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

REPLY TO
ATTENTION OF:

19 May 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 Moore's Towhead Systemic Environmental Mitigation Plan with Integrated Supplemental Environmental Assessment." The mitigation project is located on the right descending bank of the Illinois River (River mile 76.2) in Brown County, Illinois. The draft report addresses the mitigation objectives of increasing sheltered habitat structures for lotic fishes and reducing the effects of wave action and slow bank erosion in areas at risk due to incremental increase in commercial navigation. The report describes alternatives and identifies a tentatively selected mitigation 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 because of this public review have been carefully considered.

An electronic version of the draft report, titled "Navigation and Ecosystem Sustainability Program Moore's Towhead Systemic Environmental Mitigation Plan with Integrated Supplemental Environmental Assessment" and appendices are available online at:

https://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/MooresMitigationPlan.pdf

You are welcome to comment on the content of the draft report. To submit a public comment please contact Dr. Kathryn McCain of our Environmental Planning Section, telephone 314-331-8047, or email at Kathryn.McCain@usace.army.mil. For general project inquiries, please contact Mr. Shane Simmons of our Project Development Branch, telephone (314) 408-9788, or email at Shane.M.Simmons@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 (Simmons)
1222 Spruce St.
St. Louis, MO 63103-2833

The 30 day comment period runs from May 19 2021 through June 17, 2021. Due to COVID-19 concerns, a public meeting will not be held.

Sincerely,

Brian Johnson

Brian Johnson
Chief, Environmental Compliance Branch

Navigation and Ecosystem Sustainability Program

Moore's Towhead Systemic Environmental Mitigation Plan with Integrated Environmental Assessment

FISHERIES AND BANK EROSION

ILLINOIS RIVER MILE 76.2

BROWN COUNTY, ILLINOIS

May 2021

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

Moore's Towhead Systemic Environmental Mitigation Project with Integrated Environmental Assessment

Illinois River (RM 76.2 RDB), Brown 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 Integrated Mitigation Project and Environmental Assessment (IMP/EA) dated **DATE OF IMP/EA**, for the Moore's Towhead Systemic Environmental Mitigation Project addresses fisheries and bank erosion mitigation opportunities and feasibility in the Illinois River, Brown County, Illinois.

The Final IMP/EA, incorporated herein by reference, evaluated various alternatives that would mitigate bank erosion and fisheries habitat in the study area. The recommended plan is the best buy plan, preferred by stakeholders, and includes:

- Construction of 300-foot bullnose chevron at island head
- Construction of 700-feet of on-bank revetment
- Construction and placement of 3 woody bundles between island head and bullnose

In addition to a "no action" plan, three alternatives were evaluated. The alternatives included:

- Alternative 2: on-bank revetment only (not carried forward due to failing to meet the fisheries mitigation requirement)
- Alternative 3: bullnose with on-bank revetment and 3 woody bundles (recommended plan)
- Alternative 4: bullnose with off-bank revetment and 5 woody bundles

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	☒	☐	☐
Wetlands & Floodplains	☒	☐	☐
Water Resources	☒	☐	☐
Soils (Prime Farmland)	☐	☐	☒
Fish & Wildlife	☒	☐	☐
Federally listed species	☒	☐	☐
Invasive Species	☐	☐	☒
Cultural & Historic Resources	☒	☐	☐
Air Quality	☒	☐	☐

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Noise	☒	☐	☐
HTRW	☒	☐	☐
Socioeconomic 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 IMP/EA in Chapter 3 will be implemented, if appropriate, to minimize impacts.

No compensatory mitigation is required as part of the recommended plan, since the proposed action is mitigation for the implementation of the navigation efficiency measures as described in the Navigation Study (USACE, 2004).

Public review of the draft IMP/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 IMP/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, Eastern Prairie Fringed Orchid, or Prairie Bush-Clover.

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.

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 IMP/EA. The Recommended Plan would meet the conditions of the Corps 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 Golinghorst

Colonel, Corps of Engineers

District Commander

Navigation and Ecosystem Sustainability Program

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT WITH INTEGRATED L ENVIRONMENTAL ASSESSMENT

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*Denotes required NEPA sections following NEPA 2020

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MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION

1 INTRODUCTION: PURPOSE & NEED FOR ACTION*

1.1 Background & Prior Report

The U.S. Army Corps of Engineers (USACE) prepared a Final Integrated Feasibility Report and Programmatic Environmental Impact Statement (PEIS) for the Upper Mississippi River – Illinois Water ways (UMR-IWW) System Navigation Feasibility Study (Navigation 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 Navigation Study characterized significant resources and associated adverse impacts and provided the mitigation formulation strategies for implementation of navigation efficiency measures. The Adaptive Mitigation Plan for the Navigation Study (Chapter 10; USACE, 2004) included two mitigation components. The first component was the mitigation for the site-specific impacts from construction of a navigation efficiency measure (e.g., lock expansion construction footprint, mooring cell, etc.). The second component is mitigation for the impacts because of an incremental increase in navigation traffic on the system (systemic environmental mitigation). The five major parts of the systemic environmental mitigation include: fisheries, submersed aquatic plants, bank erosion, backwater and secondary channel sedimentation, and historic properties. The mitigation project at Moore's Towhead is proposed under the second component of the mitigation plan for the Navigation Study for bank erosion and fisheries (USACE, 2004).

1.2 Systemic Mitigation Planning Objectives

The system (non-site-specific) component of the Adaptive Mitigation Plan (Chapter 10; USACE, 2004) was based upon the concept of incremental traffic. Incremental traffic is defined as the expected increase in traffic that would occur over time because of the construction or implementation of a navigation efficiency measure. The Navigation Study's environmental impact assessment focused on assessing the effects to resources of concern of the projected incremental increase in traffic; therefore, the mitigation centered around the additive or synergistic detrimental effect of increased commercial traffic on the biological and cultural resources of the UMR-IWW System, and included: fisheries, submersed aquatic plants, bank erosion, backwater and secondary channel sedimentation, and historic properties. Moore's Towhead was identified for fisheries and bank erosion mitigation.

Fisheries Systemic Mitigation Planning Objective: For fish that are vulnerable to propeller entrainment the increased traffic would have adverse impacts. The Navigation Study (USACE, 2004) identified the following mitigation planning objective to offset these impacts:

Increase sheltered habitat structure for lotic fish throughout the UMR-IWW System

Bank Erosion Systemic Mitigation Planning Objective: For bank erosion, that main habitat type identified for protection was islands. Bank erosion would result in the loss or dissection of islands. The Navigation Study (USACE, 2004) identified the protection of island heads because these areas were potentially more vulnerable to prop wash and other navigation effects. The Navigation Study (USACE, 2004) identified the following mitigation planning objective to offset these impacts:

Reduce the effects of wave action and stop or slow erosion in areas identified as at risk from an incremental increase in commercial navigation

1.2.1 Systemic Mitigation Requirements and Units of Output

The Navigation Study (USACE, 2004) conducted numerous modeling and research efforts to quantify the mitigation needs due to the incremental increase in navigation. The quantity of fisheries and bank erosion mitigation measures was based upon traffic forecasts for each reach of the UMR-IWW System and summarized in Table 1-1.

Per USACE guidance (PGN-Appendix C), the output of mitigation plan increments shall be described in the same units of measurements used to calculate specific ecological losses, and used in defining mitigation planning objectives; therefore, the outputs of the Moore's Towhead mitigation plan used the same increments as provided in Table 1-1.

Table 1-1. Summary of fisheries and island bank erosion mitigation requirements by river reach. Row highlighted in yellow is applicable for Moore's Towhead (taken from Table 10-2 and Section 10.5.4.3 of the Navigation Study; USACE, 2004).

River Reach	Fisheries Requirements			Island Bank Erosion Requirements		
	Measure	Qty.	Unit	Measure	Qty.	Unit
Upper St. Anthony – Pool 3	Large Woody Debris anchor (LWD)	575	Structures	Island bank protection	10,552 (10% of total areas identified)	Feet
Pools 4-8	LWD Backwater dredging	250 5	Structures Acres			
Pools 9-15	Backwater dredging Modified pile dike LWD Dike alterations Gravel bar	20 10 1000 30 60	Acres Structures Structures Structures Acres			
Pools 16-27	Fish nursery area Backwater dredging Modified pile dike LWD Dike alterations Side channel restoration Gravel bar	180 25 5 770 30 50 40	Acres Acres Structures Structures Structures Acres Acres			
Open River	Modified pile dike Dike alterations	10 10	Structures Structures			
Lower IWW	Side channel restoration LWD	130 250	Acres Structures	Island bank protection	18,301 (100% of total areas identified)	Feet
Middle IWW	Side channel restoration LWD	55 250	Acres Structures			
Upper IWW	Side channel restoration	30	Acres			

1.2.2 Systemic Mitigation Site Identification

The Navigation Study (Chapter 8; USACE, 2004) identified bank erosion sites based on review of scientific and GIS databases, field survey, and coordination with State and Federal resource managers. These efforts were able to identify areas affected by increased navigation and measured by lineal feet of affected area. All existing islands along the IWW were identified, including Moore's Towhead.

1.3 Purpose of Report

The purpose of this report is to describe and evaluate the site-specific mitigation plan with an integrated Environmental Assessment (EA) to minimize bank erosion and enhance fisheries resources at Moore's Towhead. This will tier[1] from the PEIS and incorporate by reference the Navigation Study (USACE, 2004).

1.4 Authority

The site-specific EA for Moore's Towhead is a tiered component to the Navigation Study (USACE, 2004), which was a General Investigation study with an integrated PEIS 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.

This site-specific mitigation plan was developed in accordance to the Assistant Secretary of the Army Civil Works Director's Memo dated 2 August 2019, *Approval of updated mitigation planning language in the Planning Guidance Notebook Environmental Compliance,* and the Adaptive Mitigation Plan as outlined in Chapter 10 of the Navigation Study (USACE, 2004).

1.5 Proposed Action*

The USACE, St. Louis District, proposes to reduce bank erosion and enhance fisheries habitat at Moore's Towhead, which was a previously selected location, to mitigate systemic (non-site-specific) impacts from the incremental traffic increase due to construction or implementation of UMR-IWW navigation efficiency measures.

1.6 Location

Moore's Towhead is an island complex located on the right descending bank at river mile 76.2 of the Illinois River (Alton navigation pool), 4.5 miles north of Meredosia, Illinois in Brown County. The study area (approximately 17 acres) includes the upper island of the complex (approximately 2 acres of island habitat) and the surrounding aquatic habitat (approximately 15 acres) which were identified in the Navigation Study for being impacted by navigation induced bank erosion and provide an opportunity to enhance fisheries habitat (Figure 1-1). The lands of Moore's Towhead are owned by The Nature Conservancy.

1.7 Purpose & Need for Action*

Purpose: The USACE, St. Louis District, proposes a small-scale mitigation project for bankline erosion and fisheries resources at Moore's Towhead as part of the systemic mitigation plan described in the Navigation Study (USACE, 2004).

Need: The need for mitigation is documented in the Navigation Study (Chapter 10; USACE, 2004). Moore's Towhead was identified as a mitigation area through a system-wide field survey (Bhowmik, et al., 1999) and evaluation of these areas through comparison of geospatial databases containing information on land cover, historic properties, and threatened and endangered species (Landwehr & Nakato, 1999). Islands are rare on the Illinois River; and therefore, the Navigation Study (USACE, 2004) identified the need to protect 100% of existing islands.

[1] Tiering is the use of an umbrella or PEIS to address broad environmental matters such as descriptions of the environmental settings and general types of impacts associated with the overall action. The PIES is then followed later (tiered off) by several site-specific National Environmental Policy Act (NEPA) documents. The intent of tiering is to eliminate repetitive discussions and to focus on the unique issues at each level of the environmental review.

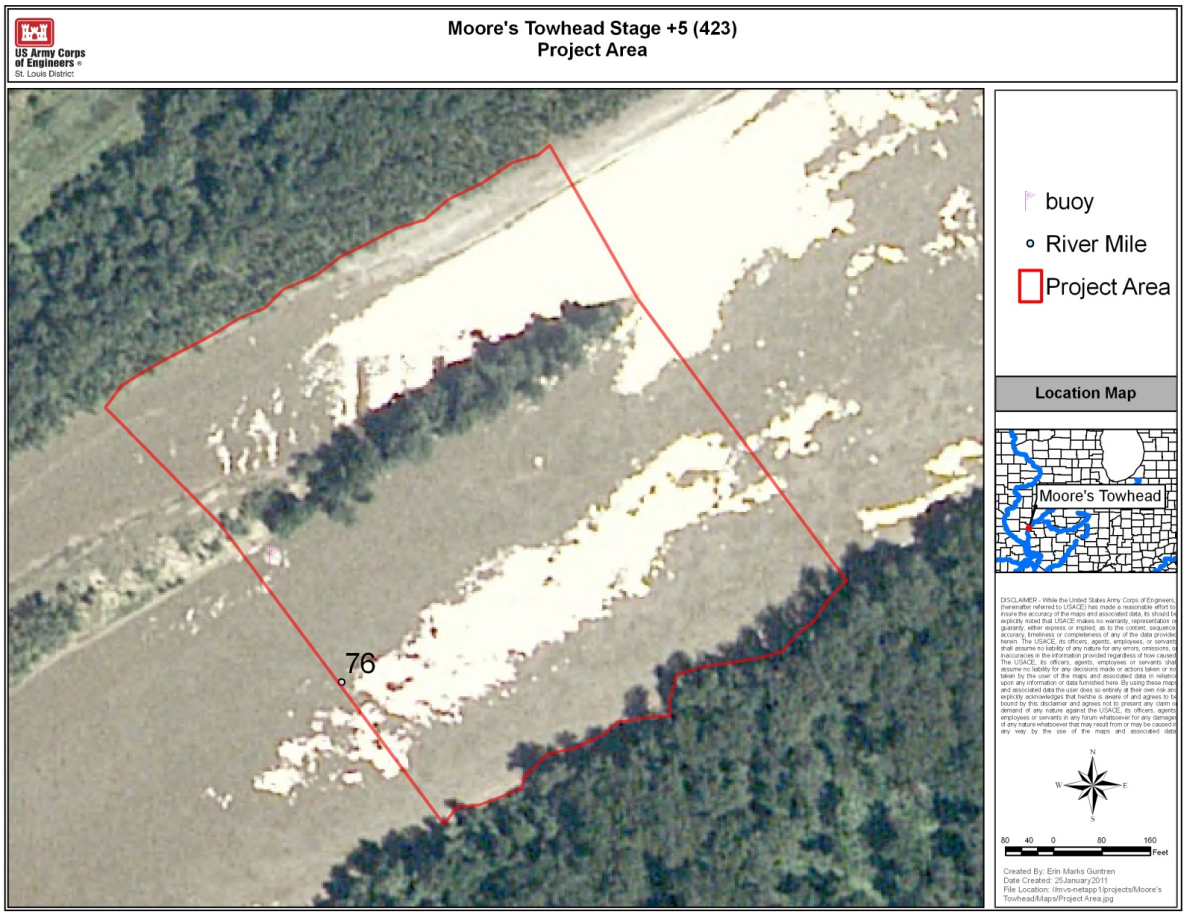

Figure 1-1. Moore's Towhead Project Area

2 ALTERNATIVE FORMULATION*

This section summarizes the adaptive mitigation plan formulation performed during the Navigation Study (Chapter 10, USACE, 2004), and describes the reasonable alternatives, including the No Action Alternative, that meet the purpose and need of the proposed action at Moore's Towhead.

2.1 UMR-IWW Mitigation Plan Formulation Summary

The Navigation Study (USACE, 2004) characterized significant resources and associated adverse impacts, described potential avoid, minimize and mitigation measures, and provided mitigation cost estimates for implementation of navigation efficiency measures. Mitigation strategies were developed to support the National Economic Development (NED) analysis. Through the Navigation Study planning process, it was identified early on that a policy of adaptive management for creating a mitigation strategy must be used to address and resolve the complex assortment of ecological needs and objectives within the UMR-IWW. Through this mitigation strategy, it was expected that individual measures would change with time, but the need to mitigate for specific components of the plan at the locations described within Chapter 10 of the Navigation Study (USACE, 2004) would remain constant. The mitigation plan for the Navigation Study consisted of two main components. The first component is the mitigation for site-specific impacts from construction of measures. The second component is mitigation for the impacts because of an incremental increase in navigational traffic on the system. This mitigation strategy was based on numerous internal discussions and coordination with the Navigation Environmental Coordination Committee (NECC) from 1997 to 2004. The plan describes appropriate mitigation based upon adverse ecological effects of the recommended alternative identified through scientific study and consultation with regional experts. The Navigation Study strategy involved staged mitigation and includes site-specific mitigation coinciding with construction of moorings, lock extensions, and switchboats; and systemic environmental mitigation resulting from incremental increase in navigation traffic (USACE, 2004).

2.1.1 Fisheries: Systemic Mitigation Measures

Section 10.5.1.1 of the Navigation Study describes in detail the systemic mitigation measures considered for fisheries and are only summarized here. The Navigation Study identified large woody debris structures, fish nursery areas, and gravel bar creation as measures that would meet the fisheries mitigation objective. Site-specific conditions at Moore's Towhead were suitable only for the large woody debris structures; therefore, fish nursery areas and gravel bar creation were not considered further.

1) Large woody debris structures are bundles of large woody debris to increase habitat diversity in the main channel border habitat. These woody structures would improve habitat by placement of the wood itself (many fish species are attracted to structure in the water as areas of cover, reproduction or forage), through the creation of localized scour holes below the bundles, and through the collection of organic debris, like leaves and drifting wood, which in turn provide a fertile food bed for aquatic insects. The following large woody structure measures were evaluated and considered:

   Anchored Large Woody Debris Bundles (Anchored Woody Bundles): The large woody debris structures (also referenced as woody bundles), would interlock existing large woody debris into bundles using cable and anchored to the riverbed. Log bundles would be placed in groups of three at a given location. At the time of the Navigation Study (USACE, 2004) this was identified as the preferred method and used to quantify the mitigation requirement as summarized in Table 1-1 above.

Modified Pile Dike: This measure entails logs being driven into a loosely structured line perpendicular to the bank, with logs staggered within the line. Due to uncertainty with constructability this measure was not carried forward for Moore's Towhead.

2) Fish nursery areas include manipulating moist soil management units to maximize benefits for production of larval and juvenile fish. Various management strategies could be employed based on site-specific conditions to artificially raise and lower water levels.
3) Gravel bar creation involves construction of riffle gravel bars with various rock sizes using various construction techniques with dike alteration and gravel placement.

2.1.2 Bank Erosion: Systemic Mitigation Measures

The Navigation Study (Chapter 10; USACE, 2004) identified the following significant resources that would be affected by bankline erosion: significant species (*i.e.*, eagle nests, heron rookeries, or listed species), floodplain forest, islands, social resources, and historic properties. The following mitigation measures for bank erosion were considered to meet the mitigation planning objective:

1) Non-structural measures included vegetative bank stabilization in conjunction with traditional bank protection methods based on individual site assessments
2) Structural measures included bank protection and offshore revetments.

2.2 Moore's Towhead Site-Specific Mitigation Plan Formulation

2.2.1 Conceptual Model

Development of a conceptual model aided the identification of site-specific resource problems related to incremental increase in navigation traffic and illustrates the interactions amongst drivers, primary stressors, 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 (USACE, 2011). For Moore's Towhead, the primary stressors from the incremental increase in navigation traffic are propeller entrainment which directly affects biota (*i.e.,* lotic fish) and bank erosion which directly affects aquatic habitat and geomorphology by eroding the shoreline and loss of microhabitats and islands.

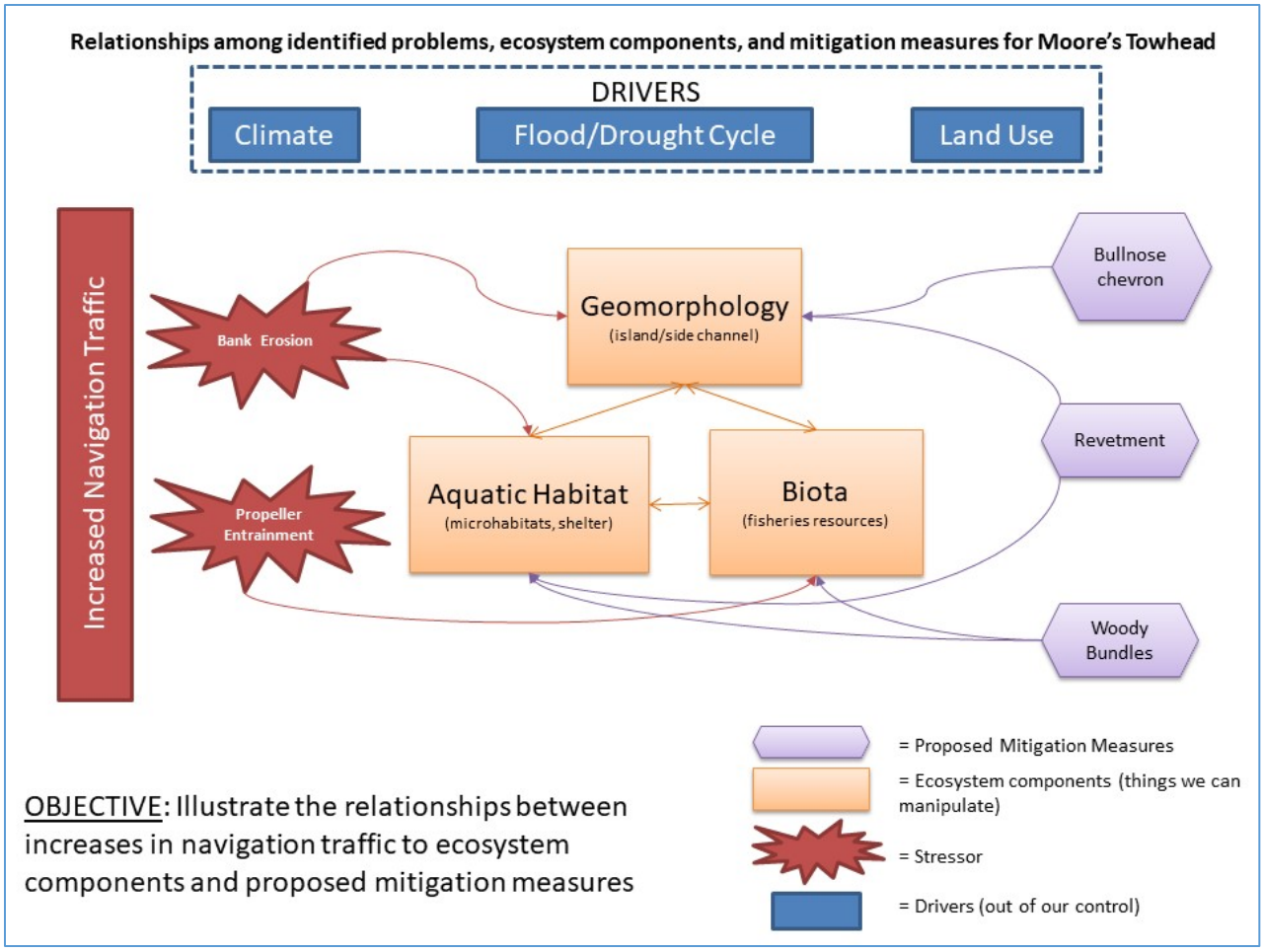

Figure 2-1. Conceptual Model for Moore's Towhead

2.2.2 Site-Specific Mitigation Measures Considered

For Moore's Towhead, Table 2-1 lists the systemic mitigation measures for fisheries and bankline erosion considered to meet the systemic mitigation planning objectives. Measures considered included:

- Non-structural. Non-structural approaches to bank stabilization include re-planting with native vegetation. This measure was found to be infeasible due to the site conditions not being conducive for vegetation establishment (e.g., steep banks, high current velocities, high wave action); therefore, not carried forward for further evaluation.
- Revetment. 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.
- Off-bank Revetment. Off-bank revetments are created by placing a parallel structure of stone a small distance from the eroding bankline. In doing so, erosion is reduced, and diverse habitats are maintained. In some areas, the revetment is notched allowing fish to move between the fast water in the main river channel and the slower water behind the off-bank revetment. The area between the bankline and the revetment is a prime fishing location.
- Off-bank Bullnose Protection. Bullnose protection is a horseshoe shaped line of rock traditionally placed upstream of eroding islands to halt erosion. 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.

- Anchored Woody Bundles. Wood logs are tied together and sunk in the water with an anchor. Woody bundles can be incorporated with any of the above measures to provide additional favorable fish habitat.

Table 2-1 Summary of Considered Site-Specific Mitigation Measures

Measure	Fisheries	Bank Erosion	Retained?
Vegetative Plantings (non-structural)		X	No
On-bank Revetment		X	Yes
Off-bank Revetment	X	X	Yes
Off-bank Bullnose Protection	X	X	Yes
Anchored Woody Bundles	X		Yes

2.3 Site-Specific Alternative Mitigation Plans

Through coordination with The Nature Conservancy (island landowner), Illinois Department of Natural Resources (state permit agency), U.S. Fish and Wildlife Service (federal partnering agency) and USACE, the following formulation strategies were used to combine measures into the reasonable alternatives to meet the systemic mitigation planning objectives:

Mitigation Alternative 1: No Action. The "No Action" plan means no mitigation measures for bank erosion or fisheries resources would be implemented by USACE.

Mitigation Alternative 2: Maximized Bank Protection. Approximately 850 feet of revetment would be placed on the bank line to the ordinary high water mark. This revetment would wrap around the head of the island and extend along the main channel side bank (Figure 2-2). No anchored woody bundles are included. Since this alternative did not meet the mitigation planning objective for fisheries, it was not moved forward for further analysis.

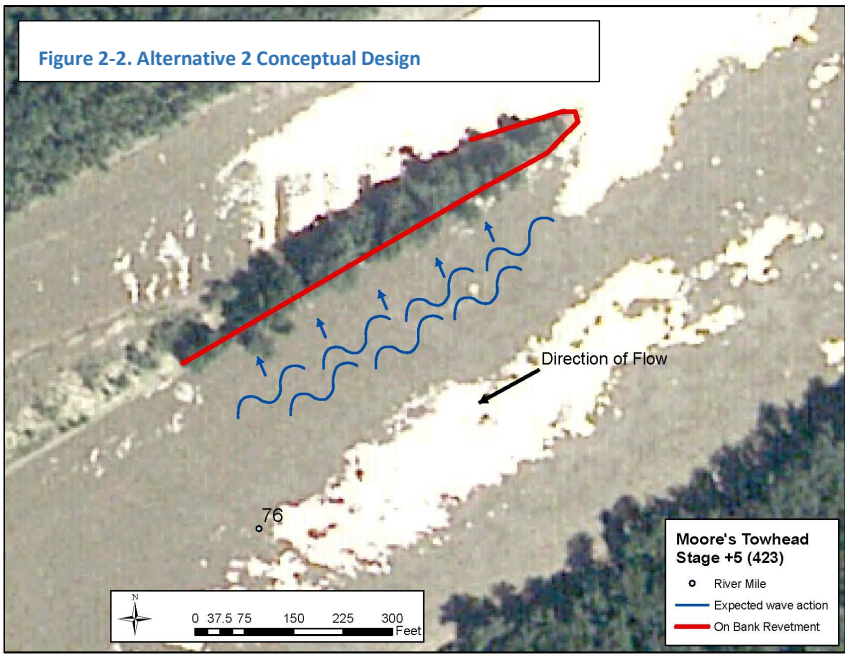

Figure 2-2. Alternative 2 Conceptual Design

Mitigation Alternative 3: Efficiency (Off-bank bullnose with on-bank revetment + wood). A 300-foot bullnose chevron would be placed approximately 50 feet off the island head to an elevation of 428 feet (NAVD88). To reduce bank erosion along the main channel side of the island, 700 feet of on-bank revetment would be placed to the ordinary high water mark. The bullnose plus revetment provides 1,000 feet of bank protection. In addition, three woody bundles would be placed between the bullnose and the head of the island to provide fish habitat (Figure 2-3).

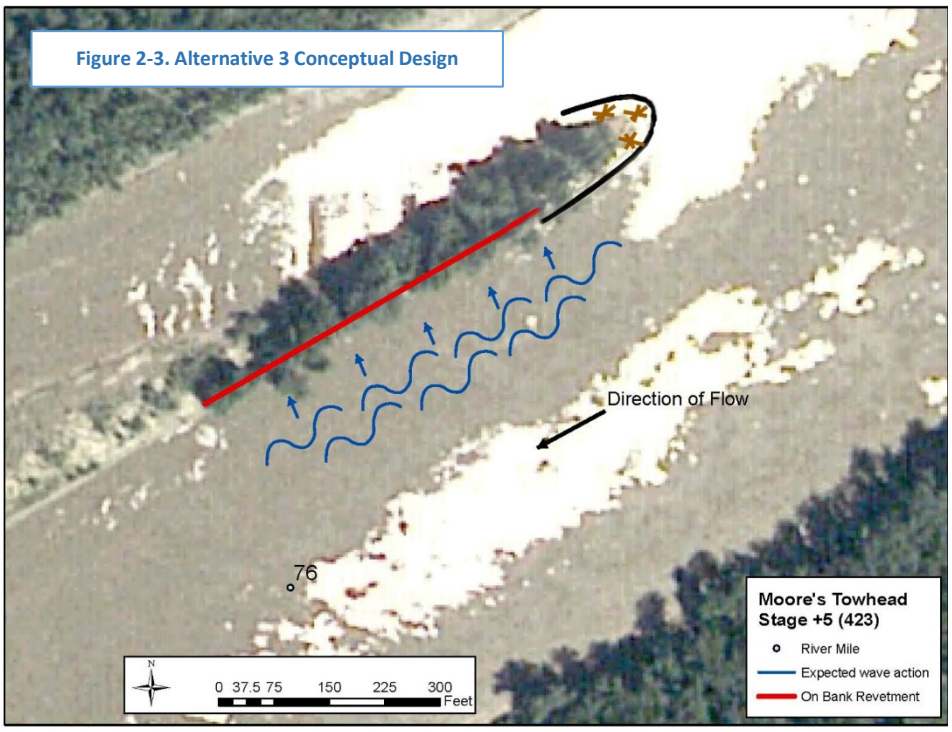

Figure 2-3. Alternative 3 Conceptual Design

Mitigation Alternative 4: Maximized Fish Habitat (Off-bank bullnose and off-bank revetment + wood). A 350-foot bullnose chevron would be placed approximately 50 feet off the island head to an elevation of 428 feet (NAVD88). The slightly larger sized bullnose is required to align with the off-bank revetment. To protect the main channel side of the island, 475-feet of notched off-bank revetment would be placed. The bullnose plus revetment provides 825 feet of bank protection. The length of the off-bank revetment does not extend downstream as far along the island as Alternative 3 due to a permanent navigation channel marker sign. (See Figure 2-5 for updated conceptual design). Between the

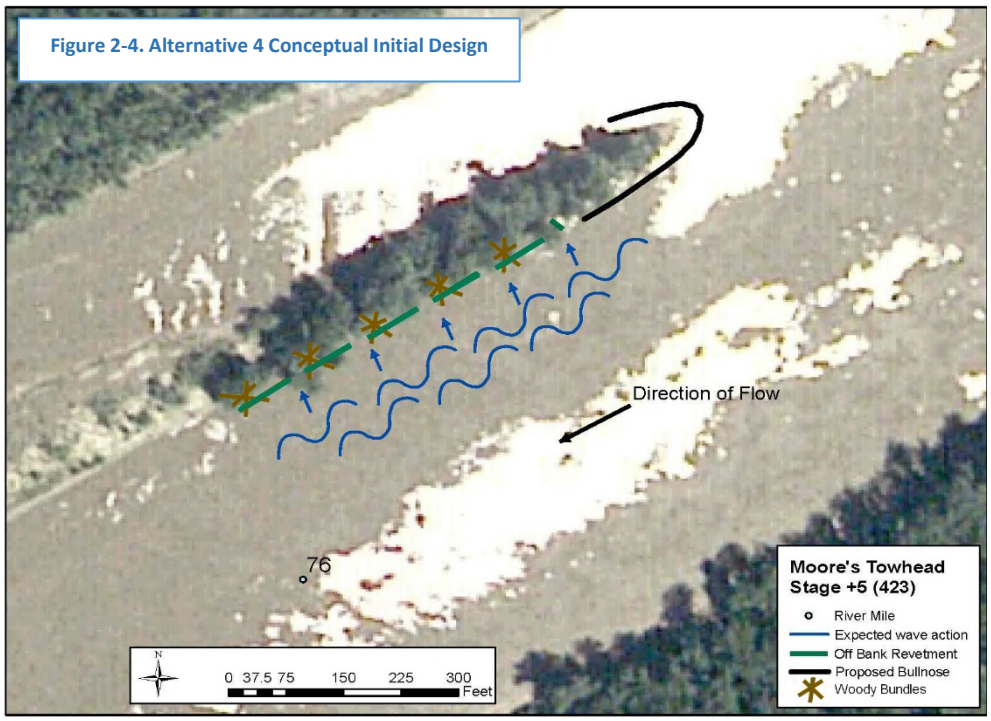

Figure 2-4. Alternative 4 Conceptual Initial Design

off-bank revetment and the island, 5 woody bundles would be needed to prevent a channel from forming and provide fish habitat.

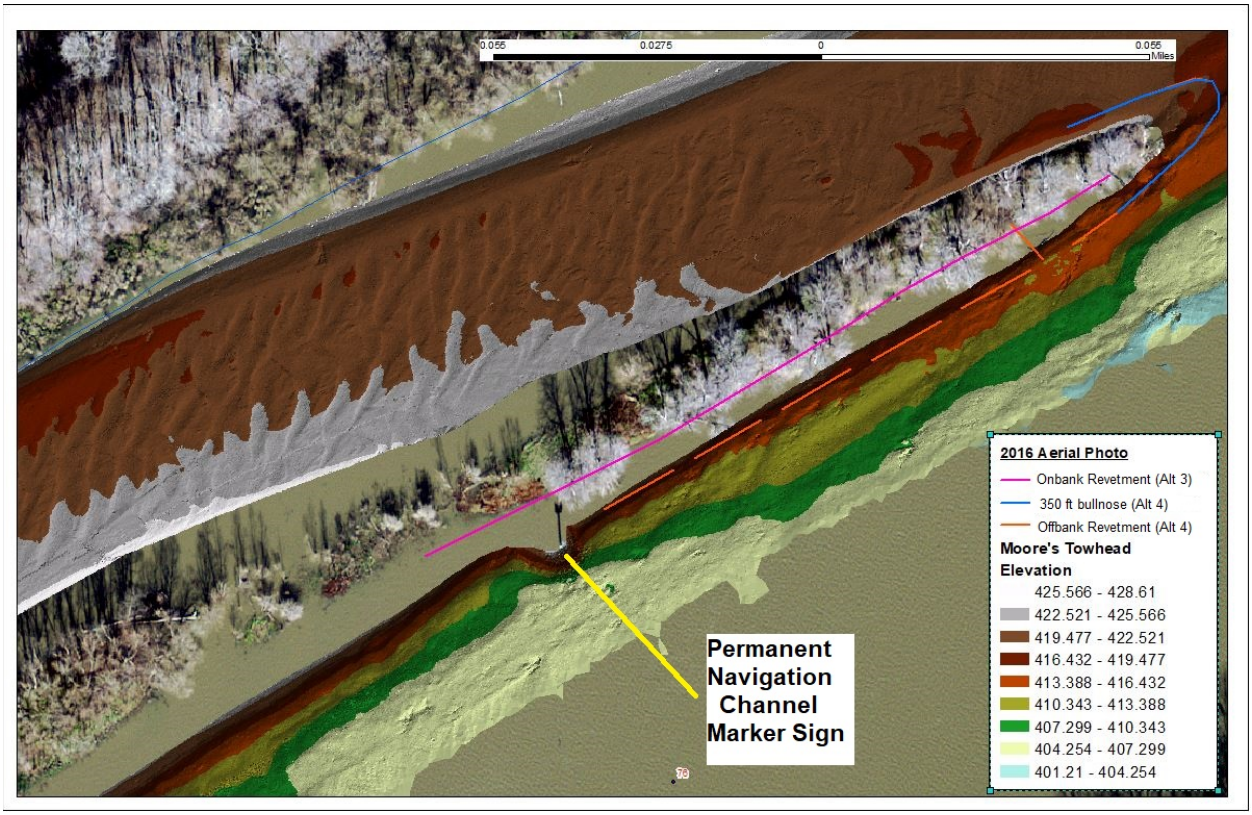

Figure 2-5.Location of navigation channel marker sign and difference in length between on-bank and off-bank revetment for proposed alternatives at Moore's Towhead.

The following mitigation alternatives were considered but screened out based on uncertainty of constructability and/or potential adverse environmental effects. Those included:

- An alternative similar to Alternative 4, but with the use of multiple round hard points (rock structures piles) in lieu of off-bank revetment. Uncertainty of performance and potential adverse effects due to changed local hydraulics to freshwater mussel bed downstream of study area led to the removal of this alternative.
- Use of wood completely in lieu of rock for off-bank revetment. High uncertainty with longevity of wood and uncertain success in meeting mitigation planning objectives resulted in the removal of this alternative.

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:

- Mitigation Alternative 1: No Action
- Mitigation Alternative 3: Efficiency (Off-bank bullnose with on-bank revetment + wood)
- Mitigation Alternative 4: Maximized Fish Habitat (Off-bank bullnose with off-bank revetment + wood)

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 affected both short and long-term, and adverse or beneficial. *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 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	Alternative 3	Alternative 4
Climate	Unaffected	Less than significant	Less than significant
Wetlands & Floodplains	Less than significant		
Water Resources			
Soils (Prime Farmland)	Unaffected	Unaffected	Unaffected
Fish & Wildlife		less than significant	less than significant
Federally listed species	Less than significant		
Invasive Species	Unaffected	Unaffected	Unaffected
Cultural & Historic Resources	Less than significant	Less than significant	Less than significant
Air Quality	Unaffected		
Noise			
HTRW			
Socioeconomic Factors & EJ		Unaffected	Unaffected

3.1 Climate

3.1.1 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 study area experiences significant seasonal variation in monthly rainfall, with May being the wettest month with an average accumulation of 4.1 inches and the least rainfall in January with an average total accumulation of 1 inch.

3.1.2 No Action (Future Without Project)

A climate change analysis in proximity to the study area was performed using the non-stationarity detection tool and the USACE Vulnerability Assessment Tool. The USACE Vulnerability Assessment Tool indicated that the HUC4 containing the Moore's Towhead project is not relatively vulnerable to climate change impacts. The qualitative climate assessments indicated upward trends in precipitation, temperatures, and streamflow which could potentially impact the future without project conditions at some indeterminate point in the future. A detailed description of the climate change analysis can be found in Appendix A, *Hydrology & Hydraulics*.

3.1.3 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.

3.2 Wetlands and Floodplains

3.2.1 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
- Clean Water Act Section 401, 402, and 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 906(d) of WRDA 1986

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

3.2.2 Potentially Affected Environment

The island habitat in the study area is classified as woody wetland. The overstory is exclusively mature silver maple. The understory and edges contain poison ivy, green ash, trumpet vine, and swamp privet. No decurrent false aster has been observed in the study area. The adjacent land area consists of woody wetlands with pockets of deciduous forest, emergent herbaceous wetlands, cultivated crops, and open water. Bank erosion is occurring along the head and riverward side of the island.

3.2.3 No Action (Future Without Project)

As the island continues to erode into the future, the loss of woody wetlands is expected. The adjacent floodplain is expected to be like existing conditions into the future.

3.2.4 Reasonable Action Alternatives

With construction of any reasonable action alternative, erosion would be reduced leading to the island (and woody wetland habitat) to be maintained in the study area. The adjacent floodplain would be unaffected by construction of any reasonable mitigation plan. **The reasonable action alternatives would result in a positive, less than significant impact to wetlands and floodplains within the study area.**

3.2.5 Environmental Commitments

To minimize impacts to 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.

3.3 Water Resources

3.3.1 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 below and Appendix B, *Clean Water Act*)

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.

3.3.2 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 25 September 2020).

3.3.3 No Action (Future Without Project)

Without action, navigation induced shoreline erosion would continue degrading the island. The water quality in the area would be like existing conditions into the future and high suspended sediment is expected to continue.

3.3.4 Reasonable Action Alternatives

Both action alternatives are expected to modify flow in the study area to reduce erosion at the head of the island and along the riverward bankline. 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 may occur due to increased nutrient loading, miscellaneous debris, or accidental spills from construction equipment.

Construction activities may create indirect effects to water quality through uncontrolled runoff or poor sediment control practices during construction, which could lead to alterations in hydrology, water column impacts, alteration of patters, water circulation, and normal water fluctuations and potential changes to nutrients loads in the water. After construction, the conditions would be expected to stabilize, and return to existing conditions.

Alternative 4 is expected to modify flows more due to the off-bank revetment and there is potential for flows to alter the existing hydrologic conditions of the downstream freshwater mussel bed outside of the study area. Alternative 3 with on-bank revetment is not expected to modify flows to impact the freshwater mussel bed downstream.

Overall, the impacts to water resources from the mitigation alternatives would be less than significant. The mitigation plans would modify flow to reduce erosion enhancing the habitat within the Lower Illinois River.

3.3.5 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) Containment of fuel and construction-required chemicals would be in place during construction.

3.4 Soils, Including Prime Farmlands

3.4.1 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.

3.4.2 Potentially Affected Environment

Considerable erosion along the head of the island is present and the island has areas of steep vertical banks with exposed soil (approximately 12 feet tall). Moore's Towhead soil consists of dockery silt with 0 to 2% slopes that is frequently flooded for long durations. The study area contains no soils designated as prime or unique farmland (Farmland Protection Policy Act, 7 CFR Part 658).

3.4.3 No Action (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.

3.4.4 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 soil resources would be unaffected by the reasonable action alternatives. **No soils in the study area are designated as prime farmland; ; therefore, prime farmland would be unaffected by any reasonable action alternative.**

3.5 Fish and Wildlife

3.5.1 Regulatory Framework

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

- 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 fisheries and wildlife would be considered significant if an alternative resulted in substantial loss of desired aquatic habitat for native species or the direct loss of fishes or wildlife within the study area because of implementing any of the action alternatives.

3.5.2 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 & Lerczak, 1993). 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. Many 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).

Beaver has been observed in the study area actively removing woody vegetation.

Freshwater mussels do occur in the vicinity of the study area (Corgiat, 2008). A freshwater mussel survey was conducted in August 2010 (Ecologist Specialists, Inc., 2010) to include the study area and downstream of the study area. The study area itself did not appear to harbor a significant freshwater mussel concentration; however, a small concentration of freshwater mussels was observed downstream of the study area. A total of 221 live mussels were collected at this downstream location. No live federal or state-listed species were collected.

3.5.3 No Action (Future Without Project)

The fisheries and wildlife resources throughout the study area would likely continue their gradual decline due to poor aquatic habitat. The island would continue to erode, and the adjacent side channel would disappear eliminating essential low flow shelter fish habitat. Bald eagles are expected to continue to occur within the vicinity of the study area during the winter months. Under the no action, the impacts to the known freshwater mussel bed downstream may be impacted by burial due to the eroding island material depositing over the bed.

3.5.4 Reasonable Action Alternatives

Negligible long-term direct construction-related impacts on fisheries and wildlife habitat are anticipated to occur at construction site. Potential direct effect on fisheries and wildlife 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 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 woody bundles would provide much needed shelter habitat.

The proposed mitigation measures of the study are designed to positively impact sheltered fish habitat. The increase in flow, scour, and depositional diversity and woody structure in the study area would add much-needed

habitat diversity to the site. The reasonable mitigation alternatives would provide high quality nursery, feeding, and overwintering habitat for fishes. Alternative 4 is expected to provide additional fisheries habitat compared to Alternative 3 due to low flow area created between the island and the off-bank revetement.

Less than significant, short-term, construction-related impacts on fisheries and wildlife 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 and wildlife to temporarily avoid impacted areas and seek refuge in nearby suitable habitat. After construction, conditions would be expected to stabilize and return to conditions like pre-construction.

Both Alternative 3 and 4, would modify flow in the study area and likely have downstream effects. In terms of impacts to the freshwater mussel bed downstream of the study area, Alternative 3 would have less impact compared to Alternative 4. Alternative 4 would most likely have a greater effect due to off-bank structures on the riverward side of the island impacting flow more. Even with changes to flow resulting from the reasonable mitigation alternatives, less than significant impacts to freshwater mussel resources would be expected.

No measurable adverse impact to migratory waterfowl, wading and shore birds, game birds, or neotropical migrants would result from any of the mitigation alternatives.

Overall, the reasonable mitigation alternatives would provide a positive, less than significant impact on fisheries and wildlife resources in the study area.

3.5.5 Environmental Commitments

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

1) Environmental impacts associated with construction would be minimized using 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) 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.
4) Pre-construction bald eagle nest survey conducted by USACE. Apply for incidental take permit if needed.

3.6 Threatened and Endangered

3.6.1 Regulatory Framework

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

- Endangered Species Act Section 7 (See Appendix C, *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.

3.6.2 Potentially Affected Environment

The Endangered Species Act consultation for the Navigation Study (USACE, 2004) 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 C, *Biological Assessment*. Table 3-2 summarizes the federally listed species potentially occurring in the study area. No critical habitat is in the proposed 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
Eastern Prairie Fringed Orchid *(Platanthera leucophaea)*	Threatened	Meadows, marsh edges, and bogs with little woody encroachment
Prairie Bush-clover (*Lespedeza leucophaea)*	Threatened	Upland prairie

3.6.3 No Action (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.

3.6.4 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, Eastern Prairie Fringed Orchid, and Prairie Bush Clover since these species have 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 C, *Biological Assessment*, provides additional details on impacts to federally listed species. **Overall, the reasonable action alternatives, would be less than significant for federally listed species.** A concurrence letter from USFWS will be included in Appendix C, *Biological Assessment* once received.

3.6.5 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 C, *Biological Assessment,* for details.
2) BMPs to reduce sedimentation and erosion into adjacent water bodies during construction.

3.7 Invasive Species

3.7.1 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 because of implementing the reasonable action alternatives.

3.7.2 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 (USACE, 2007).

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.

3.7.3 No Action (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.

3.7.4 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 affected by the considered action alternatives. Invasive species are expected to persist with or without any of the considered action alternatives. With any reasonable action alternative, 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.**

3.7.5 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*).

3.8 Cultural and Historical Resources

3.8.1 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.

3.8.2 Potentially Affected Environment

On site field inspections of the shoreline cut banks of Moore's Towhead in 2010 by Dr. F. Terry Norris, St. Louis District Archaeologist, who observed historic artifacts eroding to the ground surface of the northern end of the island. The artifacts were tentatively dated to the late 19th or early 20th century. In 2020, the shoreline was investigated by Meredith Hawkins Trautt, St. Louis District Archaeologist. A layer of unmodified shells was identified but no artifacts or cultural features. It is speculated that the artifacts identified in 2010 have already eroded away. There is no evidence of potentially significant archaeological remains.

3.8.3 No Action (Future Without Project)

No cultural and historic resources have been recently observed or identified in the study area. In the short term, continuing erosion of the upper end of the island would have no effect upon potentially significant archaeological remains but continued long-term erosion may expose yet to be identified cultural resources. Therefore, this alternative would have less than significant effect on cultural and historic resources.

3.8.4 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. The 2010 on site field inspection identified late 19th or early 20th century eroding from the northern end of the island; however, no cultural resources were identified during the 2020 on site field inspection. It is speculated that the artifacts identified in 2010 have eroded away.

The District received a letter from the IL SHPO on 2 September 2020 with no objection to the proposed project. A copy of the correspondence is included in Appendix G, *Coordination.* 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. The Miami Tribe, Forest County Potawatomi Community, and Quapaw Tribe of Indians have offered no objection to the proposed project but request to be notified if artifacts or human remains are encountered during construction. **Therefore, the reasonable action alternatives would have less than significant impacts on historic and cultural resources.**

3.8.5 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.

3.9 Air Quality

3.9.1 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.

3.9.2 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. Brown County, Illinois currently meets all USEPA air quality standards (Available online at: https://www3.epa.gov/airquality/greenbook/anayo_il.html; accessed on 25 September 2020).

3.9.3 No Action (Future Without Project)

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

3.9.4 Reasonable Action Alternatives

Minor, temporary increases in airborne particulates are expected to occur because 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 Brown 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 Brown 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.

3.9.5 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.

3.10 Noise

3.10.1 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.

3.10.2 Potentially Affected Environment

Noise is generated in industrial and commercial areas, and along transportation routes. Due to the rural nature of the project area, the primary noise source is from barge and other boat traffic.

3.10.3 No Action (Future Without Project)

Noise impacts would be impacts would be like those under existing conditions.

3.10.4 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.**

3.11 Hazardous, Toxic, and Radioactive Waste

3.11.1 Regulatory Framework

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 following applicable environmental laws, regulations, and substances:

- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- Solid Waste Disposal Act
- Local and/or State continuing obligations of HTRW
- Petroleum products

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.

3.11.2 Potentially Affected Environment

A Phase I ESA was conducted for the Moore's Towhead study area 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 footprint 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 would be contacted immediately if future development of the property discovers hazardous or toxic materials.

3.11.3 No Action (Future Without Project)

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

3.11.4 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.**

3.11.5 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 project area discovers HTRW. USACE shall work with the awarded contractor to determine appropriate methods for handling and disposal of HTRW.
3) Significant alterations to the selected work plan would require an additional HTRW investigation.

3.12 Socioeconomics

3.12.1 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.

3.12.2 Potentially Affected Environment

Moore's Towhead is residentially and commercially undeveloped. The surrounding area is primarily agriculture.

Economic Base. According to the American Community Survey (2018) dataset (www.data.census.gov; accessed on 25 September 2020), Brown County, Illinois, the median household income was $58,762. Approximately 10.0% of the population in Brown County, Illinois is below the poverty line.

Education. An estimated 92.2% of the population was a high school graduate or higher, while 11.0% held a bachelor's degree or higher (www.data.census.gov; accessed on 25 September 2020).

Employment/Unemployment. Based on the American Community Survey (2018) dataset (www.data.census.gov; accessed 25 September 2020), approximately 44.6 % of the county population is in the labor force (between ages 16 and 64). The primary occupations in the county include production (25%), management (27%) sales, and office (23%) The unemployment rate for Brown County, Illinois as of Sept 2020 is 4.9% (https://fred.stlouisfed.org/series/ILBRURN; accessed on 25 September 2020).

Population Demographics. According to the 2010 Census, Brown County, Illinois, has a total population of 6,578 (wwww.data.census.gov; accessed 25 September 2020). Median age was 39.0 years, with 4.1% of the population under 5 years old, and 20.8% of the population over the age of 65. The population within the county is approximately 77.4% white, 20.4% black, 4.3% Hispanic or Latino, 0.1% American Indian and Alaska Native, and 0.6% Asian.

Visual Resources. Visual resources of the study area consist 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 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. Near Moore's Towhead, recreational opportunities are available to the public at Meredosia National Wildlife Refuge.

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, 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 170179603002, Illinois (approximately 86.42 square miles). For this assessment, the EJSCREEN tool was used (https://ejscreen.epa.gov; accessed on 25 September 2020). 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) for the census block group was 1,366, with 0% 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.

3.12.3 No Action (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 justice are expected to be like existing conditions.

3.12.4 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 like existing conditions. Visual and recreational resources would have negligible 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 in a small rural community that is predominately white. No differential impacts to minority or low income populations are expected.

Long-term increases in commercial and recreational fishing and waterfowl hunting could occur due protection and restoration of suitable habitat. There could be negligible impacts of 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.

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

3.13 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.

3.14 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.

3.15 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 the recommended plan. 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 MITIGATION PLAN COMPARISON & SELECTION*

4.1 Display Mitigation Outputs

Per USACE guidance (PGN Appendix C), the output of mitigation plan increments shall be described in the same units of measurements used to calculate specific ecological losses, and used in defining mitigation planning objectives; therefore, the outputs of the Moore's Towhead mitigation plan used the same increments used to calculate the ecological losses as described in the Navigation Study (USACE, 2004) and provided in Table 1-1, above. Table 4-1 displays the mitigation output increment for each mitigation alternative.

Table 4-1. Comparison Mitigation Plan Outputs

Alternative	Mitigation Output	
	Bank Protection (linear feet)	Woody Bundles (#)
Alt 1: No Action	0	0
Alt 3: Efficiency (off-bank bullnose with on-bank revetment + wood)	1,000 feet	3
Alt 4: Maximized Bank Fish Habitat (off-bank bullnose with off-bank revetment + wood)	825 feet	5

4.2 Define and Estimate Costs of Mitigation Plan Increments

Table 4-2 displays the cost estimate for each mitigation alternative. These feasibility level cost estimates include construction, operation and maintenance, and monitoring and adaptive management.

Table 4-2 Mitigation Plan Feasibility Level Cost Estimates (October 2020 price levels; rounded to the nearest thousand)

Alternative	Construction Cost		OMRR&R Cost	Monitoring Cost	AM Cost	25% Contingency	Total Cost
Alt 1: No Action	$0		$0	$0	$0	$0	$0
Alt 3: Efficiency (off-bank bullnose with on-bank revetment + wood)	Wood = $30,000 Rock = $272,00	Combined Construction $302,000	$0	$10,000	$15,000	$75,000	$402,000
Alt 4: Maximized Fish Habitat (off-bank bullnose with off-bank revetment + wood)	Wood = $50,000 Rock = $267,000	Combined Construction $317,000	$0	$10,000	$15,000	$80,000	$422,000

4.3 Display Incremental Costs

Cost effectiveness and incremental cost analysis (CE/ICA) can provide decision-makers with relative output-cost relationships of various mitigation alternative and help decision-makers identify a recommended plan to pursue in more detail. The Institute of Water Resources Planning Suite II was used to complete the CE/ICA of the mitigation alternatives to evaluate and compare monetary costs and non-monetary outputs. Cost effective alternatives are plans that have the greatest output of all alternatives for that cost. A secondary analysis on the subset of cost-effective alternatives identifies superior financial investments, called "Best Buys," through an incremental cost analysis. Best Buys alternatives provide the greatest increase in output for the least increase in cost.

For Moore's Towhead, there are two different mitigation outputs (linear feet of bankline and number of woody bundles) used to calculate mitigation need originally; therefore, the incremental cost analysis was performed for each mitigation output separately to compare the alternatives.

The unit of output for fisheries mitigation was number of woody bundles, but the cost is the same for each unit ($10,000 per woody bundle) regardless of quantity; therefore, all alternatives were considered best buys when comparing the feasibility level cost to output (Table 4-3).

Table 4-3. Alternative Comparison for Fisheries Mitigation Output (# of woody bundles)

Alternative	Woody Bundle Cost	Output (#)	Cost Effective
Alt 1: No Action	$0	0	Best Buy
Alt 3: Efficiency (off-bank bullnose with on-bank revetment + wood)	$30,000	3	Best Buy
Alt 4: Maximized Fish Habitat (off-bank bullnose with off-bank revetment + wood)	$50,000	5	Best Buy

The unit of output for bank erosion mitigation was linear feet. Each of the mitigation alternatives outputs were combined with cost estimates in an incremental cost analysis to determine the cost effectiveness of each mitigation alternative. Table 4-4 displays the incremental costs for each mitigation plan arrayed from lowest to highest cost per unit of output (linear feet of bank protection). The No Action and Alternative 3 were best buy alternatives while Alternative 4 was non-cost effective.

Table 4-4 Alternative Comparison for Bank Erosion Mitigation Output (linear feet)

Alternative	Cost*	Output (linear feet)	Cost Effective
Alt 1: No Action	$0	0	Best Buy
Alt 3: Efficiency (off-bank bullnose with on-bank revetment + wood)	$372,000	1,000	Best Buy
Alt 4: Maximized Fish Habitat (off-bank bullnose with off-bank revetment + wood)	$372,000	825	Non-Cost Effective

*excludes cost of woody bundles, but includes construction cost, OMRRR, MAM, and 25% contingency

4.4 Conclusions

From this analysis, Alternative 3 (off-bank bullnose with on-bank revetment + wood) was shared with project partners and was selected as the recommended mitigation plan. This alternative best meets the mitigation planning objectives and has the support of the USFWS, IDNR, and TNC. This alternative would reduce wave-induced bank erosion at the head and riverward side of Moore's Towhead due to navigation, provides low flow area and sheltered habitat for fish, and is expected to have lower risk of adverse impacts to the existing freshwater mussel bed.

5 RECOMMENDED MITIGATION PLAN

5.1 Description of Recommended Plan

Alternative 3 is the recommended plan that helps meet the systemic environmental mitigation planning objectives for both fisheries and bank erosion as identified in the Navigation Study (USACE, 2004). The recommended plan consists of 1,000 feet of bank erosion mitigation and three sheltered structures for fisheries mitigation:

- 300-foot bullnose at elevation 428 feet (NAVD88) placed approximately 50 feet upstream of island head.

- On-bank revetment (700 feet) placed along riverward side of the island to the ordinary high water mark.
- Three woody bundles between the island and the bullnose to provide fish shelter habitat

5.2 Design Considerations

During pre-construction engineering and design (PED), the USACE and IDNR would 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 would occur during this time.

Impacts to Navigation and Flood Elevations. The main design consideration for Moore's Towhead is to ensure the proposed designs does not impede or negatively affect the navigation channel. Designs were also not permitted to restrict the flow of the Illinois River.

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

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

5.3 OMRRR Considerations

The St. Louis District has constructed similar measures on the Upper Mississippi River through operation and maintenance of the 9-Foot Navigation Channel Project. Based on past performance of these structures, the total annualized cost for OMRRR of the recommended plan was deemed negligible and estimated at $0 using the FY 2021 with a 2.75% discount rate. This may change during final design.

5.4 Real Estate Considerations

There is no fee title, permanent easement, or temporary easement required to implement the proposed project. The project lies below the ordinary high water line within the Illinois River channel; therefore, within navigational servitude limits.

5.5 Construction Considerations

5.5.1 Listed Species

Appendix C, *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.

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. The Illinois Environmental Protection Agency (IEPA) has issued Section 401 water quality certification for all projects that qualify for Regional General Permit 16 and Nationwide Permit 13 and 27. Therefore, individual certification is not required. 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. The Regional General and Nationwide Permit Summaries, as well as the General Conditions are in Appendix B, *Clean Water Act.*

Clean Water Act, Section 402 Compliance. Construction would be performed overwater from a floating platform for the Recommended Plan. Land disturbance is expected to be minimal (less than one acre). A Clean Water Act Section 402 Permit is not applicable.

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 complies with existing Nationwide Permit 13 (Bank Stabilization), Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) and Regional General Permit 16 (Bank Stabilization 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 (Appendix B, *Clean Water Act*).

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 Schedule

A project schedule was developed based upon the assumption that this report would be approved in the second 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 Schedule

Task	Tentative Scheduled Date
Technical and Public Review of Draft Mitigation Plan and EA	April 2021
District Engineer's Approval	16 June 2021
Contract Award	FY22*
Construction Complete	FY23*

*subject to change pending funding

5.7 Mitigation Success Criteria, Monitoring, and Adaptive Management

Adaptive management (i.e., contingency plan), is a plan to address uncertainty and take corrective actions in cases where monitoring demonstrates that mitigation measures are not achieving the success criteria. Success criteria for mitigation is based on the replacement of lost functions and values of the habitat, including hydrologic and vegetative characteristics. A plan for monitoring to determine the ecological success of the mitigation needs to be scaled to the minimum necessary to reach ecological success and is not to exceed 10 years (per PGN, Appx C).

The Navigation Study (USACE, 2004) provides the details for the adaptive management plan for the system, and the site-specific monitoring and adaptive management plan for Moore's Towhead complements the systemic approach. Appendix E provides full details for the site-specific monitoring and adaptive management plan for Moore's Towhead, while Table 6-1 summarizes the success criteria, monitoring elements, and adaptive management measures. Not all mitigation measures were identified to have a need for adaptive management trigger or measures because there is negligible risk and uncertainty related to constructing the revetment and bullnose which are common features used in Operation and Maintenance of the 9-foot Channel and Regulating Works Project within the St. Louis District. Monitoring of bank erosion at Moore's Towhead would include analysis of public aerial imagery and site inspections one year post-construction to ensure banks and island head are being maintained at revetment location. Monitoring of the fish habitat would include a boat survey to detect presence of woody bundles at years 2 and year 8 post-construction. If the woody bundles are unable to be detected during the survey, then adaptive management of modifying placement techniques of additional woody bundles may be required to achieve mitigation success.

Table 6-2 Summary of monitoring and adaptive management (AM) elements for Moore's Towhead

Objective	Mitigation Measure	Performance Indicator	Success Criteria	Time Effect	AM Action Trigger	AM Measure
Reduce bank erosion at Moore's Towhead	Revetment	Island Bankline	Banks and island head maintained at the revetment location	Construction Completion	None identified	Not required
	Bullnose	Island Head				
Increase sheltered riverbed microhabitats to offset the increase of propeller entrainment	Woody Bundles	Presence of woody material in the project area	Increased woody material over existing conditions		>50% loss of woody bundles compared to year 1 post construction	Modify bundling and weighting techniques and place additional new woody bundles

6 COST ESTIMATES

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 measures have been previously constructed in the District so minimal uncertainty associated with 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.

Table 6-1 shows the Project First Cost. The detailed cost estimate is provided in Appendix F, *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 6-1. Project First Cost Estimate (October 2021 Price Level).

Account	Feature	Cost
01	Lands and Damages (LEERD)	$0*
06	Fish & Wildlife Facilities	$703,000
09	Contingency	26.3%
30	Planning, Engineering, & Design	$104,000
31	Construction Management	$65,000
	Project First Costs	**$872,000**

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

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 planning process using a variety of communication methods with the affected public, agencies, and organizations. Scoping and coordination have been conducted with the following State and Federal agencies.

- Illinois Department of Natural Resources
- Illinois State Historic Preservation Office
- U.S. Fish and Wildlife Service
- The Nature Conservancy

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

7.1 Coordination Meetings

Several coordination meetings occurred with interested parties to scope existing conditions, to develop the site-specific mitigation alternatives for Moore's Towhead, and to determine potential impacts of considered alternatives.

7.2 Public Involvement

In accordance with NEPA, the draft mitigation plan with integrated environmental assessment and unsigned draft Finding of No Significant Impact (FONSI) was made available to interested members of the public during a 30-day public review period during May-June 2021.

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 2 September 2020. Three tribes, Miami Tribe, Forest County Potawatomi Community, and Quapaw Tribe of Indians have concurred with the District's opinion of no significant impact. Copies of all tribal correspondence are provided in Appendix G, *Coordination.*

7.4 Federal and State Agencies

The USFWS and IDNR have been involved throughout the planning and design process for Moore's Towhead. The USFWS also prepared a response to the Biological Assessment and a response letter which includes Fish and Wildlife Coordination Act compliance (Appendix G). The IDNR has provided written support for the construction of the proposed mitigation project (Appendix G).

7.5 Non-Governmental Organization

The Nature Conservancy has been involved throughout the planning and design process for Moore's Towhead as the island landowner. TNC provided data and subject matter expertise during scoping and development of site-specific mitigation alternatives.

8 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS*

All mitigation alternatives were subject to compliance review with all applicable environmental regulations and guidelines. Table 9 -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 alternatives as it relates to each statute and requirement for the current stage of planning.

Table 9-1. 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.	Full
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.	Full
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.

9 CLIMATE CHANGE ASSESSMENT SUMMARY

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, analysis of USGS gages near the project site, and used the USACE Vulnerability Assessment Tool. Table 10-1 summarizes the risks associated with the proposed alternative related to climate change.

Overall, Moore's Towhead project is not relatively vulnerable to climate change impacts (See Appendix A for full details). With upward trends in precipitation, temperatures, and streamflow being indicated by these qualitative climate assessments, there is the potential for future conditions to be impacted by changes in climate at some indeterminate point in the future. Constructing the Moore's Towhead project would protect island acreage and provide additional bathymetric diversity, all of which would 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 would be 5,000-lb top size, the largest top size available for river placement.

Table 10-1. Risks to the Recommended Mitigation Plan due to climate change

Measure	Trigger	Hazard	Harm	Qualitative Likelihood
Island 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.
	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 Moore's Towhead	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.
	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 damage could undermine revetment measures and cause failure	Unlikely, Higher flows should have little to no effect on the performance of the stone placed.

10 RECOMMENDATIONS*

Moore's Towhead and its resources were identified as at high risk for navigation induced bank erosion. The proposed environmental systemic mitigation project would stabilize current erosion and mitigate for any potential increase in erosion due to an incremental increase in navigation traffic. Project construction is anticipated to protect the island, increase fish shelter habitat, and improve overall habitat diversity in the area.

Construction of Alternative 3 (bullnose with on-bank revetment and 3 woody bundles) would divert flows away from the island head, reduce bankline erosion, and provide sheltered fish habitat. This plan is designed to meet the mitigation planning objectives:

- *Increase sheltered habitat structure for lotic fish throughout the UMR-IWW System*
- *Reduce the effects of wave action and stop or slow erosion in areas identified as at risk from an incremental increase in commercial navigation*

The project is consistent with and fully supports the overall goals and objectives of the Navigation and Ecosystem Sustainability Program and helps achieve the systemic environmental mitigation requirements for bank erosion and fisheries as described in the Navigation Study (USACE, 2004) by mitigating for 1,000 feet of bank erosion and 3 woody bundles. With approval of this mitigation plan, development of plans and specifications would be initiated.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual mitigation projects.

11 LIST OF PREPARERS*

Name	Role	Years of Experience
Kat McCain, Ph.D.	Environmental Planner, NEPA Specialist	11 years
Travis J Schepker	Environmental Specialist	4 years
Tyson Zobrist	Regulatory Project Manager	20 years
Meredith Trautt	Archaeologist, Tribal Liaison	16 years
Shane Simmons	Project Manager	6 years
Dawn Lamm	H&H Engineer	20 years
Greg Dyn	Cost Estimator	30 years

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Appendix A

Navigation and Ecosystem Sustainability Program

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

Hydrology and Hydraulics

Climate Change Assessment

February 2021

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

US Army Corps of Engineers®

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MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

HYDROLOGY, HYDRAULICS & CLIMATE CHANGE ASSESSMENT

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1 INTRODUCTION

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.

1.1 PROJECT SITE

The Navigation and Ecosystem Sustainability Program (NESP), Moore's Towhead, is located on the Illinois River and consists of a 1.66-acre island from River Miles 76.2 to 75.8. The upstream portion of Moore's Towhead is in Cass County, Illinois and the downstream portion is in Brown County, Illinois. The island is located 5-miles upstream of Meredosia, Illinois.

1.2 ILLINOIS RIVER

The closest automatic Illinois River gage to the project area is downstream at Meredosia, IL at river mile 70.8. 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 1 and Figure 1 come from the 2004 Upper Mississippi River Flow Frequency Study.

Table 1. Illinois River Flood Frequency Elevations (All elevations are an estimated conversion to feet NAVD 88)

River 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	435.6	440.3	443.3	446.0	447.0	447.5	448.5
37.1	435.8	440.5	443.4	446.1	447.1	447.7	448.7
37.75	436.1	440.6	443.5	446.2	447.2	447.8	448.9
38.7	436.3	440.7	443.6	446.3	447.3	448.0	449.1
39.3	436.5	440.8	443.8	446.5	447.5	448.2	449.3
39.66	436.8	441.0	443.9	446.6	447.6	448.4	449.5
40.04	436.9	441.1	444.0	446.7	447.7	448.5	449.6

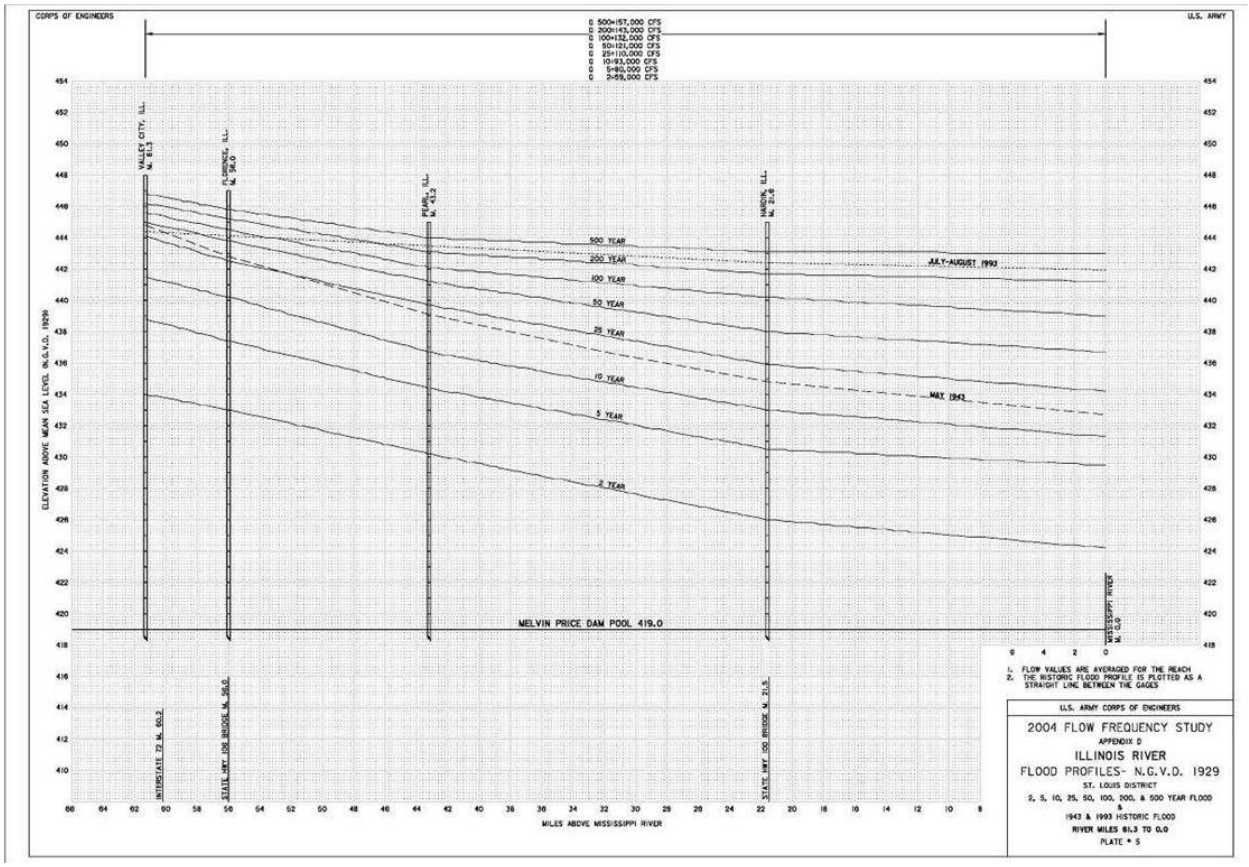

Figure 1. Illinois River Flood Frequency Profile (only available in NGVD 1929)

1.3 MOORE'S TOWHEAD

Moore's Towhead is approximately 140 ft at its widest and 55 ft at its narrowest and is 2,390 ft long. The head of the Island has eroded approximately 30 ft and the center of the island continues to become narrower and lower in elevation. The Moore's Towhead side channel varies in width from 150 ft to 310 ft and is 2.2 ft below Min pool (Min Pool is elevation 418.7 NAVD 88) at its deepest. See Figure 2 for a June 16, 2020 survey of the overall project area to include dredging areas, the project areas proximity to the Little Creek Drainage District Levee and the recommended route of the navigation channel. Figure 3 is a close-up of the bathymetry surrounding the Island head and project area.

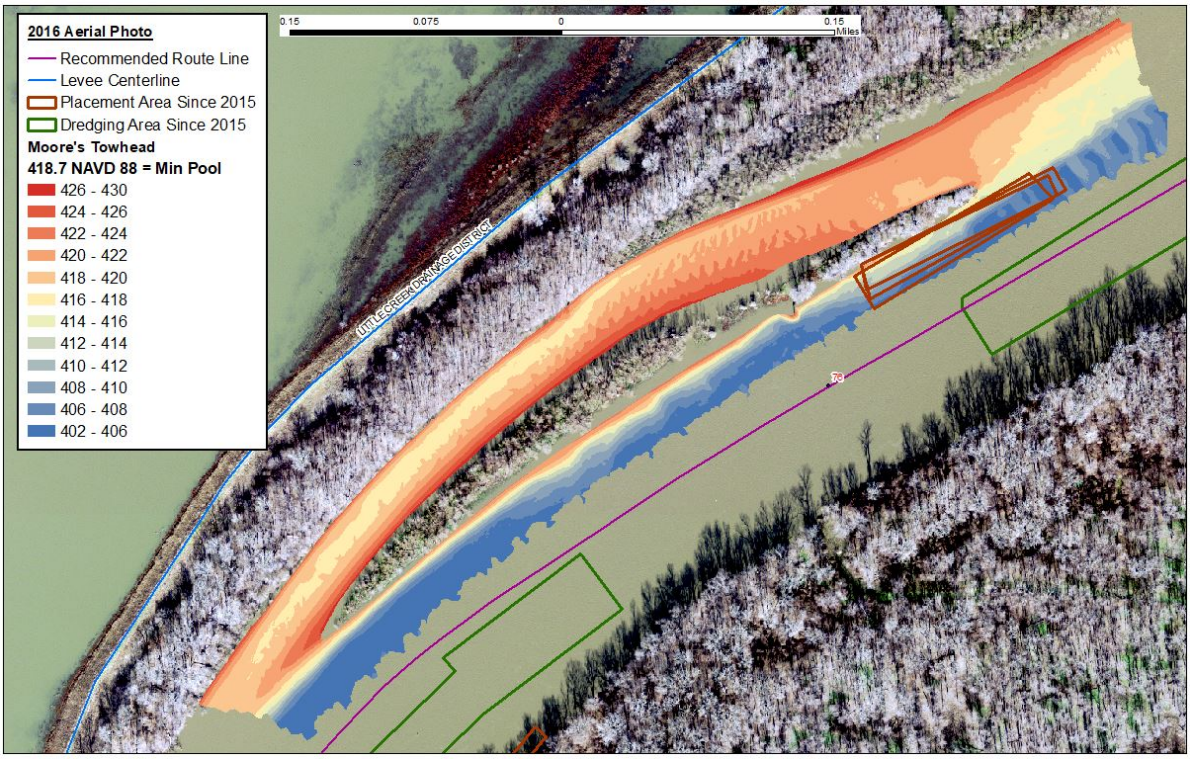

Figure 2. Aerial and channel bathymetry at Moore's Towhead. Survey date: June 16, 2020.

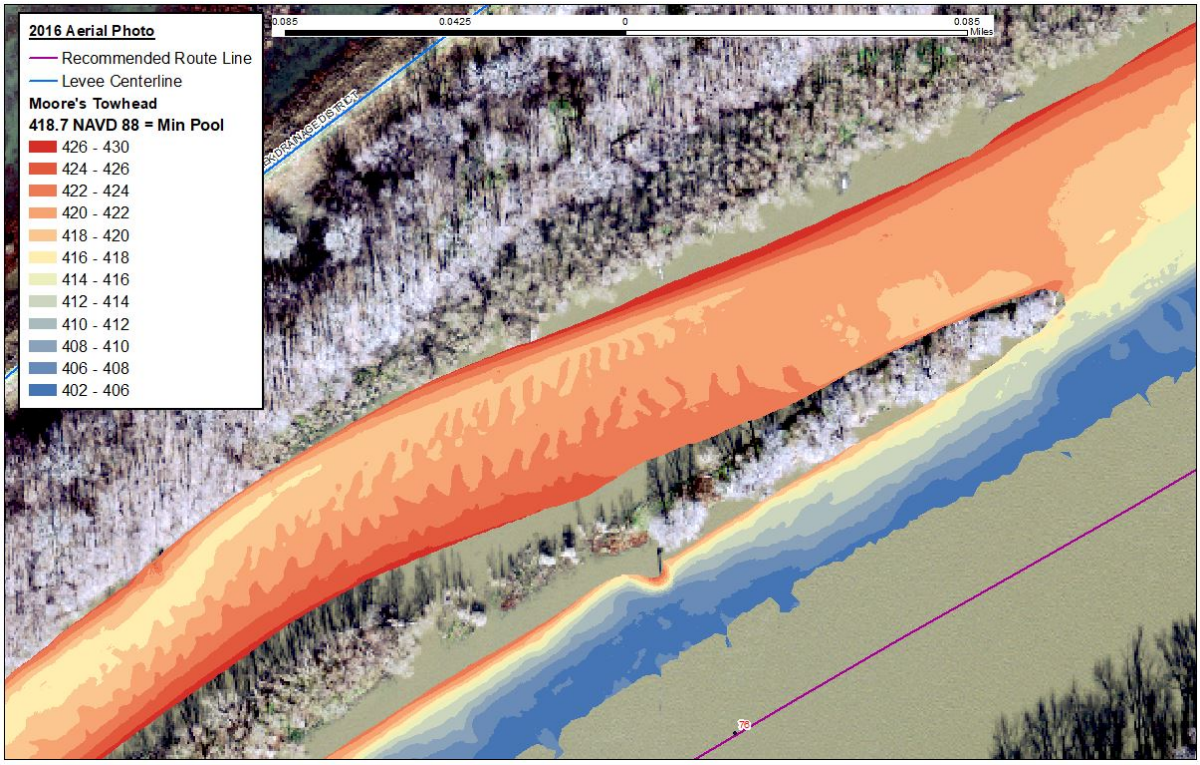

Figure 3. Close-up aerial and channel bathymetry at Moore's Towhead Island head. Survey Date: June16, 2020.

The adjacent navigation channel requires maintenance dredging approximately every 2 to 3 years to maintain the project authorized 300 ft wide and 9 ft deep channel. The dredging that occurs near the upstream end of Moore's Towhead is along the left side of the navigation channel with the material being disposed along the main channel side of the head of Moore's Towhead. An additional dredging area is located along the left side of the channel near the downstream end of Moore's Towhead with the dredge material disposed along the left descending bank of the Illinois River. See Figure 2 for dredge and disposal locations in the project area.

Moore's Towhead is restricted from additional material accretion on the downstream end 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 head and middle of the island.

The La Grange Lock and Dam is located approximately 4 miles upstream from the head of Moore's Towhead at RM 80.2. The Lock and Dam is the responsibility of the Rock Island District and was originally constructed in 1939 but received a major rehabilitation in 2020. The Lock and Dam uses Chanoine wicket gates instead of the traditional tainter gates.

Flow data was obtained using Acoustic Doppler Current Profiler (ADCP) equipment on June 16, 2020. Currents around the island head were moderate, as expected, with most flows between 0.25 and 3.5 feet per second when looking at the depth average velocities. Currents in the side channel are slower, as expected with most flows between 0.1 and 2.5 ft/sec when looking at the depth average (Figure 4).

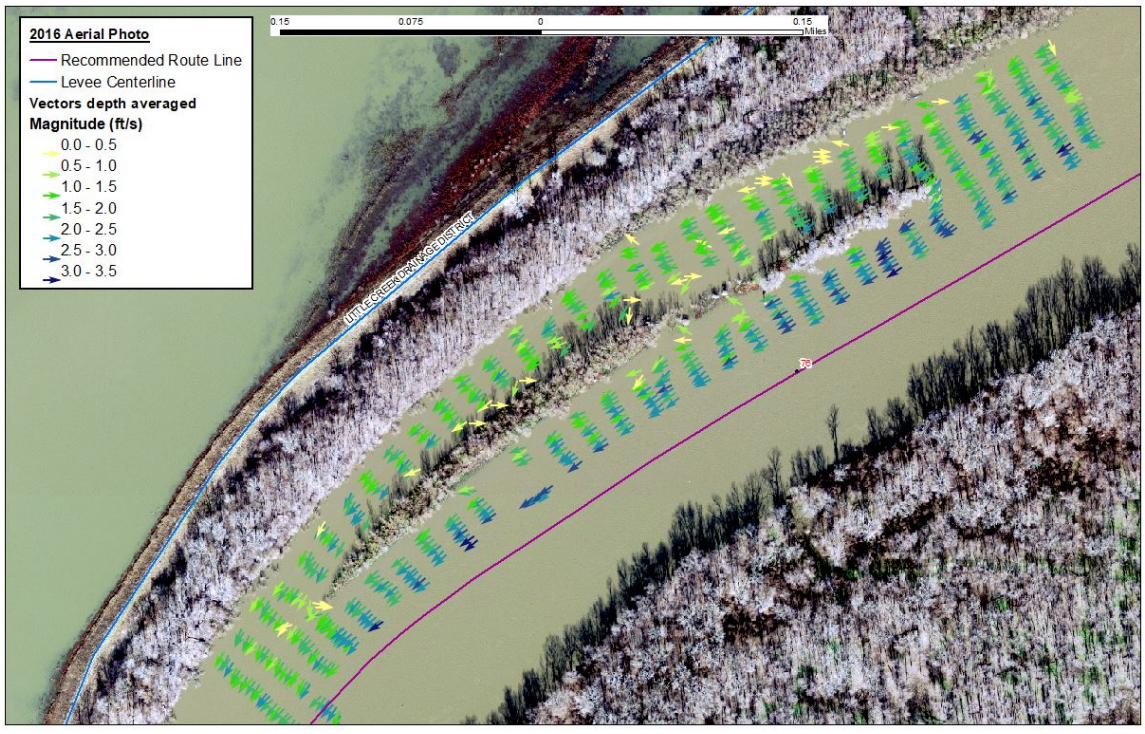

Figure 4 ADCP data (magnitude is ft/sect) at Moore's Towhead. Survey Date: June 16, 2020

Overall, the habitat diversity of this island is degraded by erosion occurring at the head and the continued narrowing of the island and its possible, eventual disappearance. This habitat diversity includes a side channel with shallow water habitat around the perimeters of the island, fish shelter in woody debris, and slow and swift current areas.

2 Mitigation Planning Objectives

The objectives for Moore's Towhead included:

- Increase sheltered habitat structure for lotic fishes
- Reduce the effects of wave action from an incremental increase in commercial navigation

3 Mitigation Alternatives

The design team decided that the protection methods for Moore's Towhead 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 the Illinois River downstream of LaGrange L&D is above the Melvin Price Pool hinge point, which is 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.

3.1 Alternatives Evaluated

The following mitigation alternatives were evaluated:

Mitigation Alternative 1: No Action. The "No Action" plan means no mitigation measures for bank erosion or fisheries resources would be implemented by USACE.

Mitigation Alternative 2: Maximized Bank Protection. Approximately 850 feet of revetment would be placed on the bank line to the ordinary high water mark. This revetment would wrap around the head of the island and extend along the main channel side bank. No anchored woody bundles are included. Since this alternative did not meet the mitigation planning objective for fisheries, it was not moved forward for further analysis (See Figure 2-2 of the Mitigation Plan).

Mitigation Alternative 3: Efficiency (Off-shore bullnose with on-bank revetment + wood). A 300-foot bullnose chevron would be placed approximately 50 feet off the island head to an elevation of 428 feet (2 feet above mean water level). To reduce bank erosion along the main channel side of the island, 700 feet of on-bank revetment would be placed to the ordinary high water mark. The bullnose plus revetment provides 1,000 feet of bank protection. In addition, three woody bundles would be placed between the bullnose and the head of the island to provide fish habitat (See Figure 2-3 of the Mitigation Plan).

Mitigation Alternative 4: Maximized Bank Protection and Fish Habitat (Off-shore bullnose and off-bank revetment + wood). A 350-foot bullnose chevron would be placed approximately 50 feet off the island head to an elevation of 428 feet (2 feet above the mean water level). To protect the main channel side of the island, 475-feet of notched off-bank revetment would be placed. The bullnose plus revetment provides 825 feet of bank protection. Between the off-shore revetment and the island, woody structure will be needed to prevent a channel from forming (See Figure 2-4 of the Mitigation Plan).

3.2 Recommended Mitigation Plan

The results of the alternative comparison and evaluation are presented in Sections 3 and 4 of the Mitigation Plan with Integrated Environmental Assessment. Alternative 3 (Figure 5) is the recommended mitigation plan that helps meet the systemic environmental mitigation planning objectives for both fisheries and bank erosion as identified in the Navigation Study (USACE, 2004). The recommended plan consists of 1,000 feet of bank erosion mitigation and three sheltered structures for fisheries mitigation:

- 300-foot bullnose at elevation 428 feet NGVD placed approximately 50 feet upstream of island head.
- On-bank revetment (700 feet) placed along riverward side of the island to the ordinary high water mark.
- Three woody bundles between the island and the bullnose to provide fish shelter habitat

Figure 5. Recommended Mitigation Alternative: Single bullnose with revetment along the main channel side and 3 woody bundles

4 Design Considerations for All Mitigation Alternatives

All alternatives were developed 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.

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 Table 2 for A-Stone Gradations and Figure 6 for typical structures cross sections.

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 side 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 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.

Table 2. A-Stone Gradation

Graded A-Stone	
Stone Weight (in pounds)	Cumulative Percent (Finer by weight)
5,000	100%
2,500	70-100%
500	40-65%
100	20-45%
5	0-15%
1	0-5%

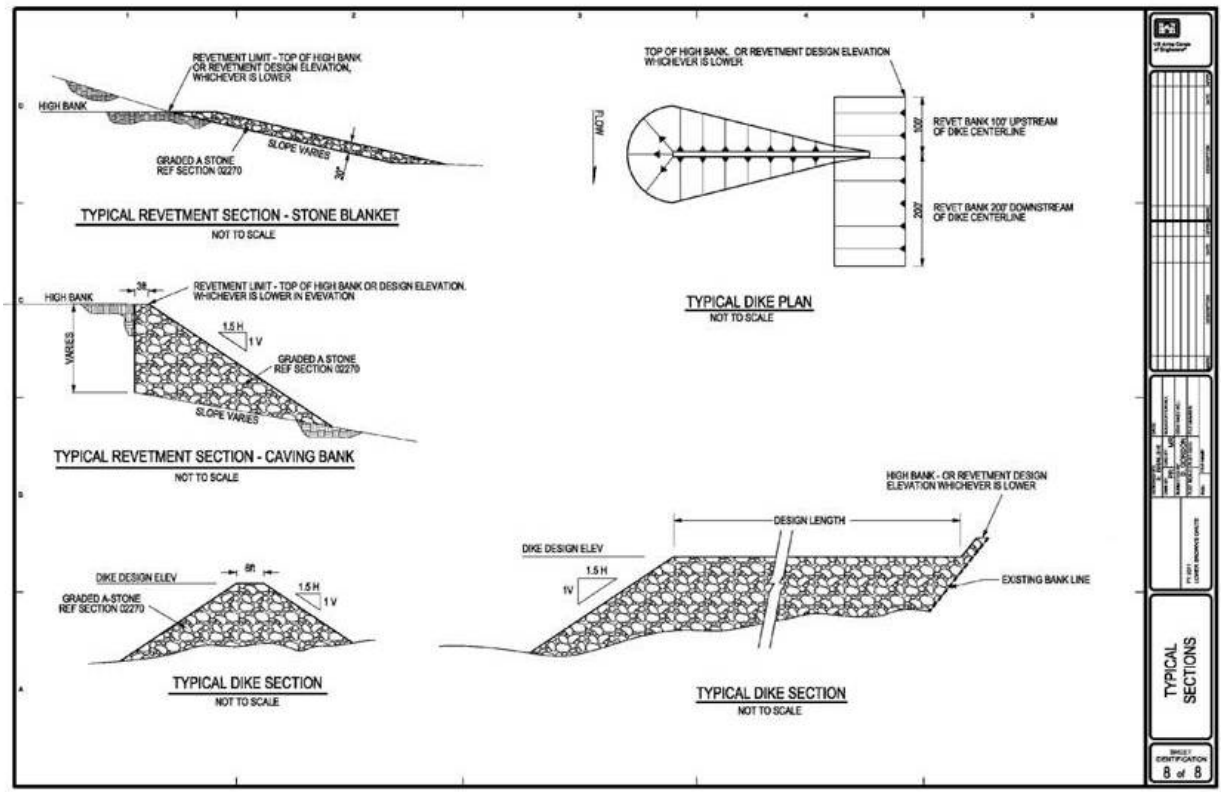

Figure 6. Typical cross section of structures

5 PROJECT RISK & 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.

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.

The Navigation Study (USACE, 2004) provides the details for the adaptive management plan for the system, and the site-specific monitoring and adaptive management plan for Moore's Towhead complements the systemic approach and is described in Section 6 of the Mitigation Plan with Integrated SEA and Appendix E, Monitoring and Adaptive Management.

6 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 Moore's Towhead 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 NESP Moore's Towhead project.

The Moore's Towhead 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 a bullnose upstream of the islands and the placement of revetment along the main channel side of the upper portion of Moore's Towhead. 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.

6.1 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).

6.1.1.1 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.

Tables 3 and4 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 3 ***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 4. 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**				

6.1.1.2 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).

6.1.1.3 REGIONAL OBSERVED METEOROLOGICAL TRENDS

Figure 7 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 8 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.

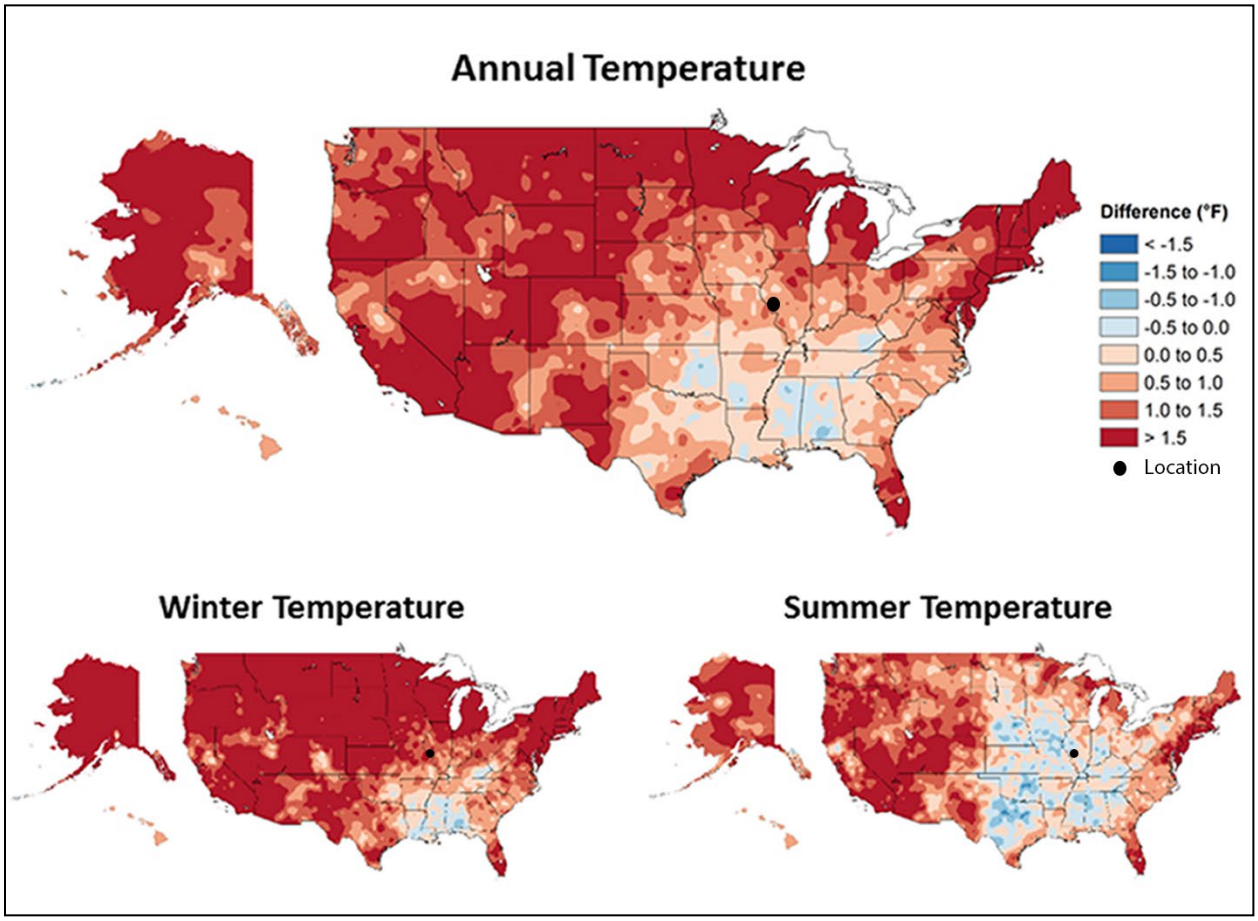

Figure 7. Observed changes in annual, winter, and summer temperature (°F). Changes are the average for present-day (1986–2015) minus the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i) divided by the average for the first half of the century (Source Peterson et al. 2013)

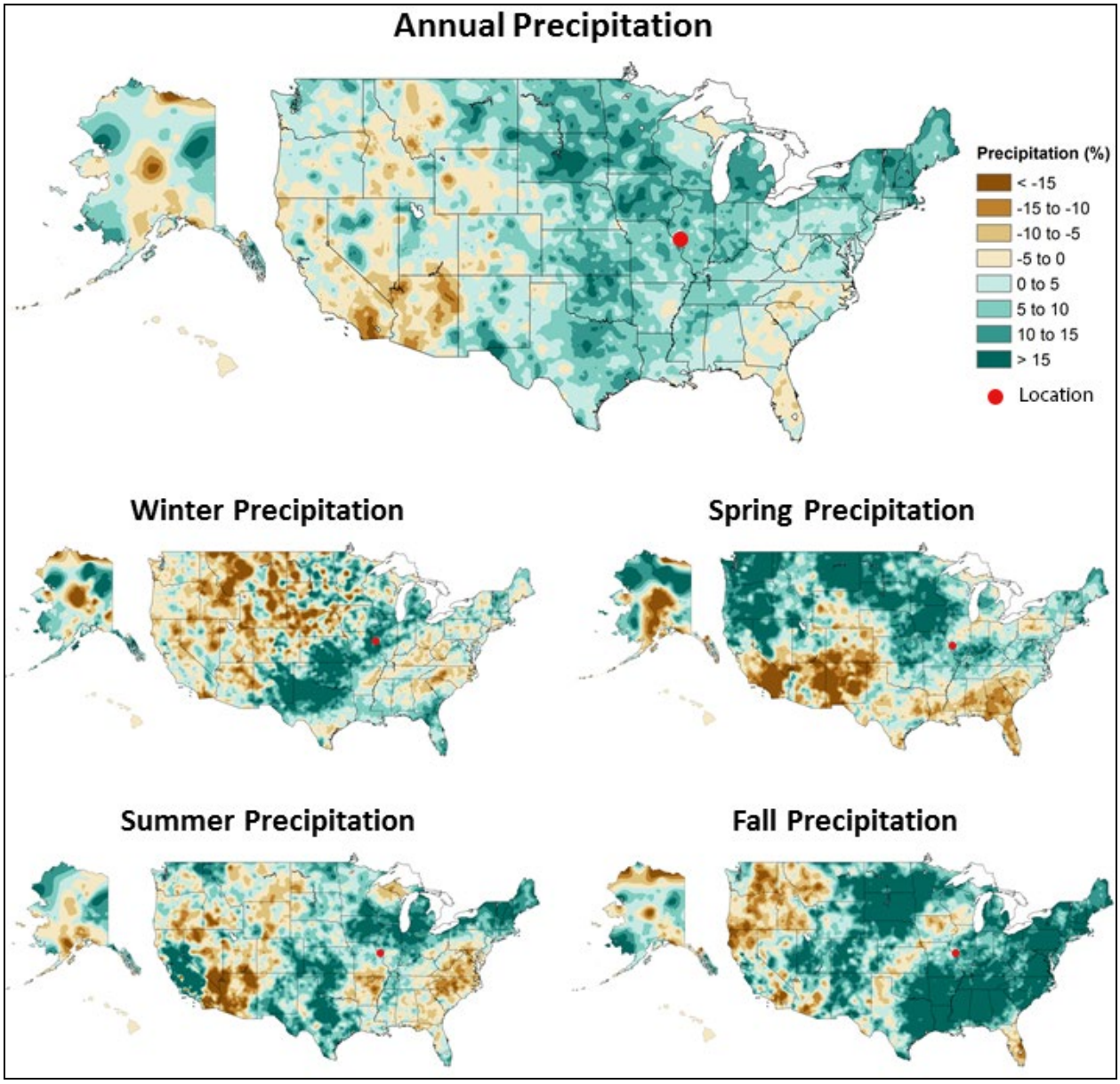

Figure 8. Annual and seasonal changes in precipitation over the United States. Changes are the average for present-day (1986–2015) minus the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i) divided by the average for the first half of the century (Source Peterson et al. 2013)

6.1.1.4 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 9, 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 forecast that annual precipitation and the frequency of large storm events will increase in the future. Figure 10 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 because of increased temperature and evapotranspiration rates (USACE, 2015).

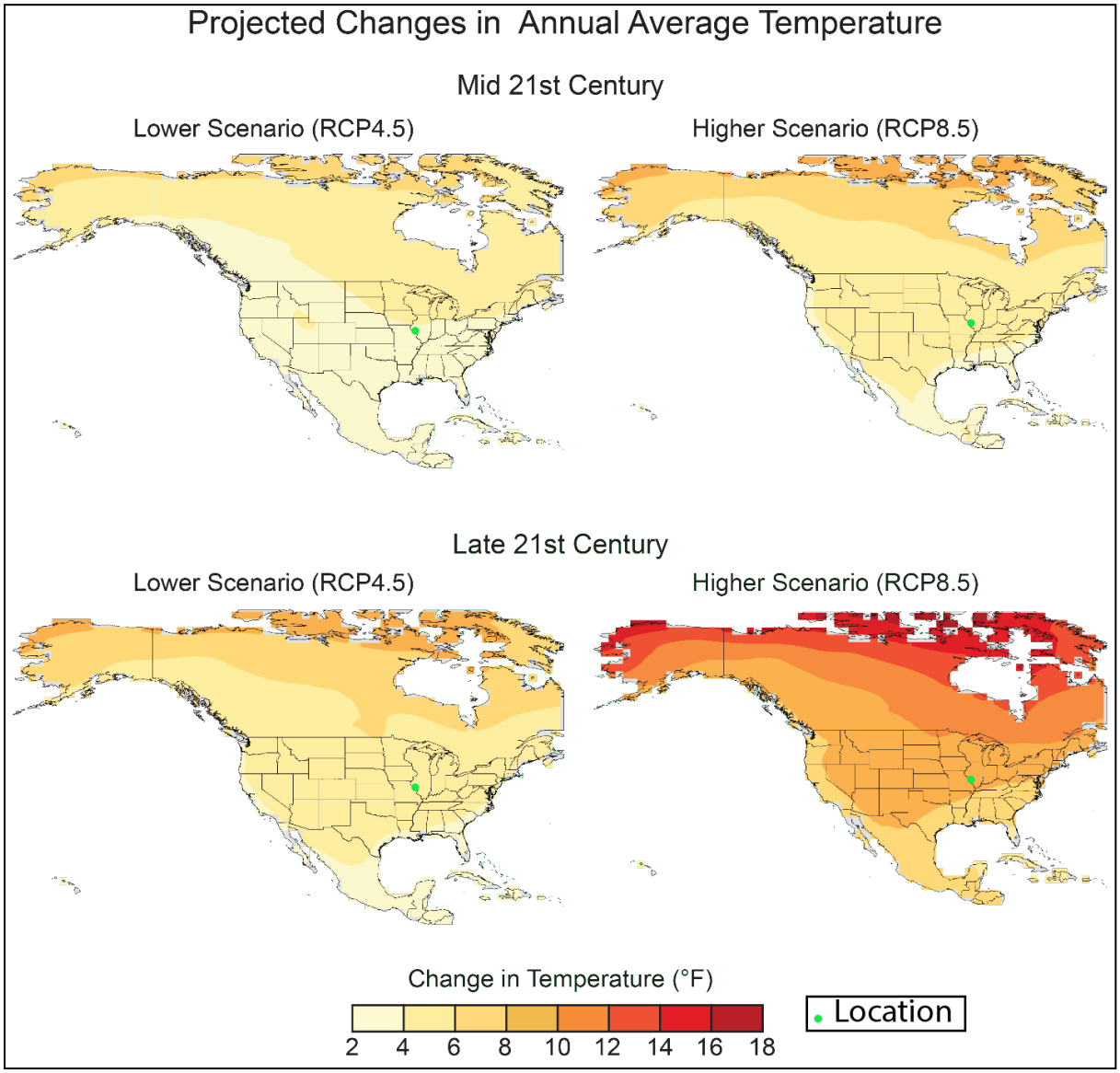

Figure 9. Projected changes in annual average temperatures (°F). Changes are the difference between the average for mid-century (2036–2065; top) or late-century (2070-2099, bottom) and the average for near-present (1976–2005). (NCA Vol 1, 2017 Figure 6.7; Figure source: CICS-NC and NOAA NCEI).

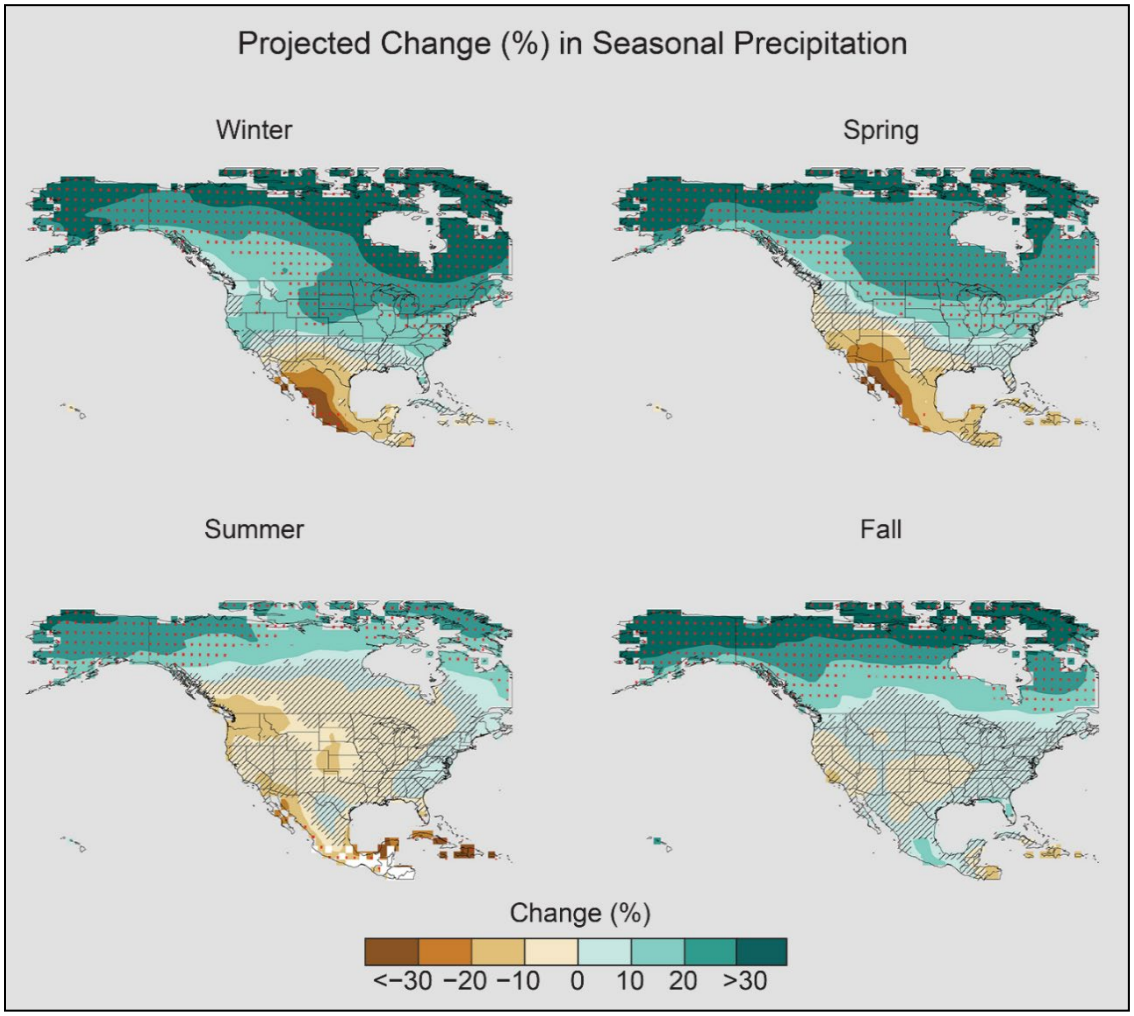

Figure 10. Projected change (%) in total seasonal precipitation from CMIP5 simulations for 2070–2099.

6.1.1.5 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).

6.1.1.6 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 11 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.

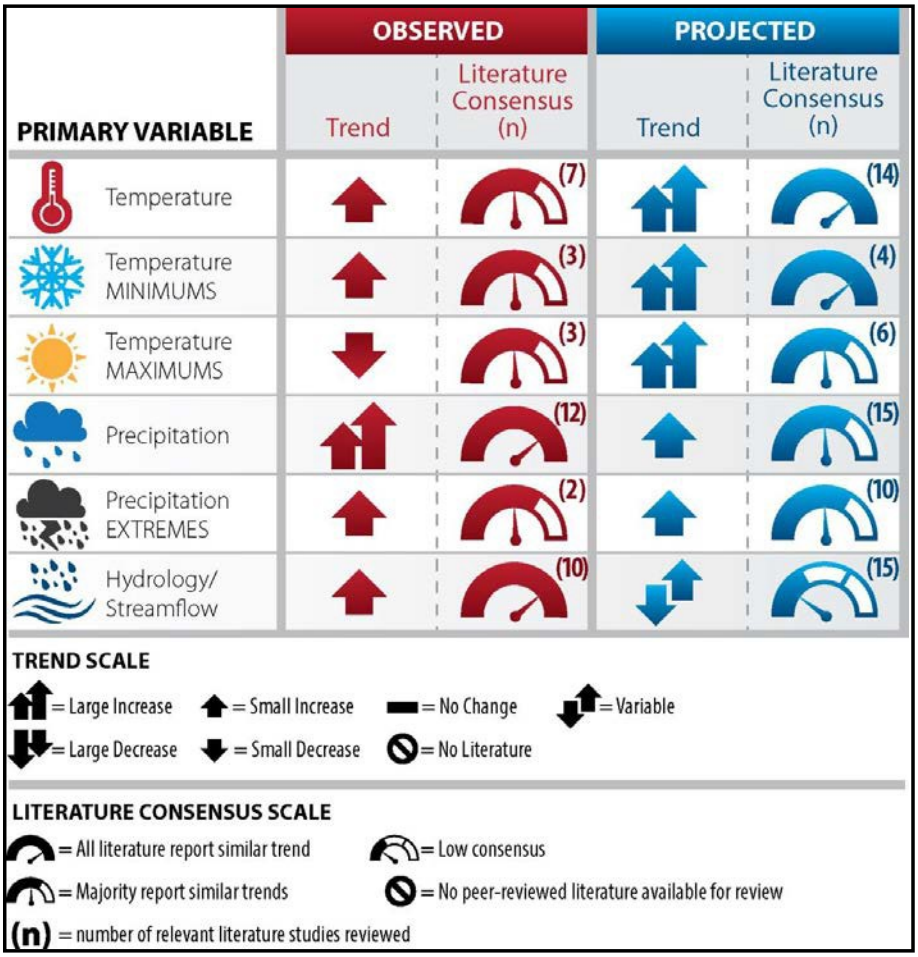

Figure 11. Summary matrix of observed and projected regional climate trends and literature consensus.

6.2 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 Moore's Towhead climate assessment are shown in Figure 12 and Table 5. 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.

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.

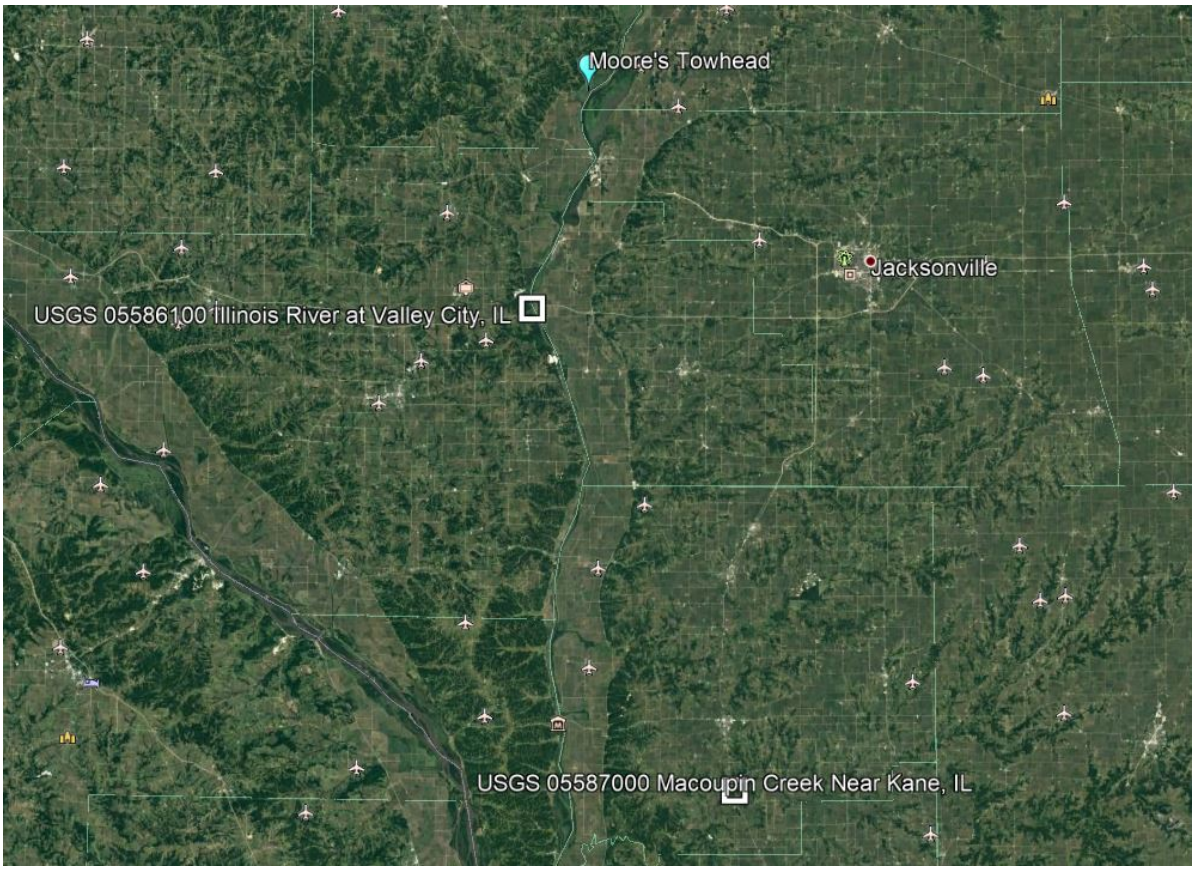

Figure 12. Gage Location Used

Table 5. USGS Gage Information

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

6.2.1.1 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 13 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).

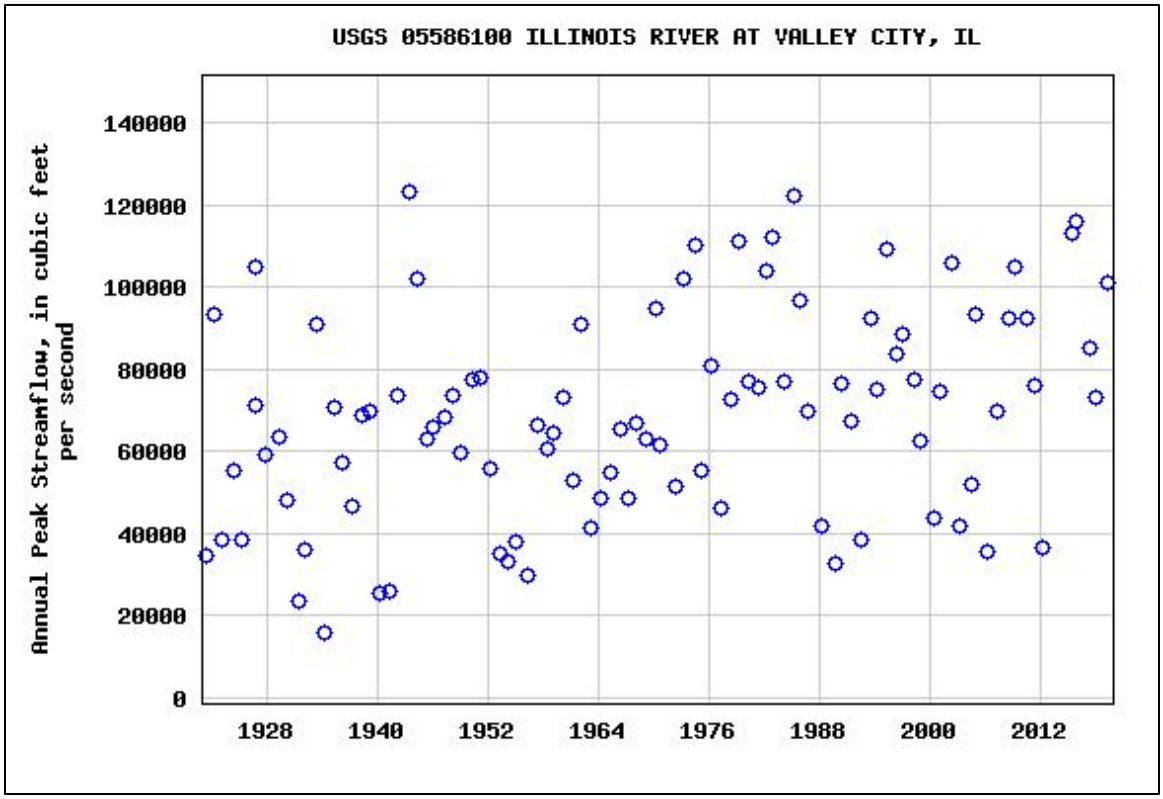

Figure 13. Annual Instantaneous Peak Streamflow for the Illinois River at Valley City, IL

In the 1930s the Corps of Engineers constructed a series of locks and dams upstream and downstream of the Moore's Towhead 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 14 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.

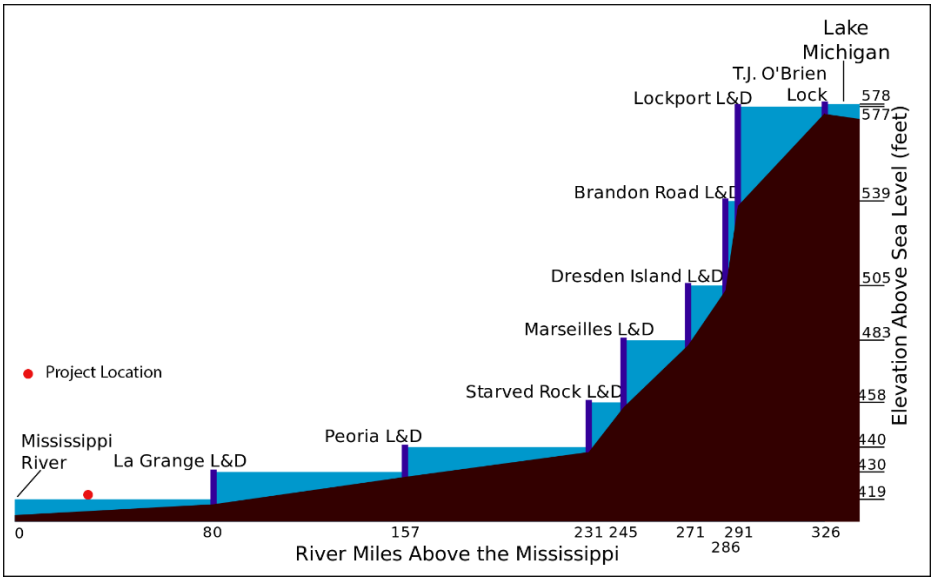

Figure 14. Annual Instantaneous Peak Streamflow for the Illinois River at Valley City, IL

Figure 15 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.

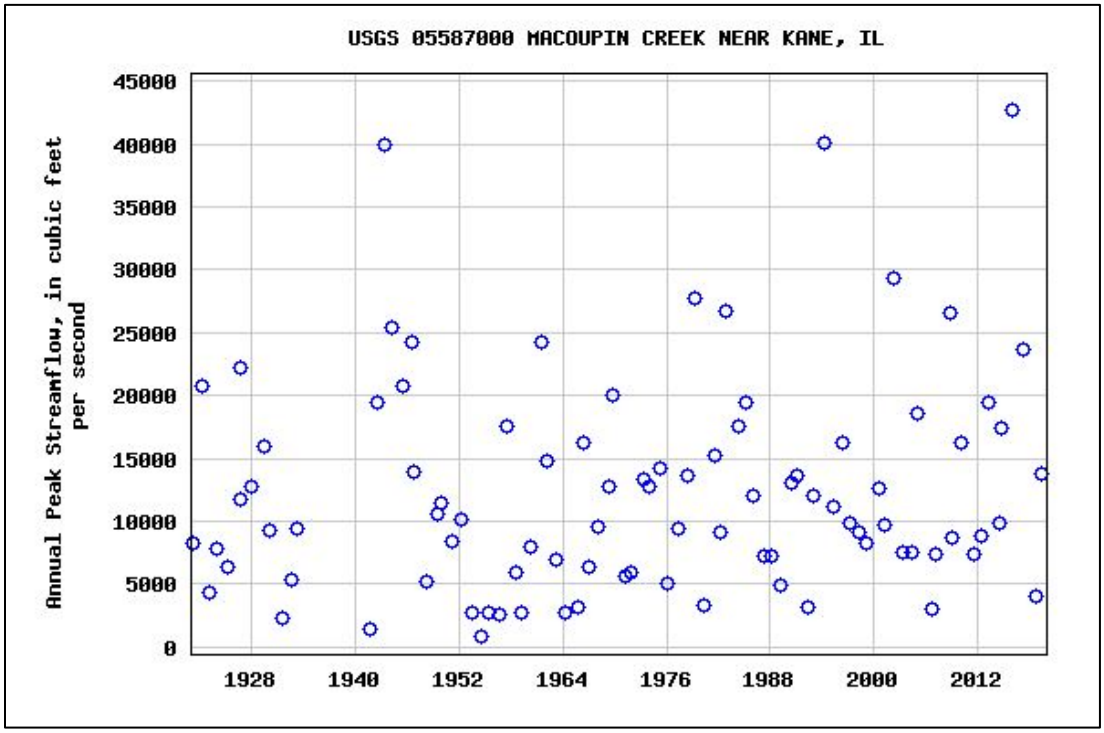

Figure 15. Annual Instantaneous Peak Streamflow for the Macoupin Creek near Kane, IL

6.2.1.1.1 NONSTATIONARITY DETECTION TOOL

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 16), 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.

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 17). 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.

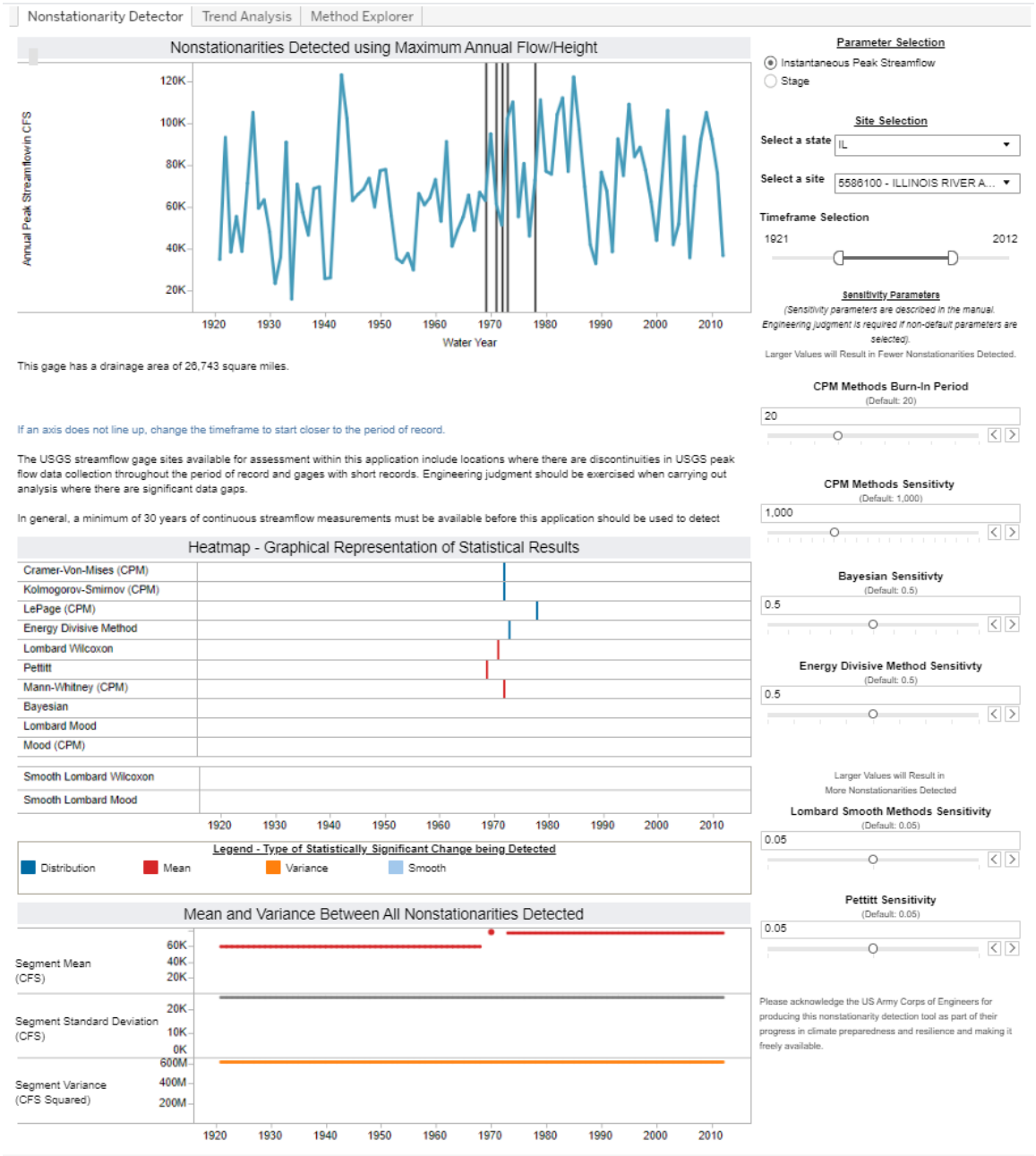

Figure 16. Nonstationarity Analysis of Maximum Annual Flow, Illinois River at Valley City, IL

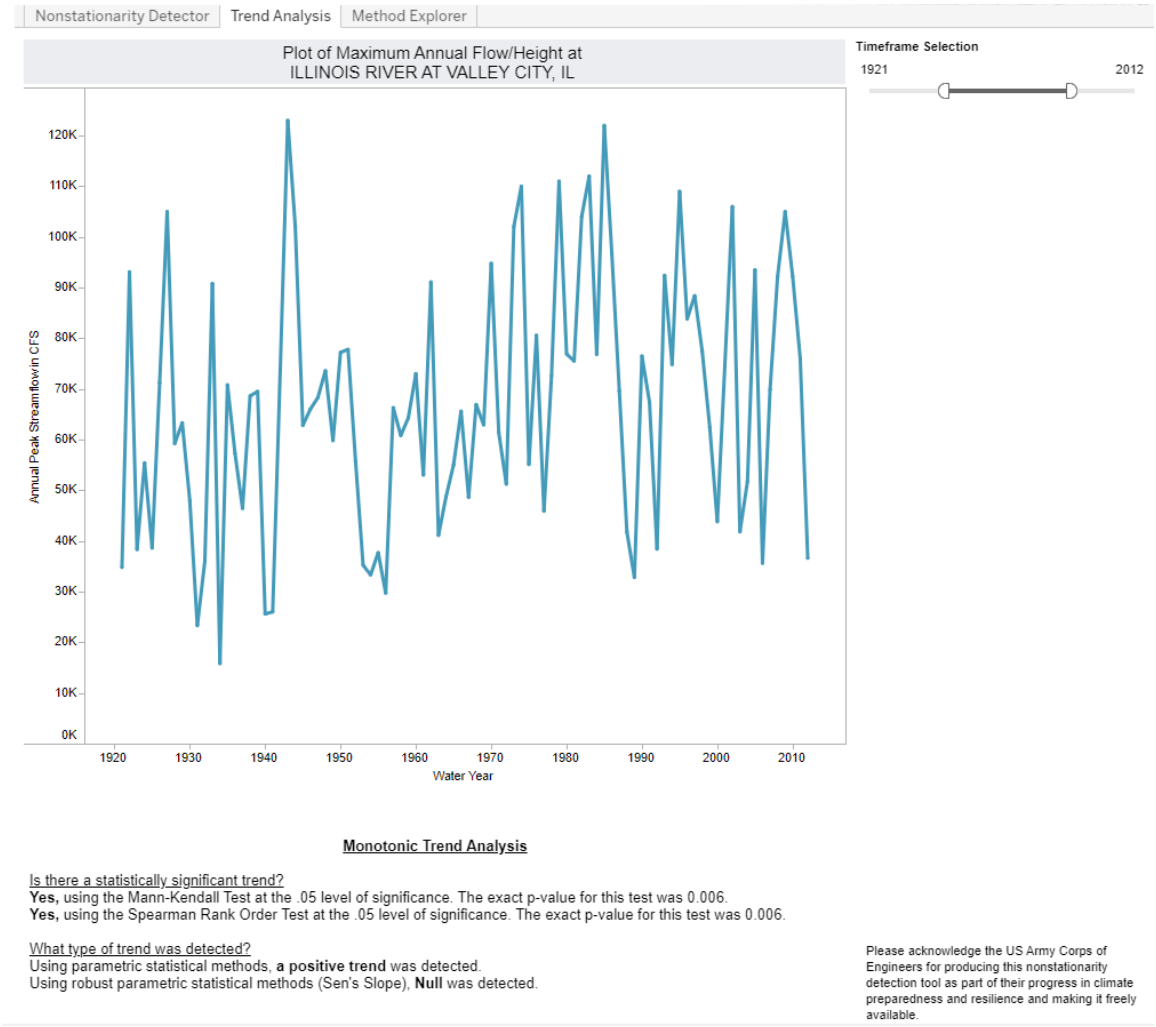

Figure 17. Monotonic Trend Analysis, Illinois River at Valley City, IL

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 18). The Monotonic Trend analysis for the full POR showed no statistically significant trend in the streamflow (Figure 19). This means it can be assumed that the full period of record is representative of homogenous hydrologic conditions for Macoupin Creek near Kane, IL.

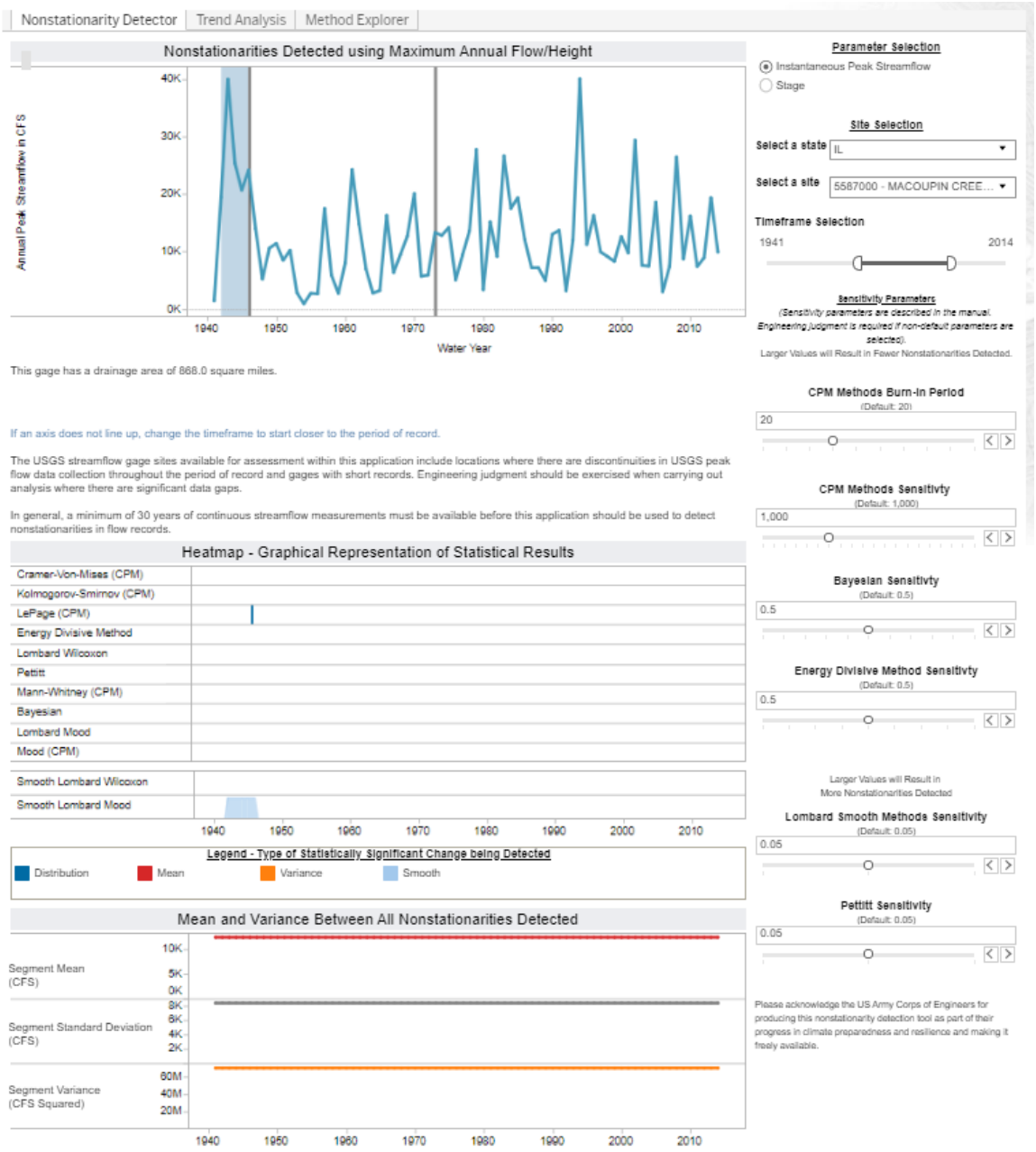

Figure 18. Nonstationarity Analysis of Maximum Annual Flow, Macoupin Creek near Kane, IL.

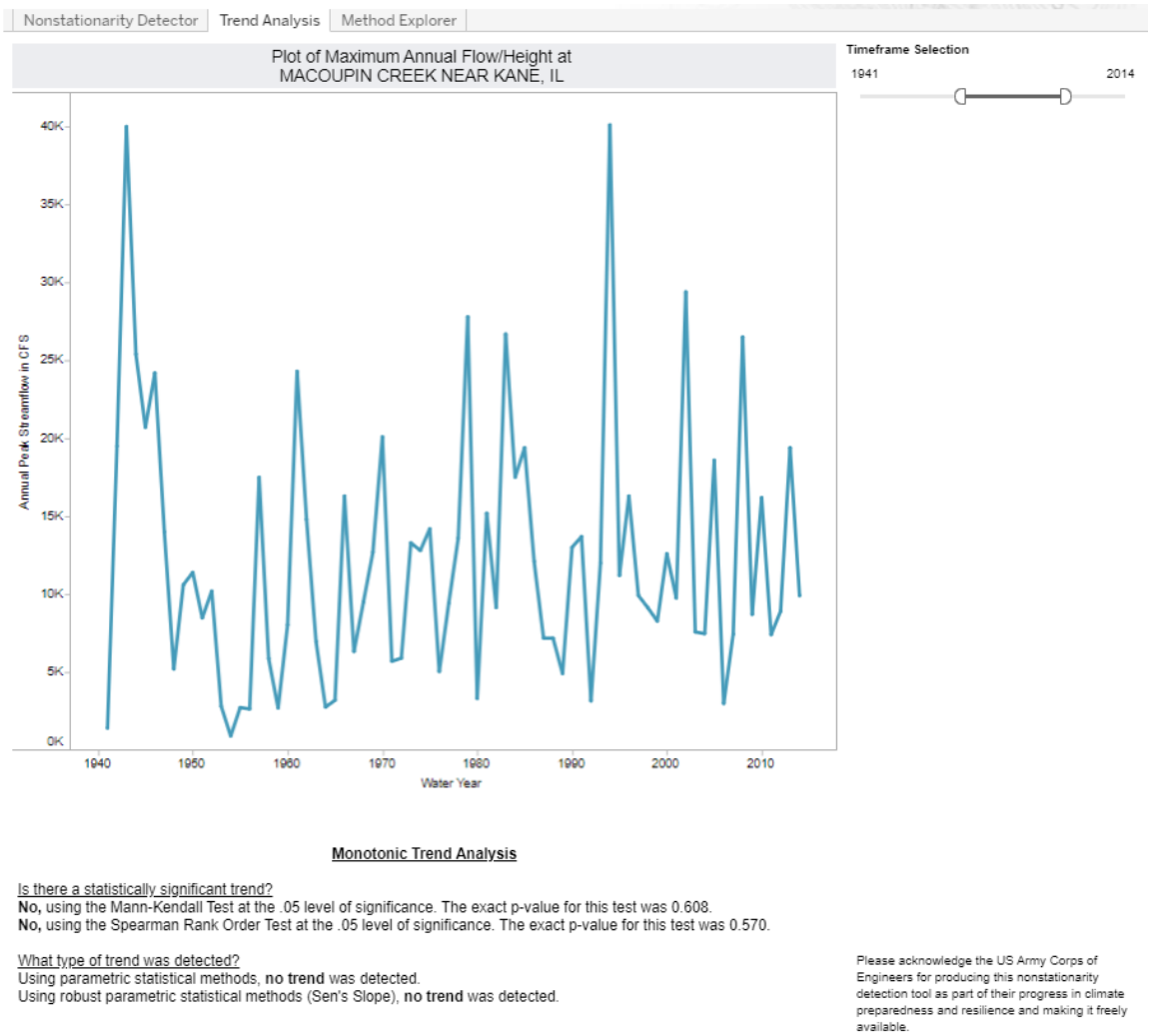

Figure 19. Monotonic Trend Analysis, Macoupin Creek near Kane, IL

6.2.1.1.2 CLIMATE HYDROLOGY ASSESSMENT TOOL

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 20. 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.

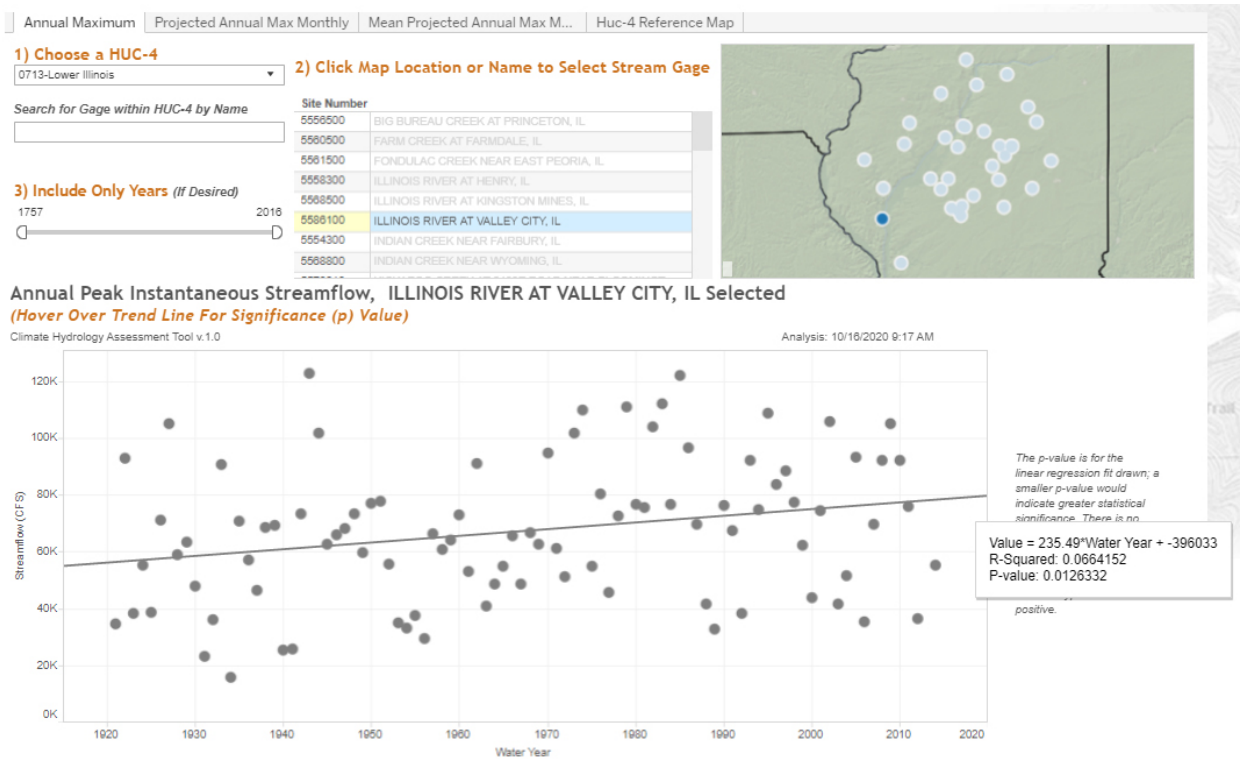

Figure 20. Annual Peak Instantaneous Streamflow, Illinois River at Valley City, IL gage (05586100).

The hydrologic time series of annual peak instantaneous streamflow at the Macoupin Creek near Kane, IL gage (05587000) is shown in Figure 21. The gage does not exhibit a statistically significant trend (p-value = 0.56 >> 0.05) in peak flows over the period of record analyzed.

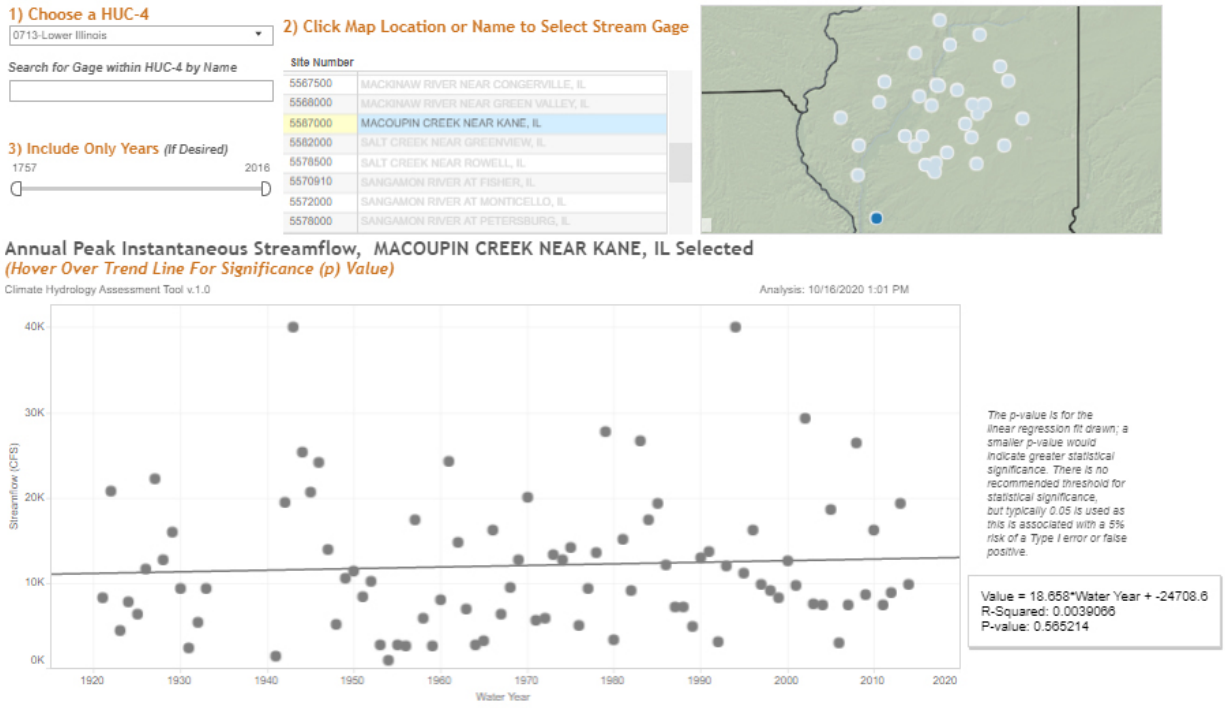

Figure 21. Annual Peak Instantaneous Streamflow, Macoupin Creek near Kane, IL gage

6.2.1.1.3 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 22; 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 23). 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.

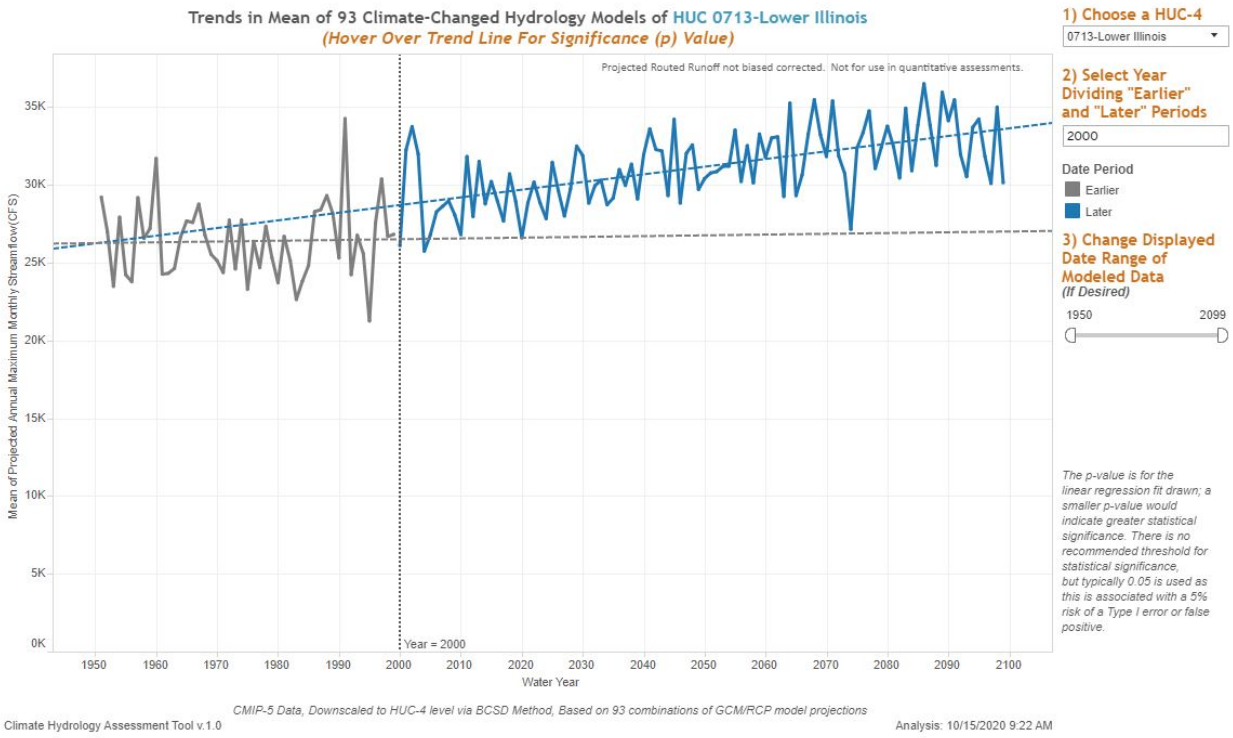

Figure 22. Mean Projected Annual Maximum Monthly Streamflow, HUC 0713-Lower Illinois River

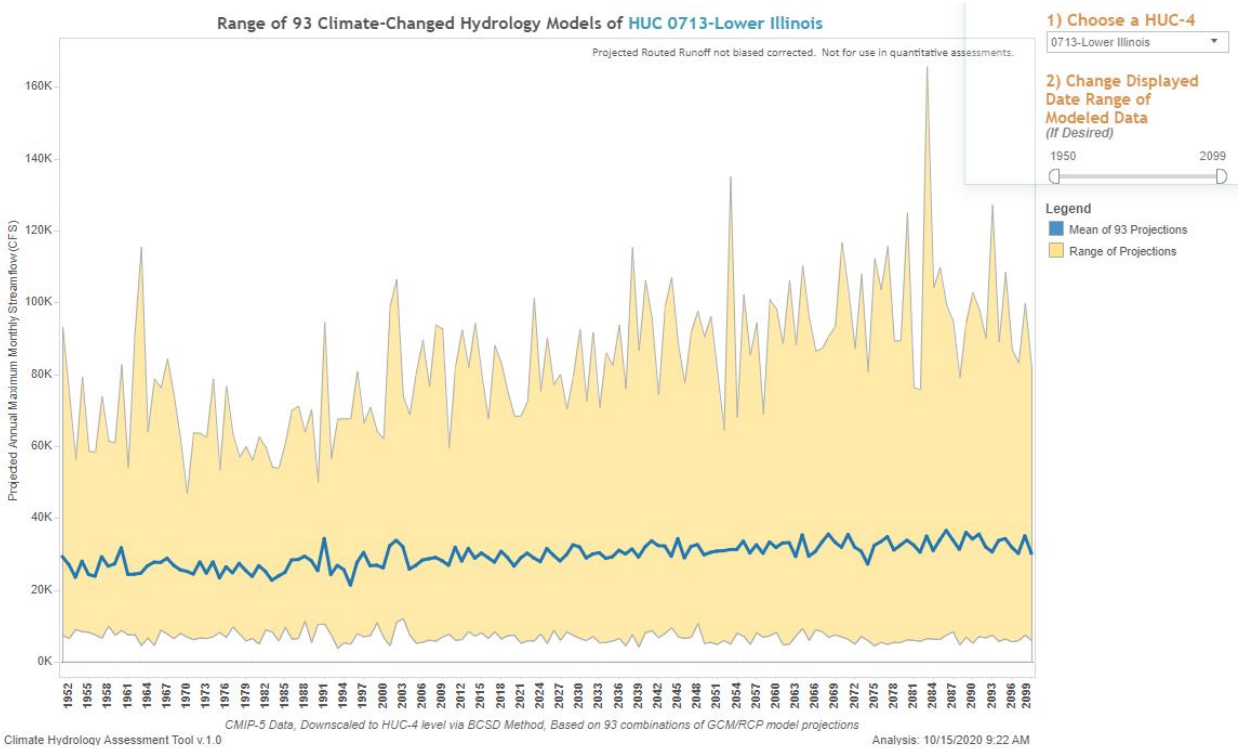

Figure 23. Range in the Projected Annual Maximum Monthly Flows, HUC 0713-Lower Illinois River

6.2.1.2 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 24, 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 6. These factors are associated with the Moore's Towhead 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.

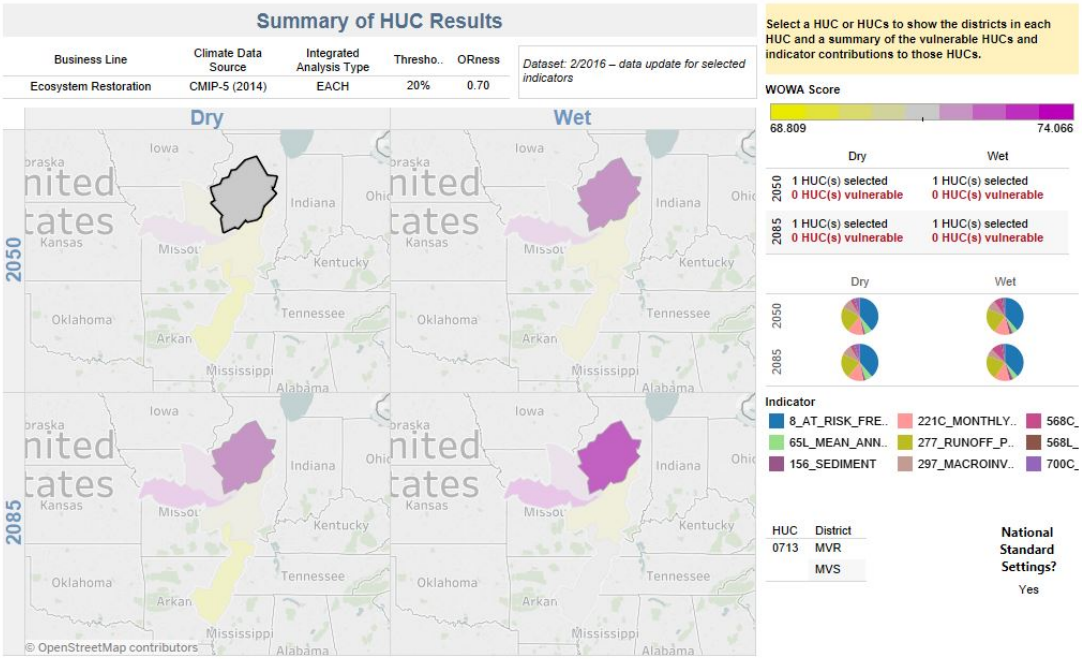

Figure 24. Vulnerability Assessment Tool HUC Results for Lower Illinois River Watershed (HUC 0713)

Table 6. 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%

6.3 Quality Residual Risk Due to Climate Change

Table 7 shows the risks that could be experienced with climate change at the project site. These risks are mitigated using 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. Risks to the Recommended Mitigation Plan due to climate change

Feature	Trigger	Hazard	Harm	Qualitative Likelihood
Island 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.
	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 Moore's Towhead	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.
	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 damage could undermine revetment measures and cause failure	Unlikely, Higher flows should have little to no effect on the performance of the stone placed.

6.4 CLIMATE CHANGE CONCLUSIONS

A review of recently published literature related to trends in observed and projected hydrometeorological datasets indicates the following for the Moore's Towhead project area:

1. The 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 Moore's Towhead 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 Moore's Towhead 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.

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Appendix B

Navigation and Ecosystem Sustainability Program

Moore's Towhead Bank Erosion and Fisheries

Environmental Mitigation

Clean Water Act

Section 404(B)1 Evaluation

October 2020

Regional Planning and Environmental Division North
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

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MOORE'S TOWHEAD BANK EROSION AND FISHERIES ENVIRONMENTAL MITIGATION

BROWN COUNTY, ILLINOIS

CLEAN WATER ACT 404(B)1 EVALUATION

Contents

Section 1: Project Description

Location

The Moore's Towhead Systemic Environmental Mitigation Project is located in Brown County, Illinois at river mile (RM) 76.2 along the right descending bank (RDB) of the Illinois River. The Island is located near the town of Meredosia, 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 *Design Documentation Report with Integrated Environmental Assessment, Moore's Towhead Bank Erosion & Fisheries Systemic Environmental Mitigation, Illinois Waterway, Brown 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.

The proposed project is part of the Adaptive Mitigation Plan outlined in the *Final Integrated Feasibility Report and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Stud*y (Navigation Study). Moore's Towhead was selected as a mitigation site to stabilize current erosion and mitigate for potential increases in erosion and fish mortality (i.e., from propeller entrainment) due to an incremental increase in navigation traffic from proposed improvements to the navigation system under the Navigation and Ecosystem Sustainability Program (NESP). Implementation of the tentatively selected plan would decrease bank erosion and provide shelter habitat for a variety of fish and other aquatic species. Stabilizing the bankline would maintain island habitat, which is a rare habitat type within the Illinois River. Incorporating woody structure with the bank stabilization structures will increase cover habitat for fish. In addition, areas of low flow, shallower water will be created between the off-shore structures and shoreline will provide spawning, rearing, and resting opportunities for a wide variety of aquatic life.

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. Stone (9,380 tons) used for the project would be obtained from commercial stone quarries in the vicinity of the project area. In addition, woody bundles consisting of non-treated timber will be tied together with cable and secured with a buoy anchor. The woody bundles would be obtained from locally available wood in the vicinity of the project area.

Description of Proposed Discharge and Placement Site

The proposed project would consist of constructing an off-shore bullnose at the head of the island (approximately 3,780 tons of stone), on bank revetment (approximately 5,600 tons of stone) along the riverside bankline, and placement of three woody bundles between the bullnose and the island head.

Description of Placement Method

Construction in the project area would use a track hoe or dragline crane. A total of approximately 9,380 tons of graded "A" stone would be needed for creation of the bullnose chevron and on bank revetment. Stone would be transported to placement site by barges. All construction would be accomplished from the river and all work would be performed below ordinary high water.

Section 2: Factual Determinations

Physical Substrate Determination

a. Substrate Elevation and Slope. Rock would be placed in a "U-shape" approximately 50 feet off the head of the northern island to an elevation of 428 feet NGVD (2 feet above mean water level). Construction specifications are provided in the full report.

b. Sediment Type. Moore's Towhead's soil consists of dockery silt loam with 0 to 2% slopes that are frequently flooded for long durations.

c. Dredged/Fill Material Movement. Use of the dragline and track hoe from the barge to form the bullnose and revetment placement would limit the movement of the fill material. Fill materials would be subject to the forces of flood flows. As none of the disposal sites would be confined, all materials would have the potential to migrate downstream.

d. Physical Effects on Benthos. Placement of riprap off the head of the island and woody piles between the bullnose and islands would temporarily disrupt the aquatic environment. Benthos present in these areas will be destroyed by burial during placement of riprap and woody piles. 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. Best Management Practices for construction will be enforced. Clean, quarry grade limestone will be utilized in construction of the bullnose chevron and revetments to reduce impacts to water quality.

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. The main purpose of this project is to reduce wave-induced bank erosion along the island. The revetment and bullnose are designed to alter flow and circulation to decrease bank erosion. These changes would alter hydraulics locally, but are not likely to adversely affect hydraulics of the Illinois River.

a. **Velocity.** Localized increased velocity around 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. Best Management Practices for construction will be enforced. Clean, quarry grade limestone will be utilized in construction of the bullnose chevron and revetments 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 and increase aquatic habitat diversity.

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.** There will be a temporary reduction until sediments suspended as part of the project activities settle out of the water column.
b. **Dissolved Oxygen**. No adverse effects expected.
c. **Toxic Metals and Organics.** No adverse effects are expected as no toxic metals or organics are known to occur in proposed work areas.
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 after construction.

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

Biotic Determination

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.

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. The project would establish new low-flow habitat and maintain island habitat in a reach of the Illinois River that currently lacks this habitat type. The increase in habitat

diversity would improve the overall health and food web of the river. Fisheries are expected to increase as well as benthic organisms as water quality and habitat diversity are improved by the project.

Effects on Special Aquatic Sites. There are no special aquatic sites within the project area; therefore, no sanctuaries and refuges, mud flats, 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 Moore's Towhead 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
Eastern Prairie Fringed Orchid *(Platanthera leucophaea)*	Threatened	Meadows, marsh edges, and bogs with little woody encroachment
Prairie Bush-clover (*Lespedeza leucophaea)*	Threatened	Upland prairie

The Biological Assessment concluded activities associated with the Recommended Plan (i.e., island bullnose chevron, on-bank revetment, and woody bundles) may affect but not likely to adversely affect Indiana bat and Northern long-eared bat, and no effect on Decurrent false aster, Eastern prairie fringed orchid, and Prairie lespedeza. No critical habitats occur within Project Area.

Other Fish and Wildlife. The project would likely result in some short-term displacement of wildlife in the immediate vicinity of the construction activities. 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 Service 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. No long-term adverse impacts to municipal and private water supplies; water-related recreation; aesthetics; or parks, national and historic monuments, national seashores, wilderness areas, research sites or similar preserves would occur. During construction the area would not be available for recreational and commercial fishing. Following construction, the proposed project would enhance fishing opportunities in the area and improve the overall condition of Moore's Towhead.

Determination of Cumulative Effects on the Aquatic Ecosystem

Although minor short-term construction-related impacts to local fish and wildlife populations are likely to occur, no negative cumulative impacts to fish and wildlife are identified. From a systemic approach, the tentatively selected plan represents an incremental step in achieving improved habitat conditions and diversity for fish and wildlife utilizing the Illinois River.

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
SYSTEMIC ENVIRONMENTAL MITIGATION – MOORE'S TOWHEAD

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.

A reasonable range of alternatives were evaluated as part of the feasibility report with integrated Environmental Assessment. Alternatives that were considered for the proposed action included off-shore structures along the river side of the island. These structures were either wood or rock or a combination of wood and rock. Seven 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 Regional General Permit 16 (Bank Stabilization Activities) and Nationwide Permit 27 (Aquatic Habitat Restoration) and 13 (Bank Stabilization). A copy of the Section 404 Regional General Permit Conditions and Nationwide Permit Conditions are attached. The project would be in compliance with water quality requirements of the State of Illinois.

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

Appendix C

Navigation and Ecosystem Sustainability Program

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

Biological Assessment

July 2020

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

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

BIOLOGICAL ASSESSMENT

Contents

Introduction

The purpose of this Biological Assessment (BA) is to review the Moore's Towhead Bank Erosion and Fisheries Systemic Environmental Mitigation 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 Moore's Towhead, located within the Alton navigation pool. The Alton navigation pool extends from river miles 0 to 80 on the Illinois River. Moore's Towhead is located on the right descending bank of the Illinois River between river miles 76.0 and 76.2 in Brown County between the cities of Meredosia and LaGrange, Illinois. The Project Area is approximately 16.37 acres of aquatic and island habitat (Figure 1).

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.

Proposed Action

The USACE is recommending the construction of the Recommended Plan (Figure 2) to mitigate systemic impacts from the Upper Mississippi River-Illinois Waterways (UMR-IWW) System Navigation Feasibility Study (USACE, 2004) due to increased navigation traffic on the system. The systemic environmental mitigation project at Moore's Towhead is being proposed to minimize bank erosion and enhance fisheries resources. The Recommended Plan (Figure 2) consists of the following measures:

- 300-foot off-shore bullnose
- 700-foot on-bank revetment along the riverward bank of Moore's Towhead
- 3 woody bundles placed between the bullnose and head of Moore's Towhead

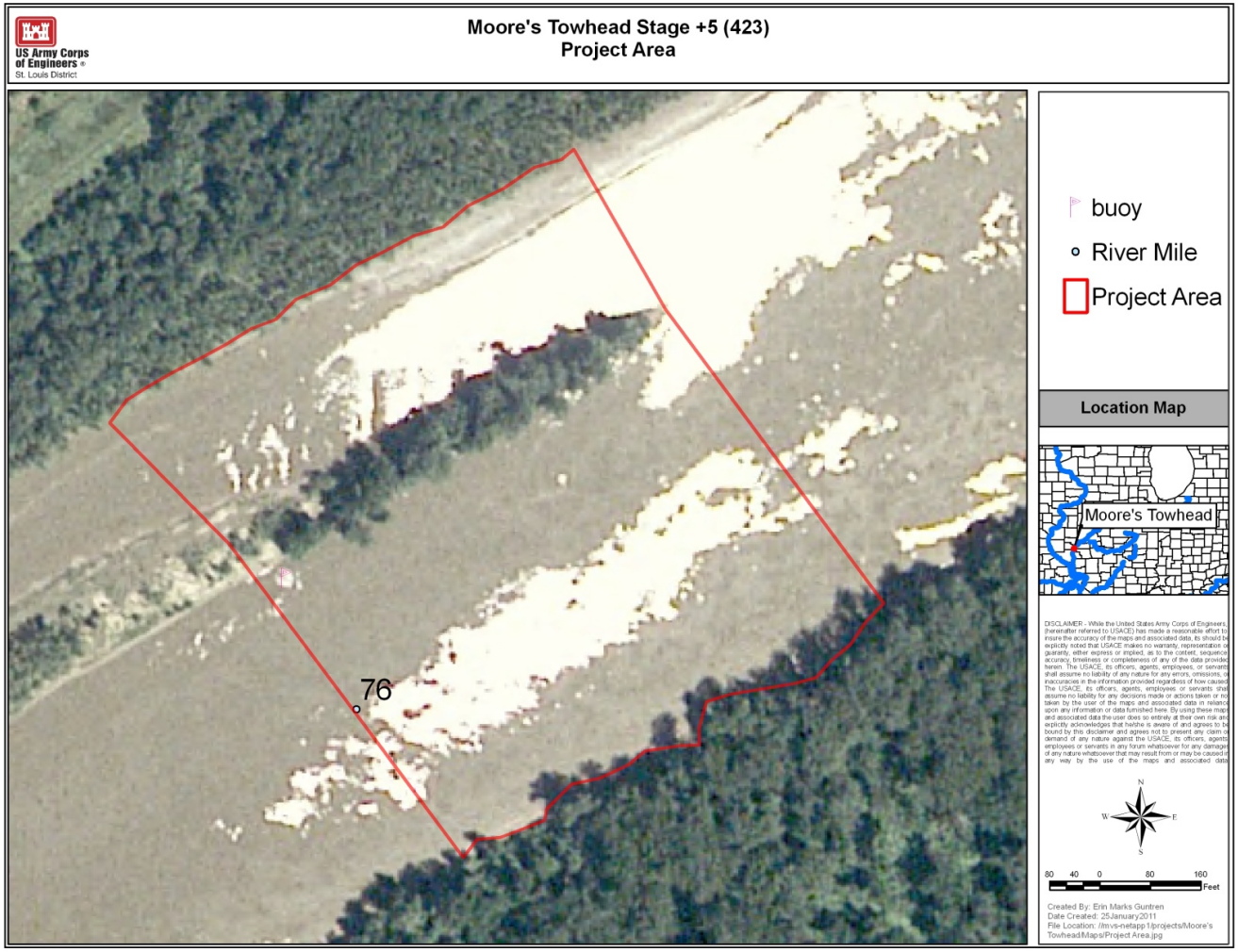

Figure 1. Project Area and Vicinity Map

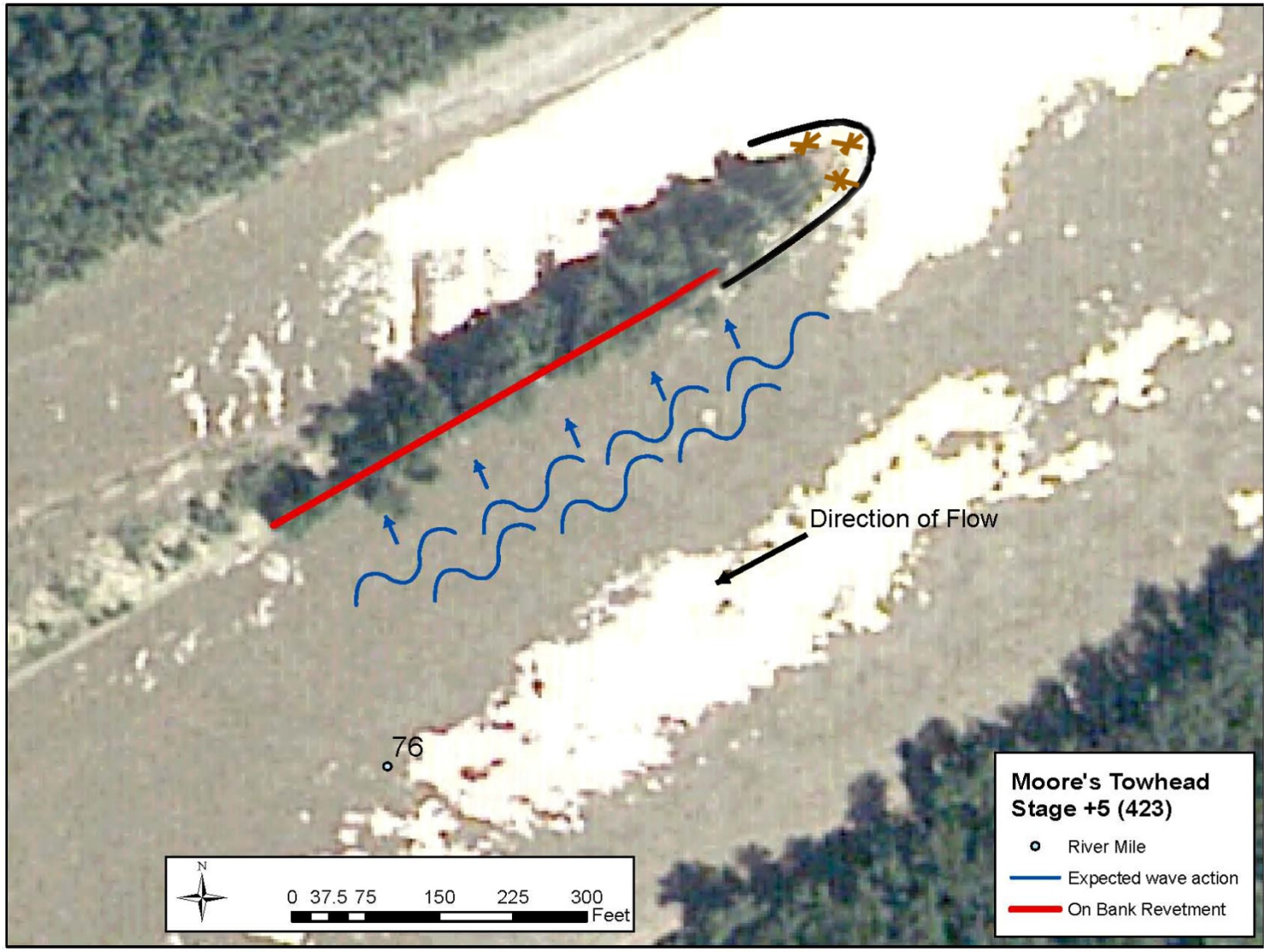

Figure 2. Schematic Design of Recommended Plan

Species Covered in this Consultation

The Corps requested the official species via the ECOS-IPaC website (http://ecos.fws.gov/ipac/). The U.S. Fish and Wildlife Service provided a list of 5 federally threatened and endangered species that could potentially be found in the area (Brown County, Illinois) via an original letter dated 29 June 2020. The 5 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 work 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
Eastern Prairie Fringed Orchid *(Platanthera leucophaea)*	Threatened	Meadows, marsh edges, and bogs with little woody encroachment
Prairie Bush-clover (*Lespedeza leucophaea)*	Threatened	Upland prairie

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, and thermal conditions. 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 and roosting 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 of foraging and roosting habitats. We conclude the Moore's Towhead 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 minimal chance for indirect effects to Northern long-eared bats through short-term noise disturbance to foraging and roosting habitats. We conclude the proposed Moore's Towhead 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 Illinois River and portions of the Mississippi River. It is dependent on flood pulses or other 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 in a preserve adjacent to the Project Area and Illinois River in Brown County, IL.

Effects Determination

Suitable habitat does not exist within the Proposed Project; therefore, we conclude the proposed Moore's Towhead Project will have ***no effect on decurrent false aster*.**

Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)

Status

Eastern Prairie Fringed Orchid is a federally listed, threatened perennial plant species that may be found in swales of upland prairies, wet bottomland prairies, and bogs (Yatskievych, 1999) as well as sand prairies and sedge meadows (USFWS, 1999). It typically occurs in spring fed alkaline meadows and on calcareous substrates. Dormant season disturbance such as prairie fire is generally considered important to the establishment and persistence of individuals, but growing season disturbance tends to weaken plants by limiting food storage abilities in its underground tubers. Early growing season disturbance was found to stop development of next season's flower buds, induce dormancy, or even result in death of the plant the following year (Sheviak, 1990).

Rangewide, the population has declined 70% and this is due primarily to habitat conversion from prairie to cropland. In Illinois, the historic range has declined from presence in 33 counties in the north and central part of the state to 6 counties primarily in the Chicago region (USFWS., 1999). Early species decline was due to habitat loss, mainly habitat conversion to cropland and pasture. The current decline is mainly due to habitat loss from wetland drainage and development. Other reasons for the current decline include succession to woody vegetation; competition from non-native species; and over-collection. No critical habitat rules have been published for the Eastern Prairie Fringed Orchid. This species has not been found within the Project Area.

Effects Determination

Suitable habitat and disturbance regime do not exist within the Proposed Project; therefore, we conclude the proposed Moore's Towhead Bank Erosion and Fisheries Project will have ***no effect on Eastern Prairie Fringed Orchid*.**

Prairie Lespedeza (*Lespedeza leptostachya*)

Status

Prairie Lespedeza is a federally listed, threatened perennial plant species that may be found in upland and mesic prairies (USFWS, 1988; Steyermark, 2013) of Iowa, Illinois, Minnesota and Wisconsin. Species records are primarily restricted to the northern 1/8 of the Illinois (Mohlenbrock, 2014), but it may have had a more widespread distribution in the middle of the state prior to extensive land cover change throughout its range. Many remaining prairie bush clover populations occur in sites that are too steep or rocky to be used for agriculture. Species decline is primarily due to three factors and includes: conversion of widespread prairie in its range to cropland, overgrazing in pastures with populations of Prairie Lespedeza, and urban expansion. Other threats include herbicide application, rock quarrying, and right-of-way maintenance and rerouting. No critical habitat rules have been published for Prairie Lespedeza. This species has not been found within the Project Area.

Effects Determination

Suitable mesic prairie does not exist within the Proposed Project; therefore, we conclude the proposed Moore's Towhead Bank Erosion and Fisheries project will have ***no effect on Prairie Lespedeza*.**

List of Preparers

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Official Species List 29 June 2020

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Illinois-Iowa Ecological Services Field Office
Illinois & Iowa Ecological Services Field Office
1511 47th Ave
Moline, IL 61265-7022
Phone: (309) 757-5800 Fax: (309) 757-5807

In Reply Refer To: June 29, 2020
Consultation Code: 03E18000-2020-SLI-2012
Event Code: 03E18000-2020-E-04776
Project Name: NESP Moore's Towhead Bank Erosion & Fisheries Systemic Environmental Mitigation

Subject: List of threatened and endangered species that may occur in your proposed project location, and/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 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 at - 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, 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 at 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
- Wetlands

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:

Illinois-Iowa Ecological Services Field Office
Illinois & Iowa Ecological Services Field Office
1511 47th Ave
Moline, IL 61265-7022
(309) 757-5800

Project Summary

Consultation Code: 03E18000-2020-SLI-2012

Event Code: 03E18000-2020-E-04776

Project Name: NESP Moore's Towhead Bank Erosion & Fisheries Systemic Environmental Mitigation

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: The Moore's Towhead Systemic Environmental Mitigation Project area is located in Brown County, Illinois at River Miles (76.2) Right Descending bank (RDB). The double island is located near the village of Meredosia, Illinois. The project area only includes the northern island. The 16.37 acre project area is comprised of 14.71 acres of aquatic habitat and 1.66 acres of island habitat. All project area land is in ownership of The Nature Conservancy.

The primary resource problems in the area are loss of island habitat due to excess bank erosion caused by wave action and the subsequent degradation of fisheries resources. A project is proposed for Moore's Towhead to stabilize current erosion and mitigate for potential increases in erosion and fish mortality due to an incremental increase in navigation traffic from proposed improvements to the navigation system under the Navigation and Ecosystem Sustainability Program (NESP). Through several system-wide field surveys and evaluations, Moore's Towhead was identified as a mitigation area through a comprehensive study of the Upper Mississippi River System (UMR-IWW) that investigated the extent of existing bank erosion, the probable processes causing bank erosion, and potential for future bank erosion related to commercial navigation traffic. In addition, the increase in navigation is projected to have measurable impact with some losses to fisheries resources within the Illinois River. An opportunity exists to protect and maintain Moore's Towhead and provide fisheries resources in order to increase ecological integrity of the Illinois River. The mitigation objectives include:

Objective 1: Reduce effects of wave action and stop or reduce bank erosion and Moore's Towhead.
Objective 2: Increase sheltered riverbed microhabitats to offset the increase of propeller entrainment with the incremental increase in navigation traffic

The proposed plan would consist of off-shore bullnose with on bank revetment extending along the main channel side bank to the end of the

northern island with woody bundles placed between the bullnose and head of island

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/39.89296420738465N90.57182984980429W

Counties: Brown, IL | Cass, IL

Endangered Species Act Species

There is a total of 5 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. Your location is outside the critical habitat. 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
Eastern Prairie Fringed Orchid *Platanthera leucophaea* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened
Prairie Bush-clover *Lespedeza leptostachya* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4458	Threatened

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.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
Illinois River National Wildlife And Fish Refuges	3,700

Illinois River National Wildlife And Fish Refuges
19031 East County Road 2110n
Havana, IL 62644-6372
(309) 535-2290

https://www.fws.gov/refuges/profiles/index.cfm?id=33653

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1A

RIVERINE

- R2UBH

Correspondence Letter from USACE to USFWS 19 August 2020

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

19 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 Systemic Environmental Mitigation for Bankline Erosion and Fisheries Resources at Moore's Towhead (Illinoi River Mile 76.2) in Brown County near Meredosia, Illinois. The Biological Assessment concludes activities associated with the Recommended Plan (i.e., island wing-nose chevron, on-bank revetment, and woody bundles) may affect but not likely to adversely affect Indiana bat and Northern long-eared bat, and no effect on Decurrent false aster, Eastern prairie fringed orchid, and Prairie lespedeza. 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,

8/19/2020

X Brian Johnson

Brian Johnson
Chief, Environmental Compliance Branch
Signed by: JOHNSON.BRIAN.LLOYD.1231330336

1 enclosure

Response Letter from USFWS to USACE

Will include once received.

Appendix D

Navigation and Ecosystem Sustainability Program

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

HTRW

01 September 2020

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

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St. Louis District®

Environmental Quality Section
1222 Spruce Street
St Louis Missouri 63103

ENVIRONMENTAL SITE ASSESSMENT REPORT

Navigation and Ecosystem Sustainability Program: Moore's Towhead Bank Erosion & Fisheries Systemic Environmental Mitigation Illinois Waterway

Moore's Towhead
Hagener Township, IL 62611

PREPARED FOR:

United States Army Corps of Engineers
Saint Louis District
1222 Spruce Street
Saint Louis, MO 63103

September 01, 2020

Table of Contents

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 Moore's Towhead project area using methods outlined by ASTM 1527-13. This included a records review, physical site visit, 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

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

ACKNOWLEDGEMENTS AND QUALIFICATIONS

Project Name:	NESP: Moore's Towhead Bank Erosion & Fisheries Systemic Environmental Mitigation Illinois Waterway
Site Information:	Moore's Towhead Hagener, IL 62611
Legal Description:	Hagener Township (Section 28) Township 17 North, Range 13 West West ½ of Southwest ¼
County:	Cass County
Latitude, Longitude:	39°53'32.22"N, 90°34'27.77"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

1 INTRODUCTION

1.1 Background

The purpose of this Environmental Site Assessment (ESA) was to evaluate the current and historical conditions of the subject property in an effort to identify Recognized Environmental Conditions (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.

1.2 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 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. Photo documentation for the site visit are available in Supplementary Materials B

- 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 C.

- USACE has physically observed adjoining properties, paying particular attention to evidence of aboveground and underground storage tanks, questionable housekeeping practices, or unusual business practices.

1.3 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.

2 GENERAL PROJECT AND SITE INFORMATION

Figure 1: Moore's Towhead Project Area

2.1 Project Description

Moore's Towhead includes a pair of isolated islands located at Illinois River Mile 76.2 towards the right descending bank (Figure 1). Historical imagery indicates that Moore's Towhead is 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 an Off-shore bullnose with on bank revetment extending along the main channel side bank to the end of the northern island with woody bundles placed between the bullnose and head of island. Clean quarry riprap rock and local large woody bundles would be used to construct project features. Most, if not all construction would be accomplished from overwater floating platforms.

2.2 Physical Site Description

The double island is located near the village of Meredosia, Illinois. The project area only includes the northern island. The 16.37 acre project area is comprised of 14.71 acres of aquatic habitat and 1.66 acres of island habitat. Moore's Towhead's soil consists of dockery silt loam with 0 to 2% slopes that is frequently flooded for long duration. The northern island is classified as a woody wetland while the southern island is classified as an emergent herbaceous wetland.

2.3 Historical and Current Land Use

Both islands are currently uninhabited. There is no evidence indicating that either island had been previously developed or occupied. All project area land is in ownership of The Nature Conservancy.

2.4 Adjoining Property Use

Moore's Towhead is surrounded entirely by the Illinois River. The Illinois River is primarily used for commercial barge traffic and habitat for aquatic wildlife. The surrounding land area consists of woody wetlands with pockets of deciduous forest, and cultivated crops.

3 PHASE I ENVIRONMENTAL SITE ASSESSMENT DUE DILIGENCE

3.1 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 for the site visit can be reviewed in Supplementary Materials A.

3.2 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.

3.3 Interviews with Knowledgeable Individuals

Efforts made to locate and contact the landowner were unsuccessful in this effort. The United States Coast Guard was interviewed on October 10, 2006 concerning the historical environmental response actions in the past in the proposed area of the project. Commander Valley indicated that information regarding spills could be obtained from the National Response Center (NRC) website. No relative findings were discovered.

4 SUMMARY OF FINDINGS AND RECOMMENDATIONS

A physical site visit, records review, and interviews with knowledgeable persons identified two RECs near or within the Moore's Towhead project footprint. Findings are 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.

2. The Illinois Emergency Management Agency (IEMA) reported the release of 10 gallons of diesel fuel on 11/26/1999 (Incident Number 992643). A cleanup was not performed.

   This is a low risk REC and warrants no additional investigation. The quantity of material released could be considered de minimis. Further, given the duration of time since the incident, natural attenuation and water flow from the Illinois River would have removed the contaminant away from the project area.

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.

5 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.

6 SUPPLEMENTARY MATERIALS A: SITE VISIT PHOTO DOCUMENTATION

Figure 2: Looking downstream at lower end of Moore's Towhead right descending bank (39.890593°, -90.577152°).

Figure 3: Looking upstream at upper end of Moore's Towhead right descending bank (39.893604°, -90.571933°).

Figure 4: Upper end of Moore's Towhead right descending bank (39.894117°, -90.570401°).

Figure 5: Upper end of Moore's Towhead (39.894108°,-90.569971°).

Figure 6: Looking downstream at the upper end of Moore's Towhead left descending bank (39.893868°, -90.569866°).

Figure 7: Looking downstream at the upper end of Moore's Towhead left descending bank (39.893609°, -90.570493°).

Figure 8: Looking upstream at the upper end of Moore's Towhead left descending bank (39.892767°, -90.572176°).

Figure 9: Looking downstream at the lower end of Moore's Towhead left descending bank (39.891532°, -90.574818°).

Figure 10: Looking downstream at the lower end of Moore's Towhead left descending bank (39.890721°, -90.576131°).

7 SUPPLEMENTARY MATERIALS B: RECORDS REVIEW

Appendix E

Navigation and Ecosystem Sustainability Program

Moore's Towhead Bank Erosion and Fisheries

Systemic Environmental Mitigation

Monitoring and Adaptive Management Plan

August 2020

Regional Planning and Environmental Division North
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

US Army Corps of Engineers®

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MONITORING AND ADAPTIVE MANAGEMENT

MOORE'S TOWHEAD BANK EROSION AND FISHERIES SYSTEMIC ENVIRONMENTAL MITIGATION

Introduction

This appendix presents the feasibility level monitoring and adaptive management plan for the Moore's Towhead Bank Erosion and Fisheries Systemic Environmental Mitigation Project. This plan identifies and describes the monitoring and adaptive management (AM) activities proposed for the considered mitigation action alternatives and estimates associated cost and duration. This plan outlines how the results of the monitoring would be used to adaptively manage the mitigation alternative, including monitoring targets which demonstrate success in meeting mitigation objectives. The intent of this plan is to develop monitoring and AM actions appropriate and to scale for the project's goal and objectives and areas of uncertainty. This plan would be further developed in the planning, engineering, and design (PED) phase as specific details are made available for the recommended mitigation 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

The proposed project is part of the AM Plan outlined in the *Final Integrated Feasibility Report and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Stud*y (Navigation Study). Moore's Towhead was selected as a mitigation site to stabilize current erosion and mitigate for potential increases in erosion and fish mortality (i.e., from propeller entrainment) due to an incremental increase in navigation traffic from proposed improvements to the navigation system under the Navigation and Ecosystem Sustainability Program (NESP). Implementation of the mitigation project would decrease bank erosion and provide shelter habitat for a variety of fish and other aquatic species. Stabilizing the bankline would maintain island habitat, which is a rare habitat type within the Illinois River. Incorporating woody structure with the bank stabilization structures would increase cover habitat for fish.

Framework

The mitigation features are fully described in the Moore's Towhead Mitigation Plan with Environmental Assessment. The Water Resources Development Act (WRDA) of 2016, Section 1162 and U.S Army Corps of Engineers (USACE) implementation guidance for Section 1162 (CECW-P Director Memorandum dated 25 March 2019: "Revised Implementation Guidance for Section 1162 of the Water Resources Development Act of 2016 and Section 1040 of the Water Resources Reform and Development Act of 2014, Fish and Wildlife Mitigation (Section 906 of the Water Resources Development Act of 1986, as amended (33 USC 2283) (WRDA 2016)" require monitoring and AM be included in all mitigation plan for fish and wildlife habitat and wetland losses.

This appendix details the monitoring and AM planning for the Corps constructed project at Moore's Towhead. 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 Moore's Towhead's AM framework follows the two phased approach for set-up and implementation (Figure 1).

Adaptive Management Planning

Adaptive management planning elements included:

1) Development of a conceptual ecological model (CEM)
2) Identification of key project uncertainties and associated risks
3) Evaluation of the mitigation measures as a candidate for adaptive management, and
4) The identification of potential adaptive management actions (contingency plan) to better ensure the mitigation project meets identified success criteria

The primary intent was to develop monitoring and AM actions appropriate for the mitigation project's goal and objectives. The specified management actions permit estimation of the AM plan costs and duration. The AM Plan:

- identifies the mitigation goal and objectives;
- presents a conceptual model that relates actions to desired mitigation outcomes; and
- lists sources of uncertainty that would lend themselves to AM.

Following the discussion of the above, the subsequent sections of this appendix describe monitoring, assessment, and decision-making in support of AM. Components of the monitoring and AM plan, including costs, were estimated using currently available information. The AM plan is a living document and would be refined as necessary as new mitigation project information becomes available.

Conceptual Ecological Model

A CEM was developed to identify the major stressors and drivers affecting the proposed mitigation project at Moore's Towhead (Figure 2). The CEM does not attempt to explain all possible relationships of potential factors influencing the mitigation project area; rather, the CEM presents only those factors deemed most relevant. Furthermore, the CEM represents the current understanding of these factors and would be updated and modified, as necessary, as new information becomes available.

Goal and Objectives

A mitigation project at Moore's Towhead meets the mitigation objectives for fisheries resources and bank erosion as described in the Navigation Study (USACE, 2004). The mitigation project at Moore's Towhead meets the need to protect the island from current and future bank erosion as well as provide sheltered habitat (woody structure) for fish species to offset the habitat degradation expected due to increased navigation traffic.

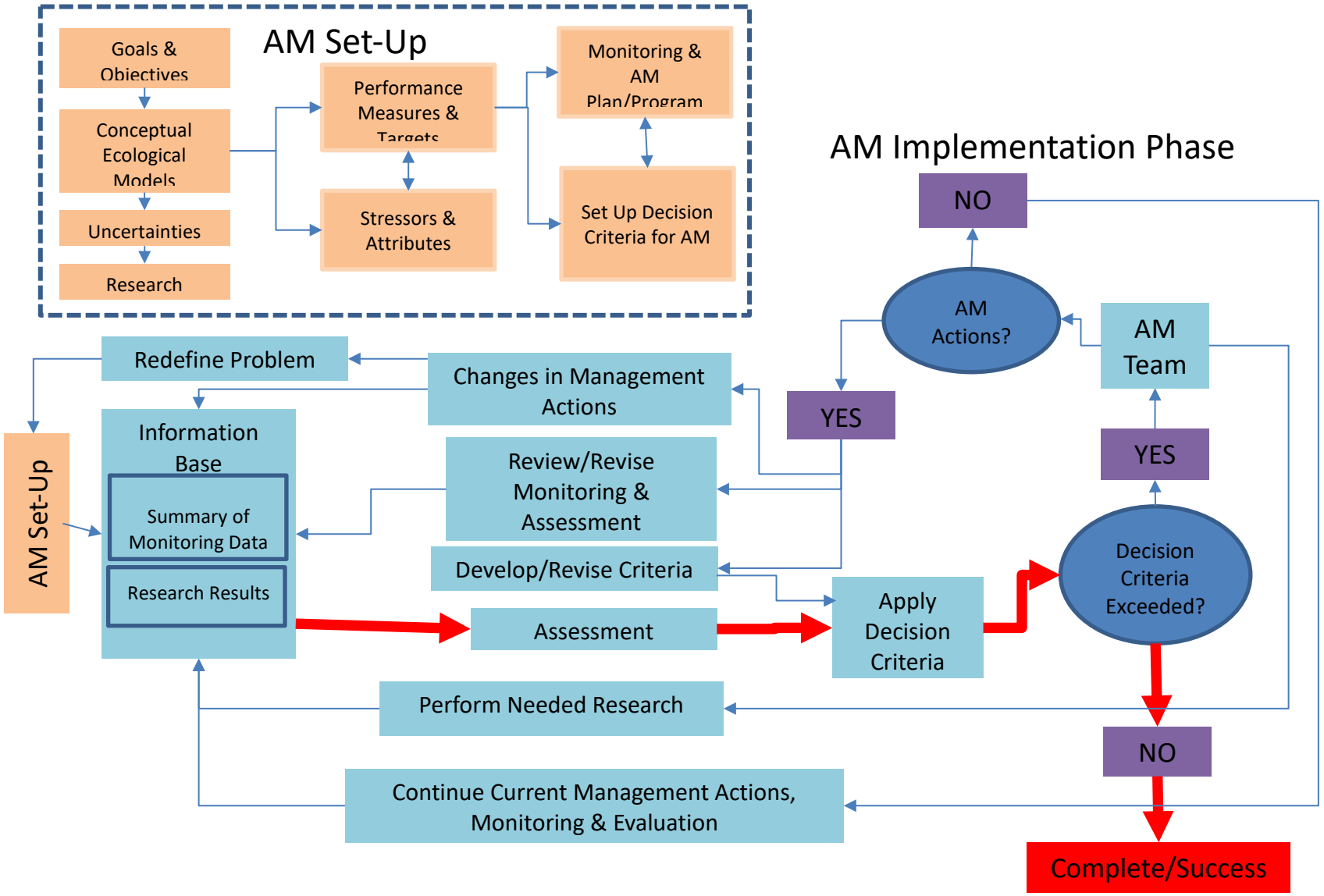

Figure 1. Adaptive Management Flow Chart

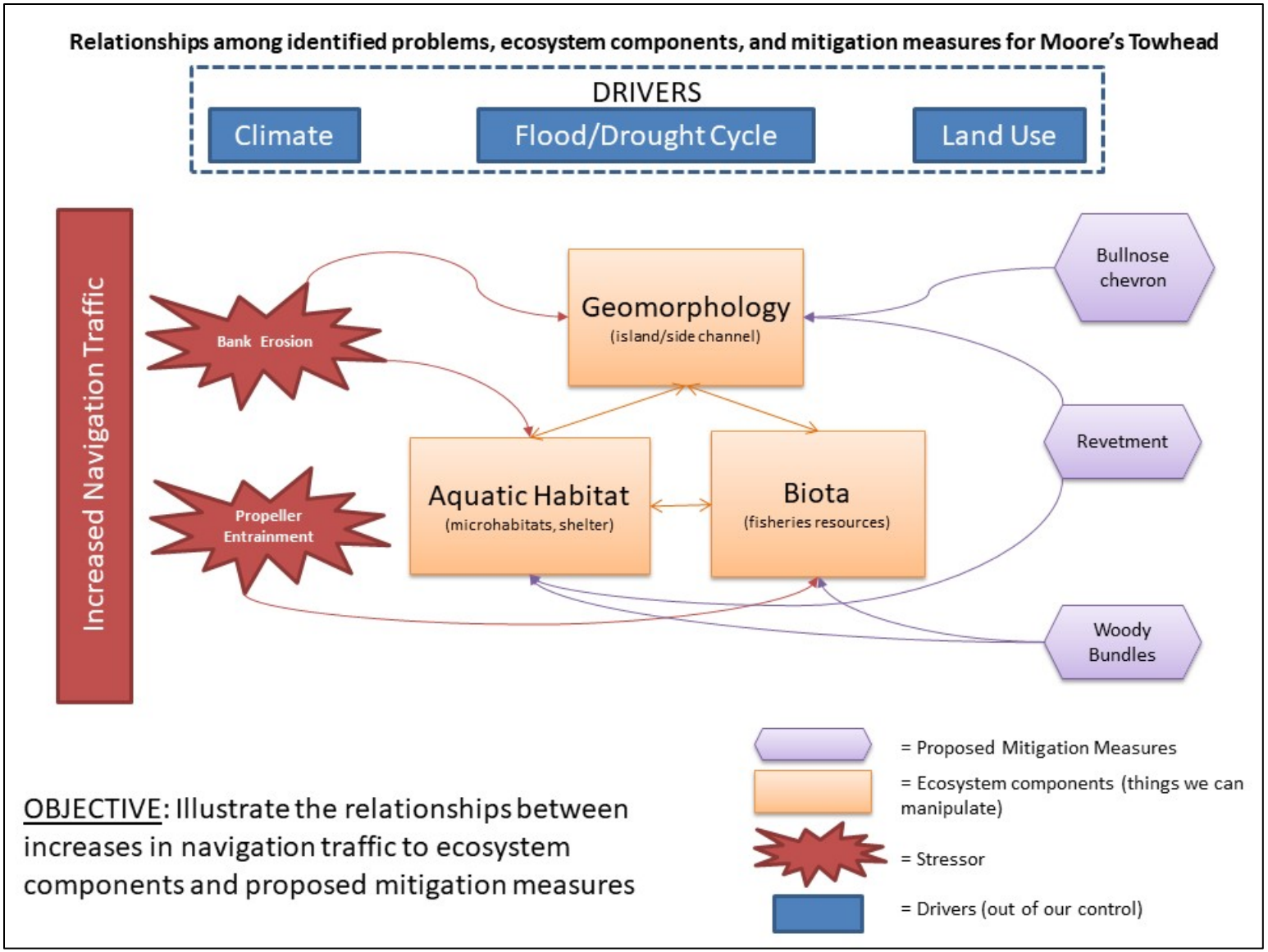

Figure 2. Conceptual Ecological Model for Moore's Towhead

Sources of Uncertainty

Bankline Protection and Bullnose Structure

The St. Louis District evaluated the level of uncertainty and risk in the bankline protection and bullnose chevron measures and determined these measures did not require using AM to address the potential of the measures to meet performance criteria. Furthermore, other projects through the Upper Mississippi River Restoration (UMRR) Program and Operation and Maintenance of the 9-foot Channel Project have routinely used rock in bankline protection and chevron construction with success and these lessons learned have been applied in the bankline protection and bullnose

Woody Bundles

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 with performance of this measure and identified the following source of uncertainty:

- Some level of uncertainty related to longevity of the woody bundles was identified since they could potential washed out during high flood events (Low Risk)

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 AM. The site-specific mitigation alternatives for Moore's Towhead included similar measures; therefore, monitoring plans would be similar among considered alternatives and are discussed collectively. Table 1 summarizes the monitoring and AM elements. Table 2 provides the generalized monitoring schedule and estimated costs.

Table 1. Summary of monitoring and adaptive management elements for Moore's Towhead.

Objective	Mitigation Measure	Performance Indicator	Monitoring Target (Desired Outcome)	Time Effect	Action Criteria (AM Trigger)	AM Measure
Reduce bank erosion at Moore's Towhead	Revetment	Island Bankline	Banks and island head maintained at the revetment location	Construction Completion	n/a	n/a
	Bullnose	Island Head				
Increase sheltered riverbed microhabitats to offset the increase of propeller entrainment	Woody Bundles	Presence of woody material in the project area	Increased woody material over existing conditions		>50% loss of woody bundles compared to year 1 post construction	Modify bundling and weighting techniques and place additional new woody bundles

Table 2. Moore's Towhead conceptual post-construction monitoring schedule and estimated costs. Construction completion is set at year 0.

Objective	Monitoring Work Item	Monitoring Schedule			Monitoring Cost	AM Cost
		Pre	Construction Phase	Post		
Bank Erosion	Public Aerial Imagery & Analysis	X		Year 1	$2,000	
Habitat	Woody Bundle Survey			Year 2, Year 8*	$5,000	
	AM Feature: modify techniques and place additional woody bundles					$15,000, if needed
Overall Project	Site Inspections	X		Year 2, Year 8*	$3,000	
*after major flood event				**TOTAL COST**	$10,000	$15,000, if needed

Island Bankline & Island Head

1) *Objective*: Reduce bankline erosion
2) *Monitoring Target:* Banks and island head maintained at the revetment location
3) *Methodology*: Pre-project aerial imagery are available for numerous years from 1939 to present for Moore's Towhead. Post-project aerial imagery would be compared to pre-project aerial imagery to determine changes to the island and determine if island bankline and island head are being maintained. The data would be from publically available sources.
4) *Success Criteria (Desired Outcomes)*: The island bankline and island head would be maintained upon placement of revetment. Island erosion would be reduced.
5) *Adaptive Management Trigger and Measure:* None identified.

Woody Bundles

1) *Objective*: Increase sheltered riverbed microhabitats to offset the increase of propeller entrainment with the incremental increase in navigation traffic.
2) *Monitoring Target:* Increased woody sheltered habitat in the study area.
3) *Methodology*: Post-construction visual surveys would be conducted to locate the constructed woody bundles. Two post-construction inspections would be conducted: 1 year post-construction, and after a major flood event.
4) *Success Criteria (Desired Outcomes)*: Pre-construction has no woody material. The desired outcome would be increased woody material over existing conditions to provide shelter and microhabitats for fisheries resources.
5) *Adaptive Management Trigger and Measure:* If more than 50% of the placed woody bundles are lost year 1 after construction or after a major flood event during the 10 year monitoring window, then modification to bundling or weighting techniques would be investigated and additional woody material would be placed within the project area.

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 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 and AM measures were estimated based on currently available data. The estimated costs in Table 2 would need refinement in PED during the development of the Detailed Monitoring and AM Plans.

Responsibilities

The Corps will be responsible for all monitoring elements as outlined in Table 1. The Corps would 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 mitigation success criteria described above. Success would be considered to have been achieved when the mitigation objectives have been met, or when it is clear that they will be met based upon the trends for the site conditions and processes. Mitigation success would be based on the following:

- Success criteria met;
- Continued site inspections to determine continued mitigation status; and
- Continued OMRR&R into the future

References

Fischenich, C., C. Vogt, and others. 2012. The application of adaptive management to ecosystem restoration projects. ERDC TN-EMRRP-EBA-10 April 2012, Vicksburg, MS: U.S. Army Corps of Engineers Ecological Management and Restoration Research Program.

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

Appendix F

Navigation and Ecosystem Sustainability Program

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

Cost Estimate

17 FEBRUARY 2021

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

US Army Corps of Engineers®

U.S.ARMY

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

COST ESTIMATE

CONTENTS

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1. GENERAL

The purpose of this report is to describe and evaluate the site-specific mitigation plan with an integrated Environmental Assessment (EA) to minimize bank erosion and enhance fisheries resources at Moore's Towhead. This will tier[1] from the PEIS and incorporate by reference the Navigation Study (USACE, 2004).

Moore's Towhead is an island complex located on the right descending bank at river mile 76.2 of the Illinois River (Alton navigation pool), 4.5 miles north of Meredosia, Illinois in Brown County. The study area (approximately 17 acres) includes the upper island of the complex (approximately 2 acres of island habitat) and the surrounding aquatic habitat (approximately 15 acres) which were identified in the Navigation Study for being impacted by navigation induced bank erosion and provide an opportunity to enhance fisheries habitat (Figure 1-1). The lands of Moore's Towhead are owned by The Nature Conservancy.

The USACE, St. Louis District, proposes to reduce bank erosion and enhance fisheries habitat at Moore's Towhead, which was a previously selected location, to mitigate systemic (non-site-specific) impacts from the incremental traffic increase due to construction or implementation of UMR-IWW navigation efficiency measures.

Alternative 3 is the recommended plan that helps meet the systemic environmental mitigation planning objectives for both fisheries and bank erosion as identified in the Navigation Study (USACE, 2004). The recommended plan consists of 1,000 feet of bank erosion mitigation and three sheltered structures for fisheries mitigation:

- 300-foot bullnose at elevation 428 feet NGVD placed approximately 50 feet upstream of island head.
- On-bank revetment (700 feet) placed along riverward side of the island to the ordinary high water mark.
- Three woody bundles between the island and the bullnose to provide fish shelter habitat

2. BASIS OF COST ESTIMATE

The cost estimate has been prepared based on current concept designs and site specific information available to date.

Quantities were developed based on a conceptual model and provided directly from MVS Engineering and Construction Branch. There is a possibility that quantities may increase during construction but cost impacts would be considered minimal and is captured in the abbreviated risk analysis as a possible risk with moderate impacts.

Pricing data was developed from recent contract estimates for similar projects in the St. Louis Area,

including the following referenced Contract for Operation and Maintenance of River Structures and Revetments, Mississippi River Basin, MRM 300.0-0.0, W912P9-19-C-0010. The stone delivery and placement production rates are based on production studies done by the St. Louis district on projects placing stone in the open river. The material cost is based on a quote from Tower Rock Stone. The wage rates were developed using Davis Bacon, Heavy & Highway construction for Brown County, IL IL20200019 08/07/2020. Fuel rates were based on the AAA Fuel Gauge Report. This estimate will be considered the basis for the Current Working Estimate and considers all phases of the project.

3. CONTINGENCIES

The Abbreviated Risk Analysis process indicated an approximate 26.3% construction contingency based on associated project risks.

4. PLANNING, ENGINEERING AND DESIGN (PED)

Planning, engineering and design costs are based on historical data of similar projects in the St. Louis District. Recommended percentages by the cost MCX were taken into consideration as well.

5. CONSTRUCTION MANAGEMENT

Construction Management costs are based on historical data of similar projects in the St. Louis District. Recommended percentages by the cost MCX were taken into consideration as well.

6. CONSTRUCTION CONTINGENCY

A contingency of 25% was applied to the Construction.

7. 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.

8. 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.

9. 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 E - *Monitoring and Adaptive Management Plan*.

PROJECT: NESP – Moore's Towhead, Systemic Environmental Mitigation Project
PROJECT NO: P2 490727
LOCATION: Illinois River, Brown County, Illinois

DISTRICT: St.louis District **PREPARED:** 2/17/2021
POC: CHIEF, COST ENGINEERING, Brandon Lewis

This Estimate reflects the scope and schedule in report; Mitigation Report with Integrated Supplemental Environmental Assessment

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC): 2021 Effective Price Level Date: 1 OCT 20									
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST ($K) C	CNTG ($K) D	CNTG (%) E	TOTAL ($K) F	ESC (%) G	COST ($K) H	CNTG ($K) I	TOTAL ($K) J	Spent Thru: 1-Oct-20 ($K)	TOTAL FIRST COST ($K) K	INFLATED (%) L	COST ($K) M	CNTG ($K) N	FULL ($K) O
06	FISH & WILDLIFE FACILITIES	$557	$146	26.3%	$703	0.0%	$557	$146	$703	$0	$703	4.7%	$583	$153	$737
	CONSTRUCTION ESTIMATE TOTALS:	$557	$146		$703	0.0%	$557	$146	$703	$0	$703	4.7%	$583	$153	$737
01	LANDS AND DAMAGES	$0	$0	-	$0	-	$0	$0	$0	$0	$0	-	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN	$95	$9	9.4%	$104	0.0%	$95	$9	$104	$0	$104	2.5%	$97	$9	$106
31	CONSTRUCTION MANAGEMENT	$56	$9	16.3%	$65	0.0%	$56	$9	$65	$0	$65	6.5%	$59	$10	$69
	PROJECT COST TOTALS:	$707	$165	23.3%	$872		$707	$165	**$872**	$0	**$872**	4.6%	$739	$173	$912

CHIEF, COST ENGINEERING, Brandon Lewis

PROJECT MANAGER, Shane Simmons

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING, xxx

CHIEF, ENGINEERING, David Busse

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING,xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, Susan Wilson

ESTIMATED TOTAL PROJECT COST: $912

****** CONTRACT COST SUMMARY ******

PROJECT: NESP - Moore's Towhead, Systemic Environmental Mitigation Project
LOCATION: Illinois River, Brown County, Illinois
This Estimate reflects the scope and schedule in report; Mitigation Report with Integrated Supplemental Environmental Assessment

DISTRICT: St.louis District
POC: CHIEF, COST ENGINEERING, Brandon Lewis
PREPARED: 2/17/2021

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 17-Feb-21 Effective Price Level: 1-Oct-20				Program Year (Budget EC): 2021 Effective Price Level Date: 1 OCT 20								
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST ($K) C	CNTG ($K) D	RISK BASED CNTG (%) E	TOTAL ($K) F	ESC (%) G	COST ($K) H	CNTG ($K) I	TOTAL ($K) J	Mid-Point Date P	INFLATED (%) L	COST ($K) M	CNTG ($K) N	FULL ($K) O
	PHASE 1 or CONTRACT 1													
06	FISH & WILDLIFE FACILITIES	$517	$136	26.3%	$653	0.0%	$517	$136	$653	202202	3.6%	$535	$141	$676
	CONSTRUCTION ESTIMATE TOTALS:	$517	$136	26.3%	**$653**		$517	$136	$653			$535	$141	$676
01	LANDS AND DAMAGES	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$13	$1	9.4%	$14	0.0%	$13	$1	$14	202103	2.1%	$13	$1	$14
1.0%	Planning & Environmental Compliance	$5	$0	9.4%	$6	0.0%	$5	$0	$6	202103	2.1%	$5	$0	$6
10.0%	Engineering & Design	$52	$5	9.4%	$56	0.0%	$52	$5	$56	202103	2.1%	$53	$5	$58
1.0%	Reviews, ATRs, IEPRs, VE	$5	$0	9.4%	$6	0.0%	$5	$0	$6	202103	2.1%	$5	$0	$6
0.0%	Life Cycle Updates (cost, schedule, risks)	$0	$0	9.4%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Contracting & Reprographics	$5	$0	9.4%	$6	0.0%	$5	$0	$6	202103	2.1%	$5	$0	$6
1.5%	Engineering During Construction	$8	$1	9.4%	$8	0.0%	$8	$1	$8	202202	5.0%	$8	$1	$9
0.0%	Planning During Construction	$0	$0	9.4%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Adaptive Management & Monitoring	$0	$0	9.4%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	9.4%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$41	$7	16.3%	$48	0.0%	$41	$7	$48	202202	5.0%	$43	$7	$51
0.0%	Project Operation:	$0	$0	16.3%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
2.0%	Project Management	$10	$2	16.3%	$12	0.0%	$10	$2	$12	202202	5.0%	$11	$2	$13
	CONTRACT COST TOTALS:	$656	$153		$809		$656	$153	**$809**			$679	$159	**$838**

****** CONTRACT COST SUMMARY ******

PROJECT: NESP – Moore's Towhead, Systemic Environmental Mitigation Project
LOCATION: Illinois River, Brown County, Illinois
This Estimate reflects the scope and schedule in report; Mitigation Report with Integrated Supplemental Environmental Assessment

DISTRICT: St.louis District
POC: CHIEF, COST ENGINEERING, Brandon Lewis
PREPARED: 2/17/2021

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 17-Feb-21 Effective Price Level: 1-Oct-20				Program Year (Budget EC): 2021 Effective Price Level Date: 1 OCT 20								
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST ($K) C	CNTG ($K) D	CNTG (%) E	TOTAL ($K) F	ESC (%) G	COST ($K) H	CNTG ($K) I	TOTAL ($K) J	Mid-Point Date P	INFLATED (%) L	COST ($K) M	CNTG ($K) N	FULL ($K) O
	PHASE 2 - Adaptive Management and Monitoring													
06	FISH & WILDLIFE FACILITIES	$40	$10	26.0%	$50	0.0%	$40	$10	$50	2027Q2	19.5%	$48	$12	$60
	CONSTRUCTION ESTIMATE TOTALS:	$40	$10	26.0%	**$50**		$40	$10	$50			$48	$12	$60
01	LANDS AND DAMAGES	$0	$0	0.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$1	$0	10.0%	$1	0.0%	$1	$0	$1	2021Q3	2.1%	$1	$0	$1
1.0%	Planning & Environmental Compliance	$0	$0	10.0%	$0	0.0%	$0	$0	$0	2021Q3	2.1%	$0	$0	$0
10.0%	Engineering & Design	$4	$0	10.0%	$4	0.0%	$4	$0	$4	2021Q3	2.1%	$4	$0	$4
1.0%	Reviews, ATRs, IEPRs, VE	$0	$0	10.0%	$0	0.0%	$0	$0	$0	2021Q3	2.1%	$0	$0	$0
0.0%	Life Cycle Updates (cost, schedule, risks)	$0	$0	10.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
1.0%	Contracting & Reprographics	$0	$0	10.0%	$0	0.0%	$0	$0	$0	2021Q3	2.1%	$0	$0	$0
1.5%	Engineering During Construction	$1	$0	10.0%	$1	0.0%	$1	$0	$1	2027Q2	25.9%	$1	$0	$1
0.0%	Planning During Construction	$0	$0	10.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Adaptive Management & Monitoring	$0	$0	10.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
0.0%	Project Operations	$0	$0	10.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	$3	$1	17.0%	$4	0.0%	$3	$1	$4	2027Q2	25.9%	$4	$1	$5
0.0%	Project Operation:	$0	$0	17.0%	$0	0.0%	$0	$0	$0	0	0.0%	$0	$0	$0
2.0%	Project Management	$1	$0	17.0%	$1	0.0%	$1	$0	$1	2027Q2	25.9%	$1	$0	$1
	CONTRACT COST TOTALS:	$51	$12		$63		$51	$12	**$63**			$60	$14	**$74**

Appendix G

Navigation and Ecosystem Sustainability Program

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

Coordination

May 2021

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

US Army Corps of Engineers®

U.S.ARMY

MOORE'S TOWHEAD SYSTEMIC ENVIRONMENTAL MITIGATION PROJECT

BROWN COUNTY, ILLINOIS

COORDINATION

CONTENTS

1 KEY ENGAGEMENTS

Coordination meetings occurred for Moore's Towhead during earlier NESP funding availability in 2010 prior funding suspense. The list of key meetings are listed below and meeting minutes are in available upon request in the project records.

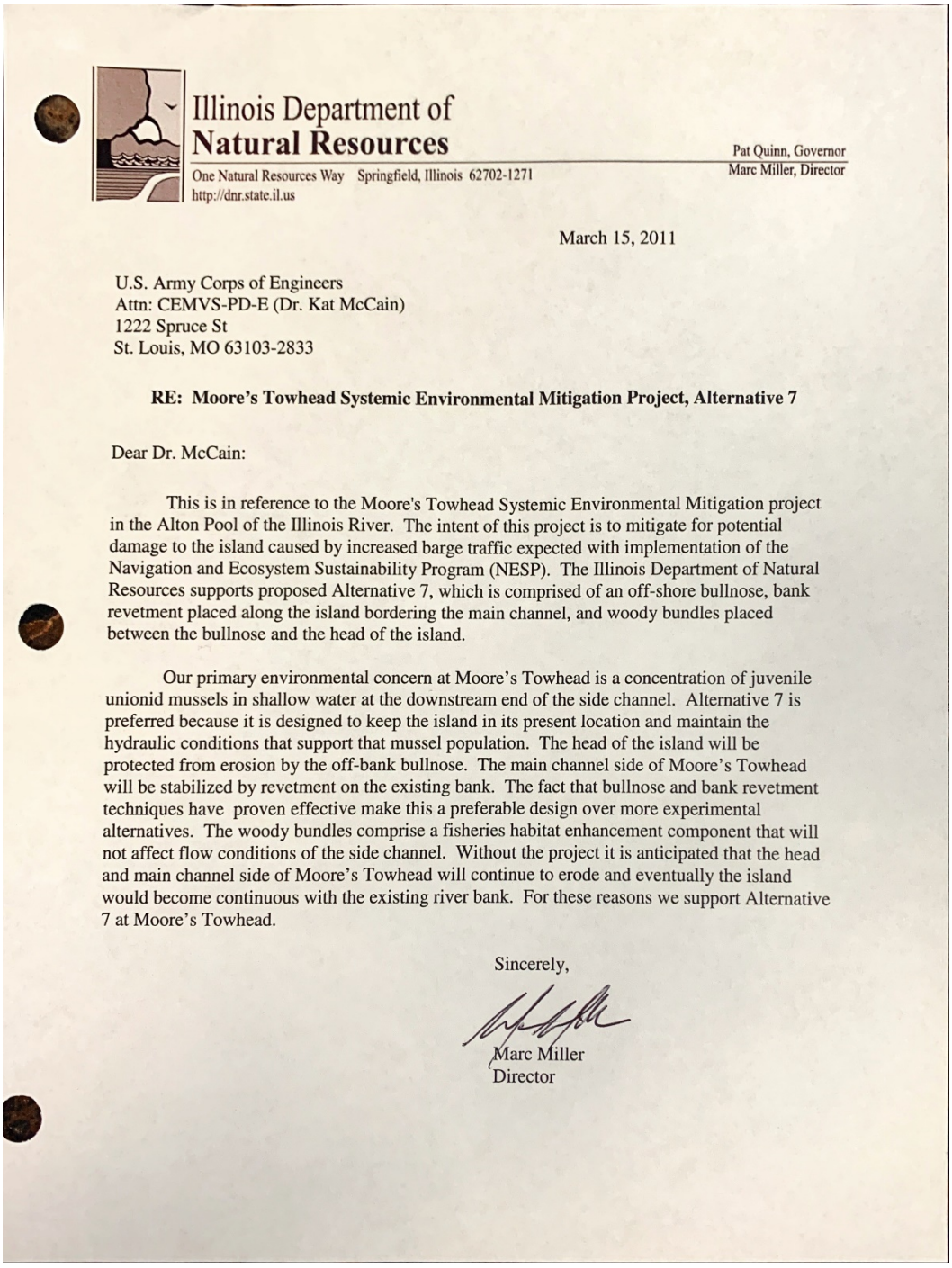
- 05 March 2010: Initial Kick-off meeting with USACE MVS, USACE MVR, TNC, IDNR, and USFWS
- 19 August 2010: Stakeholder site visit meeting with USACE MVS, USACE MVR, TNC, IDNR, and USFWS
- August 2010: Freshwater mussel survey
- 18 May 2011: project suspended
- 05 May 2020: NESP Project Team agreement to move forward with Moore's Towhead with current funding availability
- 16 June 2020: USACE bathymetric survey
- 27 July 2020: USACE Site Visit: Environmental, Cultural, and HTRW
- 20 August 2020: USACE Regional Planning & Environmental Division North Leadership decision on report format of a mitigation plan with integrated environmental assessment tiering of the PEIS (Navigation Study).

2 AGENCY COORDINATION

2.1 USFWS

2.2 IDNR

15 March 2011 Letter. The previous efforts used a different alternative numbering system then the current efforts. Alternative 7 referenced below refers to Alternative 3 in the current mitigation plan with integrated environmental assessment.



Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

March 15, 2011

U.S. Army Corps of Engineers
Attn: CEMVS-PD-E (Dr. Kat McCain)
1222 Spruce St
St. Louis, MO 63103-2833

RE: Moore's Towhead Systemic Environmental Mitigation Project, Alternative 7

Dear Dr. McCain:

This is in reference to the Moore's Towhead Systemic Environmental Mitigation project in the Alton Pool of the Illinois River. The intent of this project is to mitigate for potential damage to the island caused by increased barge traffic expected with implementation of the Navigation and Ecosystem Sustainability Program (NESP). The Illinois Department of Natural Resources supports proposed Alternative 7, which is comprised of an off-shore bullnose, bank revetment placed along the island bordering the main channel, and woody bundles placed between the bullnose and the head of the island.

Our primary environmental concern at Moore's Towhead is a concentration of juvenile unionid mussels in shallow water at the downstream end of the side channel. Alternative 7 is preferred because it is designed to keep the island in its present location and maintain the hydraulic conditions that support that mussel population. The head of the island will be protected from erosion by the off-bank bullnose. The main channel side of Moore's Towhead will be stabilized by revetment on the existing bank. The fact that bullnose and bank revetment techniques have proven effective make this a preferable design over more experimental alternatives. The woody bundles comprise a fisheries habitat enhancement component that will not affect flow conditions of the side channel. Without the project it is anticipated that the head and main channel side of Moore's Towhead will continue to erode and eventually the island would become continuous with the existing river bank. For these reasons we support Alternative 7 at Moore's Towhead.

Sincerely,

Marc Miller
Director

3 DISTRIBUTION LIST

The District sent emails to elected officials, state and federal agencies, interested citizens and parties announcing the draft report's availability for review and download from the District webpage. The distribution list is maintained as an email listserve through the St. Louis District's Regulatory Branch and 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 Darin LaHood
100 NE Monroe Street Room 100
Peoria, IL 61602

State Elected Officials

Illinois Legislature- District 93
The Honorable Norine K. Hammond
203 N Stratton Office Building
Springfield, IL 62706

Illinois Legislature- District 47
The Honorable Jil Tracy
3701 East Lake Center Drive Suite 3
Quincy, IL 62305

Local Elected Officials

Village of Meredosia
924 State Hwy 104
Meredosia, IL 62665

Pike County Board
121 E Washington
Pittsfield, IL 62363

Brown County Board
200 Court Ave
Mt. Sterling, IL 62353

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

Meredosia National Wildlife Refuge
2227 N Beach Rd
Meredosia, IL 62665

State Agencies

IDNR Springfield
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

Interested Parties

The Nature Conservancy of Illinois
400 N Michigan Ave Suite S1100
Chicago, IL 60611

4 PUBLIC REVIEW

4.1 COPY OF PUBLIC REVIEW LETTER

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

REPLY TO

ATTENTION OF:

21 August 2020

Engineering and Construction Division
Curation and Archives Analysis Branch (ECZ)

Ms. Whitney Warrior
Tribal Historic Preservation Officer
United Keetoowah Band of Cherokee of Oklahoma
P.O. Box 746
Tahlequah, OK 74464

Subject: Moore's Towhead Systemic Environmental Mitigation Project, Illinois River, Brown County, Illinois

Dear Ms. Warrior:

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

Moore's Towhead, located in the Illinois River, is experiencing loss of island/side channel habitat due to excess bank erosion caused by wave action and the subsequent degradation of fisheries resources. USACE proposes to stabilize current erosion and to mitigate for potential increases in erosion and fish mortality due to an incremental increase in navigation traffic from proposed improvements to the navigation system under the Navigation and Ecosystem Sustainability Program (NESP).

The proposed project will be to place rock "U-shape" approximately 50 feet off the head of the northern island to an elevation of 428 ft (two feet above mean water level). To protect the main channel side of the island, revetment would be placed on the bankline of the northern island to the ordinary high water mark. All construction activities would

be performed from a floating barge/work platform, and no equipment would work from or be parked on the island.

Historic maps and aerials indicate that the island has moved down river due to sediment eroding at the head and channel side and depositing along the bank side and at the tail end. A preliminary archaeological reconnaissance survey was conducted on 19 August 2010 by USACE archaeologists. The survey identified historic artifacts eroding out of the ground surface of the northern end of the island. The artifacts were tentatively dated to the late 19th or early 20th century. On 28 July 2020 a USACE archaeologists conducted a follow up site reconnaissance survey due to the time that had elapsed since the first survey. During this follow up visit, a layer of shell approximately eight feet below surface along the northwestern portion of the island was identified. The shell was unmodified and no artifacts were identified within the area. It is speculated that the historic artifacts originally identified in 2010 have eroded away. If any further artifacts are on the island, then they will be protected under the proposed plan as the erosion will be reduced.

Due to all work taking place off of the island and no cultural resources were identified during the last archaeological survey, it is the District's current opinion that the proposed project will have no effect on historic properties. 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.

If you have any questions or comments, please feel free to contact me at (314) 331-8855, or Chris Koenig (Supervisory Archaeologist and Tribal Liaison) at (314) 331-8151 or email at Christopher.J.Koenig@usace.army.mil.

Sincerely,

Jennifer L. Riordan
Chief, Curation and Archives
Analysis Branch

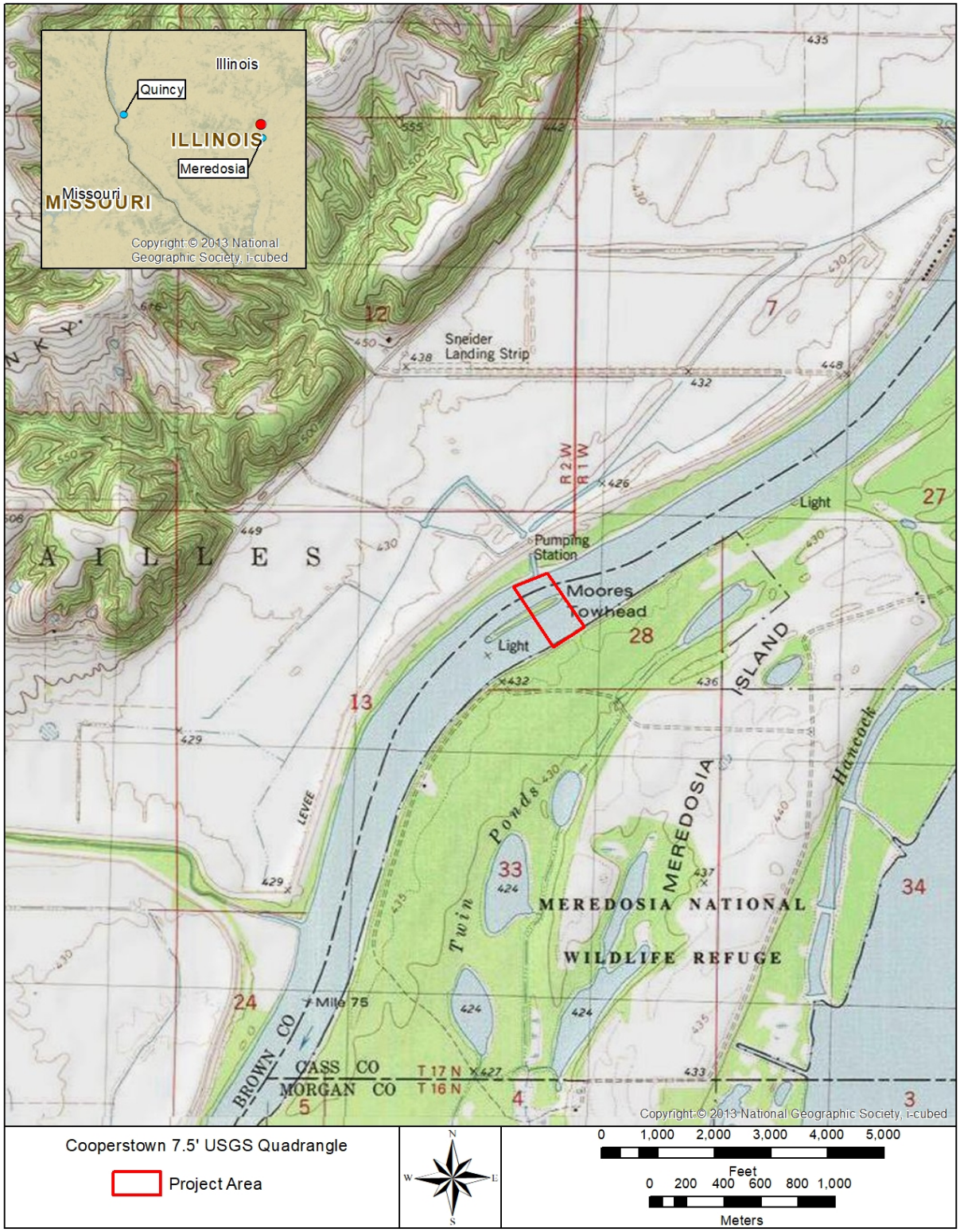


Figure 1. Project Area.

MVS Leaders

Tribe	Title	Name (First, Middle, Last)	Last Name	Street Address	Street Address 2	City	State	Zipcode	Furnished Copy
Absentee-Shawnee Tribe of Indian of Oklahoma	Governor	John Jonson	Johnson	2025 S. Gordon Cooper Drive		Shawnee	OK	74810-8381	Ms. Devon Frazier
Caddo Nation of Oklahoma	Chairman	Tamara Francis-Fourkiller	Francis-Fourkiller	P.O. Box 487		Binger	OK	73009	Mr. Phil Cross
Citizen Potawatomi Nation, Oklahoma	Chairman	John Barrett	Barrett	1601 S. Gordon Cooper Drive		Shawnee	OK	74801	Ms. Kelli Mosteller
Delaware Tribe of Indians	Chief	Chester Brooks	Brooks	5100 Tuxedo Boulevard		Bartlesville	OK	74006	Mr. Larry Heady
Eastern Shawnee Tribe of Oklahoma	Chief	Glenna J. Wallace	Wallace	P.O. Box 350		Seneca	MO	64865	Mr. Brett Barnes
Forest County Potawatomi Community, Wisconsin	Chairman	Ned Daniels	Daniels	P.O. Box 340		Crandon	WI	54520	Mr. Michael LaRonge
Hannahville Indian Community, Michigan	Chairman	Kenneth Meshigaud	Meshigaud	N 14911 Hannahville B-1 Road		Wilson	MI	49896-9728	Mr. Earl Meshigaud
Ho-Chunk Nation of Wisconsin	President	Marlon WhiteEagle	WhiteEagle	P.O. Box 667		Black River Falls	WI	54675	Mr. William Quackenbush
Iowa Tribe of Kansas and Nebraska	Chairman	Tim Rhodd	Rhodd	3345 Thrasher Road, #8		White Cloud	KS	66094	Mr. Lance Foster
Iowa Tribe of Oklahoma	Chairman	Edward B. Kent, Jr.	Kent	Route 1, Box 721		Perkins	OK	74059	Dr. Robert Fields
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	Chairman	Lester Randall	Randall	824 111th Drive		Horton	KS	66439	Mr. Fred Thomas
Kickapoo Tribe of Oklahoma	Chairman	David Pacheco	Pacheco	P.O. Box 70		McCloud	OK	74851	Mr. Kent Collier
Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan	Chairman	Bob Peters	Peters	2872 Mission Dr.		Shelbyville	MI	49344	Mr. Lakota Pochedley
Miami Tribe of Oklahoma	Chief	Douglas Lankford	Lankford	202 S. Eight Tribes Trail	P.O. Box 1326	Miami	OK	74355	Ms. Diane Hunter
Nottawaseppi Huron Band of the Potawatomi, Michigan	Chairman	Jamie Stuck	Stuck	2221—1 & 1/2 Mile Road		Fulton	MI	49052	Mr. Douglas R. Taylor
Peoria Tribe of Indians of Oklahoma	Chief	Craig Harper	Harper	118 S. Eight Tribes Trail	P.O. Box 1527	Miami	OK	74355	Mr. Logan Pepperfort
Pokagon Band of Potawatomi Indians, Michigan and Indiana	Chairman	Matt Wesaw	Wesaw	P.O. Box 180	58620 Sink Road	Dowagiac	MI	49047	Mr. Matthew Bussler
Prairie Band Potawatomi Nation	Chairman	Joseph Rupnick	Rupnick	Government Center	16281 Q Road	Mayetta	KS	66509	The Historic Preservation Office
Sac & Fox Nation of Missouri in Kansas and Nebraska	Chairperson	Tiauna Carnes	Carnes	305 N. Main Street		Reserve	KS	66434	Ms. Lisa Montgomery
Sac & Fox Nation, Oklahoma	Principal Chief	Justin F. Woods	Woods	920883 S Highway 99	Building A	Stroud	OK	74079	Mr. Chris Boyd
Sac & Fox Tribe of the Mississippi in Iowa	Chairman	Troy Werales	Werales	349 Meskwaki Road		Tama	IA	52339	Mr. Johnathan Buffalo
Shawnee Tribe	Chairman	Benjamin J. Barnes	Barnes	P.O. Box 189		Miami	OK	74355	Ms. Tonya Tipton
The Osage Nation	Principal Chief	Geoffrey Standing Bear	Standing Bear	P.O. Box 779		Pawhuska	OK	74056	Dr. Andrea Hunter
The Quapaw Tribe of Indians	Chairman	John Berrey	Berrey	P.O. Box 765		Quapaw	OK	74363	Mr. Everett Bandy
United Keetoowah Band of Cherokee of Oklahoma	Chief	Joe Bunch	Bunch	P.O. Box 746		Tahlequah	OK	74464	Ms. Whitney Warrior

MVS Reps

Tribe	Title	Name (First, Middle, Last)	Last Name	Position	Street Address	Street Address 2	City	State	Zipcode
Absentee-Shawnee Tribe of Indians of Oklahoma	Ms.	Devon Frazier	Frazier	Tribal Historic Preservation Officer	2025 S. Gordon Cooper Drive		Shawnee	OK	74810-8381
Caddo Nation of Oklahoma	Mr.	Phil Cross	Cross	Acting Tribal Historic Preservation Office	117 Memorial Lane	P.O. Box 487	Binger	OK	73009
Citizen Potawatomi Nation, Oklahoma	Ms.	Kelli Mosteller	Mosteller	Tribal Historic Preservation Officer	Cultural Heritage Center	1601 S. Gordon Cooper Drive	Shawnee	OK	74801
Delaware Tribe of Indians	Mr.	Larry Heady	Heady	THPO Special Assistant	1939 E. 8th ST		Duluth	MN	55812
Eastern Shawnee Tribe of Oklahoma	Mr.	Brett Barnes	Barnes	Historic Preservation Office	P.O. Box 350		Seneca	MO	64865
Forest County Potawatomi Community, Wisconsin	Mr.	Michael LaRonge	LaRonge	Tribal Historic Preservation Officer	Cultural Center, Library & Museum	N130 Milchickaweh Drive, P.O. Box 340	Crandon	WI	54520
Hannahville Indian Community, Michigan	Mr.	Earl Meshigaud	Meshigaud	Historic Preservation Office	P.O. Box 351, Highway 2 & 41		Harris	MI	49845
Ho-Chunk Nation of Wisconsin	Mr.	William Quackenbush	Quackenbush	Tribal Historic Preservation Officer	P.O. Box 667		Black River Falls	WI	54615
Iowa Tribe of Kansas and Nebraska	Mr.	Lance Foster	Foster	Tribal Historic Preservation Officer	3345 Thrasher Road		White Cloud	KS	66094
Iowa Tribe of Oklahoma	Dr.	Robert Fields	Fields	Historic Preservation Office	Route 1, Box 721		Perkins	OK	74059
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	Mr.	Fred Thomas	Thomas	Vice Chair	824 111th Drive		Horton	KS	66439
Kickapoo Tribe of Oklahoma	Mr.	Kent Collier	Collier	Historic Preservation Office	P.O. Box 70		McCloud	OK	74851
Match-e-be-nash-she-wish Band of Potawatomi Indians of Michigan	Mr.	Lakota Pochedley	Pochedley	Tribal Historic Preservation Officer	2872 Mission Drive		Shelbyville	MI	49344
Miami Tribe of Oklahoma	Ms.	Diane Hunter	Hunter	Tribal Historic Preservation Officer	202 S. Eight Tribes Trail	P.O. Box 1326	Miami	OK	74355
Nottawaseppi Huron Band of the Potawatomi, Michigan	Mr.	Douglas R. Taylor	Taylor	Tribal Historic Preservation Officer	1467 1 Drive S		Fulton	MI	49052
Peoria Tribe of Indians of Oklahoma	Mr.	Logan Pepperfort	Pepperfort	Historic Preservation Office	118 S. Eight Tribes Trail	P.O. Box 1527	Miami	OK	74355
Pokagon Band of Potawatomi Indians, Michigan and Indiana	Mr.	Matthew Bussler	Bussler	Tribal Historic Preservation Officer	P.O. Box 180	58620 Sink Road	Dowagiac	MI	49047
Prairie Band Potawatomi Nation	The	Historic Preservation Office	Historic Preservation Officer	Tribal Council Member	Government Center	16281 Q Road	Mayetta	KS	66509
Sac & Fox Nation of Missouri in Kansas and Nebraska	Ms.	Lisa Montgomery	Montgomery	Environmental Protection Agency Director	305 N. Main Street		Reserve	KS	66434
Sac & Fox Nation, Oklahoma	Mr.	Chris Boyd	Boyd	NAGPRA/Historic Preservation Office	920883 S. Highway 99	Building A	Stroud	OK	74079
Sac & Fox Tribe of the Mississippi in Iowa	Mr.	Johnathan Buffalo	Buffalo	Historic Preservation Office	349 Meskwaki Road		Tama	IA	52339
Shawnee Tribe	Ms.	Tonya Tipton	Tipton	Historic Preservation Office	P.O. Box 189		Miami	OK	74355
The Osage Nation	Dr.	Andrea Hunter	Hunter	Historic Preservation Office	627 Grandview Avenue		Pawhuska	OK	74056
The Quapaw Tribe of Indians	Mr.	Everett Bandy	Bandy	Tribal Historic Preservation Officer	P.O. Box 765		Quapaw	OK	74363-0765
United Keetoowah Band of Cherokee of Oklahoma	Ms.	Whitney Warrior	Warrior	Tribal Historic Preservation Officer	P.O. Box 746		Tahlequah	OK	74464

5.3 COMMENTS RECEIVED

Miami Tribe of Oklahoma
3410 P St. NW, Miami, OK 74354 • P.O. Box 1326, Miami, OK 74355
Ph: (918) 541-1300 • Fax: (918) 542-7260
www.miamination.com

Via email: Christopher.J.Koenig@usace.army.mil

September 16, 2020

Christ Koenig
US Army Corps of Engineers
St. Louis District
St. Louis, MO 63103

Re: Moore's Towhead Systemic Environmental Mitigation Project, Illinois River, Brown County, Illinois – Comments of the Miami Tribe of Oklahoma

Dear Mr. Koenig:

Aya, kikwehsitoole – I show you respect. The Miami Tribe of Oklahoma, a federally recognized Indian tribe with a Constitution ratified in 1939 under the Oklahoma Indian Welfare Act of 1936, respectfully submits the following comments regarding Moore's Towhead Systemic Environmental Mitigation Project, Illinois River, Brown County, Illinois.

The Miami Tribe offers no objection to the above-referenced project at this time, as we are not currently aware of existing documentation directly linking a specific Miami cultural or historic site to the project site. However, given the Miami Tribe's deep and enduring relationship to its historic lands and cultural property within present-day Illinois, if any human remains or Native American cultural items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) or archaeological evidence is discovered during any phase of this project, the Miami Tribe requests immediate consultation with the entity of jurisdiction for the location of discovery. In such a case, please contact me at 918-541-8966 or by email at dhunter@miamination.com to initiate consultation.

The Miami Tribe accepts the invitation to serve as a consulting party to the proposed project. In my capacity as Tribal Historic Preservation Officer I am the point of contact for consultation.

Respectfully,

Diane Hunter

Diane Hunter
Tribal Historic Preservation Officer

From: Michael LaRonge
To: Trautt, Meredith M CIV USARMY CEMVS (USA)
Subject: [Non-DoD Source] RE: Dogtooth Bend, Alexander Co., IL; Alton Pool, Pike & Greene, Cos., IL; Moore"s Towhead, Brown Co., IL; and Twin Islands, Greene Co., IL
Date: Saturday, September 26, 2020 11:20:47 AM

Re: USACE St. Louis District, Four projects in Illinois:
Twin Islands Ecosystem Restoration Project, Illinois River, Greene County
Moore's Towhead Systemic Environmental Mitigation Project, Illinois River, Brown County,
Illinois River Basin Restoration Program, Alton Pool Islands Restoration, Wing and Fisher Islands, Illinois River, Pike and Greene Counties,
and the Dogtooth Bend Emergency Response, Alexander County.

Dear Mrs. Hawkins-Trautt,

Pursuant to consultation under Section 106 of the National Historic Preservation Act (1966 as amended) the Forest County Potawatomi Community (FCPC), a Federally Recognized Native American Tribe, reserves the right to comment on Federal undertakings, as defined under the act.

I have reviewed the information sent related to projects mentioned above. The Tribal Historic Preservation Office (THPO) concurs with the archaeological report that the projects do not appear to be near any historic property of significance to the Forest County Potawatomi Community. Therefore, the FCPC THPO, on behalf of the Tribe, is pleased to offer a finding of no historic properties affected, with two conditions. First if the SHPO finding suggests there will be an adverse effect the Tribe reserves the right to reconsider this opinion. Second, in the event that human remains or archaeological materials are exposed as a result of project activities work must halt and the Tribe must be included in any consultation regarding treatment and disposition of the find prior to removal.

Your interest in protecting cultural and historic properties is appreciated. If you have any questions or concerns, please contact me at phone number or email listed below.

Respectfully,

Michael LaRonge
Tribal Historic Preservation Officer
Cultural Preservation Division
Forest County Potawatomi Community
8130 Mish ko Swen Drive
P.O. Box 340
Crandon, Wisconsin 54520
Phone: 715-478-7354
Email: Michael.LaRonge@FCPotawatomi-nsn.gov

-----Original Message-----
From: Trautt, Meredith M CIV USARMY CEMVS (USA) <Meredith.M.Trautt@usace.army.mil>
Sent: Monday, August 24, 2020 6:45 PM
To: Michael LaRonge <Michael.LaRonge@fcpotawatomi-nsn.gov>
Subject: Dogtooth Bend, Alexander Co., IL; Alton Pool, Pike & Greene, Cos., IL; Moore's Towhead, Brown Co., IL; and Twin Islands, Greene Co., IL

Dear Mr. LaRonge,
Please see the attached letters pertaining to archaeological investigations for an emergency response at Dogtooth Bend, Alexander County, IL and three Ecosystem Restoration Projects: Alton Pool in Pike and Greene Counties, IL; Moore's Towhead in Brown Co., IL, and Twin Islands in Greene Co. IL. Per USACE's recently enacted policy, hard

QUAPAW NATION

P.O. Box 765
Quapaw, OK 74363-0765

(918) 542-1853
FAX (918) 542-4694

September 17, 2020

Department of the Army
U.S. Army Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Moore's Towhead Systemic Environmental Mitigation Project, Illinois River, Brown County, Illinois

To Whom It May Concern,

This project is outside of the current area of interest for the Quapaw Nation; therefore, the Quapaw Nation does not desire to comment on this project at this time. Thank you for your efforts to consult with us on this matter.

Sincerely,

Everett Bandy

Everett Bandy, THPO
Quapaw Nation
P.O. Box 765
Quapaw, OK 74363
(p) 918-238-3100