

Lower Pool 4, Big Lake, Robinson Lake, and Tank Pond
Habitat Rehabilitation and Enhancement Project
Minnesota and Wisconsin; St. Paul District
Upper Mississippi River Restoration Program

Fact Sheet

Location

The Lower Pool 4 study area encompasses approximately 9,382 acres of open backwater, meandered side channel, main channel border, and island formations from state Highway 25 (Nelson Dike) at Wabasha, Minnesota to Lock and Dam 4 near Alma, Wisconsin. The study area extends from approximate river mile 760.2 to 752.8 (7.4 miles), and includes the main stem of the Mississippi River (8,276 acres) and portions of the Buffalo River (1,106 acres). Land ownership within the study area is a patchwork of both U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Service (USFWS) with all being managed as part of the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) (Figure 1).

Existing Resources

Aquatic Vegetation

In general, aquatic vegetation is abundant and diverse throughout most of the lower Pool 4 backwaters. Submersed plants are mostly stable, rooted-floating species are declining, and emergent plant coverage is increasing, which is primarily attributed to the expansion of wild rice (*Zizania aquatica*) beds. Outside of the backwaters, aquatic vegetation in side channels and within the main channel borders is comprised mainly of spatially disjunct pockets of wild celery (*Vallisneria Americana*) and water stargrass (*Heteranthera dubia*), two species known to be associated with lotic habitat.

Water Quality

Water quality data from Long Term Resource Monitoring (LTRM) indicate that summer water clarity has improved substantially in lower Pool 4 backwaters, including Big Lake, over the past two decades due to a reduction in turbidity. Chlorophyll a concentrations, an indicator of algal biomass, has declined. These improvements in water quality are primarily due to the increase in submersed aquatic vegetation (SAV).

Fisheries

The fishery resource within the study area is quite diverse with 79 species being documented. In addition, various endangered, threatened, or species of concern status have also been sampled. Habitat quality and quantity during spring, summer, and fall appears adequate for most species as does spawning habitat for a multitude of species during spring and early summer. However, winter habitat, comprised of deeper water areas that are protected from flow, appears limiting.

Avian

Monitoring of the Big Lake Closed Area has shown waterfowl use on the increase. Peak numbers of waterfowl recorded during fall aerial surveys include 26,970 tundra swans, 14,830 puddle ducks, and 30,755 diving ducks. There are 25 documented bald eagle nests, of which 10–12 are active each year.

Forestry

Forest inventory has been completed across the study area, but in-depth analysis has been limited to specific locations where forest enhancement projects have occurred. Forests are typical of those found across the Upper Mississippi River (UMR), characterized by reduced natural diversity and productivity and less diverse species composition, especially evident is the decline of mast-producing species.

Many of the island formations, particularly in the lower portion of the pool, are deteriorating from wind and wave action and prolonged inundation. Particularly evident are the islands and subsequently the forests at the lower end of Big Lake, which are nearly eliminated.

Current Status of Habitat Needs Assessment-II (HNA-II) Indicators

Pool 4 has the following rating for HNA-II indicators: orange (existing conditions deviates from desired, and may merit action to improve), yellow (existing condition is near defined desired condition but may merit actions to maintain or improve conditions), and gray (existing condition is near desired condition, but may merit action to maintain).

Orange: Longitudinal Aquatic Connectivity (LAC); Aquatic Functional Class 2 (AFC2); Aquatic Vegetation Diversity (AVD); Floodplain Functional Class Diversity (FFCD); Pool Flux Difference (PFD).

Yellow: Longitudinal Floodplain Connectivity (LFC); Aquatic Functional Class 1 (AFC1); Floodplain Vegetation Diversity (FVD); Total Suspended Solids (TSS).

Gray: Lateral River-Floodplain Connectivity (LRC); Tailwater Flux Difference (TFD).

Per the HNA-II, the future desired habitat condition includes: maintain and enhance existing open water area for waterfowl habitat; improve quality, depth, and distribution of lentic habitat for fish; reduce sedimentation; improve lotic habitat; maintain and enhance floodplain vegetation; restore floodplain vegetation diversity in conjunction with diversifying floodplain inundation periods; improve navigation dam gate management for native fish passage; deter invasive fish species; and adjust operation to allow for more gradual rate of change, when feasible.

Problem Identification

As with the majority of the UMR, sedimentation of the backwaters is an ongoing issue. This study area is greatly influenced by the input of sand from the Chippewa River that enters Pool 4 at about river mile 763.5. Other potential sources of sand are the historic channel maintenance dredging side-cast islands and the four active temporary placement sites within the study area. Increased flows over extended periods have transported more material into side channels, which can be seen as exposed sand bars in times of “normal” river conditions.

Big Lake has lost much of its island complex and forest to wind and wave erosion. The barrier islands between the lake and Catfish Slough have been degraded and/or eliminated over the past several years.

Tank Pond near the mouth of the Buffalo River has relatively poor water quality due to a lack of water circulation and lower abundance and diversity of SAV coupled with nutrient concentrations sufficient for algal growth, high turbidity, and chlorophyll a concentrations.

Overwintering Centrarchidae habitat in and below Big Lake is limited, in part, by high current velocities. The existing desirable overwintering areas appear to be filling with sediment and are exposed to flows that are more frequent.

Without the implementation of forest restoration measures, continued decline will result due to the following factors: dominance of reed canarygrass; loss of native plant species diversity; loss of forest structural and age class diversity and cover including fragmentation; cumulative adverse impacts on forest-dependent wildlife species, ecosystem services (e.g., improvements to water quality), and local aesthetic and cultural resources; as well as decreases in forest habitat connectivity and forest interior habitat will be witnessed.

Project Objectives

The overall goal is to maintain/enhance/create quality habitat for native and desirable plant, animal, and fish species. The project objectives are:

- Protect/stabilize/enhance existing and constructed/reconstructed islands as well as historic and current dredge material placement sites. (LAC, LRC, AFC1, AFC2, AVD, FVD, TSS)
- Protect existing, develop additional, and promote regeneration of floodplain forest. (FVD)
- Reduce sedimentation inputs to backwater lakes. (AFC1, AFC2, AVD, TSS)
- Enhance the quality of migratory bird habitat with an emphasis on waterfowl and neotropical migrants. (LAC, LRC, AFC1, AFC2, AVD, FVD)
- Reduce wind fetch in upper Big Lake. (LAC, LRC, AFC1, AFC2, AVD, FVD, TSS)
- Improve water quality in Tank Pond. (LAC, LFC, LRC, AFC1, AFC2, AVD, FVD, TSS)
- Enhance bathymetric diversity in the study area. (LAC, LFC, LRC, AFC1, AFC2, AVD, FVD)
- Maintain or increase quantity and diversity of submerged vegetation. (AFC1, AFC2, AVD, TSS)
- Maintain or increase quantity and diversity of emergent vegetation. (AFC1, AFC2, AVD, TSS)
- Enhance habitat for aquatic species. (LAC, LFC, AFC1, AFC2, AVD, TSS)

Proposed Project Features and Implementation

The project could be developed as three phases (Big Lake, Robinson Lake, and Tank Pond/Buffalo River). Big Lake and Robinson Lake phases include traditional Habitat Rehabilitation and Enhancement Project (HREP) techniques of island construction/protection with a forestry component and dredging to increase bathymetric diversity while providing fine material for the island surface. Tank Pond/Buffalo River phase is focused on connectivity and bathymetric diversity, which may not contain an element of island construction. There are also large island features (for example Island 26 in Figure 2) that could provide for opportunistic use of main channel dredge material placement along the navigation channel.

- **Island construction/enhancement and reed canarygrass reversion** could provide wave and wind fetch protection in the upper portion of Big Lake and provide for enhanced patch size of floodplain forest.
- **Mudflats and/or terraces** could increase emergent vegetation and provide bathymetric diversity to support aquatic species.
- **Dredging backwater areas and secondary channels** to obtain island construction material would create bathymetric diversity and benefit aquatic species.

- **Increasing wild celery beds and perennial emergent vegetation** could increase habitat for migratory waterfowl.

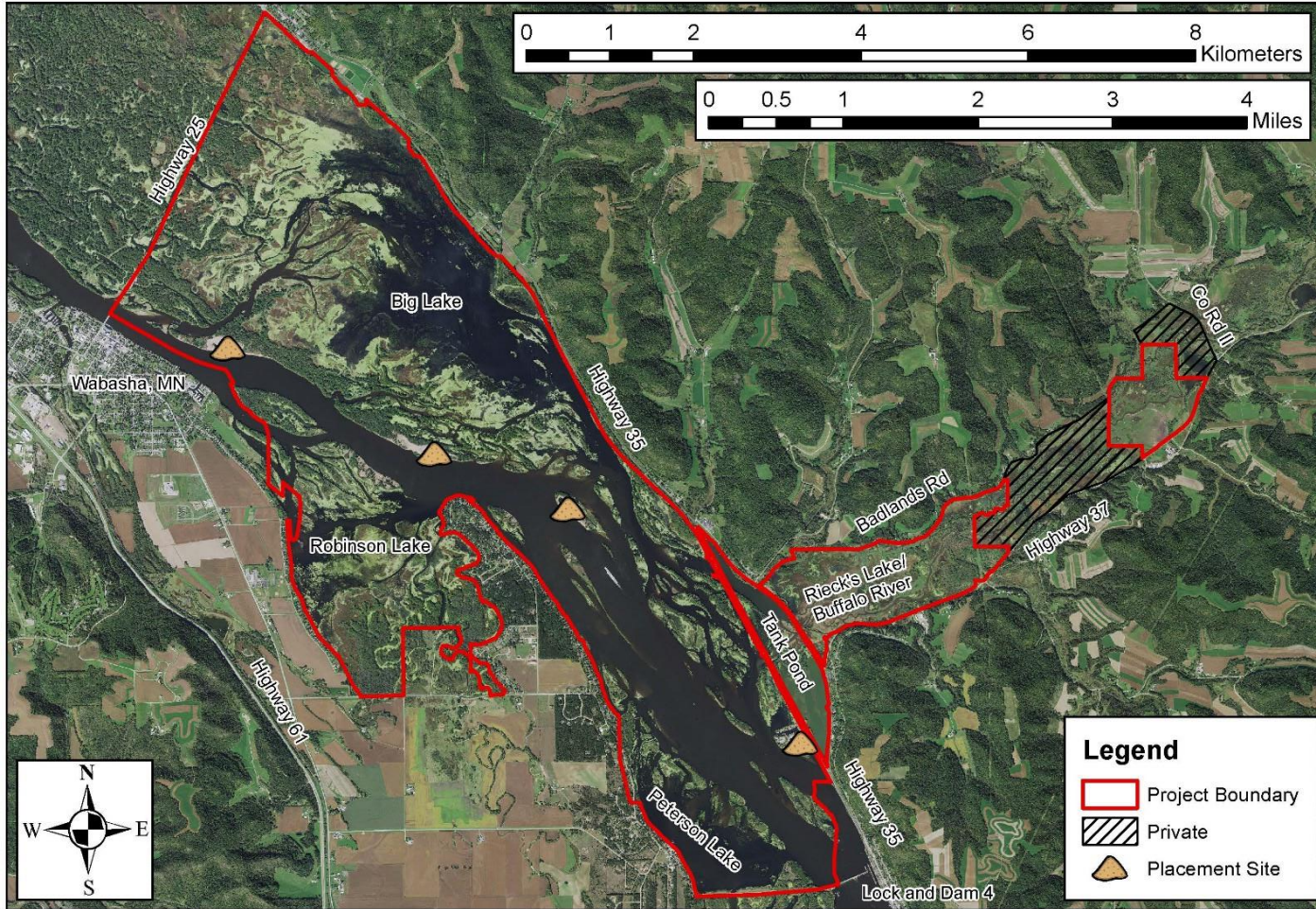
Financial Data & Sponsorship

The proposed Lower Pool 4 study area features are located within the Refuge boundary and on lands owned in fee title by the USFWS and USACE; therefore, the project cost would be 100 percent federal. In accordance with Section 107(b) of the Water Resources Development Act (WRDA) of 1992, all costs for operation, maintenance, and rehabilitation of project features would be the responsibility of the USFWS. Operation and maintenance (O&M) is estimated at \$10,000/year provided by the USFWS. During the study, if any project features are proposed that are located outside the Refuge boundaries, the states of Minnesota or Wisconsin would be the non-federal sponsor required to provide the cost share implementation and maintenance of those features in accordance with Section 107(b) of the WRDA of 1992. The estimated cost of the Lower Pool 4 project area is \$28 million to \$45 million as estimated by sub-area:

- Big Lake/Indian Slough: \$12 million to \$18 million
- Robinson Lake: \$6 million to \$12 million
- Tank Pond/Buffalo River: \$10 million to \$15 million

Point of Contact

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Map Created:10/22/2019 By: USFWS Biologist J. Froehly Project Saved as H:/FWWG/Big Lake HREP/Big Lake HREP.mxd

Figure 1. Lower Pool 4 study area.

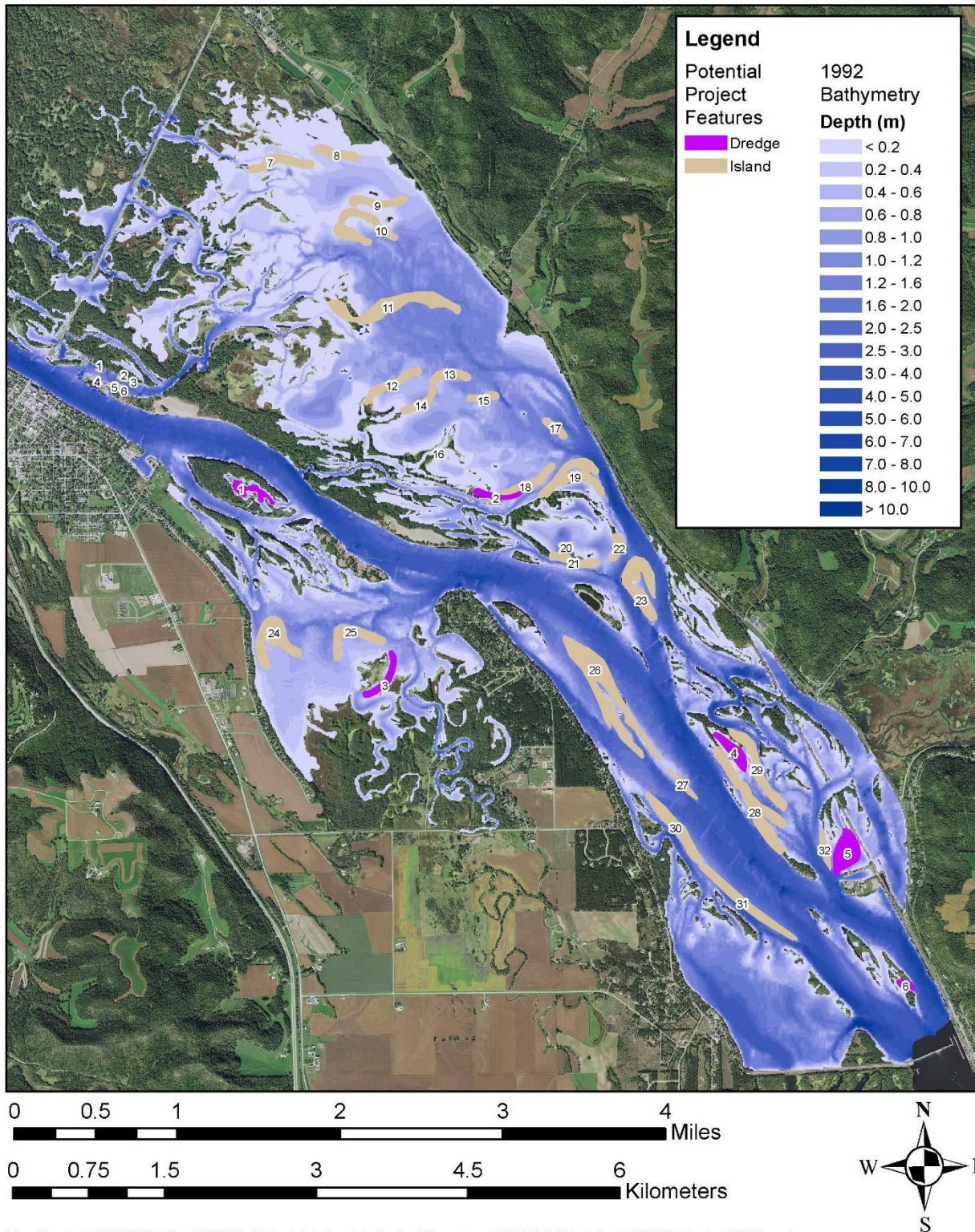


Figure 2. Potential constructed/enhanced island locations and configurations.