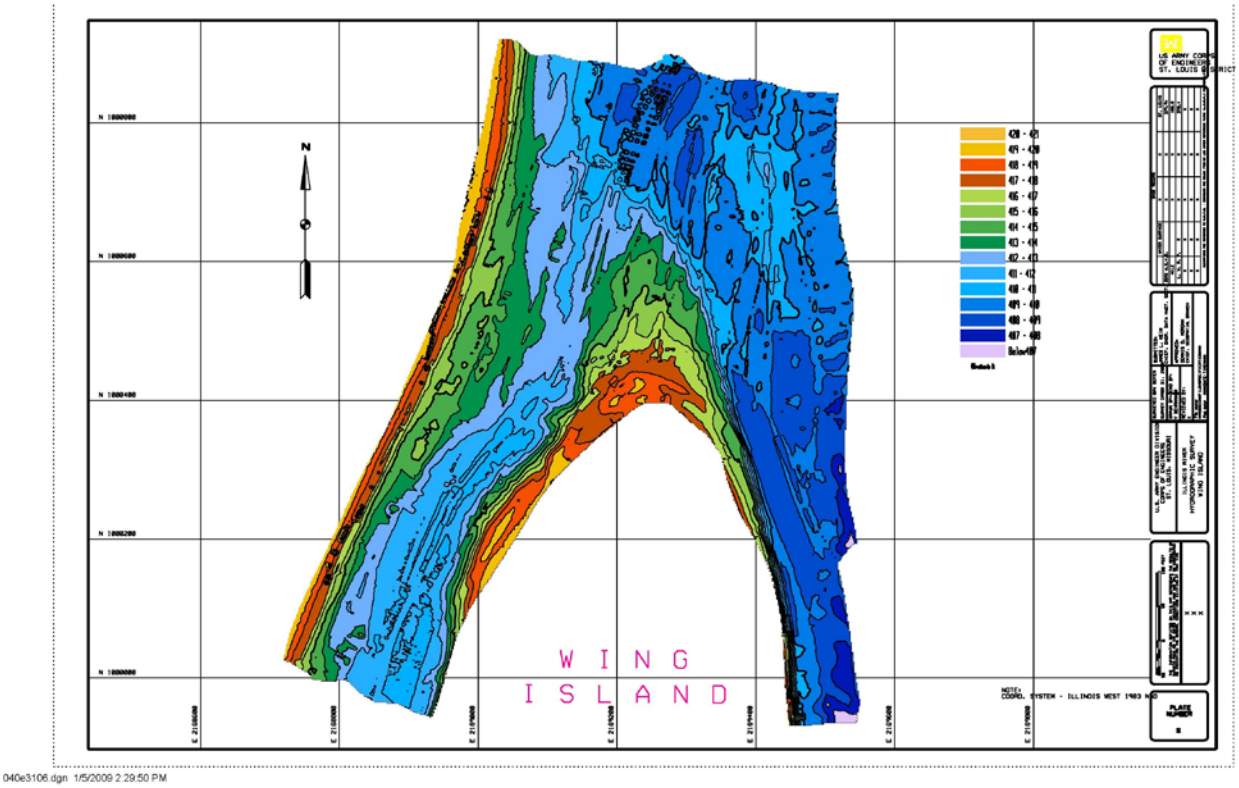


Figure 3. Channel Bathymetry at Wing Island, May 31, 2006

A mussel survey was performed on the project area and an active mussel bed was discovered at the upper end of Wing Island's side channel. Design configurations took this mussel bed into account so as to minimally alter the flow patterns over the mussel bed.

The design team decided that the protection methods for Wing Island would be constructed to a 5 year flood event height. This was based on cost and construction practicality. The elevation of the island itself is not very high and our purpose was to protect the island from erosion, not from flooding.

Fisher Island

The head of Fisher Island had eroded approximately 700 feet from its original alignment as was evident by a sediment shelf at the head of the island. Design configurations mimicked the original location of the Island head. The off-bankline revetment along the channel side of the Island was also proposed along the existing sediment shelf. In addition, the side channel has connectivity problems on the lower end where flows are losing energy and a creek introduces additional sediment load. See Figure 4.

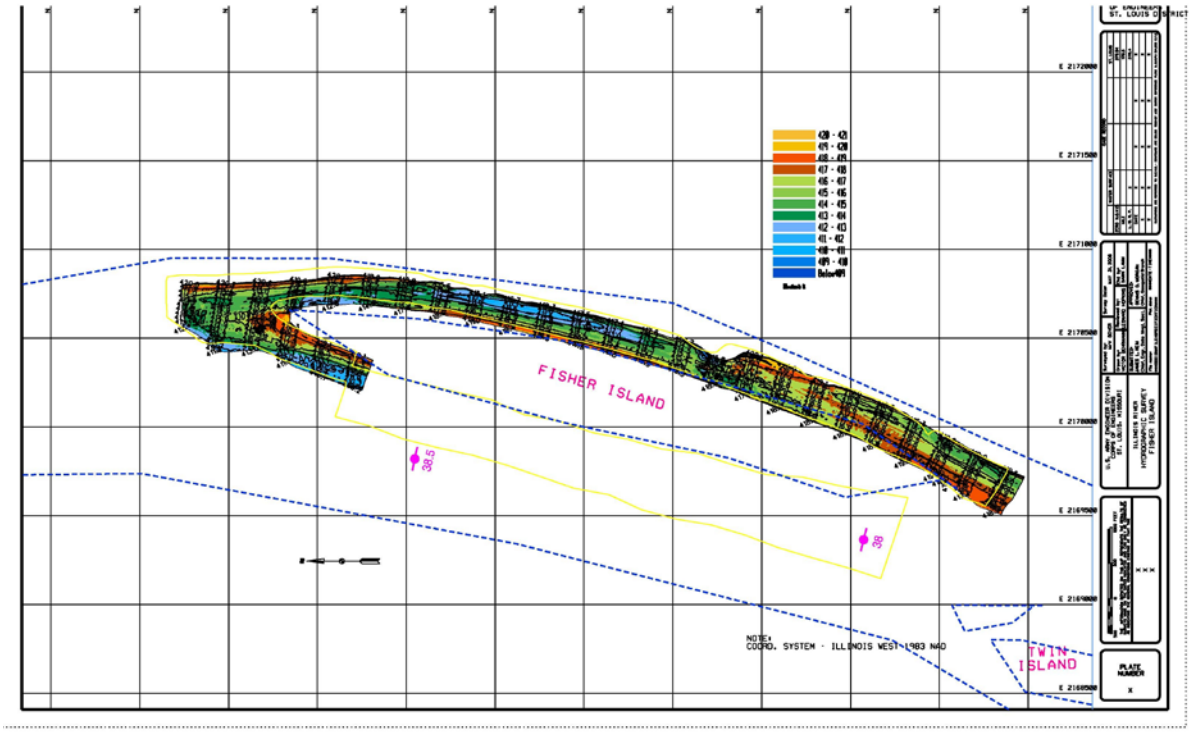


Figure 4. Channel Bathymetry at Fisher Island, May 31, 2006

No significant mussel beds were found around Fisher Island.

The design team decided that the protection methods on Fisher Island would be constructed to a 2 year flood event height. This was based on cost and construction practicality. The elevation of the island itself is not very high and our purpose was to protect the island from erosion, not from flooding.

4. PROJECT FEATURES

The Wing Island Alternatives consist of the following:

- Alternative 1 – No Corps Action

- Alternative 2 – Single Bullnose and Revetment: Installation of a 750 foot long stone structure along the historical location of the island head to an elevation of 434 feet NGVD using A-stone and incorporating woody vegetation for habitat. 434 feet NGVD is a 5 year flow frequency level of protection. The structure would tie into the side channel side of the island head to protect a mussel bed and leave a fish passage channel along the river side of the island head. Revetment would be placed where the structure tied into the island head and adjacent to the fish passage. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating

overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure. See Figure 5

- Alternative 3 – Riprap Shoreline: Installation of approximately 400 foot of revetment along the existing island head to an elevation of 434 NGVD using A-stone and incorporating existing woody vegetation for habitat. This alternative will prevent the head of the island from further eroding while providing some habitat benefits. See Figure 6

- Alternative 4 – Unrooted Bullnose with Revetment: Installation of a 750 foot long stone structure along the historical location of the island head to an elevation of 434 feet NGVD using A-stone and incorporating existing woody vegetation for habitat. The structure would not be tied into the island as to allow fish passage along both sides of the island head. Revetment would be placed adjacent to the fish passages. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure, however it does not provide protection to an existing mussel bed. See Figure 7

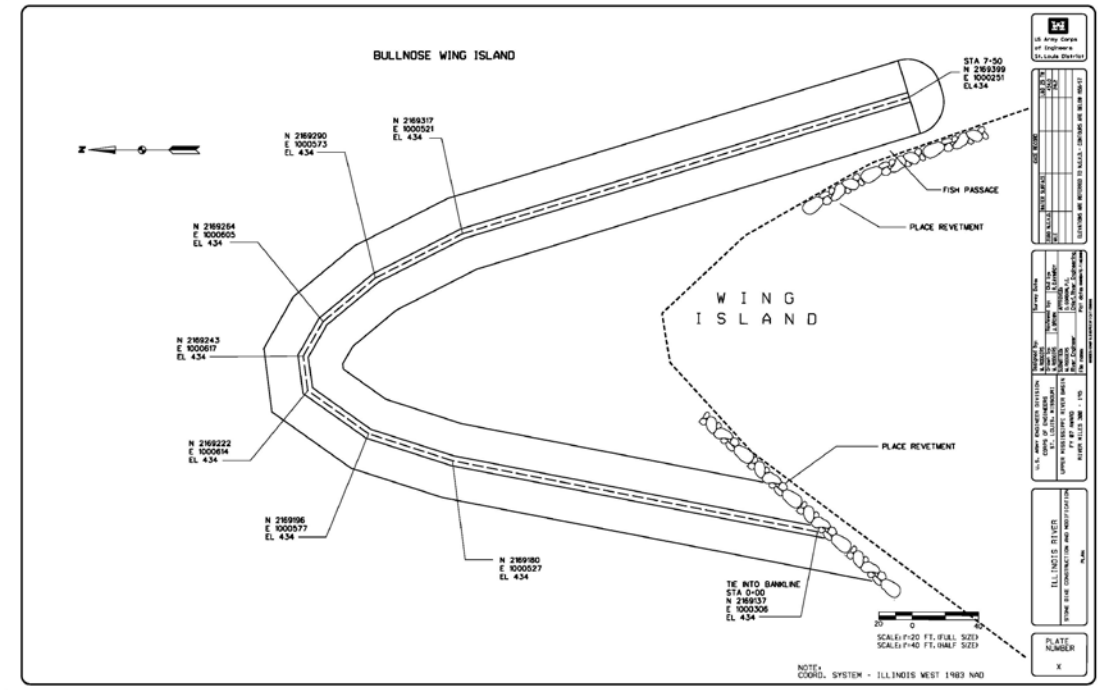


Figure 5. Wing Island Alternative 2 – Bullnose and Revetment.

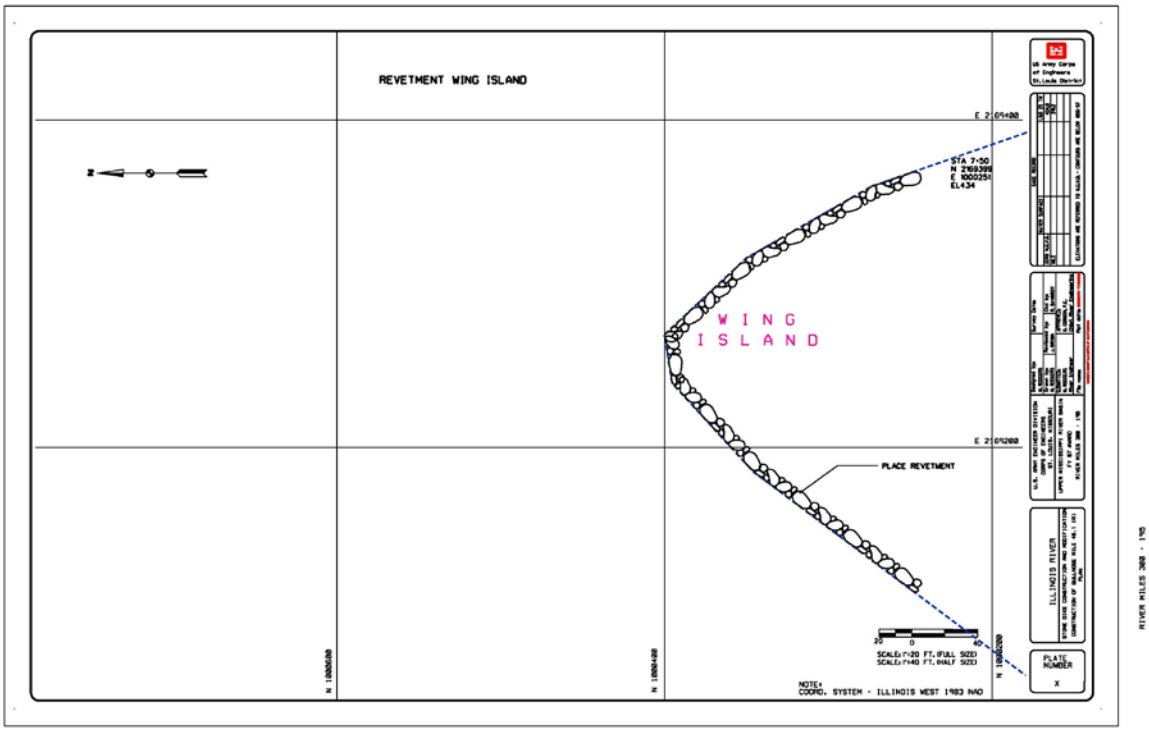


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Figure 6. Wing Island Alternative 3 – Revetment

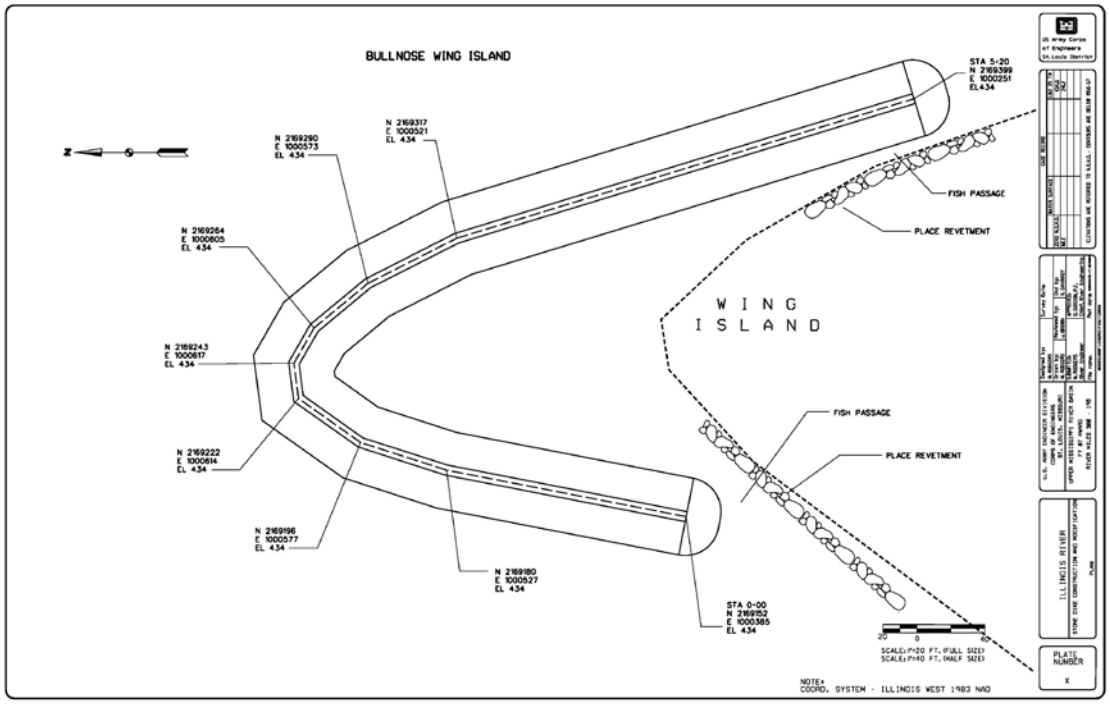

Figure 7. Wing Island Alternative 4 – Unrooted Bullnose with Revetment

The Fisher Island Alternatives originally consisted of the following:

- Alternative 1 – No Corps Action

- Alternative 2 – Riprap Shoreline: Installation of approximately 550 foot of revetment along the existing island head to an elevation of 429 feet NGVD using A-stone and incorporating existing woody vegetation for habitat. 429 feet NGVD is a 2 year flow frequency level of protection. This alternative will prevent the head of the island from further eroding while providing some habitat benefits. See Figure 8.

- Alternative 3 – Single Bullnose: Installation of an 800 foot long stone structure along the historical location of the island head to an elevation of 429 feet NGVD using A-stone and incorporating existing woody vegetation for habitat. The structure would not be tied into the island as to allow fish passage along both sides of the island head. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure. See Figure 9.

- Alternative 4 – Single Bullnose with Extended Off Bankline Revetment on Riverside: Installation of a 3,232 foot long stone structure along the historical location of the island head and as off-bankline revetment along the riverside of the island to an elevation of 429 feet NGVD using A-stone and incorporating existing woody vegetation for habitat. Notches will be placed at intervals along the off-bankline revetment and the structure would not be tied into the island as to allow fish passage along all sides of the island. This configuration would allow the head of the island to stabilize and accrete sediment while at the same time creating overwintering habitat for fish and wildlife in the plunge pool at the apex of the structure and behind the off-bankline revetment. See Figure 10.

- Alternative 5 – Alternating Hardpoints in Side Channel: Installation of five alternating 100 foot long hardpoints placed at the lower end of the side channel. These structures will be built to an elevation of 429 feet NGVD using A-stone and incorporating existing woody vegetation for habitat. The hardpoints will promote sinuosity and depth at the lower end of the side channel and assist in passing the increased sediment load from Apple Creek. See Figures 8, 9 and 10.

After reviewing historic photography, alternating hard points in the side channel were felt to be essential to keep the side channel open because:

- All side channels within the project area are narrowing with time
- Multiple islands within the Illinois River have lost their side channel becoming part of the shore
- Sediment deposition from Apple Creek is accelerating Fisher Island's side channel loss

- Side channels provide critical habitat to aquatic organisms: refuge from entrainment, protection from main channel current and cold winter temperatures, and abundant food.

Therefore, these features were included in alternatives 2 - 4 eliminating alternative 5.

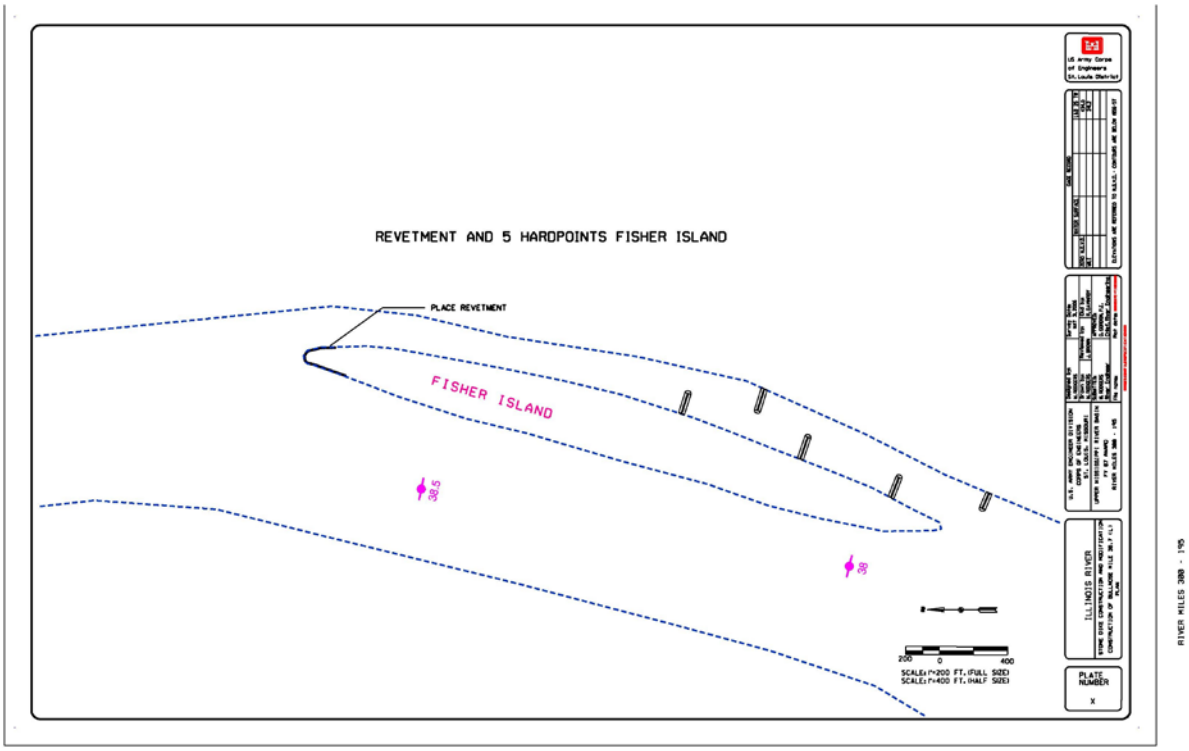

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Figure 8. Fisher Island Alternative 2 – Riprap Shoreline and Alternating Hardpoints in Side Channel.

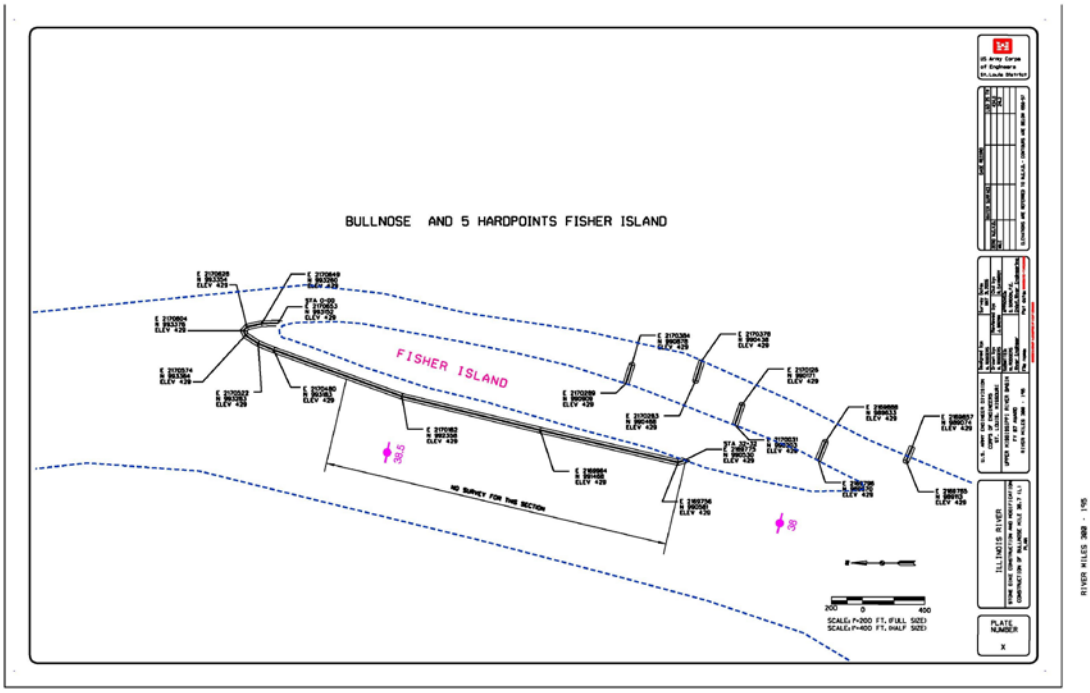

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Figure 9. Fisher Island Alternative 3 – Single Bullnose and Alternating Hardpoints in Side Channel.

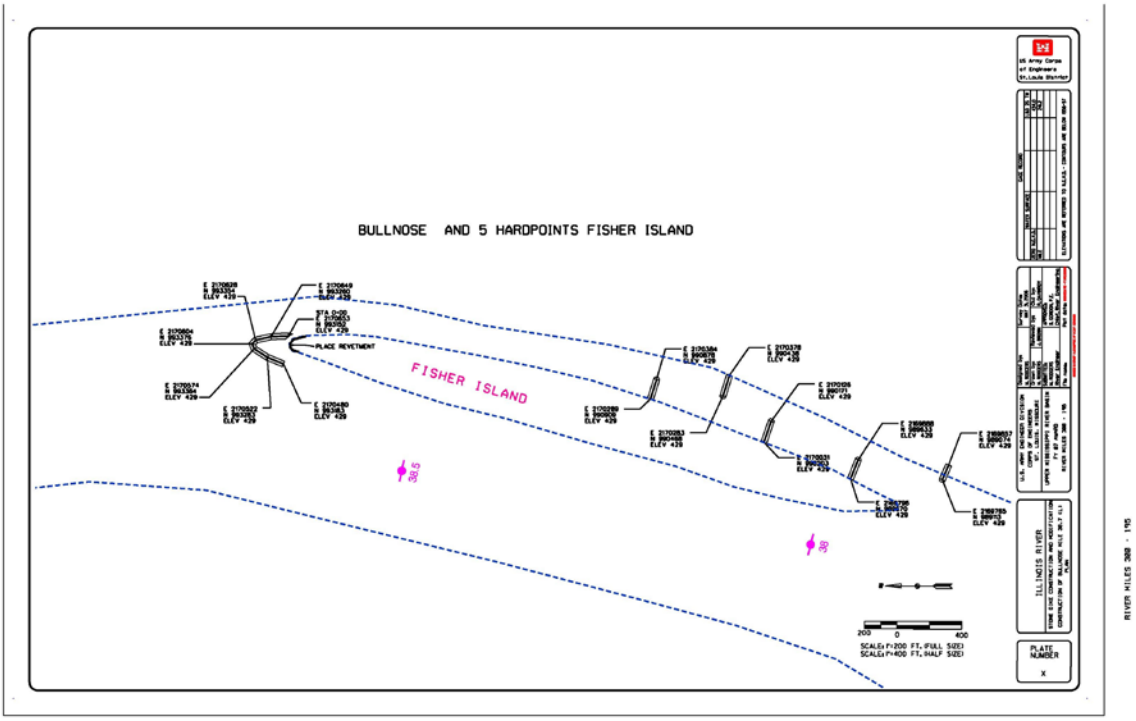

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Figure 10. Fisher Island Alternative 4 – Single Bullnose with Extended Off Bankline Revetment on Riverside and Alternating Hardpoints in Side Channel.

4. DESIGN CONSIDERATIONS FOR ALL ALTERNATIVES

All structures would be constructed using A-stone which has a top size of 5000 lbs. This stone gradation has proven effective at remaining in place, resisting movement by both high flows and ice. Revetment placement density on average is 10 tons of stone per linear foot of protection. Freestanding structures placement density is dependent on the bed elevation.

Any woody vegetation in the alignment of structures would remain in place with the A-stone placed on top of and around it to enhance the environmental habitat. No grading would be performed for this project. The stone size and placement density compensates for any shifting the incorporated woody vegetation may cause and the integrity of the protection is maintained. This method of placement has been used extensively in the St. Louis District with minimal problems and appeals to the environmental community.

Revetment work will not alter existing flows around the head of the islands since existing contours are maintained.

Bullnose construction will slightly alter the flow patterns around the head of the islands. However, the bullnose placement is designed to be constructed along the historical island head alignment, determined by bathymetric surveys and historical photographs. The altered flow patterns are considered to be minimal and should not adversely affect the conditions of the project area.

The hardpoints proposed for the lower end of Fisher Island sidechannel were designed to emphasize the existing flow pattern and encourage existing flows to “work harder” and maintain side channel connectivity. The hardpoints promote a deeper and more sinuous channel that should remain flowing more often and at lower river stages.

Alternative protection methods were discussed but were ultimately dismissed due to cost or construction feasibility. These methods included dredging material into geotubes, willow plantings, and wood pile construction.

REFERENCES

WATER SURFACE PROFILES, UPPER MISSISSIPPI RIVER MIELS 0.0 TO 847.5 and ILLINOIS RIVER MILES 0.0 TO 291.0, U.S. Army Corps of Engineers, St. Paul, Rock Island, and St. Louis Districts, page 31, January 2004.

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