Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Performance Implementation Report with

Integrated Environmental Assessment

January 2020

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

DRAFT FINDING OF NO SIGNIFICANT IMPACT*

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

Greene County, Illinois

The U.S. Army Corps of Engineers, St. Louis District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated **DATE OF IFR/EA**, for the Twin Islands Project addresses island and shoreline protection opportunities and feasibility in the Illinois River (Greene County, Illinois).

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would restore aquatic ecosystem in the study area. The recommended plan is the National Ecosystem Restoration Plan and includes:

- Construction of a 500-foot total length wing-bullnose upstream of the island heads.
- Construction of 300-foot revetment on the head of Little Twin Island.

For all alternatives, the potential effects were evaluated, as appropriate. The considered alternatives (see Chapter 2 of the IFR/EA for full details) included:

- Alternative 1: No Action
- Alternative 2: Notched bullnose with revetment
- Alternative 3: Wing-bullnose with revetment
- Alternative 4: Revetment only on island heads

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Climate	☒	☐	☐
Land Cover: Islands, Wetlands & Floodplains	☒	☐	☐
Water Resources	☒	☐	☐
Soils (Prime Farmland)	☐	☐	☒
Cultural & Historic Resources	☒	☐	☐
Air Quality	☒	☐	☐

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Noise	☒	☐	☐
HTRW	☒	☐	☐
Fish	☒	☐	☐
Wildlife	☒	☐	☐
Federally listed species	☒	☐	☐
Invasive Species	☐	☐	☒
Economic Factors	☐	☐	☒
Social Factors, including Environmental Justice	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the IFR/EA (Chapter 3) will be implemented, if appropriate, to minimize impacts:

- Use specific construction times to avoid threatened and endangered species
- BMPs to reduce sedimentation and erosion into adjacent water bodies during construction

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft IFR/EA and FONSI was completed on **DATE DRAFT EA AND FONSI REVIEW PERIOD ENDED**. All comments submitted during the public review period were responded to in the Final IFR/EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan may affect but is not likely to adversely affect the following federally listed species or their designated critical habitat: Indiana Bat and Northern Long-Ear Bat. The U.S. Fish and Wildlife Service (FWS) concurred with the Corps' determination on **DATE OF CONCURRENCE LETTER**

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will have no effect on federally listed species or their designated critical habitat: Decurrent False Aster.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan has no effect on historic properties. This determination may be re-evaluated if warranted by further developments.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Appendix B of the IFR/EA. The Recommended Plan would meet the conditions of a Regional General Permit 16 (Bank Stabilization Activities) and Nationwide Permit 27 (Aquatic Habitat Restoration) and 13 (Bank Stabilization). Therefore, an Illinois EPA 401 Certification will not be pursued.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

_____ _____

Date

Kevin R. Golinghorst
Colonel, U.S. Army
District Commander

EXECUTIVE SUMMARY

Purpose of Report. The purpose of this integrated feasibility report with environmental assessment, including the Finding of No Significant Impact (FONSI), is to evaluate and document the decision-making process for the proposed U.S. Army Corps of Engineers (USACE) ecosystem restoration project Navigation Ecosystem Sustainability Program (NESP) Island and Shoreline Protection - Twin Islands (Twin Islands Study). This report was developed by the USACE with the Illinois Department of Natural Resources (IDNR) serving as the non-Federal study sponsor. This report provides planning (including National Environmental Policy Act (NEPA) compliance), engineering, and enough construction detail to help inform the final recommendation.

Study Area Location. The Twin Islands Study area is in Greene County, Illinois, between River Miles (RM) 37.5 and 37.8 Right Descending Bank (RDB) and includes Twin Island and Little Twin Island and surrounding riverine habitat. The islands are located between the cities of Kampsville and Pearl, Illinois.

Problem Identification. The primary habitat problem in the area is loss of islands due to navigation induced shoreline erosion and associated sedimentation. An opportunity exists to restore and maintain the degraded islands and aquatic habitat in the study area in order to increase the ecological integrity of the Illinois River.

Study Goal and Objectives. The overarching goal of this study is to formulate alternatives to restore the aquatic ecosystem. In addition, the study also documents if USACE participation is economically justified in restoring ecosystem structure and function within the study area.

As part of the USACE planning process, the following ecosystem restoration objectives were identified for the study:

- Enhance geomorphic diversity in the study area within the period of analysis.
- Maintain island mosaic diversity in the study area within the period of analysis.
- Enhance the aquatic ecosystem for native fish in the study area within the period of analysis.

Plan Formulation, Evaluation, and Comparison

The Recommended Plan is consistent with the USACE ecosystem restoration mission. The planning team developed a series of measures for consideration to address the identified problems. The measures were formulated based on data collection and analyses, as well as, by experts in the field of biology, hydraulics, and geomorphology. Four unique alternatives were developed using various formulation strategies, including the No Action Alternative. This array of alternatives was evaluated for completeness, effectiveness, efficiency, and acceptability. Preliminary cost estimates and habitat benefits were calculated.

Alternative 1 – No Action.

Alternative 2 – Notched bullnose with revetment.

Alternative 3 – Wing-bullnose with revetment.

Alternative 4 – Revetment only on island heads.

The USACE completed field surveys during the summer of 2020 to support the planning and assessment of considered alternatives. Hydrographic surveys were performed to document existing bathymetry and to estimate rock quantities. Biological surveys were conducted to characterize the fish and freshwater mussel assemblages in the study area. These observations, along with future studies and monitoring, would assist in evaluating project performance.

Habitat benefits were calculated using the Striped Bass Habitat Suitability Index (HSI) Model. Outputs from this model are defined as habitat units. The habitat outputs were compared to the cost for each alternative through a cost effective and incremental cost analysis (CE/ICA). This analysis, along with an alternative's ability to meet study objectives, NEPA compliance, and USACE Planning and Guidance evaluation criteria (ER 1105-2-100) were used to compare and evaluate the alternatives. Ultimately, one alternative was identified as the National Ecosystem Restoration (NER) plan.

The Recommended NER Plan, *Alternative 3,* yields 8.4 net average annual habitat units (AAHU) for an average annual cost over the 50-year period of analysis, starting at year 2023, of $35,500. This equates to an average annual cost per AAHU of $4,200 using the fiscal year (FY) 2021 federal discount rate of 2.5%. Implementation of this alternative would restore and improve the aquatic ecosystem structure and function of approximately 32 acres of riverine habitat. The Recommended Plan is deemed acceptable by the non-Federal sponsor (IDNR).

Based on October 2020 price levels, the current estimated project first cost (*i.e.,* cost to construct) for the Recommended Plan is estimated at $ 881,800 which includes monitoring costs of $63,000 and adaptive management costs of $40,000. The IDNR is responsible for operation, maintenance, repair, rehabilitation, and replacement (OMRRR) of the constructed project but no OMRRR requirements have been identified. No compensatory mitigation is included in the proposed plan as none is required. Conservation measures would be implemented during construction to minimize effects to Federally listed plants and animals.

The St. Louis District Engineer has reviewed the significance of the resources, estimated habitat benefits outputs, economic costs, identified risks and has determined that the implementation of the Recommended Plan is in the Federal interest; therefore, the District Engineer recommends construction approval for the Island and Shoreline Protection – Twin Islands Recommended Plan.

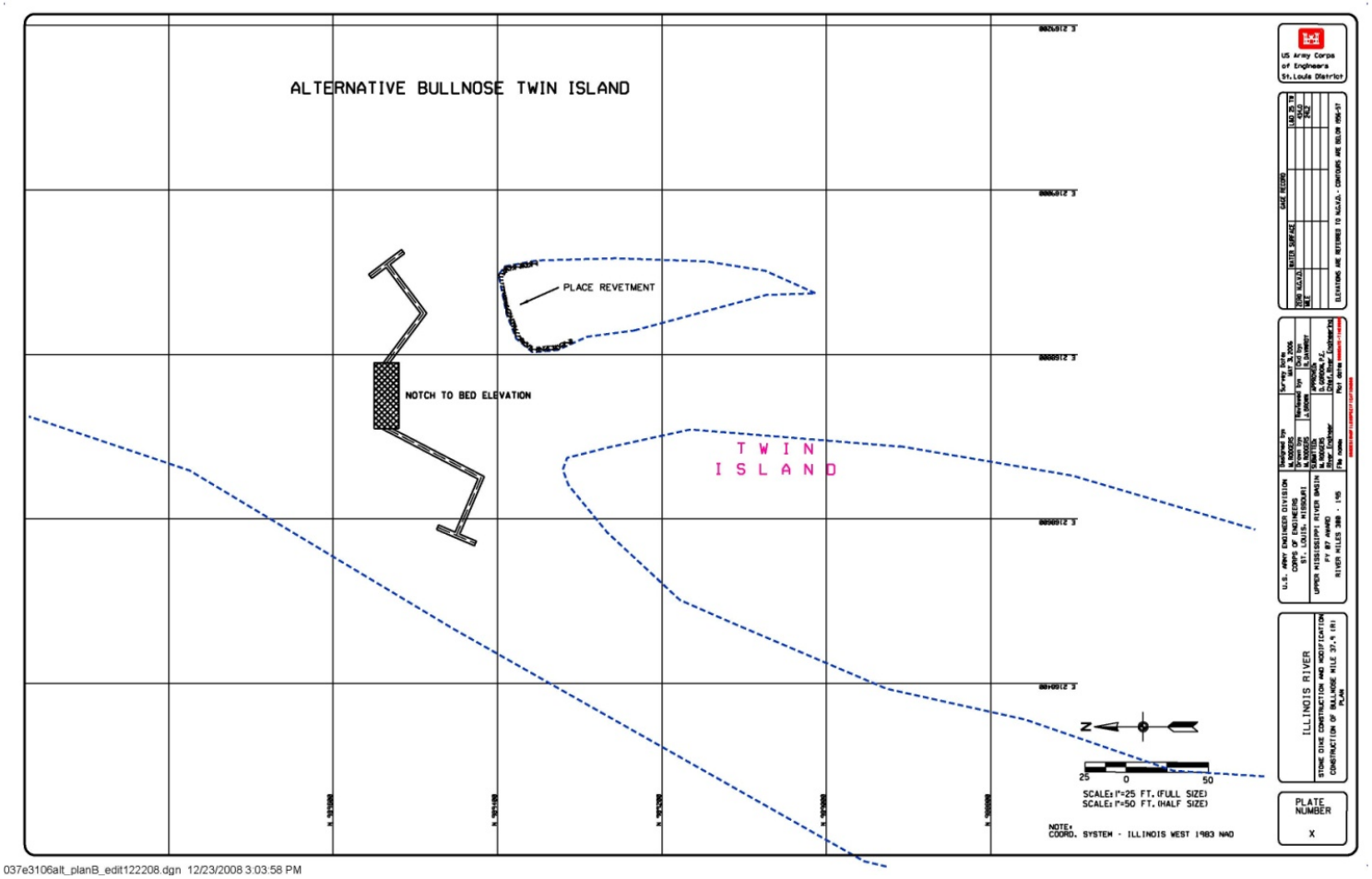


Figure ES-1 Recommended Plan

PROJECT IMPLEMENTATION REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

Navigation and Ecosystem Sustainability Program
Island and Shoreline Protection-Twin Islands
Greene County, Illinois

*denotes NEPA requirement

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

1. Introduction

1.1 U.S. Army Corps of Engineers Civil Works Mission

The U.S. Army Corps of Engineers' (USACE) civil works mission is to deliver vital public engineering solutions, in collaboration with partners, to secure the Nation, energize the economy and reduce risk from disaster.

1.2 Study Authority

The USACE feasibility studies investigate and recommend solutions to identify water resource problems that are authorized by Congress.

The USACE prepared a Final Integrated Feasibility Report and Programmatic Environmental Impact Statement (PEIS) for the Upper Mississippi River – Illinois Waterways (UMR-IWW) System Navigation Feasibility Study (USACE, 2004), and recommended a dual-purpose authorization to address the navigation efficiency and ecosystem restoration of the UMR-IWW over a 50-year planning horizon. The feasibility study at Twin Island is proposed under the ecosystem restoration component of dual-purpose authorization and the site-specific environmental assessment will tier-off the PEIS.

The dual purpose navigation and ecosystem sustainability program (NESP) program was authorized under Section 8004(b)(2) of the Water Resources Development Act of 2007, "The Secretary shall carry out, consistent with requirements to avoid adverse effects on navigation, ecosystem restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River in accordance with the general framework outlined in the Plan". Paragraph (h) identifies island and shoreline protection as a potential type of ecosystem restoration project to pursue.

In accordance with Under Section 8004(h) of the Water Resources Development Act of 2007 the USACE, and interagency partners, identified ecosystem restoration projects based on their ability to address system restoration needs, represent a range of habitats, provide restoration actions throughout various parts of the system, and contribute to system learning (i.e. refine understanding of the most cost effective restoration methods and best techniques to restore natural river processes).

Project eligibility was judged based on whether the restoration efforts addressed the ecosystem restoration goals, which include:

- Manage for a more natural hydrologic regime
- Manage for processes that shape a physically diverse and dynamic river-floodplain system
- Manage for processes that input, transport, assimilate, and output material within The Upper Mississippi River (UMR) basin river-floodplains: e.g. water quality, sediments, and nutrients
- Manage for a diverse and dynamic pattern of habitats to support native biota
- Manage for viable populations of native species within diverse plant and animal communities

1.3 Study Area

Twin Islands is located within the Alton navigation pool of the Illinois River (river miles 0 to 80). The study area contains two islands, Twin Island and Little Twin Island (Figure 1) and adjacent riverine habitat. Both islands are located on the right descending bank of the Illinois River between river miles 37.5 and 37.8 in Greene County between the cities of Kampsville and Pearl, Illinois. The study area is comprised of approximately 32 acres of island and riverine habitats.

1.4 Project Sponsor

The Illinois Department of Natural Resources (IDNR), the project sponsor, manages, conserves and protects Illinois' natural, recreational and cultural resources, furthers the public's understanding and appreciation of those resources, and promotes the education, science and public safety of Illinois' natural resources for present and future generations.

1.5 Purpose & Need*

Purpose: The USACE, St. Louis District, proposes to improve island and shoreline conditions within the Twin Islands study area by reducing the effects of erosion and sedimentation. The current conditions of these islands are degrading due to (1) island and shoreline erosion, and (2) loss of aquatic habitat and geomorphic diversity.

Need: The need is documented by a long-term loss of islands within the Illinois River which is forecasted to continue.

1) *Island and Shoreline Erosion.* Historically, 94 island mosaics within the Illinois River provided rich habitat for fish and wildlife, but due to island and shoreline erosion, the number of these mosaics have been reduced to 57 throughout the entire Illinois River System and the loss of island mosaics is expected to continue into the future (USACE 2007). Currently, in the Lower Illinois River, 14 of the 18 remaining islands, including Twin Islands, have been identified by an interagency team to need shoreline protection to reduce the ongoing excessive island erosion.

2) *Loss of Aquatic Habitat Diversity.* With the loss of island mosaic habitats, the aquatic habitat diversity will continue to degrade. The erosion and subsequent sedimentation would continue resulting in filling in slackwater off-channel habitats. The loss of these aquatic habitat cover types would lead to overall loss of aquatic habitat diversity within the Illinois River. Having a diversity of aquatic habitat is needed to support a healthy and resilient river ecosystem.

1.6 Resource Significance

When determining Federal interest, it is important to clearly identify the significance of the resources being studied for restoration. The USACE's "Principles and Guidelines" defines significance in terms of institutional, public, and technical recognition of the resources (USWRC 1983). 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 273 miles to the south, 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 and 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.

1.6.1 Institutional Recognition

The formal recognition of the Illinois River Basin in laws, adopted plans, and other policy statements of public agencies and private groups illustrates the significance of the basin to a variety of institutions. At the Federal level, the Illinois River's importance as an environmental and economic resource has long been recognized by congressional action and through the activities of several agencies. The U.S. Congress recognized the Illinois River, part of the Upper Mississippi River System (UMRS), as a unique, "…nationally significant ecosystem and national significant commercial navigation system…" in Section 1103 of the Water Resources Development Act of 1986 (WRDA 1986). The Upper Mississippi River Restoration (UMRR) Program was established in 1986 and has been conducting monitoring and habitat restoration activities along portions of the main stem of the Illinois River. The UMRR brings together the expertise of the USACE, USFWS, USGS, USEPA, the states of Minnesota, Wisconsin, Iowa, Illinois, and Missouri, and non-governmental organizations. Additional institutional significance is provided by the U.S. Department of Agriculture selecting the Illinois River Basin as one of the first seven areas in the country for the Conservation Reserve and Enhancement Program (CREP), a program allowing enhanced Federal and State partnership opportunities to implement land conservation practices.

The State of Illinois has clearly demonstrated its institutional recognition of the Illinois River Basin as a significant resource. The state has developed, adopted, and begun implementation of the *Integrated Management Plan for the Illinois River Watershed;* enacted the Illinois River Watershed Restoration Action; invested $51 million to match $271 million in Federal dollars in implementing CREP on 110,000 acres with the potential to expand to 232,000 acres; and set the vision for Illinois Rivers 2020, a proposed $2.5 billion, 20-year Federal and State program to restore the Illinois River Basin (USACE, 2007).

In addition to Federal and State recognition, local communities, counties, and non-governmental organizations have also focused attention on the Illinois River Basin. More than 35 management plans have been developed that call for restoration of all or a portion of the Illinois River Basin. Many communities and groups have begun implementation of restoration projects. Both The Nature Conservancy and The Wetlands Initiative have made major investments by purchasing levee and drainage districts for the purpose of restoration.

1.6.2 Public Recognition

The Illinois River Basin is significant based on the wide public recognition of the environmental resources present in the basin. The basin is noteworthy in that, while encompassing approximately 44 percent of the land area of the State, it includes nearly 90 percent of Illinois' approximately 11 million people. Some level of significance of the Illinois River Basin to the public is measured through the actions of elected officials and policy makers who have forwarded legislation and enacted laws mentioned above to protect and enhance the watershed.

A further recognition of the value of the basin is the amount of participation by landowners in conservation programs. Approximately 138,000 acres of land have been enrolled in the Federal and State Conservation Reserve Enhancement Program (CREP) and Conservation Reserve Program (CRP). Each year, more Illinois landowners apply for the CREP than are accepted (USACE, 2007). This demonstrates a willingness on the part of the landowners to set aside farmland to aid in the conservation of the Illinois River Basin.

Recreation in the Illinois River Basin includes water-dependent activities such as fishing, waterfowl hunting, boating, and swimming. Recreation also includes activities that are enhanced by the proximity to water, such as hiking, picnicking, bird watching, and camping. These types of recreation are provided by local, State, and Federal agencies such as park districts, forest preserve districts, the IDNR, and the USFWS. Many private concerns also provide similar recreation opportunities. The IDNR owns or leases hundreds of outdoor recreation sites throughout the State including: State parks, conservation area, nature preserves, natural areas, fish and wildlife areas, greenways, trails, and forests. This translates into millions of dollars in economic output, jobs, and earnings.

The Illinois River Basin contains some of the most productive agricultural soils in the world. These soils, combined with favorable climate, excellent transportation via water, highway, and rail, makes the Illinois River Basin a world leader in agriculture, and a major exporter of agricultural products (USACE, 2007).

1.6.3 Technical Recognition

Numerous scientific analyses and long-term evaluations of the Illinois River Basin have documented its significant ecological resources. Since the early 20th century, researchers, government agencies, and private groups have studied the large floodplain systems and proposed ecosystem restoration in the Illinois River Basin. A few examples of the efforts to identify, quantify, and understand the ecological significance of the basin are described in the following text.

In a 1995 report, the U.S. Department of the Interior 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 Illinois River is one of the few areas in the

developed world where ecosystem restoration can be implemented on large floodplain-river ecosystems (Sparks 1995).

The Nature Conservancy (TNC) has developed basin-level planning documents to guide restoration efforts. In these documents, the TNC (1998) states:

> The Illinois River remains one of a handful of world class floodplain-river ecosystems. These include the Nile, Amazon, the Mekong and portions of the Mississippi, where biological productivity is enhanced by annual flood pulses that advance and retreat over the floodplain and temporarily expand backwaters and floodplain lakes.

The USACE UMRR conducted a Habitat Needs Assessment II (McCain, Schmuecker, & De Jager, 2018) to help guide the future habitat projects on the UMRS, including the Illinois River. This assessment highlighted the future needs for the lower Illinois River to be:

- Restore floodplain functional classes (including islands and side channels)
- Reduce sedimentation (improve total suspended solids)
- Restore deep, lentic and lotic habitats
- Restore open water areas
- Increase off-channel and floodplain lentic areas
- Restore aquatic vegetation
- Restore floodplain topographic diversity and associated flooding periods
- Reduce variability in water surface elevations
- Restore floodplain vegetation diversity

The Illinois River has historically hosted a vast fishery, including numerous ancient fishes, and, at the turn of the century, produced 10 percent of the nation's catch of freshwater fish (USACE, 2007). The Illinois River and its tributaries are currently home to over 100 species of fish. Side channels and backwaters serve as nurseries and spawning areas. Sport fish in the Illinois River include white bass, largemouth bass, bluegill, black crappie, channel catfish, carp, buffalo, bullhead, walleye, sauger, and many other warm-water species.

The Illinois River is a major component of the internationally significant Mississippi River Flyway, a route followed by migratory waterfowl between Canada and the Gulf Coast. The Mississippi River Flyway is utilized by 40 percent of all North American waterfowl and over 325 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 all fall waterfowl migration in the Mississippi Flyway used the Illinois River. Approximately 20 species of waterfowl, primarily ducks and geese, make their home in the Illinois River Basin. Hundreds of thousands of the birds migrate along the Illinois River each year, resting temporarily in the wetlands, sloughs, and backwater lakes in the basin (USACE, 2007). The Illinois River basin is a major wintering grounds for the bald eagle. In recent years, as many 375 bald eagles have

been counted annually, which represents 3 percent of the total wintering population of bald eagles in the lower 48 states (USACE, 2007).

1.7 Scoping and Coordination*

Scoping is an early and open process for determining the scope of significant issues related to a proposed action. Scoping was conducted during the initial planning phase in 2010 using a variety of communication methods with the affected public, agencies, and organizations. The project was inactivated in 2011 due to funding constraints, resumption of the study involved validation of the original scope and re-coordination with the following State and Federal agencies.

- Illinois Department of Natural Resources
- Illinois Natural History Survey
- Illinois State Historic Preservation Office
- U.S. Fish and Wildlife Service

The input received during scoping was incorporated in the process of making decisions for the study. Appendix A, *Correspondence,* documents the coordination

1.7.1 Coordination Meetings

Numerous coordination occurred with study cooperators to discuss problems, opportunities, study goal and objectives, potential restoration measures, and expected outcomes with and without the proposed project.

1.7.2 Public Involvement

In accordance with NEPA, the draft report with integrated environmental assessment and unsigned draft Finding of No Significant Impact (FONSI) will be made available to interested members of the public during a 30-day public review period.

1.7.3 Tribal Scoping

The United States has a unique and legal relationship with federally recognized American Indiana tribes based on recognition and inherent powers of Tribal sovereignty and self-government. Communication with federally recognized tribes was initiated with USACE letter dated 21 August 2020. Copies of all tribal correspondence is provided in Appendix A, *Correspondence.*

1.8 Prior Studies and Reports

The following studies or programs have applicability to the Illinois River and were considered during the planning of the Twin Islands study:

McCain, K.N.S., S. Schmuecker, and N.R. De Jager. 2018. Habitat Needs Assessment-II for the Upper Mississippi River Restoration Program: Linking Science to Management Perspective. U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL. The report used 12 indicators quantifying various aspects of ecosystem health and resilience to help inform the UMRR Program in selecting, designing, and

evaluating future restoration projects. The report provides a series of tables and figures that link existing conditions to future desired conditions. For the Illinois River, several indicators substantially deviated from the desired conditions and merit actions to improve.

Johnson, B.L., and K.H. Hagerty, eds. 2008. Status and Trends of Selected Resources of the Upper Mississippi River System. U.S. Geological Survey, La Cross, WI. Technical Report LTRMP 2008-T002. This report describes the UMRS and includes discussions on the historic and existing conditions, river monitoring and management, and ecosystem goals and indicators. It also discusses the status and trends of biological, physical, and chemical indicators of system health developed through UMRR-LTRM.

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 island/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.

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 bend-way 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-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 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.

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.

McGuiness, D. 2000. 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. This report describes the critical elements of a strategy for the OMRR&R of the natural resources of the UMRS and its tributaries including the setting of restoration goals and objectives. The report suggests nine objectives for successful resource management of the UMRS: 1) improve water quality, 2) reduce erosion, sediment, and nutrient impacts, 3) return natural floodplain, 4) restore seasonal flood pulse and periodic low flow conditions, 5) restore backwater connectivity, 6) manage sediment transport and deposition in floodplain and side channels, 7) manage dredging and channel maintenance, 8) sever pathways for exotic species, and 9) provide for passage at dams.

*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.

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

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.

2 Alternative Plan Formulation*

2.1 Conceptual Model

Development of a conceptual model aided the identification of resource problems, stressors, and illustrates the interaction amongst drivers (i.e., climate, flood/drought cycles, and land use), primary stressors (i.e., navigation and sedimentation), and essential ecosystem characteristics (Figure 2-1). Essential ecosystem characteristics (EEC) are broadly defined categories of environmental features, are critical for sustaining ecological systems, and are valued by stakeholder interests (Nestler, Galat, & Hrabik, 2011). For Twin Islands, four EECs were identified to influence the study area: Geomorphology, Hydrology & Hydraulics, Habitat, and Biota. The primary stressors for the study area are past and present commercial navigation, shoreline erosion, and river-borne sedimentation. Past and present commercial navigation has directly impacted the Hydrology and Hydraulics and Habitat EECs though modified flow and connectivity. The changes in hydrology, hydraulics and habitat then impact geomorphology (e.g., altering the bathymetry and sediment movement), and biota (e.g., fish, mussels, and wildlife). Shoreline erosion directly influences geomorphology, habitat, and biota through direct loss of islands habitats. Sedimentation directly impacts the Geomorphology and Habitat EECs by altering the connectivity, depths and velocities within the aquatic habitats which then affect the biota.

2.2 Problems

The hydrologic regime and sedimentation patterns of the Illinois River have been altered over the past 150 years (USACE 2007) 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 loss of aquatic habitat diversity leading to reduced biodiversity. This lack of habitat diversity limits certain fish and wildlife populations which are evolutionarily adapted to the historic river condition.

In the study area, navigation induced shoreline erosion and sedimentation has led to island loss and degraded aquatic habitats through loss of aquatic and geomorphic diversity. In particular, the loss of the island and subsequent off-channel areas has led to degraded habitat for native fishes.

2.3 Opportunities

- Restore and maintain the degraded Twin Islands study area, assisting in the ecological integrity of the Illinois River.
- Improve the resiliency of the Twin Islands study area to effects of climate change.
- Enhance public use of the area due to improved habitat conditions.

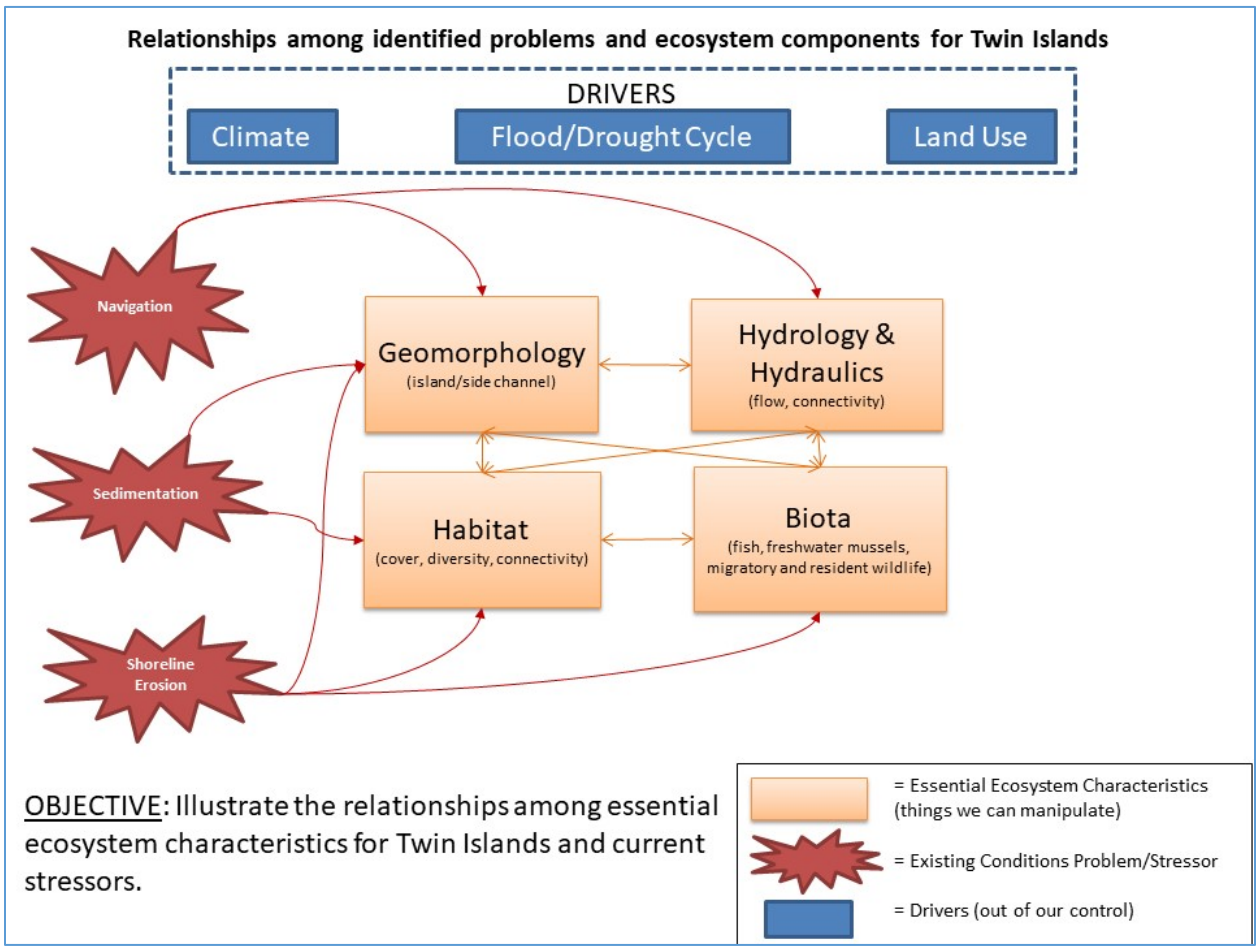


Figure 2-1. Conceptual model for Twin Islands

2.4 Constraints

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

- Navigation - Avoid 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 potential high cost associated with mitigation actions, efforts will be made to avoid this threshold.
- Authorized per project cost limit - The total cost of any single ecosystem restoration project carried out under Sec 8004 (b)(2) of WRDA 2007 shall not exceed $25,000,000 unless otherwise specified.

2.5 Project Goals and Objectives

This site-specific restoration project was identified and evaluated with the primary purpose of contributing to the restoration of the Upper Mississippi River and Illinois Waterway. The NESP has developed a vision statement and overarching and system-wide ecosystem goals for the restoration of habitat in the Upper Mississippi River System. The site-specific goals and objectives are nested within the context of the system goals and objectives as described below.

2.5.1 Vision Statement

To seek long-term sustainability of the economic uses and ecological integrity of the Upper Mississippi River System.

2.5.2 System-Wide Ecosystem Goal and Objectives

The overarching ecosystem goal is to conserve, restore, and maintain the ecological structure and function of the Upper Mississippi River System to achieve the vision. The goal and vision statement imply conserving the UMRS's remaining structure and function while restoring the degraded components to realize a sustainable UMRS. Five system-wide objectives have been identified (Galat , et al., 2007) to:

1. Manage for a more natural hydrologic regime.
2. Manage for processes that shape a physically diverse and dynamic river-floodplain system.
3. Manage for processes that input, transport, assimilate, and output material within UMR basin river-floodplains: e.g. water quality, sediments, and nutrients.
4. Manage for a diverse and dynamic pattern of habitats to support native biota.
5. Manage for viable populations of native species within diverse plant and animal communities.

2.5.3 Site-Specific Objectives

The study addresses system-wide goals 2, 4, and 5. In addition, the following site-specific objectives developed for Twin Islands are:

1. Enhance geomorphic diversity in the study area within the period of analysis.
2. Maintain island mosaic diversity in the study area within the period of analysis.
3. Enhance the aquatic ecosystem for native fish in the study area within the period of analysis.

2.6 Considered Management Measures & Screening Criteria

2.6.1 Considered Management Measures

A management measure is a feature (a structural element that requires construction or assembly on-site) or an activity (a nonstructural action) that can be combined with other management measures to form alternative plans. Management measures were developed to address ecosystem problems and to capitalize upon opportunities. Several measures were discussed during scoping, meetings with state and federal resources agencies, and the USACE Project Delivery Team (PDT). Development and preliminary screening of potential measures took place early on in the planning process to eliminate potential

features that were unfeasible, did not meet study goals and objectives, or were impractical. Measures considered included:

Box 2-1. Principles and Guidelines Criteria

Completeness: Extent to which the measure provides and accounts for all necessary investments or actions to ensure realization of the planning objectives.

Effectiveness: Extent to which the measure contributes to achieving the planning objectives.

Efficiency: Extent to which the measure is the most cost-effective means of addressing the specified problems and realizing the specified opportunities, consistent with protecting the nation's environment.

Acceptability: 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.

- Revetment (structural). Revetments are placed along a bankline to halt erosion. Usually stone is used and as an environmental measure, any woody vegetation along the bankline is incorporated into the revetment.
- Bullnose (structural). Bullnose protection is a horseshoe shaped line of rock traditionally placed at the head of eroding islands to halt erosion. Frequently, notches are interspersed in the line of rock to provide a unique habitat for species that prefer high flow. 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.
- Wing-bullnose (structural). This stone structure is constructed, if viewed facing upstream, to look like a large W. The wing-bullnose is built with the upstream points at a lower elevation then the downstream points. This design directs flows away from the heads of the islands.
- Hardpoints (structural). Hardpoints 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. Their contribution to habitat improvement is the creation of downstream scour holes that attract many fish species. In narrow side channel reaches, alternating hardpoints along both sides of the channel may create sinuosity and promote flow.
- Live Plantings (non-structural). Live plant stakes are placed in eroding banks where there roots can stabilize the otherwise bare dirt.

2.6.2 Screening of Management Measures

Screening criteria was developed based on the planning objectives, constraints, opportunities and problems of the study area. Management measures (Table 2-1) were screened and eliminated

throughout the plan formulation process based on these criteria and the criteria described in the Principles and Guidelines (P&G) as shown in Box 2-1.

Table 2-1. Management Measure Screening Criteria

MANAGEMENT MEASURE	RETAINED FOR EVALUATION	SCREENING CRITERIA/DESIGN CONSIDERATIONS
Rock riprap along surface (revetment)	Yes	Meets all criteria, retained
Notched Bullnose	Yes	Meets all criteria, retained
Wing-Bullnose	Yes	Meets all criteria, retained
Live plantings	No	Not effective, based on existing river conditions live plantings **will not work to meet study objective** to restore geographic diversity.

2.7 Alternative Plans

2.7.1 Formulation of Alternative Plans.

The remaining management measures, formulation strategies were developed to create alternatives. The formulation strategies were used to combine the management measure(s) together into alternatives based on the study goal, objectives, planning criteria and opportunies while avoiding constraints.

2.7.2 Description of Alternative Plans.

The four alternatives for Twin Islands are summarized as follows:

Alternative 1 - No Action Plan (Future Without Project) - The National Environmental Policy Act (NEPA) requires Federal agencies to consider the option of no action as one of the alternatives. The No Action Plan assumed no action is taken by the USACE to achieve the planning objectives, and is synonymous with the future without project (FWOP) condition. The No Action Plan forms the basis against which all other alternative plans are measured.

The FWOP condition is developed to describe the most likely future condition in the study area if no federal action is taken to address the identified problems. It forms the baseline for identifying the effects of the alternatives and is similar to the No Action Alternative. The future is inherently uncertain and conditions change over time.

In order to identify the FWOP condition for evaluation purposes, the team began with the existing conditions information and considered where potential changes could occur in the future. Forecasted changes in the affected resources are summarized in Table 2-2 below and discussed in detail in Chapter 3. Additional areas of potential changes during the forecasted 50-year period of analysis, starting at base year 2022, which the team felt could result in a FWOP condition that differs from the existing conditions includes climate change.

The following basic assumptions were made regarding future conditions related to study area:

- The study area would continue to be passively managed by the non-federal sponsor. No new management activities are expected.
- Commercial navigation and recreational boat traffic would continue similar to existing conditions leading to continued shoreline erosion and sedimentation.
- Sediment inputs from the watershed would continue similar to existing conditions.

Table 2-2. Summary of Future Without Project Conditions for Relevant Resources

Resource	FWOP/No Action Summary
Land Cover: Islands, Wetlands, and Floodplains	Without action, the island heads will continue to erode, and Little Twin Island would likely erode completely. The wooded wetland at the head of the islands 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.
Hydrology & Hydraulics	Without action, navigation induced shoreline erosion would continue degrading the island and aquatic habitats.
Water Resources	Similar to existing conditions into the future. Continued high suspended sediment.
Soils	Similar to existing conditions into the future
Cultural & Historical Resources	Similar to existing conditions into the future
Air Quality	Similar to existing conditions into the future
Noise	Similar to existing conditions into the future
HTRW	Similar to existing conditions into the future
Fish and Wildlife, Including Federally Listed Species	With island and shoreline erosion/sedimentation, habitat becomes less suitable and the species that use the study area would decline or move elsewhere.
Invasive Species	The damage done by invasive Asian carp would continue to impact the biodiversity of the Illinois River. Continued threats of invasive species would continue. Existing invasive species would persist.
Economic Factors	Similar to existing conditions into the future
Social Factors	Similar to existing conditions into the future

Alternative 2 – Efficient Plan - This alternative is assumed to maximize efficiency by being the most cost effective by constructing a 900 foot long notched bullnose that spans both islands. The structure would have a 100 feet notch with an invert elevation to the existing riverbed located in line with the channel between the islands. The structure would tie into the riverside of the smaller island and the side channel side of the larger island. This structure would allow the head of the islands to stabilize without cutting off flow between the islands. Slack water fish habitat would be created upstream of the both islands (Figure 2-2).

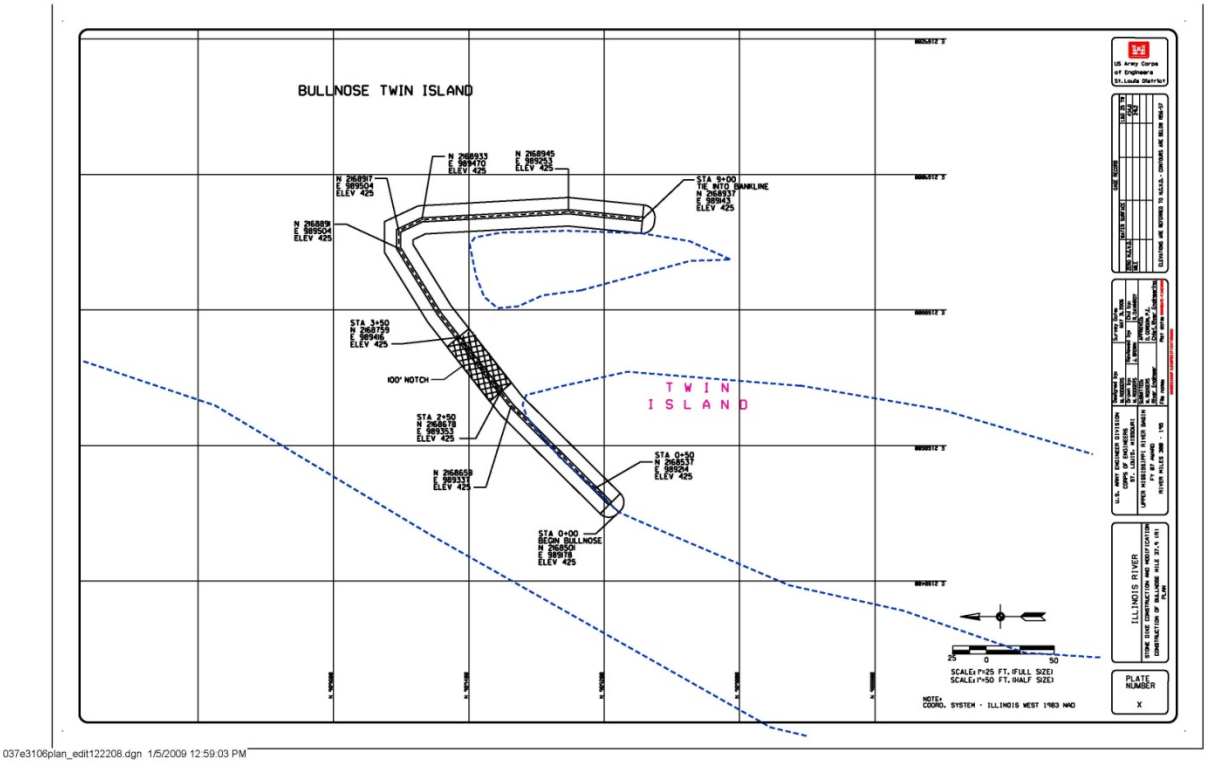


Figure 2-2. Alternative 2 – Notched bullnose across Twin Island and Little Twin Island.

Alternative 3 – **Effective Plan** - This alternative is assumed to yield the highest benefits and therefor would be the most effective plan at meeting the study objectives. Management measures included in this alternative would yield high ecosystem benefits and meet both study objectives. This alternative would construct a 500 foot total length wing-bullnose upstream of the head of the islands. Starting upstream of the head of the smaller island, angle downstream for 75 feet and slope up to an elevation of 427 feet (Illinois West 1983 NAD), then angle upstream for 75 feet and slope down to an elevation of 425 feet (Illinois West 1983 NAD). Leave a 100 feet long notch then start the structure again at an elevation of 425 feet, angle downstream for 150 feet and slope up to elevation of 427 feet (Illinois West 1983 NAD), then angle upstream for 100 feet and slope down to an elevation of 425 (Illinois West 1983 NAD). This structure will use the force of the water flowing over the angled sections of the dike to direct flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures. The notched section will still allow flows between the islands. (Figure 2-3). Additionally, approximately 300 feet of revetment would be placed on the head of Little Twin Island. Slack water fish habitat would be created upstream of the both islands.

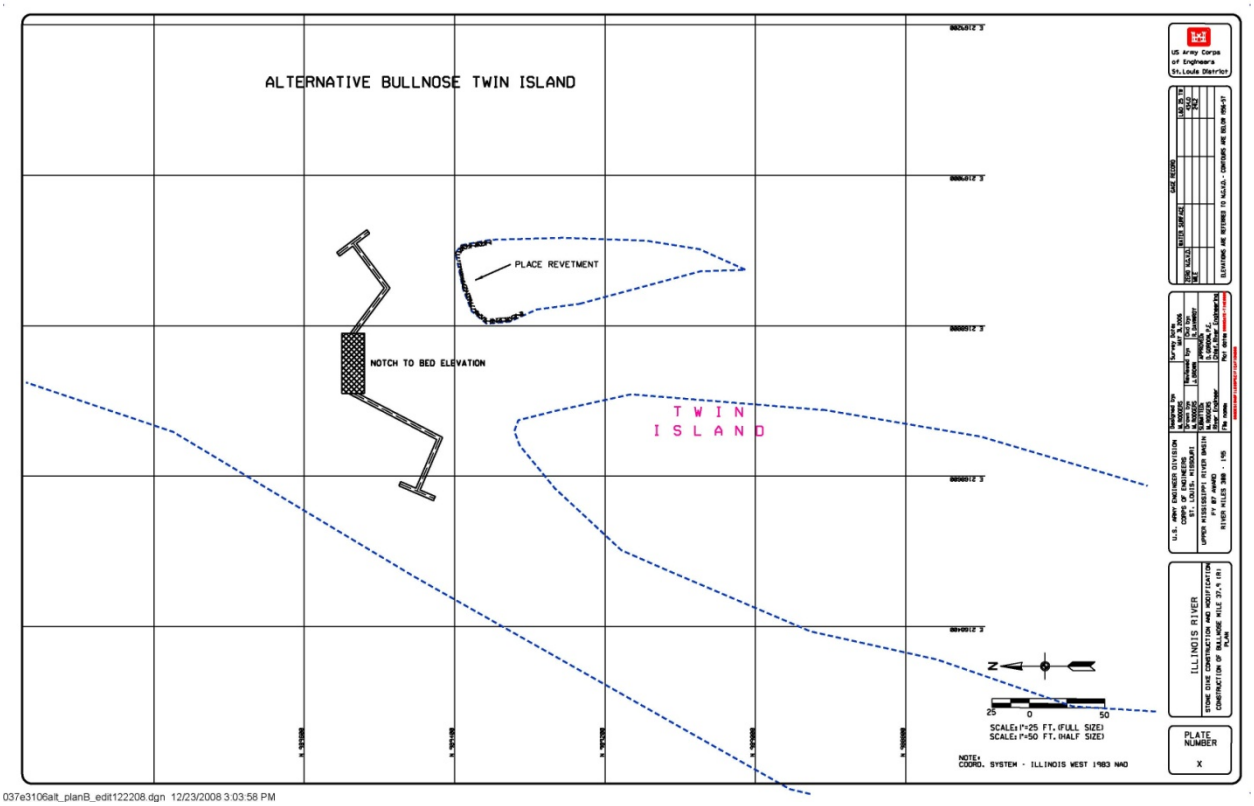


Figure 2-3. Alternative 3 –Wing-bullnose and Little Twin Island revetment.

Alternative 4 – Established Plan - This alternative utilizes revetment which has been long utilized successfully for erosion protection. This alternative would place approximately 300 foot of revetment on the head of the smaller island and approximately 450 foot of revetment on the head of the larger island. This revetment would prevent the heads of the islands from further eroding (Figure 2-4).

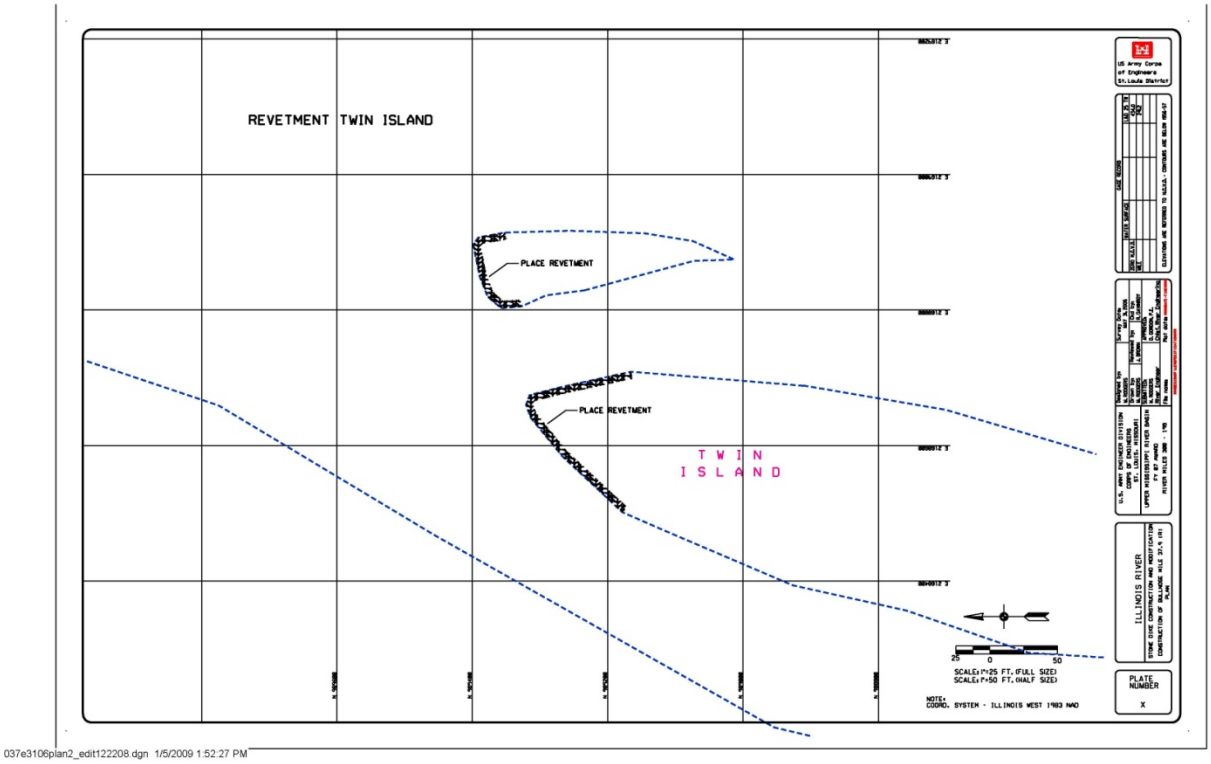


Figure 2-4. Alternative 4 – Revetment at the head of Twin Island and Little Twin Island.

3 Affected Environment & Environmental Consequences*

This chapter is organized by relevant resource topic. Per the Rivers and Harbors Act Section 122 (PL 91-6110), the planning process considered 17 resources; however, this section is not a comprehensive discussion of every resource within the study area, but rather focuses on those aspects of the environment identified as relevant during scoping or had the potential to affect or be affected by the considered alternatives. For each resource, the discussion begins with the baseline (existing conditions), including reasonably foreseeable trends and planned actions in the affected area, followed by the environmental consequences of each reasonable alternative, including the No Action Alternative. The environmental consequences discussion forms the scientific and analytic basis for comparing the alternatives and the significance of those impacts (Table 3-1) on the following alternatives:

- Alternative 1: No Action (Future Without Project)
- Alternative 2: Efficient Plan (notched bullnose with revetment)
- Alternative 3: Effective Plan (wing-bullnose with revetment)
- Alternative 4: Established Plan (revetment only at island heads)

When environmental impacts of these alternatives are the same, they are discussed collectively.

Assessing potential significant effects requires consideration to the potentially affected environment (physical, ecological and socioeconomic aspects) and degree which the resources of the human environment are effected both short and long-term. *Short-term* effects include those impacts that would occur during implementation of any reasonable alternative, as well as transient ecological effects that can be expected to occur during the first one to three years. *Long-term* effects might be expected to persist for up to ten years and beyond. For purposes of this analysis, significance definitions (*i.e.,* unaffected, less than significant, and significant) have been developed to assess the magnitude of effects for all of the affected resource categories resulting from implementing any of the reasonable alternatives:

- ***Unaffected*:** A resource was not affected or the effects were not appreciable; changes were not of any measurable or perceptible consequence.
- ***Less than significant*:** Effects on a resource were detectable, although the effects were localized, small, and short-term.
- ***Significant:*** Effects on a resource were readily detectable and obvious, localized or regional, large, and long-term.

Table 3-1. Summary of Environmental Consequences

Resource	No Action	Reasonable Alternatives*
Climate	Unaffected	Less than significant
Land Cover: Islands, Wetlands, & Floodplains	Negative	
Water Resources		
Soils	Unaffected	Unaffected
Cultural & Historical Resources	Less than significant	Less than significant
Air Quality		
Noise		
HTRW		
Fish	Negative	
Wildlife		
Federally Listed Species	Less than significant	
Invasive Species	Unaffected	Unaffected
Economic Factors		
Social Factors, including Environmental Justice		

*Alternatives 2, 3, and 4 were combined due to similar effects

3.1 Historical Setting

The Illinois River arises at the confluence of its headwater basins, the Des Plaines and Kankakee, and winds southwesterly through northern Illinois. Along this stretch, known as the "Upper Illinois," currents are swift because the river flows down a fairly steep incline through a narrow, young valley. The upper river flows to Hennepin in Putnam County, where it encounters the "Great Bend," which marks the beginning of the middle river. Here, the Illinois River turns southward and flows past the cities of Peoria and Beardstown with a gentle gradient through a broad, shallow valley 3 to 6 miles wide, the ancestral Mississippi River Valley. The banks along this stretch of the Illinois River are lined with dozens of lakes and backwaters. The lower river extends from Beardstown to the confluence with the Mississippi River at Grafton and was once rich in backwaters (USACE, 2007). Twin Islands is located in the lower river section of the Illinois River.

Using aerial imagery, Twin Island is smaller today than historically due to erosion. Little Twin Island has almost lost half its area due to erosion and is in danger of disappearing altogether. Nearly all vegetation on Little Twin Island has been eliminated due to erosion. From 1975 to current, the side channels continued to decrease in width while the islands (except Little Twin) have maintained their size.

The Twin Islands complex, along the right descending bank 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.

3.2 Climate

3.2.1 Potentially Affected Environment

The study area has a continental climate, which means that its winters are cold and dry and its summers are warm and wet. The transition season of spring tend to be very wet, while the fall seasons tend to be dry. The average temperature for the year is about 50 degrees Fahrenheit, with an average high temperature 90 degrees Fahrenheit occurring in July, and an average low temperature of about 18 degrees Fahrenheit in January. The average yearly rainfall at Kampsville is approximately 39 inches, and snowfall is approximately 18 inches.

3.2.2 No Action Alternative: Future Without Project

A climate change analysis was performed using the non-stationarity detection tool and the USACE Climate Hydrology Assessment Tool. A detailed description of the climate change analysis can be found in Appendix F. Based on the results of this assessment, including considerations of observed precipitation, temperature, and streamflow in the basin, there is not strong evidence suggesting increasing peak annual streamflow would occur in the future within the region as a result of climate change. Furthermore, there is only some consensus the region might see a moderate increase in temperature and precipitation in the Upper Mississippi River and Illinois River regions. There is also substantial uncertainty tied to the models used to forecast future streamflow in the basin; therefore, the effects of climate change can be considered within the standard uncertainty bounds associated with the hydrologic/hydraulic analysis being conducted as part of this study.

3.2.3 Reasonable Action Alternatives

Implementation of any of the reasonable action alternatives would reduce shoreline erosion and provide aquatic diversity which would provide additional resilience to climate change within the Lower Illinois River.

3.3 Land Cover: Islands, Wetlands and Floodplain

3.3.1 Regulatory Framework

This section addresses compliance for the following applicable environmental laws and regulations:

- Executive Order (EO) 11990, Protection of Wetlands
- EO 11988, Floodplain Management
- Fish and Wildlife Coordination Act (draft Fish Wildlife Coordination Act Report will be provided in Appendix J, *Fish and Wildlife Coordination Act*)
- Clean Water Act Section 404: Specific impacts to water quality due to displacement of water bodies by fill materials, stockpiling, and hydro-modifications will be described in the 404(b)1 evaluation (See Appendix B).
- Clean Water Act Section 401
- Clean Water Act Section 402

- Section 906(d) of WRDA 1986

Impacts to islands, wetlands, and floodplains would be considered significant if substantial conversion or loss of islands, wetlands, or floodplains would occur due to the reasonable action alternatives.

3.3.2 Potentially Affected Environment

Historically, the Illinois River was a complex mosaic of prairies, forests, wetlands, marshes, and clear water lakes (Mills et al. 1966; Talkington 1991; Theiling 1999; Theiling 2000) enhanced by the annual flood pulses that advance and retreat over the floodplain (Sparks and Lerczak, 1993). The pre-settlement landscape of the Illinois River Basin was approximately 66 percent prairie and 29 percent forest. Open water and wetlands accounted for 4 percent of the basin (USACE, 2007). The mosaic of land cover types were maintained by disturbance (i.e., flooding and fire). The human-induced alternation or elimination of the disturbance regime has resulted in a more homogeneous environment, with an associated loss in ecological complexity and integrity. The majority of the Illinois River Basin floodplain is used for row-crop agriculture. The remaining wetlands and floodplain are important because they provide important resting, breeding, and foraging habitats for fish and wildlife.

Figure 3-1 depicts the land cover classes for the study area, with islands classified as woody wetland and the adjacent floodplain classified as woody wetland, emergent herbaceous wetland, and deciduous forest dominated by willow, cottonwood and silver maple. The aquatic habitat cover types in the study area includes main channels, main channel border open water, and side channel. The upstream end and river side of the Twin Islands are currently experiencing significant erosion from barge traffic wave action and high flow currents. Deposition along the bank side of the island continues to narrow the side channel.

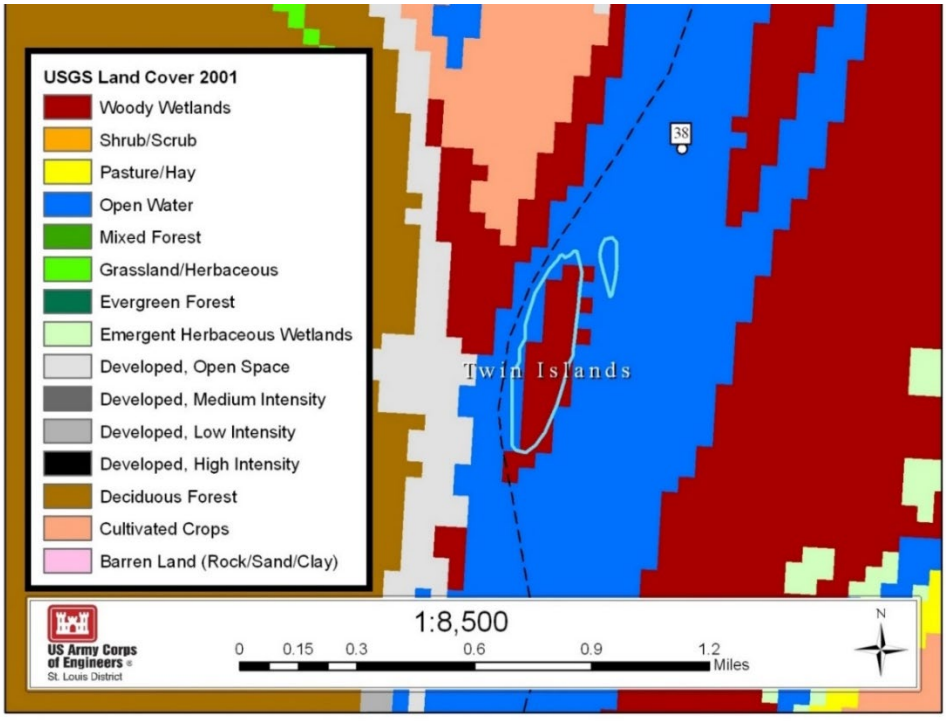


Figure 3-1 Land cover in the vicinity of Twin Islands. Data courtesy of USGS.

3.3.3 No Action Alternative: Future Without Project

Without action, the island heads will continue to erode, and Little Twin Island would likely erode completely. The wooded wetland at the head of the islands 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. The quality of island, wetland, and floodplain habitats within the study area would continue to decline which would lead to reduction in quality of these habitats within the Lower Illinois River. The gradual deterioration would have negative impact on management of the study area, and continued erosion of Little Twin Island would ultimately lead to loss of this important island habitat.

3.3.4 Reasonable Action Alternatives

The reasonable action alternatives seek to protect the existing islands by modifying the flow in the study area to reduce erosion and/or through direct placement of rock to armor the shoreline. Providing stone protection would slow or prevent the erosion of the wooded wetlands on the islands. Twin and Little Twin Islands would continue to be distinctive features within the floodplain landscape. Maintaining the islands would improve habitat for fish and wildlife.

Islands are distinctive features within the floodplain landscape. Past actions have degraded islands within Lower Illinois River. Limited opportunities for new island formation to occur naturally is unlikely due to the USACE continued operation and maintenance of the 9-foot channel study. No negative cumulative impacts would be expected from any of the considered action alternatives, combined with present actions by others, and reasonably foreseeable future actions.

The reasonable action alternatives should have positive long-term benefits to the island, wetlands, and floodplain habitats within the study area and would contribute to improving habitat within the Lower Illinois River.

3.3.5 Environmental Commitments

To minimize impacts to island, wetland, and floodplain resources, the following environmental commitments shall be implemented:

1) Best Management Practices (BMPs) would be implemented to ensure adjacent wetlands and waters of the United States are not impacted by runoff during construction. BMPs are effective, practical, structural or nonstructural methods which prevent or reduce movement of sediment, nutrients, pesticides, and other pollutants from the land to surface or ground water, or which otherwise protect water quality from potential adverse effects of construction activities. BMPs would be used to minimize construction related impacts along the entire study area.
2) All material used for construction would be free from contaminants
3) All material would be placed by qualified contractors using the appropriate equipment to minimize impacts to wetlands areas and equipment would be properly maintained.

3.4 Water Resources

3.4.1 Regulatory Framework

This water resources section addresses compliance for the following applicable environmental laws and regulations:

- Clean Water Act Section 401, 402 and 404 (see Section 5.5 3 and Appendix B for full details):

Impacts to water resources would be considered significant if an alternative caused long-term or permanent violation of state water quality standards or otherwise substantially degraded water quality.

3.4.2 Potentially Affected Environment

On January 1, 1900, the Chicago and Sanitary and Ship Canal opened. This canal connected the Des Plaines and Illinois Rivers to Lake Michigan and as a result gave the City of Chicago a means of flushing untreated domestic sewage and industrial wastes away from Lake Michigan into the Illinois River system by diverting water from Lake Michigan into the Illinois River. In addition to this major hydrologic alteration, current storm flows are higher than occurred under pre-development conditions due to land use changes and increased channelization in urban and rural areas. These hydrologic changes tend to be most apparent in the smaller tributaries to the Illinois River.

Navigation and dams have altered the hydraulics of the Illinois River. During the 1930s, six navigation dams were built along the Illinois River, eventually a total of 8 locks and dams were constructed. These dams, constructed to create a 9-foot channel for commercial navigation, had a major impact on the river. This effect was not uniform along the length of the river. The upper dams raised water levels and created pools, slowing the rate of the flow. The lower dams stabilized water levels, but did not create pools or slow river flows. Each dam keeps the water level in the pool upstream high enough to ensure a 9-foot navigation channel and, as a result, the floodplains immediately upstream of each dam are more continuously flooded than they would be under undammed conditions. Short-term water level fluctuations over the course of a day have been implicated in degradation of the Illinois River ecosystem function because the stress of that rapid changes in river conditions place on plants and animals. The magnitude and frequency of water level fluctuations have notably increased in portions of the Illinois River (USACE, 2007).

The pollution history of the Illinois River closely parallels population growth and hydrologic modifications by the very nature of the most influential project, the Chicago Sanitary and Ship Canal. Historically, untreated waste and its adverse effects progressed rapidly downstream from Chicago. And historic accounts describe the river during warm summer months as completely anoxic and extirpated (USACE, 2007).

The Illinois River within the vicinity of the study area (Assessment ID IL-D-01 is listed in the Illinois 2018 303(d) list for impairment for mercury and polychlorinated biphenyls based on fish consumption

(Available online at: https://www2.illinois.gov/epa/Documents/iepa/water-quality/watershed-management/tmdls/2018/303d-list/appendix-a-2.pdf. Accessed on 4 August 2020).

3.4.3 No Action Alternative: Future Without Project

Without action, navigation induced shoreline erosion would continue degrading the island and aquatic habitats. The water quality in the area would be similar to existing conditions into the future and high suspended sediment is expected to continue. The slackwater (low flow area) aquatic habitat within the study area would continue to degrade due to loss of flow and depth and loss of Little Twin Island itself. The conversion of habitat to more main channel habitat would continue and have adverse impacts for the study area to provide important slackwater habitat within the Lower Illinois.

3.4.4 Reasonable Action Alternatives

The reasonable action alternatives would increase scour and depositional diversity in the reach and maintain valuable aquatic and island habitat in the lower Illinois River. They would likely result in minor short-term decreases in water quality due to localized increases in turbidity resulting from construction activities. Temporary, minor water quality impacts would occur due to increased nutrient loading, miscellaneous debris, and accidental spills from construction equipment. The reasonable action alternatives with notched bullnose (Alternative 2) and winged-bullnose (Alternative 3) rock structures would directly modify the hydraulics of the flow within the study area. These modifications would lead to reduced shoreline erosion and improved sediment transport.

Construction activities can create indirect effects to water quality through uncontrolled runoff or poor sediment control practices during construction, which could lead to alterations to hydrology, water column impacts, alteration of patterns, water circulation, and normal water fluctuations, in addition to changes to salinity and nutrient loads in the water. After construction, the conditions would be expected to stabilize, allowing for suspended sediments to settle and vegetation to recolonize the area.

Past actions have altered the hydrology of the Mississippi River through lock and dam construction. Many cumulative effects are discussed in the Navigation Study (USACE, 2004) and will not be repeated here. In summary, the assessment acknowledged the tremendous changes brought about by the construction of the 9-foot Channel Project in conjunction with other impacts occurring throughout the watershed resulting in declines of backwaters and side channel habitats.

Island mosaics are an important but dwindling resource on the river. Past, present, and future actions are likely to continue to stress hydrology and hydraulics that promote the natural process for island/side channel development. However, present and future restoration actions, including the considered action alternatives, seek to offset these past and ongoing negative actions to hydrology and hydraulics and restore the natural ecosystem processes. **Overall, the impacts to water resources from the reasonable action alternatives would be less than significant. The reasonable action alternatives would improve depth, flow, and bathymetric diversity enhancing aquatic habitat within the Lower Illinois River.**

3.4.5 Environmental Commitments

To minimize impacts to water resources, the following environmental commitments shall be implemented:

1) All appropriate and practicable steps would be taken, through application of the recommendations of 40 CFR Part 230, subpart H, 230.70-230.77, to minimize adverse effects of the discharge for all proposed construction activities.
2) Prior to construction a SWPPP would be prepared to address potential impacts to water quality from construction equipment, construction crews, and construction practices. The SWPPP would include required BMPs to reduce run-off, prevent accidental spills, and otherwise minimize the potential for impacts to water quality.
3) Construction BMPs (*e.g.,* sediment curtain) would be in place during construction.
4) Dust suppression methods such as watering of construction sites would be in place during construction.
5) Containment of fuel and construction-required chemicals would be in place during construction.

3.5 Soils, including Prime and Unique Farmlands

3.5.1 Regulatory Framework

This soils resources section addresses compliance for the following applicable environmental laws and regulations:

- Farmland Protection Policy Act of 1981 (7 USC 4201 *et seq.*) 7 CFR 657-658
- 7 USC 4201, Prime and Unique Farmland
- Soil Conservation Act (16 USC 590(a) *et seq.*)
- Section 402 Clean Water Act

Impacts to soils would be considered significant if an alternative resulted in substantial conversion or loss of prime farmland soils.

3.5.2 Potentially Affected Environment

The soils in the study area are comprised of Darwin silty clay. The Darwin soils series consists of very deep, poorly and very poorly drained, very permeable soils formed in clayey alluvium on floodplains. The study area contains no soils designated as prime or unique farmland (Farmland Protection Policy Act, 7 CFR Part 658).

3.5.3 No Action Alternative: Future Without Project

No major impacts to soils would be expected. Sediment loads from the Illinois River may be deposited within the study area during flooding.

3.5.4 Reasonable Action Alternatives

The reasonable action alternatives would have negligible effect to soils. The island protection measures may indirectly promote soil development over time if vegetation establishes, captures organic matter, and builds soil, but overall the considered action alternatives would have less than significant on soils.

No soils in the study area are designated as prime farmland; therefore, no reasonable action alternative would impact prime farmland.

3.6 Cultural & Historical Resources

3.6.1 Regulatory Framework

This cultural and historic resources section addresses compliance for the following applicable environmental laws and regulations:

- National Historic Preservation Act Section 106
- Cultural Resources Management Presidential Memorandum regarding Government to Government Relations (April 29, 1994)
- EO 13007, Indian Sacred Sites
- EO 11593, Protection and Enhancement of the Cultural Environment
- Native American Graves Protection and Repatriation Act 43 CFR 10
- Archaeological resources Protection Act of 1989
- National Register of Historic Places

Impacts to cultural resources would be considered significant if an alternative resulted in a substantial adverse effect to a historic property such that implementation of the alternative would result in the destruction of the property or the loss the property's eligibility.

3.6.2 Potentially Affected Environment

Archaeological surveys conducted by the Center for American Archaeology in the late 1970s did not identify any potentially significant archaeological remains in the study area. Additionally, on site field inspections of the shoreline cut banks of the Twin and Little Twin Islands in 2006 by Dr. F. Terry Norris, St. Louis District Archaeologist, and again in 2020 by Meredith Hawkins Trautt, St. Louis District Archaeologist, also 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.

3.6.3 No Action Alternative: Future Without Project

No cultural and historic resources have been observed or identified in the study area to date. Therefore, this alternative would have less than significant effect on cultural and historic resources.

3.6.4 Reasonable Action Alternatives

There is no known prehistoric occupation of the study area lands. Less than significant impacts to cultural and historic resources are anticipated with any of the considered action alternatives.

On 10 August 2020, a letter was sent to the Illinois State Historic Preservation Officer (SHPO), initiating consultation under Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA). The letter report outlined the proposed alternatives and indicated that the Illinois Inventory of Archaeological Sites and historic maps, had been consulted and no known historic properties would be adversely affected. No historic properties were identified during an archaeological survey conducted by the Center for American Archaeology in the 1970s or site field inspections conducted by St. Louis District archaeologists in 2006 and 2020.

The District received a letter from the IL SHPO on 1 September 2020 with no objection to the proposed project. A copy of the correspondence is included in Appendix A, *Correspondence.* If, however, cultural resources were to be encountered during construction, all work would stop in the affected area and further consultation would take place as per 36 CFR 800-13.

Dated 21 August 2020, a tribal consultation letter outlining the proposed project was sent to the 25 federally recognized tribes affiliated with the St. Louis District. At this time no responses have been received. **Therefore, the reasonable action alternatives would have less than significant impacts on historic and cultural resources.**

3.6.5 Environmental Commitments

To minimize impacts to cultural and historic resources, the following environmental commitments shall be implemented:

1) Should the project alternatives change from those discussed during initial consultation, or are not implemented within two years, consultation will be reinitiated with the SHPO.
2) Should the alternatives change from those discussed during initial tribal consultation, or are not implemented within two years, consultation will be reinitiated with the tribes.
3) USACE will develop a programmatic agreement, if necessary, pursuant to 36 CFR 800.14(b) in consultation with the SHPO, Tribes, and other interested parties.

3.7 Air Quality

3.7.1 Regulatory Framework

This air quality resources section addresses compliance for the following applicable environmental laws and regulations:

- Clean Air Act
- General Conformity Rule

Impacts to air quality would be considered significant if an alternative resulted in emissions that exceeded the General Conformity de minimis thresholds associated with the Clean Air Act.

3.7.2 Potentially Affected Environment

The U.S. Environmental Protection Agency (USEPA) has identified standards for 7 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, Illinois currently meets all USEPA air quality standards (Available online at: https://www3.epa.gov/airquality/greenbook/anayo_il.html; accessed on 4 August 2020).

3.7.3 No Action Alternative: Future Without Project

Air quality within the study area would likely remain similar to existing conditions.

3.7.4 Reasonable Action Alternatives

Minor, temporary increases in airborne particulates are expected to occur as a result of mobilization and use of diesel construction equipment. These increases would be less than significant. No long-term air quality standard violations are anticipated for any considered action alternative. None of the considered action alternatives are expected to have any long term adverse effects on air quality of Greene County, Illinois. The indirect effects to air quality of implementing the considered action alternatives would be related to the emissions from transportation of personnel and equipment to and from the job site on a daily basis until the completion of construction. The limited temporal and quantitative contribution of emissions from the considered action alternatives to cumulative air emissions from other area sources such as vehicles and boat traffic in Greene County would not be expected to alter the attainment state of the county.

Air emissions from the reasonable action alternatives would be temporary and would have less than significant impacts to air quality in the regions and are not expected to cause or contribute a violation of Federal or State ambient air quality standards.

3.7.5 Environmental Commitments

To minimize impacts to air quality, the following environmental commitments shall be implemented:

1) Dust suppression methods would be implemented to minimize fugitive dust emissions, as needed.
2) Standard construction BMPs would be used during construction of the considered action alternatives, including proper and routine maintenance of all vehicles and other construction equipment to ensure that emissions were within the design standards of all construction equipment.

3.8 Noise

3.8.1 Regulatory Framework

This noise section addresses compliance for the following applicable environmental laws and regulations:

- Noise Control Act of 1972, as amended by Quiet Communities of 1978
- National Environmental Policy Act

Impacts to noise would be considered significant if an alternative resulted in:

- Substantial permanent increase in ambient noise levels for adjacent sensitive receptors
- Exposure of persons to or generation of noise and vibration levels in excess of standards established by local/regional noise ordinances or applicable standards of other agencies.

3.8.2 Potentially Affected Environment

Noise levels surrounding the study area are varied depending on the time of day and season. The current human activities causing elevated noise levels in the vicinity of the study area includes recreational boat traffic and commercial navigation. A pleasure boat or barge traffic noise range can typically be between 65-115 decibels (dB) (USEPA, 1974). Infrequent horn blasts may be in excess of 120 dB at one foot. Noise during the hunting season may occur with typical 12 gauge shot gun at 130 dB. All of these may contribute to noise levels within the study area.

3.8.3 No Action Alternative: Future Without Project

Noise impacts would be impacts would be similar to those under existing conditions.

3.8.4 Reasonable Action Alternatives

Noise levels associated with construction activities would have the potential to temporarily impact wildlife that may be present in the area. After construction completion, noise levels would be expected to return to pre-action levels. **Therefore, the reasonable action alternatives would have less than significant impacts on noise.**

3.9 Hazardous, Toxic, and Radioactive Waste (HTRW).

3.9.1 Regulatory Framework

Under ER 1165-2-132 the type and extent of HTRW contamination within the vicinity of the study area are assessed during the feasibility phase to inform the choice among alternative plans. USACE policy is to avoid the use of project funds for HTRW removal and remediation activities.

This HTRW section addresses compliance for the following applicable environmental laws and regulations:

- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act

- Solid Waste Disposal Act
- Local and/or State continuing obligations of HTRW

Impacts associated with HTRW would be considered significant if an alternative resulted in:

- The creation of a public health hazard involving the use, production, dispersal, or disposal of a hazardous material posing a health risk to people, animal, or plant populations.
- The creation of a hazard to the public or environment through reasonably foreseeable upset or accident conditions involving the release of a hazardous material.

3.9.2 Potentially Affected Environment

The U.S. Army Corps of Engineers regulations (ER-1165-2-132, ER 200-2-3) and Division policy requires procedures be established to facilitate early identification and appropriate consideration of potential HTRW in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting a Phase I Environmental Site Assessment (ESA). USACE specifies that these assessments follow the process/standard practices for conducting Phase I ESA's published by the American Society for Testing and Materials (ASTM).

The purpose of a Phase I ESA is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e. Recognized Environmental Conditions, RECs) within the scope of the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. Current policy is to avoid known HTRW to the extent practicable or until hazard risks and potential liability are mitigated.

A Phase I ESA was conducted for the Twin Islands study area in September 2020 using methods outlined by ASTM 1527-13. This included a records review, physical site visit, and communications with persons knowledgeable of the study area and adjoining properties. Generally, the study area contains no major sites of interest, which pose significant HTRW concerns. The environmental impact for the migration of off-site contaminants onto the project property is negligible. Therefore no special considerations are being recommended for the project to proceed to construction. It is however recommended that a Site Health and Safety Plan, and a Quality Control Plan are submitted by the awarded contractor, discussed internally by USACE personnel, and implemented to prevent environmental hazards from being developed during construction. CEMVS EC-EQ should be contacted immediately if future development of the property discovers hazardous or toxic materials.

There were no Recognized Environmental Conditions discovered during the Phase I ESA. The completed Phase I ESA can be reviewed in Appendix D, *Hazardous, Toxic, and Radioactive Waste.*

3.9.3 No Action Alternative: Future Without Project

Under the No Action, HTRW would be expected to be similar to existing conditions into the future.

3.9.4 Reasonable Action Alternatives

No HTRW would be expected**.** A short-term risk of fuel spill during construction activities would exist. The probability of encountering HTRW in the study area would be low; **therefore, less than significant effects would be expected.**

3.9.5 Environmental Commitments

To minimize impacts to HTRW, the following environmental commitments shall be implemented:

1) A Health and Safety Plan and Quality Control Plan shall be developed by the awarded contractor and reviewed by USACE personnel prior to construction. Plans should address Best Management Practices for the handling and disposal of HTRW.
2) USACE should be contacted immediately if future development of the s area discovers HTRW. USACE shall work with the awarded contractor to determine appropriate methods for handling and disposal of HTRW.

3.10 Fish

3.10.1 Regulatory Framework

This fisheries resources section addresses compliance for the following applicable environmental laws and regulations:

- Fish and Wildlife Coordination Act (draft Fish Wildlife Coordination Act Report is provided in Appendix J, *Fish and Wildlife Coordination Act*)

Impacts to fisheries would be considered significant if an alternative resulted in substantial loss of desired aquatic habitat for native species or the direct loss of fishes within the study area as a result of implementing any of the considered action alternatives.

3.10.2 Potentially Affected Environment

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 include paddlefish and sturgeon. The majority of these fish are migratory by nature and use a diversity of river habitats, flowing channel habitats, side channels, and backwater areas.

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).

The past actions within the Illinois River Basin have adversely impacted the fisheries resources by disconnecting the river from it floodplain, altering hydrology, and sedimentation. These actions have led to loss of access to important habitat for spawning, rearing, and foraging. 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. Actions by others would continue to effect fisheries in the Illinois River. Navigation induced shoreline erosion would continue to erode islands and suspend sediments degrading fisheries habitat. Sedimentation would continue to fill in important off-channel areas degrading fisheries habitat.

3.10.3 No Action Alternative: Future Without Project

The fisheries resources throughout the study area would likely continue their gradual decline due to poor aquatic habitat.

3.10.4 Reasonable Action Alternatives

Negligible long-term direct construction-related impacts on fisheries and aquatic habitat are anticipated to occur at construction site. Potential direct effect on fisheries would be associated with the placement of rock. Non-mobile organisms would be directly impacted due to direct burial. Bottom-dwelling fishes and sessile invertebrates that utilize edge habitat for foraging and/or spawning would have the most of the impacts associated with revetment placement. However, rock fill may result in beneficial impacts on fisheries by providing protection to larval and juvenile fishes as nursery habitat and/or providing additional habitat for foraging larger fish. The hard substrate would provide habitat for sessile filter feeders.

The proposed enhancement measures of the study are designed to positively impact river fish populations. The increase in flow, scour, and depositional diversity in the study area would add much-needed habitat diversity to the site. The considered action alternatives would provide high quality nursery, feeding, and overwintering habitat for fishes.

Less than significant, short-term, construction-related impacts on fisheries and adjacent water bodies may include decreased dissolved oxygen levels in the waters immediately surrounding the construction site, increased turbidity due to construction runoff and sedimentation, and increased water body temperature due to increased suspended solids producing during construction that could absorb incident solar radiation. Temporary, minor water quality impacts could occur, miscellaneous debris, and accidental spills may occur from construction equipment. Any of these localized changes in water quality could cause fish to temporarily avoid impacted areas and seek refuge in nearby suitable habitat. After construction, conditions would be expected to stabilize and return to conditions similar to pre-construction.

Direct cumulative impacts on fisheries and fish habitat in the study area are associated with the actual construction activities. These impacts would be primarily during the construction period. The total area within the study area potentially affected would be small and only affected temporarily. The impacts from construction would be very slight relative to the magnitude of historical changes that have occurred within the Illinois River. Past, present, and future human-induced changes to fisheries habitat in the vicinity of the study area would continue to stress the native fish, but present and future restoration actions, including the considered action alternatives, seek to offset these past negative actions to fisheries resources. No negative cumulative impacts throughout the study area would be expected. The considered action alternatives should have long-term benefits to fisheries resources in the study area and in the Lower Illinois River. **Overall, the reasonable action alternatives are expected to result in enhanced fisheries habitat by maintaining important aquatic habitat in the study area.**

3.10.5 Environmental Commitments

To minimize impacts to fisheries resources, the following environmental commitments shall be implemented:

1) Direct and indirect impacts associated with construction would be minimized by the use of BMPs to control sediment transport.
2) Continued coordination with natural resources agencies to ensure final design of features enhance fish habitat to the fullest extent practicable.

3.11 Wildlife

3.11.1 Regulatory Framework

This wildlife resources section addresses compliance for the following applicable environmental laws and regulations:

- Fish and Wildlife Coordination Act (draft Fish Wildlife Coordination Act Report will be provided in Appendix J, *Fish and Wildlife Coordination Act*)
- Bald and Golden Eagle Act of 1940, as amended
- Migratory Bird Treaty Act of 1918
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Impacts to wildlife would be considered significant if an alternative resulted in substantial loss of native wildlife habitat or the direct loss of wildlife within the study area as a result of implementing the considered action alternatives.

3.11.2 Potentially Affected Environment

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 in the vicinity of the

study area. 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. 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 2007).

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).

There are no known bald eagle active nests within the study area. The nearest known eagle sightings have occurred approximately 0.5 miles west of Fisher Island. The Illinois Natural Heritage Database lists a record of a bald eagle nest, approximately 4 miles north of Wing Island in Greene County.

3.11.3 No Action Alternative: Future Without Project

The wildlife resources throughout the study area would likely continue their gradual decline due to poor aquatic habitat. Bald eagles are expected to continue to occur within the vicinity of the study area during the winter months.

3.11.4 Reasonable Action Alternatives

Maintaining the Twin Islands would protect habitat that benefits many species of shorebirds, wading birds, raptors, songbirds, mammals, reptiles, amphibians, invertebrates, and fish. To date no known active bald eagle nests occur within the study area. Wildlife may be temporarily stressed as a result of construction from increases in noise. The impact from noise would be temporary and cease following construction completion. Mobile wildlife species would be expected to leave the area during construction activities. Mortality rates for smaller, less mobile wildlife may increase due to direct burial due to rock placement along the shoreline of Twin Island (Alternative 4). Most species of mobile organisms would likely relocate to nearby similar habitat. Wildlife movement would not results in impacts since there is available habitat nearby.

The presence of construction-related activities, machinery, and noise would be expected to cause wildlife to avoid the area during construction; therefore indirect impacts would occur on wildlife currently inhabiting outside the study area, as wildlife from the study area may migrate to the adjacent habitat. In the long term, all considered action alternatives would protect forested island habitat and

shallow backwater habitat which are isolated from terrestrial predator providing important nesting and foraging habitats.

No negative cumulative impacts would be expected from considered action alternatives, combined with other present actions by others, and reasonably foreseeable future actions. The considered action alternatives should have positive long-term benefits to wildlife by improving island habitat in the Lower Illinois River. **Overall, wildlife resources would benefit from the reasonable action alternatives by restored habitat.**

3.11.5 Environmental Commitments

To minimize impacts to wildlife resources, the following environmental commitments shall be implemented:

- Recommendations to minimize potential project impacts to eagles and their nests are provided by the USFWS in their National Bald Eagle Management Guidelines and these recommendations would be followed during construction of the considered action alternatives.
- USACE conducts pre-construction bald eagle nest survey. Apply for incidental take permit if needed.

3.12 Federally Listed Threatened and Endangered Species

3.12.1 Regulatory Framework

This Threatened and Endangered Species section addresses compliance for the Endangered Species Act Section 7 (See Appendix I, *Biological Assessment* for full compliance).

Significant impacts to Threatened and Endangered Species are:

- A direct, adverse effect on a species protected under the ESA, or an unmitigated loss of critical habitat that diminishes regional population
- An unmitigated net loss of habitat value or sensitive habitat of special biological significance
- A substantial loss to the population of any protected species.

3.12.2 Potentially Affected Environment

The Endangered Species Act consultation for the restructured UMR-IWW Feasibility Study used a tiered Endangered Species Act consultation framework. The Tier 1 Biological Opinion (BO), *Biological Opinion of the Upper Mississippi River-Illinois Waterway System Navigation Study,* was completed in August 2004. That BO evaluated the effects to listed species at the program level. A site-specific Biological Assessment (BA) was prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (15 U.S.C. 1536 (c)) located in Appendix I, *Biological Assessment*. Table 3-2 summarizes the federally listed species potentially occurring in the study area.

Table 3-2 Federally listed species potentially occurring in the vicinity of the study area.

Species	Status	Habitat

Indiana bat (*Myotis sodalis)*	Endangered	Hibernates in caves and mines; maternity & foraging habitat: small stream corridors with well-developed riparian woods; upland & bottomland forests
Northern long-eared bat (*Myotis septentrionalis)*	Threatened	Hibernates in caves and mines; swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
Decurrent false aster (*Boltonia decurrens*)	Threatened	Disturbed alluvial soils

3.12.3 No Action Alternative: Future Without Project

Degradation and loss of important fish and wildlife habitat would continue due to human and natural forces. Many different fish and wildlife species use these habitats for shelter, nesting, feeding, roosting, cover, nursery, and other life history requirements. The loss and deterioration of island/side channel habitats would continue to adversely impact all listed species in and near the vicinity of the study area. It is assumed the positive impacts of federal, state, local, and private restoration and recovery projects and programs would offset, to some degree, the adverse cumulative impacts on listed species.

3.12.4 Reasonable Action Alternatives

All reasonable action alternatives are expected to have identical impacts to federally listed species. USACE has made a "no effect" determination on Decurrent false aster since it has not been observed to occur in the study area, and a "not likely to adversely affect" determination for Indiana bat and Northern long-eared bat due to disturbance during construction to potential foraging and roosting habitat. Appendix I, *Biological Assessment*, provides additional details on impacts to federally listed species. Table 3-3 summarizes the impacts from the considered action alternatives.

Overall, the reasonable action alternatives, would be less than significant for federally listed species.

Table 3-3. Effects Determination on Federally Listed Species

Species	Status	Effects Determination
Indiana bat (*Myotis sodalis)*	Endangered	May affect, but not likely adversely affect
Northern long-eared bat (*Myotis septentrionalis*	Threatened	May affect, but not likely adversely affect
Decurrent false aster (*Boltonia decurrens*)	Threatened	No effect

3.12.5 Environmental Commitments

To minimize impacts to threatened and endangered species, the following environmental commitments shall be implemented:

1) Use specific construction times to avoid threatened and endangered species. See Appendix I, *Biological Assessment,* for details.
2) BMPs to reduce sedimentation and erosion into adjacent water bodies during construction.

3.13 Invasive Species

3.13.1 Regulatory Framework

This invasive species section addresses compliance for the following applicable environmental laws and regulations:

- EO 13112, Invasive Species
- EO 13751, Safeguarding the Nation from the Impacts of Invasive Species

Impacts to invasive species would be considered significant if an alternative resulted in a substantial spread or introduction of invasive species into the study area a result of implementing the considered action alternatives.

3.13.2 Potentially Affected Environment

Invasive species threaten biodiversity, habitat quality, and ecosystem function. These biological invasions produce severe, often irreversible impacts on agriculture, recreation, and natural resources. They are the second-most important threat to native species, behind habitat destruction, having contributed to the decline of 42 percent of U.S. endangered and threatened species (USACE, 2007). Invasive species compete with native species for habitat and food. Some invasive species are less sensitive to the changes that have taken place in the Illinois River Basin than the native species.

The Illinois River has been severely degraded due to invasive fish species. In the Illinois River, the common carp is so plentiful and has been present for so long that few people realize it is an invasive species. Grass carp has been increasing in the UMRR-LTRM and commercial catch. Asian carp continue to grow rapidly in the Illinois River. These species compete for the same food as gizzard shad and paddlefish, and Asian carp are known to occur in the vicinity of the study area.

Non-native plants are also changing the landscape and replacing native species. Non-native invasive plants common to the Illinois River Basin include read canary grass, purple loosestrife, garlic mustard, Japanese and shrub honeysuckle, multiflora rose, and buckthorn. Once established, these plants can be difficult and costly to control.

Other invasive species include zebra mussels, round gobies, snakehead, and at least two exotic zooplankton species that are entering the Illinois River system from Lake Michigan. Ongoing efforts by the USACE, Chicago District, are helping block the movement of invasive species between the Illinois River and Lake Michigan.

3.13.3 No Action Alternative: Future Without Project

Juvenile and adult Asian carp are known to occur in the study area. Without the project, Asian carps are expected to continue to use the study area. The existing invasive species found in the study area would likely continue and new invasive species, yet to be identified, may become established in the future.

Federal, state, local laws, programs, and regulations aimed at invasive species management and control would be expected to continue.

3.13.4 Reasonable Action Alternatives

Asian carps are expected to continue to the study area. It is expected that the existing invasive species found in the study area would not be effected by the considered action alternatives. Invasive species are expected to persist with or without any of the considered action alternatives. With the considered action alternatives, improving the aquatic habitat needed by native species should assist the native fishes in competing with Asian carps for shared resources.

Overall, the reasonable action alternatives would be unaffected by invasive species.

3.13.5 Environmental Commitments

To minimize impacts to invasive species, the following environmental commitments shall be implemented:

- During construction, steps would be taken to prevent the introduction and spread of invasive species to stay in compliance with EO 13751 (*Safeguarding the Nation from the Impacts of Invasive Species*) and EO 13112 (*Invasive Species*).

3.14 Socioeconomics

3.14.1 Regulatory Framework

This section addresses compliance for the following applicable environmental laws and regulations:

- NEPA
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations
- EO 13166, Improving Access to Services with Persons with Limited English Proficiency
- CEQ 1508.27(b)(3)
- National Environmental Policy Act, 23 USC Section 109(h)
- Wild and Scenic Rivers Act
- 1988 Visual Resources Assessment Procedure

Impacts to recreation would be considered significant if an alternative resulted in a substantial effect to the long-term provision of, or access to, recreational uses in the area.

Impacts to visual (aesthetics) would be considered significant if an alternative substantially degraded the existing visual character or quality of the site and its surroundings.

Impacts to environmental justice would be considered significant if the considered action alternative resulted in a disproportionate, high adverse environmental impact to a minority or low-income population.

Impacts to economic factors would be considered significant if the considered alternative resulted in substantial shift in regional spending or earning patterns.

3.14.2 Potentially Affected Environment

Economic Base. According to the American Community Survey (2018) dataset (www.data.census.gov), Greene County, Illinois, the median household income was $46,052. Approximately 14.4% of the population in Greene County, Illinois is below the poverty line.

Education. Based on the American Community Survey (2018) dataset (www.data.census.gov), an estimated 44% of the population is a high school graduate only, 31% have some college, and 12% hold a Bachelor's degree or higher.

Employment/Unemployment. Based on the American Community Survey (2018) dataset (www.data.census.gov), approximately 57.9% of the county population is in the labor force (between ages 16 and 64). The primary occupations in the county include production (9.9%), business management (10.0%), sales and office (19.2%), and service occupations (23.4%). The unemployment rate for Greene County, Illinois as of June 2020 is 8.9% (https://fred.stlouisfed.org/series/ILGRURN).

Population Demographics. According to the 2010 Census, Greene County, Illinois, has a total population of 13,218 (wwww.data.census.gov). Median age was 42.9 years, with 5.0% of the population under 5 years old, and 18.8% of the population over the age of 65. The population within the county is approximately 97.0% white, 1.5% black, 0.7% Hispanic or Latino, 0.3% American Indian and Alaska Native, and 0.2% Asian.

Visual Resources. Visual resources of the study area consists primarily of natural habitat. This includes forest, wetlands, islands, and river habitat that serve as scenery for visitors.

Recreational Resources. The Illinois River was once one of the most productive fishing and duck hunting areas in the country. Currently, the Twin Islands study 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.

Wild and Scenic Rivers. Illinois has approximately 86,076 miles of river, of which 17.1 miles of one river (Vermillion River) are designated wild and scenic, which is not in the study area.

Environmental Justice. Under this Executive Order (EO), a Federal agency "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." An Environmental Justice (EJ) analysis focuses on the potential for disproportionately high and adverse impacts to minority and low-income populations during the construction and normal operation of the

federal action. Additionally, if the impact is appreciably more severe or greater in magnitude on minority or low-income populations than the adverse effect suffered by the non-minority or non-low-income populations after taking offsetting benefits into account, then there may be a disproportionate finding. Avoidance and mitigation are then required.

The EJ assessment was performed on the census block group of 171499528002, Illinois (approximately 112.42 square miles). For this assessment, the EJSCREEN tool was used (https://ejscreen.epa.gov). EJScreen is an environmental justice mapping and screening tool that combines up-to-date economic statistics, U.S. Census Bureau decennial data (2010), and the 2013-2017 American Community Survey (ACS) estimates for a given area. The study area is rural in nature, and the ACS population estimate (2013-2017) was 977, with 3 of the residents identifying as being a minority. Forty-eight percent of the population was identified as low-income, which is greater than the state average of 30 percent.

3.14.3 No Action Alternative: Future Without Project

No impacts to socioeconomic factors would be expected. Regional spending and earnings would likely be similar to existing conditions. Under the No Action, the proposed island and shoreline protection would not be constructed. The social factors, including population demographics, visual, recreational resources, and environmental justices are expected to be similar to existing conditions.

3.14.4 Reasonable Action Alternatives

The reasonable action alternatives have no measurable direct impacts on community cohesion, population and housing, income, employment, community and regional growth, property values, industrial growth, life, health, and safety, or privately owned farms. In the short-term, construction activities related to the considered action alternatives directly provide jobs, benefit businesses through the purchases of materials and supplies, and provide sale tax revenue to local governments.

After construction, public use of the area may increase and indirectly lead to additional spending in the adjacent towns. Additionally benefits could be realized for commercial and recreational fishing and waterfowl hunting due to any of the considered action alternatives' anticipated benefits to aquatic resources. Cumulatively, past, present, and actions of others associated with construction projects have short-term economic impacts regionally on residents and businesses.

With the reasonable action alternatives, population demographics and environmental justice resources would be similar to existing conditions. Visual and recreational resources would have minor, less significant effects related to the short-term effects of construction and long-term effects to restored habitat. No wild and scenic rivers occur in the study area; therefore this resource would be unaffected by the reasonable action alternatives.

The visual attributes of the study area would be temporarily impacted by construction activities at the project site and by transport activities needed to move equipment and materials to and from the site. Temporary impacts on visual resources would occur during actual implementation of the considered

action alternatives when the area would contain construction equipment. Short-term impacts to state recreational use of the study area would occur during active construction. These will cease upon construction completion. In terms of Environmental Justice, the study area is located in a small rural community that is predominately white. No differential impacts to minority or low income populations are expected.

The visual surrounding would be indirectly affected by potential increase in recreational and public use that could occur with implementation of any considered action alternative due to enhanced fish and wildlife use. Long-term increases in commercial and recreational fishing and waterfowl hunting could occur due protection and restoration of suitable habitat. There could be minimal, indirect, construction-related impacts to recreational resources in the study area, including increased noise from construction activities. The conditions would restore to normal after the construction activity is completed.

Present and future actions by USACE, other agencies, businesses, or the public would likely contribute to cumulative improvement to recreational resources within the Lower Illinois River.

The economic resources, population demographics, visual resources, recreational resources, and environmental justice would be unaffected by the reasonable action alternatives.

3.15 Short-Term Versus Long-Term Productivity

Construction activities may temporarily disrupt fish, wildlife, and human use in the immediate vicinity of the study area. However, the long-term health and productivity of fish and wildlife in the area are anticipated to increase with any of the considered action alternatives. Therefore short-term human use impacts would be offset by long-term fish and wildlife habitat gains and their associated benefits to human use.

3.16 Irreversible and Irretrievable Resource Commitments

Irreversible commitments are those that cannot be reversed, except perhaps in the extreme long run (The Shipley Group, 2010). Simply stated, once the resource is removed it can never be replaced. For the action alternatives considered, there are no irreversible commitments of natural resources. This study is in the planning stage. Money has been expended to complete this planning document and pre-project monitoring. No construction dollars, which are considered irreversible, have been expended for the study.

Irretrievable commitments are those that are lost for a period of time (The Shipley Group, 2010). Construction activities of any of the considered action alternatives would temporarily disrupt natural resource productivity. The purchase of materials and the commitment of man-hours, fuel, and machinery to perform the study signal an irretrievable loss in exchange for the benefits of the habitat improvements.

3.17 Probable Unavoidable Adverse Environmental Impacts

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 any considered alternative. These adverse environmental impacts are considered minor as compared to the gains in fish and wildlife habitat that are anticipated with any considered action alternative.

4 Alternative Plan Evaluation & Comparison*

The USACE planning team evaluated the final array of alternatives using the four principle and guideline criteria (Box 2-1, above), the four principle and guideline accounts (Box 4-1), study opportunities and constraints, and the alternative's ability to restore the existing significant resources.

Box 4-1. Principle and Guideline Accounts to facilitate alternative evaluation

The national economic development (NED) account displays changes in the economic value of the national output of goods and services.

The environmental quality (EQ) account displays non-monetary effects on significant natural and cultural resources.

The regional economic development (RED) account registers changes in the distribution of regional economic activity that result from each alternative plan. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output and population.

The other social effects (OSE) account registers plan effects from perspectives that are relevant to the planning process, but are not reflected in the other three accounts

4.1 Habitat Benefit Evaluation

A multi-agency team (IDNR, USFWS, and USACE) conducted the habitat benefit evaluation using the Habitat Evaluation Procedures (HEP; (USFWS, 1980)) to estimate environmental benefits of the considered alternatives.

The HEP is a habitat-based evaluation methodology that documents the quality and quantity of available habitat for selected fish and wildlife species. The HEP is based on the assumption that habitat for selected species can be described by a Habitat Suitability Index (HSI). This index value is an indication of habitat quality (rated from 0.0 to 1.0 with 1.0 being ideal habitat) and is multiplied by the area of applicable habitat to obtain Habitat Units (HUs).

The HEP procedures using the Stripe Bass Habitat Suitability Index model was used to evaluate the effects of the considered alternatives aquatic habitat quantity and quality. Appendix C, *Habitat Evaluation* provides the details for model selection and quantification. This model is Regionally Approved for Use per EC 1105-2-412 and model spreadsheet calculator is approved for regional use

(Appendix C, *Habitat Evaluation*). The multi-agency team completed an assessment of existing study area conditions, projected future conditions without the Project, and estimated expected impacts of considered alternatives. Table 4-1 summarizes the habitat evaluation and provides the habitat output (Net AAHUs) that is compared to cost (See Appendix C for details). The key take-away from that habitat quantifications for Alternatives 2 and 3 had the same results based on the Striped Bass HSI model since both of these alternatives were forecasted to achieve ideal (HSI = 1.0) current velocities (50-122 cm/sec) within the aquatic habitat in the study area (32 acres), while temperature and dissolved oxygen levels were estimated to be similar to baseline conditions.

Table 4-1 Net Average Annualized Habitat Units (rounded) for each considered alternative

Alternative	Description	Acres	Net AAHUs
1	No Action	32	0
2	Notched bullnose with revetment	32	8.4
3	Wing-bullnose with revetment	32	8.4
4	Revetment only on island heads	32	3.8

4.2 Cost Estimates for Final Array of Alternatives

Table 4-2 shows an estimated cost of the final array of alternatives based on unit price estimates. Cost estimates were prepared using October 2020 price levels. Annualized costs include construction costs, contingency, interest during construction, monitoring and adaptive management costs. No Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) costs were identified. Project measures would be placed in federally controlled waters; consequently, there are no lands and damages or relocation costs. Cost estimates for the final array of alternatives were based on unit price estimates annualized using the Fiscal Year 2021 discount rate of 2.5% and a 50-year period of analysis. The 50-year period of analysis, 2023 through 2072, was selected based on Corps Regulations (ER 1105-2-100).

Table 4-2. Environmental Output and Costs of Each Alternative (Unit Price Estimates; October 2021 Price Level, 50-year period of analysis using 2.75 discount rate). Best buy plans highlighted in gray.

Alternative	Output (Net AAHU)	Project First Cost*	Interest during Construction**	Annualized Construction Cost	Annualized OMRRR Costs	Average Cost Per Output ($/AAHU)
1	0.0	$0	$0	$0	$0	-
2	8.4	$ 1,151,200	$ 14,300	$ 45,100	$0	$ 5,372
3	8.4	$ 881,800	$ 11,000	$ 35,500	$0	$ 4,227
4	3.8	$ 552,200	$ 6,800	$ 21,437	$0	$ 5,641

*includes LERRD, contingency, PED, S&A, and AMM costs, based on unit price estimates

** mid-year with 1 construction year at 2.5%

4.2.1 Operation and Maintenance Considerations

Operation and maintenance (O&M) considerations were considered for the final array of alternatives. Each of the alternatives are comprised of passive measures so O&M requirements were identified. Currently, ILDNR is routinely on the Illinois River managing the fish and wildlife in the area; therefore, the estimated O&M costs is negligible so was estimated as $0. These quantities and costs may change during final design and if necessary will be provided in the OMRRR manual following construction.

Table 4-3 lists the major components and their associated frequencies of repair, rehabilitation, and replacement (RRR). The District has constructed features of this nature within the Upper Mississippi River, it was determined that the proposed project features would not require any repair, rehabilitation, or replacement during the 50-year period of analysis. These considerations were the same among the final array of alternatives. Potential repair, rehabilitation, or replacement items beyond the 50-year period of analysis does include replacement of rock (every 75 years), and excavation/island restoration (every 60 years).

Table 4-3. Repair, Rehabilitation, and Replacement Considerations

Component	Frequency
Repair, Rehabilitate, Replace Rock Structure	Every 75 years
Repair, Rehabilitate, Replace Revetment	Every 60 years

4.2.2 Adaptive Management and Monitoring Considerations

Adaptive management and monitoring are projected to a maximum of 10 years. The estimated cost of the adaptive management and monitoring are included in the annualized costs (Table 4-2). Monitoring, regardless of considered action alternative, included hydrographic survey, public aerial imagery analysis, fish sampling, and site inspection for 10 years post-construction. Adaptive management features, if triggered, included modifying the rock structure for the considered action alternatives. For further details please see Appendix H, Monitoring and Adaptive Management.

4.3 Economics in Environmental Planning: Incremental Cost Analysis.

To determine the National Ecosystem Restoration Plan (alternative that reasonably maximizes habitat benefits compared to cost), the average annual habitat units and annualized costs from Table 4-2 of the considered alternatives (including the no action) were entered into the IWR-Planning Suite; a water resources investment decision support tool for evaluation of actions involving monetary and non-monetary cost and benefits. The purpose of entering the data was to analyze the cost effectiveness of each alternative and perform an incremental cost analysis on cost effective alternatives. Cost effective alternatives are plans that have the greatest benefit of all the alternatives at that cost. A secondary analysis on the subset of cost-effective alternatives identifies superior financial investments, called “Best Buys,” through analysis of incremental costs. The first Best Buy is the most efficient plan, producing benefits at the lowest incremental cost per unit. If a higher level of benefit is desired then the second Best Buy is the most efficient plan for producing additional benefit, and so on.

4.3.1 Cost Effective/Incremental Cost Analysis

Figure 4-1 displays the cost effectiveness of each alternative. All alternatives were considered cost-effective except for Alternative 2 - Notched bullnose with revetment since Alternative 3 - Wing-bullnose with revetment can achieve the same level of benefits for less cost.

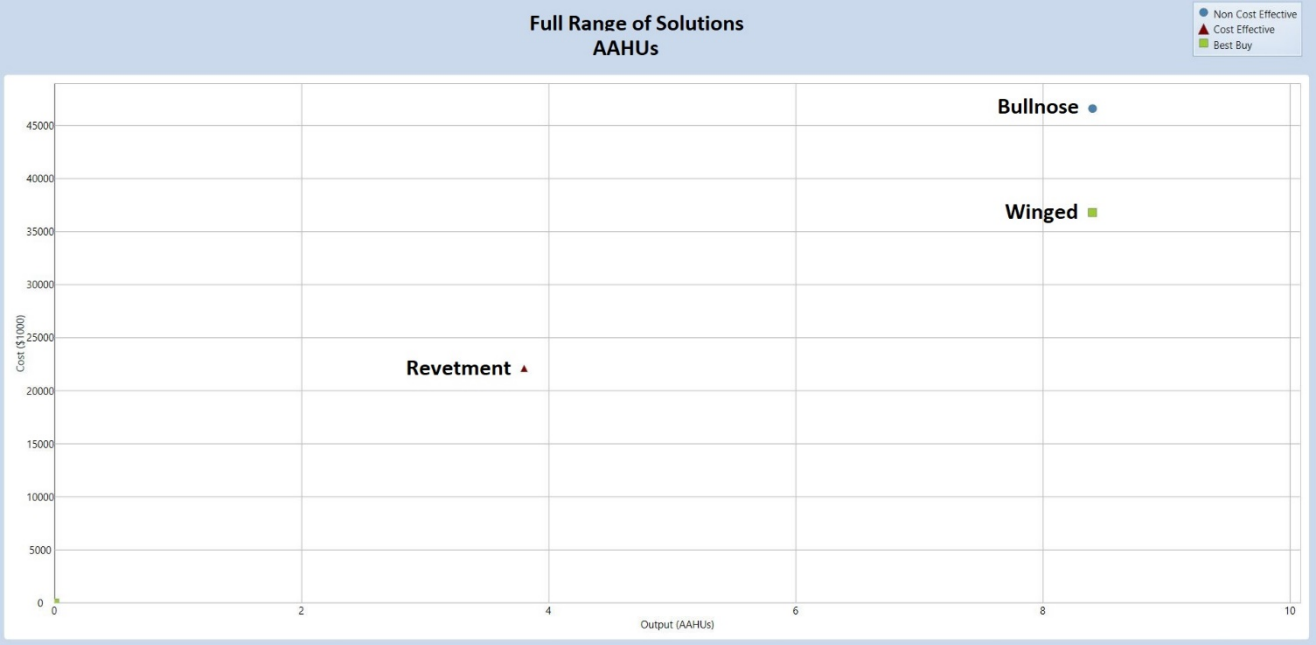


Figure 4-1. Twin Islands Alternative Cost-Effectiveness.

4.3.2 Incremental Cost Analysis.

The final step in the analysis is to determine which subset of cost-effective alternatives are incrementally justified. These solutions, also known as Best Buy Plans or Best Buy Alternatives, are those alternatives, or plans, that provide increases in benefits at the lowest average cost (per habitat unit). Incremental cost is calculated by dividing the difference between the alternative's costs by the difference between the alternative's outputs. The IWR Planning model was run to make the necessary calculations producing the incremental cost analysis results shown in Table 4-4 and Figure 4-2. Reviewing the table with the incremental cost information allows the decision maker to make the following comparisons of alternative restoration plans and to progressively ask "Is it worth it?"

Table 4-4. Incremental Cost Analysis

Alternative	AAHU	First Cost	Interest During Construction	Average Annual Cost	Average Annual Cost per AAHU	Incremental Cost (per AAHU)
1-No Action	-	$ -	$ -	$ -	$ -	$ -
3- Wing-bullnose with revetment	8.4	$ 881,755	$ 10,954	$ 35,509	$ 4,227	$ 4,227

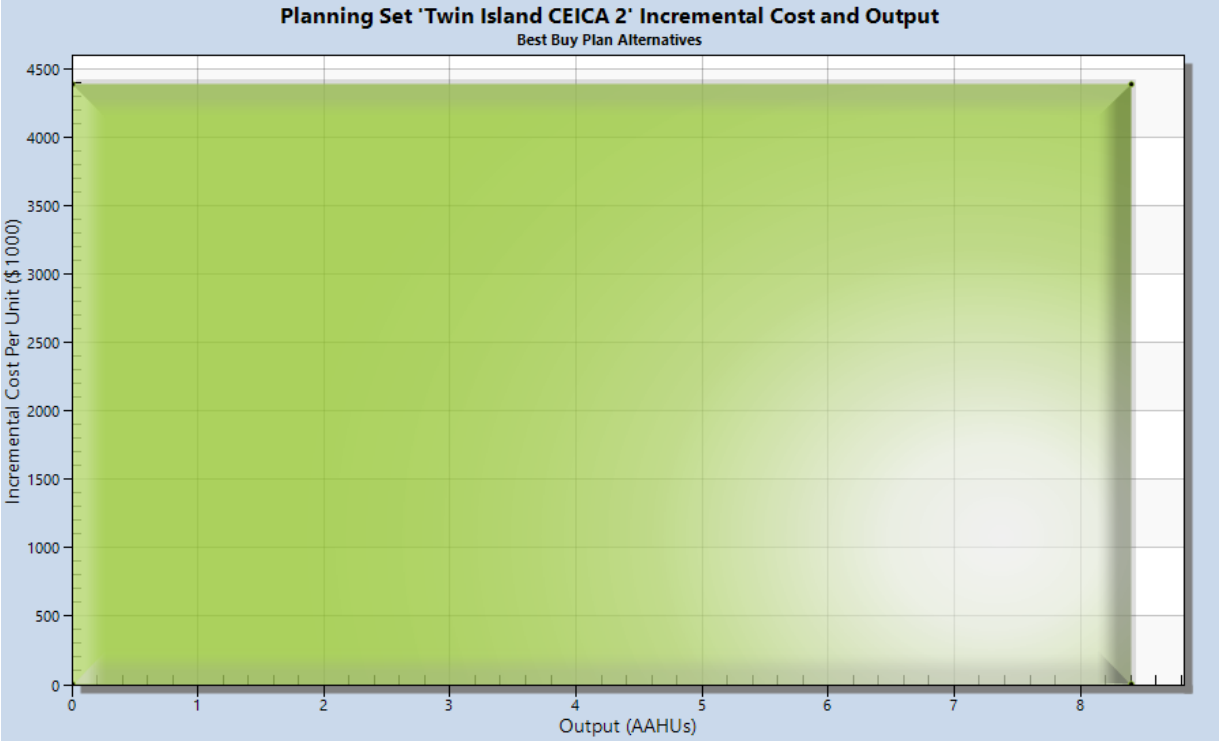


Figure 4-2. Twin Islands Alternative Incremental Cost Analysis

Alt 3 - Wing-bullnose with revetment and the no action plan are the two alternatives identified as both cost effective and incrementally justified as “Best Buy Plans”.

Neither cost effectiveness analysis nor incremental cost analysis will tell the decision maker what choice to make. However, the information developed by both analyses will help the decision maker make a more-informed decision and, once a decision is made, better understand its consequences in relation to other choices.

4.4 Alternative Plan Evaluation and Comparison.

4.4.1 Evaluation Criteria

Each alternative in the final array was independently evaluated by metrics for each of the USACE four screening criteria: Completeness, Effectiveness, Efficiency, and Acceptability. A score of "high" signifies the metric was met considerably, a score of "moderate" denotes the metric was met moderately, and a score of "low" indicates the metric was minimally met, if at all. Table 4-6 displays the scores to facilitate alternative comparison.

Completeness. No additional investments, or actions, by others to realize the benefits were identified so all alternatives scored high.

Acceptability. All the alternatives in the final array are in accordance with Federal law and policy so all alternatives scored high.

Efficiency. Alternatives 1 – No Action and Alternative 3 - Wing-bullnose with revetment were given a high efficiency since those were the only cost effective as well as incrementally justified Best Buy options.

Effectiveness. All the alternatives in the final array provide some contribution to the study objectives beside the no action alternative.

The efficacy in which alternatives met study objectives (enhance geomorphic diversity; maintain island mosaic; and enhance aquatic ecosystem for native fish) was measured by the amount of aquatic habitat units achieved. If the alternative contributed over 5 AAHU, it was given a high score, alternatives that contributed between 1-5 AAHU were given a moderate score, and if the alternative did not achieve an increase in AAHU it was given a low score (Table 4-6).

4.4.2 Opportunities and Constraints

Each alternative in the final array was independently evaluated using metrics for the most prevalent opportunities and constraints. A score of "high" signifies the metric was met considerably, a score of "moderate" denotes the metric was met moderately, and a score of "low" indicates the metric was minimally met, if at all. Table 6-6 displays the scores to facilitate alternative comparison.

4.4.2.1 Opportunity.

Opportunities are positive conditions in the study area that may result from implementation of a Federal project such as resiliency to climate change was measured by an alternative's ability to achieve benefits during extreme conditions (flood and drought). Based on hydraulic analysis all alternatives would be equally resilient to hydraulic changes so all of the alternatives scored high in the opportunity metric (Table 4-6).

4.4.2.2 Constraints

A constraint limits the extent of the planning process. It is a statement of considerations that the alternative plans should avoid or minimize impacts. The criteria considered as constraints when formulating management measures were affects to the 9-ft navigation channel, downstream flood elevation rise, and exceedance of the authorized per project limit were identified as constraints to the

planning process. It is not anticipated that any of the alternatives violate the study constraints so all alternatives scored high (Table 4-6).

4.4.3 P&G Accounts

Each alternative in the final array was independently evaluated using the four Principles and Guideline accounts: National Economic Development, Environmental Quality, Regional Economic Development, and Other Social Effects. A score of "high" signifies the metric was met considerably, a score of "moderate" denotes the metric was met moderately, and a score of "low" indicates the metric was minimally met, if at all. Table 4-7 displays the scores to facilitate alternative comparison.

In terms of **National Economic Development (NED)** effects of the alternatives, all action alternatives would have an economic cost to the nation to achieve the non-monetized environmental output of goods and services provided by the restoration of wetland and floodplain forest habitats described in the report. Other effects in the NED account include small increases in recreation (due to projected increased bird watching and hunting activity). These small changes in NED effects are described qualitatively in more detail in the environmental effects section, but were not quantified. While the non-monetized habitat benefits are captured in the EQ account, the NED effects are displayed as the annualized project cost and annualized projected OMRRR. A reduction in project cost is assumed to increase the National Economic Development to the nation therefore alternatives that are less than $1million annually were considered to have a high NED effect, alternatives more than $1 million but less than $4 million annually were considered moderate, and alternatives above $4 million annually were considered to significantly increase the cost to the nation creating a low economic benefit to the nation. Rating thresholds were based loosely on the annualized USACE Continuing Authorities Program (CAP) cost limits and mandatory independent external peer review thresholds.

Regional Economic Development (RED). All action alternatives would have a positive impact on the regional economy. It is assumed the percentage of Federal expenditure to regional benefits are similar across alternatives and not useful as comparison criteria.

Environmental Quality (EQ). It is anticipated that all alternatives would have a positive effect on ecological resources. No known cultural sites have been identified. Consequently, environmental quality of alternatives were ranked on AAHU output. Alternatives that had net benefits higher than 5 AAHU scored high, alternatives with net benefits from 1-5 scored moderate, and all alternatives that had no increase in AAHU ranked low.

Other Social Effects (OSE). All alternatives assume positive social impacts if there was an increase in AAHU, therefore, alternatives scored high for OSE if they scored high in effectiveness.

4.4.4 Resource Significance

As defined, the UMRR and its floodplain is a significant resource to the nation. All of the action alternatives in the final array are assumed to contribute positively to the relevant resources in the study area (Table 4-6).

Institutional - The efficacy in which alternatives supported institutionally significant resources was measured by how many Acts or Laws the alternative supported. Alternatives that were able to achieve benefits for resources supported in multiple Acts or Laws were rated high, alternatives that were able to achieve benefits for resources supported in at least one Act or Law was rated as moderate, and alternatives that did not achieve benefits for any resources supported in an Act or Law was rated with a low score.

Public - The efficacy in which alternatives supported publicly significant resources was measured by whether the alternative supported recreation. Alternatives that were able to achieve benefits for recreation were rated high, alternatives that were able to achieve some benefits for at least one public ally supported resource was rated as moderate, and alternatives that did not achieve benefits for any publicly supported resource were rated with a low score.

Technical - The efficacy in which alternatives supported technically significant resources was measured by an alternatives ability to restore scarce, biodiversity, representative, declining, fragmented, and critical habitat. Alternatives that were able to achieve benefits for critical or scarce resources that are characteristic of the area and support diverse biota were rated high. Alternatives that were able to achieve benefits for declining resources that are characteristic of the area and support diverse biota were rated as moderate. Alternatives that did not achieve benefits for any technically significant resources were rated with a low score.

Table 4-5. Final Array of Alternatives Evaluation Criteria, Opportunities, and Constraints.

Alternative	Acceptable	Complete	Effective			Efficient	Opportunities and Avoid Constraints			
			Geomorphology	Islands	Fish		Resilient	9-Ft	Flood Elevation Increase	Authorized Cost Limit
1 - No Action	High	High	Low	Low	Low	High	Low	High	High	High
2 –Notched Bullnose	High	High	High	High	High	Low	High	High	High	High
3 - Wing-Bullnose	High	High	High	High	High	High	Moderate	High	High	High
4 - Revetment	High	High	Moderate	Moderate	Moderate	Low	Low	High	High	High

*see text for definitions for qualitative metrics

Table 4-6. Final Array of Alternatives P&G Evaluation Accounts and Supports Existing Significant Resources

Alternative	P&G Evaluation Accounts				Resource Significance		
	NED	EQ	RED	OSE	Institutional	Public	Technical
1- No Action	High	Low	Low	Low	Low	Low	Low
2 – Notched Bullnose	Low	High	Moderate	High	High	High	High
3 - Wing-Bullnose	High	High	Moderate	High	High	High	High
4 - Revetment	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

*see text for definitions for qualitative metrics

4.5 Selection of the Recommended Plan.

Federal planning for water resources development was conducted in accordance with the Principles and Guidelines (P&G) adopted by the U.S. Water Resources Council:

> *For ecosystem restoration projects, a plan that reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the Federal objective, shall be selected. The selected plan must be shown to be cost effective and justified to achieve the desired level of output. This plan shall be identified as the National Ecosystem Restoration (NER) Plan.*

All considered action alternatives support the institutionally significant resource as identified in the Fish and Wildlife Coordination Act, as amended (16 U.S.C.§ 661), the public ally significant resources as identified in the *HNA-II* (McCain et al.,2018), and would reduce the decline in island/side channel habitat that is characteristic of the Illinois River. Implementing Alternative 2 – Notched bullnose with revetment would achieve a significant increase in habitat functionality, however, it is not cost effective. Implementing Alternative 3 – Wing-bullnose with revetment would achieve a significant increase in habitat functionality and is an incrementally justified cost effective plan. Implementing Alternative 4 – Revetment only at the island heads would achieve a moderate increase in habitat functionality and is not a cost effective plan.

As a result of this evaluation, Alternative 3 – Wing-bullnose with revetment is identified as the NER plan, or the plan that reasonably maximizes benefits compared to cost. In addition to being the NER plan, Alternative 3 effectively and efficiently meets the study objectives, is complete, acceptable, and optimizes opportunities while avoiding project constraints. As a result of this, a review of the four accounts, and the alternatives ability to support existing significant resources Alternative 3 – Wing-bullnose with revetment is the recommended plan since it reasonably maximizes ecosystem restoration benefits at an acceptable cost while meeting the Federal objective.

5 Recommended Plan*

5.1 Description of Recommended Plan

The recommended plan includes construction of a 500 foot total length wing-bullnose upstream of the head of the islands. Starting upstream of the head of the smaller island, angle downstream for 75 feet and slope up to an elevation of 427 feet, then angle upstream for 75 feet and slope down to an elevation of 425 ft. Leave a 100 feet long notch then start the structure again at an elevation of 425 feet, angle downstream for 150 feet and slope up to elevation of 427, then angle upstream for 100 feet and slope down to an elevation of 425. Additionally, approximately 300 foot of revetment would be placed on the head of Little Twin Island and a small amount of stone at the bottom of the notch in the structure.

5.2 Design Considerations

During pre-construction engineering and design (PED), the USACE and ILDNR will complete the detailed engineering & technical analysis needed to begin construction of the project as recommended in this decision document. This includes engineering design documentation and the plans and specifications. Further refinement, and any necessary changes to the alternative will occur during this time.

5.2.1 Impacts to Navigation and Flood Elevations

The main design consideration for Twin Islands Restoration Project is to ensure the proposed designs does not impede or negatively affect the navigation channel. The project would be designed not to restrict the flow of the Illinois River.

5.2.2 Datum

Bathymetric and topographic surveys were conducted in July 2020. These data are in Vertical Datum NAD83, NAVD88 for design.

5.2.3 Public Access and Safety

Safety and security are important parameters, which would be detailed during the PED.

5.3 OMRRR Considerations

Maintenance requirements would be further detailed in the Project's OMRRR Manual after construction completion. The OMRRR life cycle costs include oversight, management, monitoring, and debris removal. The total annualized cost for OMRRR of the recommended plan was negligible so was estimated at $0 using the FY 2021 with a 2.75% discount rate. The IDNR is 100% responsible for OMRRR costs. These quantities and costs may change during final design.

5.4 Land, Easements, Rights-of-Way, Relocation, and Disposal Site (LERRDS) Considerations

The study area lies within the main Illinois River Channel within navigational servitude. As such, the Project would be a 100% Federal cost. No real estate acquisition is anticipated for the recommended project. It is assumed the barge will load rock at the quarry and offload at site so a temporary easement for staging or access is not needed. Additional real estate requirements are provided in Appendix G - *Real Estate Plan*.

5.5 Construction Considerations

5.5.1 Listed Species

Appendix I, *Biological Assessment,* provides the details for measures taken to avoid impacts to listed species. The following mandatory measures will be incorporated during construction:

- Best management practices to reduce siltation to minimize impacts to water quality

- If during final design, tree clearing is determined to be required; then all tree clearing must occur during the inactive bat roosting season from November 1-March 31 unless present/probable absence survey results were obtained for the study area through appropriate bat surveys approved by the USFWS.

5.5.2 Air Quality

Diesel emissions and fugitive dust during project construction may pose environmental and human health risks and should be minimized. Applicable protective measures as outlined in USEPA's Construction Emissions Control Checklist would be followed.

5.5.3 Permits

Laws of the United States and the State of Illinois have assigned the Corps and Illinois with specific and different regulatory roles designed to protect the waters within and on the State's boundaries. Protecting Illinois' waters is a cooperative effort between the applicant and regulatory agencies.

5.5.3.1 Clean Water Act, Section 401 Compliance

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. A water quality certification pursuant to Section 401 of the Clean Water Act would be obtained through meeting the conditions of a Section 404 Nationwide 27 permit for Ecosystem Restoration and Nationwide Permit 13 for *Bank Stabilization* as the general conditions therein satisfy Section 401 water quality certification requirements from the Illinois Environmental Protection Agency. A letter of concurrence may be obtained, stating that the Recommended Plan appears to meet the requirements of Nationwide 27 permit for *Ecosystem Restoration* and Nationwide Permit 13 for *Bank Stabilization*. All conditions of the Nationwide 27 permit for *Ecosystem Restoration* and Nationwide Permit 13 for *Bank Stabilization* shall be implemented in order to minimize adverse impacts to water quality. The Nationwide Permit Summary and General Conditions are located in Appendix B, *Clean Water Act.*

5.5.3.2 Clean Water Act, Section 402 Compliance

Construction would be performed overwater from a floating platform for the Recommended Plan. A Clean Water Act Section 402 Permit is not applicable.

5.5.3.3 Clean Water Act, Section 404 Compliance

Section 404 of the Clean Water Act regulates the placement of fill, such as rock, in waters of the United States. This project can be constructed under Nationwide Permit 13 (Bank Stabilization) and Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities). Specific impacts to water quality due to displacement of water bodies by fill materials, stockpiling, and hydro-modifications are described in the 404(b)1 evaluation. The Nationwide Permit Summary and General Conditions are located in Appendix B, *Clean Water Act.*

5.5.3.4 Rivers and Harbors Act Section 10

This provides the Chief of Engineers and Secretary of the Army the authority to permit the construction or modification of structures in or over a navigable waterway. This project can be constructed under Nationwide Permit 13 (Bank Stabilization) and Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities).

5.5.4 Construction Schedule Constraints

Scheduling of construction contracts would depend on availability of funds, and based on expected funding, it is likely that the contract would be awarded in 1 construction contract.

5.6 Project Schedule

A project schedule was developed based upon the assumption that this report will be approved in the first quarter of FY 2021 (Table 5-1). The schedule sequences design and construction activities to begin in FY 2021 once the report is approved and appropriations to construct are acquired. The development of this schedule assumes Federal funding is available in the years required.

Table 5-1 Estimated Project Schedule

Milestone/Event	Current Schedule
District Engineer's Transmittal of Final Report Package	30 JAN 21
Report Approval	15 MAR 21
Contract Award	31 SEP 21
Construction Complete	31 SEP 22

5.7 Risk and Uncertainty

At the feasibility level of planning, there is always uncertainty about the extent to which the recommended plan will meet the planning objectives. Even when project performance uncertainty is negligible, there is some retained risks. In addition there can be new or transferred risks associated with the recommended plan. It is important to evaluate, communicate, and manage the risks prior to beginning PED.

5.7.1 Cost Risk

A class four cost estimate was created for the recommended plan, meaning there was a minimum level of scope and technical work done to generate a cost estimate. All potential management measures have recently been constructed in the District for other projects so minimal uncertainty regarding cost was identified.

Additionally, an abbreviated cost and schedule risk analysis was performed to include risk identification and sensitivity analysis using a Monte Carlo simulation method. The risk analysis documented the conditions, uncertainties, and evaluation methodology used to determine an overall contingency. This

contingency will be used to cover unknowns, uncertainties, and/or unanticipated conditions that are not possible to evaluate from the data used in this study but must be accounted for to cover identified risks.

5.7.2 Implementation Risk

Minimal risks associated with implementation were identified; however, to reduce the risk and associated schedule and cost delays, final design will be evaluated to ensure impacts to navigation and flood elevations do not occur.

5.7.3 Performance Risk

While risks were reduced to a tolerable level by managing the uncertainty associated with project benefits, residual risks and the potential for new risks remain. To account for these risks a monitoring and adaptive management plan was created (See Appendix H).

6 Monitoring and Adaptive Management

This chapter summarizes the monitoring and adaptive management needed to assess the habitat changes resulting from the implementation of the proposed study. Project monitoring is designed to gauge progress toward meeting the project objectives.

Section 1161 of WRDA 2016 requires that when conducting a feasibility study for ecosystem restoration, the proposed project includes a plan for monitoring the success of the ecosystem restoration. Additionally, paragraph (7)(d) of Section 1161 Implementation Guidance states that "an adaptive management plan will be developed for ecosystem restoration projects…appropriately scoped to the scale of the project." The implementation guidance for Section 1161, in the form of a CECW-P Memo dated 19 October 2017, also requires that an adaptive management plan be developed for all ecosystem restoration projects. The primary incentive for implementing an adaptive management plan is to increase the likelihood of achieving desired project outcomes given the identified uncertainties which may include incomplete description and understanding of relevant ecosystem structure and function, imprecise relationships among project management actions and corresponding outcomes, engineering challenges in implementing project alternative, and ambiguous management and decision-making.

This monitoring and adaptive management plan (Table 6-1) has been developed with input from the State and Federal resource agencies. Details on performance indicators, monitoring targets, time of effect, frequency of monitoring, adaptive management triggers, and responsibilities of monitoring and data collection are detailed in Appendix H-*Monitoring and Adaptive Management Plan.* Per Section 1121 guidance, monitoring costs (not to exceed 10 years after project construction) were considered as part of project costs. Any monitoring conducted after 10 years would not be part of the total project cost and will be 100% non-Federal costs.

Table 6-1 Twin Island conceptual post-construction monitoring and AM of the Recommended Plan

Objective	Monitoring Work Item	Monitoring Schedule		
		Pre	Construction Phase	Post
Geomorphology	Hydrographic /ADCP Survey	X		Year 2 and Year 6
	AM Feature: modifying the rock structure			If needed
Island	Public Aerial Imagery & Analysis	X		Year 2 and Year 6
	AM Feature: modify revetment			If needed
Fish	Fish Sampling	X		Year 2
Overall Project	Site Inspections	X		Year 2, Year 6
POST CONSTRUCTION MONITORING COST*				$38,000
ADAPTIVE MANAGEMENT COST*				$40,000

*no contingency added; based on FY21 costs

7 Cost Estimates

Table 7-1 shows the Project First Cost. The detailed cost estimate is provided in Appendix E - *Cost Estimate*; however, due to the sensitivity of providing this detailed cost information, which could bias construction contract bidding, this material has been omitted in the public document. Quantities and costs may vary during final design. All cost estimates are calculated using the FY21 Price Level.

Table 7-1. Project First Cost Estimate (October 2020 Price Level).

Account	Feature	Cost
01	Lands and Damages (LEERD)	$0*
06	Fish & Wildlife Facilities	$626,950
09	Contingency	$157,050
30	Planning, Engineering, & Design	$118,000
31	Construction Management	$78,400
16	Adaptive Management and Monitoring	$63,000
	Project First Costs	**$980,400**

* Project features are below the ordinary high water mark; therefore 100% federally funded through the NESP program.

8 Implementation Responsibilities

This section discusses the implementation responsibilities for the IDNR (Project Sponsor) and the USACE. The responsibility for plan implementation and construction falls to the USACE as the lead Federal

agency. After construction of the project, OMRRR would be required for features of the project. The IDNR would be 100% responsible for OMRRR of the project.

Monitoring and adaptive management, which includes monitoring of physical/chemical conditions and some biological parameters, is a USACE responsibility.

A Memorandum of Agreement (MOA) is the formal agreement that would be entered into by the USACE and the IDNR before implementation of the project. The MOA describes obligations for constructing, operation, and maintaining the implemented features of the Twin Islands Project. This draft MOA is used in lieu of a separate List of Items of Local Cooperation normally used in Specifically Authorized and Cost Shared projects.

Water Resources Development Act 2007, Title VIII, Section 8004(b)(3)(B) states that ecosystem restoration project features shall be 100 percent Federal cost if the project features are located below the ordinary high water line or in a connected backwater, modify the operation of structures for navigation, or are located on Federally-owned land. The Twin Islands Restoration Project recommended plan features are all located within the Illinois River below the ordinary high water line. As a result, the Federal cost is 100 percent.

8.1 U.S. Army Corps of Engineers

The USACE, St. Louis District, is responsible for project management and coordination with the USFWS, IDNR, and other affected agencies. The Corps will submit the subject Project Implementation Report; administer program funds; finalize plans and specifications; complete all NEPA requirements; advertise and award a construction contract; and perform construction contract supervision and administration.

8.2 Illinois Department of Natural Resources

The IDNR is the non -federal Sponsor and has provided technical and other advisory assistance during all phases of the study and will continue to provide assistance during project implementation. The OMRRR of the project is the responsibility of the IDNR in accordance with Section 107(b) of WRDA 1992, Public Law 102-580. The annual OMRRR costs are estimated at 0. These functions will be further specified in the Project OMRRR Manual to be provided by USACE prior to final acceptance of the project by the IDNR. The IDNR supports the monitoring and data collection needs as outlined earlier in this report.

9 Consistency with USACE Campaign Plan

The USACE Campaign Plan provides goals, objectives, and actions for improving the USACE contribution to the nation in the areas of warfighting, civil works processes and delivery systems, risk reduction from natural events, and preparation for the future. The four primary goals are to 1) Support National Security, 2) Deliver Integrated Water Resource Solutions, 3) Reduce Disaster Risks, and 4) Prepare for Tomorrow. The Twin Islands Project supports the Campaign Plan with contributions to Goal 2, “Deliver

Integrated Water Resource Solutions." The study does not make significant contributions to the other three goals.

Goal 2 (Deliver Integrated Water Resource Solutions) includes the following objectives: 2a - Deliver quality water resource solutions and services; 2b - Deliver the civil works program and innovative solutions; 2c - Develop the civil works program to meet the future needs of the Nation; and 2d - Manage the life-cycle of water resources infrastructure systems to consistently deliver reliable and sustainable performance. The Twin Island Project supports Goal 2 by:

- Identification of a plan to restore the function, structure, and process of the Twin Islands study area;
- Coordination with significant stakeholder groups throughout the study process; and
- Recommendation of a sustainable and resilient plan, with appropriate consideration of the long term operation and maintenance of the restoration features.

10 Consistency with USACE Environmental Operating Principles

USACE has reaffirmed its commitment to the environment by formalizing a set of Environmental Operating Principles (EOP) applicable to all its decision-making and programs. The EOPs are: foster sustainability as a way of life throughout the organization; proactively consider environmental consequences of all USACE activities and act accordingly; create mutually supporting economic and environmentally sustainable solutions; continue to meet our corporate responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments; consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs; leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner; and employ an open, transparent process that respects views of individuals and groups interested in USACE activities. The EOPs were considered during the plan formulation, and the recommended plan is consistent with the EOPs. The recommended plan promotes sustainability and economically sound measures by incorporating measures for restoring island/side channel habitats for aquatic species.

11 Relevant Laws and Regulations*

All considered action alternatives were subject to compliance review with all applicable environmental regulations and guidelines. Table 11 -1 provides a list of environmental protection statutes and other environmental requirements which were considered during the development of this report. The table reports the applicability or compliance of the considered action alternatives as it relates to each statute and requirement for the current stage of planning.

Table 11-1. Federal Policy Compliance Status

Federal Laws[1]	**Compliance Status**
Abandoned Shipwreck Act of 1987, as amended, 43 USC § 2101, et seq.	Full
American Indian Religious Freedom Act, as amended, 42 USC § 1996	Full
Archaeological and Historic Preservation Act, as amended, 54 USC § 312501, et seq.	Full
Bald and Golden Eagle Protection Act, as amended, 16 USC § 668, et seq.	Full
Clean Air Act, as amended, 42 USC § 7401, et seq.	Full
Clean Water Act, as amended, 33 USC § 1251, et seq.	Pending[2]
Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 USC § 9601, et seq.	Full
Endangered Species Act, as amended, 16 USC § 1531, et seq.	Full
Farmland Protection Policy Act, as amended, 7 USC § 4201, et seq.	Full
Federal Water Project Recreation Act, as amended, 16 USC §460l-12, et seq. and 16 USC § 662	Full
Fish and Wildlife Coordination Act, as amended, 16 USC § 661, et seq.	Pending[2]
Flood Control Act of 1944, as amended, 16 USC § 460d, et seq. and 33 USC § 701, et seq.	Full
Food Security Act of 1985, as amended, 16 USC § 3801, et seq.	Full
Land and Water Conservation Fund Act of 1965, as amended, 16 USC § 460l-4, et seq.	Full
Migratory Bird Treaty Act of 1918, as amended, 16 USC § 703, et seq.	Full
National Environmental Policy Act, as amended, 42 USC § 4321, et seq.	Pending[3]
National Historic Preservation Act, as amended, 54 USC § 300101, et seq.	Full
National Trails System Act, as amended, 16 USC § 1241, et seq.	Full
Noise Control Act of 1972, as amended, 42 USC § 4901, et seq.	Full
Resource Conservation and Recovery Act, as amended, 42 USC § 6901, et seq.	Full
Rivers and Harbors Appropriation Act of 1899, as amended, 33 USC § 401, et seq.	Pending[2]
Wilderness Act, as amended, 16 USC § 1131, et seq.	Full
Executive Orders[4]	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, EO 12898, February 11, 1994, as amended	Full
Floodplain Management, EO 11988, May 24, 1977, as amended	Full
Invasive Species, EO 13112, February 3, 1999, as amended	Full
Protection and Enhancement of Environmental Quality, EO 11991, May 24, 1977	Full
Protection and Enhancement of the Cultural Environment, EO 11593, May 13, 1971	Full
Protection of Wetlands, EO 11990, May 24, 1977, as amended	Full
Recreational Fisheries, EO 12962, June 7, 1995, as amended	Full
Responsibilities of Federal Agencies to Protect Migratory Birds, EO 13186, January 10, 2001	Full
Trails for America in the 21st Century, EO 13195, January 18, 2001	Full

[1] Also included for compliance are all regulations associated with the referenced laws. All guidance associated with the referenced laws were considered. Further, all applicable Corps of Engineers laws, regulations, policies, and guidance have been complied with but not listed fully here.

[2] Required permits, coordination would be sought during document review.

[3] Full compliance after submission for public comment and signing of FONSI.

[4] This list of Executive Orders is not exhaustive and other Executive Orders not listed may be applicable.

12 Recommendations*

Existing fish and wildlife habitat in the Twin Islands Restoration study area lacks geomorphic diversity and the island habitat is degraded. The processes, including natural scour and deposition patterns that create and maintain the islands have been altered. As a result, off-channel areas with sufficient depth for spawning, nursery and overwintering habitat are now considered limiting for many native fish.

Construction of Alternative 3, a wing-bullnose with revetment, would use the force of the water flowing over the angled sections of the dike to force flows away from the island heads reducing shoreline erosion. Slower pooled water would form upstream of the downstream angled structures restoring slackwater habitat needed for native fishes. With approval of this feasibility study, development of plans and specifications would be initiated.

This plan would result in the island and shoreline protection for two islands on the Illinois River. The project is consistent with and fully supports the overall goals and objectives of contributing to the restoration of the Upper Mississippi River and Illinois Waterway.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They reflect neither the program nor budgeting priorities inherent in the formulation of the national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before transmittal to Congress as proposals for authorization and implementation funding.

13 List of Preparers*

Name	Role	Years of Experience
Kat McCain, Ph.D.	Environmental Planner, NEPA Specialist	10 years
Travis J Schepker	Environmental Specialist	3 years
Monique Savage	Plan Formulation	12 years
Dawn Lamm	H&H	20 years
Meredith Trautt	Cultural	
Jordan Lucas	Economics	1 year
Greg Dyn	Cost Estimator	30 Years
Terrence Ollis	Real Estate Specialist	2 years
Asher Leff	Civil Engineering	10 years
Rob Gramke	Regulatory	25 years

14 References*

Anfinson, J. A. 2003. The river we have wrought, a history of the Upper Mississippi. University of Minnesota Press, Minneapolis, MN.

Baird, M.S. 2000. Life History of the Spectaclecase, *Cumberlandia monodonta* Say, 1829 (Bivalvia, Unionoidea, Margaritiferidae). Unpublished masters thesis, Southwest Missouri State University, Springfield.

Barko, V. A. and D. P. Herzog. 2003. Relationship among side channels, fish assemblages, and environmental gradients in the unimpounded Upper Mississippi River. J. Freshwater Ecol., 18:377–382.

Barko, J.W., B.L. Johnson, and C.H. Theiling. 2006. Environmental Science Panel Report 2: Implementing Adaptive Management. Upper Mississippi River System Navigation and Ecosystem Sustainability Program, U.S. Army Corps of Engineers, Rock Island, St. Louis, and St. Paul Districts.

Bell, H.E., III. 1981. Illinois wetlands - their value and management. Chicago, Illinois Institute of Natural Resources, Doc. No. 81/33.

Bhowmik, N.G. and M. Demissie. 1989. Sedimentation in the Illinois River Valley and Backwater Lakes. Journal of Hydrology 105: 187-195.

Black, R., B. McKenney, A. O'Connor, E. Gray, and R. Unsworth. 1999. Economic Profile of the Upper Mississippi River Region. Prepared for US Fish and Wildlife Service by Industrial Economics, Incorporated. Cambridge, MA.

Buchanan, A.C. 1980. Mussels (Naiades) of the Meramec River Basin. Missouri Department of Conservation Aquatic Series 17.

Carlander, H. B. 1954. A history of fish and fishing in the Upper Mississippi River. Upper Mississippi River Conservation Committee, Rock Island, IL.

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.

Council on Environmental Quality (CEQ). 1997. Considering Cumulative Effects Under the National Environmental Policy Act.

Demissie, M. and N.G. Bhowmik. 1986. Peoria Lake Sediment Investigation. Prepared for the U.S. Army Corps of Engineers, Rock Island District.

Demissie, M. and A. Kahn. 1993. Influence of wetlands on streamflow in Illinois. Illinois State Water Survey, Contract Report 561, Champaign, IL.

Ecological Specialists, Inc. 2007. Unionid Mussels and habitat at the heads of Four Islands in the Illinois River. Prepared for the U.S. Army Corps of Engineers – Memphis District.

Farber, S., R. Costanza, D. L. Childers, J. Erickson, K. Gross, M. Grove, C. S. Hopkinson, J. Kahn, S. Pincetl, A. Troy, P. Warren, and M. Wilson. 2006. Linking ecology and economics for ecosystem management. BioScience 56(2): 121-133.

Fuller, S.L.H. 1974. Clams and mussels (Mollusca: Bivalvia). Pp. 215-273 *In*: C.W. Hart, Jr., and S.L.H. Fuller, eds. Pollution Ecology of Freshwater Invertebrates. Academic Press, New York.

Galat, D., J. Barko, S. Bartell, M. Davis, B. Johnson, K. Lubinski, J. Nestler, and D. Wilcox. 2007. Environmental Science Panel Report 6: Establishing System-wide Goals and Objectives for the Upper Mississippi River System. Upper Mississippi River System Navigation and Ecosystem Sustainability Program, U.S. Army Corps of Engineers, Rock Island, St. Louis, and St. Paul Districts.

Gordon, M.E., and J.B. Layzer. 1989. Mussels (Bivalvia: Unionoidea) of the Cumberland River: Review of Life Histories and Ecological Relationships. U.S. Fish and Wildlife Service Biological Report 89(15).

Gowda, P. H. 1999. Section 5 - Watershed relations and changes. In: 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. LTRMP 99-T001.

GREAT (Great River Environmental Action Team). 1980. GREAT I: Water quality, sediment and erosion. Technical Appendixes. Volume 4. Upper Mississippi River Basin Commission, St. Paul, MN.

GREAT (Great River Environmental Action Team). 1980. GREAT II: Side channel work group appendix. U.S. Fish and Wildlife Service, Rock Island, IL.

GREAT (Great River Environmental Action Team). 1980. GREAT III: Reconnaissance Report. U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.

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

Interagency Hypoxia Committee. 2000. Draft Plan of Action for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico. Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. Federal Register, Vol. 65, No. 133. July 2000.

Johnson, B.L., and C.A. Jennings. 1998. Habitat associations of small fishes around islands in the Upper Mississippi River. North American Journal of Fisheries Management 18:327-336.

Killgore, K.J., and T.B. Hardy. 1992. Aquatic Habitat Appraisal Guide for Fishes of the Upper Mississippi River System. Technical Report EL-92-. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Kuchler, A. W. 1964. Potential natural vegetation of the conterminous United States. American Geographic Society, Special Publication No. 36.

Lehtinen, R.M., N.D. Mundahl, and J.C. Madejczyk. 1997. Autumn use of woody snags by fishes in backwater and channel border habitats of a large river. Environmental Biology of Fishes. 49:7-19.

Lubinski, K.S. and J.W. Barko. 2003. Environmental Science Panel Report 52. Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study. Report prepared for the U.S. Army Corps of Engineers.

Lubinski, K., R. Clevenstine, M. Davis, S. Brewer, N. McVay, and P. West. 2007. Environmental Science Panel Report 4: Ecosystem Services: FY 2006 Workshop. Upper Mississippi River System Navigation and Ecosystem Sustainability Program, U.S. Army Corps of Engineers, Rock Island, St. Louis, and St. Paul Districts.

Mathias, D., T.B. Hardy, K.J. Killgore, and J.W. Jordan. 1996. Aquatic habitat appraisal guide: User's Manual. Instruction Report EL-96-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Meade, R.H. (editor) 1995. Contaminants in the Mississippi River, 1987-1992. U.S. Geological Survey Circular 1133, Denver, CO.

Millennium Ecosystem Assessment. 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, D. C.

Missouri Department of Conservation and U.S. Department of Agriculture Soil Conservation Service. 1990. Wildlife Habitat Appraisal Guide User's Guide. Jefferson City, MO.

Neves, R.J. 1991. Mollusks. Pp. 251-319 *In*: K. Terwilliger, coordinator. Virginia's

Endangered Species. Proceedings of a symposium, April 1989, Blacksburg, Virginia. McDonald & Woodward Publishing Co., Blacksburg.

Oesch, R.D. 1984. Missouri Naiades: A Guide to the Mussels of Missouri. Missouri Department of Conservation, Jefferson City.

Parmalee, P.W., and A.E. Bogan. 1998. The Freshwater Mussels of Tennessee. The University of Tennessee Press, Knoxville, TN.

Robinson, R., W. Hansen, and K. Orth. 1995. Evaluation of Environmental Investments Procedures Manual, Interim: Effectiveness and Incremental Cost Analyses, IWR Report 95-R-1. U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources (IWR), Alexandria, VA 22315-3868; U.S. Army Corps of Engineers, Waterways Experiment Station (WES), Environmental Laboratory, Vicksburg, MS.

Rogala, J.T., P.J. Boma, and B.R. Gray. 2003. Rates and patterns of net sedimentation in backwaters of Pools 4, 8, and 13 of the Upper Mississippi River. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI.

Schueller, M.D. 1989. Habitat Utilization of a Main Channel Island in Navigation Pool 7 of the Upper Mississippi River by Young-of-the-Year Fishes. Thesis submitted to University of Wisconsin – La Crosse. La Crosse, WI.

Simons, D.B., S.A. Schumm, and M.A. Stevens. 1974. Geomorphology of the Middle Mississippi River. Colorado State University, Fort Collins, CO.

Sparks, R.E. 1992. Risks of altering the hydrologic regime of large rivers. Pages 119-152 IN: J. Cairns Jr., B.R. Niederlehner, and D.R. Orvos, eds. Predicting Ecosystem Risk. Vol. XX: Advances in Modern Environmental Toxicology. Princeton Scientific Publishing Co., Princeton, NJ.

Sparks, R.E. 1995. Need for ecosystem management of large rivers and their floodplains. BioScience 45: 168-182.

Sparks, R.E., and T.V. Lerczak. 1993. Recent trends in the Illinois River indicated by fish populations. Illinois Natural History Survey Center for Aquatic Ecology Technical Report 93/16.

Sparks, R.E., J.C. Nelson, and Y. Yin. 1998. Naturalization of the flood regime in regulated rivers, the case of the upper Mississippi River. Bioscience 48: 706-720.

Theiling, C.H., C. Korschgen, H. De Haan, T. Fox, J. Rohweder, and L. Robinson. 2000. Habitat Needs Assessment for the Upper Mississippi River System: Technical Report. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. Contract report prepared for U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.

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

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

UMRBC (Upper Mississippi River Basin Commission). 1982. Comprehensive Master Plan for the Management of the Upper Mississippi River System. Upper Mississippi River Basin Commission, Minneapolis, MN.

UMRCC (Upper Mississippi River Conservation Committee). 2000. 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, Rock Island, IL.

UMRCC (Upper Mississippi River Conservation Committee). 2002. Upper Mississippi and Illinois River Floodplain Forests Upper Mississippi River Conservation Committee.

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

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

USACE (U.S. Army Corps of Engineers). 2002. 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, May 2002.

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

USACE (U.S. Army Corps of Engineers). 2004b. Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study, Feasibility Report 2004. U.S. Army Corps of Engineers, Rock Island, St. Paul, and St. Louis Districts.

USACE (U.S. Army Corps of Engineers). 2005. 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.

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

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

USACE (U.S. Army Corps of Engineers). 2008. Upper Mississippi River Comprehensive Plan – Final Report. U.S. Army Corps of Engineers, Rock Island, St. Louis, and St. Paul Districts.

USFWS (U.S. Fish and Wildlife Service). 1980. Habitat evaluation procedure. ESM 102. U.S. Fish and Wildlife Service, Washington, D.C.

USFWS (U.S. Fish and Wildlife Service). 2002. Draft fish and wildlife coordination act report for the Upper Mississippi River-Illinois Waterway system navigation study through August 1, 2001. U.S. Fish and Wildlife Service, Rock Island, IL.

USFWS (U.S. Fish and Wildlife Service). 2004. Mark Twain National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment. U.S. Fish and Wildlife Service, Washington, D.C.

USFWS (U.S. Fish and Wildlife Service). 2007. National Bald Eagle management guidelines. U.S. Fish and Wildlife Service, Washington, D.C.

USGS (U.S. Geological Survey). 1998. 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. LTRMP 99-T001.

USWRC (United States Water Resources Council). 1983. Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. U.S. Government Printing Office, Washington, D.C.

Warner, K.L. 1998. Water-Quality Assessment of the Lower Illinois River Basin: Environmental Setting. U.S. Department Of The Interior, U.S. Geological Survey, Water-Resources Investigations Report 97–4165.

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

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

WEST Consultants, Inc. 2000. Upper Mississippi River and Illinois Waterway Navigation Feasibility Study – Cumulative Effects Study, Volumes 1-2. Prepared by WEST Consultants, Inc. for the U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL.

Yeager, M.M., D.S. Cherry, and R.J. Neves. 1994. Feeding and burrowing behaviors of juvenile rainbow mussels, *Villosa iris* (Bivalvia: Unionidae). Journal of the North American Benthological Society 13:217-222.

Appendix A

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Correspondence

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

Island and Shoreline Protection – Twin Islands

Appendix A- Correspondence

Contents

1 Key Meetings

Below are a list of key meetings that were held with interagency partners and with the project delivery team. Full meeting minutes are documented in the project file and available upon request.

Date	Summary
18 May 2011	Project suspended
05 May 2020	NESP Project Team agreement to move forward with Twin Island with FY 20 funding availability
27 July 2020	USACE Site Visit: Environmental, Cultural, & HTRW

2 Agency Coordination

2.1 Illinois Department of Natural Resources Letter of Support

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

JB Pritzker, Governor
Colleen Callahan, Director

April 30, 2020

Andrew Goodall
NESP Program Manager
U.S. Army Corps of Engineers
Rock Island District
Clock Tower Building
P.O. Box 2004
Rock Island, Illinois 61204

Dear Andrew Goodall,

The Illinois Department of Natural Resources (IDNR) is providing this letter of support for the Navigation and Ecosystem Sustainability Program (NESP) Twin Islands Ecosystem Restoration Project. This project is located on the Illinois River at approximately mile marker 37.8, in Greene County, Illinois. This letter of support is based upon the information provided in the Project Summary dated March 2011. IDNR support is contingent on all required state permits being secured.

IDNR, serving as the non-Federal Sponsor, is supportive of this project and hereby expresses our willingness to continue to work with the Rock Island District of the Army Corps of Engineers and NESP towards successful projects.

IDNR understands, per the Project Summary, that the cost of design and construction is 100% funded by the federal government. Therefore, there is no financial burden through construction of this project for IDNR. IDNR and USACE will, in the interim, address any OMRR&R requirements and anticipated annual cost. IDNR requests to be included in the design review and comment process throughout this project.

IDNR looks forward to assisting USACE with the coordination of this project. Should you have any questions regarding this letter, please contact Chad Craycraft at 217-782-9211 or by email at chad.craycraft@illinois.gov.

Sincerely,

Robert F. Appleman
Office Director, ORCP

Cc: Colleen Callahan Von Bandy Renee Snow Bob Mool
Chris Young Loren Wobig

2.2 Illinois Department of Natural Resources Project Correspondence

Comments from IDNR included editorial items, information on IDNR Public Water permit, and engineering information on stone grade. Due to a confidentiality notice in the below correspondence, those comments were not copied into this document.

From: Moser, Phillip L CIV USARMY CEMVS (USA) <Phillip.L.Moser@usace.army.mil>
Sent: Wednesday, November 18, 2020 6:16 AM
To: Craycraft, Chad <Chad.Craycraft@Illinois.gov>
Subject: [External] FW: IDNR Review of USACE NESP Twin Island PIR

Chad,

I received a notification that this email yesterday afternoon was too large, so I'll be sending it in two iterations. Here is the first (Main Report & App A-E).

Thanks,

Phil Moser, PMP
Project Manager
U.S. Army Corps of Engineers, St. Louis District
Office: 314-260-3922 Cell: 314-873-1251
Phillip.l.Moser@usace.army.mil

From: Moser, Phillip L CIV USARMY CEMVS (USA)
Sent: Tuesday, November 17, 2020 3:45 PM
To: Craycraft, Chad <Chad.Craycraft@Illinois.gov>
Cc: USARMY CEMVR Goodall (USA) (Andrew.J.Goodall@usace.army.mil) <Andrew.J.Goodall@usace.army.mil>
Subject: IDNR Review of USACE NESP Twin Island PIR

Good Afternoon Chad,

Per our conversation this morning, please see the attached draft version of the Twin Island Implementation Report w/ Environmental Assessment and associated Appendices (A – J). Note that the Tentatively Selected Plan remains the same as when the project was paused in 2010 due to lack of program funding. Updates were made to the document to incorporate more recent

guidance/policies/standards as well as to remain consistent with the current format of similar reports.

The starting back up of NESP in the middle of the government fiscal year has been a challenge from both a management and coordination stand point. Thank you for your continued support to the USACE NESP and we look forward to continuous improvement in our partnership throughout the process.

The USACE had originally scheduled to commence Public Review on 11/19 (for 30 calendar days), but will pause the initiation to allow for IDNR review of the subject document. The USACE requests, if possible, that comments be provided by 11/24 to facilitate public review starting on 11/25. Please let me know if this timeline works or if additional time is needed. Alternatively, we present the option of performing IDNR review concurrent with the previously scheduled public review.

Please let me know of any questions.

Thanks,

Phil Moser, PMP
Project Manager
U.S. Army Corps of Engineers, St. Louis District
Office: 314-260-3922 Cell: 314-873-1251
Phillip.l.Moser@usace.army.mil

2.3 US Fish and Wildlife Service Draft Coordination Act Report

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Southern Illinois Sub-Office (ES)
8588 Route 148
Marion, Illinois 62959

FWS/SISO

October 23, 2020

Colonel Kevin R. Golinghorst
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attention: Dr. Kathryn N.S. McCain, CEMVS-PM-E

Dear Colonel Golinghorst:

This letter constitutes our Draft Fish and Wildlife Coordination Act Report (Report) for the Twin Islands Navigation and Ecosystem Sustainability Program (NESP) Project located between Illinois River miles 37.5 and 37.8 within the Alton Pool, in Greene County, 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 (IDNR) and their concurrence is noted.

Introduction

The Upper Mississippi River – Illinois Waterway System Navigation Study was completed in September 2004 and recommended the dual purposes of ensuring a sustainable natural ecosystem and navigation system. The Navigation and Ecosystem Sustainability Program (NESP) was later authorized by the Water Resources Development Act (WRDA) of 2007. The Twin Islands Project is a component of the NESP and addresses restoration of approximately 32 acres of island and riverine habitats in the Lower Illinois River and the sponsor for the project is the IDNR.

Threatened and Endangered Species

The Service has reviewed the August 2020, Biological Assessment (BA) for proposed project. In our September 16, 2020 response letter, we concurred that proposed project is not likely to adversely affect any known federally listed threatened or endangered species.

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 and loss of islands. Overall, the estimated number of side channels in the Illinois River declined from 94 in 1903 to 57 in 2007 and the estimated length of side channels in miles 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 throughout the Illinois River. In the Alton Pool, the estimated number of side channels declined from 23 in 1903 to 18 in 2007 and the estimated length of side channels in miles 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 Twin Islands, navigation induced shoreline erosion and sedimentation has led to island loss and degraded aquatic habitats. In particular, the loss of the island and subsequent off-channel areas has led to degraded habitat for native fishes. In addition, the hydrologic regime and sedimentation patterns of the Illinois River have been altered over the past 150 years (USACE 2007) as a result of navigation system development as well as levee construction. This has brought about the stabilization of the channel and has contributed to loss of aquatic habitat diversity.

The primary habitat problem in the area is loss of islands due to navigation induced shoreline erosion and associated sedimentation. An opportunity exists to restore and maintain the degraded islands and aquatic habitat in the study area in order to increase the ecological integrity of the Illinois River.

Goals and Objectives

The goal of the Twin Islands Project is to restore aquatic and island ecosystem resources within the project area to benefit fish and wildlife resources. To achieve this goal a planning team of biologists from the U.S. Army Corps of Engineers (Corps) and Illinois Department of Natural Resources developed the objectives for the project.

The objectives include the following:

- Objective 1: Enhance geomorphic diversity in the study area within the period of analysis.
- Objective 2: Maintain island mosaic diversity in the study area within the period of analysis.
- Objective 3: Enhance the aquatic ecosystem for native fish in the study area within the period of analysis.

The goals and objectives of the Twin Islands Project fit well into the system wide objectives for the Upper Mississippi River System which includes the Illinois River (Galat et al., 2007). The system wide objectives include management for:

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

The goals and objectives of the Twin Islands Project also address needs of the lower Illinois River identified in the Habitat Needs Assessment II (McCain, Schmuecker, & De Jager, 2018). The needs for the lower Illinois River include:

- Restore floodplain functional classes (including islands and side channels)
- Reduce sedimentation (improve total suspended solids)
- Restore deep, lentic and lotic habitats
- Restore open water areas
- Increase off-channel and floodplain lentic areas
- Restore aquatic vegetation
- Restore floodplain topographic diversity and associated flooding periods
- Reduce variability in water surface elevations
- Restore floodplain vegetation diversity

Proposed Project Features

To achieve the project objectives, several project plans/features were evaluated. The recommended plan (alternative 3) consists of the following:

- Construction of a 500-foot total length wing-bullnose upstream of the island heads.
- Construction of 300-foot revetment on the head of Little Twin Island

This plan maintains and restores approximately 32 acres of island by forcing flows away from the island heads and thus reducing shoreline erosion. In addition, slower pooled water would form upstream of the downstream wing- bullnose creating slack water habitat needed by native fishes and improved flows and depth within the side channels will help maintain and improve habitat diversity within the project area.

Methodology to Evaluate Alternatives

The Twin Islands Project was analyzed using the Habitat Evaluation Procedures (HEP). The target species for the HEP included the striped bass. Existing conditions, future without project

conditions and future with project conditions were examined. This analysis was conducted by the Corps.

The utilized evaluation models produced a rating of habitat quality for each respective habitat type. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing and future habitat conditions compared to optimum habitat which is 1.0. This value, when multiplied by the available habitat within the project area, will provide a measure of available habitat quality and quantity known as habitat units (HUs). Average annual habitat units (AAHUs) for each species are typically calculated to reflect expected habitat conditions over a 50-year project life.

Existing, Future without, and Future with Project Conditions

A number of assumptions were made as to what the project area and vicinity would be like in the future with and without the project and can be found in Appendix B of this report.

Side Channel

Habitat suitability for the striped bass improved with the project, while without the project the habitat suitability declined (Table 1). Habitat quality for the striped bass improved with the project due to improved current velocity during the spawning time period. Velocity would initially decline with installation of the bullnose and would increase slightly over time with increased scour around the structure but would remain optimal. Without the project, Twin Islands would continue to erode, and more habitat would convert to main channel habitat. This will cause the current velocity during the spawning time period to increase and result in less optimal conditions and lower HSI scores. The proposed project results in a net increase of 8.44 habitat units (Table 2; Appendix C, USACE 2020).

Conclusions and Recommendations

According to the Incremental Cost Analysis, the preferred alternative is tied for highest in cost per AAHU output compared to the other alternatives including the no action alternative. A large portion of the cost for the preferred alternative is attributable to construction of the wing-bullnose structure and revetment. There are currently limited opportunities to implement side channel restoration and island restoration projects in this portion of the Illinois River. The original *Upper Mississippi River System Habitat Needs Assessment* (Theiling, et al., 2000) emphasized the need for side channel and island restoration in the Upper Mississippi River System and the *Habitat Needs Assessment II* (McCain, et al., 2018) identified the need to reduce sedimentation. restore deep, lentic and lotic habitats, and increase off-channel areas within this portion of the Illinois River. This plan restores approximately 32 acres of island and side channel habitat within the project area. Additionally, it is very difficult to capture the full benefits associated with island/side channel projects. We believe that the ecosystem benefits of island and side channel restoration extend beyond the project area for both aquatic and terrestrial species. We fully support the alternative because it would restore a component of habitat diversity in this portion of the Illinois River.

Overall, the proposed project (Alternative 3) will be beneficial to the Illinois River and biota dependent upon the river by protecting the islands, reducing side channel sedimentation, and improving habitat quality and diversity 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 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. The proposed Twin Islands Project will be beneficial to a variety of fish and wildlife resources. The Service fully supports the proposed Twin Islands NESP Project.

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. If you have questions, please contact me at (618) 998-5945.

Sincerely,

/s/ Matthew T. Mangan

Matthew T. Mangan
Fish and Wildlife Biologist

cc: IDNR (Atwood)
MDC (Vitello)

Attachments: Table 1
Table 2
Appendix A – Literature Cited
Appendix B – Assumptions

Table 1. Habitat Suitability Index (HSI) scores for Existing, Future with Project (Year 1,5,25 and 50) and Future without Project (Year 1,5,25 and 50), Twin Islands Project.

Habitat Type	Species	Existing	Future With				Future Without			
		0	1	5	25	50	1	5	25	50
Island/Side Channel	Striped Bass	0.78	1.00	1.00	1.00	1.00	0.78	0.78	0.73	0.68

Table 2. Habitat Units for Future with Project (Year 50) and Future without Project (Year 50), Twin Islands Project. Net change is the difference between Future with Project and Future without Project.

Habitat Type	Species	Future With	Future Without	Net
Island/Side Channel	Striped Bass	31.93	21.76	8.44

APPENDIX A

Literature Cited

Galat , D., Barko, J., Bartell, S., Davis, M., Johnson, B., Lubinski, K., . . . Wilcox, D. (2007). *Environmental Science Panel Report: Establishing System-wide Goals and Objectives for the Upper Mississippi River System.* U.S Army Corps of Engineers, Rock Island District, St. Louis District, St. Paul District: Rock Island, Illinois, St. Louis, Missouri, St. Paul, Minnesota

McCain, K.N.S., S. Schmuecker, and N.R. De Jager *2018*. Habitat Needs Assessment-II for the Upper Mississippi River Restoration Program: Linking Science to Management Perspectives. U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL

Theiling, C. H., Korschgen, C., DeHaan, H., Fox, T., Rohweder, J., & Robinson, L. (2000). *Habitat Needs Assessment for the Upper Mississippi River System Technical Report.* La Crosse, WI: U.S. Geological Survey, Upper Midwest Environmental Sciences Center.

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

USACE (U.S. Army Corps of Engineers). 2020. Navigation and Ecosystem Sustainability Program, Performance Implementation Report with Integrated Environmental Assessment, Island and Shoreline Protection – Twin Islands Project. U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.

APPENDIX B

Assumptions

Certain assumptions were made regarding existing and future conditions during the habitat analysis. Taken from Appendix C (Habitat Evaluation and Quantification) of the Project Implementation Report (USACE 2020).

Baseline condition: Gage data were collected from the USGS Valley City gage. These data were used to estimate velocity (centimeters per second). The team used USACE data (from 1993 to 2018) from the Upper Mississippi River Restoration Program Long Term Resource Monitoring Pool 26 water quality data set to estimate temperature and dissolved oxygen.

Future Without Project Condition: Future conditions of the aquatic habitat assumed temperature and dissolved oxygen would remain similar to baseline conditions and were held constant through the period of analysis. This assumption was made due to the size of the project area compared to the lower Illinois River. It was assumed that velocities would increase downstream of the Little Twin Island due to the continued erosion and the habitat converting to more main channel habitat.

Future With Project Condition: The team assumed that temperature and dissolved oxygen would not differ among proposed action alternatives and be similar to the baseline conditions throughout the entire period of analysis; however, it was assumed that velocity would differ among the proposed action alternatives (Table 2).

Table 2. Future with Project Velocity Assumptions

Alternative	Assumption
2 – Single bullnose with revetment	The bullnose that spans both islands would decrease velocities between and downstream of the islands. By year 25 and 50, velocities would increase due to scour downstream of bullnose
3 – Unrooted wing-bullnose with revetment	The winged bullnose would decrease velocities between and downstream of the islands. By year 25 and 50, velocities would increase due to scour downstream of bullnose
4 – Revetment only on island head	Assumed minimal decrease in velocity initially, but through time would likely return to baseline conditions.

3 Distribution List

The District sent emails to elected officials, state and Federal agencies, interested citizens, and parties announcing the draft report's availability. Additionally, information on where the draft report is available for review and comment will be posted on the District's social media platforms and website. The email distribution list contains personal information, and therefore not provided here.

U.S. Elected Officials

United States Congress
The Honorable Tammy Duckworth
8 South Old State Capitol Plaza
Springfield, IL 62701

United States Congress
The Honorable Richard Durbin
525 S. 8th Street
Springfield, IL 62703

United States Congress
The Honorable Rodney Davis
2833 S. Grand Avenue East
Springfield, IL 62703

State Elected Officials

Illinois Legislature- District #100
The Honorable C.D. Davidsmeyer
202 N. Stratton Office Building
Springfield, IL 62706

Illinois Legislature- District #50
The Honorable Steve McClure
218 Capitol Building
Springfield, IL 62706

Local Elected Officials

Greene County Board
519 N Main St. #2
Carrollton, IL 62016

Mayor Joseph L. Montanez Sr.
621 S Main
Carrollton, IL 62016

Mayor Nicholas Bishop
510 Walnut Street
Greenfield, IL 62044

Federal Agencies

Mr. Kurt Thiede
USEPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3507

Mr. Matt Mangan
USFWS Ecological Services
Southern Illinois Sub-Office
8588 Route 148
Marion, IL 62959

State Agencies

Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702-1271

Region IV Office
Pere Marquette State Park
13112 Visitor Center Ln.
Grafton, IL 62037

Mr. Elmer (Butch) Atwood
Illinois Department of Natural Resources
Office of Fisheries
1000 Killarney Drive
Greenville, Illinois 62246

Ms. Nerissa McClelland
IDNR- Division of Fisheries
Havana Field Office
700 S. 10th St.
Havana, IL 62644

4 Public Review

4.1 Copy of Public Review Letter

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

REPLY TO
ATTENTION OF:

6 January 2021

Dear Sir or Madam:

The U.S. Army Corps of Engineers St. Louis District has prepared a draft report entitled "Navigation and Ecosystem Sustainability Program Island and Shoreline Protection- Twin Islands Performance Implementation Report with Integrated Environmental Assessment." The project is located on the right descending bank of the Illinois River (River miles 37.5-37.8) in Greene County, Illinois. The draft report addresses the goal to restore the aquatic ecosystem within the Study Area. The report describes alternative solutions 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, titled "Navigation and Ecosystem Sustainability Program Island and Shoreline Protection- Twin Islands Performance Implementation Report with Integrated Environmental Assessment" and appendices are available online at:

http://www.mvs.usace.army.mil/Missions/Programs-Project-Management/Plans-Reports/

You are welcome to comment on the content of the draft report. To submit a public comment please contact Mr. Benjamin McGuire of our Environmental Planning Section, telephone 314-331-8478, or email at Benjamin.M.Mcguire@usace.army.mil. For general project inquiries, please contact Mr. Phillip Moser of our Project Development Branch, telephone 314-260-3922, or email at Phillip.L.Moser@usace.army.mil. Written comments may also be sent to our address below:

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

The 30 day comment period runs from January 6, 2021 through February 4, 2021. Due to COVID-19 concerns, a public meeting will not be held.

Sincerely,

Brian Johnson

Brian Johnson
Chief, Environmental Compliance Branch

4.2 Public Comments Received

5 Cultural and Tribal Scoping

5.1 Distribution List

Illinois State Historic Preservation Office
Absentee-Shawnee Tribe of Indians
Caddo Nation of Oklahoma
Citizen Potawatomi Nation, Oklahoma
Delaware Tribe of Indians
Eastern Shawnee Tribe of Oklahoma
Forest County Potawatomi Community, Wisconsin
Hannahville Indian Community, Michigan
Ho-Chunk Nation of Wisconsin
Iowa Tribe of Kansas and Nebraska
Iowa Tribe of Oklahoma
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas
Kickapoo Tribe of Oklahoma
Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan
Miami Tribe of Oklahoma
Nottawaseppi Huron Band of the Potawatomi, Michigan
Peoria Tribe of Indians of Oklahoma
Pokagon Band of Potawatomi Indians, Michigan and Indiana
Prairie Band of Potawatomi Nation
Sac & Fox Nation of Missouri in Kansas and Nebraska
Sac & Fox Nation, Oklahoma
Sac & Fox Tribe of the Mississippi in Iowa
Shawnee Tribe
The Osage Nation
The Quapaw Tribe of Indians
United Keetoowah Band of Cherokee of Oklahoma

5.2 Copy of Letter Sent to THPO/SHPO

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

21 August 2020

Engineering and Construction Division
Curation and Archives Analysis Branch (EC-Z)

Ms. Devon Frazier
Tribal Historic Preservation Officer
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 S. Gordon Cooper Drive
Shawnee, OK 74810-9381

Subject: Twin Islands Ecosystem Restoration Project, Illinois River, Greene County, Illinois

Dear Ms. Frazier:

We are contacting your tribe to initiate consultation on a proposed undertaking of the U.S. Army Corps of Engineers (USACE) to restore Twin Islands, Greene County, Illinois (Figure 1) in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Twin Islands consists of two islands within the Illinois River. The hydrologic regime and sedimentation patterns of the Illinois River have been altered over the past 150 years 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 evolutionarily adapted to the historic river condition. Within the project site, sedimentation and erosion are causing a loss of productive backwaters, side channels, and channel border areas limiting ecological health and altering the character of this floodplain river system. In particular, critical spawning, nursery, and overwintering areas for fish; habitat for diving ducks and other aquatic species; and backwater aquatic plant communities have declined significantly.

Historic maps and aerial imagery indicate that the islands have moved down river and towards the shore due to sediment eroding at the head and channel side and deposition along the bank side and at the tail end. Additionally the floodplain has been disconnected from the river by the Hartwell and Keach levees along the left descending bank. The Twin Islands complex, along the right descending bank, has been severely modified. Little Twin Island 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.

USACE is proposing to construct a 500-foot length wing-bullnose upstream of the head of the islands. This structure will use the force of the water flowing over the angled sections of the dike to direct flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures. The notched section will still allow flows between the islands. Additionally, approximately 300 foot of revetment will be placed on the head of the smaller island. Slack water fish habitat would be created upstream of both islands.

Archaeological surveys conducted by the Center for American Archaeology in the 1970s and did not identify any potentially significant archaeological remains. In 2006 and 2020, USACE archaeologists conducted on-site field inspection of the islands and no cultural resources were found. 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.

For these reasons, it is the District's current opinion that the proposed project will have no effect on historic properties. In the unlikely event cultural properties are located during construction they will be evaluated for National Register eligibility, in consultation with the Illinois Historic Preservation Officer, and appropriate mitigation will be completed. Should an inadvertent discover of human remains occur, all work will cease until the St. Louis District complies with the appropriate state acts.

If your tribe has any questions, comments, or areas of concern, please contact me at (314) 331-8855, or Chris Koenig (Supervisory Archaeologist and Tribal Liaison) at (314) 331-8151, email at Christopher.J.Koenig@usace.army.mil.

Sincerely,

SIGNED

Jennifer Riordan
Chief, Curation and Archives
Analysis Branch

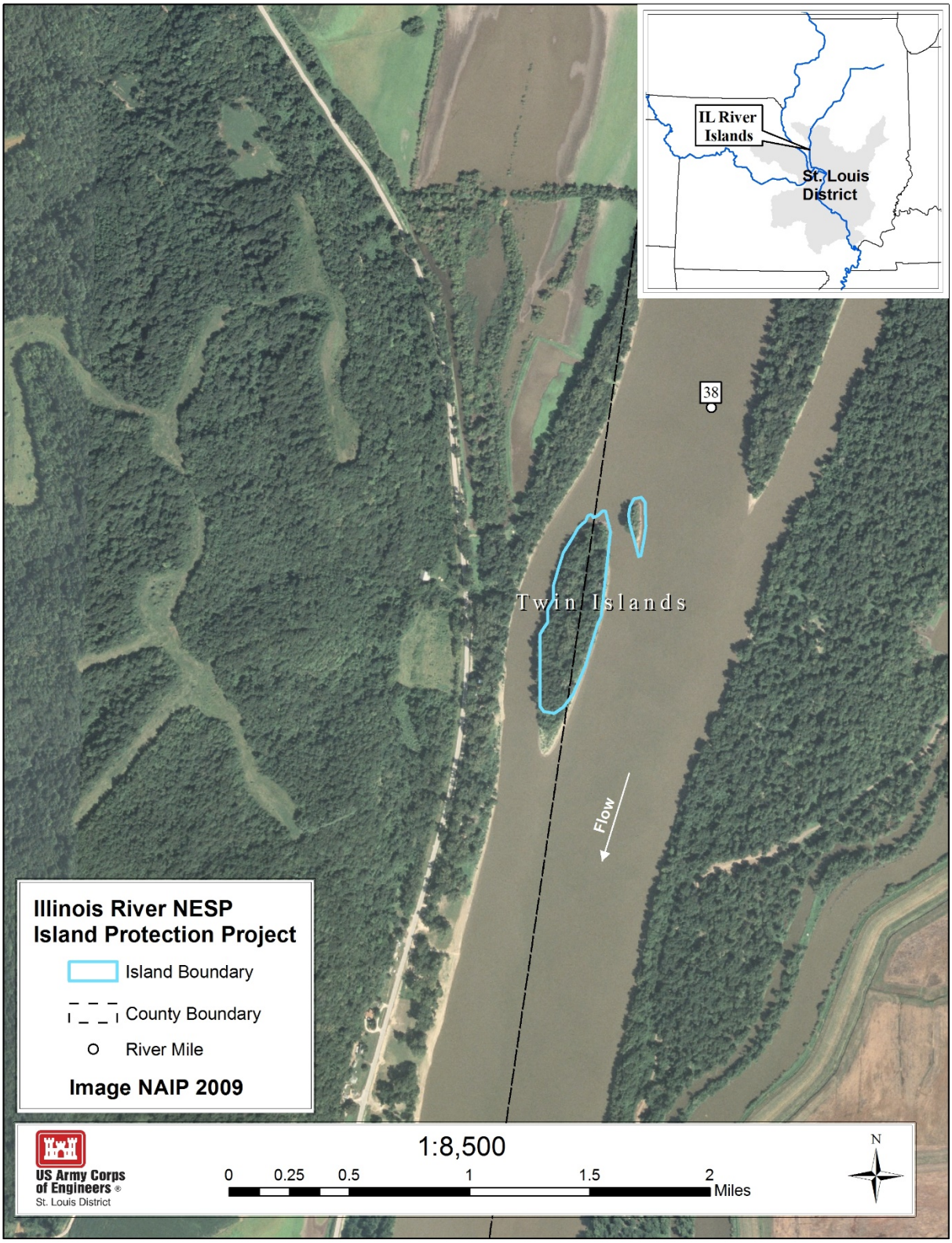


Figure 1. Location Map of Project Area.

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

REPLY TO
ATTENTION OF:

August 10, 2020

Engineering and Construction Division
Curation and Archives Analysis Branch (EC-Z)

Jeffrey D. Kruchten
State Historic Preservation Office
Illinois Dept. of Natural Resources
Attn: Review & Compliance
1 Old State Capitol Plaza
Springfield, Illinois 62701

Subject: Twin Islands Ecosystem Restoration Project, Illinois River, Greene County, Illinois

Dear Mr. Kruchten:

Pursuant to the National Historic Preservation Act, Section 106 (as amended), and its implementing regulation 36 CPR 800, and the executed *Programmatic Agreement Among the Chicago, Rock Island the St. Louis District of the U.S. Army Corps of Engineers, the State of Illinois Department of Natural Resources, the Illinois State Historic Preservation Officer, and the Advisory Council on Historic Preservation, Regarding Implementation of the Illinois River Ecosystem Restoration (IRER)* (PA) to afford protection to historic properties during the implementation of the IRER, U.S. Army Corps of Engineers (Corps), hereby notifies the Illinois State Historic Preservation Officer that the Corps is proposing a restoration project on two islands in the Illinois River located in Greene County, Illinois (Figure 1). The Corps has determined that no adverse effect will occur to significant historic properties as the result of this restoration project.

Problems: The hydrologic regime and sedimentation patterns of the Illinois River have been altered over the past 150 years 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 evolutionarily adapted to the historic river condition.

Within the project site, sedimentation and erosion are causing a loss of productive backwaters, side channels, and channel border areas limiting ecological health and altering the character of this floodplain river system. In particular, critical spawning, nursery, and overwintering areas for fish; habitat for diving ducks and other aquatic species; and backwater aquatic plant communities have declined significantly.

Opportunities: An opportunity exists to restore and maintain the degraded Twin 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. 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.

Existing Conditions: A historical look at the mainstem 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. The 1904 Woermann map (Figure 2) and aerial imagery from 1939 (Figure 3), 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. Additionally the floodplain has been disconnected from the river by the Hartwell and Keach levees along the left descending bank. The Twin Islands complex, along the right descending bank, has been severely modified. Little Twin Island 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.

Proposed Action: (1) Construction of a 500 foot total length wing-bullnose upstream of the head of the islands. This structure will use the force of the water flowing over the angled sections of the dike to direct flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures. The notched section will still allow flows between the islands. (2) Place approximately 300 foot of revetment on the head of the smaller island. Slack water fish habitat would be created upstream of the both islands (Figures 4 and 5).

Archaeological surveys conducted by the Center for American Archaeology in the 1970’s, and on site field inspections in by St. Louis District archaeologists in 2006 and 2020 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.

In the unlikely event any cultural properties are located during construction they will be evaluated for National Register eligibility, in consultation with the Illinois Historic Preservation Officer, and appropriate mitigation will be completed. Should an inadvertent discover of human remains occur, all work will cease until the St. Louis District complies with the appropriate state acts.

Given this information, the St. Louis District is requesting your concurrence with our determination that no significant properties will be affected by these projects. If you have any questions or comments, please feel free to contact me at (314) 331-8855, or contact Dr. Mark Smith at (314) 331-8831 or Mark.A.Smith4@usace.army.mil.

Thank you,

Jennifer Riordan
Chief, Curation and Archives Analysis Branch

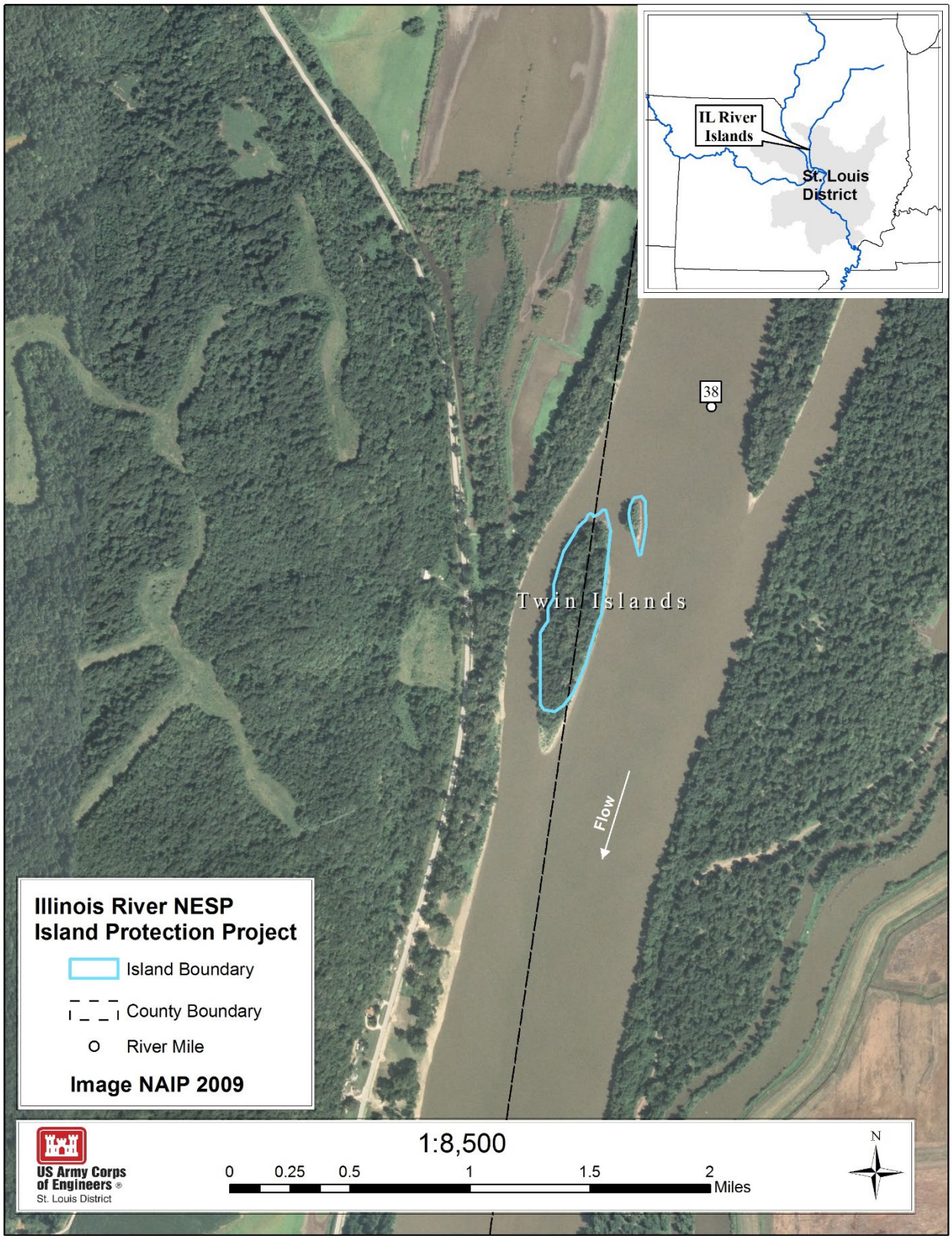


Figure 1. Project Area

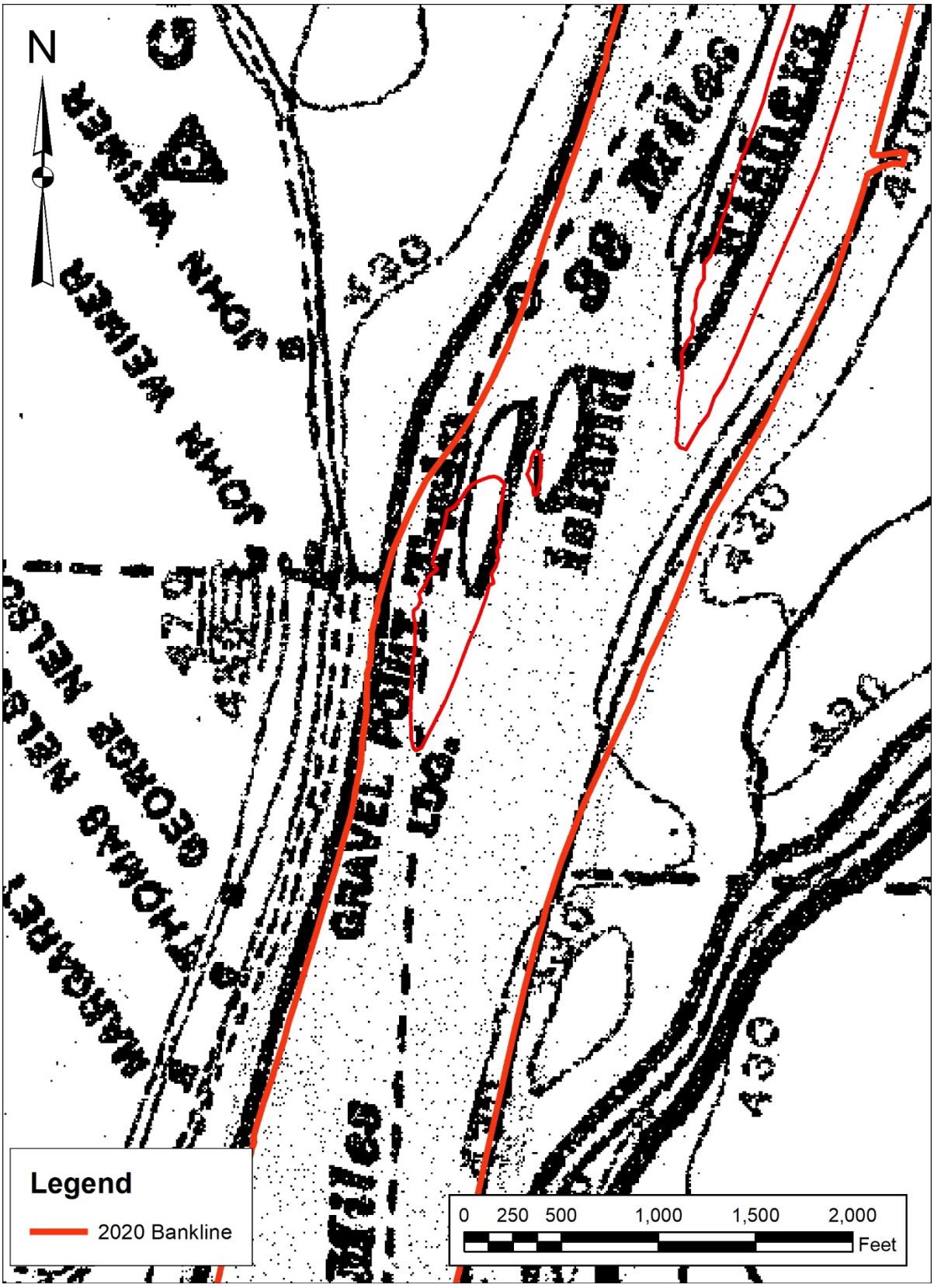


Figure 2. 1904 Woermann chart showing project area

Figure 3. 1939 Aerial photograph showing project area

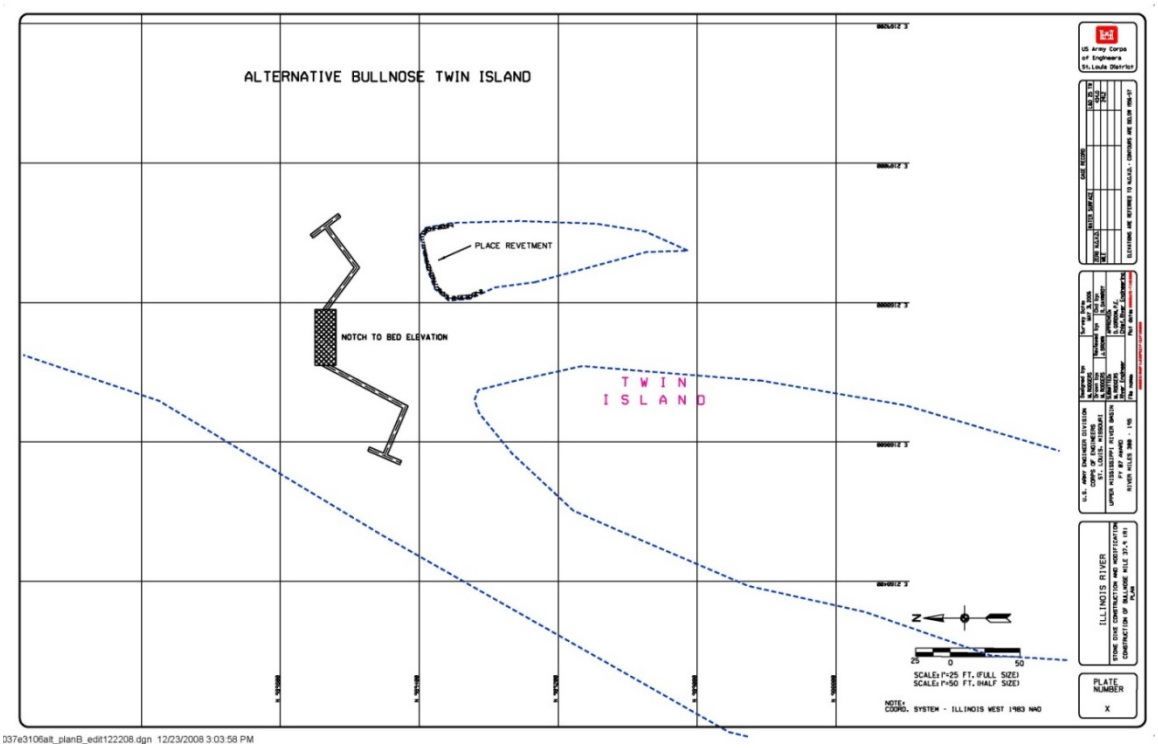


Figure 4. Proposed construction

Figure 5. Remnants of Little Twin Island (July 2020), view to south (location where revetment is proposed).

5.3 Comments Received

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of
Natural Resources

JB Pritzker, Governor
Colleen Callahan, Director

www.dnr.illinois.gov

Mailing address: State Historic Preservation Office, 1 Old State Capitol Plaza, Springfield, IL 62701

Greene County
Cliffdale
Between Illinois River miles 40.2 & 37.8
CORPS
Ecosystem Restoration - Twin Islands

PLEASE REFER TO: SHPO LOG #020081420

August 26, 2020

Mark A. Smith
Dept. of the Army, Corps of Engineers
St. Louis Dist. - 1222 Spruce Street
St. Louis, MO 63103-2833

Dear Dr. Smith:

We have reviewed the documentation submitted for the referenced project(s) in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two (2) years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you are an applicant, please submit a copy of this letter to the state or federal agency from which you obtain any permit, license, grant, or other assistance. If further assistance is needed contact Jeff Kruchten, Chief Archaeologist at 217/785-1279 or Jeffery.kruchten@illinois.gov.

Sincerely,

Robert F. Appleman
Deputy State Historic
Preservation Officer

6 Previous Project Correspondence

APPENDIX A - CORRESPONDENCE

PROJECT IMPLEMENTATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

Navigation and Ecosystem Sustainability Program
Island and Shoreline Protection
Twin Islands
Greene County, Illinois

From: Allen, Teri C MVS
To: "Jon_Duyvejonck@fws.gov"
Subject: RE: Illinois River Islands projects
Date: Tuesday, December 11, 2007 3:17:27 PM

John,

These are two separate projects. One is funded under NESP, the other is funded under Section 519. There will be two EAs. I will send them to you for review when completed.

Thanks for the website.

Teri

Teri C. Allen
Aquatic Ecologist

U.S. Army Corps of Engineers
CEMVS-PM-E
1222 Spruce Street
St. Louis, MO 63103

Phone 314-331-8084
Fax 314-331-8806
E-mail Teri.C.Allen@mvs02.usace.army.mil

-----Original Message-----
From: Jon_Duyvejonck@fws.gov [mailto:Jon_Duyvejonck@fws.gov]
Sent: Tuesday, December 04, 2007 11:27 AM
To: Allen, Teri C MVS
Subject: Illinois River Islands projects

Teri,

I received the two letters requesting a species list for Illinois River Islands. Can you provide some clarification? Are these two projects being planned separately, as in there will be 2 separate EAs? Or are you requesting lists separately because it is one project, but there might be two separate or alternate funding sources? Unless you absolutely need one, we do not have to send you a letter. The Service has a web page that lists Federally endangered species for each county. Any letter we send would be a duplication of species on that web page. The web page is http://www.fws.gov/midwest/endangered/section7/index.html

Jon Duyvejonck
US Fish & Wildlife Service
1511 - 47th ave
Moline, IL 61265
telephone 309/757-5800, ext. 207

From: Allen, Teri C MVS
To: "Jon_Duyvejonck@fws. gov (Jon_Duyvejonck@fws.gov)"
Subject: Illinois River Islands - Section 7 Determinations
Date: Thursday, June 19, 2008 3:07:22 PM
Attachments: FWS Section 7 Determination - Wing and Fisher Islands.pdf
FWS Section 7 Determination - Twin Islands.pdf

Jon,

Attached are the Endangered Species Act Section 7 determination documents for the Twin Islands and Wing & Fisher island projects.

Please feel free to contact me if you have any questions.

Thanks,
Teri

Teri C. Allen
Aquatic Ecologist

U.S. Army Corps of Engineers
CEMVS-PM-E
1222 Spruce Street
St. Louis, MO 63103

Phone 314-331-8084
Fax 314-331-8806
E-mail Teri.C.Allen@usace.army.mil

From: Allen, Teri C MVS
To: "Jon_Duyvejonck@fws. gov (Jon_Duyvejonck@fws.gov)"
Cc: Farmer, Jason W MVS
Subject: CAR request for Illinois River island projects
Date: Thursday, June 19, 2008 2:48:12 PM
Attachments: FWS CAR Request Wing and Fisher Islands.pdf
FWS CAR Request Twin Islands.pdf

Jon,

Attached are the requests for draft CAR reports for Twin, Wing, and Fisher Islands. If you have any questions, please feel free to contact me.

Thanks so much,
Teri

Teri C. Allen
Aquatic Ecologist

U.S. Army Corps of Engineers
CEMVS-PM-E
1222 Spruce Street
St. Louis, MO 63103

Phone 314-331-8084
Fax 314-331-8806
E-mail Teri.C.Allen@usace.army.mil

From: Allen, Teri C MVS
To: "Jon_Duyvejonck@fws.gov"
Cc: Lamm, Dawn MVS; Farmer, Jason W MVS
Subject: RE: Twin Islands & Wing/Fisher Islands CARs
Date: Monday, June 30, 2008 3:13:01 PM

Hi Jon,

I would be happy to send you a hard copy of the mussel report... I do not have an electronic copy either.

When we spoke a couple of weeks ago, we discussed the catch-22 situation regarding the overlapping need for the DCAR and DPIR. If my notes are correct, you said I could send you a description of the project, alternatives, the preferred alternative, and a map and that you would be able to supply a (supplemental) (D)CAR. I would then incorporation your information into the draft PIR and send it to you for review, at which time you would supply a FCAR. I sent the DCAR requests via e-mail on 6/19/08, along with our Section 7 determinations.

If you still need a VERY ROUGH copy of the PIR, please let me know.

Thanks,
Teri

Teri C. Allen
Aquatic Ecologist

U.S. Army Corps of Engineers
CEMVS-PM-E
1222 Spruce Street
St. Louis, MO 63103

Phone 314-331-8084
Fax 314-331-8806
E-mail Teri.C.Allen@usace.army.mil

-----Original Message-----
From: Jon_Duyvejonck@fws.gov [mailto:Jon_Duyvejonck@fws.gov]
Sent: Monday, June 30, 2008 2:41 PM
To: Allen, Teri C MVS
Cc: Lamm, Dawn MVS; jason.w..farmer@usace.army.mil
Subject: RE: Twin Islands

Teri,

I cannot seem to find the mussel survey done for Twin Islands by ESI. Can you send me either a digital or hard copy? Also, looking at the schedule see you want the CAR by mid August. Do you plan to send me an advance copy of the PIR by mid-July? In order to complete the CAR, I need to have an advance copy of the PIR 30 days in advance. It does not have to be "camera ready", but I need the draft EA, and supporting information. Same thing for Alton Island Restoration. Note: after checking our TFA scopes, it looks like we are OK for funds on these 2.

Jon Duyvejonck
US Fish & Wildlife Service
1511 - 47th ave
Moline, IL 61265

telephone 309/757-5800, ext. 207

"Allen, Teri C MVS" <Teri.C.Allen@usace.army.mil>

06/30/2008 11:00 AM To
<Jon_Duyvejonck@fws.gov>, <jason.w..farmer@usace.army.mil>
cc
"Lamm, Dawn MVS" <Dawn.Lamm@usace.army.mil>
Subject
RE: Twin Islands

Jon,

As we discussed previously, I need two DCARs this FY (by 8/15/08)... one under NESP W (Dawn) and one under IL River Section 519 (Jason).

Jason & Dawn - Please coordinate funding as required.

Thanks,
Teri

Teri C. Allen
Aquatic Ecologist

U.S. Army Corps of Engineers
CEMVS-PM-E
1222 Spruce Street
St. Louis, MO 63103

Phone 314-331-8084
Fax 314-331-8806
E-mail Teri.C.Allen@usace.army.mil

-----Original Message-----
From: Jon_Duyvejonck@fws.gov [mailto:Jon_Duyvejonck@fws.gov]
Sent: Monday, June 30, 2008 10:52 AM
To: jason.w..farmer@usace.army.mil
Cc: Allen, Teri C MVS
Subject: Twin Islands

Jason,

This FY the Service is allocated $5k for general coordination for all shoreline protection projects under NESP project W 125640. For FY 2008, the SOW description reads: "...Coordinate with District on review of alternatives for bank protection project $4,000 recommended (up from $2,500) Field Trip to the site could be included as part of the effort" This does not include any funds for preparing a CAR. Are you anticipating a need for a CAR this fiscal year? You might want to check with your NESP program manager to confirm

this. If you need a CAR this FY, it looks like a TFA modification may need to be made.

Teri, I will have to check with our Administrative Officer regarding transfer funds for Sec. 519 projects.

Jon Duyvejonck
US Fish & Wildlife Service
1511 - 47th ave
Moline, IL 61265
telephone 309/757-5800, ext. 207

Jon Duyvejonck
US Fish & Wildlife Service
1511 - 47th ave
Moline, IL 61265
telephone 309/757-5800, ext. 207

FISH & WILDLIFE COORDINATION ACT REPORT REQUEST

Project (include state): NESP Island and Shoreline Protection (W), Twin Islands Ecosystem Restoration Project Tier II EA, Greene County, Illinois

Project Manger:	Jason Farmer	Phone: 314-331-8033
F&WS Contact:	Jon Duyvejonck	Phone: 309-757-5800 ext. 207
COE Envir. POC:	Teri Allen	Phone: 314-331-8084

Project Authority:

The site-specific evaluation was initiated as a follow on component of the Upper Mississippi River and Illinois Waterway System Navigation Study (Sept 2004), which was a General Investigation study authorized by Section 216 of the Flood Control Act of 1970. Subsequent authorization was received in the Water Resources Development Act (WRDA) of 2007, Title VIII. Section 8004 of Title VIII, authorizes implementation of Ecosystem Restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River.

Project Location:

The Twin Islands Ecosystem Restoration Project area is located in Greene County, Illinois, between River Miles (RM) 37.5 and 37.8 RDB. The islands are located between the cities of Kampsville and Pearl, Illinois. Figure 1 provides vicinity and general location maps for the Twin Islands Ecosystem Restoration Project.

Brief Description of Project:

Existing islands and side channel habitat throughout the Illinois Waterway and Middle Mississippi River Systems are gradually being lost due to sedimentation (Simons et al. 1974) and erosion. 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 Twin Islands and their adjacent side channels, in order to increase the ecological integrity of the Illinois River. Selection of a preferred alternative is awaiting completion of an incremental cost analysis, thus a description of all potential project alternatives is included.

- Alternative 1 – No Corps Action
- Alternative 2 – Construct a 900 foot long bullnose that spans both islands. The structure would be built to an elevation of 425 ft NGVD and would have a 100 ft notch with an invert elevation to the existing riverbed located in line with the channel between the islands. The structure would tie into the riverside of the smaller island and the side channel bank of the larger island. This structure

would allow the head of the islands to stabilize without cutting off flow between the islands. Fish habitat would be created upstream of the smaller island.

- Alternative 3 – Construct a 500 foot total length W-dike upstream of the head of the islands. Starting upstream of the head of the smaller island at an elevation of 425 ft NGVD, angle downstream for 75 ft and slope up to an elevation of 427 ft, then angle upstream for 75 ft and slope down to an elevation of 425 ft. Leave a 100 ft long notch then start the structure again at an elevation of 425 ft. Angle downstream for 150 ft and slope up to elevation of 427, then angle upstream for 100 ft and slope down to an elevation of 425. This structure will use the force of the water flowing over the angled sections of the dike to force flows away from the island head. Slower pooled water will form upstream of the downstream angled structures.

- Alternative 4 – Place approximately 300 foot of revetment on the head of the smaller island and approximately 450 foot of revetment on the head of the larger island. All revetments would be placed to a height of 425 ft NGVD. This revetment would prevent the heads of the islands from further eroding.

Project Major Milestone Schedule: (include activity and scheduled completion date):

15 July 2008 – Unit Price Estimate by EC-DCS and selection of Preferred Alternative

15 August 2008 – Receive CAR from FWS

1 September 2008 – Draft PIR ready for internal review

30 September 2008 – PIR ready for ITR

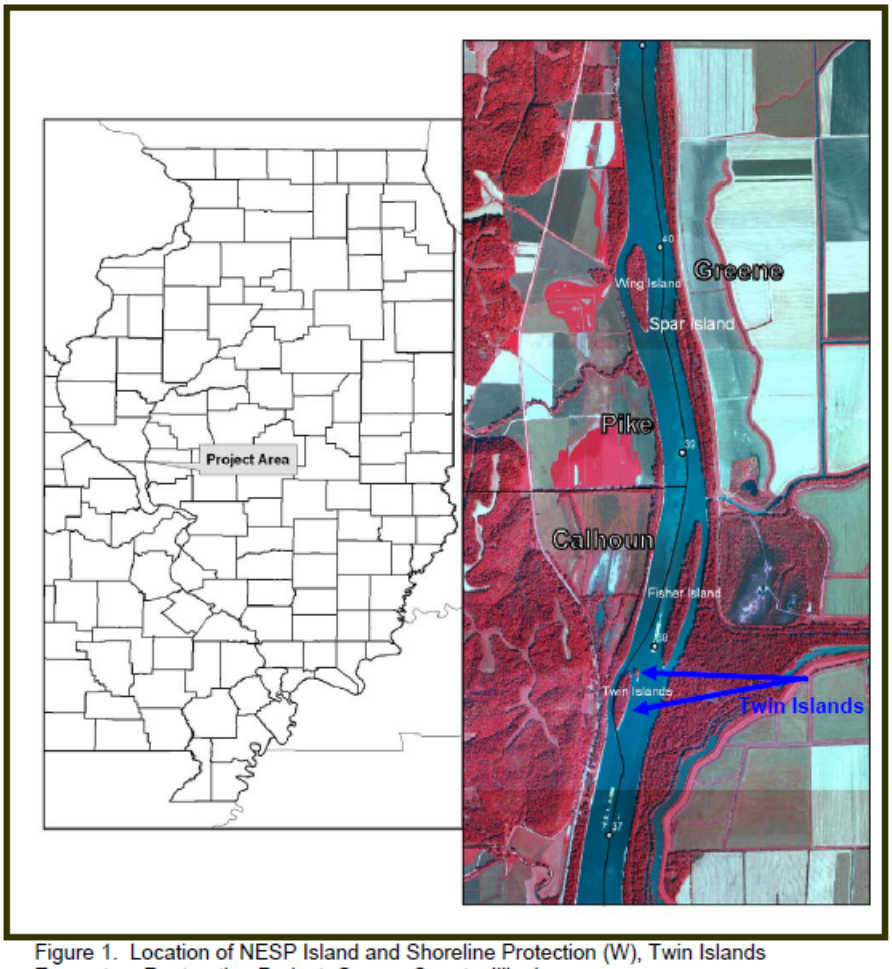


Figure 1. Location of NESP Island and Shoreline Protection (W), Twin Islands Ecosystem Restoration Project, Greene County, Illinois

Endangered Species Act Section 7 Determination

Project (include state): NESP Island and Shoreline Protection (W), Twin Islands Ecosystem Restoration Project Tier II EA, Greene County, Illinois

Project Manger:	Jason Farmer	Phone: 314-331-8033
F&WS Contact:	Jon Duyvejonck	Phone: 309-757-5800 ext. 207
COE Envir. POC:	Teri Allen	Phone: 314-331-8084

Project Authority:

The site-specific evaluation was initiated as a follow on component of the Upper Mississippi River and Illinois Waterway System Navigation Study (Sept 2004), which was a General Investigation study authorized by Section 216 of the Flood Control Act of 1970. Subsequent authorization was received in the Water Resources Development Act (WRDA) of 2007, Title VIII. Section 8004 of Title VIII, authorizes implementation of Ecosystem Restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River.

Project Location:

The Twin Islands Ecosystem Restoration Project area is located in Greene County, Illinois, between River Miles (RM) 37.5 and 37.8 RDB. The islands are located between the cities of Kampsville and Pearl, Illinois. Figure 1 provides vicinity and general location maps for the Twin Islands Ecosystem Restoration Project.

Brief Description of Project:

Existing islands and side channel habitat throughout the Illinois Waterway and Middle Mississippi River Systems are gradually being lost due to sedimentation (Simons et al. 1974) and erosion. 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 Twin Islands and their adjacent side channels, in order to increase the ecological integrity of the Illinois River. Selection of a preferred alternative is awaiting completion of an incremental cost analysis, thus a description of all potential project alternatives is included.

- Alternative 1 – No Corps Action
- Alternative 2 – Construct a 900 foot long bullnose that spans both islands. The structure would be built to an elevation of 425 ft NGVD and would have a 100 ft notch with an invert elevation to the existing riverbed located in line with the channel between the islands. The structure would tie into the riverside of the smaller island and the side channel bank of the larger island. This structure

would allow the head of the islands to stabilize without cutting off flow between the islands. Fish habitat would be created upstream of the smaller island.

- Alternative 3 – Construct a 500 foot total length W-dike upstream of the head of the islands. Starting upstream of the head of the smaller island at an elevation of 425 ft NGVD, angle downstream for 75 ft and slope up to an elevation of 427 ft, then angle upstream for 75 ft and slope down to an elevation of 425 ft. Leave a 100 ft long notch then start the structure again at an elevation of 425 ft. Angle downstream for 150 ft and slope up to elevation of 427, then angle upstream for 100 ft and slope down to an elevation of 425. This structure will use the force of the water flowing over the angled sections of the dike to force flows away from the island head. Slower pooled water will form upstream of the downstream angled structures.

- Alternative 4 – Place approximately 300 foot of revetment on the head of the smaller island and approximately 450 foot of revetment on the head of the larger island. All revetments would be placed to a height of 425 ft NGVD. This revetment would prevent the heads of the islands from further eroding.

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 Greene County, 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 Greene County, Illinois. According to the web site, four federally listed species may be present in the County (Table 1). There is no federally designated critical habitat in the proposed project area.

Table 1. Endangered and Threatened Species of Greene County, Illinois

Common Name	Scientific Name	Status	Habitat
Indiana bat	*Myotis sodalis*	FE	Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)
Spectaclecase mussel	*Cumberlandia monodonta*	FCa	Large rivers
Eastern prairie fringed orchid	*Platanthera leucophaea*	FT	Mesic to wet prairies
Prairie bush clover	*Lespedeza leptostachya*	FT	Dry to mesic prairies with gravelly soil

FE – Federally endangered, FT – Federally threatened, SE – State endangered, ST – State threatened

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.

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 Islands project site.

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.

Conservation Measures

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

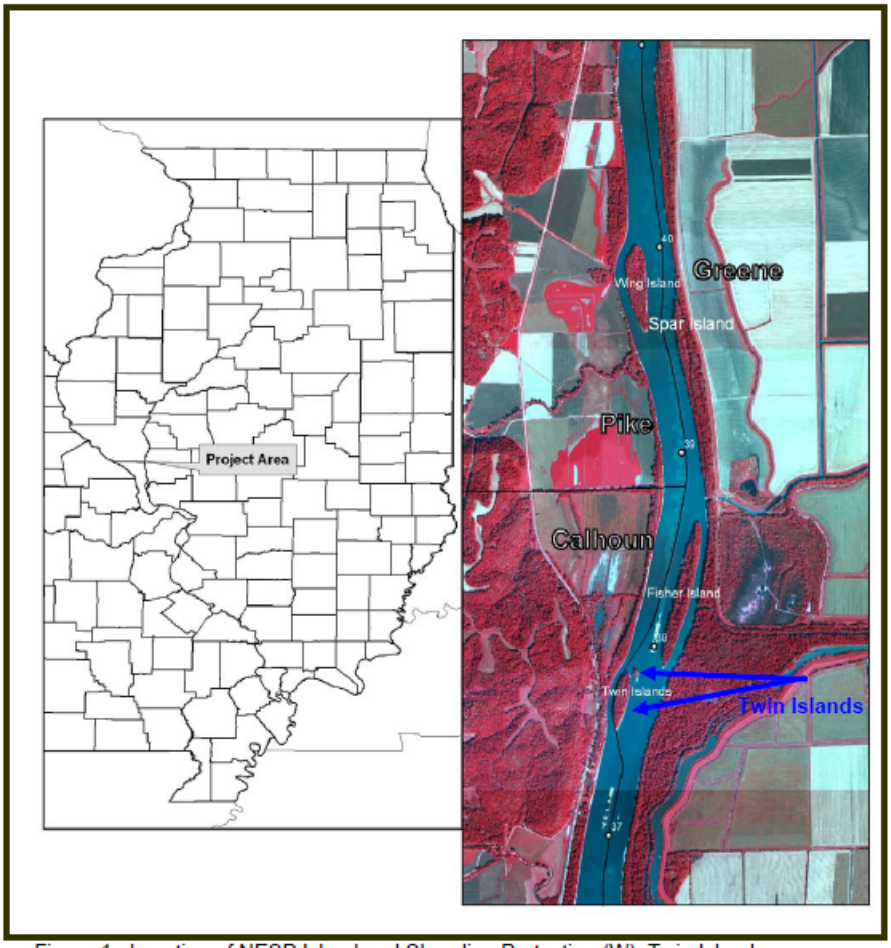


Figure 1. Location of NESP Island and Shoreline Protection (W), Twin Islands Ecosystem Restoration Project, Greene County, Illinois

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 #: 0902676
Date: 09/25/2008

Project: Twin Islands
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.

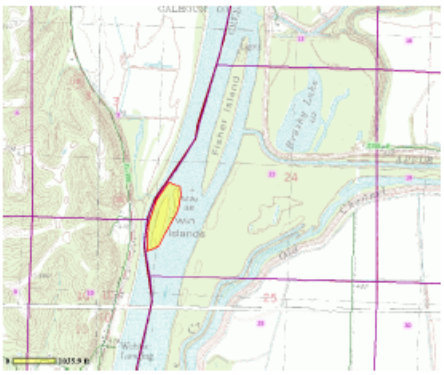
The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

Location

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

County: Greene

Township, Range, Section:
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

Page 1 of 2

IDNR Project Number: 0902676

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.

Terms of Use

By using this website, you acknowledge that you have read and agree to these terms. These terms may be revised by IDNR as necessary. If you continue to use the EcoCAT application after we post changes to these terms, it will mean that you accept such changes. If at any time you do not accept the Terms of Use, you may not continue to use the website.

1. The IDNR EcoCAT website was developed so that units of local government, state agencies and the public could request information or begin natural resource consultations on-line for the Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act, and Illinois Interagency Wetland Policy Act. EcoCAT uses databases, Geographic Information System mapping, and a set of programmed decision rules to determine if proposed actions are in the vicinity of protected natural resources. By indicating your agreement to the Terms of Use for this application, you warrant that you will not use this web site for any other purpose.

2. Unauthorized attempts to upload, download, or change information on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act.

3. IDNR reserves the right to enhance, modify, alter, or suspend the website at any time without notice, or to terminate or restrict access.

Security

EcoCAT operates on a state of Illinois computer system. We may use software to monitor traffic and to identify unauthorized attempts to upload, download, or change information, to cause harm or otherwise to damage this site. Unauthorized attempts to upload, download, or change information on this server is strictly prohibited by law. Unauthorized use, tampering with or modification of this system, including supporting hardware or software, may subject the violator to criminal and civil penalties. In the event of unauthorized intrusion, all relevant information regarding possible violation of law may be provided to law enforcement officials.

Privacy

EcoCAT generates a public record subject to disclosure under the Freedom of Information Act. Otherwise, IDNR uses the information submitted to EcoCAT solely for internal tracking purposes.

From: Pitrolo, Elizabeth A MVS
Sent: Tuesday, March 30, 2010 4:23 PM
To: Stephens, Dennis L MVS; Johnson, Brian L MVS; Oliver, Amanda J MVS; Frerker, Charles F MVS; Gramke, Robert MVS
Cc: Mcclendon, Danny D MVS; Levins, William P MVS; Jeffries, June M MVS; Davinroy, Robert D MVS; Brauer, Edward J MVS
Subject: Opinion Regaring State No Rise Certificate for Environmental Restoration Projects

Folks...

I have performed a further review of the law regarding no-rise certificates, specifically in regard to whether or not they are necessary for environmental and/or river engineering structures such as dikes and chevrons. I stand by my opinion of last week that, absent a policy reason to the contrary, this is not a legal requirement if, and only if, the structure is built as a Corps of Engineers project with no other state, local or private partner. Here is the rationale behind that legal opinion:

1) The requirement of no-rise certification stems from Title 44 CFR Parts 59-60, which deal entirely with emergency assistance and the requirements for floodplain management FOR THE PURPOSES OF OBTAINING FLOOD INSURANCE. It is extremely clear that these requirements are designed for the construction of residential housing, buildings or community features. It is equally clear that the reason for the issuance of the certificate is to maintain eligibility of the constructed feature (and the community in which it is located) under the National Flood Insurance Program (NFIP). In fact, the penalty for non-attainment of a no-rise certificate is to render the property ineligible for coverage under the NFIP--- in other words, if you do not have a no-rise certificate, you will be denied flood insurance on the property. Since the Corps cannot and would not seek flood insurance from FEMA for any of the constructed features at issue, this has no relevance to the Corps.

2) As stated in prior e-mails, the federal government can only be subject to state law/local ordinance if it has consented to be so regulated. This federal supremacy is provided for in the U.S. Constitution. Therefore, for state laws/local ordinances dealing with no-rise to be enforced against a federal project, there must be a federal law or delegated federal authority. FEMA"s no-rise regulations are NOT a delegation of federal authority. Instead, these regulations are a mandate for community participation in a federal program. In the relevant part, 44 CFR §60.1 states:

"(a) The Act provides that flood insurance shall not be sold or renewed under the program within a community, unless the community has adopted adequate flood plain management regulations consistent with Federal criteria. Responsibility for establishing such criteria is delegated to the Federal Insurance Administrator."

In other words, for a state/local government (and its citizens living in the floodplain) to participate in NFIP, they must comply with FEMA regulations. If a state/local government does not develop and comply with state laws/local ordinances, the penalty is that federal flood insurance opportunities will not be provided. Again, the Corps is not ever attempting to gain federal flood insurance, therefore this restriction is irrelevant.

3) Finally, 44 CFR Part 59 contains the definitions of persons and structures that are subject to this federal regulation. 44 CFR §59.1 states that "Person":

...includes any individual or group of individuals, corporation,

partnership, association, or any other entity, including State and local governments and agencies.

Please note this definition does NOT include the FEDERAL government. 44CFR §59.1 also states that "Structure":

...means, for floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. Structure, for insurance purposes, means:

(1) A building with two or more outside rigid walls and a fully secured roof, that is affixed to a permanent site;

(2) A manufactured home ("a manufactured home," also known as a mobile home, is a structure: built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation); or

(3) A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community"s floodplain management and building ordinances or laws.

For the latter purpose, "structure" does not mean a recreational vehicle or a park trailer or other similar vehicle, except as described in paragraph (3) of this definition, or a gas or liquid storage tank.

Accordingly, by virtue of the definitions in the CFR itself, dikes and chevrons are not included as regulated structures, and the federal government is not a regulated party.

Once again, I will reiterate that there may be certain policy reasons for obtaining a no-rise certificate, although I have not been provided with any written Corps policy that states this. In addition, if we have partners in a project that ARE required to obtain a no-rise certificate, such a certificate may be required to enable the partner to comply with their relevant laws and restrictions. Finally, if a project is subject to additional scrutiny, we may want to go on record as having a no-rise certificate, again as a policy (not a legal) consideration, simply to demonstrate that this parameter was evaluated.

Beth Pitrolo
Assistant District Counsel
U.S. Army Corps of Engineers
St. Louis District
Attorney Work Product and/or Attorney-Client Privileged Do Not Copy or Forward
Do Not Release to FOIA Requestors

Appendix B

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Clean Water Act

Section 404(B)1 Evaluation

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

CLEAN WATER ACT 404(B)1 EVALUATION

Contents

Section 1: Project Description

Location

The Twin Islands Ecosystem Restoration Project area is located in Greene County, Illinois, between River Miles (RM) 37.5 and 37.8 along the right descending bank (RDB). The islands are located between the cities of Kampsville and Pearl, Illinois.

Authority and Purpose

The site-specific evaluation was initiated as a follow on component of the Upper Mississippi River and Illinois Waterway System Navigation Study (Sept 2004), which was a General Investigation study authorized by Section 216 of the Flood Control Act of 1970. Subsequent authorization was received in the Water Resources Development Act (WRDA) of 2007, Title VIII. Section 8004 of Title VIII, authorizes implementation of Ecosystem Restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River.

The purpose of the evaluation portion of this document is to comply with Section 404 of the Clean Water Act pertaining to guidelines for the placement of dredged material into waters of the United States. This evaluation, in conjunction with the *Project Implementation Report with Integrated Environmental Assessment, Navigation and Ecosystem Sustainability Program, Island and Shoreline Protection, Twin Islands, Greene County, Illinois* will assist in analysis of alternatives for the proposed project, resulting in a designated Recommended Plan. Further, this evaluation will provide information and data to the state water quality certifying agency demonstrating compliance with state water quality standards.

General Description of Dredged and Fill Material

The St. Louis District has determined for optimal erosion protection, fill material would be used and woody vegetation along the bankline would be incorporated where applicable. Fill material would include quarry run limestone consisting of graded A stone.. The soils component is comprised of 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 floodplains and floodplain steps. Slopes are from 0 to 2 percent. The Twin Islands would require 5000 tons of stone. Stone used for the project would be obtained from commercial stone quarries in the vicinity of the project area.

Description of Proposed Discharge Sites

The proposed project (Alternative 3) would consist of construction of a 500 foot total length wing-bullnose upstream of the head of the islands. Starting upstream of the head of the smaller island at an elevation of 425 ft NGVD, angle downstream for 75 ft and slope up to an elevation of 427 ft, then angle upstream for 75 ft and slope down to an elevation of 425 ft. Leave a 100 ft long notch then start the structure again at an elevation of 425 ft. Angle downstream for 150 ft and slope up to elevation of 427 ft NGVD, then angle upstream for 100 ft and slope down to an elevation of 425 ft NGVD. This structure will use the force of the water flowing over the angled sections of the dike to force flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures.

The Islands have a terrestrial habitat similar to that of a forested wetland with cottonwood, willow and silver maple species located on the island and on the main land area adjacent to the islands.

Approximately 300 feet of riprap would be placed as shoreline protection at the head of little Twin Island. The riprap should prevent the island from further erosion.

Description of Placement Method

Construction within the project area would use a crane with a clamshell to place rock forming a wing-bullnose and along the head of the islands, or an endloader to push off larger boulders.

The general scenario for construction of the wing-bullnose and revetments on the island would be to shape the banklines to accept graded A riprap stone. After shaping of the banklines, graded A riprap stone can be placed at the head of the island to create the revetments upstream of the islands to create the wing-bullnose. Detailed drawings of all stone dike structure options are found in the main report. All stone will be brought to the site by barges.

Section 2: Factual Determinations

Physical Substrate Determination

a. Substrate Elevation and Slope. Normal pool elevation for Twin Islands is 429.0 feet National Geodetic Vertical Datum (NGVD). Revetment at the head of little Twin Island is proposed to be constructed to an elevation of 429.0 feet NGVD.

b. Sediment Type. The digital soil survey Greene County describes the soils with the project area on Twin Islands as alluvial materials consisting of silty clay loams. Material in the adjacent side channels probably consists of finer grained materials.

c. Dredged/Fill Material Movement. Use of the clamshell crane and endloader from the barge to form the island revetments and wing-bullnose would limit the movement of the fill material. Fill materials would be subject to the forces of flood flows. As none on the disposal sites will be confined, all materials will have the potential to migrate downhill.

d. Physical Effects on Benthos. Placement of riprap at the head of the island and the creation of the wing-bullnose would temporarily disrupt the aquatic environment. Benthos present in these areas will be destroyed by burial during placement of riprap. However, the benefits gained from improved aquatic habitat and water quality would far outweigh any loss in benefits during that time.

e. Actions Taken to Minimize Impacts. The primary actions taken to avoid adverse effects during construction of the riprap revetments at the head of little Twin Island and the wing-bullnose upstream of Twin Islands are utilizing clean, quarry grade limestone to reduce water quality impacts, designing stable slopes on the structures and use of stone large enough to resist erosive forces.

Water Circulation, Fluctuation, and Salinity Determination

Water

a. **Salinity.** Not applicable
b. **Water Chemistry**. Construction activity is expected to have a short-term temporary effect on water chemistry. Increased turbidity is expected with rock placement; however, turbidity levels are not expected to significantly adversely affect any aquatic organisms or downstream habitat

c. **Water Clarity.** Elevated suspended sediment levels are expected to occur in a localized nature during rock placement. Decreased water clarity is expected to be short-term.
d. **Color.** No change is expected.
e. **Odor.** No change is expected.
f. **Taste.** No change is expected.
g. **Dissolved Gas Levels.** Construction activities associated with the project will have no significant adverse impact on dissolved gas levels.
h. **Nutrients.** Nutrients are not expected to be released to wetland or aquatic areas during the construction process.
i. **Eutrophication.** The project is not expected to contribute to eutrophication of the water column in aquatic areas.
j. **Temperature.** No change is expected.

Current Patterns and Circulation

Overall, the project would slightly alter and circulation and flow patterns with the wing-bullnose. These changes would alter hydraulics locally, but are not likely to adversely affect hydraulics of the Illinois River.

a. **Velocity.** Localized increased velocity in the notch of the wing-bullnose, but should be no detectable changes in current velocity in the Illinois River.
b. **Stratification.** Stratification does not occur within the project area because of shallow depths. Stratification may occur after construction completion with increased depths throughout the backwater. This would likely only occur during temperature extremes, i.e., hot ambient temperatures during the summer and cold ambient temperatures during the winter.
c. **Hydrologic Regime.** The project would not alter the hydrologic regime or the flood profile of the Illinois River.

Normal Water Level Fluctuations

The Illinois River is typified by wide fluctuations in water levels during flood events. According to the Illinois River Basin Restoration Comprehensive Plan, the Illinois River Basin has and continues to experience a loss of ecological integrity due to sedimentation of backwaters and side channels, increased water level fluctuations and other adverse impacts caused by intensive development over the last 150 years. The project is designed to have minimal effect on the water surface elevation of the Illinois River by returning Islands to historic elevations.

Actions Taken to Minimize Impacts

The primary actions taken to avoid adverse effects during construction of the wing-bullnose and revetment at the head of little Twin Island are using clean, quarry grade limestone to reduce water quality impacts, designing stable slopes on the structures and use of stone large enough to resist erosive forces. Therefore, the erosion control structures are designed in such a manner to reduce water quality impacts allow for unimpeded movement of water around the islands and within the side channel.

Suspended Particulate/Turbidity Determination

Expected Changes in Suspended Particles and Turbidity Levels in Vicinity of Placement Site

Increases in suspended particulates and turbidity due to construction activities are expected to be greatest within the vicinity of rock placement locations. This would cease after construction completion. Stabilization of the island shoreline erosion would be realized upon revetment construction completion.

Effects on Physical and Chemical Properties of the Water Column

a. **Light Penetration.** Use of quarry graded A riprap stone to construct the wing-bullnose and revetment at the head of little Twin Island are not anticipated to have any negative impacts to the aquatic environment. Increases in suspended particulates and turbidity due to construction activities are expected to be greatest within the vicinity of the rock structures. These increases are expected to be of relatively short duration after construction is completed and will temporarily decrease light penetration within the project area.
b. **Dissolved Oxygen**. No adverse effects expected.
c. **Toxic Metals and Organics.** No adverse effects are expected. Hazardous material surveys would be completed during Plans & Specs.
d. **Pathogens.** There is no reason to believe any pathogens exist in any of the proposed areas on construction.
e. **Aesthetics.** Aesthetics of work sites are likely to be temporarily adversely affected during construction, but are expected to be temporary and improve with the establishment of vegetation after construction.

Effects on Biota

Impacts from the project would be negligible as most of the proposed work would consist of placement of rock. However, the advantages to be gained by the improved habitat after project completion far outweigh any disadvantages occurring during project construction. No impacts to primary production and photosynthetic processes are expected to occur. A temporary reduction in benthos production is expected only during the construction process and would improve upon project completion. Temporary impacts to sight-feeders are expected during the construction process due to temporarily elevated turbidity levels during placement of the revetments and hard point structures.

Actions Taken to Minimize Impacts

Several measures to minimize the impacts of the project features will be implemented in the design, and during and after construction. The configuration of the rock placement is designed to minimize erosional impacts from wind and wave action. After the island's shoreline is modified to suit quarry graded A stone, riprap would be placed to further reduce any erosion. It is also expected that the island's bankline will become vegetated up to the revetments by the seed bank contained on the island from existing vegetation.

Contaminant Determination

A Phase I Environmental Site Assessment was conducted for the project area following the guidance of ASTM 1527.13. This included a records review of federal and local documents, a physical site inspection, and interviews with individuals having institutional knowledge of project area. There was no evidence of anthropogenic development, land disturbance, or displaced hazardous waste discovered during the assessment. There was no evidence of dumping discovered during the assessment. The likelihood of hazardous substances adversely affecting the project is very low.

Aquatic Ecosystem and Organism Determination

Effects on Plankton, Nekton, and Benthos. The project is anticipated to improve the quality of the aquatic habitat in the project area. The project could have temporary adverse effects on benthos by direct burial due to rock placement. However, the benefits gained from improved aquatic habitat would far outweigh any loss in benefits during the time of construction. And the rock would provide additional substrate diversity that is lacking in the project area and is expected recolonize following construction. Temporary adverse effects may be experienced by free-swimming aquatic life during construction, as with the benthic community; the long-term impact would be beneficial.

Effects on Aquatic Food Web. Construction of the wing-bullnose and placement of revetment at the head of little Twin Island would improve the overall health and food web of the river and the terrestrial island habitat. Fisheries would increase as well as benthic organisms as water quality and habitat diversity are improved by the project.

Effects on Special Aquatic Sites. The project should have positive effects on special aquatic sites, such as mussel beds and/or fish spawning habitat located in the vicinity. In addition, the project will preserve the island habitat that is limited in the Illinois River. No mudflats, vegetated shallows, coral reefs, or riffle and pool complexes would be affected by the proposed actions.

Threatened and Endangered Species. In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, the St. Louis District obtained a list of federally threatened or endangered species, currently classified or proposed for classification that may occur in the vicinity of the Twin Islands from the U.S. Fish and Wildlife Service website.

Species	Status	Habitat
Indiana bat (*Myotis sodalis)*	Endangered	Hibernates in caves and mines; maternity & foraging habitat: small stream corridors with well-developed riparian woods; upland & bottomland forests
Northern long-eared bat (*Myotis septentrionalis*	Threatened	Hibernates in caves and mines; swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
Decurrent false aster (*Boltonia decurrens*)	Threatened	Disturbed alluvial soils

The Biological Assessment (found in Appendix G) concluded activities associated with the Recommended Plan (i.e., island wing-nose chevron and shoreline revetment on Little Twin Island) may affect but not likely to adversely affect Indiana bat and Northern long-eared bat, and no effect on Decurrent false aster. No critical habitats occur within Project Area.

Other Fish and Wildlife. Other fish and wildlife associated with the aquatic ecosystem are expected to be positively impacted by increased habitat benefits as a result of this project.

Actions Taken to Minimize Impacts. Early and open coordination with state and Federal resource agencies helps to minimize potential adverse impacts to aquatic, wetland, and terrestrial ecosystems. Best management practices to reduce siltation during construction activities would be implemented to minimize impacts to water quality and effects to listed aquatic species within the project area.

The proposed activities associated with the Recommended Plan does not require any tree clearing; however, if that changes during final design then all tree clearing resulting from the USACE action will occur during the inactive season from November 1 to March 31 unless presence/probable absence

survey results were obtained for the action area through appropriate bat surveys approved by the U.S. Fish and Wildlife Services to minimize effects to currently listed bats within the project area.

Proposed Placement Site Determinations

Mixing Zone Determinations. A mixing zone is that volume of water at a placement site or discharge site required to dilute contaminant concentrations associated with a discharge of dredged material to an acceptable level. Since no dredge material would be used at the proposed project area, no violation of any standard would result during placement of rock in the project area.

Determination of Compliance with Applicable Water Quality Standards. This Clean Water Act Section 404(b)(1) provides the necessary compliance required by law. Section 401 Water Quality certification in compliance with the Clean Water Act, and all other permits necessary for the completion of the project, would be obtained prior to project construction.

Potential Effects on Human-Use Characteristics. Implementation of the proposed project would have no effect on municipal or private water supplies; parks; national monuments or other similar preserves. The project is anticipated to improve commercial or recreational fishery in the project area.

Determination of Cumulative Effects on the Aquatic Ecosystem

The project is designed for a minimum life of 50 years, and island modifications within Twin Islands using placement of rock are anticipated to produce improvements on the aquatic and terrestrial ecosystem over the life of the project. The project would also improve long-term water quality within the pool by increasing side channel habitat as well as improving fisheries within the project area. The project would provide spawning and rearing areas for fisheries located within the side channels. Additional recreational benefits would also be provided for boaters and fishermen.

Determination of Secondary Effects on the Aquatic Ecosystem

No adverse secondary affects should result from the proposed action. Improved water quality, fish habitat and other wildlife benefits are expected as a result of the proposed action. This determination is subject to reevaluation, if warranted by Federal, state, or local agency comment, as well as input from the general public.

Navigation and Ecosystem Sustainability Program
ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

Findings of Compliance or Non-Compliance with the Restrictions on Discharge

No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation.

Evaluation of Practicable Alternatives. A reasonable range of alternatives were evaluated as part of the feasibility report with integrated Environmental Assessment. These structures were either wood or rock or a combination of wood and rock. Four alternatives were analyzed for environmental benefits and costs. The tentatively selected plan provided environmental benefits, met the requirements from agency partners, and best met project objectives and the four plan formulation criteria of completeness, effectiveness, efficiency, and acceptability.

The project would be authorized by Nationwide Permit 27 (Aquatic Habitat Restoration) and 13 (Bank Stabilization). A copy of the Section 404 Regional General Permit Conditions and Nationwide Permit are attached. A water quality certification pursuant to Section 401 of the Clean Water Act would be obtained through meeting the conditions of a Section 404 Nationwide 27 permit for Ecosystem Restoration and Nationwide Permit 13 for *Bank Stabilization* as the general conditions therein satisfy Section 401 water quality certification requirements from the Illinois Environmental Protection Agency. Pending information to be developed during the pre-construction engineering and design phase, a Nationwide 27 permit for *Ecosystem Restoration* and Nationwide Permit 13 for *Bank Stabilization* will be obtained prior to construction and a letter dated DATE OF LETTER, the STATE, TERRITORY, OR TRIBE stating that the recommended plan appears to meet the requirements therein. All conditions of the Nationwide 27 permit for *Ecosystem Restoration* and Nationwide Permit 13 for *Bank Stabilization* shall be implemented in order to minimize adverse impacts to water quality.

The proposed fill activity is in compliance with Applicable Toxic Effluent Standards of Prohibition under Section 307 of the Clean Water Act.

No adverse impacts to Federal or state-listed endangered species would result from the project.

The project is situated along an inland freshwater river system. No marine sanctuaries are involved or would be affected by the proposed action.

No municipal or private water supplies would be affected by the proposed actions, and no degradation of waters of the United States is anticipated. The proposed construction activity would have no significant adverse effect on human health and welfare, recreation and commercial fisheries; nor the life stages of plankton, fish, wildlife; nor special aquatic sites; nor aquatic ecosystem diversity, productivity, and stability; nor recreational, aesthetic, and economic values.

The materials used for construction would be chemically and physically stable and non-contaminating.

No other practicable alternative less damaging to the aquatic environment has been identified that would address the project goals and objectives better than the preferred alternative. The proposed action is in compliance with Section 404(b)(1) of the Clean water Act, as amended. The proposed action would not significantly impact water quality.

_____ _____

Date

Kevin R. Golinghorst
Colonel, U.S. Army
District Commander

2017 Nationwide Permit Summary

U.S Army Corps
Of Engineers
St. Louis District

Issued: March 19, 2017 **Expires: March 18, 2022**

No. 27 Aquatic Habitat Restoration, Enhancement, and Establishment Activities

(NWP Final Notice, 82 FR, 1989)

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

To be authorized by this NWP, the aquatic habitat restoration, enhancement, or establishment activity must be planned, designed, and implemented so that it results in aquatic habitat that resembles an ecological reference. An ecological reference may be based on the characteristics of an intact aquatic habitat or riparian area of the same type that exists in the region. An ecological reference may be based on a conceptual model developed from regional ecological knowledge of the target aquatic habitat type or riparian area.

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, as well as discharges of dredged or fill material to restore appropriate stream channel configurations after small water control structures, dikes, and berms, are removed; the installation of current deflectors; the enhancement, rehabilitation, or re-establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to enhance, rehabilitate, or re-establish stream meanders; the removal of stream barriers, such as undersized culverts, fords, and grade control structures; the backfilling of artificial channels; the removal of existing drainage structures, such as drain tiles, and the filling, blocking, or reshaping of drainage ditches to restore wetland hydrology; the installation of structures or fills necessary to restore or enhance wetland or stream hydrology; 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; re-establishment of submerged aquatic vegetation in areas where those plant communities previously existed; re-establishment of tidal wetlands in tidal waters where those wetlands previously existed; 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., the conversion of a stream to wetland or vice versa) or uplands. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type. 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.

Compensatory mitigation is not required for activities authorized by this NWP since these activities must result in net increases in aquatic resource functions and services.

Reversion. For enhancement, restoration, and establishment activities conducted: (1) In accordance with the terms and conditions of a binding stream or wetland enhancement or restoration agreement, or a wetland 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), U.S. Forest Service (USFS), 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 Office of Surface Mining Reclamation and Enforcement (OSMRE) 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, USFS, 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 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 results 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 stream enhancement or restoration agreement or 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 stream enhancement or restoration action or wetland restoration, enhancement, or establishment action; or (3) the SMCRA permit issued by OSMRE or the applicable state agency. The report must also include information on baseline ecological conditions on the project site, such as a delineation of wetlands, streams, and/or other aquatic habitats. 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 any activity (see general condition 32), 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 stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS or their designated state cooperating agencies;

(2) Voluntary stream or wetland restoration or enhancement action, or wetland establishment action, 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 OSMRE or the applicable state agency.

However, the permittee must submit a copy of the appropriate documentation to the district engineer to fulfill the reporting requirement. (Authorities: Sections 10 and 404)

Note: This NWP can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee projects. 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 General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, 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. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

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. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

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, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

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, storm water management activities, and temporary and permanent road crossings, 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, or during low tides.

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 and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. 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.

16. Wild and Scenic Rivers.

(a) No NWP 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.

(b) If a proposed NWP activity will 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, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (*e.g.*, National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: *http://www.rivers.gov/*.

17. Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species.

(a) No activity is authorized under any NWP which is likely to directly or indirectly 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 directly or indirectly 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 ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted,

additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity 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 might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. 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 activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

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

(e) Authorization of an activity by an 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 FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide Web pages at *http://www.fws.gov/* or *http://www.fws.gov/ipac* and *http://www.nmfs.noaa.gov/pr/species/esa/* respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties.

(a) In cases where the district engineer determines that the activity may have the potential to cause effects to 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. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.
The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, 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 might have the potential to be affected by the proposed NWP activity 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 properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)).
When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. 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 in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c)

when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might 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 to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, 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. If NHPA section 106 consultation is required, the district engineer will notify the non- Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/ THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public 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, 50, 51, and 52 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, 38, and 54, notification is required in accordance with general condition 32, 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.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than 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 for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than 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 either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-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 only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult- to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (*e.g.*, conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored 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. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. 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 minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if

compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (*e.g.*, resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) 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 NWP activity resulting in the loss of greater than $^1/_2$- 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 an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee- responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee- responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert 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 environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. 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.

26. 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.

27. 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.

28. 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.

29. 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."

_____
(Transferee)

_____ (Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-

responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

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

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre- construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. 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, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers 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) 45 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 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there 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 Act (see 33 CFR 330.4(g)) has been 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 may not 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 activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and 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, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (*e.g.*, a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, 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 on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) 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, or explaining why the adverse environmental effects are

no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will 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, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(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 an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(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 activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. 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 concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer 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.

(4) 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.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. 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 a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands, cannot exceed 1/2- acre.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental

setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (*e.g.*, partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (*e.g.*, watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. 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 NWP activities with smaller impacts, or for impacts to other types of waters (*e.g.*, streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than 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 environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. 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 proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) That the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity 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 environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

E. 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 (see general condition 31).

F. 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 (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting 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.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

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.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

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 non-linear 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.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

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 acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity.
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 that do not require Department of the Army authorization, such as 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.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. 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 flowing or standing 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.

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.

Protected tribal resources: Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by, or reserved by or for, Indian tribes through treaties, statutes, judicial decisions, or executive orders, including tribal trust resources.

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 and functions.

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 next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

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 linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes 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 or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. 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.

Single and complete non-linear project: For non-linear projects, 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 non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

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 jurisdictional wetland that is inundated by tidal waters. 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.

Tribal lands: Any lands title to which is either: (1) Held in trust by the United States for the benefit of any Indian tribe or individual; or (2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

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. If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any 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.

[FR Doc. 2016–31355 Filed 1–5–17; 8:45 am]

BILLING CODE 3720–58–P

2017 Nationwide Permit Summary

U.S Army Corps
Of Engineers
St. Louis District

Issued: March 19, 2017 **Expires: March 18, 2022**

No. 13 Bank Stabilization
(NWP Final Notice, 82 FR, 1986)

Bank stabilization activities necessary for erosion control or prevention, such as vegetative stabilization, bioengineering, sills, rip rap, revetment, gabion baskets, stream barbs, and bulkheads, or combinations of bank stabilization techniques, 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 the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects (an exception is for bulkheads – the district engineer cannot issue a waiver for a bulkhead that is greater than 1,000 feet in length along the bank);

(c) The activity will not exceed an average of one cubic yard per running foot, as measured along the length of the treated bank, below the plane of the ordinary high water mark or the high tide line, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects;

(d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects;

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

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

(g) Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization;

(h) The activity is not a stream channelization activity; and

(i) The activity must be properly maintained, which may require repairing it after severe storms or erosion events. This NWP authorizes those maintenance and repair activities if they require authorization.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the bank stabilization activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After construction, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

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; or (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 as measured along the length of the treated bank, below the plane of the ordinary high water mark or the high tide line. (See general condition 32.) (**Authorities**: Sections 10 and 404)

Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, 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. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

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. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

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, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

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, storm water management activities, and temporary and permanent road crossings, 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, or during low tides.

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 and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. 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.

16. Wild and Scenic Rivers.

(a) No NWP 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.

(b) If a proposed NWP activity will 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, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: *http://www.rivers.gov/*.

17. Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species.

(a) No activity is authorized under any NWP which is likely to directly or indirectly 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 directly or indirectly 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 ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for

the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity 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 might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. 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 activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

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

(e) Authorization of an activity by an 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 FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide Web pages at *http://www.fws.gov/* or *http://www.fws.gov/ipac* and *http://www.nmfs.noaa.gov/pr/species/esa/* respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties.

(a) In cases where the district engineer determines that the activity may have the potential to cause effects to 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. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.
The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, 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 might have the potential to be affected by the proposed NWP activity 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 properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)).
When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. 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 in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the

activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might 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 to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, 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. If NHPA section 106 consultation is required, the district engineer will notify the non- Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public 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, 50, 51, and 52 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, 38, and 54, notification is required in accordance with general condition 32, 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.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than 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 for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than 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 either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-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 only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult- to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (*e.g.*, conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored 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. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. 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 minimization or compensatory mitigation, the district engineer may

waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (*e.g.*, resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) 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 NWP activity resulting in the loss of greater than 1/2- 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 an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee- responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee- responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert 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 environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. 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.

26. 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.

27. 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.

28. 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.

29. 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."

_____
(Transferee)

_____ (Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

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

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation. The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre- construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. 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, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers 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) 45 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 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there 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 Act (see 33 CFR 330.4(g)) has been 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 may not 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 activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and 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, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (*e.g.*, a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, 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 on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and

other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) 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, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will 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, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(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 an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(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 activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. 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 concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer 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.

(4) 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.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. 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 a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or
54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43,
44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands,

cannot exceed 1/2- acre.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (*e.g.*, partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (*e.g.*, watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. 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 NWP activities with smaller impacts, or for impacts to other types of waters (*e.g.*, streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than 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 environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. 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 proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) That the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity 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 environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

E. 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 (see general condition 31).

F. 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 (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting 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.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

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.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

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 non-linear 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.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

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 acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity.
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 that do not require Department of the Army authorization, such as 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.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. 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 flowing or standing 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.

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.

Protected tribal resources: Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by, or reserved by or for, Indian tribes through treaties, statutes, judicial decisions, or executive orders, including tribal trust resources.

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 and functions.

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 next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

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 linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes 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 or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. 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.

Single and complete non-linear project: For non-linear projects, 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 non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

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 jurisdictional wetland that is inundated by tidal waters. 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.

Tribal lands: Any lands title to which is either: (1) Held in trust by the United States for the benefit of any Indian tribe or individual; or (2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

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. If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any 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.

[FR Doc. 2016–31355 Filed 1–5–17; 8:45 am]

BILLING CODE 3720–58–P

Appendix C

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Habitat Evaluation & Quantification

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

HABITAT EVALUATION & QUANTIFICATION

Contents

Introduction

This appendix presents an ecological habitat assessment of the project area and quantification, to the extent possible, of the aquatic ecological benefits resulting from the proposed alternatives for the *Island and Shoreline Protection Twin Islands (Twin Islands)* project. The evaluation was conducted by a multi-agency team of biologists from the U.S. Fish and Wildlife Services (USFWS); the Illinois Department of Natural Resources (IDNR), and the U.S. Army Corps of Engineers (USACE), St. Louis District.

Habitat Benefit Evaluation Methods

The purpose of the habitat benefit evaluation is to evaluate and quantify, to the extent possible, environmental benefits of alternative plans for the aquatic habitat improvements within the project area. Aquatic benefits were quantified through the use of the Engineering Circular 1105-2-412, *Assuring Quality of Planning Models* and habitat suitability index model for striped bass (Crance, 1984). This model is approved for regional and nationwide use by the USACE Ecosystem Planning Center of Expertise (ECO-PCX). The Habitat Suitability Index (HSI) spreadsheet calculators for this model was reviewed by the ECO-PCX and was recommended for regional use (Memorandum for CECW-MVD; 15 September 2016; Enclosure 1). The Corps Model Certification Panel concurred and the spreadsheet calculators were approved for use (email dated 4 October 2016; Enclosure 2). Consistent with guidance from the ECO-PCX, the Agency Technical Review (ATR) team member will conduct an assessment of the model used for this project. This process will evaluate the technical quality and appropriateness of the models utilized.

Quantity Component

Traditionally, the USACE has used the quantity and quality of habitat jointly, in the form of habitat units, to measure the benefits provided by ecosystem restoration projects. The quantity portion is often measured as area (acres of habitat, landform, etc.) or number of species; in some systems, it is measured as length (feet of stream bank). The area associated with a given proposed feature must have a clear definition for use as guidance in estimating the area component of the ecosystem output model, and must be applied consistently to all actions evaluated.

For Twin Islands, different scales of the area were considered to determine which would be most suitable area metric to use in the analysis. Table 1 summarizes the capabilities and limitations of each. For Twin Islands, the team determined the use of area of restored process is the optimal approach to estimating ecological benefits beyond the specific action footprint with the least amount of uncertainty. The team determined that the action footprint would grossly underestimate the spatial extent of habitat benefits provided by Twin Islands. Estimating the potential are of influence was considered too uncertain and speculative.

For Twin Islands, the team calculated the area to use at 32 acres of aquatic habitat (Figure 1).

Table 1. Different scales of areas considered for use.

Scale	Description	Capability	Limitation
Action Footprint	Measurement of physical footprint of the project feature	Accurately quantified with a high degree of certainty	Grossly underestimates the spatial extent of ecological benefit
Area of Restored Process	Area directly affected by the restoration process; includes footprint + processes	Accurately quantified with high level of certainty for some measures; and more fully captures the area that would experience ecological benefits	Difficult to quantify with certainty for some measures
Potential Area of Influence	Area that could benefit from the process restoration provided by the action; could extend beyond the area of restored process to the greater ecosystem	Fully captures the area of ecological benefits of a given measure	Not feasible to estimate with any degree of certainty and consistency

Figure 1. Twin Islands aquatic habitat used for habitat evaluation. Blue polygon is 32 acres of aquatic habitat (excludes acreage of terrestrial islands).

Quality Benefits

The methodology used for evaluating benefits to aquatic habitat incorporates the Habitat Evaluation Procedures (HEP) format developed by USFWS. HEP is a habitat-based evaluation methodology used for project planning. The procedure documents the quality and quantity of available habitat for selected fish and wildlife species. HEP is based on the assumption that habitat for selected fish and wildlife species can be described by a Habitat Suitability Index (HSI). This index value (on a scale of 0.0 to 1.0) is multiplied by the area of applicable habitat to obtain Habitat Units (HUs), which are used in comparisons of the relative value of fish and wildlife habitat at points in time.

Changes in HUs will occur as a habitat matures naturally or is influenced by development. These changes influence the cumulative HUs derived over the life of the project (50 years). Habitat Units are calculated for select target years (existing, 1, 5, 25, 50), and annualized (using IWR Planning Suite II NER Annualizer) over the life of the project to derive Average Annual Habitat Units (AAHUs). AAHUs are used as the output measurement to compare the proposed alternatives for the Twin Islands.

In preparation of the using the HSI models, the team reviewed aerial photography, USGS water quality and gauge data, and conducted a site visit in 27 July 2020. During the evaluation, assumptions were developed regarding the existing conditions and projected with project conditions relative to habitat changes over time and management practices.

The USACE approved (per EC 1105-2-412) Striped Bass HSI model (Crance, 1984) was used to assess the aquatic habitat benefits resulting in the proposed features. The proposed features were developed to increase flow, depth, and sediment transport to reduce erosion on the islands. The striped bass (*Morone saxatilis*), in the family Moronidae, is a fluvial dependent species that prefers cool, well-oxygenated water, and cannot tolerate poor water quality (MDC, 2016). Water current velocity between 50-122 cm/second is considered ideal (HSI of 1.0) for striped bass (Crance, 1984).

The following assumptions were made when applying the Striped Bass model to Twin Islands, which includes 3 model parameters: temperature, dissolved oxygen, and current velocity.

Baseline condition: Gage data were collected from the USGS Valley City gage. These data were used to estimate velocity (centimeters per second) at 148 cm/sec, which is outside the ideal conditions for striped bass. The team used USACE data (from 1993 to 2018) from the Upper Mississippi River Restoration Program Long Term Resource Monitoring Pool 26 water quality data set to estimate temperature and dissolved oxygen.

Future Without Project Condition: Future conditions of the aquatic habitat assumed temperature and dissolved oxygen would remain similar to baseline conditions and were held constant through the period of analysis. This assumption was made due to the size of the project area compared to the lower Illinois River. It was assumed that velocities would increase (year 25 at 155 cm/sec and by year 50 at 160 cm/sec) in the study area due to the continued erosion of the island and the side channel habitat converting to more main channel habitat.

Future With Project Condition: The team assumed that temperature and dissolved oxygen would not differ among proposed action alternatives and be similar to the baseline conditions throughout the entire period of analysis; however, it was assumed that velocity would differ among the bullnose

alternatives (Alternatives 2 and 3) and the revetment only alternative (Alternative 4; Table 2). It was assumed that both bullnose alternatives would achieve reducing velocity downstream of the structures by creating more slackwater-like habitat and achieve the desired velocity range between 50-122 cm/second for striped bass in the study area.

Table 2. Future With Project Velocity Assumptions

Alternative	Assumption
2 – Notched bullnose with revetment	The notched bullnose that spans both islands would decrease velocities between and downstream of the islands. By year 25 and 50, velocities would increase due to scour downstream of bullnose; however, this increase of up to 120 cm/sec would still fall within the ideal conditions (HSI of 1.0) range.
3 – Wing-bullnose with revetment	Assumed the wing-bullnose, even though a different shape, would have a similar effect on velocity as the notched bullnose in Alternative 2 and would achieve the ideal velocity of 50-122 cm/second in the study area throughout the period of analysis.
4 – Revetment only on island head	Assumed minimal decrease in velocity initially, but through time would likely return to baseline conditions.

Habitat Evaluation Results

The following action alternatives were evaluated during the habitat quantification exercise and a summary of the total net AAHUs for each is provided in Table 3:

Alternative 2 – Construct a 900 foot long notched bullnose that spans both islands. The structure would be built to an elevation of 425 ft National Geodetic Vertical Datum (NGVD) and would have a 100 ft notch with an invert elevation to the existing riverbed located in line with the channel between the islands. The structure would tie into the riverside of the smaller island and the side channel side of the larger island. This structure would allow the head of the islands to stabilize without cutting off flow between the islands. Slack water fish habitat would be created upstream of the both islands.

Alternative 3 – Construct a 500 foot total length wing-bullnose upstream of the head of the islands. Starting upstream of the head of the smaller island at an elevation of 425 ft NGVD, angle downstream for 75 ft and slope up to an elevation of 427 ft, then angle upstream for 75 ft and slope down to an elevation of 425 ft. Leave a 100 ft long notch then start the structure again at an elevation of 425 ft, angle downstream for 150 ft and slope up to elevation of 427, then angle upstream for 100 ft and slope down to an elevation of 425. This structure will use the force of the water flowing over the angled sections of the dike to direct flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures. The notched section will still allow flows between the islands. Place approximately 300 foot of revetment on the head of the smaller island. Slack water fish habitat would be created upstream of the both islands.

Alternative 4 – Place approximately 300 foot of revetment on the head of the smaller island and approximately 450 foot of revetment on the head of the larger island. All revetments would be placed to a height of 425 ft NGVD. This revetment would prevent the heads of the islands from further eroding.

Table 3. Detailed Results for Benefit Evaluation

Alternative	Condition	Year	Suitability Index	Acres	Habitat Units*	AAHUs* (from IWR Annualizer)	Net AAHUs*
1 – No Action	Existing	0	0.78	32	25.0	23.5	0
	FWOP	1	0.78	32	25.0		
		5	0.78	32	25.0		
		25	0.73	32	23.4		
		50	0.68	32	21.8		
2 – Notched bullnose with revetment	Existing	0	0.78	32	25.0	31.9	8.4
	With Project	1	1.00	32	32.0		
		5	1.00	32	32.0		
		25	1.00	32	32.0		
		50	1.00	32	32.0		
3- Wing-bullnose with revetment	Existing	0	0.78	32	25.0	31.9	8.4
	With project	1	1.00	32	32.0		
		5	1.00	32	32.0		
		25	1.00	32	32.0		
		50	1.00	32	32.0		
4 – Revetment only at island heads	Existing	0	0.78	32	25.0	27.3	3.8
	With Project	1	0.89	32	28.5		
		5	0.89	32	28.5		
		25	0.85	32	27.2		
		50	0.81	32	25.9		
*rounded							

References

Crance, J. H. (1984). *Habitat suitability index models an dinstream flow suitability curves: inland stocks of striped bass.* U.S. Fish and Wildlife Service. Retrieved November 9, 2016, from https://el.erdc.dren.mil/hsi/StripedBass(Inland).PDF

MDC. (2016, November 9). *Striped Bass*. Retrieved from Missouri Department of Conservation: https://nature.mdc.mo.gov/discover-nature/field-guide/striped-bass

Enclosure 1

DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO
ATTENTION OF:

CEMVD-PD-L 15 September 2016

MEMORANDUM FOR CECW-MVD (Redican)

SUBJECT: Recommendation for Regional Use Approval of 11 Spreadsheet Calculators for Application of Regionally Approved Habitat Suitability Index Models

1. References:
   a. Engineer Circular 1105-2-412: Assuring Quality of Planning Models, dated 31 March 2011.
   b. Final Planning Model Quality Assurance Review Comment Response Record for 11 Habitat Suitability Index Model Calculators, USACE (Encl 1).
   c. Ecosystem Restoration Model Library, Habitat Suitability Index Models

2. The National Ecosystem Restoration Planning Center of Expertise (ECO-PCX) evaluated spreadsheet calculators for the black capped chickadee, bullfrog, creek chub, fox squirrel, gray squirrel, least tern, smallmouth bass, smallmouth buffalo, striped bass, white bass, and wood duck habitat suitability index models following reference 1.a. Based on the review results (Encl 1), the ECO-PCX recommends Regional Use Approval of all spreadsheet calculators for use in the geographic area defined for each model. Please log in this recommendation with the Office of Water Project Review for the Model Certification Team to consider.

3. The black capped chickadee, bullfrog, creek chub, fox squirrel, gray squirrel, least tern, smallmouth bass, smallmouth buffalo, striped bass, white bass, and wood duck habitat suitability index models are approved for regional use per EC 1105-2-412 (Reference 1.c.). However, software was lacking which would allow planners to apply the models in a computational correct fashion for individual projects. Consequently, MVP, MVR, and MVS collaborated to develop a library of Microsoft Excel spreadsheet calculators. Each spreadsheet calculator is an independent spreadsheet built using the same variables, habitat suitability index curves, aggregation equations, and habitat cover types as displayed in the approved model documentation. Furthermore, all spreadsheet calculators employed a similar development scheme to include consistent use of formatting, input requirements, and output display. Each calculator includes user documentation or a link to a user's guide, and employs best spreadsheet practices.

4. The ECO-PCX and biologists from MVP, MVR, and MVS reviewed each spreadsheet calculator independently to assess the degree to which the spreadsheets meet the system quality and usability criteria in accordance with EC 1105-2-412. The spreadsheet development team and the spreadsheet reviewers included individuals with expertise in habitat benefit evaluations, Habitat Evaluation Procedures, plan formulation policies, and software/spreadsheet programming and auditing. Review results are found in the Final Planning Model Quality Assurance Review Comment Response Record for 11 Habitat Suitability Index Model Calculators, USACE (Encl 1).

Review of the spreadsheet calculators resulted in 72 total comments. All comments were related to the system quality and usability of the model, all were of low to medium significance, and all evaluations resulted in concurrence with the comments. The ECO-PCX reviewed the comments, evaluations, and revisions made to the model. All were made to the satisfaction of the ECO-PCX and are in alignment with the requirements of assuring the quality of planning models. The following summarizes the overall review and modifications made to the spreadsheets to improve system quality and usability.

SUBJECT: Recommendation for Regional Use Approval of 11 Spreadsheet Calculators for Application of Regionally Approved Habitat Suitability Index Models

Overall, the calculators were found to function well and included simple and easy-to-use interfaces. Most importantly, the variables, suitability index curves, aggregation equations, and habitat cover types match the technical model documentation. The review resulted in several minor to moderate revisions to improve clarity for the user, reduce potential calculation errors, and improve the quality of the spreadsheets.

- All spreadsheets are locked so only identified input cells are available for modification.
- Requirement to include all inputs prior to population of an overall HSI score.
- Model documentation was made available to the user within the spreadsheet.
- Data validation was included for all input cells.
- HSI curves were added to the user documentation to increase transparency.
- Discrepancies between the variables in the model documentation and those in the calculators were identified and fixed.

5. The spreadsheet calculators have sufficient system quality and usability. The models are all encoded in MS Excel. The spreadsheets are computationally correct and employ best spreadsheet practices including cell locking, highlighting input/calculation/output cells, and data validation. Error messages display appropriately when erroneous inputs are attempted and final scoring is displayed and easy to understand. The models are transparent and would allow for verification of inputs and outputs. User documentation is available and sufficient to implement the technique and use the spreadsheets. The spreadsheets will be maintained by the ECO-PCX on the Ecosystem Restoration Model Library. During application input and output scores should be documented and ATR teams charged with review to ensure the application of the model and its associated parts is appropriate.

6. The ECO-PCX finds the spreadsheet calculators for the black capped chickadee, bullfrog, creek chub, fox squirrel, gray squirrel, least tern, smallmouth bass, smallmouth buffalo, striped bass, white bass, and wood duck habitat suitability index models has sufficient system quality, meets usability criteria, and maintains the already approved technical quality of the models. The ECO-PCX recommends Regional Use Approval of all spreadsheet calculators for use in the geographic area defined for each model. Please notify the ECO-PCX of the Model Certification Panel's findings.

Gregory Miller

Encls (1)

Gregory Miller
Operating Director
National Ecosystem Restoration
Planning Center of Expertise

CF (without enclosures)
CECW-PC (Paynes, Coleman, Matusiak, Trulick, Bee)
CECW-MVD (Brown, Hanneken, Turner)
CEMVD-PD (Chewning, Lachney, Miller, Young)
CEMVP-PD-C (Johnson, Clark, Allen, Jordan, Popkin, McFarlane)
CEMVP-PD-P (Barr, McCain, Herzog, McGuire, Simmons, Ingvalson)
CEMVP-PD-F (Knollenberg, Richards, Opsahl, Savage)

Enclosure 2

From: Richards, Nathan S MVR
To: Redican, Joseph H HQ02; Hanneken, Charles D HQ; Chewning, Brian MVD; Lachney, Fay V MVD; Young, Gary L MVD; Johnson, Brian L MVS; McFarlane, Aaron M MVP; Knollenberg, Camie A MVP @ MVR; Opsahl, Katie MVP; Savage, Monique E MVR; Barr, Kenneth A MVP @ MVR; Mccain, Kathryn MVP @ MVS; Herzog, Kathryn MVP @ MVR; McGuire, Benjamin MVP; Simmons, Shane M MVP @ MVS; Ingvalson, Derek MVP; Turner, Matthew E MVD; Allen, Teri C MVS; Clark, Steven J MVP; Jordan, Joseph W MVP @ MVR; Popkin, Breann; Miller, Gregory B MVD; Hubbell, Marvin E MVR
Subject: RE: Model Recommendation - MVD - 11 HSI Spreadsheet Calculators - Regional Use Approval
Date: Wednesday, October 05, 2016 10:42:31 AM

All --

Good news! The HSI spreadsheet calculators recommended for regional use in the RPEDN were approved by the HQ Model Certification Team. Thank you to all of you in MVP, MVR, and MVS who contributed to the development, review, and documentation of the models. Also, thank you to the MVD RIT for getting the recommendation routed, logged, and on the agenda. This is a significant addition to our model library!

The HQ memo outlining the recommendation is being prepared and will be routed as soon as we receive it. In the meantime, please use October 4, 2016, as the approval date for all official documentation.

Nate

_____
Nathan Richards
U.S. Army Corps of Engineers
Mississippi Valley Division
Regional Technical Specialist
ECO-PCX Model Review Manager
Office: 309-794-5286
Cell: 309-230-3804

-----Original Message-----
From: Miller, Gregory B MVD
Sent: Monday, September 19, 2016 2:27 PM
To: Redican, Joseph H HQ02 <Joseph.H.Redican@usace.army.mil>
Cc: Paynes, Wilbert V HQ <Wilbert.V.Paynes@usace.army.mil>; Coleman, Wesley E Jr HQ02 <Wesley.E.ColemanJr@usace.army.mil>; Matusiak, Mark HQ02 <Mark.Matusiak@usace.army.mil>; Trulick, Jeff HQ02 <Jeff.Trulick@usace.army.mil>; Bee, Patricia L HQ02 <Patricia.L.Bee@usace.army.mil>; Brown, Theodore A SES HQ02 <Theodore.A.Brown@usace.army.mil>; Hanneken, Charles D HQ <Charles.D.Hanneken@usace.army.mil>; Chewning, Brian MVD <Brian.Chewning@usace.army.mil>; Lachney, Fay V MVD <Fay.V.Lachney@usace.army.mil>; Young, Gary L MVD <Gary.L.Young@usace.army.mil>; Johnson, Brian L MVS <Brian.L.Johnson@usace.army.mil>; McFarlane, Aaron M MVP <Aaron.M.McFarlane@usace.army.mil>; Knollenberg, Camie A MVP @ MVR <Camie.A.Knollenberg@usace.army.mil>; Richards, Nathan S MVR <Nathan.S.Richards@usace.army.mil>; Opsahl, Katie MVP <Katie.M.Opsahl@usace.army.mil>; Savage, Monique E MVR <Monique.E.Savage@usace.army.mil>; Barr, Kenneth A MVP @ MVR <Kenneth.A.Barr@usace.army.mil>; Mccain, Kathryn MVP @ MVS <Kathryn.Mccain@usace.army.mil>; Herzog, Kathryn MVP @ MVR <Kathryn.Herzog@usace.army.mil>; McGuire, Benjamin MVP <Benjamin.M.Mcguire@usace.army.mil>; Simmons, Shane M MVP @ MVS <Shane.M.Simmons@usace.army.mil>; Ingvalson, Derek MVP <Derek.S.Ingvalson@usace.army.mil>; Turner, Matthew E MVD <Matthew.E.Turner@usace.army.mil>; Allen, Teri C MVS <Teri.C.Allen@usace.army.mil>; Clark, Steven J MVP <Steven.J.Clark@usace.army.mil>; Jordan, Joseph W MVP @ MVR <Joseph.W.Jordan@usace.army.mil>; Popkin, Breann <Breann.K.Popkin@usace.army.mil>
Subject: Model Recommendation - MVD - 11 HSI Spreadsheet Calculators - Regional Use Approval

Joe - Please see attached recommendation memo covering 11 spreadsheets related to species models used in RPEDN. The ECO-PCX finds the spreadsheet calculators for the habitat suitability index (HSI) models have sufficient system quality, meet usability criteria, and maintain the technical quality of the models. The ECO-PCX recommends Regional Use Approval of all 11 spreadsheet calculators for use in the geographic area defined for each model. Please log in this recommendation with the Office of Water Project Review for the Model Certification Team to consider, and notify the ECO-PCX of the panel's findings. Greg

****

Gregory Miller
Operating Director, National Ecosystem Restoration Planning Center of Expertise
U.S. Army Corps of Engineers - Mississippi Valley Division
Cell: (504) 957-3474 Blackberry: (504) 481-9683 Office: (504) 862-2310
Email: Gregory.B.Miller@usace.army.mil
Address: Corps of Engineers, New Orleans District, Room 123, 7400 Leake Avenue, New Orleans, LA 70118

US Army Corps of Engineers
St. Louis District®

Environmental Quality Section
1222 Spruce Street
St Louis, Missouri 63103

ENVIRONMENTAL SITE ASSESSMENT REPORT
Navigation and Ecosystem Sustainability Program Island and Shoreline Protection: Twin Islands

Twin Islands
Walkerville, IL 62092

PREPARED FOR:

United States Army Corps of Engineers
Saint Louis District
1222 Spruce Street
Saint Louis, MO 63103

Page Left Intentionally Blank

Table of Contents

1.0 ABBREVIATIONS

ABV	Description
AST	Above Ground Storage Tank
ATSM	American Society for Testing and Materials
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
DOD	Department of Defense
EDR	Environmental Data Resources
EMF	Electromotive force
ES	Enforcement Standard
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FRDS	Federal Reporting Data System
HTRW	Hazardous Toxic Radioactive Waste
IEMA	Illinois Emergency Management Agency
LLC	Limited Liability Company
MDL	Method Detection Limit
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NWI	National Wetlands Inventory
PAL	Preventative Action Limit
PCB	Polychlorinated Biphenyl
PQL	Practical Quantitation Limit
RCL	Residual Contaminant Levels
REC	Recognized Environmental Condition
SEMS	Superfund Enterprise Management System
SSURGO	Soil Survey Geographic Database
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank

2.0 ACKNOWLEDGEMENTS AND QUALIFICATIONS

Project Information: NESP Island and Shoreline Protection: Twin Islands

Site Information: Twin Islands
Walkerville, IL 62092

Legal Description: Walkerville Township (Section 24)
Township 11 North, Range 14 West
West ½ of Southwest ¼

County: Greene County

Latitude, Longitude: 39°22'52.25"N, 90°37'11.40"W

Site Assessor: _____
Travis J Schepker
Environmental Specialist

Environmental Professional Qualification:

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 40 CFR 312.10.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

_____
Kevin P Slattery
Senior Reviewer
Supervisory Environmental Specialist

3.0 EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers regulations (ER-1165-2-132, ER 200-2-3) and Division policy requires procedures be established to facilitate early identification and appropriate consideration of potential HTRW in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting a Phase I Environmental Site Assessment (ESA). USACE specifies that these assessments follow the process/standard practices for conducting Phase I ESA's published by the American Society for Testing and Materials (ASTM).

The purpose of a Phase I ESA is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e. Recognized Environmental Conditions, RECs) within the scope of the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. Current policy is to avoid known HTRW to the extent practicable or until hazard risks and potential liability are mitigated.

A Phase I ESA has been conducted for the Twin Islands project area using methods outlined by ASTM 1527-13. This included a physical site visit, records review, and communications with persons knowledgeable of the project footprint and adjoining properties. Generally, the project area contains no major sites of interest, which pose significant HTRW concerns. The environmental impact for the migration of off-site contaminants onto the project property is negligible. Therefore no special considerations are being recommended for the project to proceed to construction. It is however recommended that a Site Health and Safety Plan, and a Quality Control Plan are submitted by the awarded contractor, discussed internally by USACE personnel, and implemented to prevent environmental hazards from being developed during construction. CEMVS EC-EQ should be contacted immediately if future development of the property discovers hazardous or toxic materials.

4.0 INTRODUCTION

4.1 Background

The purpose of this Environmental Site Assessment (ESA) was to evaluate the current and historical conditions of the subject properties in an effort to identify RECs in connection with the subject property and surrounding operations. Recognized Environmental Conditions are defined as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not recognized environmental conditions.

4.2 Scope of Work

A Phase I ESA was conducted at the subject property in accordance with ASTM Standards Practice E 1527-13, 1903-44, and further defined below:

- USACE has gathered and reviewed available Federal, State, and tribal environmental records. Standard environmental records reviewed included Federal NPL; Federal and State CERCLIS; Federal and State institutional controls/engineering controls registries; Federal ERNS list; State and tribal landfill and/or disposal site lists; State and tribal leaking storage tank lists; State and tribal registered storage tank lists; State and tribal voluntary cleanup sites; and State Brownfield sites. Details from the standard environmental records review are available in Supplementary Materials A.

- USACE has engaged with individuals having institutional knowledge of the subject properties to discuss environmental conditions. Documented conversations and questionnaires are available in Supplementary Materials B.

- USACE has physically inspected the subject property via walking survey, looking for signs of recognized environmental conditions such as stressed vegetation, soil staining, dumping, and evidence of aboveground and underground storage tanks.

- USACE has physically observed adjoining properties, paying particular attention to evidence of aboveground and underground storage tanks, questionable housekeeping practices, or unusual business practices.

4.3 Limitations

The observations, measurements, and research reported herein are considered sufficient in detail and scope to form a reasonable basis for a limited Phase I ESA of the subject property (ASTM 1527-13). The assessment, conclusions, and recommendations presented herein are based upon the subjective evaluation of limited data. The data may not represent all conditions at the subject site, as they reflect the information gathered from specific locations. The limitations of this assessment should be recognized as the client formulates conclusions on the environmental risks associated with these properties.

5.0 GENERAL PROJECT AND SITE INFORMATION

5.1 Project Description

The project includes a pair of islands located between Illinois River Miles 37.5 and 37.8 towards the right descending bank (Figure 1). Historical imagery indicates that Twin Islands are eroding due to natural processes and/or anthropogenic modifications to the Illinois River.

A Tentatively Selected Plan (TSP) has been developed whose objective it is to halt island erosion and potentially reconstruct islands via sedimentation. The TSP would include construction of a 500 foot wing-bullnose upstream of the head of the islands. This structure will use the force of the water flowing over angled sections of the dike to direct flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures. Additionally, approximately 300 feet of revetment would be placed on the head of the smaller island. Slack water fish habitat would be created upstream of the both islands. Clean quarry riprap rock and large woody bundles would be used to construct project features. Most, if not all construction would be accomplished from overwater floating platforms.

5.2 Physical Site Description

In totality, the two islands are approximately eight acres in area. Island topography is relatively flat with steep banklines. The larger of the two islands, Twin Island, is heavily vegetated by bottomland tree species and thick understory vegetation. The smaller of the two islands, Little Twin Island, has lost nearly all vegetation due to erosion.

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.

5.3 Historical and Current Land Use

Both islands are currently uninhabited. There is no evidence indicating that either island had been previously developed or occupied.

5.4 Adjoining Property Use

Twin Islands are surrounded entirely by the Illinois River. The Illinois River is primarily used for commercial barge traffic and habitat for aquatic wildlife. Land use is outside of the Illinois River channel within a one mile radius is rural-agriculture.

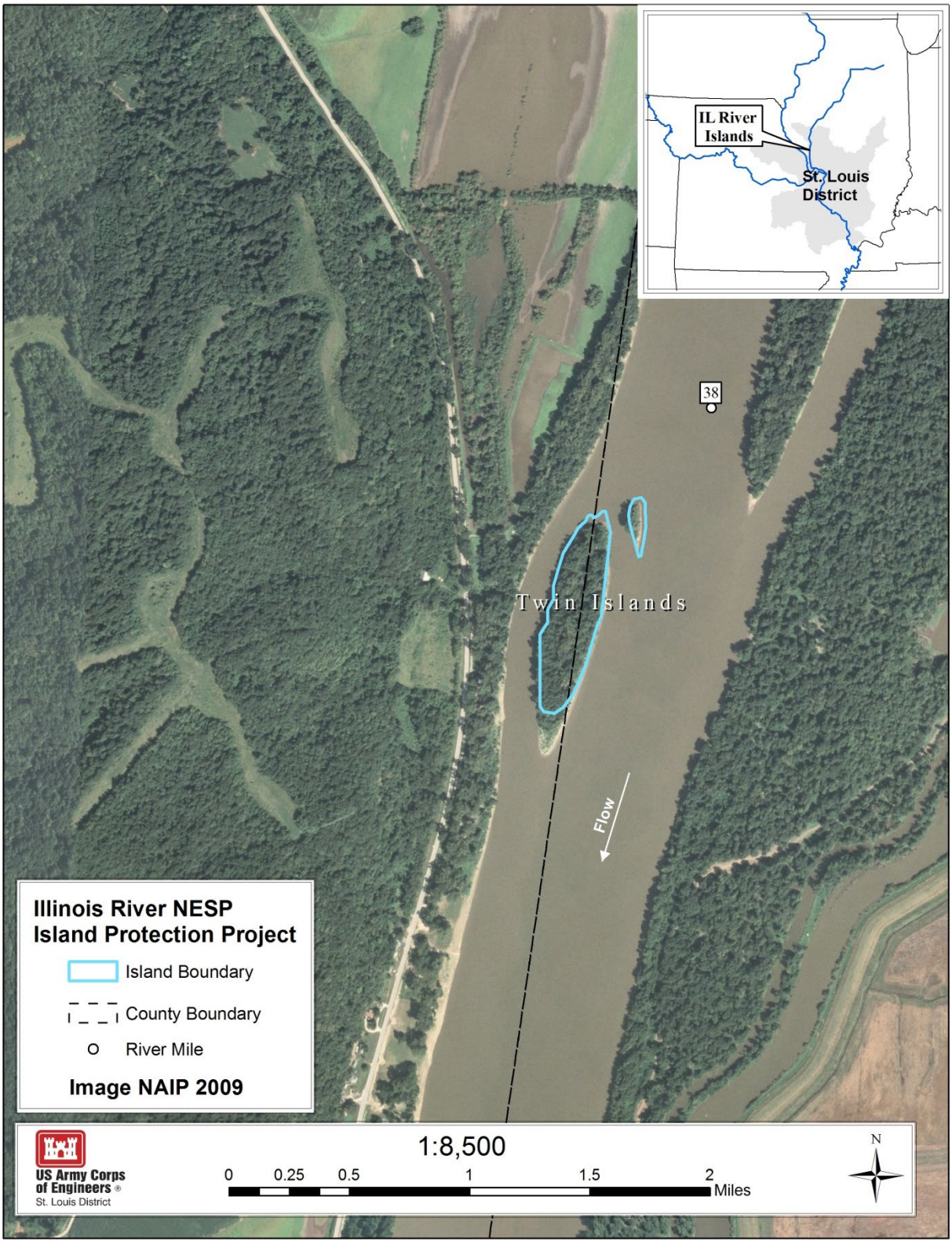


Figure 1: Twin Islands Project Footprint.

6.0 PHASE I ENVIRONMENTAL SITE ASSESSMENT DUE DILIGENCE

6.1 Physical Site Visit

A physical site visit was performed on 27 July 2020 by Environmental Specialist Travis J. Schepker (CEMVS-EC-EQ) and Wildlife Biologist Benjamin M. McGuire (CEMVP-RPEDN-PD-P). The site visit inspected the project area footprint and adjoining properties by boat. Photos documentation can be reviewed in Supplementary Materials A.

6.2 Records Review

For the purpose of this ESA, the following standard record sources were obtained and reviewed to assist in the identification of potential RECs in connection with this project:

- Federal National Priorities List (NPL)
- Federal and State Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)
- Federal Emergency Response Notification System (ERNS)
- Federal and State institutional controls/engineering controls registries
- State and tribal landfill and/or disposal site lists
- State and tribal leaking storage tank lists
- State and tribal registered storage tanks lists
- State and tribal voluntary cleanup sites
- State Brownfield sites
- State 303D list
- Historical aerial photographs
- USACE historical information
- Historical topographic maps
- National Pipeline Mapping System

These records assist in meeting the requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), and the ASTM Standard Practice for Environmental Site Assessments (E 1527-13). For properties that contained inadequate address information for mapping purposes, reasonable efforts were made to identify the approximate location of the sites in relation to the target property as part of the review process. In addition, the physical setting was assessed for the target property by reviewing topographic maps to identify conditions in which hazardous substances or petroleum products could migrate. Additional details can be reviewed in Supplemental Materials B.

6.3 Interviews with Knowledgeable Individuals

Waiting for information from land manager.

7.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

A physical site visit, records review, and interviews with knowledgeable persons identified one REC near or within the Twin Islands project footprint. The REC is summarized below:

1. According to the 2018 Illinois Environmental Protection Agencies 303d list, elevated concentrations of Fecal Coliform Bacteria commonly occur within the Illinois River near the

project footprint. Fecal Coliform Bacteria occur in ambient water as a result of the overflow of domestic sewage or nonpoint water sources of human and animal waste.

This is a low risk REC and warrants no additional investigation. Water should be treated as non-potable.

Generally, the project area contains no major sites of interest, which pose significant environmental concerns. The environmental impact for the migration of off-site contaminants onto the project property is negligible. Therefore a Phase II Environmental Site Assessment is not being recommended at this time. A Site Health and Safety Plan, and a Quality Control Plan should be required, discussed, and implemented to prevent environmental hazards from being developed during construction. CEMVS EC-EQ should be contacted immediately if future development of the property indicates the presence of hazardous or toxic materials.

8.0 LIMITATIONS AND EXCEPTIONS

U.S. Army Corps of Engineers, Environmental Quality and HTRW Section, Environmental and Munitions Branch (CEMVS-EC-EQ) 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, expressed 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 conditions 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 herein, 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, material, 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 is to assess the physical characteristics of the subject site with respect to the presence of hazardous waste, material, oil, or petroleum products in the environment. Except as otherwise described in this report, 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.

Personnel from CEMVS-EC-EQ have specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property and declare that, to the best of their professional knowledge and belief, meet the definitions of Environmental Professionals as defined under 40 CFR 312.

SUPPLEMENTARY MATERIALS A: PHOTO DOCUMENTATION OF SITE VISIT

Photo 1: Looking upstream at Big Twin Island (39.378353°, -90.620823°).

Photo 2: Looking upstream at the lower right descending bank of Big Twin Island (39.378901°, -90.620815°).

Photo 3: Looking upstream at the upper right descending bank of Big Twin Island (39.381112°, -90.620764°).

Photo 4: Foreground-Upper right descending bank of Big Twin Island; Background- Little Twin Island (39.382295°, -90.620081°).

Photo 5: Looking downstream at Big Twin Island (39.382677°, -90.619279°).

Photo 6: Looking upstream at left descending bank of Big Twin Island (39.381648°, -90.618732°).

Photo 7: Looking downstream at left descending bank of Big Twin Island (39.380607°, -90.618835°).

Photo 8: Right descending bank of Little Twin Island (39.382401°, -90.619001°).

Photo 9: Left descending bank of Little Twin Island (39.382459°, -90.618146°).

SUPPLEMENTARY MATERIALS B: RECORDS REVIEW

Available upon request

SUPPLEMENTARY MATERIALS C: INTERVIEW QUESTIONNAIRE

In-progress

Appendix E

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Cost Estimate

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

CONTENTS

PAGE INTENTIONALLY LEFT BLANK

1 CONSTRUCTION CONTINGENCY

A contingency of 25% was applied to the Construction.

2 ESCALATION

No escalation was applied to any of the costs for any of alternatives, however the TSP will have an escalation applied to it to adjust costs to the Program Year level.

3 ENGINEERING AND DESIGN

A standard 15% for engineering and design was applied to each alternative based on historic pricing from similar projects. This standard percentage is considered fair and reasonable for alternative selection. A detailed cost for PED will be developed for the Tentatively Selected Plan.

4 CONSTRUCTION SUPERVISION AND ADMINISTRATION

A standard 10% was applied to each estimate based on the St. Louis District's average expenditures for construction management on a typical contract of this magnitude. This standard percentage is considered fair and reasonable for alternative selection.

5 ADAPTIVE MANAGEMENT

Costs for adaptive management were supplied by the PDT and includes monitoring, inspections, analysis, and rework of failed designs. Further details can be found in the Appendix H - *Monitoring and Adaptive Management Plan*.

6 MITIGATION

There are no Cultural mitigation or Fish and Wildlife mitigation costs associated with this project.

7 REAL ESTATE

There are no real estate costs for any of the alternatives. Please refer to Appendix G – Re*al Estate Plan* for additional information.

GOVERNMENT ESTIMATE WORK SHEET

EC-DM

PROJECT: NESP - Twin Islands DATE: 14-Oct-2020

SUBJECT: Alternative 2 - Bullnose Structure and Revetment FILE:

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
Mobilization and Demobilization	1	JB		100,000
Structure, Graded Stone A	18,900	TN	30.50	576,450
Revetment, Graded Stone A	500	TN	30.50	15,250
Monitoring - Years 1-10	1	JB		63,000
Adaptive Management - Years 1-10	1	JB		40,000
SUBTOTAL:				$794,700
CONTINGENCIES: (in %)			25	$198,300
SUBTOTAL:----------				$993,000
E & D (in %)----------			15	$149,000
S & A. (in %)----------			10	$99,300
TOTAL COST				**$1,241,300**

Figure 1. Cost Estimate Alternative 2 – Bullnose and revetment

GOVERNMENT ESTIMATE WORK SHEET

EC-DM

PROJECT: NESP - Twin Islands DATE: 14-Oct-2020

SUBJECT: Alternative 3 - Wing-Bullnose Structure and Revement FILE:

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
Mobilization and Demobilization	1	JB		100,000
Structure, Graded Stone A	10,900	TN	30.50	332,450
Revetment, Graded Stone A	3,000	TN	30.50	91,500
Monitoring - Years 1-10	1	JB		63,000
Adaptive Management - Years 1-10	1	JB		40,000
			SUBTOTAL:	$626,950
			CONTINGENCIES: (in %) 25	$157,050
			SUBTOTAL:----------	$784,000
			E & D (in %)---------- 15	$118,000
			S & A. (in %)---------- 10	$78,400
			TOTAL COST	**$980,400**

Figure 2. Cost Estimate Alternative 3 – Wing-Bullnose and revetment

GOVERNMENT ESTIMATE WORK SHEET

EC-DM

PROJECT: NESP - Twin Islands DATE: 14-Oct-2020

SUBJECT: Alternative 4 - Revetment Only FILE:

ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
Mobilization and Demobilization	1	JB		100,000
Revetment, Graded Stone A	7,500	TN	30.50	228,750
Monitoring - Years 1-10	1	JB		33,000
Adaptive Management - Years 1-10	1	JB		15,000
SUBTOTAL:				$376,750
CONTINGENCIES: (in %)			25	$94,250
SUBTOTAL:----------				$471,000
E & D (in %)----------			15	$70,700
S & A. (in %)----------			10	$47,100
TOTAL COST				**$588,800**

Figure 3. Cost Estimate Alternative 4 – Revetment

Assumptions -
Assume Mob & Demob to be the same for all alternatives, $100k to mob & demob floating plant
Use revised quantities for all alternatives
For A Stone Reference W912P919C0010 MRM 300 - 0
Assume Shallow Draft work Sites
Use CLIN's 0003 & 0005
Use escalation factor of 1.54
Assume 25% contingencies
Monitoring and AM cost from table 3 of Appendix I - Monitoring and Adaptive Management Plan

Appendix F

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

H&H Analysis

US Army Corps of Engineers®

U.S.ARMY

CONTENTS

List of Tables

List of Figures

1. INTRODUCTION AND LOCATION OF SITE

The Navigation and Ecosystem Sustainability Program (NESP), Project W – Twin Islands, is located on the Illinois River and consists of two separate islands (referred to as Little and Big Twin) located adjacent to each other. Twin Islands are located in Greene County, Illinois at Illinois River Mile 37.9. The islands are located near 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 recommended plan.

2. ILLINOIS RIVER

The closest automatic Illinois River gages to the project area are upstream at Florence, IL at river mile 56.0, Valley City, IL at river mile 61.3 and downstream at Hardin, IL at river mile 21.5. Design heights were based on flood frequency elevations for the project areas. Table 2-1 shows the Illinois River flood frequency elevations for the project area. Figure 2-1 shows the flood frequency profiles for the Illinois River. Table 2-1 and Figure 2-1 come from the 2004 Upper Mississippi River Flow Frequency Study.

Table 2-1. Illinois River Flood Frequency Elevations (All Elevations are an estimated conversion to ft NAVD 88)

Mile	***2 Year***	***5 Year***	***10 Year***	***25 Year***	***50 year***	***100 Year***	***500 Year***
	50%	***20%***	***10%***	***4%***	***2%***	***1%***	***0.20%***
36.3	429.2	433.5	435.8	438.8	440.5	441.8	444.0
37.1	429.3	433.6	436.0	438.9	440.6	441.9	444.0
37.75	429.4	433.7	436.1	439.0	440.7	441.9	444.1
38.7	429.6	433.9	436.2	439.2	440.8	442.0	444.1
39.3	429.7	434.0	436.3	439.3	440.9	442.1	444.1
39.66	429.8	434.1	436.4	439.4	441.0	442.1	444.2
40.04	429.9	434.1	436.5	439.4	441.0	442.1	444.2
40.8	430.0	434.3	436.6	439.6	441.1	442.2	444.2
41.8	430.2	434.4	436.8	439.8	441.3	442.3	444.2

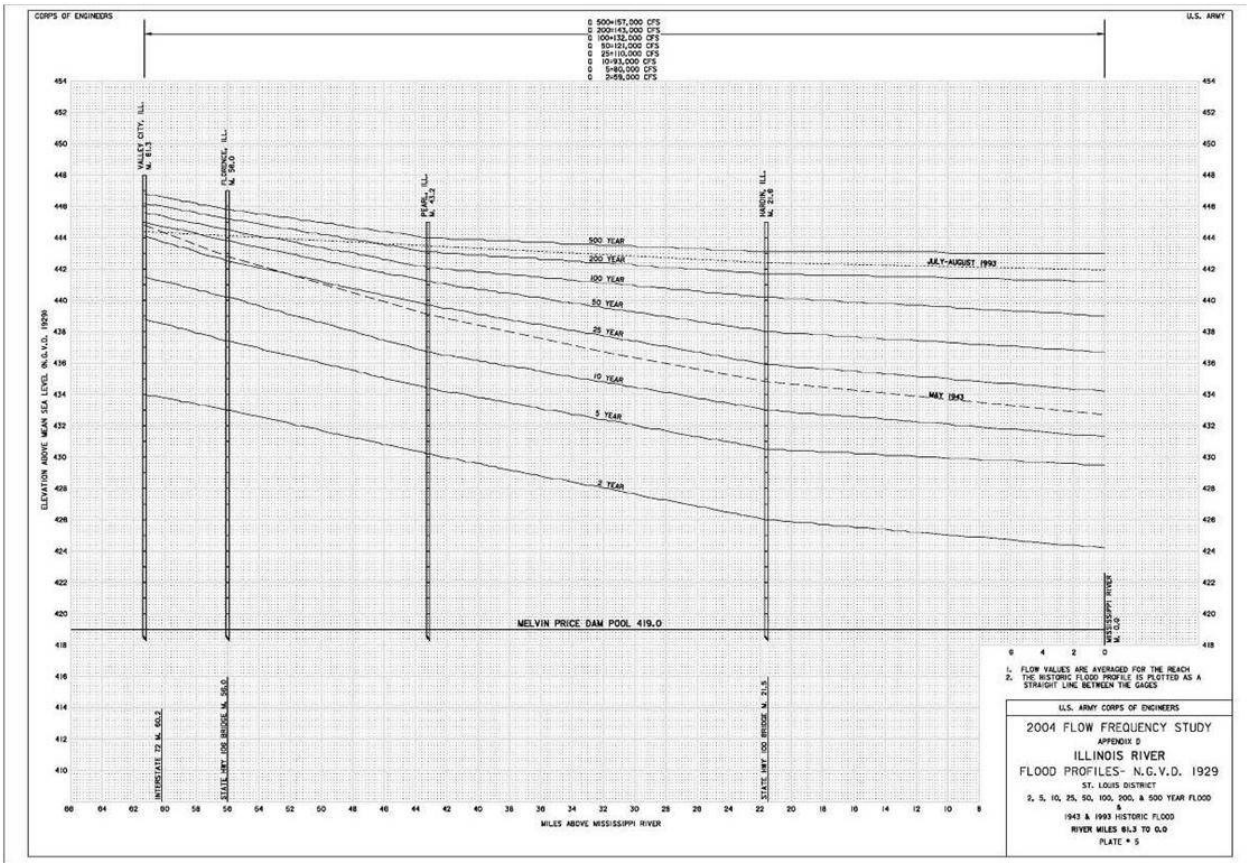


Figure 2-1. Illinois River Flood Frequency Profile (only available in NGVD)

3. EXISTING CONDITIONS AND CONSIDERATIONS

The goal of this project was to protect the islands from further erosion and to provide increased habitat diversity. Alternatives were based on proven protection methods used extensively within the Corps of Engineers. These protection and habitat creation methods have been proven to protect the head of islands without having detrimental effects on the island or side channel. No modeling or testing was done due to the straightforward nature of these projects, extensive experience working with these issues and structures and the prohibitive cost of performing model testing. While the Twin Islands situation is unique, there are proven methodologies that can address the issues that are present.

Twin Islands

Big Twin Island is approximately 307 feet wide by 1,415 feet long which is a 49% increase in size from 1939 aerial photos. However, the head of Big Twin Island has eroded approximately 230 feet from its historical location. Little Twin Island is currently approximately 60 feet wide by 160 feet long which is 85.9% smaller than its 1939 size. The head of Little Twin Island has eroded approximately 350 feet from its historical location. These measurements are evident by a sediment shelf at the head of the islands that was observed on a bathymetric survey of the channel as well as historical aerial photos of the island. Lock and Dam 26 in Alton, Illinois was

completed and started holding pool on August 8, 1938. This would have had a significant effect on the dynamics of the Illinois River and may be a contributing factor of the Island changes. See Figure 3-1 and Figure 3-2

The side channel between Big Twin Island and the bankline currently averages between 180 and 225 feet in width however the width in 1939 averaged 390 feet. The side channel between Little and Big Twin Islands currently averages 120 to 150 feet in width but the width in 1939 averaged closer to 80 feet.

Twin Islands are restricted from additional material accretion on their downstream ends due to the proximity to the navigation channel and the configuration of the Illinois River in this reach. The proximity of the navigation channel and the resulting waves from passing vessels are one of the main contributors to the erosion of the heads of these islands.

Overall, the habitat diversity of this two-island complex is threatened by the eventual disappearance of Little Twin Island. This habitat diversity includes two side channels, one deep channel between the two islands and another side channel along Big Twin Island and the bankline. Additional habitats include shallow water habitat around the perimeters of the islands, fish shelter in woody debris, and slow and swift current areas.

Flow data was obtained using Acoustic Doppler Current Profiler (ADCP) equipment on June 27, 2006 and June 17, 2020. Currents around the island head were moderate, as expected, with most flows between 0.25 and 1.75 feet per second. See Figure 3-3.

Since no significant mussel beds were found around Twin Islands, design considerations were not restricted to avoid impacts.

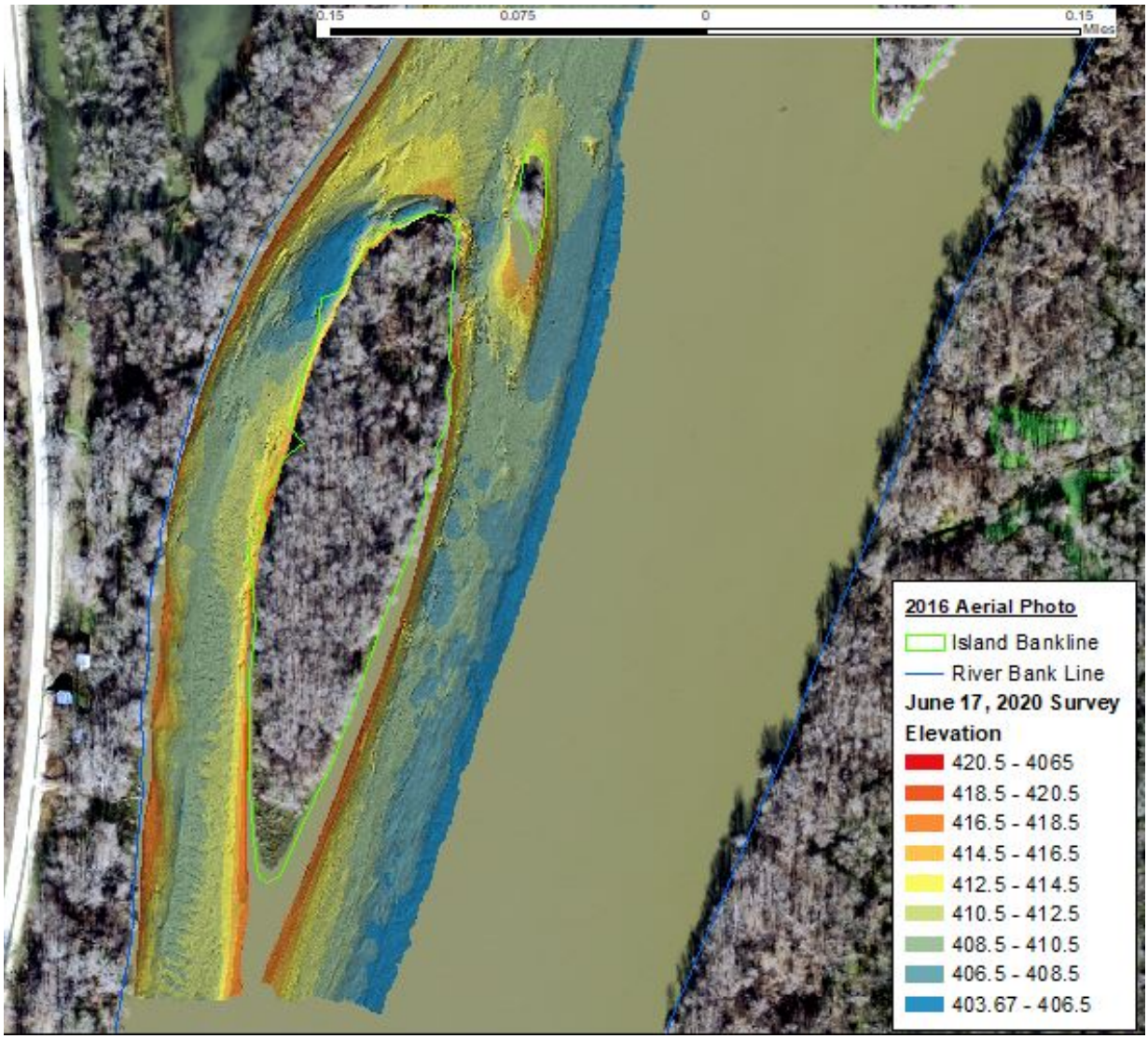


Figure 3-1. Channel Bathymetry at Twin Islands, June 17, 2020

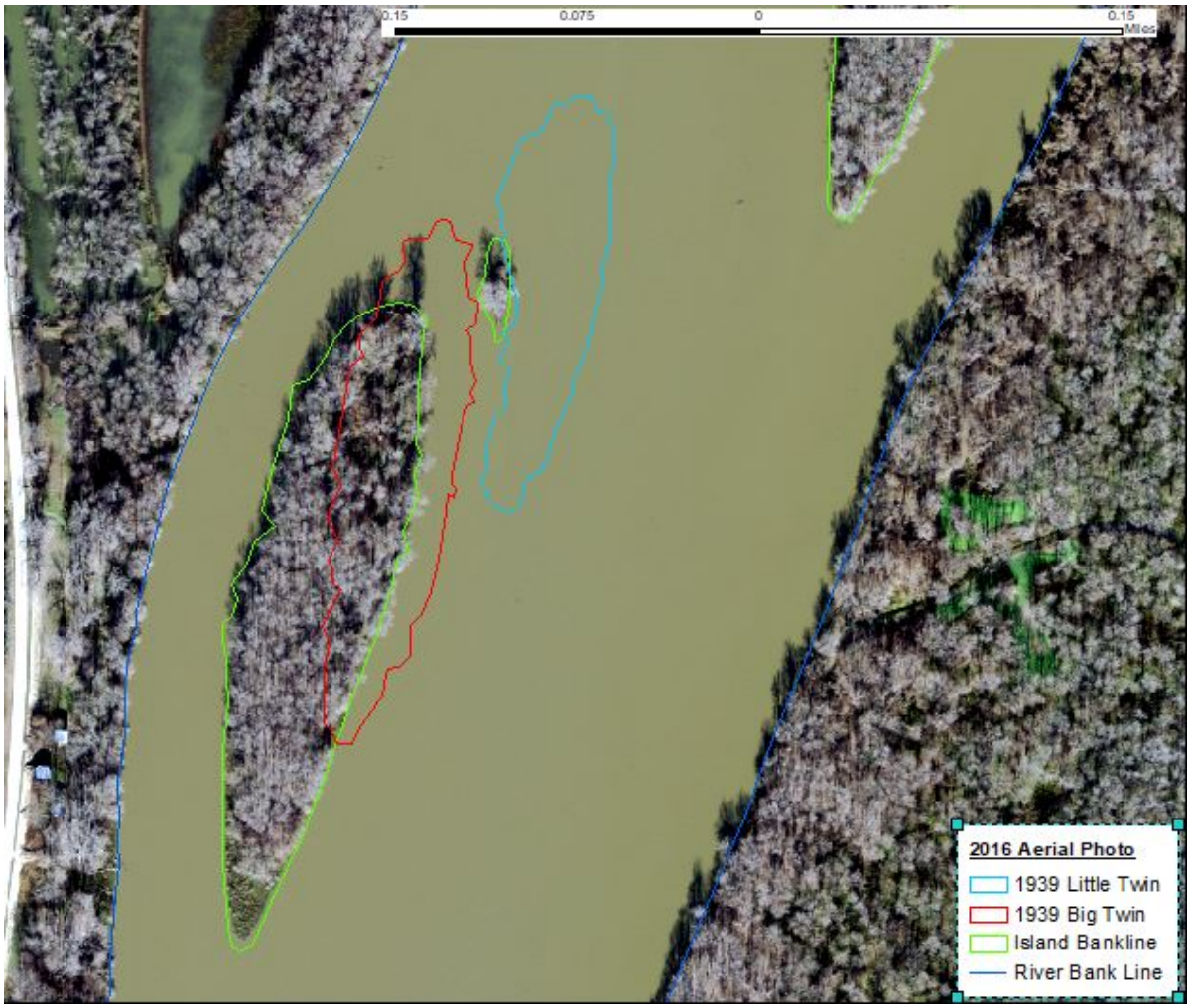


Figure 3-2. Historical Aerial Photo Comparison, Twin Islands

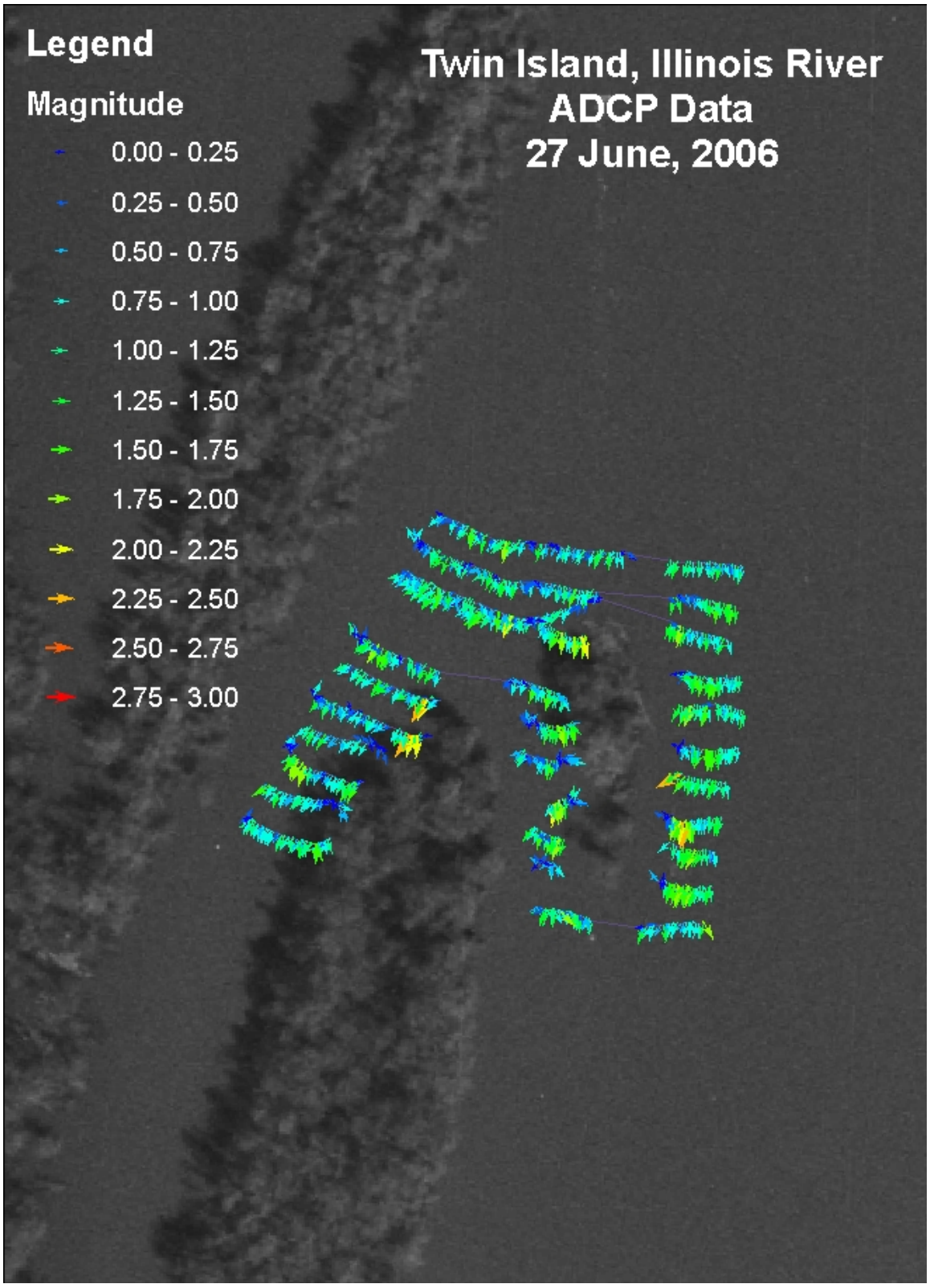


Figure 3-3. ADCP data at the head of Twin Islands, June 27, 2006. Magnitude is ft/sec.

4. PROJECT FEATURES

The design team decided that the protection methods for Twin Islands would be constructed to two foot above the mean water level, which is our standard structure protection height above the hinge point in pooled sections of the river. All of the Illinois River downstream of LaGrange L&D is above the Melvin Price Pool hinge point, which is located in Grafton, Illinois at the confluence of the Illinois River and the Mississippi River.

Revetment protection would be placed to the top of the bank on the islands due to their low elevation. This was based on cost, construction practicality and general building practices in the St. Louis District. The elevations of the islands themselves are not very high and our purpose was to protect the island from erosion, not from flooding.

The Twin Islands Alternatives consist of the following:

Alternative 1 – No Corps Action

Alternative 2 – Construct a 900 foot long bullnose that spans both islands. The structure would be built to an elevation of 425 ft NAVD 88 and would have a 100 ft notch with an invert elevation to the existing riverbed located in line with the channel between the islands. The structure would tie into the riverside of the smaller island and the sidechannel side of the larger island. This structure would allow the head of the islands to stabilize without cutting off flow between the islands. Additional revetment would be placed on the head of Little Twin. (See Figure 4-1).

Alternative 3 – Construct a 500-foot total length notched wing-bullnose upstream of the head of the islands. Starting upstream of the head of the smaller island at an elevation of 425 ft NAVD 88, angle downstream for 75 ft and slope up to an elevation of 427 ft, then angle upstream for 75 ft and slope down to an elevation of 425 ft. Leave a 100 ft long notch then start the structure again at an elevation of 425 ft. Angle downstream for 150 ft and slope up to elevation of 427 ft, then angle upstream for 100 ft and slope down to an elevation of 425 ft. The bottom of the notch will be paved with stone for erosion protection. This structure would allow the heads of the islands to stabilize by directing flows away from the island heads. Slower pooled water will form upstream of the downstream angled structures. The notched section will still allow flows between the islands. Place approximately 300 foot of revetment on the head of Little Twin. (See Figure 4-2).

Alternative 4 – Place approximately 300 foot of revetment on the head of the Little Twin and approximately 450 foot of revetment on the head of the Big Twin. All revetments would be placed to a height of 425 ft NAVD 88. This revetment would prevent the heads of the islands from further eroding (See Figure 4-3).

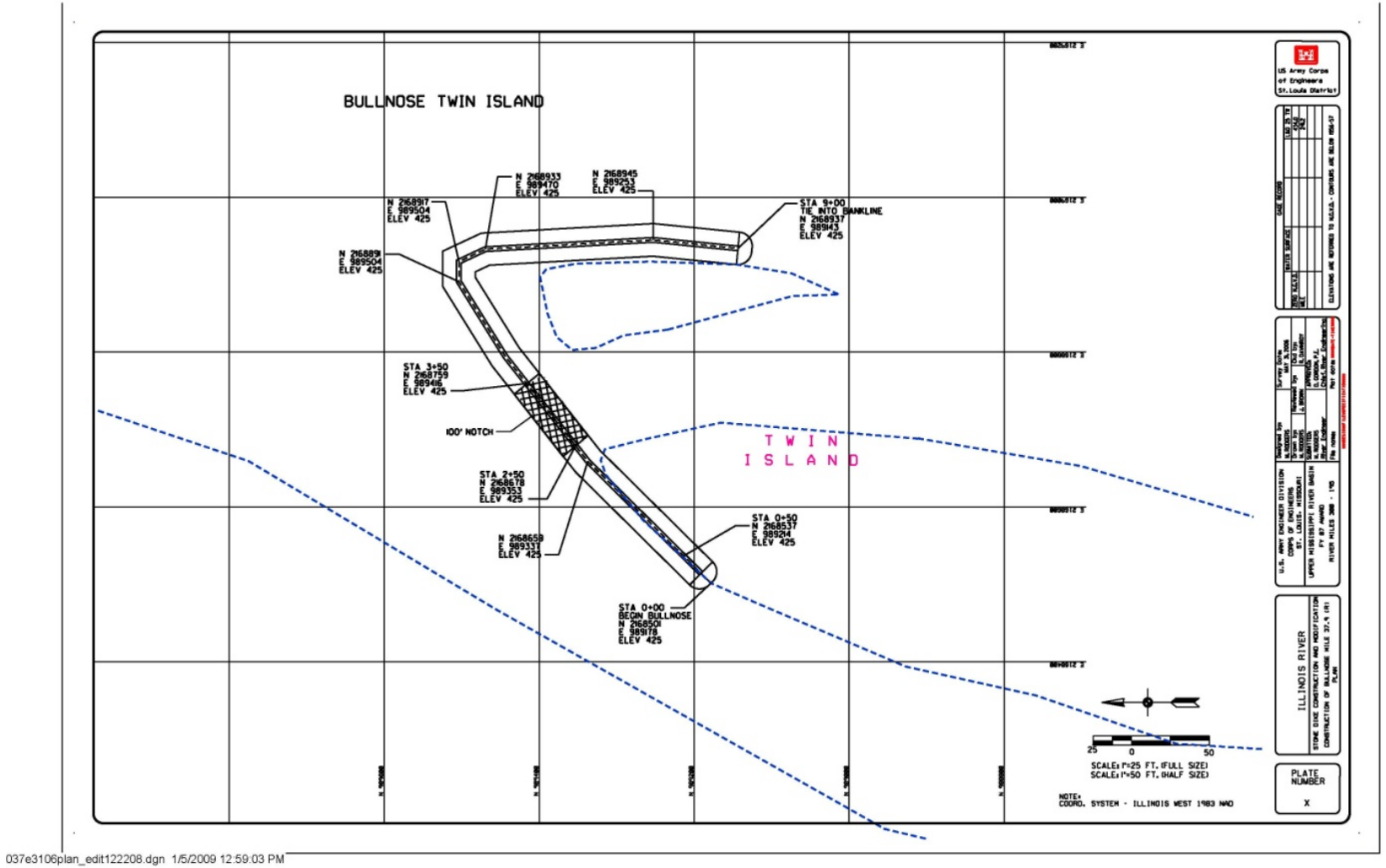


Figure 4-1. Alternative 2 – Single Bullnose with a Notch Across Both Islands and Revetment on the Head of Little Twin Island.

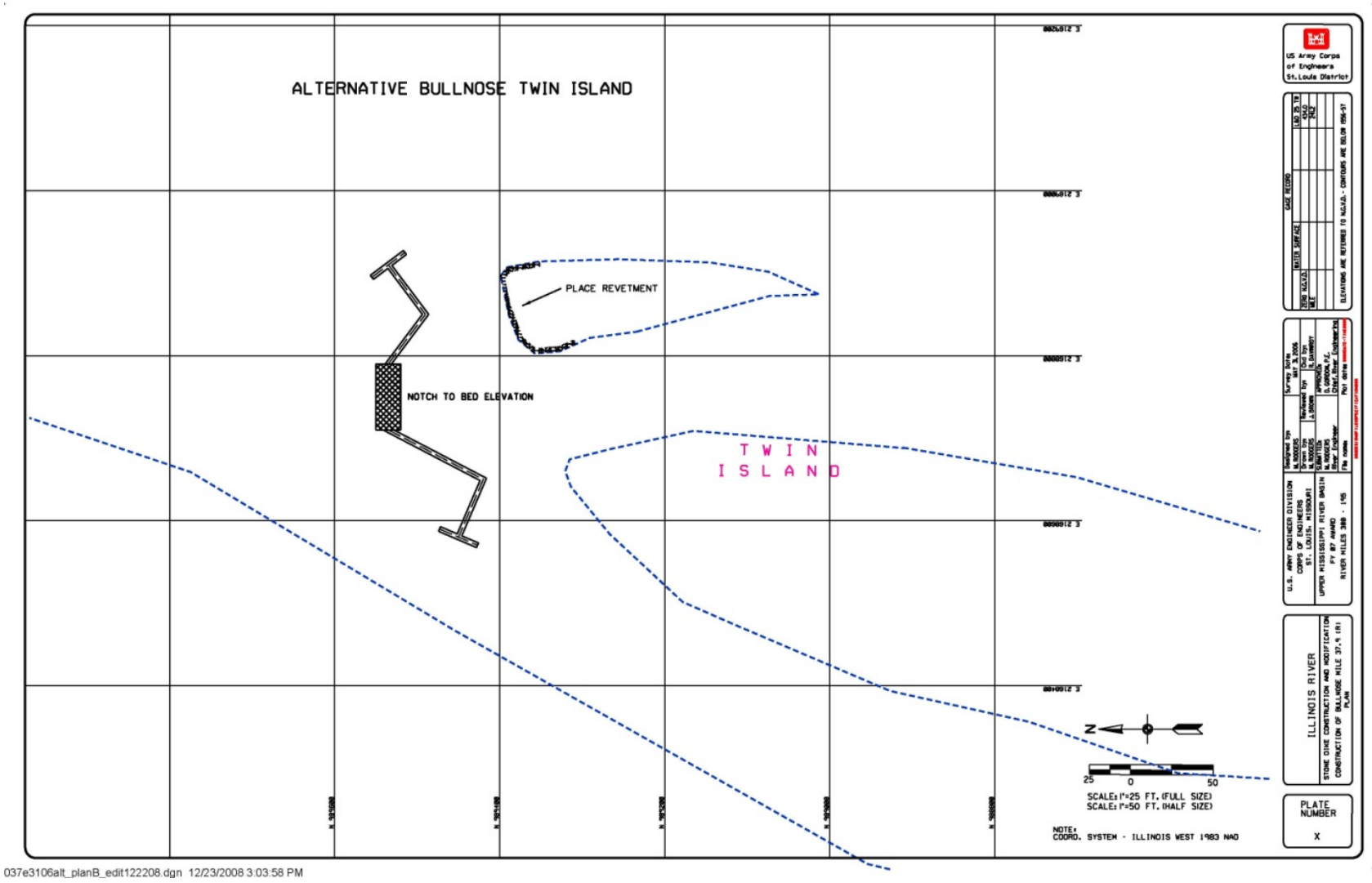


Figure 4-2. Alternative 3 – Wing Bullnose with a Notch Across Both Islands and Revetment on the Head of Little Twin Island.

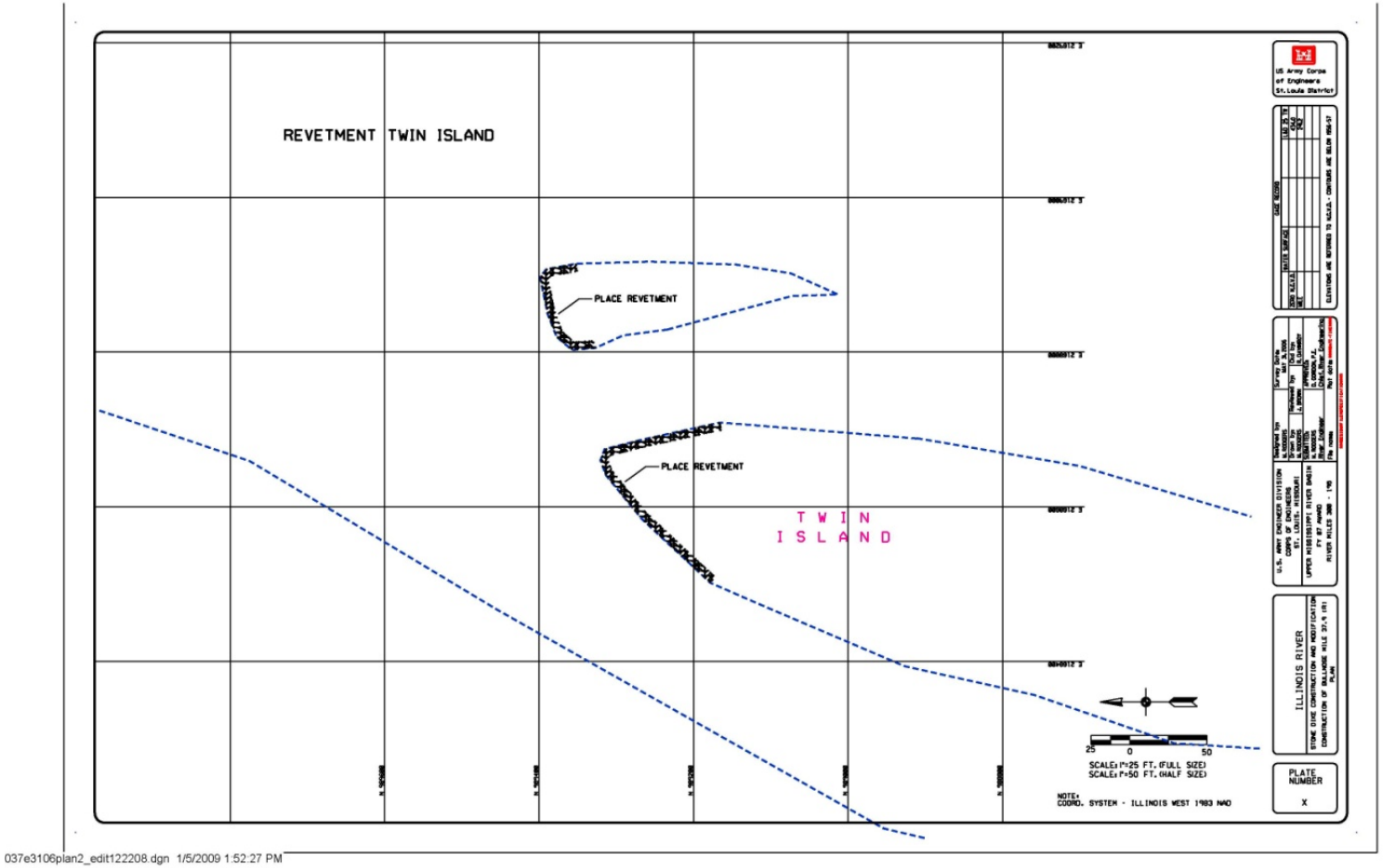


Figure 4-3. Alternative 4 – Revetment on Twin Islands

.

5. 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 and 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 and the structures height. See Figure 5-1 for A-Stone Gradations and Figure 5-2 for typical structures cross sections.

GRADED A-STONE

STONE WEIGHT POUNDS	CUMULATIVE PERCENT FINER BY WEIGHT
5,000	100
2,500	70-100
500	40-65
100	20-45
5	0-15

Figure 5-1. A-Stone Gradation Table

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 compensate 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 structures placement is designed to be constructed within the footprint of the historical island alignments determined by historical aerial photographs and should not adversely affect the conditions of the project area.

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.

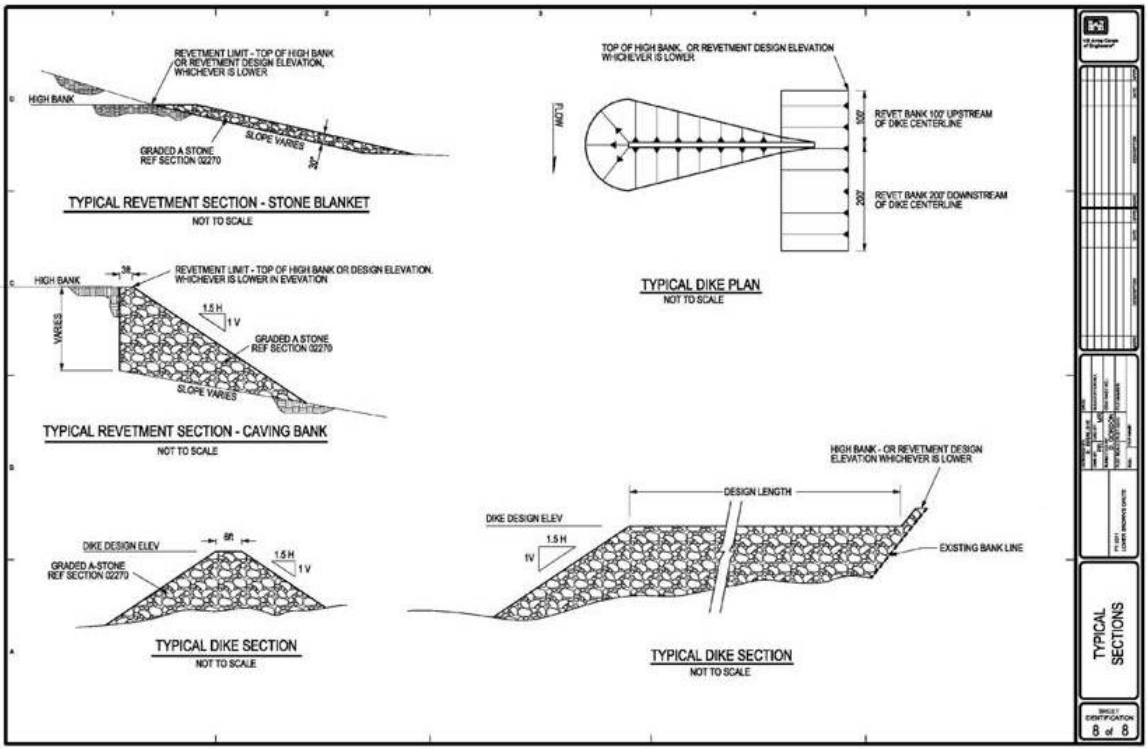


Figure 5-2. Typical Cross Section of Structures

6. PROJECT RISK AND UNCERTAINTY

Risk: There is always a level of risk associated with the implementation of this type of work that the project features could cause unexpected changes leading to negative impacts. To minimize the risk of negative impacts, the project area will be monitored as laid out in the post-construction monitoring plan and any detrimental results will be analyzed and/or modeled and corrected under the NESP Adaptive Management Program. This may include small alterations or complete removal of a project feature.

Uncertainty: Some uncertainty exists in the development of stone quantity estimates for the various alternatives considered for this Project. Stone quantities are also based on conditions at the time of the estimate and could change as river conditions change.

7. CLIMATE CHANGE ASSESSMENT

A qualitative climate change analysis was undertaken in accordance with the USACE Engineering and Construction Bulletin No. 2018-14, *Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects* (USACE, 2018) and Engineering Technical Letter 1100-2-3, *Guidance for Detection of Nonstationarities in Annual Maximum Discharges* (USACE, 2015). This analysis included both a literature review and analysis of USGS gages near the project site. The Island and Shoreline Protection – Twin Islands project is an ecosystem restoration project, so the ecosystem restoration business line was considered. While this assessment does not change the numerical results of the alternatives evaluated, it helps to inform alternative selection by providing information on possible trends in flood flows with time.

USACE projects, programs, missions, and operations have generally proven to be robust enough to accommodate the range of natural climate variability over their operating life spans. However, recent scientific evidence shows that in some places and for some impacts relevant to USACE operations, climate change is shifting the climatological baseline about which that natural climate variability occurs and may be changing the range of that variability as well. This is relevant to USACE because the assumptions of stationary climatic baselines and a fixed range of natural variability as captured in the historic hydrologic record may no longer be appropriate for long-term projections of the climatologic parameters, which are important in hydrologic assessments for inland watersheds, such as the Island and Shoreline Protection – Twin Islands project.

The Island and Shoreline Protection – Twin Islands project has the objectives of enhancing the geomorphic diversity, maintaining the islands mosaic diversity, and enhancing the aquatic ecosystem for native fish in the study area. Project measures to achieve these objectives include construction of wing-bullnose upstream of the islands and the placement of revetment on the head of little twin island. Climate change parameters that could impact project reliability include temperature, precipitation, stream flow, ice flow and changes in seasonality. It is important to understand these parameters to make informed decisions ensuring that the life cycle of the project will be met. It is important to build resilience into the design so the habitat features function effectively through the project lifecycle.

The USACE has developed a series of tools that can be used to evaluate observed and projected, climate changed hydrology for trends and nonstationarities. The climate change hydrology assessment tool (CHAT) and non-stationarity detection tool (NSD) facilitate an assessment of historic and projected maximum streamflows. The USACE time series toolbox (TST) enables the user to evaluate trends and nonstationarities in a user inputted hydrometeorological dataset. Analysis with the USACE Vulnerability Assessment Tool provides outputs specific to ecosystem restoration projects.

The trends in the Illinois River Basin appear to be temperature increases in the winter and spring seasons with precipitation trends increasing during all seasons. It also appears that frequency and intensity of extreme precipitation events has increased.

7.1 Literature Review

The Climate Science Special Report from the Fourth National Climate Assessment (USGCRP, 2018) and the USACE Recent US Climate Change and Hydrology Literature Applicable to US Army Corps of Engineers Missions Upper Mississippi Region 7 (USACE, 2015) were referenced for observed trends in regional precipitation, temperature, streamflow, and changes in seasonality. NOAA's State Climate Summary for Illinois was referenced to summarize trends in precipitation and temperature observed specific to the state of Illinois (NOAA, 2017).

Current Climate

The project site has a humid, subtropical climate characterized by hot and humid summers and cold, but mild winters. Average annual rainfall is around 40 inches with the largest amounts occurring in May and June. Average annual snowfall is around 20 inches with the largest amounts falling in January and February. July and August are the hottest months with averages in the high seventies and maximums near 100 degrees F. December through February are the coldest months with averages around freezing and minimums as low as 6 degrees F.

Table 7-1 and Table 7-2 show precipitation and temperature data from the St. Louis Missouri Lambert International Airport, Network ID GHCND: USW00013994, Latitude 38.7525°, Longitude -90.3736°, Elevation 161.8 m. The period of record for this gage is April 1, 1938 to Jan 1, 2016.

Table 7-1 *Precipitation Data - St. Louis Missouri Lambert International Airport*

	PRECIPITATION ALL					SNOWFALL				
Month	**Average (in)**	**Max (in)**	**Year**	**Min (in)**	**Year**	**Average (in)**	**Max (in)**	**Year**	**Min (in)**	**Year**
Jan	2.1	9.0	2005	0.1	1986	5.6	23.9	1977	0.1	1989
Feb	2.2	5.0	1951	0.3	1963	4.5	20.8	1993	0.0	-
Mar	3.3	8.4	2008	0.7	1941	3.7	22.4	1960	0.0	-
Apr	3.9	10.3	1994	1.0	1977	0.3	6.5	1971	0.0	-
May	4.1	12.9	1995	0.8	2005	0.0	0.2	1973	0.0	-
Jun	4.3	13.1	2015	0.4	1991	0.0	0.0	-	0.0	-
Jul	3.7	12.7	1948	0.5	1941	0.0	0.0	-	0.0	-
Aug	3.0	14.8	1946	0.1	1971	0.0	0.0	-	0.0	-
Sep	2.9	10.0	1945	0.0	1940	0.0	0.0	-	0.0	-
Oct	2.9	12.4	2009	0.2	1975	0.0	0.0	-	0.0	-
Nov	3.2	10.0	1985	0.1	1949	1.2	11.3	1951	0.0	-
Dec	2.6	11.8	2015	0.0	1955	3.8	26.3	1973	0.0	-
Annual	**38.1**					**19.2**				

Table 7-2. *Temperature Data – St. Louis Missouri Lambert International Airport*

	TEMPERATURE				
Month	**Average (°F)**	**Maximum (°F)**	**Year**	**Minimum (°F)**	**Year**
Jan	30.7	53.4	1990	6.1	1940
Feb	34.9	55.2	1976	14.0	1978
Mar	44.8	72.1	2012	22.6	1960
Apr	56.6	75.2	2010	39.4	1961
May	66.2	83.7	2012	46.9	1961
Jun	75.4	94.6	1952	59.2	1961
Jul	79.5	98.6	2012	64.8	1950
Aug	77.9	96.1	1947	61.5	1967
Sep	70.0	87.8	1939	52.0	1974
Oct	58.8	79.9	1963	39.0	1976
Nov	45.6	63.9	1999	26.1	1976
Dec	34.9	53.8	2015	13.8	1963
Annual	**56.3**				

Local Climate Trends

According to the State Climatologist Office for Illinois, "climate change has become a major issue and will have direct and indirect impacts on Illinois." The 2017 NOAA climate summary for the state of Illinois states that average annual temperature in the state has increased by approximately one degree F since the beginning of the 20th century. Spring temperatures have increased the most dramatically (by about 2 degrees). Winter warming is also significant with a below average number of very cold nights (minimum temperature below zero degrees F). Very little change has been observed in summer temperatures. Over the past two decades spring and summer precipitation has been above average. This has resulted in increased soil moisture and delays in spring planting. Illinois has seen a significant increase in the number of extreme rainfall events (over 2 inches). Temperature is projected to increase in the future. Winter and spring precipitation are projected to increase. Future increases in extreme precipitation and changes in evaporation rates may result in increases in the intensity of both floods and droughts(NOAA, 2017).

Regional Observed Meteorological Trends

Figure 7-1 shows that annual temperature in the study area has increased over time and the largest increase has been in the winter compared to the summer. Figure 7-2 shows that the annual mean precipitation in the study area has increased. The largest increases in precipitation occurred in the spring and fall. Climate change is very likely to affect the timing, severity, magnitude, and frequency of severe storm events, in addition to affecting seasonal and annual precipitation trends. Changes are reported as the average for present-day (1986–2015) minus

the average for the first half of the last century (1901–1960, for the contiguous United States) divided by the average for the first half of the century.

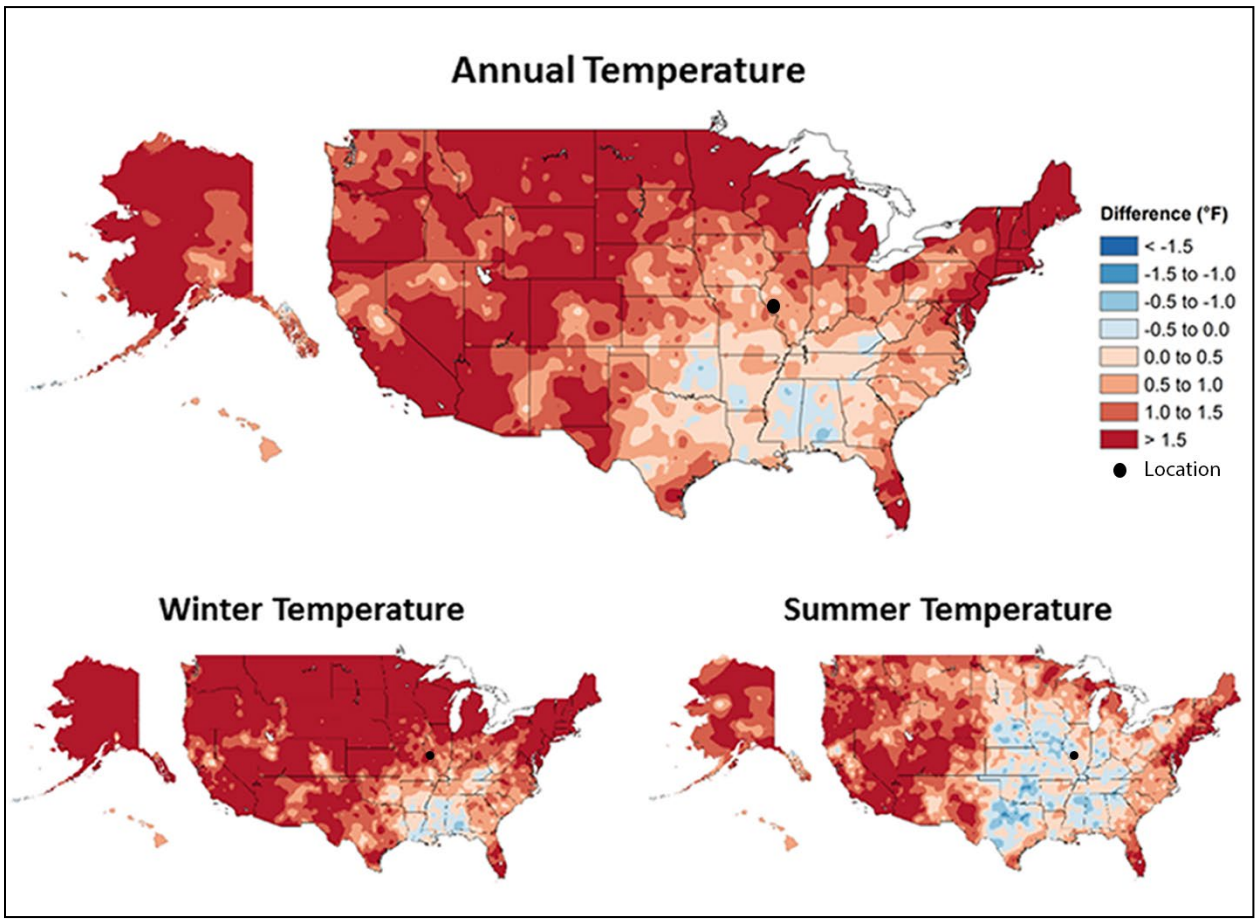


Figure 7-1. Observed changes in annual, winter, and summer temperature (°F). Changes are the average for present-day (1986–2015) minus the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i) divided by the average for the first half of the century (Source Peterson et al. 2013)

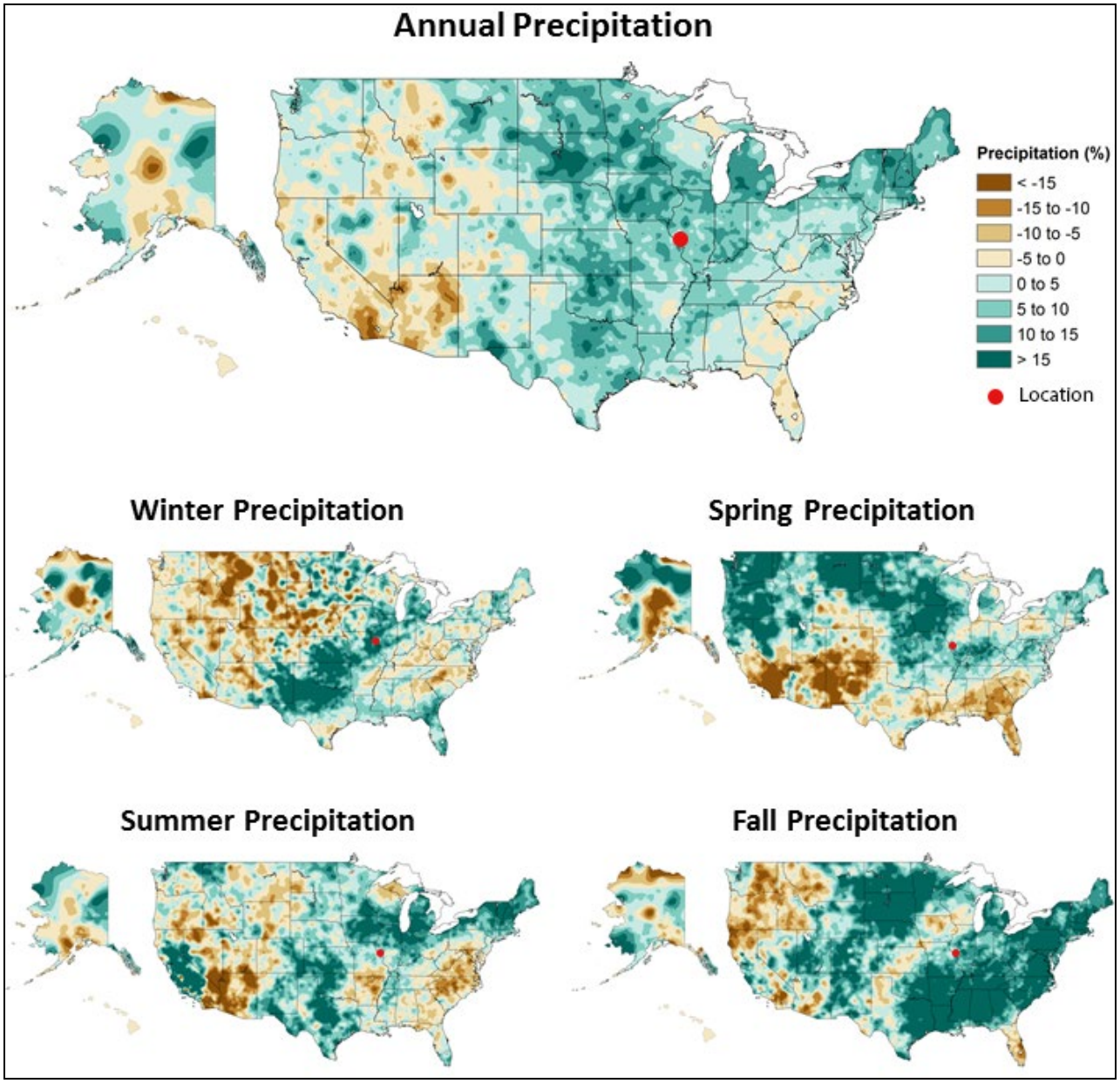


Figure 7-2. Annual and seasonal changes in precipitation over the United States. Changes are the average for present-day (1986–2015) minus the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i) divided by the average for the first half of the century (Source Peterson et al. 2013)

Regional Projected Meteorological Trends

There is strong consensus in the literature that air temperatures will increase in the study region, and throughout the country, over the next century. The studies reviewed generally agree on an increase in mean annual air temperature of approximately 2 to 6 ºC (3.6 to 10.8 ºF) by the latter half of the 21st century in the Upper Mississippi Region (USACE, 2015). This trend is shown in Figure 7-3, by emission scenario. Temperatures at the project site are projected to increase from 2-4 degrees F for the low emission scenario (RCP 4.5) by the Late-21st Century and from 8-10 degrees for the high emission scenario (RCP 8.5) by the Late-21st Century. Reasonable consensus is also seen in the literature with respect to projected increases in extreme temperature events, including more frequent, longer, and more intense summer heat waves in the long-term future compared to the recent past.

Increased air temperatures and increased frequencies of drought, particularly in the summer months, will result in increased water temperatures. This may lead to water quality concerns, particularly for the dissolved oxygen levels, which are an important water quality parameter for aquatic life. Increased air temperatures are associated with the growth of nuisance algal blooms and influence wildlife and supporting food supplies (USACE, 2015).

How projected changes in temperature will impact ice conditions in the future is unknown. Even as overall temperatures are expected to increase, ice may still be a factor, but possibly during different time periods throughout the year.

Multiple studies project that annual precipitation and the frequency of large storm events will increase in the future. Figure 2 shows that future precipitation is forecasted to increase for all but the summer and possibly fall seasons in the project area. This projected increase in precipitation is strongest for the spring season, while changes in the summer and fall are likely to be small compared with the natural variation of precipitation at the site. However, some of the literature reviewed indicates that the northern portion of the Upper Mississippi Region and lower portion of the Illinois Region will experience a slight decrease in annual precipitation. Additionally, some studies indicate a projected decrease in precipitation during summer months. Lastly, despite projected precipitation increases, droughts are also projected to increase in the basin as a result of increased temperature and evapotranspiration rates (USACE, 2015).

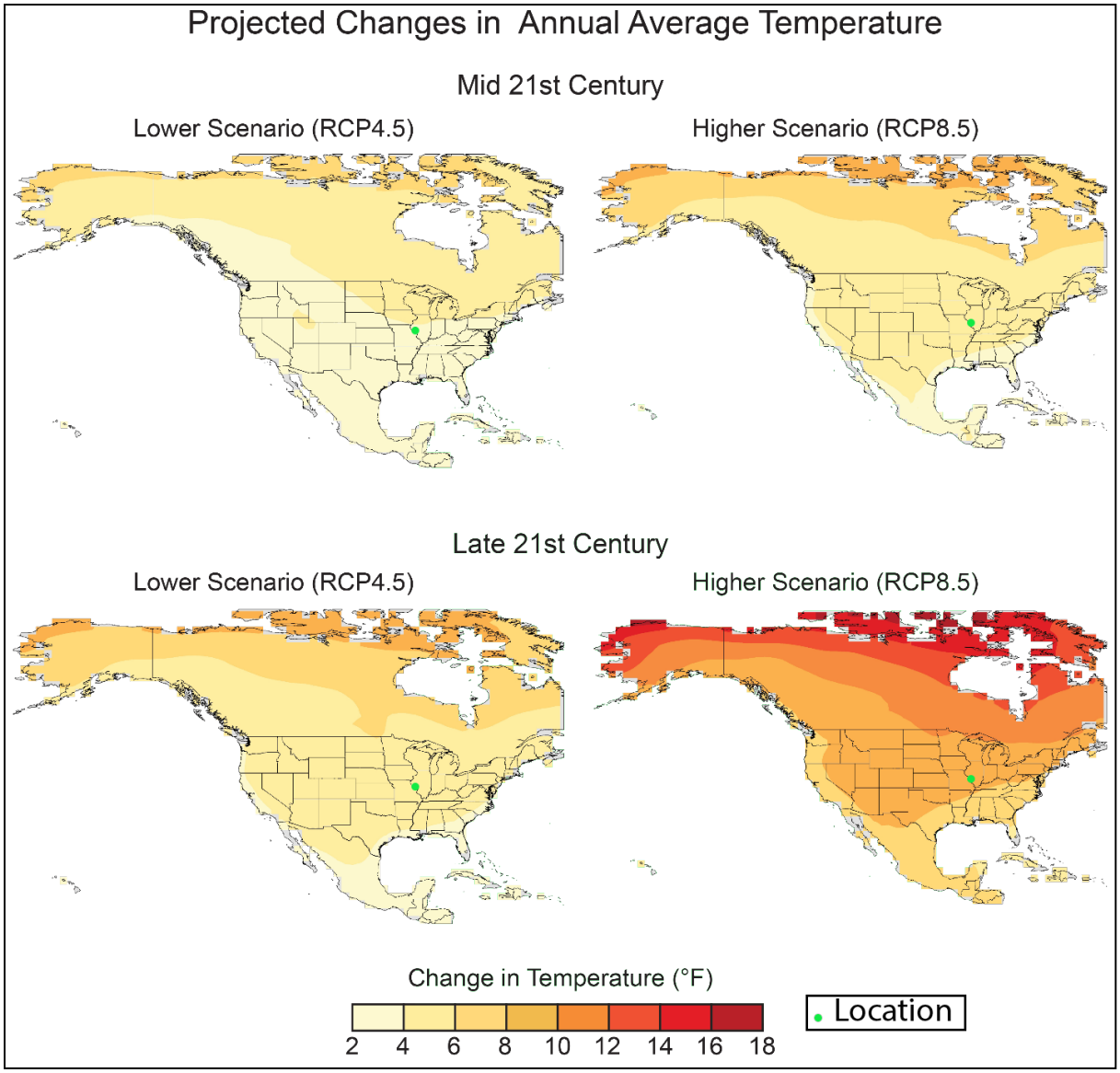
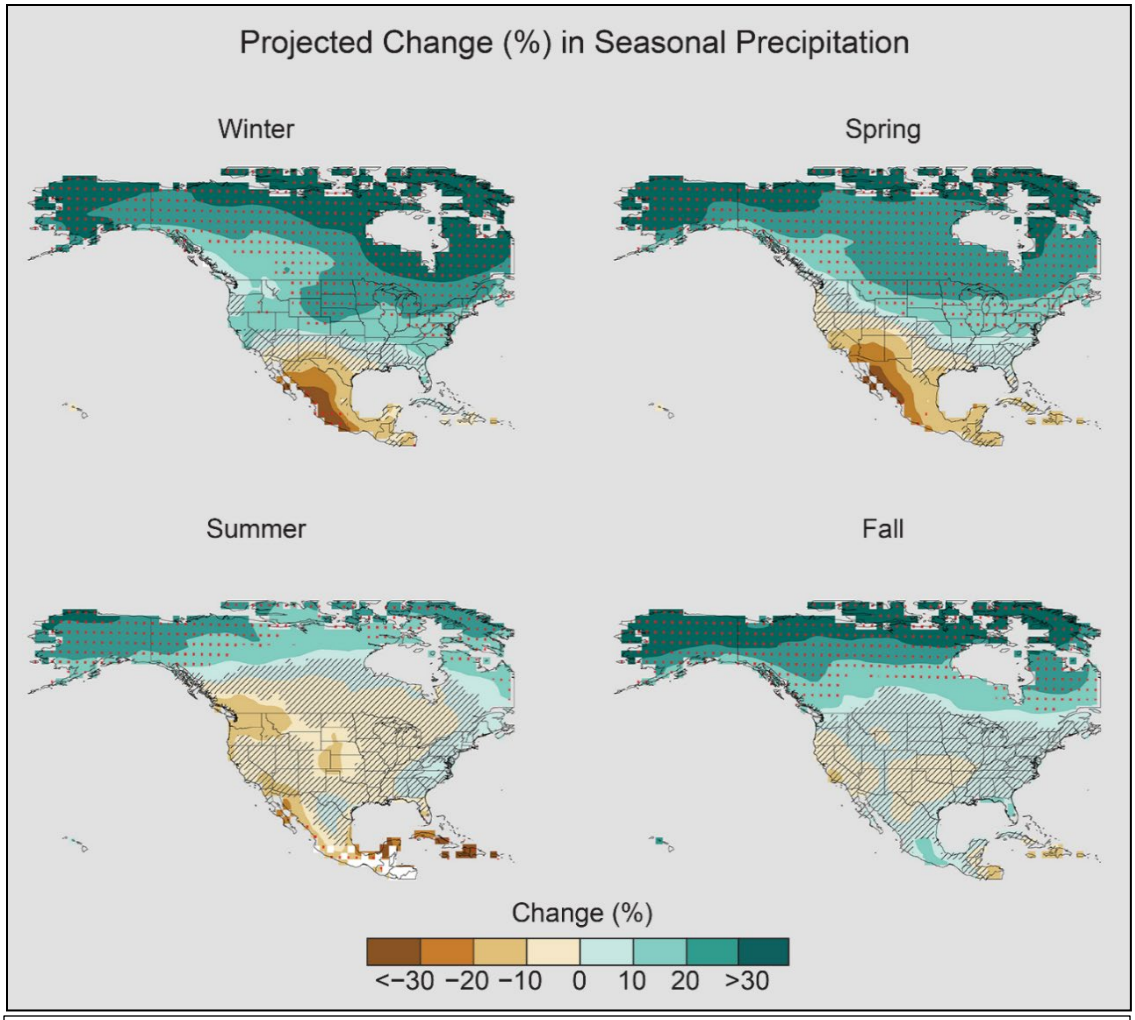


Figure 7-3. Projected changes in annual average temperatures (°F). Changes are the difference between the average for mid-century (2036–2065; top) or late-century (2070-2099, bottom) and the average for near-present (1976–2005). (NCA Vol 1, 2017 Figure 6.7; Figure source: CICS-NC and NOAA NCEI).



The values are weighted multi-model means and expressed as the percent change relative to the 1976–2005 average. These are results for the higher scenario (RCP8.5). Stippling indicates that changes are assessed to be large compared to natural variations. Hatching indicates that changes are assessed to be small compared to natural variations. Blank regions (if any) are where projections are assessed to be inconclusive. Data source: World Climate Research Program's (WCRP's) Coupled Model Intercomparison Project. (NCA Vol 1, 2017 Figure 7.5, Figure source: NOAA NCEI)

Figure 7-4. Projected change (%) in total seasonal precipitation from CMIP5 simulations for 2070–2099.

Regional Observed & Projected Trends in Streamflow

Within the literature reviewed, there is not clear consensus with regards to trends in hydrologic projections. Projected streamflows are dependent on the selection of Global Circulation/Climate Models (GCM) used for temperature and precipitation, the emission scenario, and the hydrologic model used. Each of these elements of the modeling chain present a considerable source of uncertainty (USACE, 2015).

In some cases, projections of streamflow, generated by coupling Global Circulation/Climate Models (GCM) with macroscale hydrologic models, indicate a reduction in future streamflow, but in other cases models project an increase in streamflow. Of the limited number of studies reviewed here, more results point toward the latter than the former; particularly, during the critical summer months. However, there is no strong consensus in the reviewed literature with respect to forecasts for future streamflow in the basin. The literature reviewed relevant to

observed streamflow in the project area indicates that there is a small increasing trend in streamflow, which goes along with a large increasing trend in precipitation. (USACE, 2015).

Literature Review Summary

Given the high degree of variability in climate and uncertainty in projecting climate change, quantifying future project impacts related to changing hydroclimatic conditions involves a large amount of uncertainty. In general, as summarized in Figure 7-5 from USACE Recent Climate Review (USACE, 2015), temperatures and precipitation will likely increase in the future. There is evidence that streamflow is increasing in the historic record, but there is no consensus within the literature regarding future projections of streamflow.

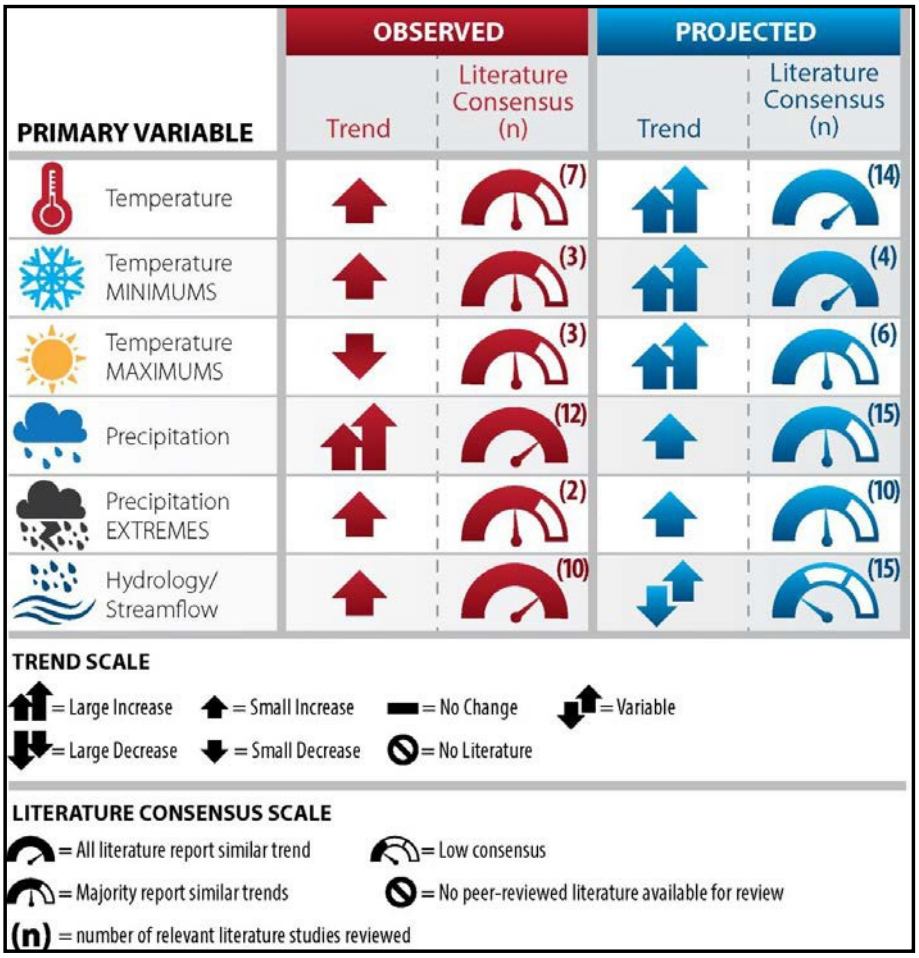


Figure 7-5. Summary matrix of observed and projected regional climate trends and literature consensus.

7.2 First Order Statistical Analysis & Screening Level Vulnerability Assessment

The USACE Climate Hydrology Assessment Tool (CHAT) and the USACE Nonstationarity Detection Tool (NSD) are used to evaluate the stationarity of the streamflows recorded in the

vicinity of the project. The CHAT tool is also used to assess trends in projected, climate changed hydrology at a HUC04 scale (HUC 0713). Within the CHAT and NSD tool, p-values less than 0.05 were assumed to be indicative of statistical significance for the trend analyses. Stream gages used in the Twin Island climate assessment are shown in Figure 7-6 and Table 7-3. Peak flows were used since they are the most appropriate to project features for habitat restoration; the most damage can be done to the project at peak flows.

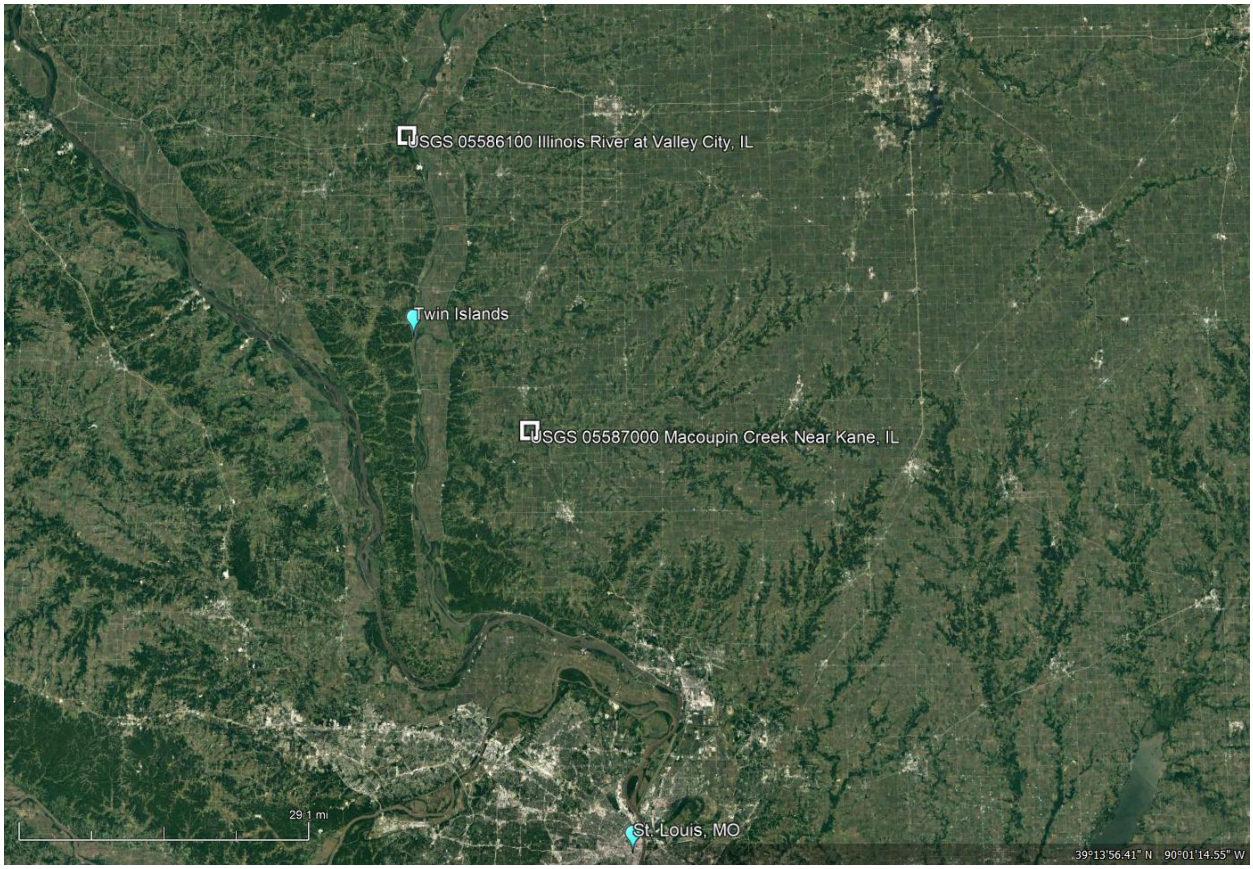


Figure 7-6. Gage Locations Used

Stream Gage	Station ID	Upstream Area (sq mi)	Period of Record (POR)	Observed Years
Illinois River at Valley City, IL	05586100	26,743	1938-2020	82
Macoupin Creek near Kane, IL	05587000	868	1940-2020	80

Table 7-3. USGS Gage Information

The USACE Vulnerability Assessment (VA) Tool is used to carry out a screening level vulnerability assessment of the HUC04 watershed (07013) which includes the study site for the USACE ecosystem restoration business line.

Streamflows: Assessment of Trends & Nonstationarities

The USGS/USACE gages mentioned in Section 2 located along the Illinois River at Hardin, IL (USGS gage 05587060) and Florence, IL (USGS 05586300) were not used in the Climate Change Assessment since they experience a backwater effect from the Mississippi River. The Hardin gage has a stage record for water years 1878 through 1880 and 1932 to present. The Florence gage has a stage record for water years 1930 through 1938 and 1942 to present. Figure 7-7 shows the annual instantaneous peak streamflow data obtained from the USGS website for the Illinois River at Valley City. Examination of metadata at this Gage indicates the water discharge records are good, but that the natural flow of the stream is affected by many reservoirs and navigation dams in the Illinois and Mississippi River Basin (metadata available at https://wdr.water.usgs.gov/wy2013/pdfs/05586100.2013.pdf).

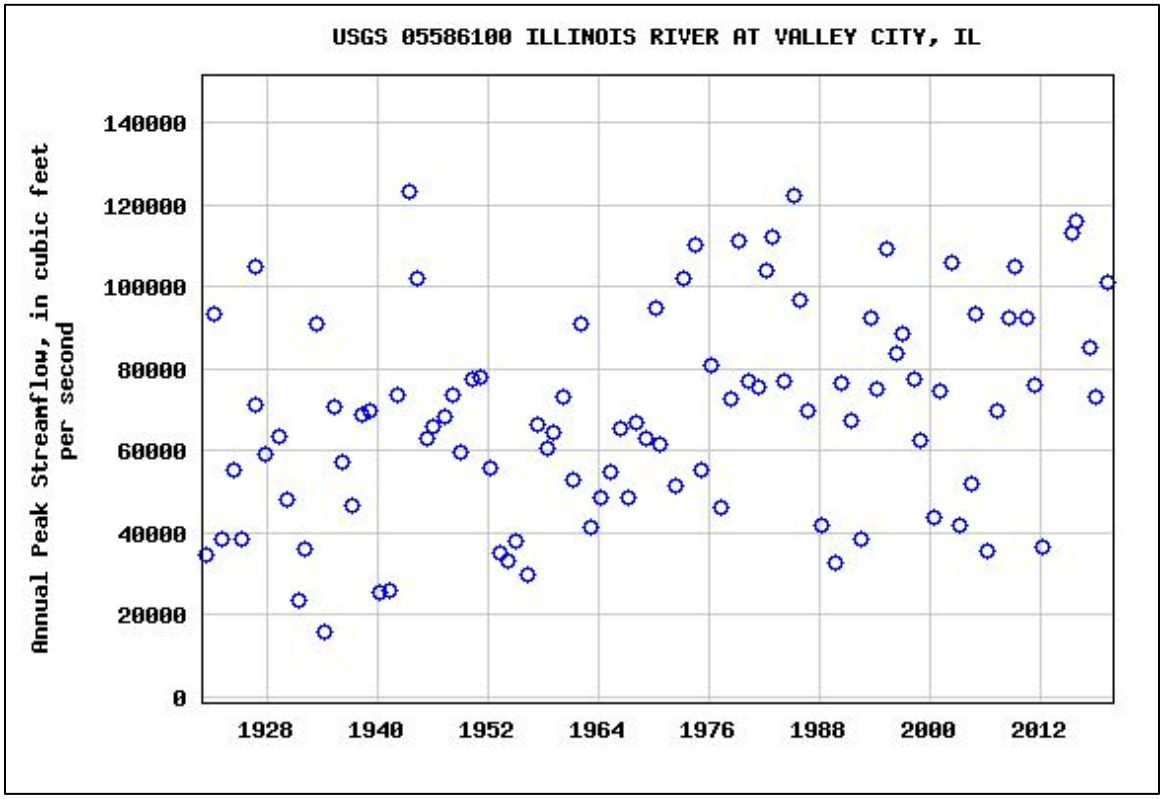


Figure 7-7. Annual Instantaneous Peak Streamflow for the Illinois River at Valley City, IL

In the 1930's the Corps of Engineers constructed a series of locks and dams upstream and downstream of the Twin Islands area. The navigation dams on the Illinois River are regulated for the purpose of creating pools to provide a nine-foot depth navigation channel. The pooled reaches of the Illinois River benefit the region in that they provide environmental habitat and recreational boating/fishing while supporting commercial barge traffic using the Corps' authorized 9-foot deep and 300-foot wide channel. Figure 7-8 shows the lock and dams on the Illinois River. The Illinois River Valley is impacted by regulation due to the lock and dams present, however they are operated as run-of-the-river structures and consequently they do not impact the stationarity of the annual instantaneous peak streamflow record.

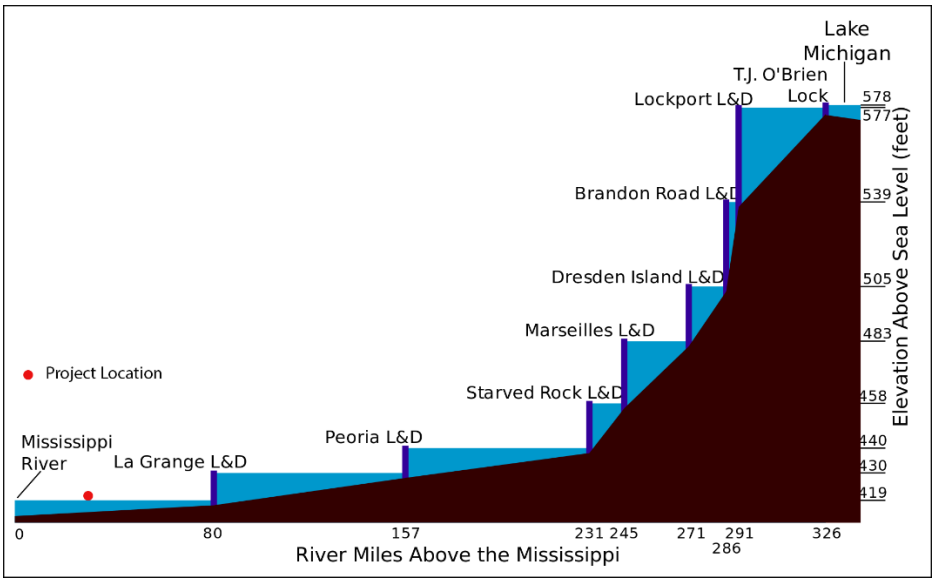


Figure 7-8. Annual Instantaneous Peak Streamflow for the Illinois River at Valley City, IL

Figure 7-9 shows the annual instantaneous peak streamflow data obtained from the USGS website for Macoupin Creek near Kane, IL gage. The tabulated data from the USGS has a peak gage-height qualification code indicating that the gage datum changed in 1921. There is no known regulation on Macoupin Creek that would impact peak streamflow.

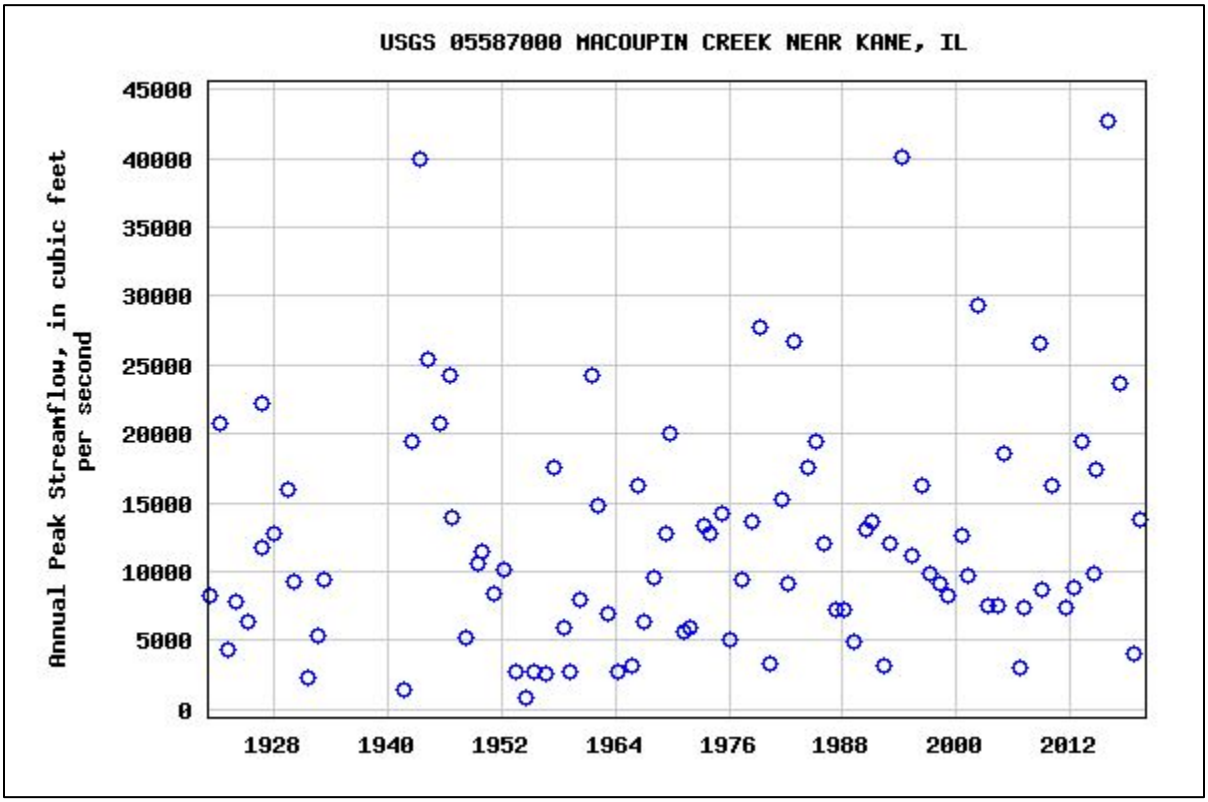


Figure 7-9. Annual Instantaneous Peak Streamflow for the Macoupin Creek near Kane, IL

The Nonstationarity Detection Tool helps to identify if the record of annual peak stream flows is impacted by anthropogenic activities (e.g. dam construction, urbanization, etc.), naturally driven changes in climate, and/or human driven climate change. The nonstationarity detection tool enables the user to identify whether the statistical properties of a given streamflow record are homogenous throughout its period of record. For a nonstationarity to be considered strong, it must be identified by two or more tests within a range of five years for the same statistic (distribution, mean, etc.) to show consensus, it must trigger two or more tests within a range of five years for different statistics to show robustness, and it must show a significant change in the magnitude of the standard deviation and/or mean.

The Nonstationarity Detection Tool was used to examine the annual instantaneous peak streamflow time series at the Illinois River at Valley City, IL gage (05586100). The full period of record included was considered (1920-2012, 2015-2019, 95 years) but 1920-2012 was used due to the gap in the record (2013 & 2014 are missing). The default sensitivity parameters were applied. Seven abrupt nonstationarity tests detected change points in the record (Figure 7-10), circa 1972. For the Illinois River at Valley City, IL the changepoint year is 1972 and it is strong because it is being flagged by multiple tests indicating a statistical change in the mean and overall statistics of the dataset. There is also an operationally significant change in the mean circa 1972.

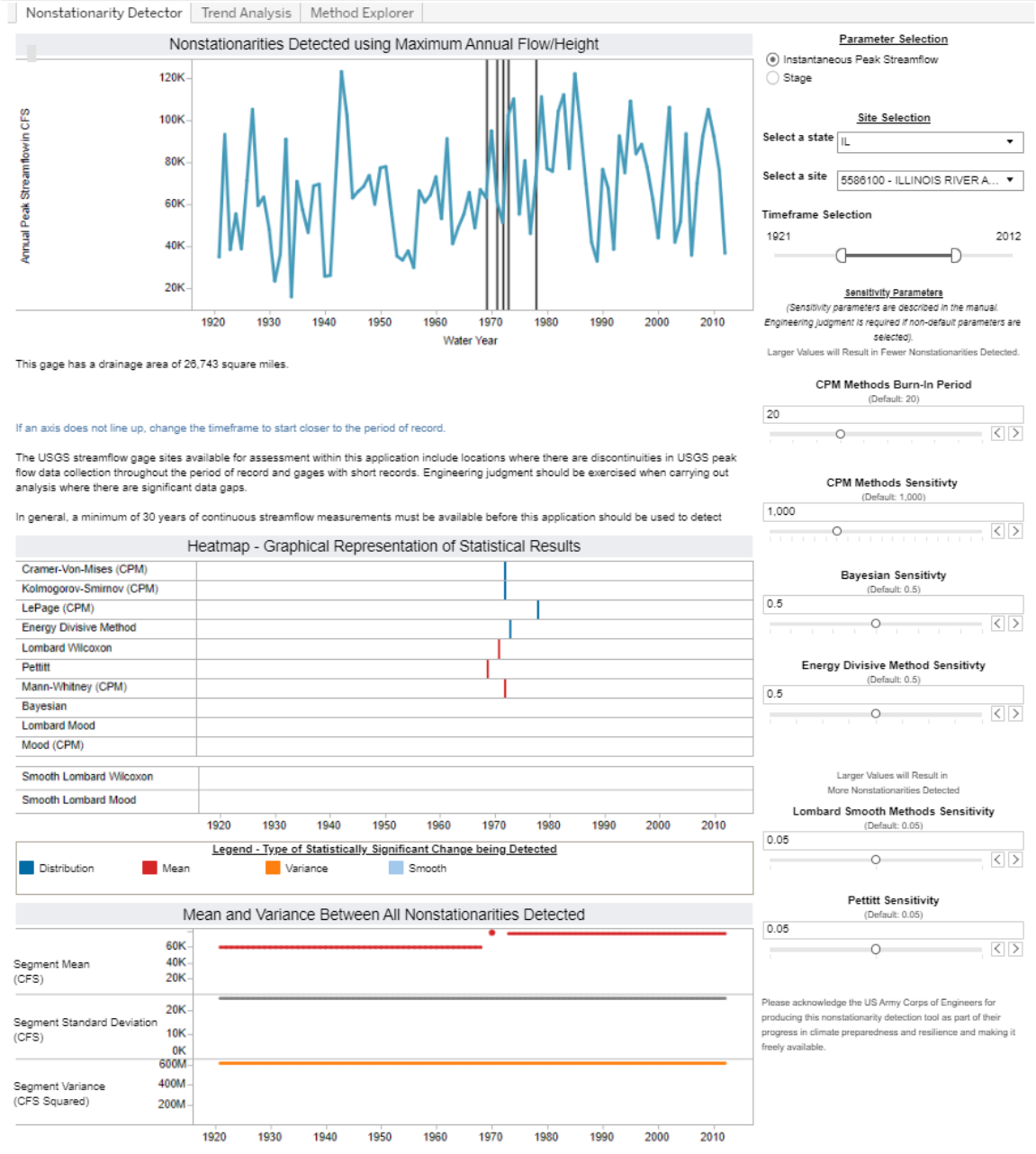


Figure 7-10. Nonstationarity Analysis of Maximum Annual Flow, Illinois River at Valley City, IL

Monotonic trend analysis for the uninterrupted period of record (1921-2012) showed a positive trend in peak streamflow along the Illinois River at Valley City, IL when the Mann-Kendall and Spearman Rank Order test were applied (Figure 7-11). When a Monotonic trend analysis was performed on the time periods before and after the nonstationarity event in 1972 (1921 to 1972 and 1972 to 2012), no statistically significant trends were detected.

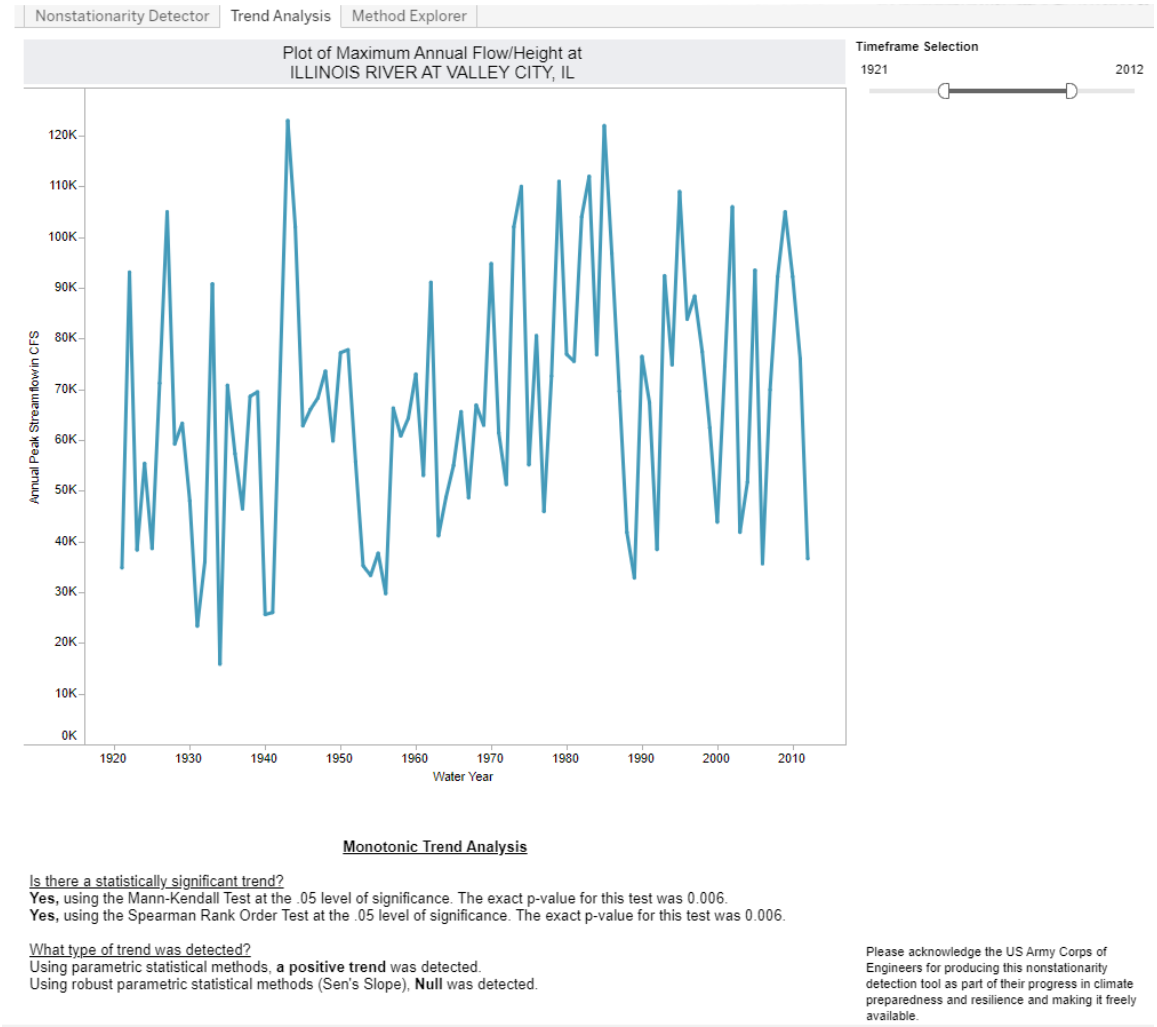


Figure 7-11. Monotonic Trend Analysis, Illinois River at Valley City, IL

The Nonstationarity Detection Tool was used to examine the hydrologic time series at the Macoupin Creek near Kane, IL gage (05587000). The full period of record (POR) for Macoupin Creek near Kane, IL was 1921-1933 and1941-2014, however, only the continuous period of record post-1941 (1941-2014) was adopted for analysis due to the gap in data available. The default sensitivity parameters were applied. Two nonstationarity tests indicate a changepoint in 1946, but they do not provide strong evidence of nonstationarity in the record (Figure 7-12). The Monotonic Trend analysis for the full POR showed no statistically significant trend in the streamflow (Figure 7-13). This means it can be assumed that the full period of record is representative of homogenous hydrologic conditions for Macoupin Creek near Kane, IL.

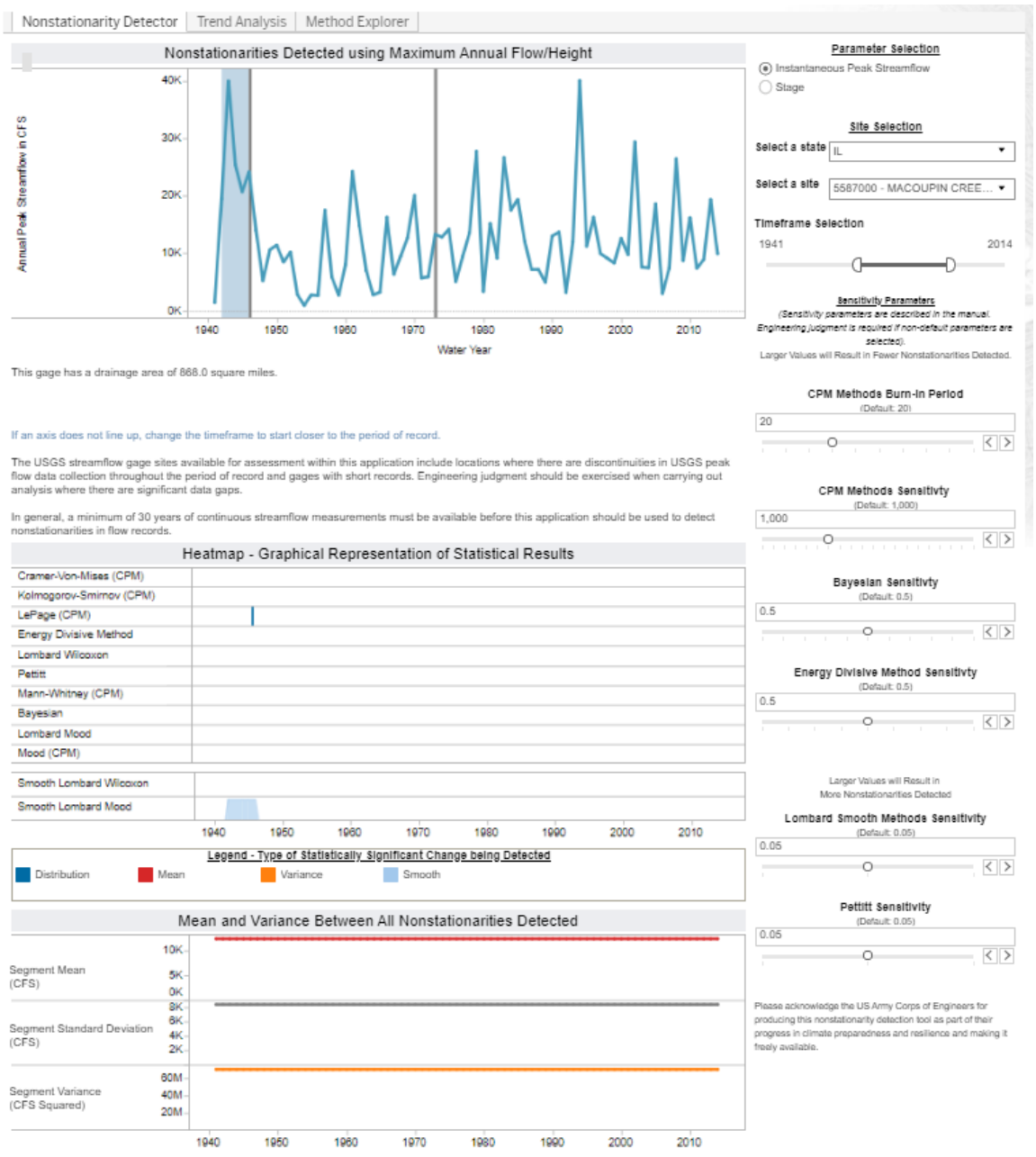


Figure 7-12. Nonstationarity Analysis of Maximum Annual Flow, Macoupin Creek near Kane, IL.

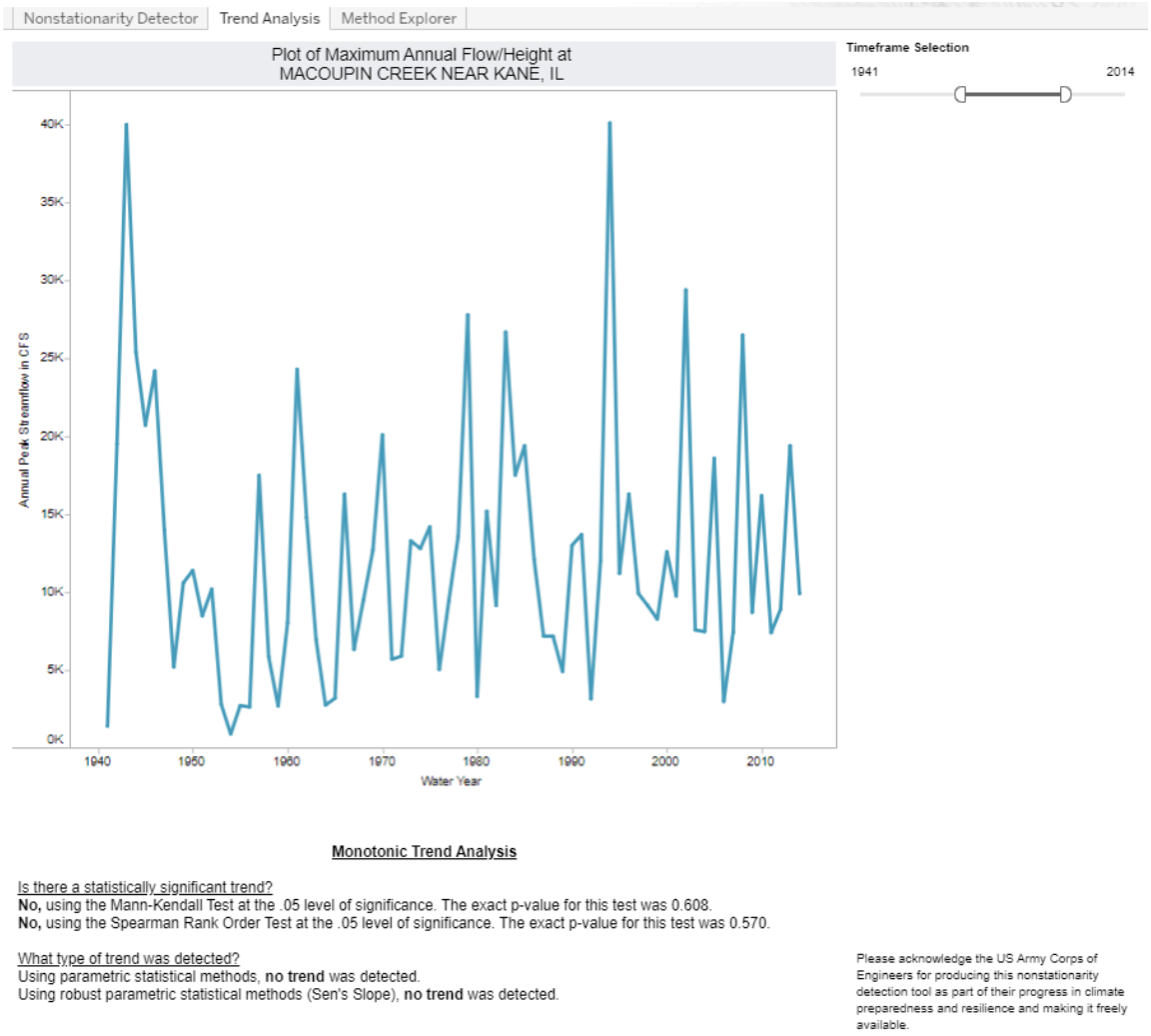


Figure 7-13. Monotonic Trend Analysis, Macoupin Creek near Kane, IL

The USACE Climate Hydrology Assessment Tool (CHAT) (USACE 2020) was also used to examine observed annual instantaneous peak streamflow trends in the vicinity of the project. The hydrologic time series of annual peak instantaneous streamflow at the gage Illinois River at Valley City, IL gage (05586100) is shown in Figure 7-14. The gage exhibits a statistically significant, increasing trend (p-value = 0.006 < 0.05) in peak flows over the period of record analyzed (1920-2012; 92 years). This is consistent with the results derived using the Mann Kendall and Spearman Rank Order tests as applied by the Nonstationarity Detection Tool.

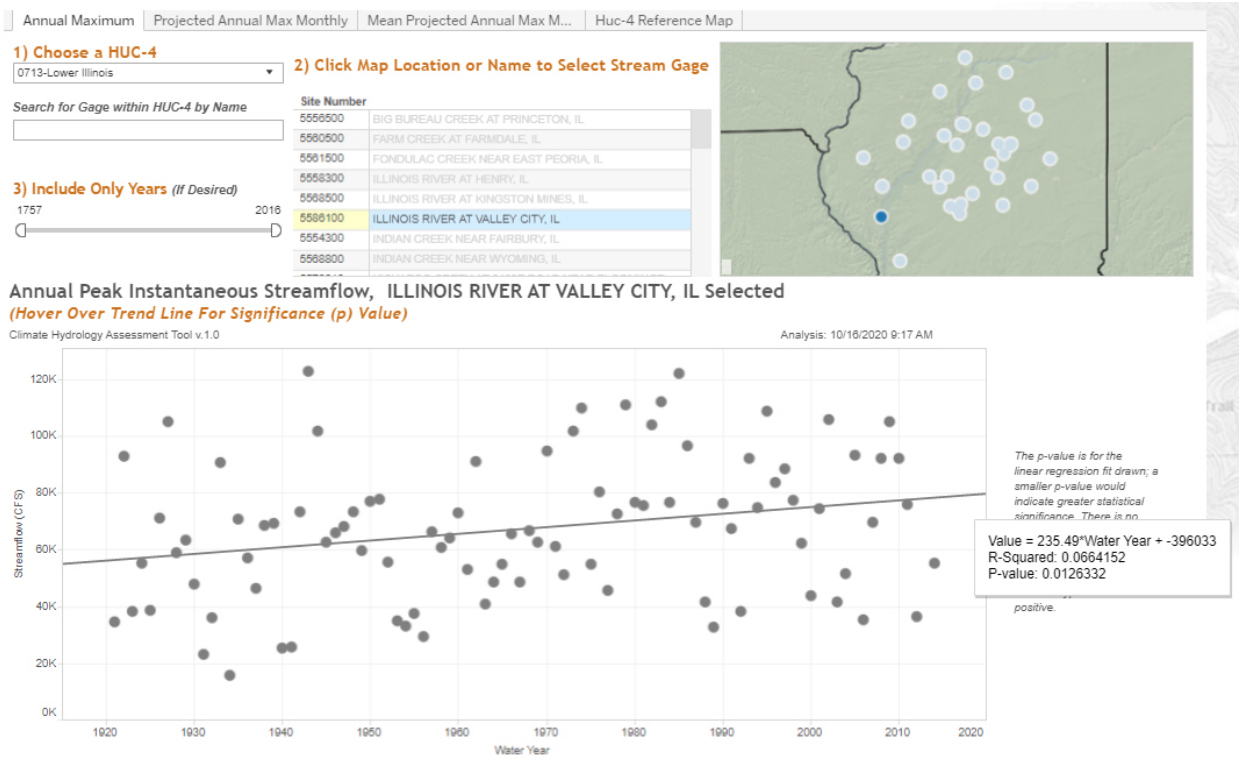


Figure 7-14. Annual Peak Instantaneous Streamflow, Illinois River at Valley City, IL gage (05586100).

The hydrologic time series of annual peak instantaneous streamflow at the Macoupin Creek near Kane, IL gage (05587000) is shown in Figure 7-15. The gage does not exhibit a statistically significant trend (p-value = 0.56 >> 0.05) in peak flows over the period of record analyzed.

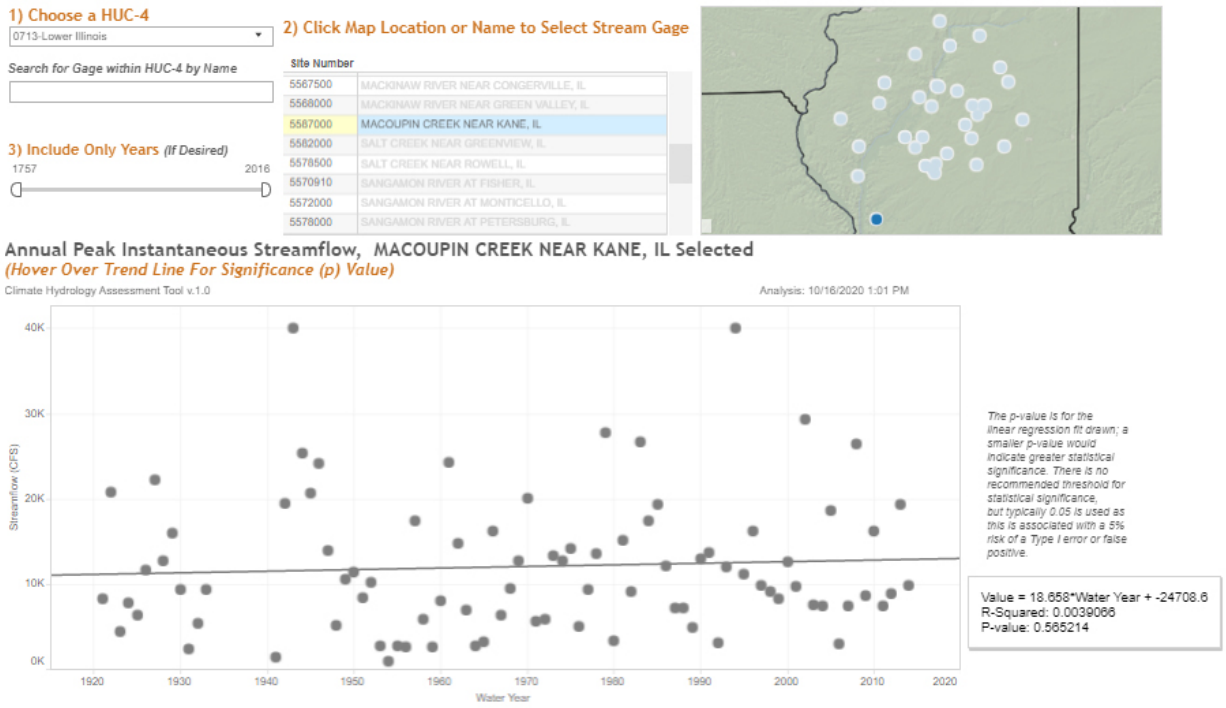


Figure 7-15. Annual Peak Instantaneous Streamflow, Macoupin Creek near Kane, IL gage

Regional Projections in Streamflow

Unregulated, modeled, projected, climate changed, annual maximum monthly streamflows for the HUC4 containing the project site (0713-Lower Illinois River) exhibit a statistically significant, upward trend ((Figure 7-16; p-value <0.0001). Trend analysis is carried out using the USACE CHAT tool with the default year of 2000 separating the portion of the modeled data where greenhouse gas emissions were held constant (1950-1999) and the portion of the data where the projected, climate changed pathway of emissions is being applied (2000-2099).

The projected hydrology used by the CHAT tool was produced from the Global Circulation/Climate Model (GCM) Coupled Model Intercomparison Project Phase 5 (CMIP-5) suite of model simulations of temperature and precipitation. GCM based meteorological outputs are downscaled to a spatial scale appropriate for water resources planning using the Bias Correction and Spatial Downscaling (BCSD) method. The output presented in the CHAT tool is based on 93 combinations of GCM outputs run for various Representative Concentration Pathway of Greenhouse Emissions (RCP). GCM based meteorological outputs are translated to a hydrologic response using the U.S. Bureau of Reclamation's unregulated, CONUS wide Variable Infiltration Capacity (VIC) model. As expected for this type of analysis, there is considerable, but consistent spread in the projected annual maximum monthly flows (Figure 7-17). This spread reveals some of the considerable uncertainty associated with the described modeling process. This finding suggests that there may exist the potential for higher peak streamflows in the future.

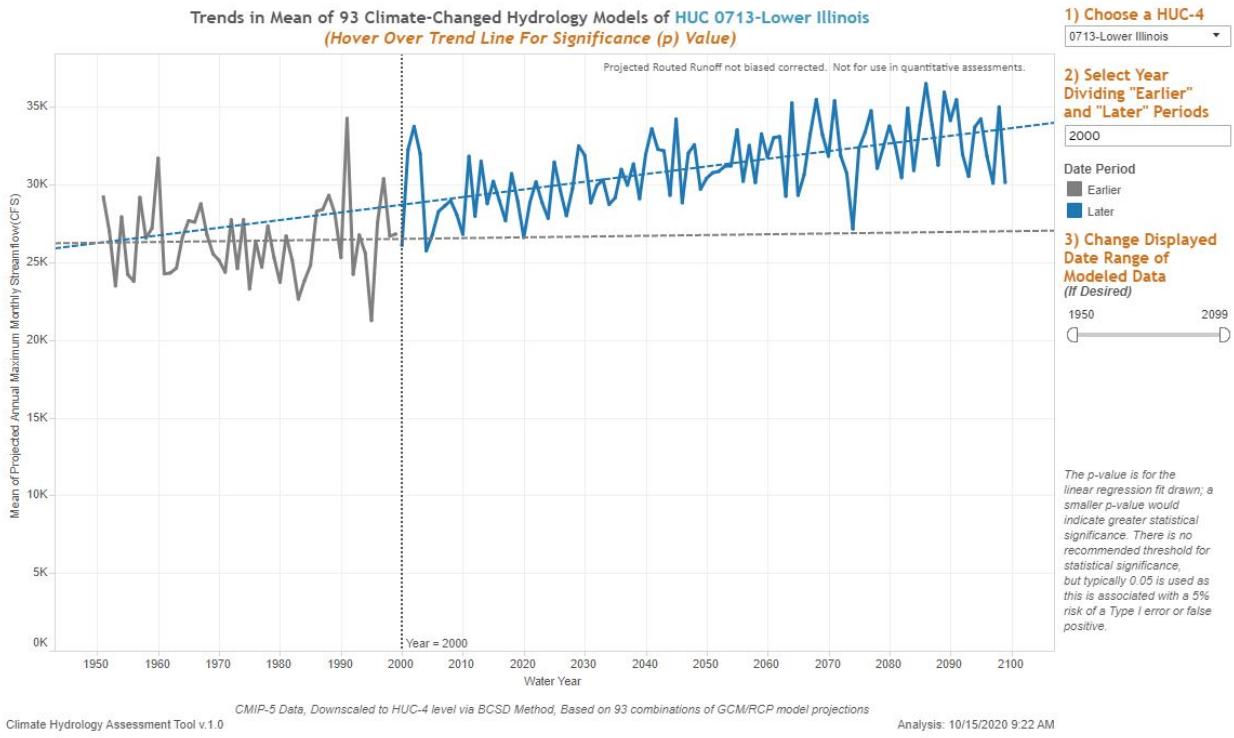


Figure 7-16. Mean Projected Annual Maximum Monthly Streamflow, HUC 0713-Lower Illinois River

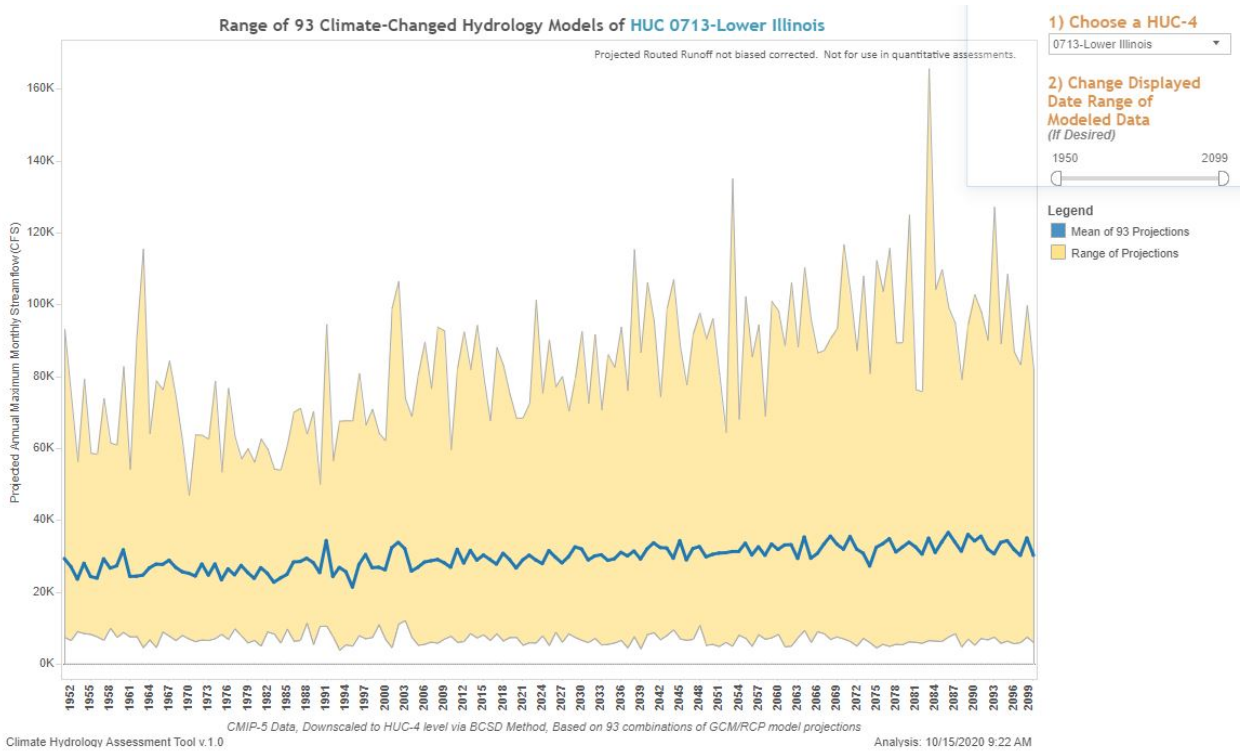


Figure 7-17. Range in the Projected Annual Maximum Monthly Flows, HUC 0713-Lower Illinois River

Screening-Level Vulnerability Assessment

The USACE Vulnerability Assessment (VA) Tool (USACE 2020) provides a nationwide, screening-level assessment of climate change vulnerability related to the USACE mission, operations, programs, and projects. The VA Tool was used to help determine if the Lower Illinois River watershed is considered relatively vulnerable to climate change impacts for ecosystem restoration. Only the ecosystem restoration business line was assessed in this study because the project is an environmental restoration project.

The USACE vulnerability assessment tool flags watersheds as being vulnerable to climate change across a specific USACE business line (ecosystem restoration in the case of this study) if that watershed's HUC 4 vulnerability score falls within the top 20% of vulnerability scores as compared to the other 201 HUC 4 watersheds in the contiguous United States (CONUS).

The vulnerability score is calculated using a weighted order weighted area (WOWA) method based on a series of indicator variables. The tool uses climate changed hydrology determined using 93 traces of CMIP5 GCM based climate outputs converted to a hydrologic response using the U.S. Bureau of Reclamations CONUS wide Variable Infiltration Capacity (VIC) models. The uncertainty in the modeling is partially communicated by providing output for two 50-year epochs of time centered on year 2050 and 2085. Uncertainty associated with output is further illustrated by displaying both the top 50% of traces by flow (WET scenario) and bottom 50% of traces by flow (Dry scenario). The default national standard settings were used in the tool for this analysis.

As can be seen from Figure 7-18, the Lower Illinois River Watershed (HUC 0713) is not among the top 20% of HUCs at greatest risk for ecosystem decline for either set of traces (WET/DRY) or epoch of time considered (2050/2085). Although the Lower Illinois River Watershed is not flagged as a particularly vulnerable watershed to climate change impacts on the ecosystem restoration business line, this does not mean that climate change does not have the potential to impact the watershed and possibly undermine ecosystem function in the future.

Indicators considered within the WOWA score for Ecosystem Restoration include: change in sediment load, short-term variability in hydrology, runoff elasticity (ratio of streamflow runoff to precipitation), macroinvertebrate index (sum score of six metrics indicating biotic condition), two indicators of flood magnification (indicator of how much high flows are projected to change overtime), mean annual runoff, change in low runoff, and percent of at risk freshwater plant communities. The primary indicator variable driving the vulnerability score is the percentage of at-risk wetland and riparian plant communities that are at risk of extinction based on remaining number and condition, remaining acreage, threat severity, etc. The variable contributing the second most to the vulnerability score is the runoff elasticity. The top two variables contributing to the ecosystem restoration vulnerability score in the Lower Illinois River Watershed (HUC 0713), Freshwater plant communities at risk and Runoff to Precipitation elasticity are broken out in Table 7-4. These factors are associated with the Twin Island Ecosystem Restoration project goals of habitat creation and Island protection. The two variables contributing most to the vulnerability score for the ecosystem restoration business line does not appear to be changing significantly with time or with subset of traces considered.

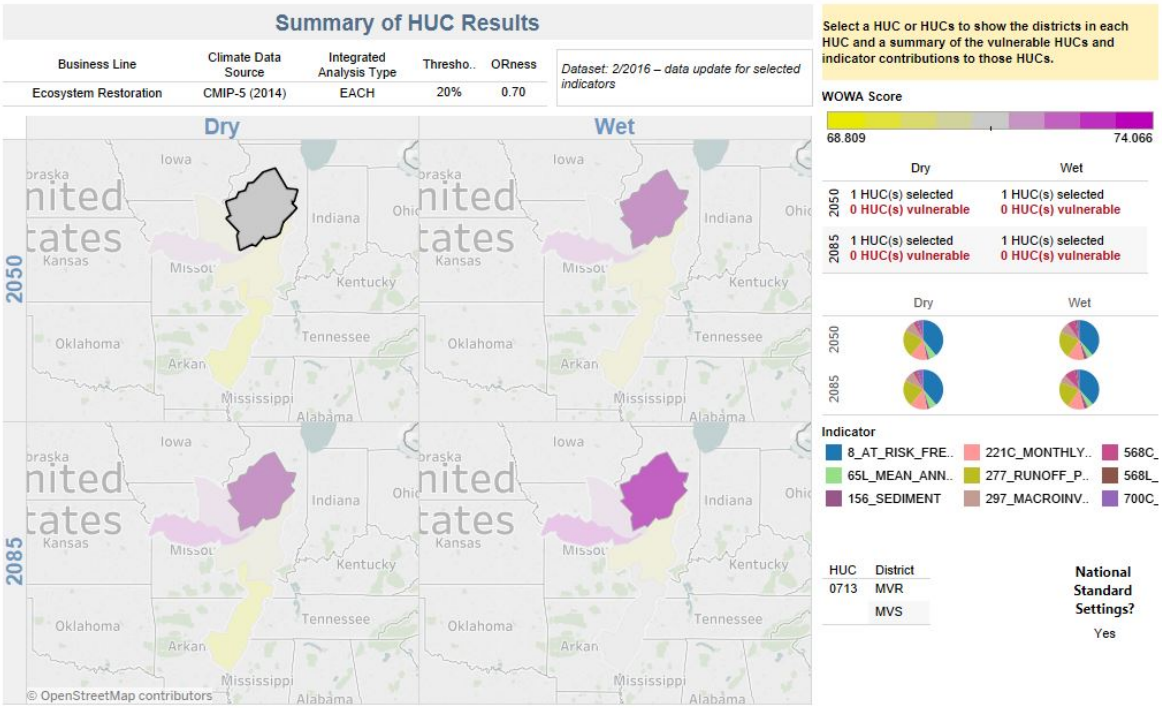


Figure 7-18. Vulnerability Assessment Tool HUC Results for Lower Illinois River Watershed (HUC 0713)

Table 7-4. Top two indicators for Lower Illinois River Watershed (HUC 0713) – Ecosystem Restoration Business Line

2050 Epoch	**HUC 0713 - Not Vulnerable**			
Indicator	**Dry**		**Wet**	
	WOWA Cont.	% Cont.	WOWA Cont.	% Cont.
8 - Percent of freshwater plant communities at risk	27.92	39.02%	27.628	38.52%
277 - Percent change in runoff divided by percent change in precipitation (Runoff Elasticity)	15.58	21.78%	15.56	21.69%
2085 Epoch	**HUC 0714 - Not Vulnerable**			
Indicator	**Dry**		**Wet**	
	WOWA Cont.	% Cont.	WOWA Cont.	% Cont.
8 - Percent of freshwater plant communities at risk	27.92	38.82%	27.84	38.28%
277 - Percent change in runoff divided by percent change in precipitation (Runoff Elasticity)	15.45	21.48%	15.49	21.29%

Qualitative Residual Risk Due to Climate Change

Table 7-5 shows the risks that could be experienced with climate change at the project site. These risks are mitigated by the use of large stone that is unlikely to be affected by increased precipitation, changes in river ice and higher or prolonged river levels. The larger stone used is

the standard size used by USACE St. Louis District (MVS) on most river projects on the Mississippi River and has proven to be resistant to failure. Velocities, even during flooding events, on the Illinois River are typically slower than those seen on the Mississippi River.

Table 7-5. Risks to the Tentatively Selected Plan (TSP) due to climate change

Feature or Measure	Trigger	Hazard	Harm	Qualitative Likelihood
Notched Wing-Bullnose	Increased precipitation from larger slower moving storms	Future Flood Volumes or durations may be larger.	Prolonged high water could damage the structure however the large stone used should be able to withstand damage	Unlikely, Higher flows should have little to no effect on the performance of the stone placed.
Revetment on Little Twin Island	Increased precipitation from larger slower moving storms	Future Flood Volumes or durations may be larger.	Prolonged high water could undermine revetment measures and cause failure	Unlikely, Higher flows should have little to no effect on the performance of the stone placed.
Notched Wing-Bullnose	Increased River Ice during High Flow conditions	Future Flood Volumes or durations may be larger and shifts in seasonality may cause changes in ice impacts	River Ice could damage the structure however the large stone used should be able to withstand damage	Unlikely, Higher flows should have little to no effect on the performance of the stone placed.
Revetment on Little Twin Island	Increased River Ice during High flow conditions	Future Flood Volumes or durations may be larger and shifts in seasonality may cause changes in ice impacts	River Ice could damage could undermine revetment measures and cause failure	Unlikely, Higher flows should have little to no effect on the performance of the stone placed.

7.3 Climate Change Conclusions

A review of recently published literature related to trends in observed and projected hydrometeorological datasets indicates the following for the Island and Shoreline Protection – Twin Islands project area:

1. The general consensus in recent literature points towards observed increases in temperature and precipitation in the Upper Mississippi Region over the past century. Some observed precipitation records point to an increase in the frequency of extreme storm events.
2. Within the state of Illinois annual temperature is increasing with the greatest warming occurring in spring and winter. Precipitation has been above average for the past two decades with the most significant increases occurring in winter and spring.
3. Observed Streamflow for the region shows a small increasing trend.
4. Regional Streamflow projections were variable with no clear consensus but with indications that flood intensity may increase due to increased frequency of extreme storm events.
5. Climate change is very likely to affect the timing, severity, magnitude, and frequency of severe storm events, in addition to affecting seasonal and annual precipitation trends.

First order statistical analysis of maximum streamflows which have been observed in the watershed and projected for the region indicates the following:

1. Nonstationarity analysis and monotonic trend analysis of annual peak streamflow records observed at sites in the vicinity of the project area demonstrate mixed results. A nonstationarity was detected at one site analyzed and an increasing trend was detected at that location, but not at the other location assessed.
2. An upward trend is detected in unregulated, modeled, projected, climate changed, annual maximum monthly streamflows for the HUC4 containing the project site (0713-Lower Illinois River).

The trend and nonstationarity identified in the observed record cannot be attributed to regulation. It is unknown if land use/land cover/urbanization were potential drivers in the increasing trends or nonstationarity. The driving factors could be related to meteorological conditions in the Illinois River Basin and could be driven by man-made or natural occurring events.

The USACE Vulnerability Assessment Tool indicates that the HUC4 containing the Twin Islands project is not relatively vulnerable to climate change impacts for the Ecosystem Restoration Business Line in all future scenarios tested (2050-dry, 2050-wet, 2085-dry, and 2085-wet). With upward trends in precipitation, temperatures, and streamflows being indicated by this qualitative climate assessments, there is the potential for Future, Without Project Conditions to be impacted by changes in climate at some indeterminate point in the future. Constructing the Island and Shoreline Protection – Twin Islands project will protect island acreage and provide additional bathymetric diversity, all of which will ensure additional resilience to climate change within the reach. Project resilience to changes in flow regime and ice conditions have been taken into consideration by the grading of rock used for creating the proposed project structures. The rock placed will be 5,000-lb top size, the largest top size available for river placement.

8. REFERENCES

1. Frankson, R., K. Kunkel, S. Champion, B. Stewart, D. Easterling, B. Hall, and J. R. Angel, 2017: Illinois State Climate Summary. *NOAA Technical Report NESDIS 149-IL,* 4 pp.
2. Friedman, D., J. Schechter, B. Baker, C. Mueller, G. Villarini, and K. D. (White. 2016) US Army Corps of Engineers Nonstationarity Detection. US Army Corps of Engineers: Washington, D.C.
3. Upper Mississippi River Flow Frequency Study, U.S. Army Corps of Engineers, St. Paul, Rock Island, and St. Louis Districts, Appendix D, Table D-31, January 2004.
4. USACE (2015). Recent US Climate Change and Hydrology Literature Applicable to US Army Corps of Engineers Missions – Water Resources Region 07, Upper Mississippi. Civil Works Technical Report, CWTS-2015-10, USACE, Washington, DC.
5. USACE (2018) Engineering and Construction Bulletin 2018-14: Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects.
6. USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

NAVIGATION AND ECOSYSTEM SUSTAINABILITY PROGRAM
ISLAND AND SHORELINE PROTECTION
TWIN ISLANDS
ILLINOIS RIVER, GREENE COUNTY, ILLINOIS

PROJECT IMPLEMENTATION REPORT
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

APPENDIX H
REAL ESTATE PLAN
TWIN ISLANDS

Real Estate Planning Report
Navigation and Environmental Sustainability Program (NESP)
Ecosystem Restoration
Twin Islands

Table of Contents

Real Estate Plan
Navigation and Environmental
Sustainability Program (NESP)
Ecosystem Restoration
Twin Islands

Project Location and Description

The Twin Islands project is conducted under the Navigation and Environmental Sustainability Program (NESP).

The project area is located on the Illinois River at River Miles 38.0 in Calhoun County, Illinois, and includes two (2) islands, the smaller of which is situated in close proximity to the navigation channel.

The upper ends of both islands have suffered severe erosion resulting from wave wash, wake wash and ice flows. Much of the vegetation no longer exists on the smaller island, increasing the potential for erosion impacts. It is likely that the small island will disappear quickly if not protected. Project construction will protect both islands from erosion impacts and will allow the small island to continue to exist as a diverse habitat feature.

A modified dike structure should be constructed upstream of the existing islands to direct the forces of the water flows away from the head of the islands, protecting them from further damage. The notch in the dike structure would be placed to allow the small channel between the islands to continue to flow and provide habitat diversity.

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 Flood Control Act of 1970. Section 216 authorizes modification to navigation, flood control, and water supply structures or their operation for improving the quality of the environment in the overall public interest. Subsequent authorization was received in the Water Resources Development Act (WRDA) of 2007, Title VIII. Section 8004 of Title VIII, which authorizes implementation of Ecosystem Restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River.

1. Purpose

This Real Estate Plan (REP) has been prepared to present the real estate requirements and support the Navigation and Environmental Sustainability Program (NESP) 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 required to implement the proposed plan for protecting the Islands in the Illinois River for the project. The project area lies within the main Illinois River Channel within navigational servitude.

3. **LER Required that is Owned by Sponsor**

There is no sponsor for this project. The project will be 100% federally funded.

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.

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**

Not applicable since this project is 100% federally funded.

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 in within the project area. .

18. **Landowner Support or Opposition to the Project**

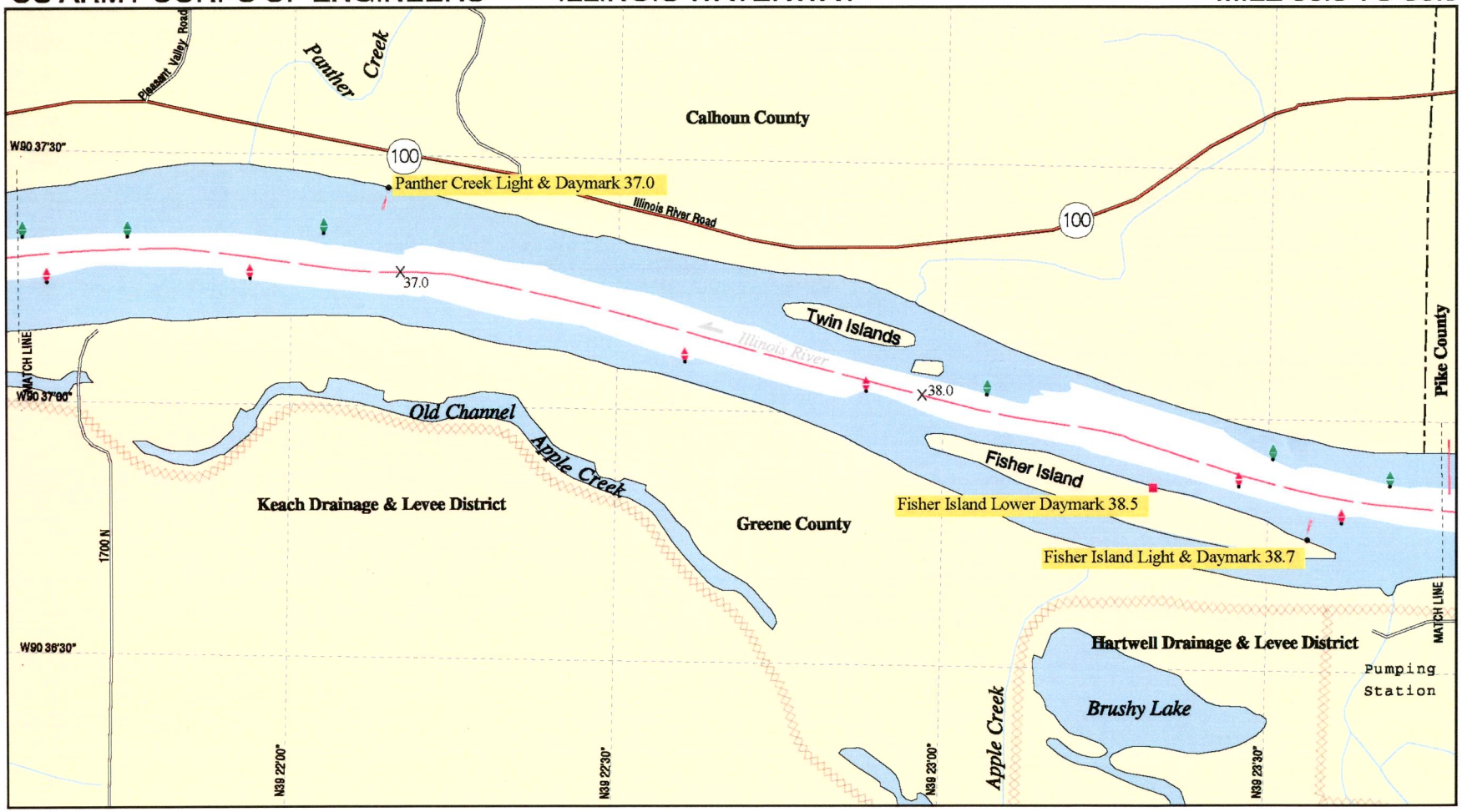
There is no known landowner opposition to this project. Members of the St. Louis District project delivery team (PDT) met with the owners of the Twin Islands on-site. They expressed only support for this project and any measures that could be taken to preserve the ecosystem in this area.

19. **Notification to the Non-Federal Sponsor Regarding Risks Associated with Acquiring Land before Execution of the PPA**

There is no non-federal sponsor. The project will be 100% federally funded.

ANNE L. KOSEL
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

Quality Control Plan Checklist

Real Estate Plans

And other similar Feasibility-Level Real Estate Planning Documents

ER 405-1-12, Section 12-16, Real Estate Handbook, 1 May 1998

A Real Estate Plan (REP) is prepared in support of a decision document for full-Federal or cost shared specifically authorized or continuing authority projects. It identifies and describes lands, easements and rights-of-way (LER) required for the construction, operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of a proposed project including requirements for mitigation, relocations, borrow material, and dredged or excavated material disposal. It also identifies and describes facility/utility relocations, LER value, and the acquisition process. The REP does not just cover LER to be acquired by the non-Federal sponsor (NFS) or Government. The report covers all LER needed for the project, including LER already owned by the NFS, Federal Government, other public entities, or subject to the navigation servitude.

The REP must contain a detailed discussion of the following 20 topics, as set out in Section 12-16 of the ER, including sufficient description of the rationale supporting each conclusion presented. If a topic is not applicable to the project, this should be stated in the REP. The pages of a REP should be numbered.

PROJECT: Navigation and Environmental Sustainability Program (NESP) Ecosystem Restoration - Twin Islands

REPORT TITLE: Project Implementation Report (PIR)

Date of Report_____ Date of REP: September 23, 2010

1. **Purpose of the REP.** __X__
   a. Describe the purpose of the REP in relation to the project document that it supports.
   b. Describe the project for the Real Estate reviewer.
   c. Describe any previous REPs for the project.

2. **Describe LER.** __X__
   a. Account for all lands, easements, and rights-of-way underlying and required for the construction, OMRR&R of the project, including mitigation, relocations, borrow material and dredged or excavated material disposal, whether or not it will need to be acquired or will be credited to the NFS.
   b. Provide description of total LER required for each project purpose and feature.
   c. Include LER already owned by the Government, the NFS and within the navigation servitude.
   d. Show acreage, estates, number of tracts and ownerships, and estimated value.
   e. Break down total acreage into fee and the various types and durations of easements.

f. Break down acreage by Government, NFS, other public entity, and private ownership, and lands within the navigation servitude.

3. **NFS-Owned LER.** __N/A__

a. Describe NFS-owned acreage and interest and whether or not it is sufficient and available for project requirements.

b. Discuss any crediting issues and describe NFS views on such issues.

4. Include any proposed **Non-Standard Estates.** __N/A__

a. Use Standard Estates where possible.

b. Non-standard estates must be approved by HQ to assure they meet DOJ standards for use in condemnations.

c. Provide justification for use of the proposed non-standard estates.

d. Request approval of the non-standard estates as part of document approval.

e. If the document is to be approved at MSC level, the District must seek approval of the non-standard estate by separate request to HQ. This should be stated in the REP.

f. Exception to HQ approval is District Chiefs of RE approval of non-standard estate if it serves intended project purposed, substantially conforms with and does not materially deviate from the standard estates found in the RE Handbook, and does not increase cost or potential liability to the Government. A copy of this approval should be included in the REP. (See Section 12-10c. of RE 405-1-12)

g. Although estates are discussed generally in topic 2, it is a good idea to also state in this section which standard estates are to be acquired and attach a copy as an appendix. The duration of any temporary estates should be stated.

5. **Existing Federal Projects.** __X__

a. Discuss whether there is any existing Federal project that lies fully of partially within LER required for the project.

b. Describe the existing project, all previously-provided interests that are to be included in the current project, and identify the sponsor.

c. Interest in land provided as an item of local cooperation for a previous Federal project is not eligible for credit.

d. Additional interest in the same land is eligible for credit.

6. **Federally-Owned Lands** __X__

a. Discuss whether there is any Federally owned land included within the LER required for the project.

b. Describe the acreage and interest owned by the Government.

c. Provide description of the views of the local agency representatives toward use of the land for the project and issues raised by the requirement for this land.

7. **Navigation Servitude.** __X__

a. Identify LER required for the project that lies below the Ordinary High Water Mark, or Mean High Water Mark, as the case may be, of a navigable watercourse.

b. Discuss whether navigation servitude is available

c. Will it be exercised for project purposes? Discuss why or why not.

d. Lands over which the navigation servitude is exercised are not to be acquired nor eligible for credit for a Federal navigation or flood control project or other project to which a navigation nexus can be shown.

e. See paragraph 12-7 of ER 405-1-12.

8. **Map** __X__

a. An aid to understanding

b. Clearly depicting project area and tracts required, including existing LER, LER to be acquired, and lands within the navigation servitude.

c. Depicts significant utilities and facilities to be relocated, any known or potential HTRW lands.

9. **Induced Flooding** can create a requirement for real estate acquisition. __X___

a. Discuss whether there will be flooding induced by the construction and OMRR&R of the project.

b. If reasonably anticipated, describe nature, extent and whether additional acquisition of LER must or should occur.

c. Physical Takings Analysis (separate from the REP) must be done if significant induced flooding anticipated considering depth, frequency, duration, and extent of induced flooding.

. d. Summarize findings of Takings Analysis in REP. Does it rise to the level of a taking for which just compensation is owed?

10. **Baseline Cost Estimate** as described in paragraph 12-18. _N/A_

a. Provides information for the project cost estimates.

b. Gross Appraisal includes the fair market value of all lands required for project construction and OMRR&R.

c. PL 91-646 costs

d. Incidental acquisition costs

e. Incremental real estate costs discussed/supported.

f. Is Gross Appraisal current? Does Gross Appraisal need to be updated due to changes in project LER requirements or time since report was prepared?

11. **Relocation Assistance Benefits** Anticipated. __X__

a. Number of persons, farms, and businesses to be displaced and estimated cost of moving and reestablishment.

b. Availability of replacement housing for owners/tenants

c. Need for Last Resort Housing benefits

d. Real Estate closing costs

e. See current 49 CFR Part 24

12. **Mineral Activity**. __X__

a. Description of present or anticipated mineral activity in vicinity that may affect construction, OMRR&R of project.

b. Recommendation, including rationale, regarding acquisition of mineral rights or interest, including oil or gas.

c. Discuss other surface or subsurface interests/timber harvesting activity

d. Discuss effect of outstanding 3rd party mineral interests.

e. Does estate properly address mineral rights in relation to the project?

13. **NFS Assessment** _N/A_

a. Assessment of legal and professional capability and experience to acquire and provide LER for construction, OMRR&R of the Project.

b. Condemnation authority

c. Quick-take capability

d. NFS advised of URA requirements

e. NFS advised of requirements for documenting expenses for credit.

f. If proposed that Government will acquire project LER on behalf of NFS, fully explain the reasons for the Government performing work.

g. A copy of the signed and dated Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability (Appendix 12-E) is attached to the REP.

14. **Zoning** in Lieu of Acquisition __X__

a. Discuss type and intended purpose

b. Determine whether the proposed zoning proposal would amount to a taking for which compensation will be due.

15. **Schedule** __X__

a. Reasonable and detailed Schedule of land acquisition milestones, including LER certification.

b. Dates mutually agreed upon by Real Estate, PM, and NFS. _____

16. **Facility or Utility Relocations** __X__

a. Describe the relocations, identity of owners, purpose of facilities/utilities, whether owners have compensable real property interest.

b. A synopsis of the findings of the Preliminary Attorney's Investigation and Report of Compensable Interest is included in the REP as well as statements required by Sections 12-17c.(5) and (6).

c. Erroneous determinations can affect the accuracy of the project cost estimate and can confuse Congressional authorization.

d. Eligibility for substitute facility

1. Project impact
2. Compensable interest
3. Public utility or facility
4. Duty to replace
5. Fair market value too difficult to determine or its application would result in an injustice to the landowner or the public.

e. See Sections 12-8, 12-17, and 12-22 of ER 405-1-12.

17. **HTRW** and Other Environmental Considerations __X___

a. Discussion the impacts on the Real Estate acquisition process and LER value estimate due to known or suspected presence of contaminants.

b. Status of District's investigation of contaminants.

c. Are contaminants regulated under CERCLA, other statues, or State law?
d. Is clean-up or other response required of non-CERCLA regulated material?
e. If cost share, who is responsible for performing and paying cost of work?
f. Status of NEPA and NHPA compliances
g. See ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects.

18. **Landowner Attitude**. __X__
a. Is there support, apathy, or opposition toward the project?
b. Discuss any landowner concerns on issues such as condemnation, willing seller provisions, estates, acreages, etc.?

19. A statement that the **NFS has been notified in writing about the risks of acquiring LER before the execution of the PPA**. If not applicable, so state. _N/A_

20. **Other Relevant Real Estate Issues**. Anything material to the understanding of the RE aspects of the project. __N/A__

A copy of the completed Checklist is attached to the REP. __X__
(Draft REPs must contain a draft checklist and draft Technical Review Guide)

I have prepared and thoroughly reviewed the REP and all information, as required by Section 12-16 of ER 405-1-12, is contained in the Plan.

Lynn Haerner
Preparer

27 Sept 2010
Date

A copy of the Real Estate Internal Technical Review Guide for Civil Works Decision Documents is attached and signed by me as the Reviewer

Craig Davis
RE Internal Technical Reviewer

9/28/2010
Date

The REP has been signed and dated by the Preparer and the District Chief of Real Estate.
✓

Appendix H

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Monitoring and Adaptive Management Plan

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

Table of Contents

Introduction

This appendix presents the feasibility level monitoring and adaptive management plan for the Island and Shoreline Protection Study at Twin Islands. This plan identifies and describes the monitoring and adaptive management activities proposed for the considered action alternatives and estimates associated cost and duration. This plan outlines how the results of the monitoring would be used to adaptively manage each of the action alternatives, including monitoring targets which demonstrate success in meeting project objectives. The intent of this plan is to develop monitoring and adaptive management actions appropriate and to scale for the project's goal and objectives and areas of uncertainty. This plan will be further developed in the planning, engineering, and design (PED) phase as specific details are made available for the recommended plan.

Authority

The site-specific evaluation was initiated as a follow on component of the Upper Mississippi River and Illinois Waterway System Navigation Study (Sept 2004), which was a General Investigation study authorized by Section 216 of the Flood Control Act of 1970. Subsequent authorization was received in the Water Resources Development Act (WRDA) of 2007, Title VIII. Section 8004 of Title VIII, authorizes implementation of Ecosystem Restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River

Framework

Section 1161 of WRDA 2016 requires that when conducting a feasibility study for ecosystem restoration, the proposed study includes a plan for monitoring the success of the ecosystem restoration. Additionally, paragraph (7)(d) of Section 1161 Implementation Guidance states that "an adaptive management plan will be developed for ecosystem restoration projects…appropriately scoped to the scale of the project." The implementation guidance for Section 1161, in the form of a CECW-P Memo dated 19 October 2017, also requires that an adaptive management plan be developed for all ecosystem restoration projects. Adaptive management "prescribes a process wherein management actions can be changed in response to monitored system response, so as to maximize restoration efficacy or achieve a desired ecological state" (Fischenich et al. 2012). The Twin Islands' adaptive management framework follows the two phased approached for set-up and implementation (Figure 1).

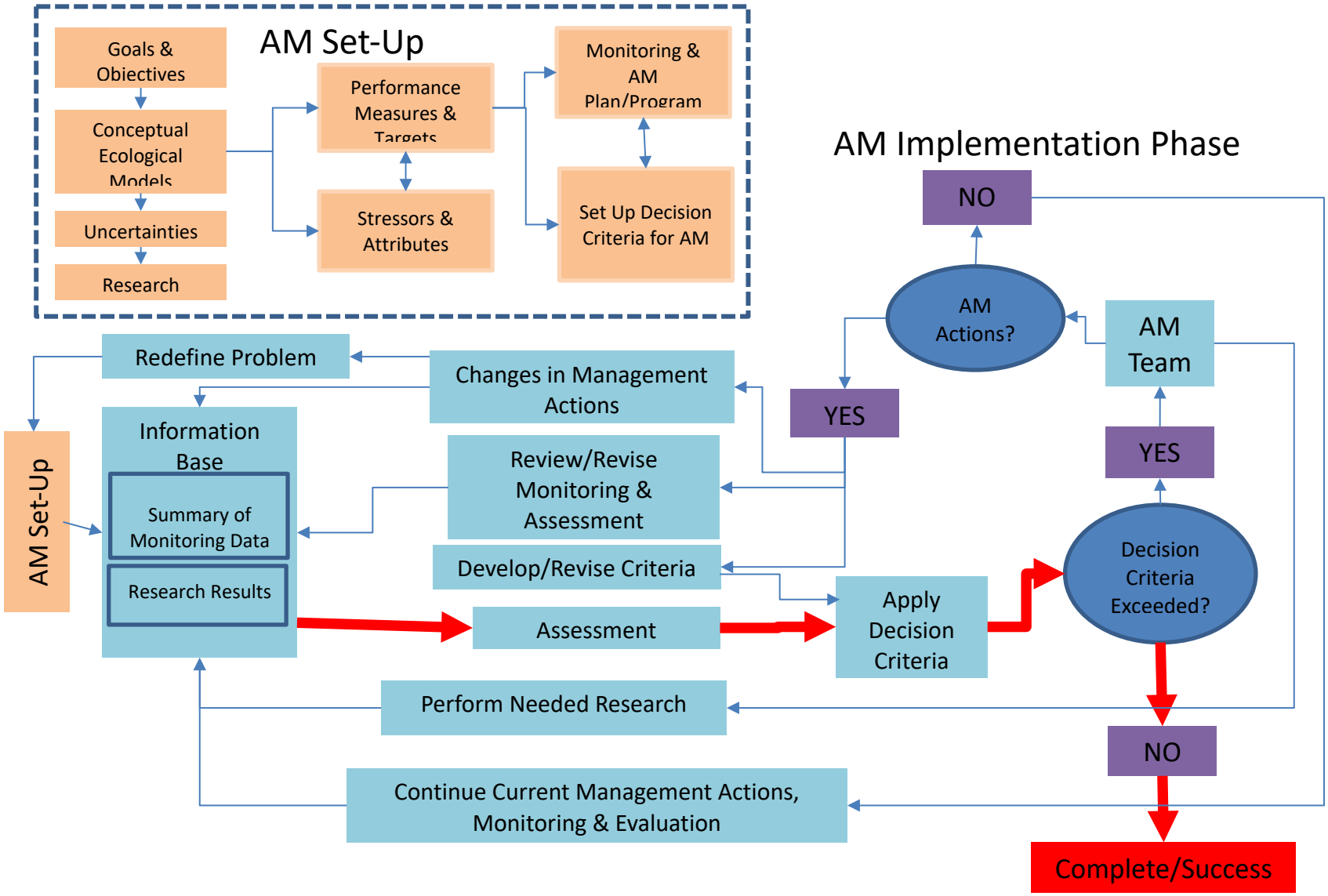


Figure 1. Adaptive Management Planning Flow Chart

Adaptive Management Planning

The resulting adaptive management plan for Twin Islands describes and discusses whether adaptive management is needed in relation to the considered action alternatives identified in the Feasibility Study. The plan also identifies how adaptive management would be conducted and who would be responsible for specific adaptive management actions. The developed plan outlines how the results of study-specific monitoring would be used to adaptively manage the considered action alternatives, including specifications that will define success.

The Adaptive Management Plan reflects a level of detail consistent with the feasibility study. The primary intent was to develop monitoring and adaptive management actions appropriate for the study's restoration goal and objectives. The specified management actions permit estimation of the adaptive management plan costs and duration. The Adaptive Management Plan:

- identifies the restoration goal and objectives;
- presents a conceptual model that relates management actions to desired study outcomes; and
- lists sources of uncertainty that would lend themselves to adaptive management.

Following the discussion of the above, the subsequent sections of this appendix describe monitoring, assessment, and decision-making in support of adaptive management. The level of detail in this plan is based on currently available data and information developed during plan formulation as part of the Feasibility Study. Uncertainties remain concerning the exact restoration measures, monitoring elements and adaptive management opportunities. Components of the monitoring and adaptive management plan, including costs, were similarly estimated using currently available information.

Goal and Objectives

The overarching goal of this study is to formulate an alternative that can restore the aquatic ecosystem. To meet this goal, the following project objectives were identified:

- Enhance geomorphic diversity in the study area within the period of analysis.
- Maintain island mosaic diversity in the study area within the period of analysis.
- Enhance the aquatic ecosystem for native fish in the study area within the period of analysis.

Sources of Uncertainty

Shoreline Protection

The St. Louis District evaluated the level of uncertainty and risk in the shoreline protection measure and determined it did not require using Adaptive Management to address the potential of the measure to meet performance criteria. Furthermore, other ecosystem restoration projects through the Upper Mississippi River Restoration (UMRR) Program and Operation and Maintenance of the 9-foot Channel Project have routinely used rock in shoreline protection with success and these lessons learned have been applied in the shoreline protection measure. Monitoring would be conducted to determine success (see below).

Notched Bullnose Structure

This type of structure has successfully been constructed by the St. Louis District and has achieved desired results. The St. Louis District evaluated the level of uncertainty and risk in the notched bullnose structure as described in Alternative 2 (see Section 5.6.2 of the main report) and identified the following sources of uncertainty applicable to site conditions at Twin Islands:

- Placement of keys where the structure ties into the island heads since they are of high importance for structure integrity (Low Risk)
- Placement of notch (design, size) to achieve desired flow pattern (Low Risk)
- Stability of the existing Little Twin Island being able to support the tie in since the island is currently highly eroded and potential for bullnose to be outflanked (Low Risk)

Wing-Bullnose Structure

This type of structure has successfully been constructed in the Mississippi River by the St. Louis District and has achieved desired results. Lessons learned from these designs have been applied here; however, the St. Louis District evaluated the level of uncertainty and risk in the wing-bullnose structure as described in Alternative 3 (see Section 5.6.2 of main report) and identified the following source of uncertainty:

- Ability of structure (design, height, notch placement) to achieve desired flow pattern to reduce island erosion and create slack water fish habitat due to conditions in the Illinois River different than the Mississippi River (Low Risk)

Conceptual Model

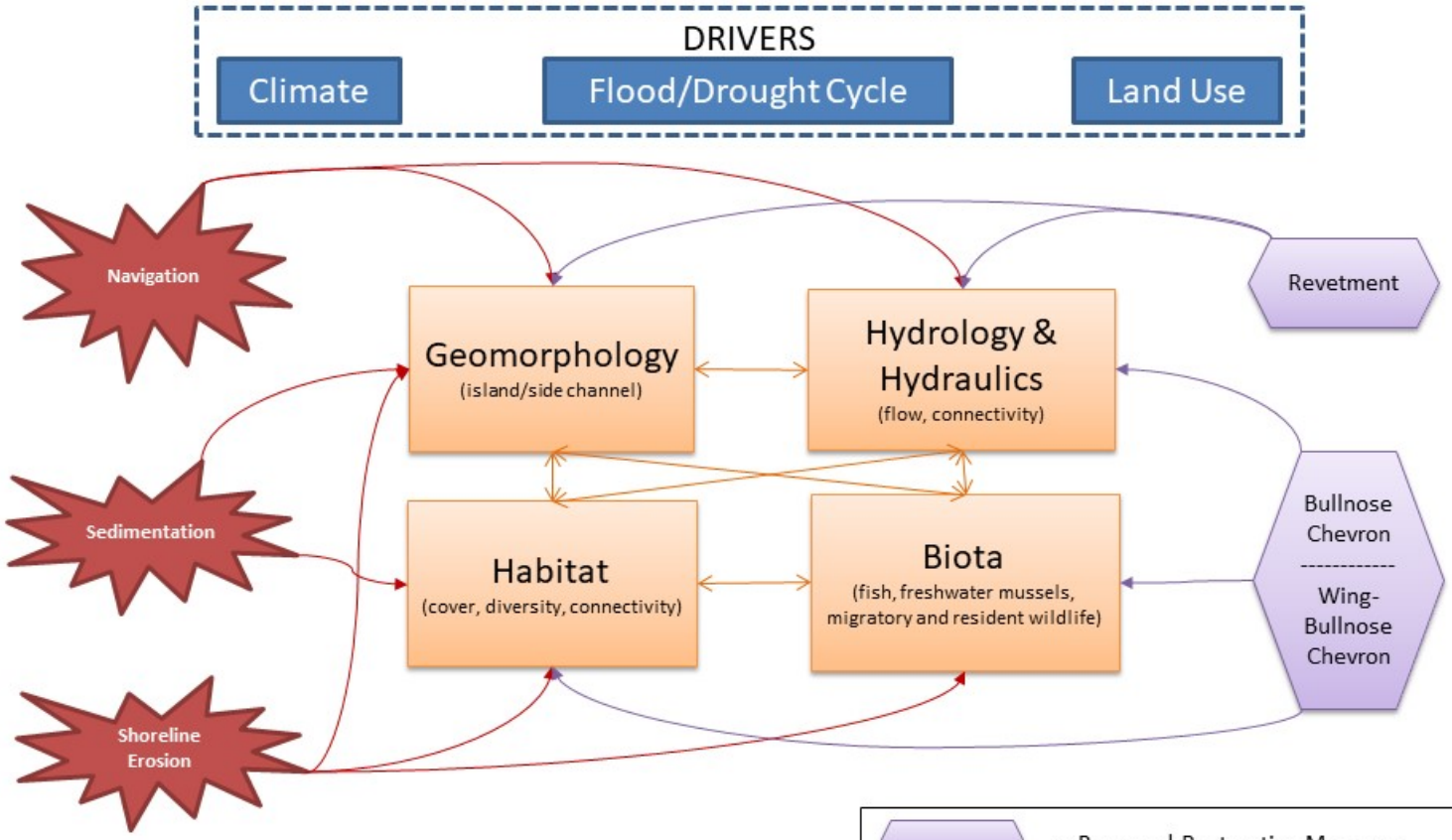
Figure 2 shows the conceptual ecological model. This model identifies the drivers and stressors of the system and how they relate to the four essential ecosystem characteristics. The team developed this model to aid in identifying the problems and potential management actions that could be implemented to counter the stressors that are degrading the ecosystem.

Monitoring to Determine Success & Adaptive Management Measures

The power of a monitoring program developed to support determination of success and inform adaptive management lies in the establishment of feedback between continued monitoring and corresponding project management. Alternatives 2 and 3 are similar in terms of both having shoreline protection and a bullnose type structure to modify the flow in the project; therefore, the monitoring and corresponding adaptive management measures are similar. Alternative 4 only includes shoreline protection; and therefore the monitoring plan would be less and has no need for adaptive management.

Performance indicators were developed to be specific, measurable, attainable, realistic and timely. Table 1 summarizes the performance indicators. Table 2 provides the generalized monitoring schedule and estimated costs by considered alternative.

Relationships among identified problems, ecosystem components, and restoration measures for Twin Islands



OBJECTIVE: Illustrate the relationships among essential ecosystem characteristics for Twin Islands and current stressors and proposed restoration measures.

Figure 2. Conceptual Ecological Model

Table 1. Project objectives, performance indicators, monitoring target, and adaptive management triggers and measures

Objective	Performance Indicator	Monitoring Target (Desired Outcome)	Responsible Party	Action Criteria (AM Trigger)	AM Measure
Enhance geomorphic diversity	Bathymetric Diversity	Increase % of side channel ≥ 8 feet deep	USACE	By year 6 post construction, >50% of loss of desired deep and slack water habitat compared to year 2 post construction At any point, the rock structure is outflanked	Modify rock structure
	Average current velocity (ft/sec)	Increase % of project area as slack water	USACE		
Maintain island mosaic diversity	Number and acreage of islands	Maintain existing island and acreage	USACE	By year 6 post construction; >50% loss of island acreage compared to year 1 post construction At any point, the rock structure is outflanked	Modify rock structure and/or revetment
Enhance the aquatic ecosystem for native fish	Native fish assemblage	Increase in abundance (Catch-per-unit-effort) over existing conditions of native fish	USACE	None identified	n/a

Table 2. Twin Island conceptual post-construction monitoring schedule and estimated costs. Construction completion is set at year 0. Alternatives 2 and 3 would include similar monitoring and adaptive components, while Alternative 4 does not include activities related to the geomorphology objective.

Objective	Monitoring Work Item	Monitoring Schedule			Unit Cost	Applicable Alternative		
		Pre	Construction Phase	Post		2	3	4
Geomorphology	Hydrographic /ADCP Survey	X		Year 2 and Year 6	$10,000/sample	X	X	
	AM Feature: modifying the rock structure			If needed	$25,000	X	X	
Island	Public Aerial Imagery & Analysis	X		Year 2 and Year 6	$1,500/sample	X	X	X
	AM Feature: modify revetment			If needed	$15,000	X	X	X
Fish	Fish Sampling	X		Year 2[1]	$6,000/sample	X	X	X
Overall Project	Site Inspections	X		Year 2, Year 6	$1,500/sample	X	X	X

[1] Post-Project sampling would be conducted in the summer and fall at least one year after construction.

Table 3. Estimated Costs (rounded to the nearest $1000) for Monitoring and Adaptive Management for each Considered Alternative

Alt	PED Monitoring Cost ($)	Estimated Monitoring Cost by Year per Considered Alternative ($)											AM Cost ($)
		+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	Post-Construction Monitoring Cost ($)	Years 1-10
1	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2	25,000	0	25,000	0	0	0	13,000	0	0	0	0	**38,000**	**40,000**
3	25,000	0	25,000	0	0	0	13,000	0	0	0	0	**38,000**	**40,000**
4	15,000	0	15,000	0	0	0	3,000	0	0	0	0	**18,000**	**15,000**

Bathymetric Diversity

1) *Objective*: Enhance geomorphic diversity in the study area within the period of analysis.
2) *Applicable Alternatives*: 2 and 3
3) *Monitoring Target:* % of side channel ≥ 8 feet deep
4) *Methodology*: Hydrographic surveys would be conducted upon completion of the Project 2-year post construction to determine base depth conditions and construction compliance. A comparison survey (ISOPACH) survey would be conducted year 6 to map and quantify the amount of side channel habitat greater than 8 feet in depth.
5) *Success Criteria (Desired Outcomes)*: The amount of deep water habitat would be increased over existing for Alternatives 2 and 3. The monitoring target (2 years post-construction) is an increase in % area as compared to pre-project conditions. For Alternative 3, a scour hole should be achieved downstream of the wing bullnose. 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 bullnose chevron (Alternative 2) or the winged bullnose chevron (Alternative 3) are realized and a state of relative equilibrium is reached.
6) *Adaptive Management Trigger and Measure:* If monitoring results indicate an inability to reach success criteria or that by year 6 post construction, >50% of loss of desired deep water habitat compared to year 2 post construction then adaptive management may be warranted. At any point if the rock structure is outflanked then adaptive management would be needed. Adaptive management measures would include modifying the rock structure to improve flow and scour within the project area.

Average Current Velocity

1) *Objective*: Enhance geomorphic diversity in the study area within the period of analysis.
2) *Applicable Alternatives*: 2 and 3
3) *Monitoring Target:* % of project area as slack water
4) *Methodology*: ADCP surveys would be conducted upon completion of the Project 2-year post construction to determine base flow conditions and construction compliance. A comparison analysis would be conducted at year 6 to map and quantify slack water habitat as defined as average current velocity of less than 2.0 feet per second.
5) *Success Criteria (Desired Outcomes)*: Velocities should be enhanced throughout the side channel. For Alternative 3, as water flows through or over the wing-bullnose, it should create large scour holes downstream of the dike similar to that of chevron dikes. Bathymetric surveys will be used to indicate that depth is being maintained in the channel and deep areas have formed around the wing-bullnose. Several high water events may be necessary before the benefits of the wing-bullnose are evident. The amount of slack water habitat would be increased over existing for Alternatives 2 and 3. The monitoring target (2 years post-construction) is an increase in % area of slack water as compared to pre-project conditions. 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 bullnose chevron (Alternative 2) or the winged bullnose chevron (Alternative 3) are realized and a state of relative equilibrium is reached.
6) *Adaptive Management Trigger and Measure:* If monitoring results indicate an inability to reach success criteria or a >50% of loss of desired slack water habitat by year 6 post construction

compared to year 2 post construction then adaptive management may be warranted. At any point if the rock structure is outflanked then adaptive management would be needed. Adaptive management measures would include modifying the rock structure to improve flow and scour within the project area.

Number and Acreage of Islands

1) *Objective*: Maintain island mosaic diversity in the study area within the period of analysis.
2) *Applicable Alternatives*: All
3) *Monitoring Target:* Maintain existing island and acreage
4) *Methodology*: Pre-project aerial surveys are available for numerous years from 1939 to present for the Twin Island complex. Post-project aerial surveys will be compared to pre-project surveys to determine changes in island size and determine if island size is being maintained. The data would be from publically available sources.
5) *Success Criteria (Desired Outcomes)*: The amount of island (number and acreage) would be maintained upon placement of revetment. Island erosion would be reduced.
6) *Adaptive Management Trigger and Measure:* If monitoring results indicate an inability to reach success criteria by year 6 post construction or >50% loss of island acreage compared to year 1 post construction then adaptive management may be warranted. Adaptive management measures would include modifying the revetment along the island heads to reduce erosion.

Native Fish Assemblage

1) *Objective*: Enhance the aquatic ecosystem for native fish in the study area within the period of analysis.
2) *Applicable Alternatives*: All
3) *Monitoring Target:* Increase in abundance (Catch-per-unit-effort) over existing conditions of native fish
4) *Methodology*: Day electrofishing samples would be conducted pre-project and post project to determine fish abundance and composition. Pre-project samples would be conducted during the summer and fall prior to construction. Post-construction sampling would occur during the summer and fall at least 1 year after construction completion to allow fish communities to inhabit the island-side channel complex following construction disturbance.
5) *Success Criteria (Desired Outcomes)*: The maintenance of both islands and the introduction of new habitats are likely to maintain or slightly enhance the existing fish communities. As mentioned previously, the effects on fish communities are likely to be fairly localized. These effects would be difficult to measure outside of the project area. The desired outcome would be in increased abundance of native fish.
6) *Adaptive Management Trigger and Measure:* Due to the mobility of the fish and exterior drivers that effect the fish community no adaptive management triggers have been identified.

Documentation, Implementation Costs, Responsibilities, and Project Close-Out

Documentation, Reporting, and Coordination

The Project Delivery Team will document each of the performed assessments and communicate the results to the Project Manager and sponsor for the Project. Periodic reports will be produced to measure progress towards the project goal and objectives as characterized by the selected performance measures.

Cost

The costs associated with implementing monitoring an adaptive management measures were estimated based on currently available data and information developed during plan formulation as part of the feasibility study. Because uncertainties remain as to the exact Project measures, monitoring elements, and adaptive management opportunities, the estimated costs in Tables 2 and 3 will need refinement in PED during the development of the Detailed Monitoring and Adaptive Management Plans.

Responsibilities

The Corps will be responsible for collecting hydrographic surveys, aerial imagery analysis, and fish surveys. The sponsor and the Corps will be responsible for site inspections and visual observations to assist in overall project success evaluation.

Project Close-Out

Close-out of the Project would occur when it is determined that the Project has successfully met the Project success criteria described above. Success would be considered to have been achieved when the Project objectives have been met, or when it is clear that they will be met based upon the trends for the site conditions and processes. Project success would be based on the following:

- Success criteria met;
- Continued site inspections to determine continued Project status; and
- Continued OMRR&R into the future

Appendix I

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Biological Assessment

U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

BIOLOGICAL ASSESSMENT

Contents

Introduction

The purpose of this Biological Assessment (BA) is to review the *Island and Shoreline Protection Twin Islands (Twin Islands)* project in sufficient detail to evaluate whether the proposed actions may affect any federally threatened, endangered, proposed, or candidate species identified by the U.S. Fish and Wildlife Service (USFWS). This BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act (15 U.S.C. 1536 (c)) and applicable guidance documents. The BA includes the description of the project area, proposed actions, species accounts and status, effects of the proposed actions, and effects determinations.

Project Setting

The U.S. Army Corps of Engineers, St. Louis District, is preparing to implement an ecosystem restoration project at Twin Islands, located within the Alton navigation pool of the Illinois River (river miles 0 to 80) to restore island and side channel habitat. The Project Area contains two islands, Twin Island and Little Twin Island (Figure 1). Both islands are located on the right descending bank of the Illinois River between river miles 37.5 and 37.8 in Greene County between the cities of Kampsville and Pearl, Illinois.

Study Authority

The site-specific evaluation was initiated as a follow on component of the Upper Mississippi River and Illinois Waterway System Navigation Study (Sept 2004), which was a General Investigation study authorized by Section 216 of the Flood Control Act of 1970. Subsequent authorization was received in the Water Resources Development Act (WRDA) of 2007, Title VIII. Section 8004 of Title VIII, authorizes implementation of Ecosystem Restoration projects to attain and maintain the sustainability of the ecosystem of the Upper Mississippi River and Illinois River.

Proposed Action

The USACE is recommending the construction of the Recommended Plan (Figure 2) to restore degraded island and side channel habitat structure, function, and dynamics processes. The Recommended Plan consists of the following restoration measures:

- Construction of a 500-foot total length wing-bullnose upstream of both islands.
- Shoreline revetment along the head of the Little Twin Island

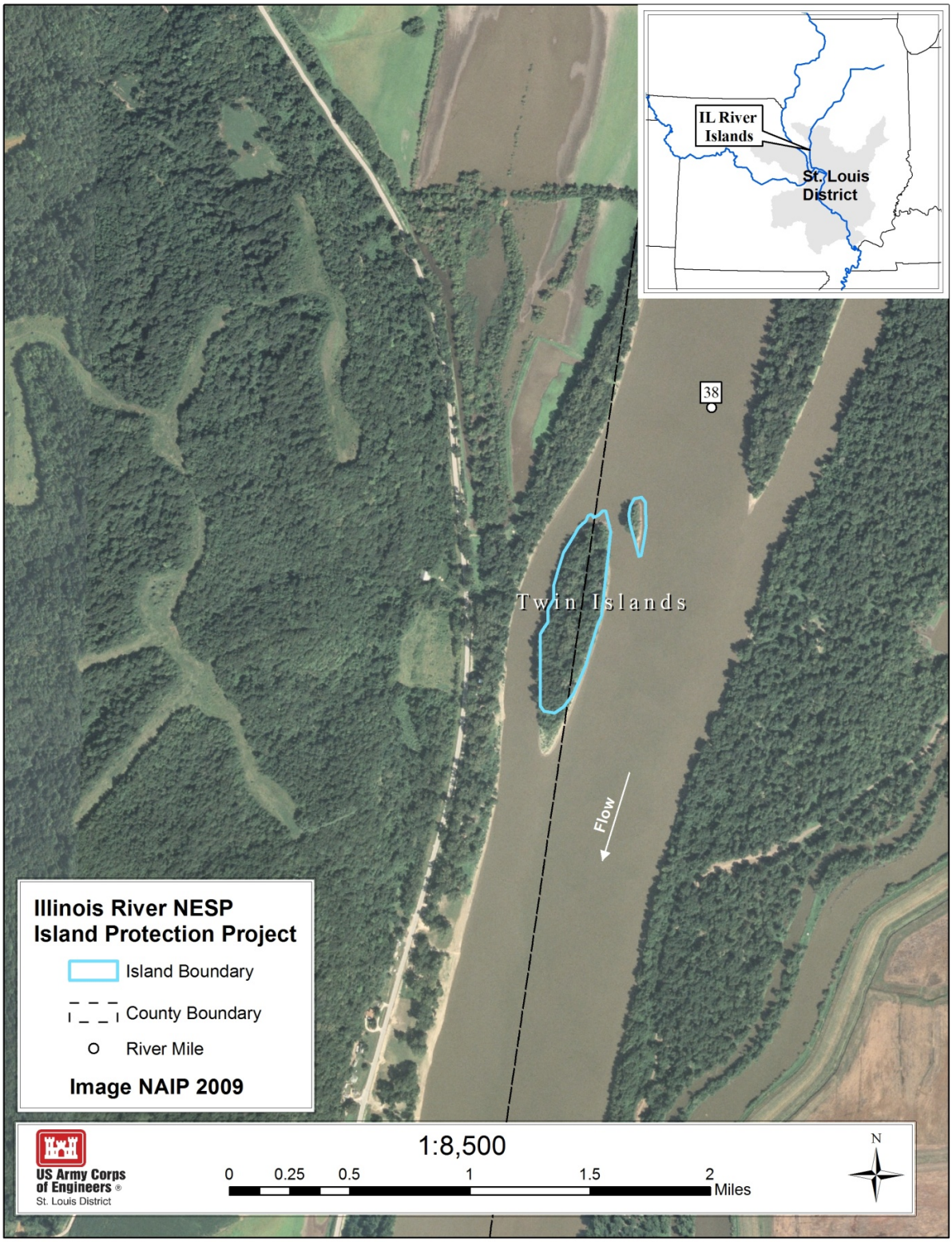


Figure 1. Twin Islands project location and vicinity

Species Covered in this Consultation

The Corps requested the official species via the ECOS-IPaC website (http://ecos.fws.gov/ipac/). U.S. Fish and Wildlife Service provided a list of thee federally threatened and endangered species that could potentially be found in the area (Jersey county, Illinois) via an original letter dated 29 June 2020. The three species, federal protection status, and habitat can be found in Table 1. No critical habitat is located in the proposed Project Area.

Table 1. Federally listed threatened and endangered species potentially occurring in the vicinity of the Project Area.

Species	Status	Habitat
Indiana bat (*Myotis sodalis)*	Endangered	Hibernates in caves and mines; maternity & foraging habitat: small stream corridors with well-developed riparian woods; upland & bottomland forests
Northern long-eared bat (*Myotis septentrionalis*	Threatened	Hibernates in caves and mines; swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
Decurrent false aster (*Boltonia decurrens*)	Threatened	Disturbed alluvial soils

Measures Taken to Avoid Impact to Listed Species

Conservation measures are actions to benefit or promote the recovery of a listed species that a Federal agency includes as an integral part of the proposed action and that are intended to avoid, minimize or compensate for potential adverse effects of the action on the listed species. As such, mandatory measures below will be incorporated into every USACE action that falls within this consultation framework.

Best management practices to reduce siltation during construction activities would be implemented to minimize impacts to water quality and effects to listed aquatic species within the project area.

The proposed activities associated with the Recommended Plan does not require any tree clearing; however, if that changes during final design then all tree clearing resulting from the USACE action will occur during the inactive season from November 1 to March 31 unless presence/probable absence survey results were obtained for the action area through appropriate bat surveys approved by the U.S. Fish and Wildlife Services to minimize effects to currently listed bats within the project area.

Impact Assessment

Indiana Bat (*Myotis sodalis*)

Status

The Indiana bat is a federally listed, endangered mammal species (USFWS, 2016). The range of the Indiana bat includes much of the eastern half of the United States, including Illinois. 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. 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 forest, over clearings with early successional vegetation (old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. Females form nursery colonies under the loose bark of trees (dead or alive) and/or cavities, where each

female gives birth to single young in June or July. A maternity colony may vary widely in size due to time of year, roost switching behavior, thermal conditions, and other factors. Maternity roosts with a few to more than 350 individuals have been reported (Whitaker & Brack, 2002), but typically contain fewer than 100 individuals. A single colony may utilize several roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near 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.

Disturbance and vandalism, improper cave gates and structures, natural hazards, such as flooding or freezing, microclimate changes, land use changes in maternity range, and chemical contamination are the leading causes of population decline in the Indiana bat (USFWS, 2000) (USFWS, 2004). To avoid impacting this species, tree clearing activities should not occur during the period of 1 April to 30 September.

No suitable hibernation habitat exists within the Project Area. Suitable summer foraging habitat exists within the proposed Project Area.

Effects Determination

Direct detrimental effects from implementing the Proposed Project are not anticipated since construction would be performed using water-based equipment and tree clearing is not required. There is minimal chance for indirect effects to Indiana bats through short-term noise disturbance in the foraging and roosting habitat. We conclude the proposed Twin Islands Project ***may affect but is not likely to adversely affect Indiana bat.***

Northern Long-Eared Bat (*Myotis septentrionalis*)

Status

The northern long-eared bat is a federally listed, threatened mammal species (Federal Register 4 May 2015). The northern long-eared bat is sparsely found across much of the eastern and north central United States and spends winter hibernating in caves and mines. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Within hibernacula, they are found in small crevices or cracks (USFWS, 2016a). Northern long-eared bats typically occupy their summer habitat from mid-May through mid-August each year and the species may arrive or leave some time before or after this period. Summer habitat for the northern long-eared bat includes a wide variety of forested/wooded habitats and some adjacent habitats where they roost, forage, and travel for resources. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees >3 inches diameter at breast height. Suitable roost habitat may occur in blocks of forest, linear corridors (i.e. fencerows or riparian forests), and dense or loose clusters of trees with variable amounts of canopy closure. Males and non-reproductive females may also roost in cooler places, like caves and mines. They have also been found, rarely, roosting in structures like barns and sheds (USFWS, 2016a). Foraging occurs in floodplain and upland forests. Forest fragmentation, logging and forest conversion are major threats to the species. One of the primary threats to the northern long-eared bat is the fungal disease, whitenose syndrome, which has killed an estimated 5.7-6.7 million cave-hibernating bats in the Northeast, Southeast, Midwest and Canada between 2006 and 2011.

The Project does not have suitable hibernation habitat, but suitable summer foraging habitat is present in the proposed Project Area.

Effects Determination

Direct detrimental effects from implementing the Proposed Project are not anticipated since construction would be performed using water-based equipment and tree clearing is not required. There is a minimal chance for indirect effects to Northern long-eared bats through short-term noise disturbance in the foraging and roosting habitats. We conclude the proposed Twin Islands Project ***may affect but is not likely to adversely affect Northern long-eared bat.***

Decurrent False Aster (*Boltonia decurrens*)

Status

Decurrent false aster is a federally listed, threatened floodplain perennial plant species that may be found on moist, sandy floodplains and prairie wetlands along the Mississippi and Illinois Rivers. It is dependent on flood pulses or disturbances that eliminate competing vegetation and provide the high light and moist soil conditions needed for seed germination and establishment (Smith & Keevin, 1998). Without disturbance, other plant species can out-compete decurrent false aster and eliminate it in 3 to 5 years from any given area. Species decline is due to several factors including excessive silting of habitat due to topsoil run-off, conversion of natural habitat to agriculture, drainage/development of wetlands, altered flooding patterns, and herbicide use. No critical habitat rules have been published for the decurrent false aster. This species has not been found within the Project Area, but has been found along the Mississippi River in Madison County, Illinois and St. Charles County, Missouri.

Effects Determination

Suitable habitat does not exist within the Proposed Project; therefore, we conclude the proposed Twin Islands Project will have ***no effect on decurrent false aster*.**

List of Preparers

Lane Richter
Wildlife Biologist
U.S. Army Corps of Engineers – Regional Planning & Environmental Division North
St. Louis MO 63013

Dr. Kat McCain
Chief, Environmental Planning Section
U.S. Army Corps of Engineers – Regional Planning & Environmental Division North
St. Louis MO 63013

References

Smith, M., & Keevin, T. (1998). *Achene morphology, production, and germination, and potential for water dispersal in Boltonia decurrens (decurrent false aster), a threatend floodplain species. .* Rhodora, 69-81.

USFWS. (2000). *Biological Opinion for the Operation and Maintenance of the 9-Foot Navigation Channel on the Upper Mississippi River System.* U.S. Fish and Wildlife Service.

USFWS. (2004). *Final Biological Opinion for the Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study.* U.S. Fish and Wildlife Service.

USFWS. (2016, July 19). *Species Profile: Indiana bat (Myotis sodalis)*. Retrieved from USWFW Endangered Species: https://www.fws.gov/midwest/Endangered/mammals/inba/index.html

USFWS. (2016a, September 2). *Northern long-eared bat fact sheet*. Retrieved March 26, 2015, from USFWS Endangered Species: https://www.fws.gov/Midwest/Endangered/mammals/nleb/nlebFactSheet.html

Whitaker, J., & Brack, V. (2002). *"Distribution and summer ecology in Indiana." The Indiana bat: biology and management of an endangered species. .* Austin, TX: Bat Conservation International.

Official Species List – 6 January 2021

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Southern Illinois Sub-Office
Southern Illinois Sub-office
8588 Route 148
Marion, IL 62959-5822
Phone: (618) 997-3344 Fax: (618) 997-8961
http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

In Reply Refer To: January 06, 2021
Consultation Code: 03E18100-2020-SLI-0645
Event Code: 03E18100-2021-E-00357
Project Name: NESP Island and Shoreline Protection (Twin Islands)

Subject: Updated list of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies any federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the Service if they determine their project "may affect" listed species or critical habitat. Under the ESA, it is the responsibility of the Federal action agency or its designated respresentative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with the Service further. Similarly, it is the responsibility of the Federal action agency or project proponent, not the Service to make "no effect" determinations. If you determine that your proposed action will have "no effect" on threatened or endangered species or their respective critical habitat, you do not need to seek concurrence with the Service. Nevertheless, it is a violation of Federal law to harm or harass any federally-listed threatened or endangered fish or wildlife species without the appropriate permit.

Under 50 CFR 402.12(e) (the regulations that implement Section 7 of the Endangered Species Act) the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally. You may verify the list by visiting the ECOS-IPaC website http://ecos.fws.gov/ipac/ at regular intervals during project planning and implementation and

completing the same process you used to receive the attached list. As an alternative, you may contact this Ecological Services Field Office for updates.

Please use the species list provided and visit the U.S. Fish and Wildlife Service's Region 3 Section 7 Technical Assistance website http://www.fws.gov/midwest/endangered/section7/s7process/index.html. This website contains step-by-step instructions which will help you determine if your project will have an adverse effect on listed species and will help lead you through the Section 7 process.

For all wind energy projects and projects that include installing towers that use guy wires or are over 200 feet in height, please contact this field office directly for assistance, even if no federally listed plants, animals or critical habitat are present within your proposed project or may be affected by your proposed project.

Although no longer protected under the Endangered Species Act, be aware that bald eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*) and Migratory Bird Treaty Act (16 U.S.C. 703 *et seq*), as are golden eagles. Projects affecting these species may require measures to avoid harming eagles or may require a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website http://www.fws.gov/midwest/midwestbird/EaglePermits/index.html to help you determine if you can avoid impacting eagles or if a permit may be necessary.

We appreciate your concern for threatened and endangered species. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Southern Illinois Sub-Office
Southern Illinois Sub-office
8588 Route 148
Marion, IL 62959-5822
(618) 997-3344

Project Summary

Consultation Code: 03E18100-2020-SLI-0645
Event Code: 03E18100-2021-E-00357
Project Name: NESP Island and Shoreline Protection (Twin Islands)
Project Type: LAND - RESTORATION / ENHANCEMENT
Project Description: The Twin Islands Ecosystem Restoration Project area is located in Greene County, Illinois, between River Miles (RM) 37.5 and 37.8 Right Descending Bank (RDB). 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 excess erosion. Existing side channel habitat throughout the Illinois Waterway and Middle Mississippi River Systems are gradually being lost due to sedimentation (Simons et al. 1974) and erosion. 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 Twin Islands and their adjacent side channels, in order to increase the ecological integrity of the Illinois River.

The recommended plan would involve constructing a wing-bullnose with revetment on little Twin Island. The plan, if implemented, would result in long term benefits to fish, birds, and other species that utilize the area around the islands. The project would increase scour and depositional diversity, and maintain valuable side channel and island habitat which is a dwindling resource in the Illinois River.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.37978641375099,-90.61878203664727,14z

Counties: Calhoun and Greene counties, Illinois

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Flowering Plants

NAME	STATUS
Decurrent False Aster *Boltonia decurrens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7705	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

01/06/2021 Event Code: 03E18100-2021-E-00357 1

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Correspondence Letter from USACE to USFWS

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

14 August 2020

Regional Planning and
Environmental Division North

Mr. Matthew Mangan
U.S. Fish and Wildlife Service
Ecological Services
Marion Illinois Sub-Office
8588 Route 148
Marion, IL 62959

Dear Mr. Mangan,

The St. Louis District, U.S. Army Corps of Engineers, is submitting the enclosed biological assessment on the potential effects of activities associated with the Navigation and Ecosystem Sustainability Program Island Shoreline Protection Project at Twin Islands (Illinoi River Miles 37.8 to 37.5) in Greene County between the cities of Kampsville and Pearl, Illinois. The Biological Assessment concludes activities associated with the Recommended Plan (i.e., island wing-nose chevron and shoreline revetment on Little Twin Island) may affect but not likely to adversely affect Indiana bat and Northern long-eared bat, and no effect on Decurrent false aster. No critical habitats occur within Project Area.

Pursuant to Section 7 of the Endangered Species Act, as amended, we are requesting your concurrence with these determinations. If you have any questions concerning this submittal, please contact Dr. Kat McCain at (314) 331-8047 or email at Kathryn.mccain@usace.army.mil.

Sincerely,

8/14/2020

X Brian Johnson

Brian Johnson
Chief, Environmental Compliance Branch
Signed by: JOHNSON.BRIAN.LLOYD.1231330336

1 enclosure

Response Letter from USFWS to USACE

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Southern Illinois Sub-Office (ES)
8588 Route 148
Marion, Illinois 62959

FWS/SISO

September 16, 2020

Colonel Kevin R. Golinghorst
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attention: Dr. Kathryn McCain

Dear Colonel Golinghorst:

Thank you for the opportunity to review and comment on the August 2020, Biological Assessment (BA) for the proposed Twin Islands Navigation and Ecosystem Sustainability Program (NESP) Project located between Illinois River miles 37.8 and 37.5, Greene Counties, Illinois. The proposed project involves the construction of a 500-foot wing-bullnose upstream of Twin and Little Twin Islands and shoreline revetment along the head of Little Twin Island to protect and restore approximately 32 acres of island/side channel habitat. These comments are prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*); and, the National Environmental Policy Act (83 Stat. 852, as amended P.L. 91-190, 42 U.S.C. 4321 et seq.).

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. In the BA you provided a list of species which may be present within the proposed project area that includes the Indiana bat (*Myotis sodalis*), threatened decurrent false aster (*Boltonia decurrens*), and threatened northern long-eared bat (*Myotis septentrionalis*). There is no designated critical habitat in the project area at this time.

Information in the BA indicates that suitable habitat does not exist within the proposed project area for the decurrent false aster, thus the Corps has determined that the proposed project will have no effect on the decurrent false aster. This precludes the need for further action on this

project as required under Section 7 of the Endangered Species Act of 1973, as amended for these species.

Information in the BA indicates that no tree clearing is required for the proposed project and that potential effects will be limited to short term noise disturbance, thus the Corps has determined the proposed project is not likely to adversely affect the Indiana bat and northern long-eared bat. Based on this information, the Service concurs that the proposed project is not likely to adversely affect the Indiana bat and northern long-eared bat. Should this project be modified, or new information indicate listed or proposed species may be affected, consultation or additional coordination with this office, as appropriate, should be initiated.

Conclusion

Thank you for the opportunity to provide comment on the BA. For additional coordination, please contact me at (618) 998-5945.

Sincerely,

/s/ Matthew T. Mangan

Matthew T. Mangan
Fish and Wildlife Biologist

cc: IDNR (Atwood, Hayes)

Appendix J

Navigation and Ecosystem Sustainability Program

ISLAND AND SHORELINE PROTECTION – TWIN ISLANDS

GREENE COUNTY, ILLINOIS

Draft Fish and Wildlife Coordination Act

Regional Planning and Environmental Division North
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

U.S.ARMY

Draft FWCA Report

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Southern Illinois Sub-Office (ES)
8588 Route 148
Marion, Illinois 62959

FWS/SISO

October 23, 2020

Colonel Kevin R. Golinghorst
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attention: Dr. Kathryn N.S. McCain, CEMVS-PM-E

Dear Colonel Golinghorst:

This letter constitutes our Draft Fish and Wildlife Coordination Act Report (Report) for the Twin Islands Navigation and Ecosystem Sustainability Program (NESP) Project located between Illinois River miles 37.5 and 37.8 within the Alton Pool, in Greene County, 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 (IDNR) and their concurrence is noted.

Introduction

The Upper Mississippi River – Illinois Waterway System Navigation Study was completed in September 2004 and recommended the dual purposes of ensuring a sustainable natural ecosystem and navigation system. The Navigation and Ecosystem Sustainability Program (NESP) was later authorized by the Water Resources Development Act (WRDA) of 2007. The Twin Islands Project is a component of the NESP and addresses restoration of approximately 32 acres of island and riverine habitats in the Lower Illinois River and the sponsor for the project is the IDNR.

Threatened and Endangered Species

The Service has reviewed the August 2020, Biological Assessment (BA) for proposed project. In our September 16, 2020 response letter, we concurred that proposed project is not likely to adversely affect any known federally listed threatened or endangered species.

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 and loss of islands. Overall, the estimated number of side channels in the Illinois River declined from 94 in 1903 to 57 in 2007 and the estimated length of side channels in miles 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 throughout the Illinois River. In the Alton Pool, the estimated number of side channels declined from 23 in 1903 to 18 in 2007 and the estimated length of side channels in miles 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 Twin Islands, navigation induced shoreline erosion and sedimentation has led to island loss and degraded aquatic habitats. In particular, the loss of the island and subsequent off-channel areas has led to degraded habitat for native fishes. In addition, the hydrologic regime and sedimentation patterns of the Illinois River have been altered over the past 150 years (USACE 2007) as a result of navigation system development as well as levee construction. This has brought about the stabilization of the channel and has contributed to loss of aquatic habitat diversity.

The primary habitat problem in the area is loss of islands due to navigation induced shoreline erosion and associated sedimentation. An opportunity exists to restore and maintain the degraded islands and aquatic habitat in the study area in order to increase the ecological integrity of the Illinois River.

Goals and Objectives

The goal of the Twin Islands Project is to restore aquatic and island ecosystem resources within the project area to benefit fish and wildlife resources. To achieve this goal a planning team of biologists from the U.S. Army Corps of Engineers (Corps) and Illinois Department of Natural Resources developed the objectives for the project.

The objectives include the following:

- Objective 1: Enhance geomorphic diversity in the study area within the period of analysis.
- Objective 2: Maintain island mosaic diversity in the study area within the period of analysis.
- Objective 3: Enhance the aquatic ecosystem for native fish in the study area within the period of analysis.

The goals and objectives of the Twin Islands Project fit well into the system wide objectives for the Upper Mississippi River System which includes the Illinois River (Galat et al., 2007). The system wide objectives include management for:

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

The goals and objectives of the Twin Islands Project also address needs of the lower Illinois River identified in the Habitat Needs Assessment II (McCain, Schmuecker, & De Jager, 2018). The needs for the lower Illinois River include:

- Restore floodplain functional classes (including islands and side channels)
- Reduce sedimentation (improve total suspended solids)
- Restore deep, lentic and lotic habitats
- Restore open water areas
- Increase off-channel and floodplain lentic areas
- Restore aquatic vegetation
- Restore floodplain topographic diversity and associated flooding periods
- Reduce variability in water surface elevations
- Restore floodplain vegetation diversity

Proposed Project Features

To achieve the project objectives, several project plans/features were evaluated. The recommended plan (alternative 3) consists of the following:

- Construction of a 500-foot total length wing-bullnose upstream of the island heads.
- Construction of 300-foot revetment on the head of Little Twin Island

This plan maintains and restores approximately 32 acres of island by forcing flows away from the island heads and thus reducing shoreline erosion. In addition, slower pooled water would form upstream of the downstream wing- bullnose creating slack water habitat needed by native fishes and improved flows and depth within the side channels will help maintain and improve habitat diversity within the project area.

Methodology to Evaluate Alternatives

The Twin Islands Project was analyzed using the Habitat Evaluation Procedures (HEP). The target species for the HEP included the striped bass. Existing conditions, future without project

conditions and future with project conditions were examined. This analysis was conducted by the Corps.

The utilized evaluation models produced a rating of habitat quality for each respective habitat type. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing and future habitat conditions compared to optimum habitat which is 1.0. This value, when multiplied by the available habitat within the project area, will provide a measure of available habitat quality and quantity known as habitat units (HUs). Average annual habitat units (AAHUs) for each species are typically calculated to reflect expected habitat conditions over a 50-year project life.

Existing, Future without, and Future with Project Conditions

A number of assumptions were made as to what the project area and vicinity would be like in the future with and without the project and can be found in Appendix B of this report.

Side Channel

Habitat suitability for the striped bass improved with the project, while without the project the habitat suitability declined (Table 1). Habitat quality for the striped bass improved with the project due to improved current velocity during the spawning time period. Velocity would initially decline with installation of the bullnose and would increase slightly over time with increased scour around the structure but would remain optimal. Without the project, Twin Islands would continue to erode, and more habitat would convert to main channel habitat. This will cause the current velocity during the spawning time period to increase and result in less optimal conditions and lower HSI scores. The proposed project results in a net increase of 8.44 habitat units (Table 2; Appendix C, USACE 2020).

Conclusions and Recommendations

According to the Incremental Cost Analysis, the preferred alternative is tied for highest in cost per AAHU output compared to the other alternatives including the no action alternative. A large portion of the cost for the preferred alternative is attributable to construction of the wing-bullnose structure and revetment. There are currently limited opportunities to implement side channel restoration and island restoration projects in this portion of the Illinois River. The original *Upper Mississippi River System Habitat Needs Assessment* (Theiling, et al., 2000) emphasized the need for side channel and island restoration in the Upper Mississippi River System and the *Habitat Needs Assessment II* (McCain, et al., 2018) identified the need to reduce sedimentation. restore deep, lentic and lotic habitats, and increase off-channel areas within this portion of the Illinois River. This plan restores approximately 32 acres of island and side channel habitat within the project area. Additionally, it is very difficult to capture the full benefits associated with island/side channel projects. We believe that the ecosystem benefits of island and side channel restoration extend beyond the project area for both aquatic and terrestrial species. We fully support the alternative because it would restore a component of habitat diversity in this portion of the Illinois River.

Overall, the proposed project (Alternative 3) will be beneficial to the Illinois River and biota dependent upon the river by protecting the islands, reducing side channel sedimentation, and improving habitat quality and diversity 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 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. The proposed Twin Islands Project will be beneficial to a variety of fish and wildlife resources. The Service fully supports the proposed Twin Islands NESP Project.

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. If you have questions, please contact me at (618) 998-5945.

Sincerely,

/s/ Matthew T. Mangan

Matthew T. Mangan
Fish and Wildlife Biologist

cc: IDNR (Atwood)
MDC (Vitello)

Attachments: Table 1
Table 2
Appendix A – Literature Cited
Appendix B – Assumptions

Table 1. Habitat Suitability Index (HSI) scores for Existing, Future with Project (Year 1,5,25 and 50) and Future without Project (Year 1,5,25 and 50), Twin Islands Project.

Habitat Type	Species	Existing	Future With				Future Without			
		0	1	5	25	50	1	5	25	50
Island/Side Channel	Striped Bass	0.78	1.00	1.00	1.00	1.00	0.78	0.78	0.73	0.68

Table 2. Habitat Units for Future with Project (Year 50) and Future without Project (Year 50), Twin Islands Project. Net change is the difference between Future with Project and Future without Project.

Habitat Type	Species	Future With	Future Without	Net
Island/Side Channel	Striped Bass	31.93	21.76	8.44

APPENDIX A

Literature Cited

Galat , D., Barko, J., Bartell, S., Davis, M., Johnson, B., Lubinski, K., . . . Wilcox, D. (2007). *Environmental Science Panel Report: Establishing System-wide Goals and Objectives for the Upper Mississippi River System.* U.S Army Corps of Engineers, Rock Island District, St. Louis District, St. Paul District: Rock Island, Illinois, St. Louis, Missouri, St. Paul, Minnesota

McCain, K.N.S., S. Schmuecker, and N.R. De Jager *2018.* Habitat Needs Assessment-II for the Upper Mississippi River Restoration Program: Linking Science to Management Perspectives. U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL

Theiling, C. H., Korschgen, C., DeHaan, H., Fox, T., Rohweder, J., & Robinson, L. (2000). *Habitat Needs Assessment for the Upper Mississippi River System Technical Report.* La Crosse, WI: U.S. Geological Survey, Upper Midwest Environmental Sciences Center.

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

USACE (U.S. Army Corps of Engineers). 2020. Navigation and Ecosystem Sustainability Program, Performance Implementation Report with Integrated Environmental Assessment, Island and Shoreline Protection – Twin Islands Project. U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.

APPENDIX B

Assumptions

Certain assumptions were made regarding existing and future conditions during the habitat analysis. Taken from Appendix C (Habitat Evaluation and Quantification) of the Project Implementation Report (USACE 2020).

Baseline condition: Gage data were collected from the USGS Valley City gage. These data were used to estimate velocity (centimeters per second). The team used USACE data (from 1993 to 2018) from the Upper Mississippi River Restoration Program Long Term Resource Monitoring Pool 26 water quality data set to estimate temperature and dissolved oxygen.

Future Without Project Condition: Future conditions of the aquatic habitat assumed temperature and dissolved oxygen would remain similar to baseline conditions and were held constant through the period of analysis. This assumption was made due to the size of the project area compared to the lower Illinois River. It was assumed that velocities would increase downstream of the Little Twin Island due to the continued erosion and the habitat converting to more main channel habitat.

Future With Project Condition: The team assumed that temperature and dissolved oxygen would not differ among proposed action alternatives and be similar to the baseline conditions throughout the entire period of analysis; however, it was assumed that velocity would differ among the proposed action alternatives (Table 2).

Table 2. Future with Project Velocity Assumptions

Alternative	Assumption
2 – Single bullnose with revetment	The bullnose that spans both islands would decrease velocities between and downstream of the islands. By year 25 and 50, velocities would increase due to scour downstream of bullnose
3 – Unrooted wing-bullnose with revetment	The winged bullnose would decrease velocities between and downstream of the islands. By year 25 and 50, velocities would increase due to scour downstream of bullnose
4 – Revetment only on island head	Assumed minimal decrease in velocity initially, but through time would likely return to baseline conditions.

Comments Received on Draft FWCA

From: Atwood, Butch
To: Matthew Mangan
Cc: McCain, Kathryn N S (Kat) CIV USARMY CEMVP (USA); McGuire, Benjamin M CIV USARMY CEMVP (USA); Vitello, Matt; Glover, Dave; McClelland, Nerissa
Subject: [Non-DoD Source] Re: [EXTERNAL] Revised main report for NESP Twin Report
Date: Wednesday, October 21, 2020 4:05:12 PM

Matt,

We have reviewed the Draft Fish and Wildlife Coordination Act Report for the Twin Island NESP Project, Illinois River, Green County, Illinois.

We concur with your conclusions and recommendations and believe the project will benefit the Mississippi River System and associated biota by improving habitat quality in this reach of the Illinois River.

Thank you for the opportunity to review and comment on the Draft Report.

Butch