

Upper Mississippi River Restoration Program

Coordinating Committee

May 16, 2018

Habitat Restoration: River Team Project Recommendations

Earlier this year, at the request of the UMRR Program Manager, the River Teams were asked to identify and evaluate new HREP proposals that could start the Feasibility phase over the next few years beginning as early as FY 18. Over the life of the Program there have been several efforts to identify new HREP projects that have enabled the Program to maintain a ready list of projects to start feasibility at any given time. In FY 19, that process will be undertaken again. However, due to several HREP's projects, particularly in MVR, being halted for various reasons, the need for the identification of a handful of high quality projects that could move quickly into feasibility is needed. The River Teams have identified the following projects (see attached proposals):

MVP

- Reno Bottoms

MVR*

- Pool 13 Lower Islands
- Green Island
- Pool 12 Forestry
- Oquawka Islands Lower Pool 18
- Snyder Slough

MVS

- Yorkinut Slough

* At the time read ahead material were due, the River Resources Coordinating Team (RRCT) had not met yet to make a formal recommendation to the UMRR CC. Therefore, the proposals being considered by the RRCT at the May 2nd meeting are included for your information. The RRCT has been asked to recommend 1-3 projects to move forward for endorsement from the list above.

FACT SHEET

RENO BOTTOMS HABITAT REHABILITATION AND ENHANCEMENT PROJECT POOL 9, UPPER MISSISSIPPI RIVER, MN and IA UPPER MISSISSIPPI RIVER RESTORATION PROGRAM

LOCATION

The 14,000 acre Reno Bottoms area is located within the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) in Houston Co, Minnesota and Allamakee Co, Iowa, and is in Pool 9 between river miles 671-682 (Figure 1). The area is bounded on the west by the Canadian Pacific railroad, on the east by the main Mississippi River navigation channel, on the north by the Lock and Dam 8 dike, and on the south by the Upper Iowa River. The closest communities to the project area are New Albin, Iowa and Reno, Minnesota.

EXISTING RESOURCES

Much of the floodplain forest in the Reno Bottoms project area has been declining in coverage over the past several decades. Current Pool 9 water management and flow through the Lock and Dam 8 embankment have shifted the floodplain forest distribution to elevations about two feet higher than pre-impoundment conditions (Heitmeyer et al. 2009). Flat topography, higher groundwater levels caused by impoundment, increased frequency and duration of inundation and reduced creation of new islands and shoreline have decreased the amount of terrestrial land cover suitable for sustaining forested communities in the UMR floodplain (Figure 2). Furthermore, increased competition from reed canary grass and other aggressive native herbaceous plants (e.g. stinging nettle) has adversely affected forest regeneration and altered the normal successional progression of abandoned agricultural areas. Reed canary grass is an aggressively invasive species whose occurrence is widespread throughout the Reno Bottoms area. Important mast species such as swamp white oak have declined in importance, and Dutch elm disease has also eliminated most American elm, once a prominent component of the river corridor. The relatively recent discovery of Emerald Ash Borer in the near vicinity of the project area could prove devastating for green ash populations in the floodplain, which are another important component of Upper Mississippi River System floodplain forests. Thus, the majority of the current forest is mostly composed of a few highly water tolerant species such as silver maple and black willow. Most of these trees are mature, and being relatively short-lived species are already either approaching the end of their life span or will be in the near future. Although a small amount of scattered young cottonwood and willow are present in Reno Bottoms, a younger tree replacement component is generally lacking throughout the area.

The Minnesota, Iowa, and Wisconsin Departments of Natural Resources document the presence of additional state threatened or endangered species within Pool 9. In addition, there are numerous eagle nests within the project area. Many of these species would benefit from restoration and enhancement of the area. Reno Bottoms, among the few remaining high quality large blocks of bottomland forest along the Upper Mississippi River, is the only one that contains a federally designated Research Natural Area.

Wildlife that currently use the area include Cerulean Warblers, Prothonotary Warblers, Red-shouldered Hawks, transient neotropical migrants, tree-roosting bats, dabbling ducks, beaver, eagles, deer, mussels, and fish.

There are on-going and past efforts to study, monitor, and restore habitat in the Reno Bottoms area including the Corps' forestry inventory and the Navigation and Ecosystem Sustainability Program (NESP) Lock and Dam 8 Embankment project. Because of these efforts, a significant amount of monitoring data and other information currently exists for this project including a hydrogeomorphic evaluation (Heitmeyer and COE, 2009), water quality (WI DNR and USGS), fisheries (MN DNR), and forestry (USACE, USFWS).

Refuge management of the Reno Bottoms area includes the Reno Bottoms Research Natural Area, Reno Bottoms Slow No Wake Area, Pool Slough No Entry Sanctuary, a canoe trail, and boat landings.

PROBLEM IDENTIFICATION

Without active management, floodplain forest in the Reno Bottoms project area is likely to continue to degrade. The diversity of overstory tree species has declined from historic levels and is likely to continue to do so. Forest health has also been negatively impacted due to the effects of forest pests and diseases, and likely the chronic physiological stress associated with alterations to hydrology. On higher elevation sites, the prevalence of reed canary grass and other non-woody competition throughout the management area will continue to preclude successful natural regeneration from the species that are still present on or near the site. Even if reed canary grass were not present, it is not certain whether standard tree planting techniques alone would lead to a successful outcome due to changes in the hydrologic regime at the site, primarily at lower elevations relative to mean pool. For example, higher impact restoration techniques such as alterations in topographic diversity may ultimately be required to ensure the long-term sustainability of healthy floodplain forest attributes.

A variety of physical, chemical and biological stressors have individually and cumulatively affected the quantity and quality of habitat for biota. Specifically, without the implementation of active site restoration measures, the following conditions are likely to occur at the Reno Bottoms project area:

- Increased coverage and dominance of reed canary grass.
- Increased loss of tree and other native plant species diversity.
- Increased loss of forest structural and age class diversity.
- Increased loss of forested land cover.

- Increase in floodplain forest habitat fragmentation.
- Decrease in floodplain forest habitat connectivity.
- Decrease in amount of floodplain forest interior habitat.
- Increase in cumulative adverse impacts on forest-dependent wildlife species.
- Increase in cumulative adverse impacts on local aesthetic and cultural resources.
- Increase in cumulative adverse impacts on ecosystem services (e.g., improvements to water quality).

PROJECT GOALS

Project goals are derived from the Refuge's Comprehensive Conservation Plan (2006), the Refuge's Habitat Management Plan (2017 draft), River Resources Forum Pools 1-10 Environmental Pool Plans (2004), the Corps of Engineers' Upper Mississippi River Systemic Forestry Stewardship Plan (2012), and other Upper Mississippi River System restoration documents. The project goal is as follows:

Protect/maintain/enhance the ecological health of floodplain hardwood forests to levels that are sustainable.

- Increase topographic diversity and elevation of floodplain areas.
- Increase the extent, patch size, and successional variety of forest communities.
- Restore and maintain large contiguous patches of forest communities.
- Increase habitat corridor sizes and connectivity (focus is on forest-dependent and migratory bird species).

PROPOSED PROJECT

Project features proposed to address the habitat goals for the project area could include the following:

- Forest inventory.
- Forest creation and enhancement activities such as understory plantings and timber stand improvement, and reed canary grass management.
- Elevation modification which may include aquatic dredging, dredged material placement, grading, etc.
- Connectivity management activities such as channel manipulations, and spillway modifications.

Collectively, these features will provide the environmental conditions necessary to reach and maintain the desired future habitat conditions. Other potential actions include controlling invasive species and other habitat management actions. Fine material from backwater dredging along with main channel sand will be used for elevation modification. This backwater dredging could provide additional deep water fish habitat. (Figure 3.)

PROJECT OUTPUTS

The project has the potential to improve conditions on over 14,000 acres of floodplain habitat by providing forest establishment and increasing forest species, size, age, and structural diversity, with secondary benefits to marsh and aquatic areas. Topographic modifications related to increasing site elevation will also provide additional microhabitat diversity. By reducing forest fragmentation and providing larger contiguous forest patch size forest-dependent species, including many Refuge priority resources of concern, will benefit. Additional habitat improvements will be provided by invasive species eradication and control. (Figure 3.)

This project provides the opportunity to protect, enhance, and restore quality forest and wetland habitat for all native and desirable plant, wildlife, and fish species. Targeted animals include many of the Refuge priority resources of concern (ROC) as identified by the Refuge's Habitat Management Plan (USFWS, 2017 draft), as well as one priority ROC native plant community, the Midwestern wooded swamps and floodplains. Priority wildlife ROCs potentially benefiting from the proposed actions include Cerulean Warbler, Prothonotary Warbler, Red-shouldered Hawk, transient neotropical migrant passerines, and tree-roosting bats. Reno Bottoms also provides several opportunities to implement adaptive management strategies. The two separate spillways, well-studied forests, and modeled sloughs will be valuable features for testing hypotheses and establishing experimental designs to test forestry management practices.

Secondarily, fish and mussel species will benefit from managed flows, additional bathymetric diversity, and reduced sedimentation.

IMPLEMENTATION CONSIDERATIONS

At the outset of planning, the team could consider planning and implementing the project in two stages. The first stage could be used to address elevated water levels within the Reno Bottoms complex with a primary objective being the protection and maintenance of forest habitats. The second stage could then be used to consider measures for additional habitat improvement within the complex. After the first stage is constructed, water levels within the complex could be evaluated to determine the effectiveness of those measures. Those measures could be modified in the second stage if needed, but most importantly, the uncertainty about their effectiveness would hopefully be eliminated, helping guide the planning and decision-making process for the second stage. Planning and implementing and implementing the project in this manner should lead to a higher likelihood of success because bottomland forest is critically dependent on hydrology.

Some of the proposed project features are located within the Refuge's Reno Bottoms Research Natural Area and the Pool Slough No Entry Sanctuary. Work within the sanctuary requires that construction and other activities halt upon the start of the State's waterfowl hunting season (around the end of September or early October).

There are several active eagle nests in the area that could affect construction timing. Some areas of the project may be difficult to access.

FINANCIAL DATA

The proposed project features are located on Federally owned lands in an area managed by the U.S. Fish and Wildlife Service (USFWS) as part of the Upper Mississippi River National Wildlife and Fish Refuge. Therefore, the project costs would be 100 percent Federal. In accordance with Section 107(b) of the WRDA 1992, all costs for operation, maintenance, and rehabilitation of project features would be the responsibility of the USFWS. During the study, if any additional project features are proposed that are located outside the Refuge boundaries, the Minnesota or Iowa Department of Natural Resources would likely be the non-federal sponsor and would be required to provide the cost-share for those features. The estimated cost of the proposed project, depending upon the project features selected for implementation, are \$2,000,000 to \$8,000,000.

STATUS OF PROJECT

This is a priority project for the Refuge, and is being considered for endorsement by the St. Paul District River Resources Form and Fish and Wildlife Workgroup.

POINTS OF CONTACT

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Jeff Janvrin, WI DNR, Mississippi River Habitat Specialist, 608-785-9005

Mike Griffin, IA DNR, Mississippi River Habitat Biologist, 563-872-5700

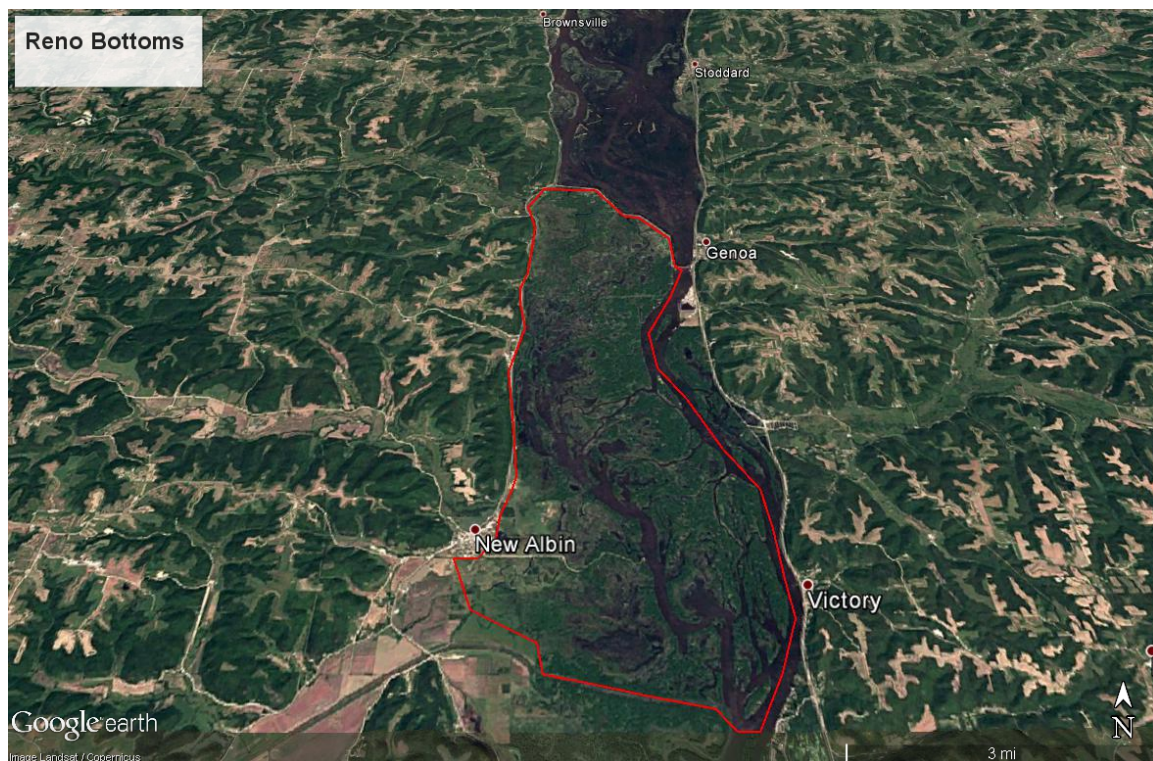


Figure 1. Reno Bottoms location. Approximate boundary shown.

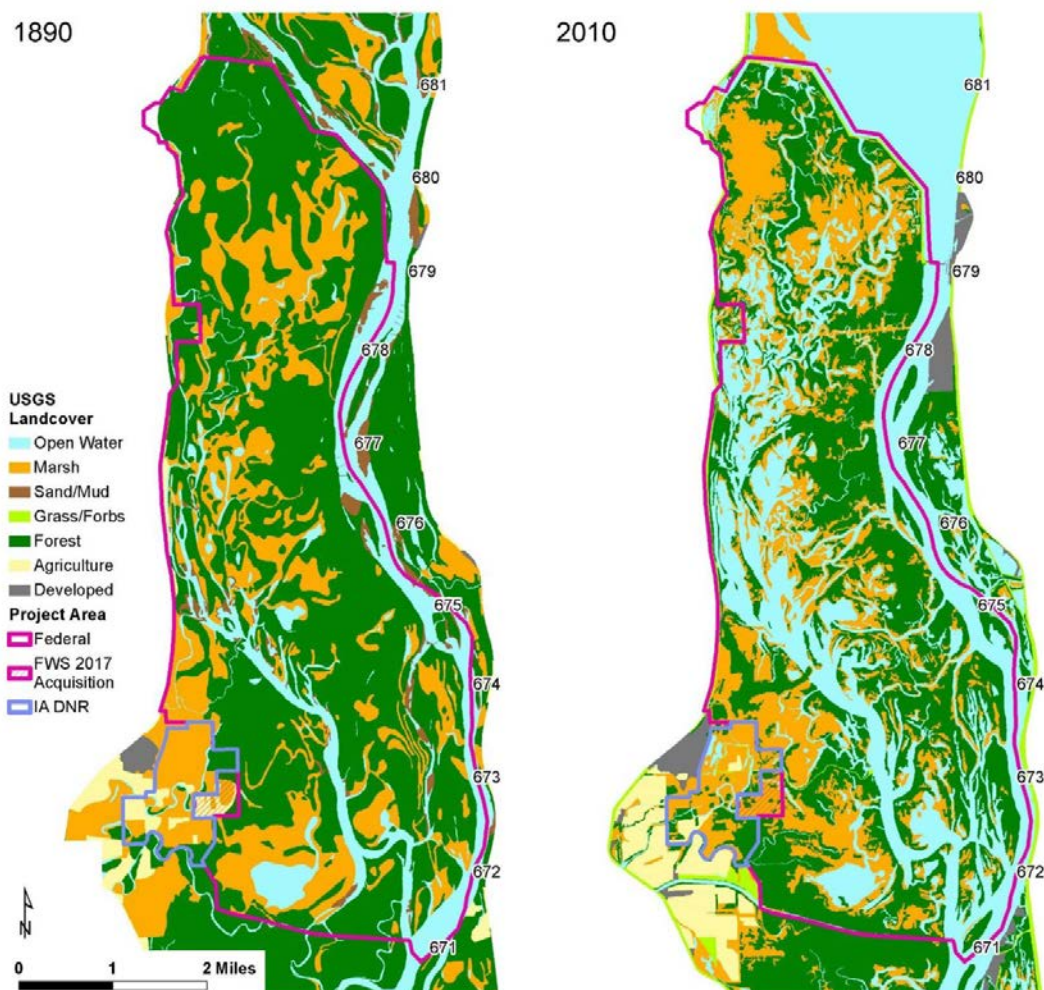


Figure 2. Maps showing land cover changes in Reno Bottoms from 1890 (left) to 2010 (right). Note the drastic increase of open water and marsh habitats and the decrease of forested habitat over that 120-year time period.

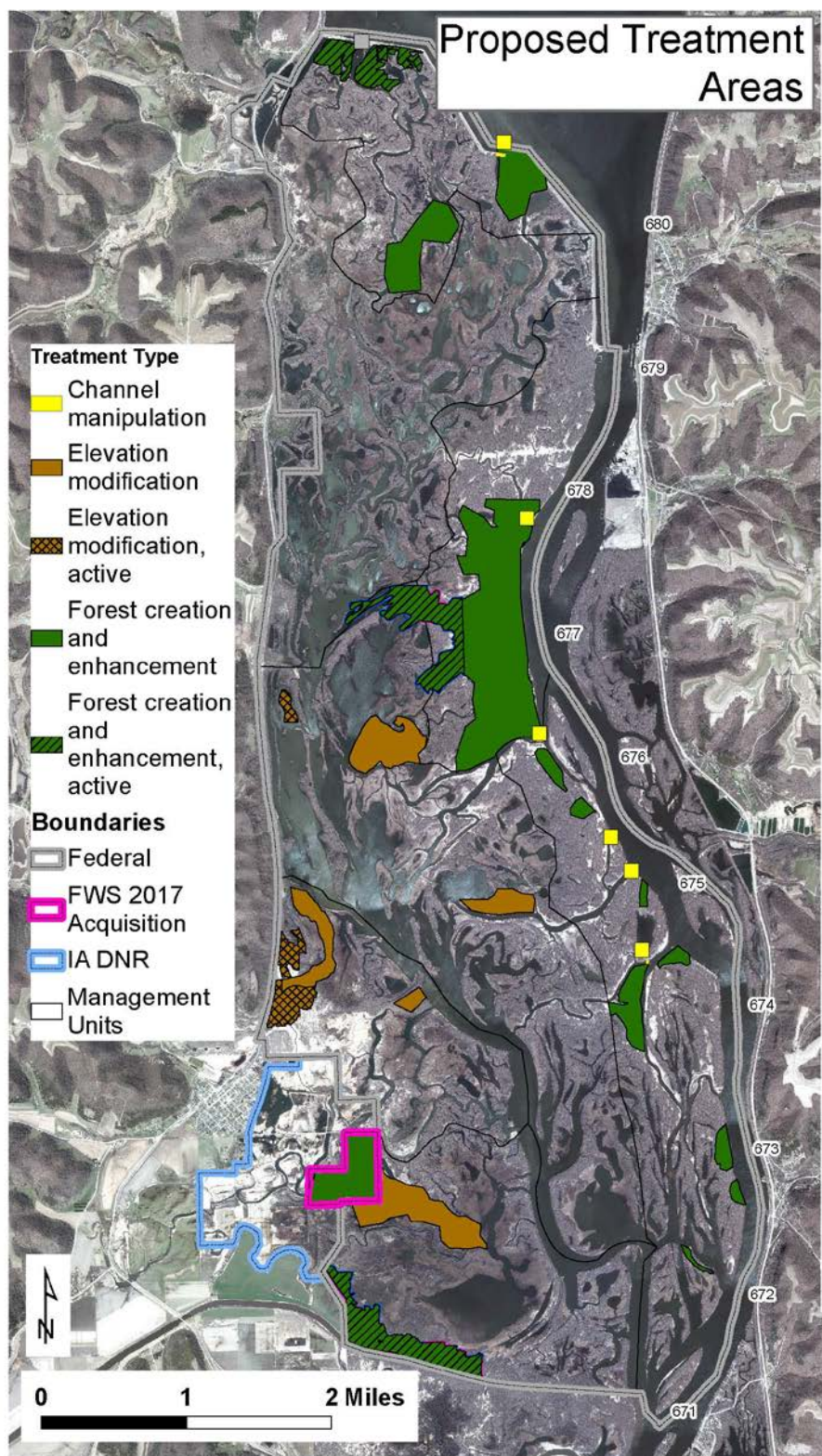


Figure 3. Map depicting potential project features. (Corps of Engineers, St. Paul District, Andy Meier.)

FACT SHEET

LOWER POOL 13 RIVERINE, BACKWATER, AND FLOODPLAIN HABITAT PROJECT

**POOL 13, UPPER MISSISSIPPI RIVER, IOWA
UPPER MISSISSIPPI RIVER RESTORATION PROGRAM**

LOCATION

The Lower Pool 13 Islands project is located in Pool 13 of the Upper Mississippi River. The Project is located at RM 523.0-529.0 of the UMR. This large area includes backwater lakes, sloughs, flowing channels, and impounded water over historic flooded islands and remnant islands. The project area is in Whiteside Co, IL, and Clinton County, IA. The closest community to the project area is Clinton, Iowa, located approximately 3 miles downstream from the center of the project area.

EXISTING RESOURCES

Pre-impoundment, the project area was a mixture of bottomland forest, braided islands, permanent and seasonal lakes and forested wetlands, wet meadow, main channel and sloughs that conveyed flow seasonally. Lock and Dam 13 began operation in the late 1930's, which resulted in the inundation of several thousand acres of floodplain in lower Pool 13.

Connectivity of backwater and off channel areas within the project area changed from seasonal discharge related events to year round connectivity. The resulting continuous inundation has contributed to island loss, sedimentation and resuspension of sediments due to wave action.

The lower 13 mile section of Pool 13 has very few land masses in a valley that is 1.5 to 4.5 miles wide. The lower portion is oriented N-S. In this reach, a sediment laden tributary the Elk River enters the project area. The Elk River delivers sediment and nutrients into the Mississippi from an intensive agricultural area. The Elk River waters are generally turbid due to tributary inputs.

Lower Pool 13 has been colonized by several species of submerged aquatic vegetation . Most of the aquatic area is between 3 and 4 feet deep. Fisheries resources are limited by the lack of habitat diversity. Migratory water bird use is high compared to other adjacent pools. Resident water bird use of the island – (what island are you referencing?) has been exponentially growing in recent times. A rookery has been established on an island on the north part of the area that has now been the site of the first documented nesting of the White Pelicans in Iowa since 1909. This island also has over 200 Double Crested Cormorant nests, Great Egret nests, Cattle Egret nests, Ring-bill Gull nests and the first Iowa record of a successful Herring Gull nest.

PROBLEM IDENTIFICATION

Forecasted future conditions anticipate continued sedimentation. Backwater sedimentation of fine material is also expected to continue. Wave resuspension of sediment will continue to affect the sustainability of aquatic vegetation in the complex due to influences of the Elk River, ambient turbidity levels, and wind fetch. The fish community and use in the area is expected to continue to degrade due to a lack of structure, habitat diversity, and overwintering habitat for

various species. Migratory water bird habitat will continue to be variable, primarily driven by variability in year to year aquatic plant production.

Stressors Affecting the Condition of Habitat and Biota

A variety of physical, chemical and biological stressors have individually and cumulatively affected the quantity and quality of habitat for biota. These stressors include, but are not limited to:

- Impoundment by locks and dams increased and stabilized water levels
- River regulation affecting stage hydrograph
- Loss of islands
- Altered sediment transport and deposition
- Wind-driven sediment resuspension
- High lateral hydraulic connectivity
- Sedimentation in off-channel areas
- Sediment loading from tributaries
- Nutrient loading from tributaries
- Invasive species –
- Loss of isolated wetlands
- Loss of fish over wintering habitat
- Loss of sand/mud bar habitat
- Degraded migratory water bird habitat
- Degraded channel habitat for aquatic species (fish and mussels)
- Long shorelines with riprap

Connectivity is high in the project area with over 50% of the total river flow being conveyed outside of the main channel. Backwaters adjacent to the impounded area are degraded because of island inundation, sediment deposition, and high turbidity. Wind fetch within the project area is high because of the pool width in the lower section, as this pool is over 4.5 miles wide in the project area. Wave erosion is obvious on many islands. Erosion of islands will continue in the future, further degrading physical conditions in backwaters. Island erosion will occur at a moderate rate, and while there are a few locations in the project area where land building is occurring, overall there is a net loss. Backwater fisheries habitat will continue to decline due to increased flows and sedimentation of presently protected areas. Waterfowl habitat will deteriorate over time as island loss continues and more of the project area is subjected to higher current velocities and wave action that will negatively affect plant species composition and coverage. Impoundment of the pool and permanently higher water tables has affected the health of floodplain forest habitat on islands and adjacent floodplain areas. These higher water tables are adversely affecting floodplain forest composition and regeneration.

PROJECT GOALS

The project will be designed to meet the following reach and project scale objectives. Primary project objectives are identified in *italics*. Primary objectives represent the main focus of the

project to address alterations in processes/drivers and will be used to assess overall project performance and success. The remaining objectives are secondary and will be considered during detailed project planning for evaluation of project alternatives (i.e. if a small increase in cost allows attainment of a secondary objective, this may become the selected alternative due to increase in ecosystem benefits).

Hydrology and Hydraulics

- *Altered hydraulic connectivity*

Biogeochemistry

- *Improved water clarity*
- *Reduced nutrient loading*
- *Reduced sediment loading from tributaries and sediment resuspension in and loading to backwaters*

Geomorphology

- *Restore a sediment transport regime so that sediment transport rates and future change in geomorphic patterns are within acceptable limits*
- *Restored pattern of channels and floodplain features*
- *Restored diversity of floodplain topography*

Habitat

- *Restored habitat connectivity*
- *Restored riparian habitat*
- *Restored aquatic off-channel areas*
- *Restored terrestrial floodplain areas*
- *Restored channel areas*

Biota

- *Diverse and abundant native aquatic vegetation communities (SAV, EAV, R/F)*
- *Diverse and abundant native floodplain forest and prairie communities*
- *Diverse and abundant native fish community*
- *Diverse and abundant native mussel community*
- *Diverse and abundant native bird community*
- *Diverse and abundant amphibian and reptile community (Project)*

Islands will restore the riparian border between the secondary channels and adjacent backwaters, partially restoring a more natural hydro geomorphic condition in the project area. Restoring depth diversity and seasonal water level variation will also be pursued. There is an opportunity to maintain and restore a quality and resilient mix of riverine, backwater, and floodplain habitat in lower Pool 13. Some of this habitat exists already, but it is degraded and will continue to degrade as the existing islands erode and sediment deposition in backwaters occurs.

PROPOSED PROJECT

Project features proposed to address the habitat goals for this sub-area include island construction, backwater dredging, and island stabilization. Collectively, these features will provide the environmental conditions necessary to reach and maintain the desired future habitat conditions. Other potential actions include controlling invasive species and other habitat management actions. Borrow material for construction of islands will come from Gomers Lake backwater and the area north of the Bulgers Hollow boat ramp. Main channel sand along with other suitable material will be used to construct the islands.

The desired future also includes improved habitat conditions for mussels, turtles, and forest resources. Island stabilization and construction are the main features identified for maintaining habitat quality in the lower Pool 13 area. Additional features to restore isolated wetlands, sand and mudflat habitat, shorebird habitat, turtle habitat, raising the elevation of floodplain habitat, etc. are also proposed for the area. Pool-wide water level management (minor and major drawdowns) is proposed as one tool to revitalize aquatic vegetation in the area. Proposed project features are shown in Figure 1. The project features would be designed with little or no O&M required. The authority for this study and potential project construction is provided by Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended.

PROJECT OUTPUTS

6.1 Ecological Benefits

Processes:

Restoration of islands in the Lower Pool 13 area will provide protection from wind fetch, nesting islands for waterfowl, colony nesting water birds, turtles, amphibians, refuge for fish and the increase in aquatic vegetation along with the overwintering areas will increase fisheries population and diversity.

Habitats

Restoration of islands would allow for the opportunity to include sand areas for turtle nesting, mud flats for waterfowl and shorebird loafing and feeding areas and isolated wetlands for amphibians. Backwater dredging would be performed to increase bathymetric diversity for fisheries along with overwintering habitat. Forest diversity would be enhanced through planting, elevating islands, and forest management on existing and restored islands.

Biota

The restored islands, along with protection of existing islands, will restore flow distribution and reduce impact of wind and wave actions. This will improve conditions for more sustainable, less annually variable aquatic vegetation (especially submersed vegetation) by improving light penetration. Improvement in the diversity, distribution, and coverage of aquatic vegetation will

result in an increased spring and fall use by migratory water birds. This will also lead to increased use by many fish species by providing habitat diversity.

Restoration of overwintering habitat will increase the survival and abundance of these species at all times of the year. Enhancement of channel border habitat will improve use by channel fish species seasonally, and potentially year round. The improved channel and channel border habitat will also provide improved habitat conditions for native mussel species.

Scales of Anticipated Benefits

Geographic extent – Present knowledge about project level geographic scale influences on biota and processes will limit alternative incremental evaluation. However, extant monitoring and research results indicate many fish and wildlife species will seasonally use the restored habitat, traveling anywhere from a few hundred feet to thousands of miles. For example, migratory water bird use of food resources of the area will contribute to improved fitness and the proposed island features will contribute to some increase nesting opportunities for locally nesting migratory and resident avian species.

Timing of anticipated responses -- Migratory water bird habitat will primarily be seasonal (spring and fall). Locally nesting species such as cormorants, pelicans, gulls, eagles, herons, egrets, bitterns, some waterfowl, etc. will use the area for the additional nesting opportunities and food resources that will be provided.

Turtle nesting in the area will increase as a secondary feature of the project. The creation of low flow backwater areas will contribute to increased habitat availability for adult and juvenile of many different species, thereby contributing to increased year round use.

Fisheries use will be both seasonal and year round. The use will vary by species, with backwater species expected to exhibit a significant increase in year round use based on response documented at other restoration locations.

Duration of anticipated responses – The duration of responses are expected to continue for at least 50 years based on the performance of similar types of restoration projects that have been completed since 1986. Some responses will be sustained without additional maintenance or operation for >50 years, while maintaining some responses will require periodic maintenance (i.e. sandy terrestrial areas for turtle nesting habitat).

The proposed project would result in the protection and restoration of about 1000 acres of riverine, backwater, and floodplain habitat. Dredging for island fill material would provide additional deep water habitat for high quality, diverse floodplain forest, and fishery benefits.

IMPLEMENTATION CONSIDERATIONS

The presence of the Higgins Eye Pearly Mussel (*Lampsilis higginsii*) at various locations in Pool 13 indicates they may be present in the project area. If present, many of the proposed project

features can be modified to avoid any impact. However, the implementation of some potential actions may be constrained or limited if they are present in the area.

Plan formulation should consider the possibility of using channel maintenance generated sand as a potential source of material for construction of some proposed features.

FINANCIAL DATA

The project features would be located entirely on the Upper Mississippi River National Wildlife and Fish Refuge. Therefore, in accordance with Section 906(e) of the Water Resources Development Act of 1986, the total estimated project cost of \$15,000,000 would be 100% Federal. The U.S. Fish and Wildlife Service manages the lands and would be responsible for operation, maintenance, and rehabilitation of project features, in accordance with Section 107(b) of the Water Resources Development Act of 1992.

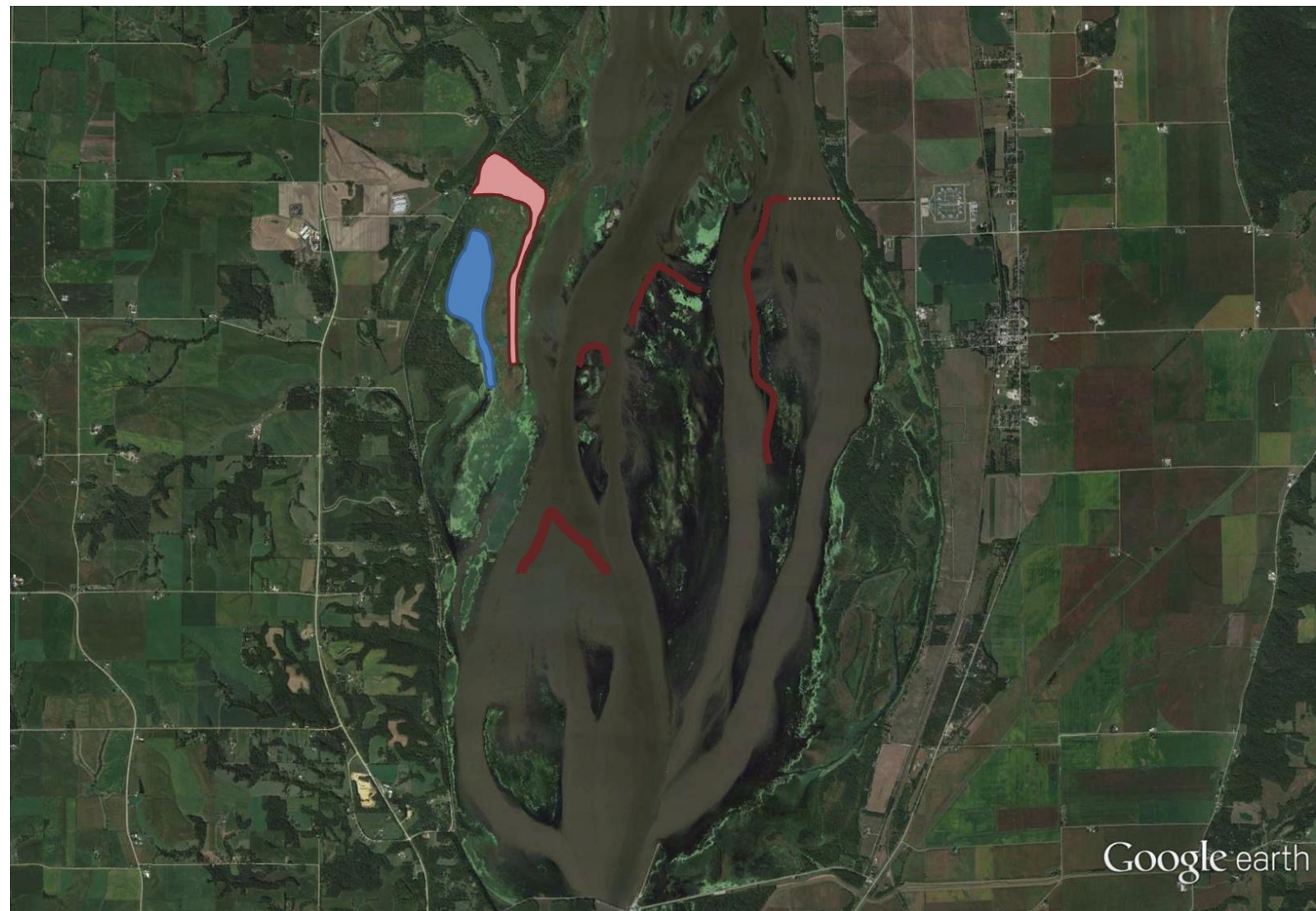
STATUS OF PROJECT

This project was presented to The Fish & Wildlife Interagency Committee (FWIC) at the February 15, 2017 meeting.

POINTS OF CONTACT

- Corps of Engineers, Rock Island District 309-794-5428
- U.S. Fish and Wildlife Service Upper Mississippi River Wildlife and Fish Refuge – Savanna District, District Manager, 815-273-2732
- Iowa Department of Natural Resources, UMRR Habitat coordinator, 563-872-4976
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Figure 1 – Lower Pool 13 Proposed Project Features



GREEN ISLAND WETLAND COMPLEX
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
JACKSON COUNTY, IOWA
UPPER MISSISSIPPI RIVER RESTORATION
ROCK ISLAND DISTRICT

FACT SHEET

I. LOCATION

The 4,064 acre Green Island Wildlife Management Area is located in Pool 13 below the confluence of the Maquoketa River along the right descending bank. It is positioned between RM 548.5-546. The area is within the Green Island Levee and Drainage District and is managed by the Iowa Department of Natural Resources (Figure 1).



Figure 1. General Project Location

II. EXISTING RESOURCES

The Green Island Wildlife Management Area consists of a managed wetland complex. The complex is characterized by shallow lakes, emergent vegetation and managed moist soil areas, with braided channels surrounded by degrading riparian timber. There are five degraded drainage ditches that are remnants of the era when Green Island was last farmed (1950's). There is a one-way, diesel engine powered pump station used to pump water into the area, which is further compartmentalized into five managed areas. The area is listed on the RAMSAR delineation as a wetland of international significance. The area receives heavy use by migratory waterfowl, shorebirds, secretive marsh birds, wading birds and passerines. In past years there

have been up to seven bald eagle nests on the area. The area also exhibits a vast array of non-avian wetland-dependent wildlife such as herptiles, odonates, and aquatic furbearers.

III. PROBLEM IDENTIFICATION

The existing forest is degrading at an alarming rate. Many trees are stressed and dying. The old ox-bow lakes have lost much of their depth and provide little refuge for fish in the area. The pump system is old, inefficient and expensive to use. The old drainage ditches are filled in to the point that a drawdown cannot be completed to regenerate high quality moist soil, emergent and aquatic vegetation. Higher water tables on the Mississippi River proper are adversely affecting floodplain forest composition and regeneration.

IV. PROJECT GOALS

To maintain this wetland of international significance we will have to increase the ability to drawdown the area for vegetation regeneration. Restoration of aquatic habitat quality through increased depth diversity is also needed. The project goals are as follows:

Maintain/enhance/create quality habitat for all native and desirable plant, animal and fish species.

- Maintain existing aquatic habitat complexes for fish and wildlife
- Increase the number and acreage of centrarchid over-wintering habitat areas
- Increase the acreage, age class diversity and species diversity of the bottomland forest
- Restore isolated wetlands in several locations
- Improve waterfowl habitat by increasing the coverage of aquatic vegetation
- Provide nesting habitat for turtles

Maintain/enhance/restore/emulate a sustainable ecosystem (natural water levels, sediment transport and deposition regime, and distribution of water flows across the Mississippi River floodplain).

- Reduce average wind fetch in open water areas (e.g., backwaters and impounded areas).
- Manage pooled water elevations to emulate more natural seasonal water elevations
- Minimize adverse effects of elevated water table on soil moisture conditions

V. PROPOSED PROJECT

The desired future state of the Green Island wildlife area hinges upon the ability to manage the growing season vegetation (emergent, moist soil and bottomland hardwoods). The proposed project includes features that will provide this necessary management capability. The project will create the ability to drawdown this important migratory stopover in order to provide consistent, high quality food resources for migratory birds. Restoring the ability to drawdown the area via dredging the lakes, sloughs and ditches will obtain critical additional benefits for fisheries

resources. The current pump station will need to be converted to an electric pump system, and a second electric pump station will need to be installed at the current outlet to serve as a reliable way to remove water. Modern pump stations will allow area managers to control water regimes during the growing season and during the migration.

Dredged material will be used to make islands in the open water portions of the project to reduce wind fetch and promote aquatic vegetation. Dredged material will also be used to raise areas for diverse forest to replace the declining forest on the area.

Project construction is provided by Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended.

VI. IMPLEMENTATION CONSIDERATIONS

The area is currently within the Green Island Levee and Drainage District.

VII. FINANCIAL DATA

All Project features would be located on federally -owned lands managed through a cooperative agreement with the U.S. Fish and Wildlife Service (USFWS); responsibility for the operation, maintenance, and repair of the lands has, in turn, been given to the Iowa Department of Natural Resources (IA DNR) by the USFWS through a cooperative agreement. Therefore, the total project cost would be 100% Federal. The Iowa Department of Natural Resources manages the lands and would be responsible for operation, maintenance, and rehabilitation of project features. The OM&R costs are estimated to be about \$40,000 annually.

VIII. STATUS OF PROJECT

This project was presented to the Fish and Wildlife Interagency Committee (FWIC) on February 15, 2018.

IX. POINTS OF CONTACT

Marvin Hubbell, USACE UMRR program manager, 309-794-5428.

Ed Britton, U.S. Fish and Wildlife Service, Savanna District Manager, 815-273-2732.

Sharonne Baylor, U.S. Fish and Wildlife Service, EMP Coordinator, 507-494-6207.

Mike Griffin, Iowa Department of Natural Resources, Mississippi River Wildlife Biologist, 563-872-5700

Kirk Hansen, Iowa Department of Natural Resources, UMRR coordinator, 563-872-4976.

15 February 2018

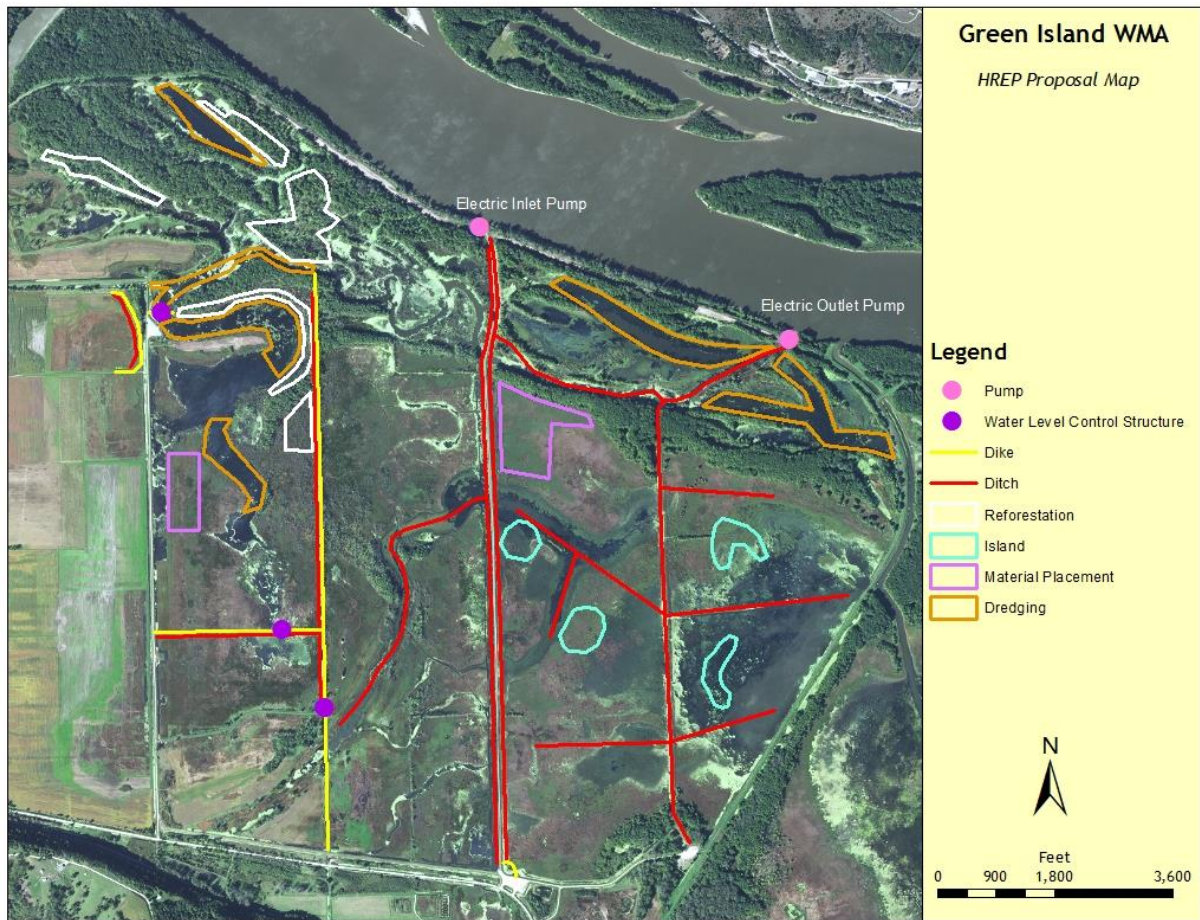


Figure 2. Green Island Pool 13 Proposed Project Features

FACT SHEET

Pool 12 Floodplain Forest Habitat Rehabilitation and Enhancement Project POOL 12, UPPER MISSISSIPPI RIVER, IOWA AND ILLINOIS UPPER MISSISSIPPI RIVER RESTORATION PROGRAM

LOCATION

Pool 12 of the Mississippi River extends for roughly 26 miles from Lock and Dam 12 (River Mile 557) near Bellevue, Iowa, to Lock and Dam 11 (River Mile 583) at Dubuque, Iowa, including portions of Jo Daviess County in Illinois and Dubuque and Jackson Counties in Iowa (Figure 1). This project is located within the Upper Mississippi River National Wildlife and Fish Refuge.

EXISTING RESOURCES

The vast majority of bottomland islands and backwater lakes found in Pool 12 are managed by the U.S. Fish and Wildlife Service as part of Upper Mississippi River National Wildlife and Fish Refuge (Refuge). Excepting Nine-Mile Island at River Mile 573 and Scott Island at River Mile 561, most of this land is on the Illinois side of the River in Jo Daviess County.

As of 2010, there were over 4,000 acres of floodplain forest within Pool 12. Flat topography, higher water levels caused by impoundment of the River, increased flood frequency and duration, and erosion (both natural and human-induced) have decreased the amount of terrestrial habitat capable of supporting a diverse, sustainable forest community (Figures 1 and 2).

The remaining forest suffers from a loss of diversity and is now dominated by a handful of tree species; most notably silver maple, cottonwood, willows and green ash. Although isolated areas include hard mast, soft mast, and light seeded species, these areas are scattered and have limited capacity to remain sustainable without active management. Thus, the majority of the current forest is composed of a few flood-tolerant and short-lived species.

Additionally, the increasing spread of invasive species such as reed canary grass, Japanese hops, and *Phragmites* exacerbates the problem. Competition from these aggressive invaders has adversely affected forest regeneration and altered the normal succession of forest growth.

Even with the declining forest health and loss of resilience for diverse forest communities, Pool 12 is host to a diverse guild of resident and migrating species dependent on these forests for major components of their life cycle needs. Resident mammals like deer, squirrel, beaver and other rodents rely on these floodplain forests. Likewise, resident and migrating birds like woodpeckers, warblers, waterfowl and raptors use the forest for nesting and foraging during some part of their life.

PROBLEM IDENTIFICATION

Although Pool 12 has remaining floodplain forests, they suffer from a loss of diversity, lack of natural regeneration, increased fragmentation, and loss of land from erosion. Additionally, existing forested areas are diminished by increased flooding (both frequency and duration), sedimentation, and increased competition from invasive species.

PROJECT GOALS

Project goals are derived from the Refuge's Comprehensive Conservation Plan (2006), the Refuge's Habitat Management Plan (2017 draft), River Resources Coordinating Team Pools 11-22 Environmental Pool Plans (Draft 2004), the Corps of Engineers' Upper Mississippi River Systemic Forestry Stewardship Plan (2012), and other Upper Mississippi River System restoration documents. The project goal is as follows:

Protect/maintain/enhance the ecological health of floodplain hardwood forests to levels that are sustainable and resilient.

- Protect and promote continued forest health and growth in existing quality floodplain forests.
- Increase topographic diversity and elevation where significant forest loss and decline occurs from increased flooding.
- Enhance and increase the pool coverage extent, patch size, and successional diversity of floodplain forest communities.
- Restore and maintain large contiguous patches of forest communities by reduction in canopy gaps converted to invasive species.
- Protect and increase habitat corridors and connectivity (focus is on forest-dependent and migratory species).

Focus on the forest health decline and dwindling forested islands of Pool 12 through the protection of productive forest stands, enhancing forest species diversity, enhancing forest structural diversity, establishing additional forested areas that are ecologically resilient, and reducing detrimental expanse of invasive species.

PROPOSED PROJECT

Locations of greatest need and capability of maximum restoration would be determined through timber inventory analysis and use of the Forest Successional Model developed by USGS.

Recent advances in silviculture and management techniques identified through research and application on the Upper Mississippi River provide land managers new capability to address the decline in floodplain forest sustainability. Timber stand improvements (i.e. crown thinning, basal area thinning, understory thinning, crop tree release, understory planting, invasive species control, and open canopy tree planting), timber harvest (i.e. modified shelterwood, shelterwood, seed tree, and group selection), and increased topography establishment (i.e. through beneficial use of dredged material and placement of potential backwater dredging) are tools available to reverse or prevent the loss of quality floodplain forest within Pool 12.

Areas comprised mainly of the invasive exotic reed canary grass could be converted to forest habitat by raising the ground elevation through deposit of dredged material, and/or planting of nursery stock (Figures 3-5).

Collectively, these features and actions can provide the environmental conditions necessary to achieve our project goals and continue providing habitat for wildlife and generations of people into the future.

PROJECT OUTPUTS

The project has the potential to increase resilience of floodplain forest on over 3,000 acres of floodplain habitat by providing forest establishment, recapturing areas of forest loss, and increasing forest diversity by species distribution and structural development; with secondary benefits to marsh and aquatic areas. Creating new floodplain forest areas where forest loss has occurred and creation of topographic modifications by increasing variances in site elevation will also provide additional microhabitat diversity. By reducing forest fragmentation and providing larger contiguous blocks of forested corridors, forest-dependent species, including many Refuge priority resources of concern, will benefit. Additional habitat improvements will be provided by invasive species eradication and control.

This project provides the opportunity to protect, enhance, and restore quality floodplain forest and wetland habitat for all native and desirable plant, wildlife, and fish species. Targeted animals include many of the Refuge priority resources of concern (ROC) as identified by the Refuge's Habitat Management Plan (USFWS, 2017 draft), as well as one priority ROC native plant community, the Midwestern wooded swamps and floodplains. Priority wildlife ROCs potentially benefiting from the proposed actions include Prothonotary Warbler, Red-shouldered Hawk, transient neotropical migrant passerines, and tree-roosting bats.

Secondarily, fish and mussel species may benefit from additional bathymetric diversity.

IMPLEMENTATION CONSIDERATIONS

Coordination with partnering agencies on timing of work activities, temporary impacts to the recreational public and temporary disturbance to wildlife could all be constraints. Remote locations and difficult access could require specialized equipment and creative construction methods to achieve project objectives. Eagle nesting and maternity bat roosts could affect project construction schedules.

FINANCIAL DATA

All proposed activities are located in Pool 12 of the Mississippi River and would take place on lands managed by the U.S. Fish and Wildlife Service (Service) as part of Upper Mississippi River National Wildlife and Fish Refuge. Because of this, the project qualifies for 100% funding through the U.S. Army Corps of Engineers as part of the Upper Mississippi River Restoration Program in accordance with WRDA, 1992. Operation and maintenance of any project features would be the responsibility of the

Service. The estimated cost of the proposed project, depending upon the project features selected for implementation, are \$5,000,000 to \$9,000,000.

STATUS OF PROJECT

Forest restoration and control of invasive species are both priority objectives of the Refuge. After presentation, review and endorsement by the Rock Island District FWIC, the proposal would be forwarded to the RRCT for approval and implementation.

POINTS OF CONTACT

Upper Mississippi River National Wildlife and Fish Refuge

Ed Britton, Savanna District Refuge Manager – 815-273-2732

Russell Engelke, Savanna District Deputy Manager – 815-273-2732

Sharonne Baylor, Environmental Engineer – 507-494-6207

Partnering Agencies

Mike Griffin, IaDNR River Biologist

Kirk Hansen, IaDNR Fisheries Biologist

Ben Vandermyde, USACE Forester

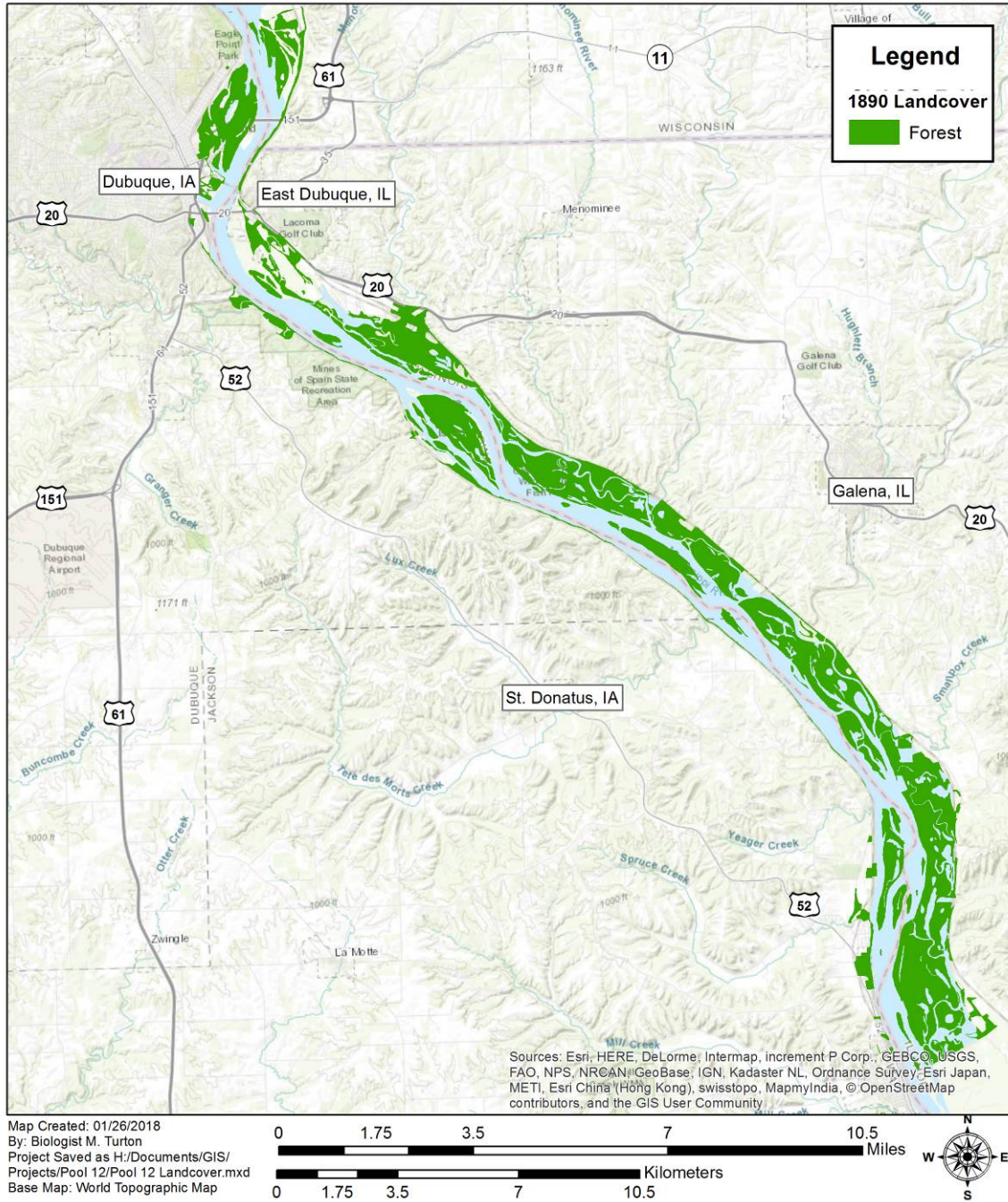


Figure 1: Pool 12 location and 1890 land cover map indicating the pre 9-foot Navigation Channel forested areas within Pool 12.

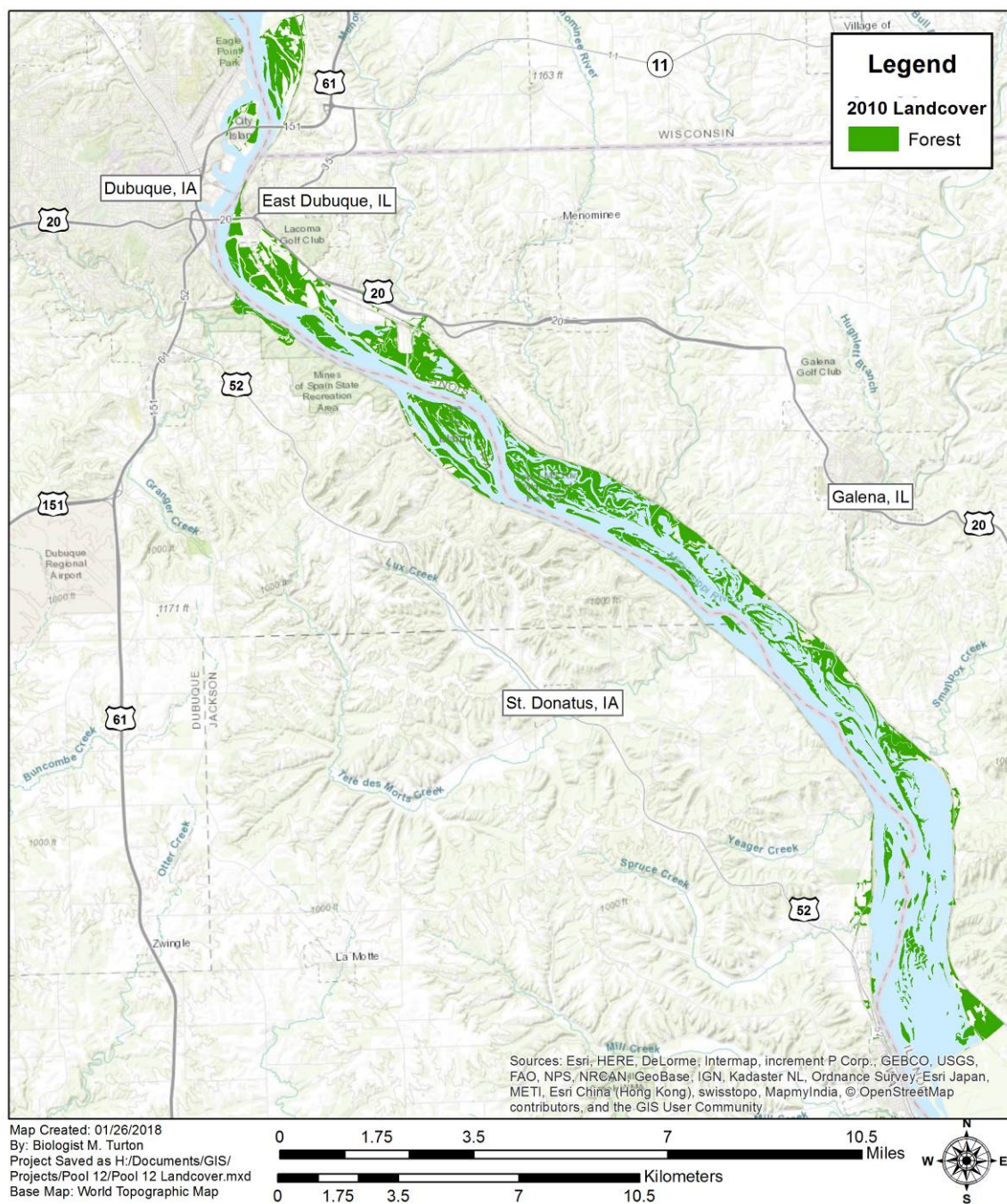


Figure 2: 2010 land cover map indicating the recent extent of Pool 12 forested areas.



Figure 3: Map showing examples of reed canary grass locations that could be restored to floodplain forest. There are many sites like this throughout Pool 12.

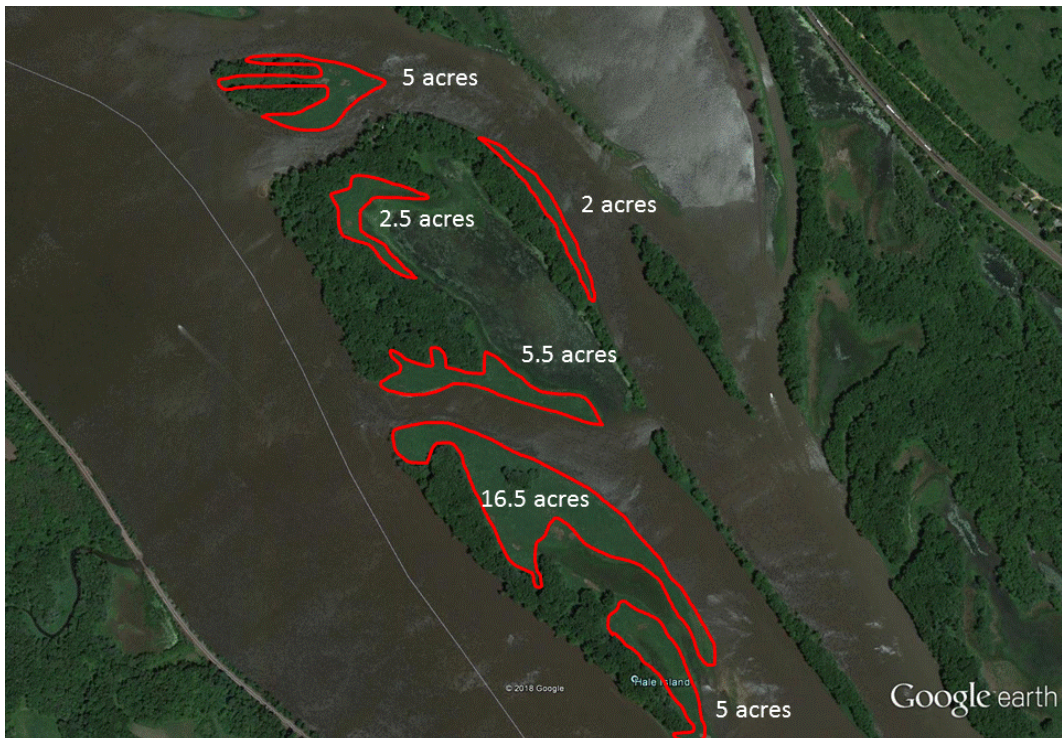


Figure 4: Map showing examples of reed canary grass locations that could be restored to floodplain forest. There are many sites like this throughout Pool 12.



Figure 5: Map showing examples of reed canary grass locations that could be restored to floodplain forest. There are many sites like this throughout Pool 12.

FACT SHEET

OQUAWKA ISLANDS - MISSISSIPPI RIVER ISLANDS WILDLIFE MANAGEMENT AREA HABITAT REHABILITATION AND ENHANCEMENT PROJECT (HREP)

DES MOINES COUNTY, IOWA

POOL 18, UPPER MISSISSIPPI RIVER, IOWA UPPER MISSISSIPPI RIVER RESTORATION PROGRAM

LOCATION

The project is located between river miles 412 and 417 in the southernmost portion of pool 18 in the Upper Mississippi River near Oquawka, Illinois. The area is bounded on the west by the Iowa River Flint Creek Levee District No. 16 levee and on the east by the town of Oquawka, Illinois and the Henderson County Drainage District No. 9 levee. The Iowa River enters the Mississippi River 17 miles upriver of this project supplying significant quantities of sediment. The project area is located in Iowa waters.

EXISTING RESOURCES

In Pool 18, the Iowa shoreline is bounded by levees except at the mouth of the Iowa River. This levee system facilitated agriculture, but the upper two miles are now utilized for wetland enhancements as a part of the Lake Odessa Wildlife Area. The Illinois shoreline includes urban levees at Keithsburg and Oquawka, eight miles of agricultural levee, and three miles of levee facilitating wetland management at the Keithsburg Refuge, managed by the Fish and Wildlife Service. Major tributaries are the Iowa River, and the Edwards River in Illinois. Smaller tributaries include Flint Creek and the Hawkeye-Dolbee and Yellow Springs diversions in Iowa, and Pope Creek in Illinois. A large watershed of 14,000 square miles enters the pool and contributes to several chronic channel maintenance dredging sites.

Other characteristic features include large braided island complexes extending through mid-pool with associated deep secondary channels. Most backwaters exist as small units within large islands such as Huron Island. Larger backwater lakes, however, are located at Boston Bay, Benton Bay, and Benton Island, and landward of levees at Lake Odessa and Keithsburg Refuge. The Iowa River is a major influence in Pool 18, significantly increasing flow and sediment loads. Pool 18 is accreting at an accelerated rate (Cumulative Effects Study, 1999).

The prominent geomorphic features in the immediate project area include the main channel, a larger side channel (formerly the shallow Dasher Slough before inundation), and a few remnants of former islands including: Furnald, Long, and Rag Islands. Connectivity in and around the islands is continuous. These islands appear to be slowly accreting due to recent construction of chevrons for channel maintenance (construction began in 2011 and finished in 2014) (Fig. 1).

PROBLEM IDENTIFICATION

The 1890 Mississippi River Commission Survey detailed the project area and its large expansive floodplain as a mixture of bottomland forest, braided islands, permanent and seasonal lakes and forested wetlands, wet meadow, main channel and sloughs that conveyed flow seasonally. The vast majority of this diverse habitat has been lost due to agricultural levees and the operation of Lock and Dam 18 which began in the late 1930's. The project area of islands once consisted of an estimated 650 acres of lowland

forest and now contains roughly 230 acres; most of the island area was lost to inundation during construction of the current navigational channel. This island loss has contributed to sedimentation due to increased wind fetch and wave action. Also, minimal aquatic vegetation remains in this reach of river (most notably after frequent high water events beginning in 2008).

Forecasted future conditions anticipate continued sedimentation due to high water events, ambient turbidity levels, and wind fetch. The fish community and use in the area is expected to continue to degrade due to a lack of structure, habitat diversity, and overwintering habitat for various species. Migratory water bird habitat will continue to be variable, primarily driven by variability in year to year aquatic plant production.

Stressors Affecting the Condition of Habitat and Biota

A variety of physical, chemical and biological stressors have individually and cumulatively affected the quantity and quality of habitat for biota. These stressors include, but are not limited to:

- Impoundment by locks and dams increased and stabilized water levels
- River regulation affecting stage hydrograph
- Loss of islands
- Altered sediment transport and deposition
- Wind-driven sediment resuspension
- High lateral hydraulic connectivity
- Sedimentation in off-channel areas
- Sediment loading from tributaries
- Nutrient loading from tributaries
- Invasive species
- Loss of isolated wetlands
- Loss of fish over wintering habitat
- Loss of sand/mud bar habitat
- Degraded migratory water bird habitat
- Degraded channel habitat for aquatic species (fish and mussels)
- Long shorelines with riprap

Connectivity is high in the project area with considerable river flow being conveyed outside of the main channel. Backwaters adjacent to the impounded area are degraded because of island inundation, sediment deposition, and high turbidity. Wave erosion is obvious on many islands. Erosion of islands will continue in the future, further degrading physical conditions in backwaters. Backwater fisheries habitat will continue to decline due to increased flows and sedimentation of presently protected areas. Waterfowl habitat will deteriorate over time as island loss continues and more of the project area is subjected to higher current velocities and wave action that will negatively affect plant species composition and coverage. Impoundment of the pool and permanently higher water tables has affected the health of floodplain forest habitat on islands and adjacent floodplain areas. These higher water tables are adversely affecting floodplain forest composition and regeneration.

PROJECT GOALS

The project will be designed to meet the following reach and project scale objectives. Primary project objectives are identified in *italics*. Primary objectives represent the main focus of the project to address alterations in processes/drivers and will be used to

assess overall project performance and success. The remaining objectives are secondary and will be considered during detailed project planning for evaluation of project alternatives (i.e. if a small increase in cost allows attainment of a secondary objective, this may become the selected alternative due to increase in ecosystem benefits).

Biogeochemistry

- *Improved water clarity*
- *Reduced nutrient loading*
- *Reduced sediment loading from tributaries and sediment resuspension in backwaters*

Geomorphology

- *Restore a sediment transport regime so that sediment transport rates and future change in geomorphic patterns are within acceptable limits*
- *Restored pattern of channels and floodplain features*
- *Restored diversity of floodplain topography*

Habitat

- *Restored habitat connectivity*
- *Restored riparian habitat*
- *Restored aquatic off-channel areas*
- *Restored terrestrial floodplain areas*
- *Restored channel areas*

Biota

- *Diverse and abundant native aquatic vegetation communities (SAV, EAV, R/F)*
- *Diverse and abundant native floodplain forest and prairie communities*
- *Diverse and abundant native fish community*
- *Diverse and abundant native mussel community*
- *Diverse and abundant native bird community*
- *Diverse and abundant amphibian and reptile community (Project)*

Operations and Maintenance

- *Reduced main channel dredging*

Islands will restore the riparian border between the secondary channels and adjacent backwaters, partially restoring a more natural hydro geomorphic condition in the project area.

PROPOSED PROJECT

Project features proposed to address the habitat goals for this sub-area include island construction, backwater dredging, and island stabilization. Collectively, these features will provide the environmental conditions necessary to reach and maintain the desired future habitat conditions. Other potential actions include controlling invasive species and other habitat management actions. Borrow material for construction of islands will come from backwater dredging areas. Main channel sand along with other suitable material will be used to construct the islands.

The desired future also includes improved habitat conditions for mussels, turtles, and forest resources. Island stabilization and construction are the main features identified for maintaining habitat quality in the lower Pool 18 area. Additional features to restore isolated wetlands, sand and mudflat habitat, shorebird habitat, turtle habitat, raising the elevation of floodplain habitat, etc. are also proposed for the area. Pool-wide water level management (minor and major drawdowns) is proposed as one tool to revitalize aquatic

vegetation in the area. Proposed project features are shown in Figure 1. The project features would be designed with little or no O&M required. The authority for this study and potential project construction is provided by Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended.

PROJECT OUTPUTS

6.1 Ecological Benefits

Processes:

Restoration of islands in the Lower Pool 18 area will provide protection from wind fetch, nesting islands for waterfowl, colony nesting water birds, turtles, amphibians, refuge for fish and the increase in aquatic vegetation along with the overwintering areas will increase fisheries population and diversity.

Habitats

Restoration of islands would allow for the opportunity to include sand areas for turtle nesting, mud flats for waterfowl and shorebird loafing and feeding areas and isolated wetlands for amphibians. Backwater dredging would be performed to increase bathymetric diversity for fisheries along with overwintering habitat. Forest diversity would be enhanced through planting, elevating islands, and forest management on existing and restored islands.

Biota

The restored islands, along with protection of existing islands, will restore flow distribution and reduce impact of wind and wave actions. This will improve conditions for more sustainable, less annually variable aquatic vegetation (especially submersed vegetation) by improving light penetration. Improvement in the diversity, distribution, and coverage of aquatic vegetation will result in an increased spring and fall use by migratory water birds. This will also lead to increased use by many fish species by providing habitat diversity.

Restoration of overwintering habitat will increase the survival and abundance of these species at all times of the year. Enhancement of channel border habitat will improve use by channel fish species seasonally, and potentially year round. The improved channel and channel border habitat will also provide improved habitat conditions for native mussel species.

Scales of Anticipated Benefits

Geographic extent – Present knowledge about project level geographic scale influences on biota and processes will limit alternative incremental evaluation. However, extant monitoring and research results indicate many fish and wildlife species will seasonally use the restored habitat, traveling anywhere from a few hundred feet to thousands of miles. For example, migratory water bird use of food resources of the area will contribute to improved fitness and the proposed island features will contribute to some increase nesting opportunities for locally nesting migratory and resident avian species.

Timing of anticipated responses -- Migratory water bird habitat will primarily be seasonal (spring and fall). Locally nesting species such as cormorants, pelicans, gulls, eagles, herons, egrets, bitterns, some waterfowl, etc. will use the area for the additional nesting opportunities and food resources that will be provided.

Turtle nesting in the area will increase as a secondary feature of the project. The creation of low flow backwater areas will contribute to increased habitat availability for adult and juvenile of many different species, thereby contributing to increased year round use.

Fisheries use will be both seasonal and year round. The use will vary by species, with backwater species expected to exhibit a significant increase in year round use based on response documented at other restoration locations.

Duration of anticipated responses – The duration of responses are expected to continue for at least 50 years based on the performance of similar types of restoration projects that have been completed since 1986. Some responses will be sustained without additional maintenance or operation for >50 years, while maintaining some responses will require periodic maintenance (i.e. sandy terrestrial areas for turtle nesting habitat).

The proposed project would result in the protection and restoration of much riverine, backwater, and floodplain habitat. Dredging for island fill material would provide additional deep water habitat for high quality, diverse floodplain forest, and fishery benefits.

IMPLEMENTATION CONSIDERATIONS

The presence of the Higgins Eye Pearly Mussel (*Lampsilis higginsii*) at various locations in Pool 18 indicates they may be present in the project area. If present, many of the proposed project features can be modified to avoid any impact. However, the implementation of some potential actions may be constrained or limited if they are present in the area.

Plan formulation should consider the possibility of using channel maintenance generated sand as a potential source of material for construction of some proposed features.

FINANCIAL DATA

The project features would be located entirely on general plans land owned by United States Army Corps of Engineers and licensed in a cooperative agreement to the Iowa DNR. Therefore, in accordance with Section 906(e) of the Water Resources Development Act of 1986, the total estimated project cost of \$15,000,000 would be 100% Federal. The U.S. Fish and Wildlife Service manages the lands and would be responsible for operation, maintenance, and rehabilitation of project features, in accordance with Section 107(b) of the Water Resources Development Act of 1992.

STATUS OF PROJECT

This project was presented to The Fish & Wildlife Interagency Committee (FWIC) at the February 15, 2018 meeting.

POINTS OF CONTACT

- Corps of Engineers, Rock Island District 309-794-5428
- U.S. Fish and Wildlife Service Upper Mississippi River Wildlife and Fish Refuge – Savanna District, District Manager, 815-273-2732
- Iowa Department of Natural Resources, UMRR Habitat coordinator, 563-872-4976



Figure 1. Proposed HREP project structures in lower Pool 18 near Oquawka, IL.

Snyder Slough Backwater Complex Ecosystem Restoration Project Proposal

Rock Island District

1. Potential Project Sponsors

Upper Mississippi River Wildlife and Fish Refuge and Wisconsin Department of Natural Resources.

2. Location

The Snyder Slough Backwater Complex is located in pool 11 of the Upper Mississippi River. The 2000 acre Snyder Slough Backwater Complex extends from RM 595-599 along the left descending bank (Wisconsin Side) of the main channel to the south and the Wisconsin mainland to the north. This large area includes backwater lakes, sloughs, flowing channels, and remnant islands. The entire project area is in Grant County, Wisconsin. The closest community to the project area is Potosi, Wisconsin, located approximately 3 miles downstream.



River miles 595 - 599

Pool 11, Upper Mississippi
River, Geomorphic Reach
4

Grant County, WI

3. Significant Resources

Pool 11 has several documented areas of federally endangered Higgins eye pearly mussel (*Lampsilis higginsii*) concentrations. Recent surveys conducted confirm that Higgins eye are in areas adjacent to the project area. The Wisconsin Natural Heritage Inventory documents the presence of 6 additional state threatened or endangered species within Pool 11. Many of these species would benefit from restoration and enhancement of the area.

4. Problem Identification

4.1 Historic Conditions

Pre-impoundment, the Snyder Slough Backwater Complex was a mixture of bottomland forest, permanent and seasonal lakes and forested wetlands, wet meadow and sloughs that conveyed flow seasonally. Lock and Dam 11 began operation in 1937, which resulted in the inundation of >15,000 acres of floodplain in lower pool 11. Connectivity of backwater and off channel areas within the Snyder Slough Backwater Complex changed from seasonal discharge related events to year-round connectivity. The resulting continuous inundation has contributed to island loss, continued erosion of remaining islands and sedimentation in continuously connected backwaters and smaller sloughs.

4.2 Existing Conditions

Island erosion, island dissection and sedimentation have greatly reduced the quality of much of the terrestrial and aquatic habitat in this location. Historically, this area was used by migratory waterbirds, but the use has been low since 1990 when aquatic vegetation declined in the area (Figure 1). 2005 saw an increase in aquatic vegetation due to favorable water clarity conditions and was followed by a corresponding increase

in waterfowl use. However, the observed aquatic vegetation coverage has been variable for through 2017. Future resilience of the aquatic vegetation in the area is difficult to predict due to continued wind fetch, current and static summer water levels.

Fishery resources in the area are poor for backwater species. Surveys conducted in 2004, 2005, 2011-13 did not locate any overwintering habitat within the project area due to lack of depth in areas protected from current or velocities outside the tolerance of overwintering centrarchids in areas with sufficient depth. The closest overwintering habitat is within backwater complexes where UMRR Habitat Rehabilitation and Enhancement Projects have been completed. Bertom and McCartney Lake HREP, completed in 1991, is located approximately 3 miles upstream of Snyder Slough and Pool 11 Islands, Mud Lake HREP, completed in 2006, is approximately 6 miles downstream of Snyder Slough.

Floodplain forestry resources in the area consist of a mixture of maple and willow on lower elevations, with oak being supported on some higher elevation islands in the upstream portion of the project area.

4.3 Forecasted Future Conditions

Forecasted future conditions anticipate continued island erosion and sedimentation. Some island erosion may be offset by the accretion of low elevation islands that may form as areas upstream continue to fill with sediment, increasing sediment delivery to the Snyder Slough Backwater Complex. Backwater sedimentation of fine material is expected to continue. Wave resuspension of sediment will continue to affect the sustainability of aquatic vegetation in the complex due to a combination of fine sediment deposition and island erosion. The fish community and use in the area is expected to continue being a seasonal use with no overwintering habitat available. Migratory waterbird habitat will continue to be variable, primarily driven by variability in year to year aquatic plant production. Forestry diversity is expected to decline into the future due to continued island erosion and lack of regeneration of less flood tolerant species.

4.4 Stressors Affecting the Condition of Habitat and Biota

A variety of physical, chemical and biological stressors have individually and cumulatively affected the quantity and quality of habitat for biota with the Snyder Slough Backwater Complex. These stressors include, but are not limited to:

- Loss of islands
- Sedimentation
- Island dissection
- Loss of Isolated wetlands
- Forest Fragmentation
- Lack of Forest Regeneration
- Loss of over wintering habitat
- Exotic Species (ie. zebra mussels and reed canary grass)
- Loss of sand/mud bar habitat
- Increased and stabilized water levels

The impacts on processes and biota are described elsewhere in the project proposal.

4.5 Restoration Opportunities

The project provides the opportunity to protect, enhance, and restore quality wetland habitat for a wide variety of native and desirable plant, wildlife, and fish species. Targeted animals include eagles, mussels, fish, turtles, migrating waterfowl, terrestrial mammals, and waterbirds. Targeted plants include emergent vegetation such as arrowhead, burreed, and bulrush; submersed vegetation such as wild celery and sago pondweed; and terrestrial vegetation such as swamp white oak, cotton wood, and button bush.

4.6 Project Ecosystem Goals

The project will address the following reach and project scale objectives.

Hydrology and Hydraulics

Altered hydraulic connectivity

Biogeochemistry

Improved water clarity

Reduced sediment loading from tributaries and sediment resuspension in and loading to backwaters

Geomorphology

Restore a sediment transport regime so that sediment transport rates and future change in geomorphic patterns are within acceptable limits

Restored pattern of channels and floodplain features

Restored diversity of floodplain topography

Habitat

Restored terrestrial floodplain areas

Restored habitat connectivity

Restored riparian habitat

Restored aquatic off-channel areas

Restored channel areas

Biota

Diverse and abundant native aquatic vegetation communities (SAV, EAV, R/F)

Diverse and abundant native floodplain forest

Diverse and abundant native fish community

Diverse and abundant native mussel community

Diverse and abundant native bird community

Diverse and abundant reptile and amphibian community

5. Description of the Proposed Project

5.1 Project Features

The proposed project actions include, but are not limited to, a combination of island restoration, island stabilization, backwater dredging, mud flats and isolated wetlands (Figure 2). Islands are proposed to be restored similar to alignments present in 1949 aerial photography. Other potential actions include controlling invasive species and additional habitat management actions to achieve secondary objectives.

5.2 Implementation Sequence of Project Features

The entire backwater complex should be included in project planning to allow for development of the most cost-efficient plan and attainment of the objectives. However, within the complex there may be the opportunity to separate implementation into at least 2 stages. Factors such as cost, access, etc. will determine sequencing, if needed, since presently there is no clear ecological justification for implementing stages of construction.

6. Anticipated Ecosystem Benefits

6.1 Ecological Benefits

Processes:

Restoration of hydraulic connectivity in the Snyder Slough Backwater Complex will emulate more natural conditions by changing sediment transport and deposition patterns in backwater channels and backwater lakes, and increasing diversity and variability of water velocities within the backwater complex. Placement of restored islands to reduce wind fetch will reduce resuspension of sediment, resulting in improved water clarity during open water season (ie. late-March through November) at below bank full discharge events.

Island restoration and stabilization will emulate a more natural rate of island erosion and sedimentation distribution/rate in portions of the backwater complex. Elevation of islands will be based on targets for forest diversity.

Restoration of hydraulic connectivity will also include emulation of seasonally connected floodplain depressions (i.e. isolated wetlands) in selected areas within the backwater complex. These areas would be connected at a variety of discharge/stage levels, but would not be connected during low discharge events or year round. This will create conditions where dissolved oxygen levels will annually induce mortality of species that prey upon anurans.

Habitats

Restoration of islands would allow for the opportunity to include sand areas for turtle nesting, mud flats for waterfowl and shorebird loafing and feeding areas and isolated wetlands for amphibians. Backwater dredging would be performed to increase bathymetric diversity for fisheries along with overwintering habitat. Forest diversity could be enhanced through planting, elevating islands, and forest management on existing and restored islands.

Increasing velocities in channels, along with restoration of channel border landforms will enhance channel border habitat for riverine mussel species.

Biota

The restored islands, along with protection of existing islands, will restore flow distribution and reduce impact of wind and wave actions. This will improve conditions for more sustainable, less annually variable, aquatic vegetation, especially submersed vegetation, by improving light penetration. Improvement in the diversity, distribution and

coverage of aquatic vegetation will result in an increased spring and fall use by migratory waterbirds.

Restoration of centrarchid overwintering habitat will increase the survival and abundance of these species at all times of the year. Enhancement of channel border habitat will improve use by channel fish species seasonally, and potentially year round. The improved channel and channel border habitat will also provide improved habitat conditions for native mussel species.

6.2 Scales of Anticipated Benefits

Geographic extent – Present knowledge about the geographic scale of project influence on biota and processes will limit alternative incremental evaluation to the 2,000 acre Snyder Slough Backwater Complex directly influenced by proposed features, along with some consideration of nearby effects in adjacent sloughs. However, extant monitoring and research results indicate many of fish and wildlife species will be resident or seasonally use the restored habitat, traveling anywhere from a few 100 feet to thousands of miles. For example, migratory waterbird use of food resources available in the area will contribute to improved fitness and the proposed island features will contribute to some increase nesting opportunities for locally nesting migratory and resident avian species.

From a fisheries perspective, the project will “fill in a gap” of approximately 9 miles between existing quality backwater complexes (Bertom and McCartney Lakes upstream and Mud Lake downstream of project location). This should decrease overall mortality of fish moving between or to these existing backwater complexes, resulting in increased abundance for a variety of species.

Timing of anticipated responses -- Migratory waterbird habitat will primarily be seasonal (spring and fall). Locally nesting species such as eagles, herons, egrets, bitterns, some waterfowl, etc. will use the area for the additional nesting opportunities and food resources that will be provided.

Turtle nesting in the area will increase if nesting habitat is selected as a feature of the project. The creation of low flow backwater areas will contribute to increased habitat availability for adult and juvenile of many different species, thereby contributing to increased year-round use.

Fisheries use will be both seasonal and year-round. The use will vary by species, with backwater species expected to exhibit a significant increase in year-round use based on response documented at other restoration locations.

Restoration of isolated wetlands are expected to increase the diversity and abundance of anurans within the project area year-round.

Duration of anticipated responses – The duration of responses are expected to continue for at least 50 years based on the performance of similar types of restoration projects that have been completed since 1986. Some responses will be sustained without additional maintenance or operation for >50 years, while maintaining some responses will require periodic maintenance (i.e. sandy terrestrial areas for turtle nesting habitat).

6.3 Anticipated Effects on Significant Resources

The presence of the Higgins eye pearly mussel (*Lampsilis higginsii*) within the project area will require additional mussel surveys once proposed project features are identified. It is likely any proposed can be modified to avoid any impact

6.4 Contribution to Attaining Reach Objectives

The Snyder Slough Backwater Complex ecosystem restoration project addresses many reach objectives in a localized area (see 4.6 Project Ecosystem Objectives). Specifically, the project will address habitat needs affecting a variety of species by reducing the distance between patches in availability of critical seasonal habitat needs.

The project, along with existing and future restoration projects in the area, will cumulatively contribute to attainment of a variety of reach objectives beyond the influence of an individual project.

7. Implementation Considerations

7.1 Affected Stakeholders

No private landowners will be affected since no privately owned properties are present in the project area.

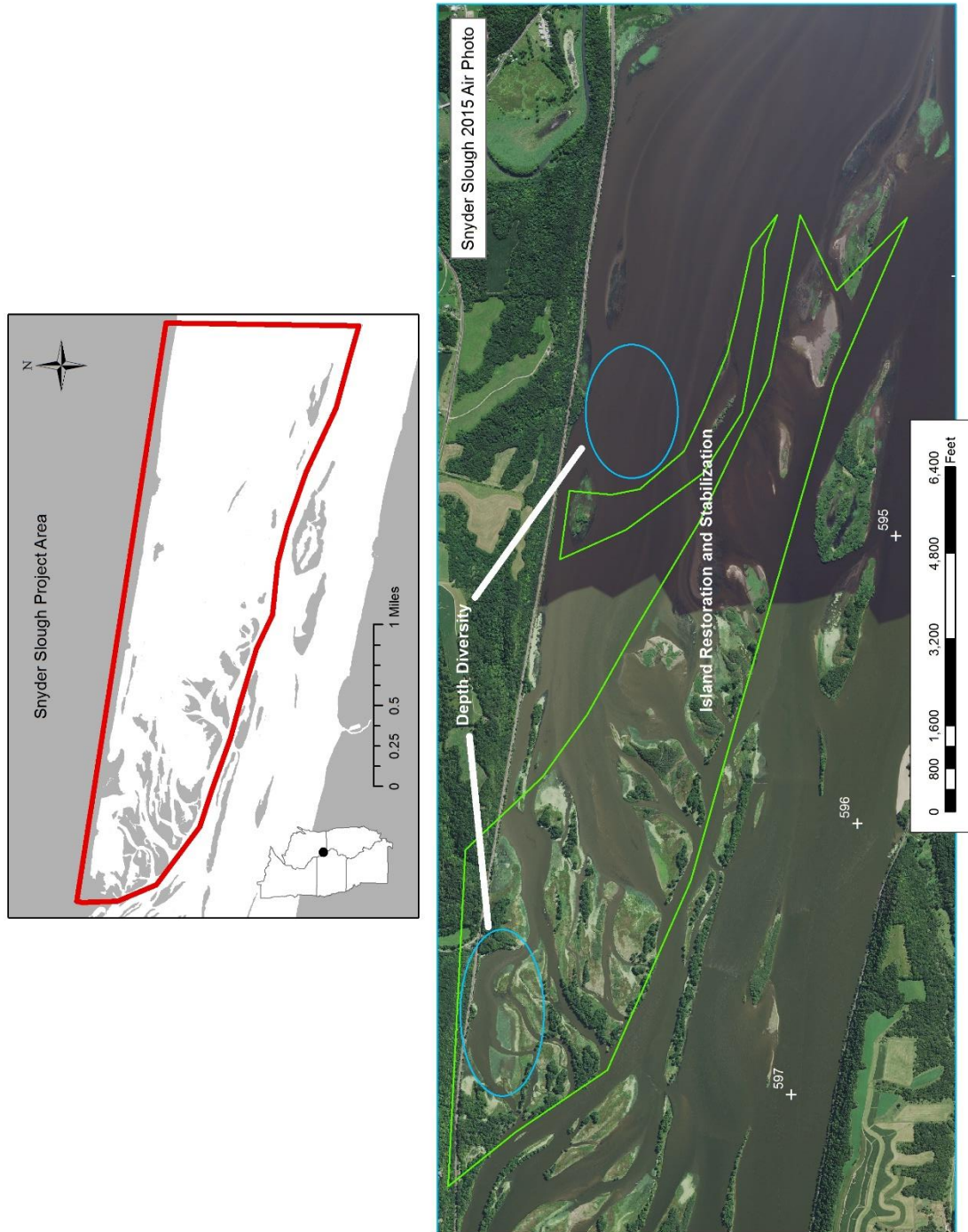
7.2 Land Ownership

Land ownership is a mixture of Fish and Wildlife Service Upper Mississippi River Wildlife and Fish Refuge and Corps of Engineers fee title.

8.0 Points of Contact

- Corps of Engineers, Rock Island District XXX-XXX-XXXX
- U.S. Fish and Wildlife Service Upper Mississippi River Wildlife and Fish Refuge - McGregor District, District Manager, 563-873-3423
- Wisconsin Department of Natural Resources, Mississippi River Fisheries Team Supervisor, Jordan Weeks, 608-785-9002
- Iowa Department of Natural Resources, Mississippi River Wildlife Biologist, 563-872-5700

Figure 1. 2015 air photo of Snyder Slough Backwater Complex, Pool 11, Upper Mississippi River, Grant County, Wisconsin.



**Upper Mississippi River Restoration Program
Fact Sheet
Yorkinut Slough Habitat Rehabilitation and Enhancement Project
Mississippi River Pool 26
Calhoun County, Illinois
USACE St. Louis District**

Location

The Yorkinut Slough Habitat Rehabilitation and Enhancement Project (HREP) is located in the Mississippi and Illinois River floodplain on the right descending bank of the Illinois River at river mile 5 in Calhoun County, Illinois approximately 5 miles southwest of Grafton, Illinois (Figure 1). The Project Area consists of approximately 1182 acres of floodplain habitat located in Pool 26 of the Upper Mississippi River approximately 22 miles upstream of Melvin Price Locks and Dam. The U.S. Fish and Wildlife Service owns and manages Yorkinut Slough as part of the Two Rivers National Wildlife Refuge, Calhoun Division.

Existing Resources

The Yorkinut Slough HREP area is a former agricultural area that is at the confluence of the Illinois and Mississippi Rivers adjacent to Swan Lake. Swan Lake can host more than 150,000 ducks during fall migration. This landform floods nearly annually and has the potential to provide food for the fall and spring waterfowl and shorebird migrations should moist soil units be developed with water management capabilities.

The Illinois River Valley is part of the Mississippi flyway and this site lies within a region designated as an area of major concern by the North American Waterfowl Management Plan. The Two Rivers National Wildlife Refuge functions as an important link for migratory birds that rest, feed, and winter along the Mississippi Flyway. More than 200 different species of birds funnel through this important river juncture on their fall migration. On average, over 9,700,000 duck use days and 400,000 geese use days are recorded during the fall and winter (INHS 2011). Open water pools, backwater sloughs, small impoundments, wetland management units, and a cooperative farming program provide resources that can be used by migrating species.

Problem Identification

- Existing moist soil units in the Yorkinut Slough HREP project area lack proper water management capabilities and ridge and swale topography is not developed to provide habitat for migrating waterfowl and shorebirds.
- A small tributary that once meandered into the area wetlands from the adjacent watershed is now channelized, limiting its utility as fish and wildlife habitat.
- Sedimentation from hillside runoff degrades habitat.
- Forest hard mast resources are lacking in the confluence area and the site has potential to support hard mast species, providing a valuable food resource.

Project Goals

The overall project goal is to restore the natural ecosystem functions of the project area as a site within the Mississippi and Illinois River floodplains consisting of wetlands and bottomland forest habitats to benefit desirable native migratory and resident wildlife and aquatic species. The goal would be met through the following objectives:

- Improve water management capabilities
- Enhance aquatic habitats to benefit migratory wildlife and other organisms with an emphasis on dabbling ducks and wading birds
- Enhance natural topographic gradient and restore wetland functions
- Enhance seasonal wetland vegetation
- Improve quality (diversity of age, structure, and species) and quantity (total acres) of bottomland forest
- Enhance aquatic habitats to benefit fisheries with an emphasis on spring spawning habitat

Proposed Project (Figure 2)

- Install water control structures and wells.
- Develop interior impoundments that follow contours of ridge and swale system.
- Create a meandering channel through the wetland system for the upland tributary.
- Create tree plantings of bottomland hardwood species.

The components of this project would substantially protect and enhance the value of habitat management programs on the refuge. Wetland acres would be increased and improved providing additional benefits for large numbers of migrating waterfowl and shorebirds. The additional wells and water control structures would allow targeted and timely management of specific wetland units. Forest birds would directly benefit from the restoration of hard mast trees. The meander would increase the water quality of the tributary stream and provide important wildlife and invertebrate habitat.

Financial Data

The total estimated base year cost for this project is currently \$5.5 million.

The estimated annual operation and maintenance cost is \$25,000.00.

All project features are located on Corps owned General Plan lands managed as a refuge.

Points of Contact

The point of contact is Mr. Brian Markert, District Program Manager, (314) 331-8455, brian.j.markert@usace.army.mil.

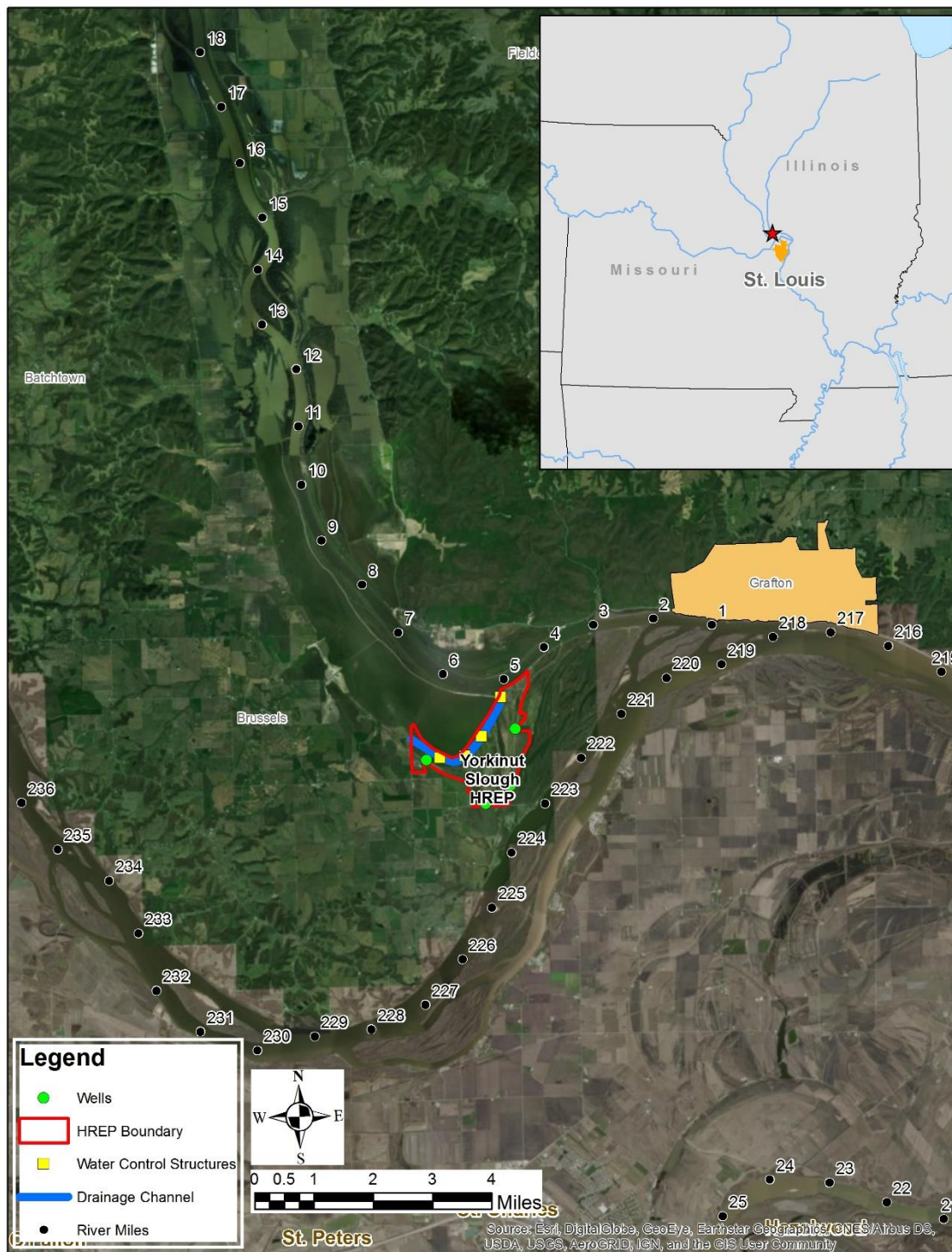


Figure 1. Yorkinut Slough HREP location.

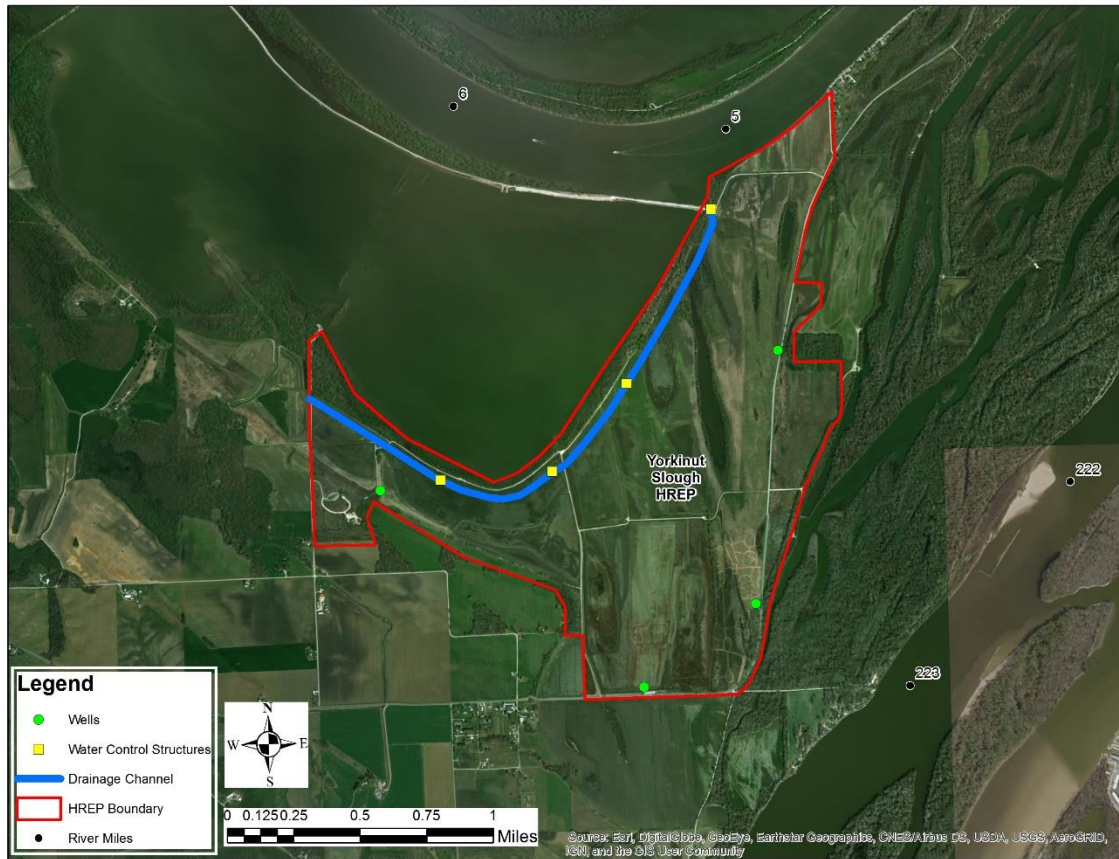


Figure 2. Yorkinut Slough HREP potential features.