DRAFT

MANAGEMENT PLAN FOR THE

St. Louis River Natural Area

OF THE DULUTH NATURAL AREAS PROGRAM

DATE: 10/17/19

Nominated by: City of Duluth Parks & Recreation Division

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Introduction

This management plan for the St. Louis River Natural Area (SLRNA) was developed following the requirements of the Duluth Natural Area Program (DNAP) ordinance. The purpose of this plan is to provide guidance for maintaining and improving the ecological function of the natural features for which the St. Louis River Natural Area was nominated to the program, including significant native plant communities, natural water feature area, important bird congregation area, special species area, and geological landform area.

The 2019 Western Waterfront Trail, Park and Recreation Master Plan (draft), the 2017 Duluth Traverse Mini Master Plan, and the 2017 St. Louis River Estuary National Water Trail Plan are additional guiding documents related to the infrastructure and uses within the St. Louis River Natural Area that this plan is intended to inform and does not supersede.

The City of Duluth will implement this plan with the assistance of its partners with interests within the natural area. Partners involved in stewardship, management, and maintenance of features within the SLRNA include the Duluth Cooperative Invasive Species Management Area (CISMA), Community Action Duluth, Cyclists of Gitchee Gumee Shores (COGGS), Friends of the Western Waterfront Trail, and the St. Louis River Alliance. Partners involved in the restoration and remediation of prioritized sites and actions in the St. Louis River Area of Concern (AOC) include Fond du Lac Band of Lake Superior Chippewa, Minnesota Department of Natural Resources (MNDNR), Minnesota Land Trust, Minnesota Pollution Control Agency (MPCA), Wisconsin Dpeartment of Natural Resources, US Environmental Protection Agency, as well as other local and federal partners.

This plan presents an inventory of natural resources and human uses within the natural area, describes threats to the ecological function of these features, describes strategies for preserving the natural features, and presents an implementation plan with prioritized actions, timelines, and costs.

Natural Area Conditions

This section provides a summary of natural resources in each of the five scientific categories for which the SLRNA was nominated to the DNAP, describes human use of the natural area, and discusses the current status of land ownership for future preservation.

The SLRNA is comprised of approximately 1,230 acres located in nine project sites along the St. Louis River (Figure 1) from Chamber's Grove on the southwest (most upstream) to Grassy Point on the northeast (most downstream). Selection of the lands for inclusion in the natural is described in the SLRNA nomination (City of Duluth, 2019).

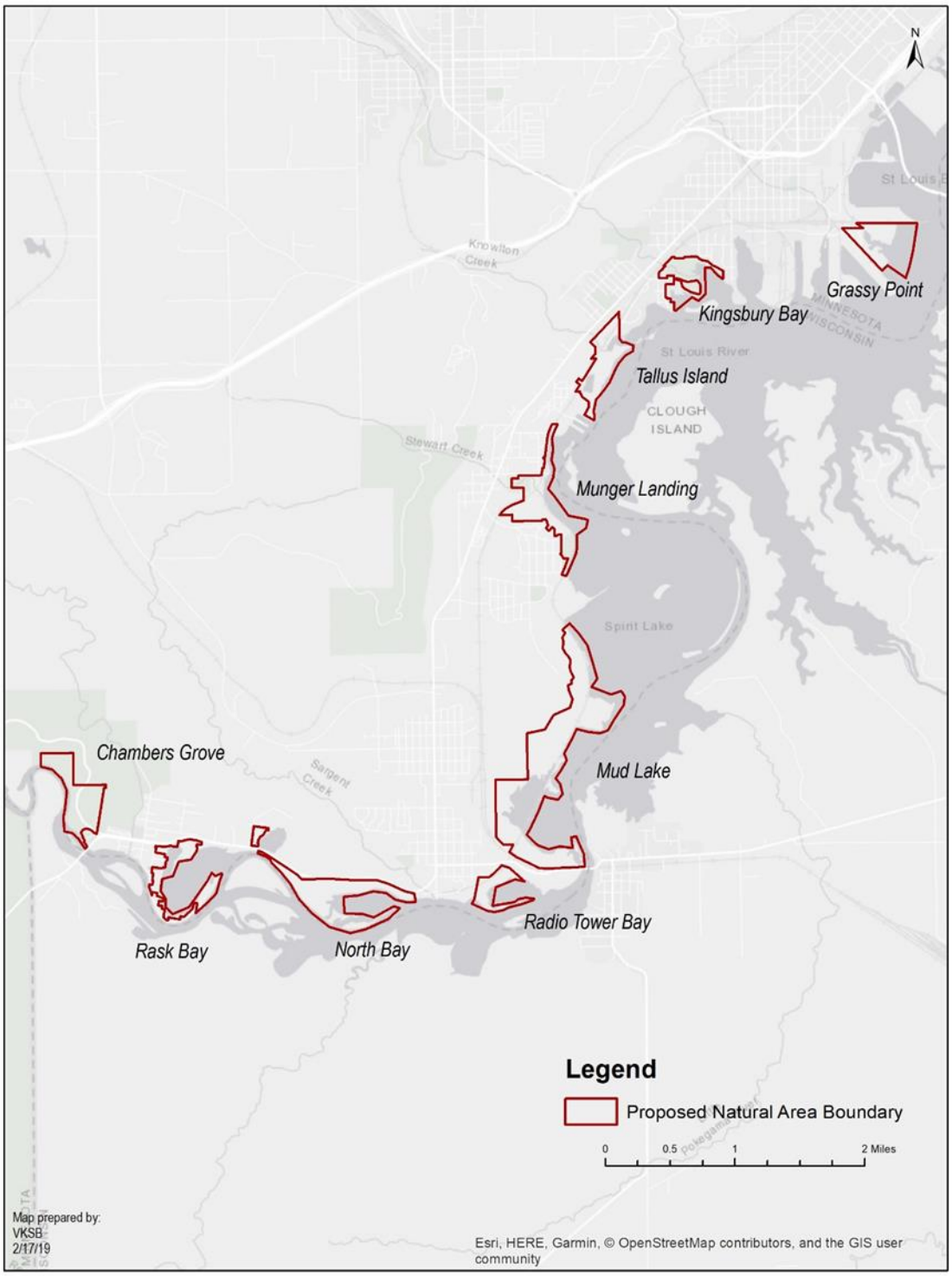

Figure 1: Proposed St. Louis River Natural Area Boundary

Note: Inclusion in the natural area is subject to landowner assent and land protection in accordance with the DNAP ordinance.

NATURAL RESOURCES INVENTORY

The significant natural resources for which the St. Louis River Natural Area was nominated include:

- Significant native plant communities (NPCs)
- Natural water features
- Important bird congregation area
- Special species area
- Geological landforms

Please refer to the SLRNA Nomination (City of Duluth, 2019) for descriptions of the ecological resources within each of these categories. The important features of these resources are summarized in Table 1.

Table 1: Summary of Important Features in the St. Louis River Natural Area

DNAP Scientific Category	Important Features
Significant native plant communities	• 17 distinct native plant community types within the natural area comprised of various types of hardwood forest, mixed hardwood-conifer forest, floodplain forest, forested swamps, shrub swamps, wet meadows, and marshes. • 120 acres of Estuary Marsh (Lake Superior) – MRU94a - This coastal wetland community is unique because it only occurs in estuaries and river mouths influenced by the Lake Superior seiche. • 63% of the NPCs have condition rank of B (good) or higher
Natural water features	• St. Louis River Estuary is the largest tributary to Lake Superior in the U.S. and supports globally important coastal wetland ecosystems • Mouths of four designated trout streams, Knowlton Creek, Stewart Creek, Kingsbury Creek, and Keene Creek, are in the natural area
Important bird congregation area	• Important congregation area for four bird guilds: waterfowl, shorebirds, waterbirds, and migratory landbirds • 169 species and almost 15,000 individuals surveyed in 2018
Special species area	• One state-listed endangered species, pale sedge (*Carex pallescens*) • Two state-listed special concern species, discoid beggarticks (*Bidens discoidea*) and soapberry (*Shepherdia canadensis*) • 52 sensitive bird species
Geological landforms	• Evidence of the drowned river valley draining to Glacial Lake Duluth is present in the form of backwater bays (e.g., Rask Bay, North Bay, Radio Tower Bay, Kingsbury Bay) • Bedrock geology from the Midcontinent Rift

HUMAN USES

Recreational uses are abundant within the nine project sites of the SLRNA and include hiking, biking, shore fishing, birdwatching, picnicking, and access for paddling. Recreational infrastructure within each project site is inventoried in Table 2.

Table 2: Recreational Infrastructure in the Nine Project Areas of the St. Louis River Natural Area

Recreational Use Facilities	Project Area								
	Chamber's Grove	Rask Bay	North Bay	Radio Tower Bay	Mud Lake	Munger Landing	Tallus Island	Kingsbury Bay	Grassy Point
Hiking trail	X		X				X	X	(X)
Mountain Biking trail	X						X	X	
Accessible trail	X	(X)	X	(X)	(X)	(X)	X	X	(X)
Picnic area	X					X	(X)	X*	
Shorefishing pier			X		(X)	X			
Trailhead with parking and restrooms	X		(X)		(X)	(X)	(X)	X	
Carry-in boat access (nonmotorized)	X		X		(X)	(X)	(X)	X	(X)
Public water access (motorized and nonmotorized)						X			

(X) = planned
X* present nearby on City property outside the natural area boundary

The 2019 Western Waterfront Trail, Park and Recreation Master Plan (City of Duluth, 2019) details the planned extension of the Western Waterfront Trail from its current end point at Spring Street (just south of the Tallus Island project site) upstream along the St. Louis River to Chamber's Grove. Once the plan is fully implemented it will connect all of the project sites within the SLRNA with the exception of Grassy point

(Figure 2). This plan also includes construction or improvement of existing trailheads along the trail which also serve as access points for the St. Louis River National Water Trail (designation pending).

An accessible hiking trail and carry-in boat access are identified as desired future amenities at Grassy Point in the St. Louis River Corridor Mini-Master Plans (City of Duluth, 2016). The existing boardwalk trail at Grassy Point is in disrepair and is being removed during the extensive habitat restoration work that is happening at the site.

Other existing trails within the SLRNA include:

- Chamber's Grove - Mission Creek mountain biking trails (portions), including the Duluth Traverse; St. Louis River accessible interpretive trail; Mission Creek hiking trail (Figure 3)

- North Bay –accessible Boy Scout hiking trail (Figure 4)

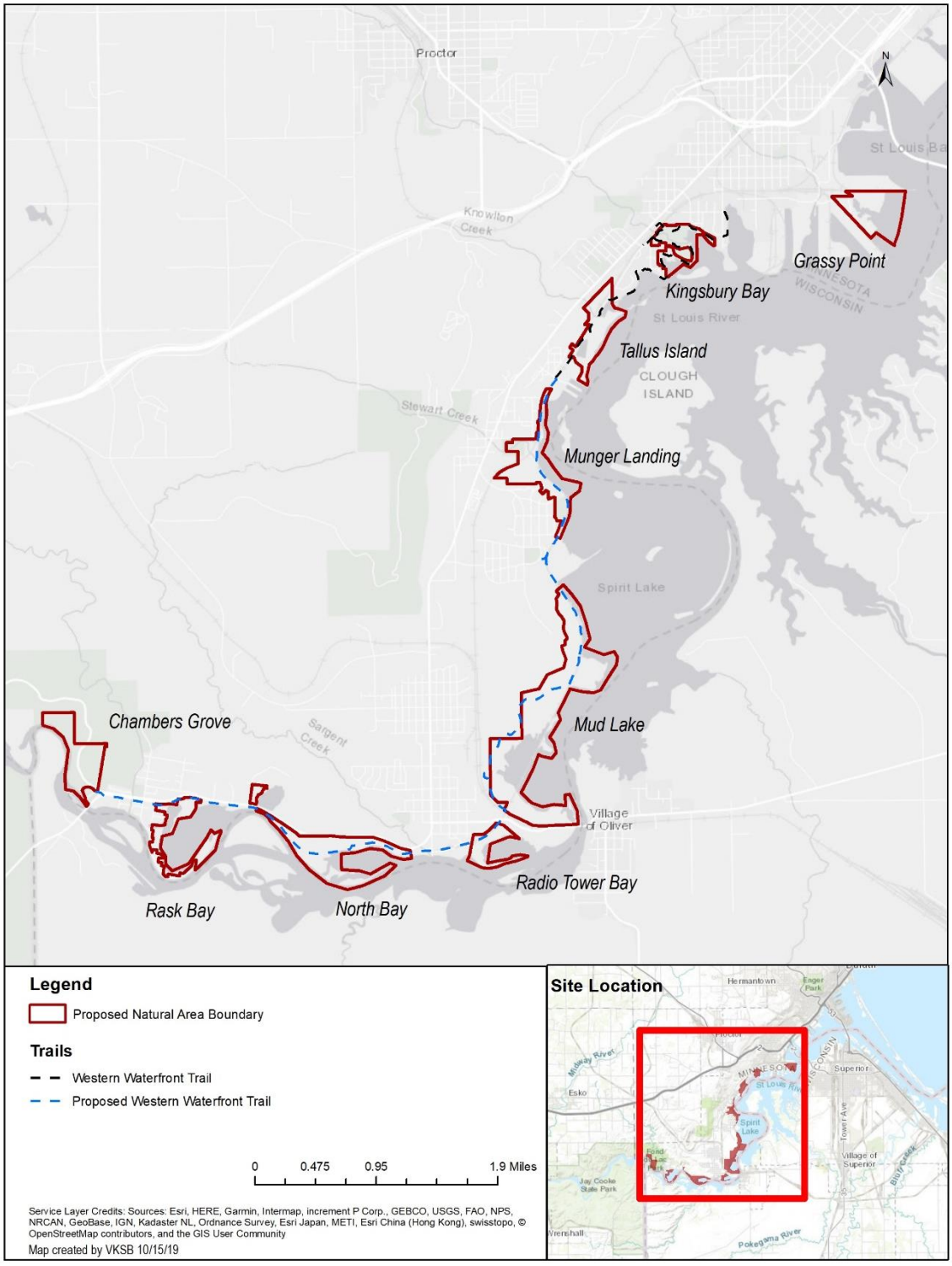

Figure 2: Western Waterfront Trail Project Limits

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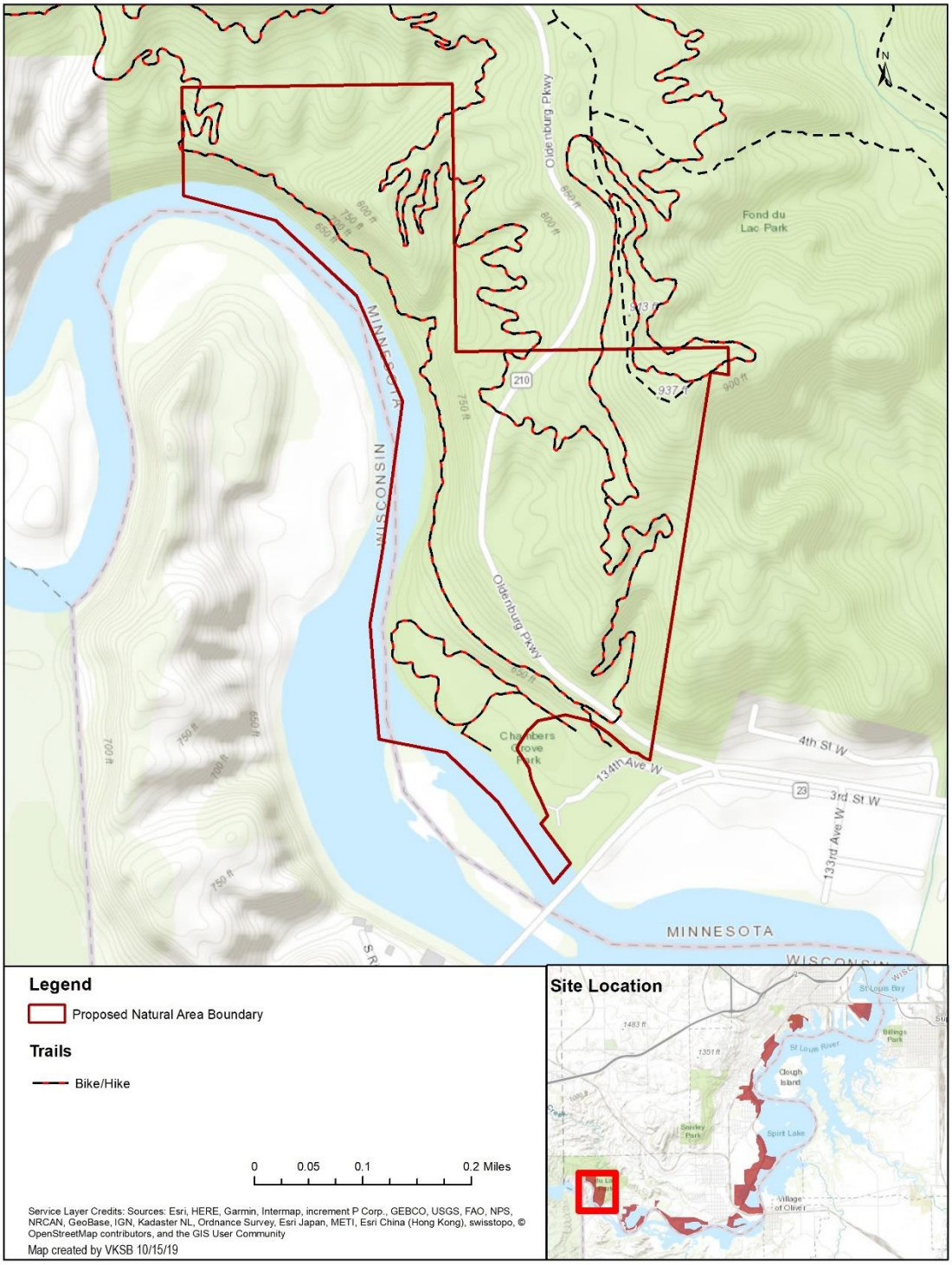

Figure 3: Trails in the Chamber's Grove Project Site

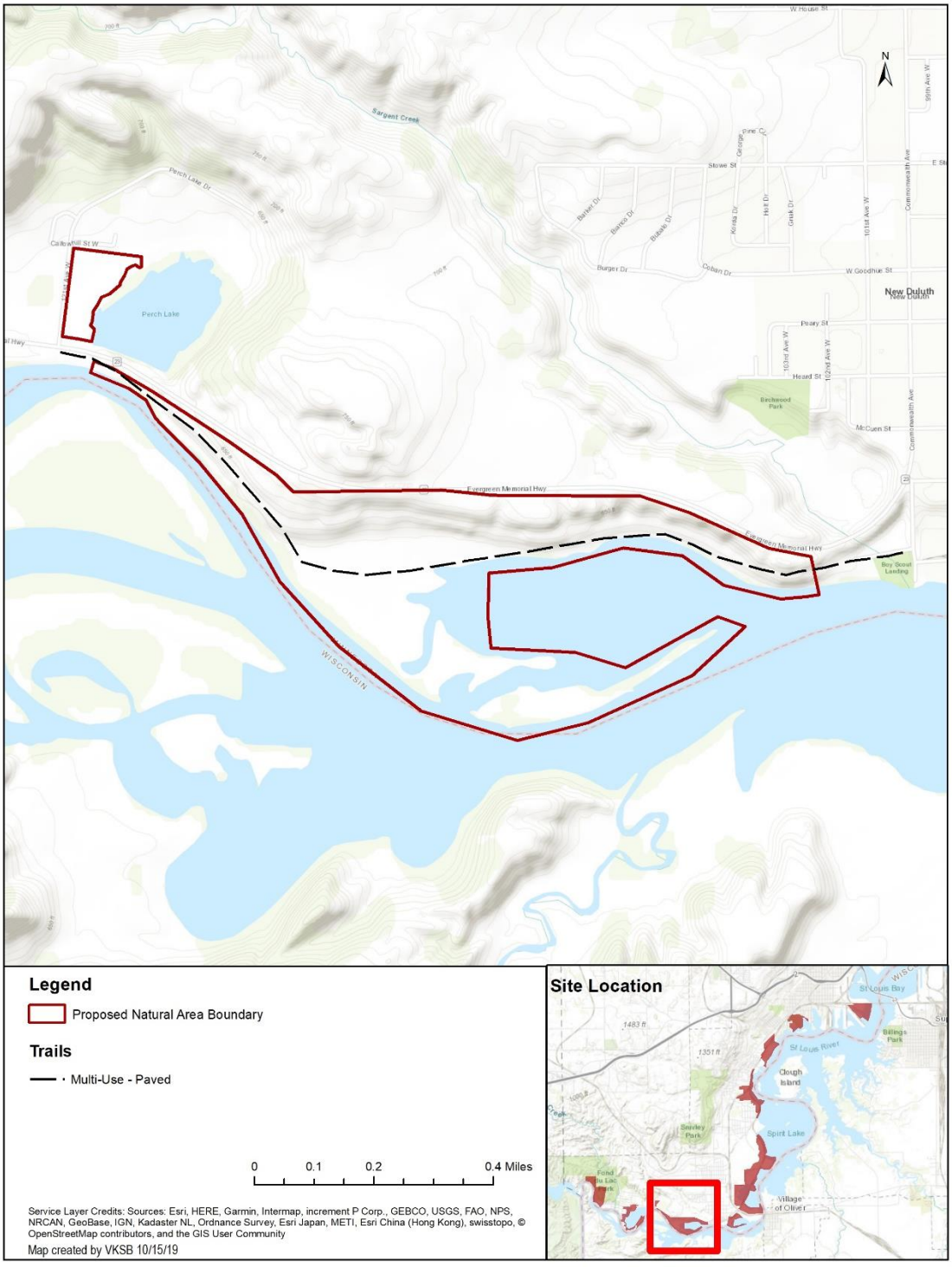

Figure 4: Trails in the North Bay Project Site

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LAND OWNERSHIP

As described in the SLRNA Nomination, landownership in the SLRNA is 32% City, 36% private, 27% State of Minnesota tax-forfeit, and 5% State of Minnesota. The City of Duluth is working with public and private landowners within the proposed natural area boundary to seek the conveyance of land to the DNAP through gift, sale, or other mechanism.

The priority for acquisition of lands not currently under City ownership is as follows:

- Private parcels
- State of Minnesota tax forfeit parcels
- Larger parcels versus smaller parcels
- Higher quality habitat

Threats

The threats to the ecological integrity of the special features for which the SLRNA was nominated to the DNAP are described in this section. Threats identified during the 2018 field surveys are described followed by other known threats.

THREATS IDENTIFIED DURING FIELD SURVEYS

Threats within each of the nine project areas of the SLRNA were identified during the 2018 plant and avian field surveys (Table 3). Section 2 of plant survey report (SEH, 2018; see Appendix A) provides a characterization of each project site with identified threats.

Table 3: Threats Identified in the St. Louis River Natural Area Project Areas

Threat	Chambers Grove	Rask Bay	North Bay	Radio Tower Bay	Mud Lake	Munger Landing	Tallus Island	Kingsbury Bay	Grassy Point
Invasive species	X	X	X	X	X	X	X	X	X
Erosion	X		X			X			
Unauthorized Trails	X		X			X			
Unauthorized fire pits	X								

Off-Highway Vehicle (OHV) Use			X			X			
Substrate issues*					X				
Earthworms								X	
Emerald Ash Borer			X						

*Could include lack of topsoil, compaction from past industrial use, and/or unsuitable substrate due to chemical characteristics (such as nutrient limitation).

Further information on the threats listed in Table 3 is as follows:

- The presence of invasive species was identified and described for each project area during the Summer 2018 plant surveys (SEH, 2018; Appendix A). Invasive species are discussed further below.

- Erosion is a concern at Chamber's Grove and North Bay on hillslopes affected by the 2012 flood. Erosion control work was conducted by Minnesota Department of Transportation and COGGS on hillslopes below Highway 210 within the Chamber's Grove project site. Additional work was completed in 2016/2017 that appears to have stabilized the slope. Erosion is a concern at North Bay due to runoff from Truck Highway 23 causing rills to form in the forested communities on the top of slope below the highway in the north end of the project site. In both North Bay and Munger Landing, localized erosion occurs due to OHV use.

- Unauthorized trails, unauthorized fire pits, and OHV use can be similarly categorized as "human uses". These uses that are not authorized within the natural area. Unauthorized trails and fire pits are present in the Chamber's Grove project site that may be suitable for soapberry (*Shepherdia canadensis*), a state species of special concern. Their presence could affect habitat sustainability for this special species. OHV use on unauthorized trails is occurring in North Bay and Munger Landing and has been identified as a source of erosion at wetland crossings in North Bay and in localized areas in Munger Landing. Human uses are further discussed below.

- Substrate issues are presumably the cause for the lack of tree canopy growing in areas described as non-native plant communities described as open fields in the Mud Lake project area. These are likely areas that were disturbed by industrial activity. These issues could include lack of topsoil, compaction from past industrial use, and/or unsuitable substrate due to chemical characteristics (such as nutrient limitation).

- Earthworms appear to be negatively affecting a Aspen-Birch-Red Maple Forest (MHn4b) community on the north side of Kingsbury Bay. This community ranks D (poor) for condition with a sparse ground layer. Anecdotal observations from the field included a lack of humus and leaf litter, and earthworm castings on the ground surface.

- Emerald ash borer is a concern for the North Bay project site, as ash trees are an important component of the site's plant communities. EAB is a beetle inadvertently imported from China that

kills ash trees once it infests them. EAB is present in the Duluth area and is a significant threat to ash trees.

Invasive species

Invasive species have a variety of negative effects in an ecosystem. They can displace, weaken or kill desirable plants resulting in loss of diversity; pose human health risks; degrade wildlife habitat; interfere with recreational activities; disrupt urban and community ecosystems, and divert millions of dollars for their control (MN Invasive Species Advisory Council, 2015). Impacts to human health can occur from certain invasive species, such as wild parsnip (*Pastinaca sativa)* which causes severe chemical burns on skin.

Invasive plants can quickly colonize areas with high levels of disturbance. Therefore, they are a concern wherever regular human use occurs. Compaction and erosion in high use areas such as trails provides more opportunities for invasive species to establish. Invasive species are better able to take advantage of these conditions than native species and can quickly populate disturbed sites.

Invasives are introduced via hitchhiking of seeds on boots, tires, domestic animals, and equipment. They can also be spread by wildlife and domestic animals, and infestations can encroach from surrounding areas. Boats, trailers, and associated gear can also be a source of invasive aquatic species.

The NPC survey conducted in 2018 identified 10 invasive species that are present in infestations of 0.1 acre and greater in at least one project site in the St. Louis River Natural Area (Table 4). The species and locations of these infestations are provided in Figures 4-1 through 4-8 of the SEH (2018) report located in Appendix A.

Table 4: Invasive Plant Species Found in the St. Louis River Natural Area in Infestations of 0.1 acre or Greater

Common Name	Latin Name	Project Sites
Canada thistle	*Cirsium arvense*	Grassy Point
Common buckthorn	*Rhamnus cathartica*	Chamber's Grove; Mud Lake; Tallus Island
False spirea	*Sobaria sorbifolia*	Tallus Island
Lily of the valley	*Convallaria majalis*	Chamber's Grove; North Bay; Munger Landing; Kingsbury Bay
Narrowleaf cattail	*Typha angustifolia*	Radio Tower Bay
Phragmites	*Phragmites australis*	Mud Lake; Munger Landing; Tallus Island; Grassy Point
Purple loosestrife	*Lythrun salicaria*	North Bay; Mud Lake
Reed canary grass	*Phalaris arundinacea*	North Bay; Kingsbury Bay
Siberian peashrub	*Caragana aborescens*	Mud Lake
Wild parsnip	*Pastinaca sativa*	Tallus Island

Human uses

Trails, both terrestrial and aquatic, provide important opportunities for people to connect with nature and improve health and well-being. However, disturbance of the natural area is inherent with human use. These disturbances can be threats to ecological function if human uses are not carefully considered and managed. A thorough review of available research in the US and aboard on the impacts of recreation on the ecology of natural areas was conducted by Metro, the regional planning authority for the Portland, OR area (Henning, 2017). This section relies heavily on information summarized in this highly regarded literature review.

Trails and trail use have been found to have negative impacts to soils, vegetation, water quality, plants, and wildlife (Henning, 2017). All human uses impact the ecology of a natural area in some manner. The level and type of impact is dependent both on the type of use and the frequency of use; no one user group has greater impacts in all categories. For example, hikers typically cause greater amounts of trail widening and associated impacts on vegetation; they are also likely the group most prone to creating unauthorized trails (in part because they are often the most common type of user and because they can readily move off trail on foot). Bikers can cause trail incision and have greater effects on wildlife than hikers. While it is important to understand possible impacts by different user groups in order to properly plan for and manage impacts, it is also important to consider these impacts without bias towards any one set of users. Regarding impacts to trails themselves, the literature is inconclusive about which user group cause the most damage on a one-to-one basis (Henning, 2017).

Damage from trails is generally greatest during trail construction. Further impacts can and do occur over time from users. These impacts include:

- Vegetation damage adjacent to trails
- Soil erosion and compaction
- Trail widening and incision

Effects on ecological processes by trails and trail use in a natural area can include:

- Riparian habitat and water quality – disturbed riparian vegetation; altered drainage patterns and increased runoff
- Habitat loss, fragmentation, and edge effects – altered vegetation structure and invasive species introductions along corridors; creation of zones of avoidance for wildlife
- Introduction of invasive species – trail users transport species along trail systems, with multi-use trails tending to have more invasive species than single-use trails

The use of OHVs is not authorized within City limits. Any use of OHVs on trails within the natural area exacerbates erosion, invasive species colonization, wildlife disturbance and user conflicts..

Boats, trailers, and associated gear provide a vector for transport of aquatic invasive species from one water body to another. Accessing water from non-designated access points can damage shoreline vegetation, disturb wildlife, and cause erosion.

OTHER KNOWN THREATS

Other known threats to the ecological integrity of the features for which the SLRNA was nominated to the DNAP include historic contamination and degradation of habitat in the St. Louis River AOC and water quality impairments in three trout streams and the St. Louis River. It should be noted that while these threats exist, the ecological integrity of the natural area is still intact and improving.

Historic Contamination and Degradation of Habitat

The SLRNA is located within the boundary of the St. Louis River AOC, one of 43 such areas identified around the Great Lakes. The St. Louis River was originally listed as an AOC in 1987 because of the large amount of suspended solids, nutrients, and biochemical oxygen demand resulting from discharges to the river from various industries and communities. By 1992 when the AOC Stage I Remedial Action Plan was developed, many of these discharges were being treated as required by the Clean Water Act, and the primary concerns for the AOC were legacy contamination and historical habitat degradation. These sources of impairment led to the designation of nine of 14 possible beneficial use impairments (BUIs).

The St. Louis River AOC 2018 Remedial Action Plan (MNDNR and WDNR, 2018) describes the actions necessary to officially "delist" the AOC along with the progress; the plan is updated every year. A number of sites with actions still to be completed in the Remedial Action Plan are located in the aquatic portions of the river immediately adjacent to the SLRNA (Figure 5).Each of these sites has been selected for restoration (green sites) and/or remediation (red sites) based on historic habitat degradation and the presence of sediment contaminination from historic industrial operations. The required actions in the 2018 Remedial Action Plan for each of the sites are highlighted in Figure 5 and listed in Table 5. Restoration actions in or adjacent to SLRNA project sites have been completed at Chamber's Grove, Radio Tower Bay, and in the Knowlton Creek watershed. Restoration is underway at Kingsbury Bay and Grassy Point and will be started in the next year at Spirit Lake.

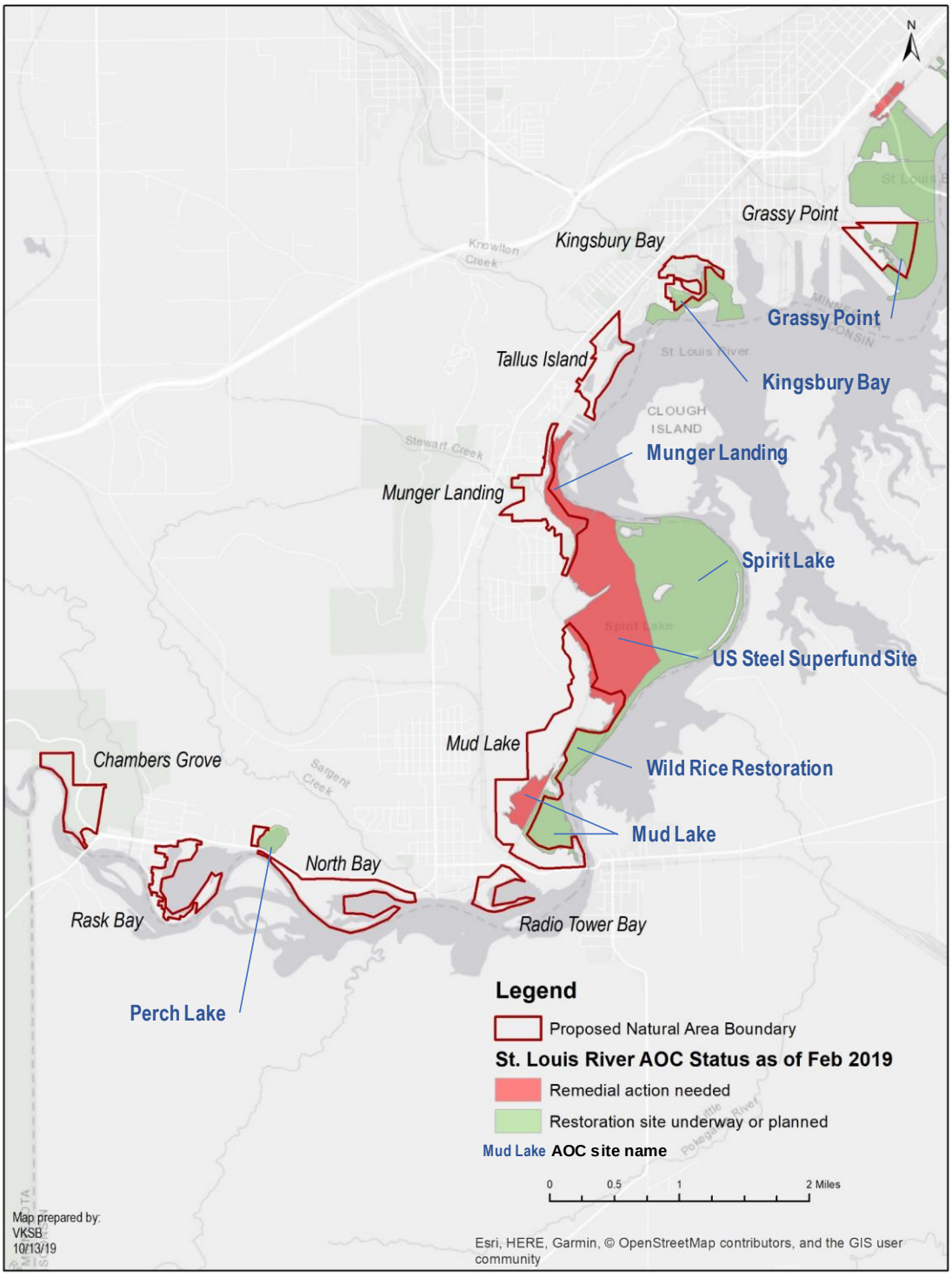

Figure 5: St. Louis River Area of Concern Sites Adjacent to the St. Louis River Natural Area

Note: Inclusion in the natural area is subject to landowner assent and land protection in accordance with the DNAP ordinance.

Table 5: St. Louis River AOC Projects Adjacent to the St. Louis River Natural Area

Project Name	AOC Action Number	Project Description	Date to be Completed
Perch Lake*	9.09	Revitalize biological connection between estuary and Perch Lake and restore optimum bathymetry	2020
Wild Rice Plan and Associated Restoration Sites	9.21	Develop a plan that identifies the high priority restoration sites and provides a process for restoring those sites.Restoration of 275 acres of wild rice.	2024
Mud Lake*	9.08	Remediate contaminated sediments, establish more vital hydrologic connection and restore wetland habitat including wild rice; establish deep water.	2020
Mud Lake*	5.18	Remediate contaminated sediments.	2020
Spirit Lake*	9.01	Remediate contaminated sediments and restore emergent wetlands.	2021
Munger Landing*	5.09	Remediate contaminated sediments.	2020
Kingsbury Bay	9.06	Restore wetland complex at the mouth of Kingsbury Creek to pre-1961 condition.	2020
Grassy Point	9.04	Remove nonnative material and restore optimum bathymetry.	2020

Source: St. Louis River AOC 2018 Remedial Action Plan (MPCA and WDNR, 2018).

*Project design is not yet complete for these sites.

Water Quality Impairments

Stewart Creek, Kingsbury Creek, Keene Creek, and the St. Louis River have been listed by MPCA as impaired in Minnesota's 2018 Impaired Waters List (MPCA, 2019). Impairments in these waterbodies are summarized in Table 6.

Table 6: Water Quality Impairments of Waterbodies in the St. Louis River Natural Area

Waterbody	Impaired Beneficial Use	Pollutant or Stressor
Stewart Creek	Aquatic recreation	*E. coli*
Keene Creek	Aquatic recreation	*E. coli*
Kingsbury Creek	Aquatic life	Aquatic macroinvertebrate bioassessment, Fishes bioassessments
St. Louis River - Fond du Lac Dam to Mission Creek and Mission Creek to Oliver Bridge	Aquatic consumption	DDT, dieldrin, mercury in fish tissue, mercury in water column, PCB in fish tissue, PCB in water column,
St. Louis River - Oliver Bridge to Pokegama River	Aquatic consumption	Mercury in fish tissue, PCB in fish tissue
St. Louis River - Pokegama River to Mouth of St. Louis Bay at Blatnik Bridge	Aquatic consumption	DDT, dieldrin, mercury in fish tissue, mercury in water column, PCB in fish tissue, PCB in water column, dioxin (including 2,3,7,8-TCDD), toxaphene

Source: Minnesota's Final 2018 Impaired Waters List

Potential sources of *E. coli* include from humans (e.g., leaking wastewater infrastructure, failing septic systems, homeless population), stormwater runoff, livestock, wildlife,and domestic pets. Storm sewer systems provide a vector for transport of pathogens deposited on the land surface into waterbodies. In addition, bacterial regrowth and naturalized *E. coli* strains in the environment can be a substantial source of *E. coli* to receiving waters, particularly in urban streams.

Total suspended solids (TSS) is the water quality parameter used as a surrogate to assess impacts to aquatic macroinvertebrates and fishes bioassessments. Sources of TSS in the Kingsbury Creek watershed include streambank and bluff erosion, unstable gully and ravine tributaries, and overland runoff from urban areas (Tetra Tech, 2018b).

Many of the impairments in the St. Louis River are a result of legacy contamination from historic industrial operations in the watershed. Dioxin is a biproduct of industrial processes, but can also be created by natural sources such as forest fires. PCB (polychlorinated biphenyls) are a group of manmade chemicals used historically in carbonless copy paper. Mercury is a ubiquitous metal pollutant in Minnesota waters due to atmospheric deposition; however, in the St. Louis River, it is also present from historic discharges. DDT, dieldrin, and toxaphene are insecticides.

Strategies

Strategies for managing native plant communities, special species, non-native or cultural plant communities, natural water features, bird habitat, invasive species, and trails within the SLRNA are described in this section.

NATIVE PLANT COMMUNITIES

The DNAP uses NPCs, defined according to MNDNR's *2005 Field Guide to Native Plant Communities of Minnesota*, to assess and manage all natural areas within the city. The classification of NPCs is a scientifically based method to assist understanding and managing an area's natural resources. A NPC is composed of plant species that were commonly associated prior to European development. Identifying a NPC today indicates a relatively high degree of naturalness, or lack of human disturbance. NPC species lists can also be used as a template for restorations or reintroductions. In addition to identifying NPCs, data can be collected to also identify growth stage and condition rank (a measure of quality).

Forest and wetland ecosystems rely on certain types of natural disturbance processes to recruit, and maintain their array of native plants and animals, recycle nutrients, and stimulate growth and reproduction. The techniques used to manage any vegetation should be based on mimicking, or using, the natural ecosystem processes that shape a particular NPC, such as fire, windthrow, or flooding.

Plant communities within the St. Louis River Natural Area will be managed to maintain or improve the condition rank of each NPC, while recognizing natural development through growth stages. Management actions should be aligned with an understanding of the timing, extent, severity, and frequency of natural dynamics of each NPC to the extent practicable.

Management recommendations follow for each of the major plant community systems in the St. Louis River Natural Area.

Mesic Hardwood Forest

Aspen – Birch – Basswood Forests (MHn35a), Red Oak – Sugar Maple – Basswood (Bluebead Lily) Forests (MHn35b), Aspen – Birch – Red Maple Forests (MHn44a), White Pine – White Spruce – Paper Birch Forest (MHN44b), Aspen – Birch – Fir Forest (MHn44d), Aspen – Ash Forests (MHn46a), Black Ash – Basswood Forests (MHn46b), and Sugar Maple – Basswood (Bluebead Lily) Forests (MHn47a)

Dry-mesic to wet-mesic forests occur on well-drained and loamy to poorly drained and clayey soils, often with high local water tables. They are generally located on level-ground over glacial lake deposits, moraines, or till plains, but occasionally over bedrock hills. These soil characteristics buffer these communities from drought; however, they only occasionally experience saturated soils after snowmelt or heavy rains. These moist, level soils create a rich humus layer that provides predictable access to water and nutrients. Accordingly, these forests are generally dominated by hardwoods such as sugar maple, basswood, paper birch, quaking aspen, black ash and northern red oak. Balsam fir is also a typical component of these forests. These forests have continuous, dense canopies that restrict the amount of light reaching the forest floor and have well-defined sub-canopy, shrub and herbaceous layers. Characteristic understory species are adapted to low-light conditions and include wild sasparilla (*Aralia nudicaulis*), canada mayflower (*Maianthemum canadense*), dwarf raspberry (*Rubus pubescens*), sweet-scented bedstraw (*Galium triflorum*), large-leaved aster (*Eurybia macrophylla*), lady fern (*Arthyrium felix-femina*), rose twisted stalk (*Streptopus roseaus*), and

pennsylvania sedge (*Carex pensylvanica*). The shrubs beaked hazelnut (*Corylus cornuta*), chokecherry (*Prunus virginiana*), and fly honeysuckle (*Lonicera canadensis*) are also common. Unique spring ephemerals are also found in these forests, and capture light and energy before full canopy closure.

The typical source of mortality in these systems is windthrow or other small-scale disturbances, with fire uncommon due to the moist soils. In general, these systems, once mature, can operate for thousands of years with little management. Catastrophic disturbances such as fire or large windthrow events occur approximately every 1000 years. Patchy windthrow or light surface fires happened more often, about every 150 years.

Management: These systems generally require low maintenance once mature. Patchy windthrow is the most common disturbance and still operates in these areas today. Allowing this type of disturbance to proceed naturally will be the main management action required in these areas, with monitoring and response to invasive species colonization following disturbance. However, these forests do have various stages of development, from young to mid-aged to mature forests, and successional progression may need to be assisted in certain areas. Aspen dominate in young stands but are replaced by later successional species such as white pine, sugar maple, basswood, white spruce and yellow birch in older stands. In densely overgrown areas, selective clearing of aspen accompanied by planting of late successional species could speed progression towards mature mesic hardwood forests. The planting of long-lived conifers, such as white pine, spruce and cedar, is especially recommended as they suffer from over browsing by deer, and protection from deer browse will be required. Finally, due to logging and other human disturbances, the amount of mature mesic hardwood forests in Minnesota has declined substantially. Therefore, maintaining as much of this community in older age classes as possible is desirable.

Additional management concerns include invasive species, erosion and trails, and forest pests and diseases. First, these communities can be prone to invasion by non-native species. Ongoing monitoring and control of invasive species, such as buckthorn, non-native honeysuckles, and garden lily of the valley (C*onvallaria majalis*) will be required. Additionally, invasive earthworms reduce the humus layer in these forests and threaten to permanently change the community composition of these systems. Reducing the spread of these invaders will help maintain the full diversity of mesic hardwood systems. When repairing and maintaining trails, care needs to be taken to avoid working these areas when soils are saturated, generally in the spring, which compacts soils and destroys plants and plant roots. Trails also need to be planned so that they drain away water and maintain a dry surface during these times. Trails can damage fragile understory plants in these areas. Forest pests and diseases can be major threats to healthy forest systems and continual attention should be paid for unusual symptoms of decline in tree species.

Floodplain Forests

Black Ash - Silver Maple Terrace Forest (FFn57a)

Flood plain forests are wet-mesic deciduous forests on silty or sandy alluvium on level sites associated with rivers. They are high enough for only occasional flooding which occurs every 5 to 20 years. Mature forests are naturally dominated by American elm, black ash, and green ash mixed with some bur oak, basswood, and white spruce. This community increasingly includes silver maple as a significant component of the canopy. This plant community is stable and normally driven by individual windthrow or rare flood disturbance. Stand replacing events happen extremely rarely, occurring every 600 years or longer.

Management: The objective for floodplain forest management is the mature growth stage. Natural windfall events will create adequate regeneration. Active forestry is not recommended for this plant community.

However, response to emerald ash borer may be advised. Individual or small group selection of green and black ash with replanting of silver maple, white spruce, or basswood will keep this plant community intact. Mesic to moist soil conditions can be conducive to exotic species, such as buckthorn, invasion following natural or man made clearing and disturbance. Trail routing and building should consider river terrace soils may be saturated for long periods, appropriate methods should apply. Monitoring for invasive species and response should follow wind throw events and new trail work.

Wet Forests

Black Ash - Aspen - Balsam Poplar Swamp (Northeastern) (WFn55a)

Wet forest systems are hardwood forests on wet, mucky mineral soils in shallow basins and groundwater seepage areas and on low, level terrain near rivers, lakes, or wetlands. Standing water is typical in the spring and grading from wet to dry by late summer. Forest is stable and can consist solely of black ash or black ash mixed with other hardwood species including alder, basswood, red maple, quaking aspen, green ash, balsam poplar and, yellow birch and white cedar.

Management: The objective for wet forest communities in the Hartley Natural Area is to manage for mature growth stages with limited presence of non-native species. Timber harvest is not recommended for these plant communities. Natural windfall events will create adequate opportunities for regeneration. However, response to emerald ash borer impacts may be advised. Planting of red maple, northern white cedar, basswood, and yellow birch in gaps created by windfalls or in areas of mortality caused by emerald ash borer may keep these plant communities intact. Wet soil conditions can be conducive to invasive species, such as reed canary grass, with invasion following natural or manmade clearing and disturbance. Trail routing should be avoided in wet forest community types. Where trails are necessary, raised boardwalks should be used to avoid negative impacts to the soils and plant communities. Monitoring for invasive species and response should follow wind throw events and emerald ash borer treatments.

Shrub Swamps

Willow - Dogwood Shrub Swamp (WMn82a) and Alder Swamp (FPn73a)

Shrub swamps are open wetlands dominated by dense cover of broad-leaved graminoids and tall shrubs. These communities are typically present on mineral to sapric peat soils in basins and along streams. Tall shrubs such as willows (*Salix spp.*), red-osier dogwood (*Cornus sericea*), and speckled alder (*Alnus incana*) can be dense, along with meadowsweet (*Spiraea alba*). Paper birch, black ash, red maple, American elm, and tamarack saplings are occasionally present in the shrub layer. Trees taller than 16ft (5m) are rarely present and if so, have less than 25% cover. Peak water levels are high enough and persistent enough to prevent trees from becoming established, although there may be little or no standing water much of the growing season. The invasive species common reed grass (*Phragmites australis*) and reed canary grass (*Phalaris arundinacea*) have become increasingly abundant in this community type over the past several decades, reducing species diversity in many occurrences.

Management: Maintain NPC as is, discourage invasive species including Phragmites ssp. and purple loosestrife by limiting disturbance. An early detection and treatment plan for these species should be developed and implemented to ensure treatment of small patches of invasive plants before they spread. Shrub swamps don't exhibit age related growth stages. Die-back and community composition changes can be seen when water levels remain higher or lower for extended periods.

Wet Meadow and Marsh

Cattail - Sedge Marsh (Northern) (MRn83a) and Sedge Meadow (WMn82b)

Emergent marsh communities are typically dominated by cattails in areas where standing water is present most of the year. They can be present as floating mats along shorelines in lakes, ponds, and river backwaters or rooted in mineral soil in shallow basins. Vegetation is often composed of dense stands of cattails interspersed with pools of open water. Shallow water wetlands throughout much of the state have been invaded by dense stands of the non-native species narrow-leaved cattail (*Typha angustifolia*) and hybrid cattail (*T. x glauca*). Marshes dominated by the native species broad-leaved cattail (*T. latifolia*) are considered higher-quality and are increasingly rare in Minnesota. Substrate surface is usually covered with plant litter, especially dead cattail stalks. Marshes are transitional between shallow aquatic communities and wet meadows.

Management: The objective for these communities is to manage to enhance sedge marsh and sedge meadow characteristics. Cattail often comes to dominate these communities in stable conditions, decreasing plant diversity and lowering habitat quality for wildlife. Occasional physical disturbance by mechanical removal, prescribed burning, or water level management will benefit these communities. Trail routing should be avoided in wet meadow and marsh community types. Where trails are necessary, boardwalks should be used to avoid negative impacts to the soils and plant communities.

Estuary Marsh

Estuary Marsh (Lake Superior) (MRu94a)

These emergent marshes only occur in estuaries at river mouths along the shore of Lake Superior. Vegetation consists of a variable mixture of species, typically with a dense layer of submerged plants under and between floating-leaved and emergent aquatic plants. Cyclic wind-driven changes in lake level cause changes in local water levels resulting in water levels oscillating up and down similar to tidal effects. These oscillations can reverse the flow of these tributary rivers and function to flush sediment, move nutrients, and change water surface elevations. Water surface elevation changes, normally ranging between 1 to 10 inches, are the primary mechanism limiting dominance of these marsh communities by cattail. Water levels in coastal marshes are also influenced by river flooding from runoff following snowmelt or heavy precipitation. Estuary marsh generally has higher species diversity than cattail marsh,

Management: Estuary marsh is listed by MNDNR as a community of special conservation need with a conservation status rank of “critically imperiled”. Management objectives are to maintain or restore the open and diverse growth forms found in this community. Stabilizing water levels, reducing flow rates, and filling or hardening shoreline promotes invasion by cattail mats reducing the open water, species diversity, and aquatic habitats characteristic of estuary marsh.

Sparse Vegetated Upland

Dry Sandstone Cliff (Northern) (CTn11e), Wet Sandstone Cliff (Northern) (CTn42d)

Both wet and dry sandstone cliff communities are open communities on moderately acidic cliffs composed of quartz sandstone. Differences in the two communities arise from their moisture level due to their orientation (south- to west-facing, sunny cliffs or shaded northwest- to east-facing). Few records are available on the flora of these communities. Birds-eye primrose (*Primula mistassinica*) and shrubby cinquefoil are present on one known occurrence of CTn42d in Hinckley.

Management: These communities are highly restricted in area because they occur only on vertical, or nearly vertical sandstone. The primary location for this NPC is on the exposed rock faces of the abandoned quarry west of Chambers Grove Park. The bedded sandstones along the lower St. Louis River are weak and brittle and unsuitable for climbing or trails. Only hardy plants can survive the conditions and the species tend to be slow growing and long lived. Therefore, the community tends to be stable and the best management for these communities is avoidance. However, trails, or other human use in the immediate vicinity of these communities, such as the trails through the quarry, does not have a detrimental effect. Exotic plant invasion is unlikely because of the extremely harsh growing conditions on the rock.

SPECIAL SPECIES

To protect the three sensitive plant species, locations of the occurences are not available to the public. The City will consider the locations of these populations when planning future human use or land management actions. Unauthorized trails within Chamber's Grove are a threat to habitat for soapberry (*Shepherdia canadensis*). Efforts will be undertaken to close these trails and discourage additional unauthorized trail creation, as described in the Prioitized Actions section below. Additional recommendations may be made for these species following coordination with MNDNR ecologists.

For the 52 sensitive bird species, the strategies that support healthy NPCs and water features will serve to protect the habitat for these species.

CULTURAL OR NON-NATIVE PLANT COMMUNITIES

In general, the DNAP program encourages the establishment of NPCs to the extent possible. Non-native/disturbed cover exists on approximately 15% of the natural area (City of Duluth, 2019). This includes transportation corridors (e.g., railroad, streets), invasive species, restoration areas, and old fields. These areas are included in the natural area because they are limited patches surrounded by NPCs and have the potential to reduce fragmentation; in addition, some have potential to be restored with management actions (such as invasive species control). The plant community survey provides valuable information on possible NPC targets for these areas.

The current focus of plant community restoration within the St. Louis River Natural Area is within Grassy Point, as described in Prioritized Actions below.

INVASIVE SPECIES

Invasive plant species are present throughout the SLRNA and the City of Duluth. Their control is an integral part of stewardship efforts. Management must address both existing infestations, as well as the ongoing possibility of introduction of new seeds through human use and disturbance.

Control of Existing Invasive Infestations

City will continue to work with partners to control infestations of invasive plant species within the natural area. The City and its partners will continually assess available control techniques for invasive species.

Management of New Introductions

Because of the many human uses within the project sites of the SLRNA, management of new introductions of invasive species is vital to long term control or eradication. This must include both education of natural area

users and requirements for use of best management practices (BMPs) for restoration and maintenance activities.

The City and its partners will work in partnership to address both education and control of invasive species. Future management efforts, including detection, monitoring, and treatment of invasive species will be managed according to the City's invasive species management plans. A draft plan of past and on-going work is being used until it is incorporated into a comprehensive natural resource management plan. See Prioritized Actions below for description of work anticipated in 2020-2022.

NATURAL WATER FEATURES

Strategies for managing the natural water features of the trout streams and the St. Louis River estuary are described in this section.

Trout Streams

Knowlton Creek, Stewart Creek, Kingsbury Creek, and Keene Creek are class 2A waters under Minnesota Rule 7050.0470. The rule states that the quality of these waters shall be such as to permit the propagation and maintenance of a healthy community of cold water aquatic biota, and their habitats. In addition, these waters shall be suitable for aquatic recreation of all kinds, including bathing.. This class of surface waters is also protected as a source of drinking water" (Minnesota Rule 7050.0222), though none of these creek serve as drinking water sources for the City.

Management of these trout streams and their surrounding landscapes within the SLRNA need to comply with water quality standards appropriate to the class 2A designation, as specified in Minnesota Rule 7050.0222 and to support the health of the unique cold water fisheries.

Total Maximum Daily Loads (TMDLs) are in draft form for Stewart Creek, Keene Creek, and Kingsbury Creek. As a permtted municipal separate storm sewer system (MS4), the City of Duluth will receive wasteload allocations (WLAs) for their portion of the TMDLs once the they are approved and will be responsible for implementing actions to meet these WLAs. The City will also particiate, along with multiple stakeholders, in addressing the load allocations (LA) for the non-permitted pollutant sources, such as pet waste, channel erosion, failing septic systems, and wildlife.

The overwhelming majority of the watersheds for Stewart, Kingsbury, and Keene Creek are located upstream of the SLRNA project sites in which the creek mouths are located. Therefore, the focus of management efforts will be predominantly outside of the natural area. Stream restoration projects are planned by MNDNR for Kingsbury Creek and Keene Creek in reaches of those streams just upstream of the natural area boundaries.

St. Louis River Estuary

The St. Louis River is a class 2B water under Minnesota Rule 7050.0470. The rule states that the quality these waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water aquatic biota, and their habitats…". These waters shall be suitable for aquatic recreation of all kinds, including bathing. This class of surface water is not protected as a source of drinking water.

Management of the landscapes contributing to the St. Louis River within the SLRNA shall comply with water quality standards appropriate to the class 2B designation, as specified in Minnesota Rile 7050.0222 and to support the health of this ecosystem that is vital to the region and Lake Superior.

TMDLs have not been completed for the St. Louis River impairments. TMDLs are scheduled to be completed by MPCA for PCB, mercury, and dioxin in 2020, for DDT, dieldrin, and toxaphene in 2022, and for mercury in 2025.

BIRD HABITAT

The SLRNA is nesting ofand stopover habitat for at least 169 species of birds, including 52 species of concern (NRRI, 2018) and is a key reason for designating the SLRNA. The City will continue to work with partners to allow the restoration and enhancement of avian habitats within and adjacent to the SLRNA. Implementing the strategies for maintaining or improving, NPCs, controlling invasive species, and management of human uses will support vibrant bird habitat in the natural area.

TRAILS

Trails allow citizens to recreate and experience the benefits of nature within the natural area. The Western Waterfront Trail, Park and Recreation Master Plan (draft) describes planned extensions of the Western Waterfront Trail and assocaited facilities, incuding river access points for the St. Louis River Esutary National Water Trail (designation pending), from Tallus Island to Chamber's Grove.

All trail construction, restoration, and realignments must follow best practices in sustainable trail design, management, and maintenance principles and must consider impacts to NPCs and natural water features. The City will work with their partners to maintain the trail system and to educate users on proper BMPs related to trail use (e.g., invasive species and erosion control).

Impact reduction must also include proper trail maintenance, prevention of unauthorized trail segments, and education of users regarding appropriate trail use and BMPs for invasive species control.

Unauthorized "social" trails are not allowed within the natural area. Social trails are generally created by members of the general public versus members of organized groups. The City will work with partners to eliminate unauthorized trails and educate users about the negative impacts of unauthorized trail creation.

OHV use is strictly prohibited within city limits.

Implementation

Management of natural resources in the SLRNA will rely on the approaches described in the previous section. A set of prioritized actions has been selected based on the identified threats to ecological function in the natural area. The prioritized actions with associated timelines and costs, as well as partner responsibilities for implementing this St. Louis River Natural Area Management Plan are described in this section.

PRIORITIZED MANAGEMENT ACTIONS

Four prioritized actions have been identified for the St. Louis River Natural Area. These are summarized in Table 7 and described below.

Funding will be sought from appropriate sources for these projects. Possible sources include: Great Lakes Restoration Initiative, Conservation Partners Legacy Fund, National Oceanic and Atmospheric Administration Coastal Program, and the National Fish and Wildlife Federation Sustain Our Great Lakes program.

Table 7: Prioritized Actions for the St. Louis River Natural Area

Action	Cost	Responsible Parties	Target Completion Date
Special Plant Species Evaluation	None.	City of Duluth	2020
Invasive Species Control and Re-Planting with Native Species	$165,000	Community Action Duluth	2022
See comment			
Address Unauthorized Trails and OHV Use	$7,500	City of Duluth	2022
Grassy Point/Kingsbury Bay Restoration	Funds secured.	Minnesota Land Trust, MNDNR	2022
Coordination with St. Louis River AOC Remediation and Restoration Projects	None.	City of Duluth staff	2025

Special Plant Species Evaluation

The City will coordinate with MNDNR ecologists to identify potential habitat protection and management needs for pale sedge (*Carex pallescens*), discoid beggarticks (*Bidens discoidea*), and soapberry (*Shepherdia canadensis*). No funds are needed for this initial task. The evaluation will be completed in 2020.

Invasive Species Control and Re-Planting with Native Species

The City is working with contractors to control invasive species along the St. Louis River corridor (Figure 6). A total of 382 acres were treated in 2015 with trees and shrubs planted in some locations. Funding is being sought from the Great Lakes Restoration Initiative through the US Environmental Protection Agency as well as other potential sources to retreat these areas and re-plant as necessary with native plants. This work is planned for 2020-2022 and is estimated to cost $165,000.

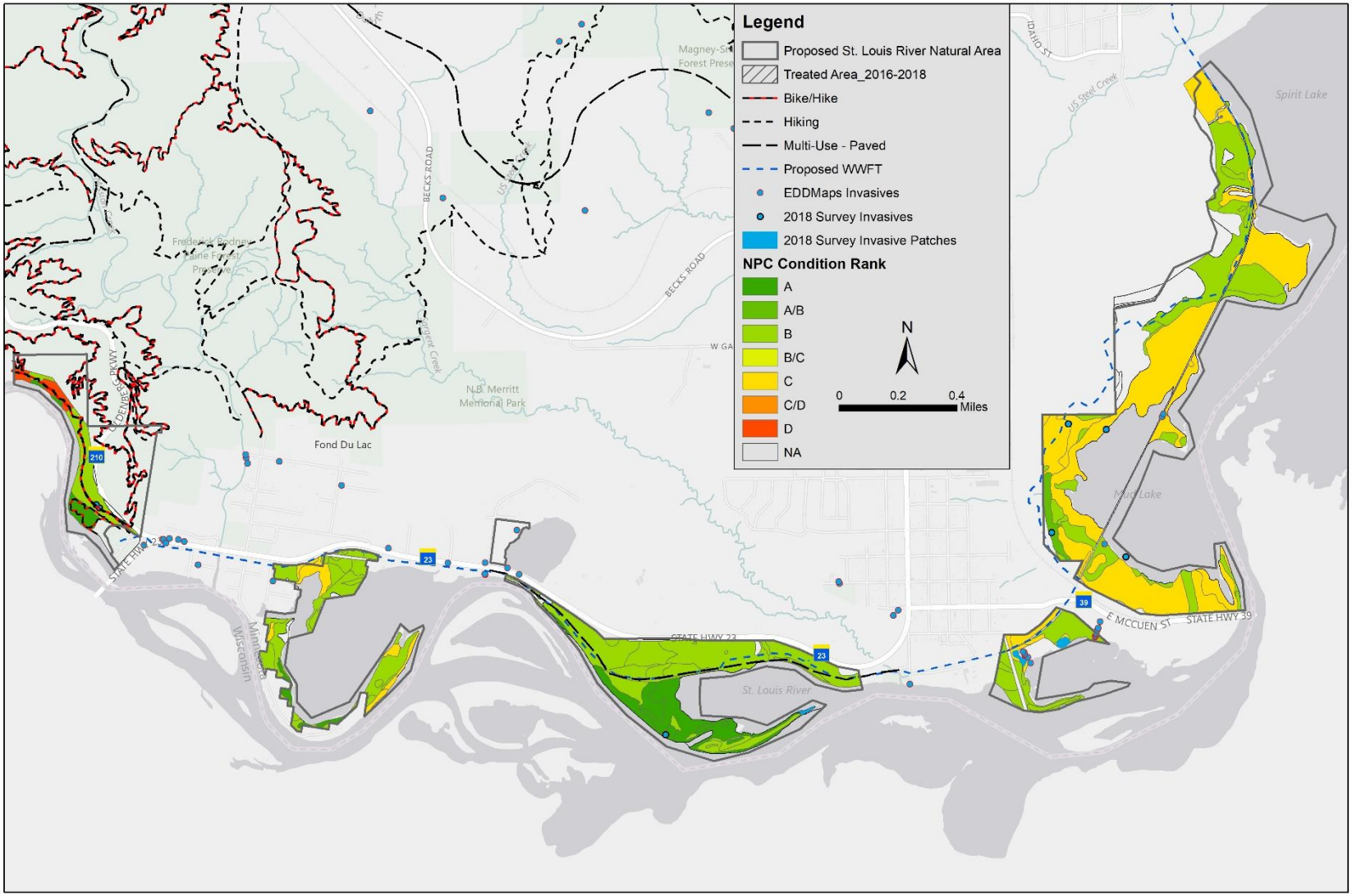

Figure 6: Priority Invasive Species Control Areas for 2020-2021 in the SLRNA

Note: Inclusion in the natural area is subject to landowner assent and land protection in accordance with the DNAP ordinance.

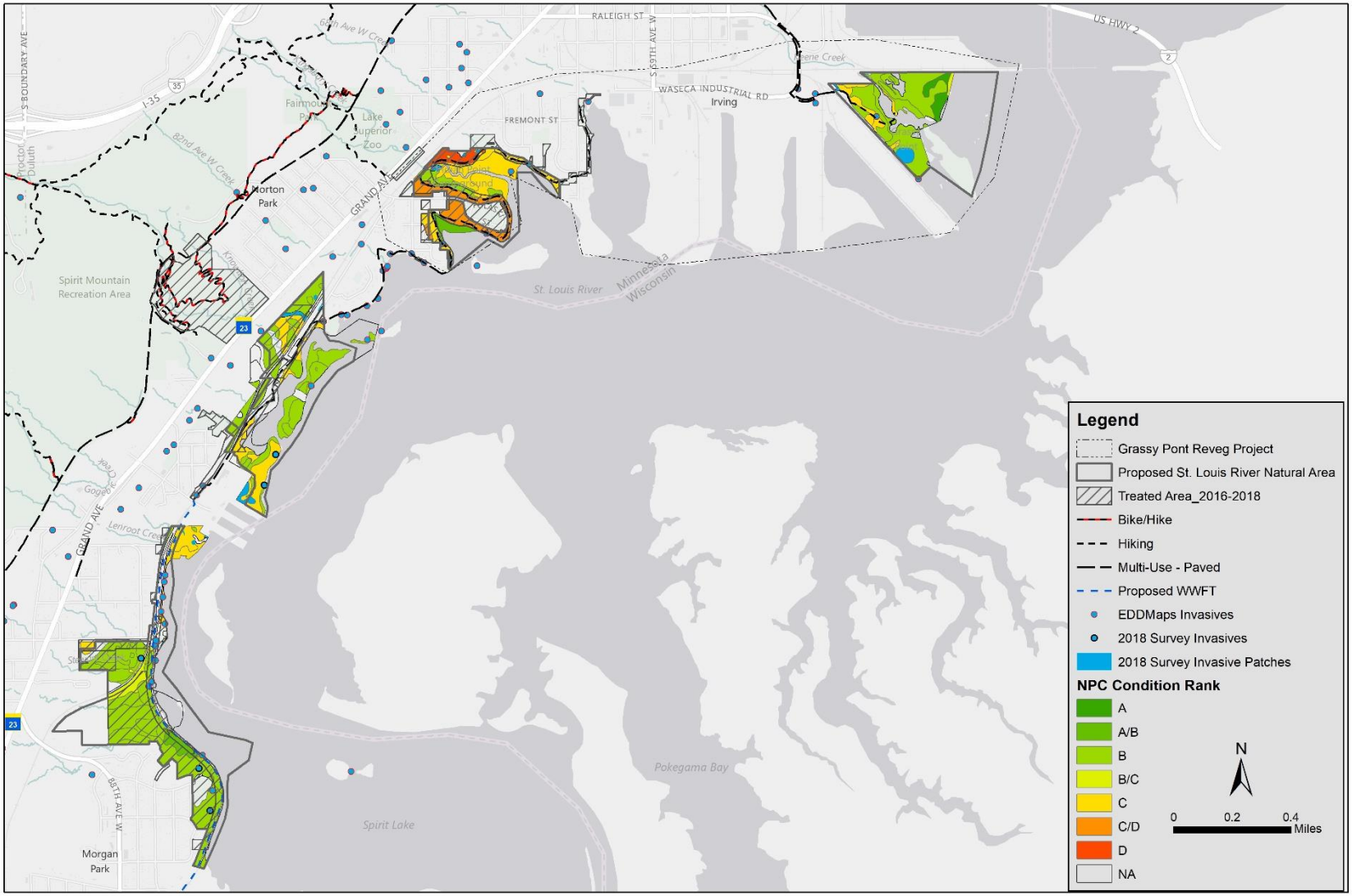

Figure 7: Priority Invasive Species Control Areas for 2020-2021 in the SLRNA

Note: Inclusion in the natural area is subject to landowner assent and land protection in accordance with the DNAP ordinance.

Address Unauthorized Trails and OHV Use

Unauthorized trails were identified as threats in Chamber's Grove, North Bay, and Munger Landing with OHV use occuring in North Bay and Munger Landing. The City will develop an approach for addressing unauthorized trails and OHV within the natural area, with a focus on these three project sites, that will likely consist of an information and education campaign along with signage and barricading at select locations. Funds required for this effort are estimated at $7,500. This initial work is expected to begin in 2022 after much of the construction has occurred that is underway and trail systems come into use.

Grassy Point/Kingsbury Bay Restoration

This project compliments the St. Louis River AOC in-water restoration project at Grassy Point and Kingsbury Bay. The AOC project is underway and consists of the removal of accumulated sediments, wood waste, and historic wetland fill. The bathymetry will be restored to provide for a sheltered bay habitat. The Grassy Point Revegetation Project, which focuses on the terrestrial areas of Grassy Point, will follow in-water construction to maximize migratory bird habitat value of adjacent wetland and upland areas. The work includes invasive species control (e.g., Phragmities, narrow leaf cattail, buckthorn) followed by revegetation of terrestrial native plants (i.e., grasses, forbs, shrubs trees). Invasive species control in areas proximal to the project is included to reduce the potential for spread and colonization by invasive plant species in the periphery (Figure 7). Minnesota Land Trust is leading this effort with involvement from the City, MNDNR, University of Minnesota Natural Resources Research Institute, CISMA, Community Action Duluth, and US Fish and Wildlife Service. Funding has been secured. Work is anticipated to be complete in 2022.

Coordination with St. Louis River AOC Remediation and Restoration Projects

City staff have been designated for each of the St. Louis River AOC sites for which designs and construction are not yet complete. Staff are involved in the in-water restoration planning, design, and constructoin for Grassy Point, Kingsbury Bay, Perch Lake, Mud Lake, Spirit Lake, and Munger Landing to ensure communication, cooperation and terrestrial issues on City land are represented. This includes recognition of current and future human uses planned for each site, as well as the important ecological values in relation to the adjacent natural area. It is anticipated that the remediation and restoration work will follow the estimated timelines listed in Table 5. No outside funds are required for this effort.

RESPONSIBILITIES

Responsibilities for implementation of this SLRNA Management Plan are described in this section.

City of Duluth

The city of Duluth is responsible for implementing the strategies and prioritized actions described in this plan. The City will work in close collaboration with partners to implement the plan.

The City will present annual progress updates on the plan to the City of Duluth Natural Resource Commission.

Trail User Groups

Implementation of this plan requires cooperation and participation of the user groups responsible for trails management and repair. In particular, partners will be asked to:

- Develop user education on appropriate trail use with the City. The issues to be addressed include, but are not limited to the following:

  - Stay on the trail to minimize trail widening and trampling of native vegetation
  - Stay off trails when they are wet
  - Clean bikes, shoes, and other equipment regularly to minimize introduction of invasive species
  - Unauthorized trails are strictly forbidden
- Use sustainable trail construction techniques
- Implement BMPs for invasive species control during all maintenance and construction activities
- Train all volunteers and contractors to comply with sustainable trail construction and invasive species BMP requirements
- Trail restoration/realignment efforts must be reviewed for compliance with this plan

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Appendices

Appendix A: Native Plant Community and Special Species Verification and Mapping, St. Louis River Natural Area Project.


DULUTH NATURAL AREAS PROGRAM

Native Plant Community and Special Species Verification and Mapping

St. Louis River Natural Area Project

Submitted to Minnesota Land Trust

MNLAN 146196 | October 31, 2018

St. Louis River Natural Area Project – Native Plant Community Summary

The proposed project areas of the St. Louis River Natural Area have many assemblages of native plant species that classify as native plant communities (NPC) as defined by the Minnesota Department of Natural Resources. Across the nine (9) project areas within the corridor, there are 16 distinct native plant community types comprised of various types of hardwood forest, mixed hardwood-conifer forest, floodplain forest, forested swamps, shrub swamps, wet meadows, and marshes. The corridor has widespread past and current human use and disturbance. Although these disturbances pose challenges to the ecological integrity of the corridor, they have not removed NPCs and rare species habitat except in limited patches.

Significant native plant communities include Estuary Marsh (Lake Superior), Minnesota NPC Code MHn94a. This community occurs only in estuaries and river mouths influenced by the Lake Superior seiche. The fluctuating water levels of the seiche, caused by wind-driven changes in Lake Superior elevation, can reverse the flow of the river and flush sediment and nutrients back upstream. The MHn94a community is more species-diverse than similar native marsh communities in inland settings. The proposed St. Louis River Natural Area below the Fond du Lac dam contains the largest area of this community in the state; its only other documented presence is in much smaller patches at river mouths on the north shore of Lake Superior through Lake County, Minnesota.

The corridor contains one (1) state-listed endangered species, pale sedge (*Carex pallescens*). In addition, the corridor contains two (2) state-listed special concern species, discoid beggarticks (*Bidens discoidea*) and soapberry (*Shepherdia canadensis*). Plant communities in the corridor may also provide suitable habitat for other rare species, including state-listed special concern narrow reedgrass (*Calamagrostis lacustris*) and state-listed endangered two leaf waterweed (*Elodea bifoliata*).

In Rask Bay and other project areas with large areas of wetlands influenced by the seiche of Lake Superior, there were significant areas of dead or dying woody species, likely past forested or shrub swamps that are currently classified as sedge meadows or marshes. These locations were generally inundated with surface water. It appears that wetland shrubs and trees are stressed by higher water levels in Lake Superior over the course of the previous years, after experiencing a historic low water level in 2007. The lake elevation at the time of the survey in August 2018 was approximately 602.69 feet, compared to a 602.13 foot long term average, and a low of 600.43 feet in August 2007. These communities may fluctuate between open wetland and tree/shrub dominated communities as water levels vary over the course of multiple years. The presence of native plant communities across a range of elevations from below to well above the current St. Louis River and Lake Superior water levels helps to preserve the ability of these communities to succeed between different NPCs as water levels change.

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SEH

Table 1 – Summary of Plant Communities

Community Grouping	Percent of Project Areas	Description
Forested Upland NPCs[1]	22%	Plant communities variously dominated by aspen, basswood, birch, white cedar, and oak
Forested Wetland NPCs	7%	Plant communities with a shallow water table variously dominated by ash, balsam poplar, and white cedar
Shrub and Open Wetland NPCs	31%	Plant communities with a shallow water table to inundation with surface water, dominated by shrub and herbaceous plants adapted to wet conditions
Aquatic Communities	29%	Aquatic communities include open water and areas dominated by submerged and floating-leaf plants
Non-native / Disturbed	11%	Non-NPC cover types such as maintained turf, non-native species, bare ground, pavement, and etc…

[1] NPCs – Native Plant Communities as defined by the Minnesota Department of Natural Resources (2003)

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Native Plant Community and Special Species Verification and Mapping

St. Louis River Natural Area Project

Prepared for Minnesota Land Trust on behalf of the City of Duluth

1 Introduction

This project collected natural resources data in approximately 1,300 acres of properties along the Lower St. Louis River within the City of Duluth to inform potential inclusion of parcels in the Duluth Natural Areas Program (DNAP). Field scientists collected data in July and August of 2018, verifying remote sensing native plant community data, collecting plot-based vegetation data, and surveying for target state-listed rare plant species. Results indicated a number of plant communities ranging from disturbed areas to excellent quality examples of native plant community types.

Objective

The overall objective of the project is to characterize natural resources conditions within the project area. A secondary objective is to determine the condition of specific resources to inform site management and restoration goals.

In order to meet these objectives, the Minnesota Land Trust (MLT) sought classification and condition ranking of native plant communities (NPCs), as well as description of plant communities not meeting NPC classifications. Additionally, MLT sought identification of occurrences of rare and protected plant species (also referred to as species of greatest conservation need, or SGCN) within the St. Louis River project area.

2 Analysis by Project Area

Field scientists surveyed nine (9) project areas along the Lower St. Louis River (**Figure 1**). Areas dominated by native vegetation were classified by native plant community according to the *Field Guide to Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* (MNDNR 2003). The Minnesota Department of Natural Resources (MNDNR) developed the nomenclature for the plant community codes to consider the ecological system (e.g, “MH” for mesic-hardwood), floristic region (e.g., “n” for northern), relative soil moisture regime on a scale from 0-9 (0 being driest and 9 the wettest), and nutrient regime on a scale from 0-9 (0 being the poorest and 9 the richest). For example, MHn44 is a northern wet-mesic hardwood-conifer forest with a moderate moisture regime and moderate nutrient regime. A lowercase letter after the plant community code identifies a specific type of the native plant community; MHn44a is an Aspen-Birch-Red Maple Forest type within the MHn44 class.

Cover types not representing native plant communities are also present in the St. Louis River project areas, and these were also identified and mapped. Plant communities not classified as NPCs were given identifiers specific to this report: NN for nonnative plant cover (e.g., old field or turf grass), NVMM for non-vegetated manmade (e.g., roads or rail corridors), DIST for recently disturbed, INV for a discrete patch of one invasive species, and OW for open water. The code SAq was assigned to aquatic communities dominated by submerged and floating-leaf vegetation. Although these aquatic communities were dominated by native plants, the MNDNR has not assigned an NPC class to this habitat. **Figures 2-1** through **2-27** show NPCs and other cover types in the natural area. All NPCs have condition ranks ranging from excellent to poor; **Table 1** below describes the ranking system.

Table 1 – Condition Ranks for Native Plant Communities

Condition Rank	Description
A	Excellent ecological integrity. Little disturbed by recent human activity or invasive species.
B	Good ecological integrity. Lightly disturbed or recovered from past disturbance. Can return to A-rank with protection or management.
C	Fair ecological integrity. Strong evidence of human disturbance, but retain some characteristic species.
D	Poor ecological integrity. Severely altered by human disturbance or invasive species.
NA	Non-NPC cover types are not assigned a condition rank.

Source: MNDNR 2009

Figures 3-1 through **3-13** show the condition rank of each NPC. Condition ranks consider abundance of invasive species; where invasive plants are present throughout an NPC, the condition rank and detailed descriptions provide this information. Where there are discrete, concentrated patches of invasive plants, **Figures 4-1** through **4-8** identify these locations. Detailed methods for assigning NPCs and collecting vegetation data follow in **Appendix A.** The sections below contain summaries for each of the nine project areas within the larger St. Louis River Natural Area.

2.1 Chambers Grove

2.1.1 Significant Features

The Chambers Grove project area extends along the St. Louis River upstream of Trunk Highway (TH) 23 and adjacent to TH 210, on terraces, steep slopes, and cliffs above the river (**Figures 2-2** and **2-3**).

This project area contains mesic and wet-mesic forested communities as well as areas of Dry Sandstone Cliff (Northern), CTn11e, and Wet Sandstone Cliff (Northern), CTn42d, NPCs not found elsewhere in the St. Louis River natural area. See Photo 1 in **Appendix B** for a typical area of CTn11e. **Figures 2-2** and **2-3** detail the locations of NPCs within Chambers Grove, and **Table 2** below lists the NPC codes with descriptions. With the exception of eroded slopes (discussed in Section 2.1.2 below), the communities in Chambers Grove rank B and A for “good” to “excellent” condition (see **Figure 3-1**), and community composition appears typical of minimally

disturbed habitat. Chambers Grove contains suitable habitat for the boreal shrub soapberry (*Shepherdia canadensis* – state special concern).

Uses of the Chambers Grove area include established mountain biking and walking trails. Informal fire pits and "social" (unofficial) trails agooglre also present.

The Chambers Grove project area is contained within a MNDNR-identified site of high biodiversity significance (MNDNR 2006), that covers a portion of the Mission Creek watershed and surrounding area south of I-35 and north of the St. Louis River. The biodiversity significance designation identifies the statewide significance of a natural area based on rare species, size and condition of native plant communities, and landscape context (i.e., connectivity to other native plant communities).

Table 2 – NPCs in Chambers Grove

NPC Code	Description	Condition Rank
CTn11e	Dry Sandstone Cliff (Northern)	D
CTn42d	Wet Sandstone Cliff (Northern)	A
MHn35a	Aspen-Birch-Basswood Forest	B
MHn44b	White Pine-White Spruce-Paper Birch Forest	B
MHn46b	Black Ash-Basswood Forest	A
NN	Nonnative plant community[1]	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

2.1.2 Threats

The Chambers Grove project area has been affected by significant erosion, presumably beginning with the historic rain event of June 2012. Large areas of exposed clay are present (see Photo 2 in **Appendix B**, and areas with a condition rank of D or "poor" on **Figure 3-1**), with some early-successional and disturbance-adapted plant species such as red raspberry (*Rubus idaeus*), goldenrods (*Solidago canadensis* and *S. altissima*), and staghorn sumac (*Rhus typhina*). Erosion control measures are evident, including biorolls and erosion control netting staked into the open hillsides.

Although not widespread in the project area, common buckthorn (*Rhamnus cathartica*) was present on site. Garden lily-of-the-valley (*Convallaria majalis*) was also found in one dense patch. Locations of concentrations of invasive species are shown on **Figure 4-1**.

Social trails and fire pits are located in suitable habitat areas for soapberry, and may negatively affect the sustainability of this area for soapberry.

2.1.3 Restoration and Management Actions

In order to protect existing NPCs and rare species occurrences, erosion control activities should continue. Treatment and ongoing monitoring of common buckthorn will likely be necessary to protect the current good to excellent conditions of forested NPCs. Removal of social trails may preserve suitable habitat for soapberry.

2.2 Rask Bay

2.2.1 Significant Features

The Rask Bay project area covers aquatic, wetland, and forested areas of Rask Bay south of TH 23 in the Fond du Lac neighborhood of Duluth.

Rask Bay has large areas of Estuary Marsh (Lake Superior), MRu94a, an NPC occurring only in estuaries and embayments near river mouths along the shores of Lake Superior, where water levels are influenced by Lake Superior seiche. This community may be present in smaller patches along the north shore of Lake Superior, but is only found in sizable areas in the St. Louis River estuary below the Fond du Lac dam. The MRu94a community is suitable habitat for discoid beggarticks (*Bidens discoidea* – state special concern). Areas of deeper water with submerged and floating leaf vegetation were dominated by native species such as yellow pond-lily (*Nuphar variagata*), American white water-lily (*Nymphaea odorata*), and water marigold (*Bidens beckii*). This community is not given a native plant community classification in the *Field Guide* (MNDNR 2003), but still appears to be a good condition community with few invasive species. Rask Bay also contains sedge meadows (WMn82b), shrub swamps (WMn82a), floodplain terrace forest (FFn57a), and wet-mesic forest (MHn44a). **Figures 2-3** through **2-5** detail locations of NPCs in Rask Bay, and **Table 3** below lists the NPCs with descriptions. Most communities in Rask Bay are ranked B for "good" condition, with the exception of a few areas of marsh with dense cover of nonnative cattails (*Typha angustifolia* and/or *Typha x glauca*) (**Figure 3-2**).

In Rask Bay and other project areas with large areas of wetlands influenced by the seiche of Lake Superior, there were significant areas of dead or dying woody species (see Photo 3 in **Appendix B**). These locations were generally inundated with surface water, and anecdotally wetland shrubs and trees appear stressed by high water levels in Lake Superior over the course of the previous two (2) years, after experiencing a historic low water level in 2007. The lake elevation at the time of the survey in August 2018 was approximately 602.69 feet, compared to a 602.13 foot long term average, and a low of 600.43 feet in August 2007 (NOAA-GLERL 2018). These communities may fluctuate between open wetland and tree/shrub dominated communities as water levels vary over the course of multiple years. The presence of native plant communities across a range of elevations from below to well above the current St. Louis River and Lake Superior water levels helps to preserve the ability of habitats to succeed between different NPCs as water levels change.

Rask Bay is contained within a DNR identified site of outstanding biodiversity significance, covering both Rask and adjacent North Bays.

Table 3 – NPCs in Rask Bay

NPC Code	Description	Condition Rank
FFn57a	Black Ash-Silver Maple Terrace Forest	B, C
MHn44a	Aspen-Birch-Red Maple Forest	C
MRn83a	Cattail-Sedge Marsh (Northern)	C
MRu94a	Estuary Marsh (Lake Superior)	A, B
WMn82a	Willow-Dogwood Shrub Swamp	B, C
WMn82b	Sedge Meadow	B, C
SAq	Shallow Aquatic Community[1]	NA
NN	Nonnative plant community[2]	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), but dominated by native species

[2] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

2.2.2 Threats

Reed canary grass (*Phalaris arundinacea*) is present in scattered patches in the FFn57a community (typical FFn57a shown on Photo 4 in **Appendix B**). Wild rice (*Zizania palustris*) in the shallow aquatic plant communities of the bay appears to have been heavily grazed.

2.2.3 Restoration and Management Actions

Monitoring for reed canary grass and nonnative cattails, combined with herbicide treatment as needed may help maintain the integrity of the terrace forest and marsh communities. Recent research in the St. Louis River estuary by University of Wisconsin – Superior students has investigated hazing of herbivores such as Canada geese to protect wild rice. Depending on eventual results of this and other studies, herbivore hazing or exclosure fences may be considered for preserving wild rice in Rask Bay.

2.3 North Bay

2.3.1 Significant Features

The North Bay project area is located just east of Rask Bay in the Fond du Lac neighborhood, south of TH 23.

North Bay contains eight (8) distinct NPCs, as well as an aquatic community dominated by native species (see **Table 4** below). North Bay contains B rank or "good" condition examples of MRu94a (see Photo 5 in **Appendix B**), including areas of native emergent plant species with few nonnative cattails. This area also has A and B rank (excellent and good condition) examples of wet-mesic hardwood forest (MHn44a, MHn44d, and MHn46a), with canopies typical of mature forest (>95 years) and diverse ground layers (**Figures 2-6** to **2-9** and Photo 6 in **Appendix B**). In general, this project area had the highest condition ranks of the nine (9) project areas, ranking A and B for all areas assigned NPCs (**Figures 3-3** to **3-4**).

Recreational OHV/pedestrian trails cross the site on three parallel corridors: one through forested areas on the grade of old "Fond du Lac Road", one along old rail grade through wetland communities to the south (Photo 8 in **Appendix B**), and one along the outer edge of the bay through terrace forest. The old rail grade has likely changed hydrology of the low-lying areas to

the north, which are now disconnected from the influence of the St. Louis River and Lake Superior seiche.

North Bay is contained within a DNR identified site of outstanding biodiversity significance.

Table 4 – NPCs in North Bay

NPC Code	Description	Condition Rank
FFn57a	Black Ash-Silver Maple Terrace Forest	A, B
FPn73a	Alder Swamp	B
MHn44a	Aspen-Birch-Red Maple Forest	B
MHn44d	Aspen-Birch-Fir Forest	B
MHn46a	Aspen-Ash Forest	B
MRu94a	Estuary Marsh (Lake Superior)	A
WFn55a	Black Ash-Aspen-Balsam Poplar Swamp (Northern)	B
WMn82a	Willow-Dogwood Shrub Swamp	A, B
WMn82b	Sedge Meadow	B
DIST	Recently disturbed[1]	NA
NN	Nonnative plant community[1]	NA
OW	Open Water	NA
SAq	Shallow Aquatic Community[2]	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

[2] Not an NPC identified in the *Field Guide* (MNDNR 2003), but dominated by native species

2.3.2 Threats

Threats to ecological integrity in North Bay include invasive plant species, localized areas of off-trail/unsustainable OHV use, and erosion on slopes downslope from and south of TH 23 (**Figure 2-9**). Field observation of erosion included locations where OHV trails cross wetland habitat, and rills forming from the top of slope near TH 23 in the forested communities on the north side of the project area. Similar to Rask Bay, wild rice in the shallow aquatic plant communities of the bay appears to have been heavily grazed (some grazed stems are visible on Photo 7 in **Appendix B**). Concentrations of invasive species, including purple loosestrife (*Lythrum salicaria*) on end of point, are shown on **Figure 4-2**.

2.3.3 Restoration and Management Actions

Reduce erosion by working to reduce OHV trail usage in unsuitable locations and educate the community on appropriate places for OHV use. Explore stormwater management solutions for slopes eroding near TH 23. Invasive plant species in North Bay should be monitored. If increasing in cover, management such as herbicide treatment or release of biocontrol insects (specifically for purple loosestrife) may be appropriate.

2.4 Radio Tower Bay

2.4.1 Significant Features

Radio Tower Bay is located east of North Bay, and is separated from Mud Lake to the north by TH 39.

The Radio Tower Bay project area is comprised almost entirely of aquatic, wetland, and floodplain terrace forest communities (**Figure 2-10**). The bay contains a relatively species diverse example of MRu94a (Photo 10 in **Appendix B**) that provides suitable habitat for discoid beggarticks. Most NPCs in Radio Tower Bay are in "good" condition with a B rank; a few areas rank as C or "fair" based on dense stands of nonnative cattails (**Figure 3-5** and Photo 9 in **Appendix B**). There are visible timbers and coarse woody debris at the river shoreline. A 2014-2015 restoration project removed sawmill wood waste from the bottom of the bay to restore sheltered bay bathymetry; therefore the remaining visible slab wood may not be present in ecologically significant quantities that would affect the condition ranks of the NPCs.

Like a number of other low-elevation communities in the project area, portions of Radio Tower Bay had stressed ash (*Fraxinus* species) and balsam poplar (*Populus balsamifera*) with typical marsh species such as lake sedge (*Carex lacustris*) and cattails growing in the ground layer vegetation. The trees appear to be stressed due to high water levels.

Radio Tower Bay is contained within a DNR identified site of high biodiversity significance.

Table 5 – NPCs in Radio Tower Bay

NPC Code	Description	Condition Rank
FFn57a	Black Ash-Silver Maple Terrace Forest	B
FPn73a	Alder Swamp	B
MHn44a	Aspen-Birch-Red Maple Forest	B, C
MRn83a	Cattail-Sedge Marsh (Northern)	C
MRu94a	Estuary Marsh (Lake Superior)	B
WMn82a	Willow-Dogwood Shrub Swamp	B, C
WMn82b	Sedge Meadow	B
DIST	Recently disturbed[1]	NA
NN	Nonnative plant community[1]	NA
NVMM	Nonvegetated, manmade feature (rail corridor)[1]	NA
OW	Open Water	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

2.4.2 Threats

Nonnative cattails are present in Radio Tower Bay in a few dense stands, shown as sites of C ("fair") condition rank on **Figure 3-5** and in locations detailed on **Figure 4-3**.

2.4.3 Restoration and Management Actions

Monitor patches of nonnative cattails, and treat as needed to maintain the ecological integrity of marsh communities.

2.5 Mud Lake

2.5.1 Significant Features

The Mud Lake project area includes portions of the former U. S. Steel "Duluth Works" industrial site near the Duluth neighborhood of Morgan Park. This project area stretches from TH 39 on the south to near Idaho St. and 88th Ave. West in the north.

Mud Lake contains a mix of native plant communities and disturbed/non-native dominated habitats. Native plant communities persist in wetland and aquatic habitats immediately adjacent to the St. Louis River and in forested communities on ravines and on steep side slopes that were likely undisturbed for industrial development (**Figures 2-11** through **2-18** and Photo 11 in **Appendix B**). Areas of MRu94a in this project area provide suitable habitat for discoid beggarticks. Community condition ranks in Mud Lake are based largely on abundance of invasive species, which may itself be a function of the level of past disturbance of each community. Forested communities ranking as C or "fair" had abundant common buckthorn and showy honeysuckle (*Lonicera x bella*) in the shrub layer. The wet forest (WFn55a) community ranked A/B or "excellent/good" had a mature canopy and plant species typical of the NPC, and would rank as A except that the community is small in size, and is likely vulnerable to invasion from nearby stands of invasive plant species. Marsh communities with a C rank had dense stands of nonnative cattails. Many other areas in Mud Lake ranked as B or "good", with plant communities typical of NPCs with more limited occurrences of invasive species (**Figures 3-6** through **3-8**).

A railroad causeway running roughly northeast to southwest bisects this bay of the St. Louis River, and may limit the influence of the Lake Superior seiche on water levels inside the causeway.

Higher-quality forested as well as all wetland/aquatic portions of the Mud Lake project area are contained within a DNR identified site of high biodiversity significance that stretches to the north and also covers portions of the Munger Landing project area.

Table 6 – NPCs in Mud Lake

NPC Code	Description	Condition Rank
FFn57a	Black Ash-Silver Maple Terrace Forest	C
FPn73a	Alder Swamp	B
MHn35b	Red Oak-Sugar Maple-Basswood-(Bluebead Lily) Forest	B
MHn44a	Aspen-Birch-Red Maple Forest	B, C
MHn46a	Aspen-Ash Forest	B
MRn83a	Cattail-Sedge Marsh (Northern)	B, C
MRu94a	Estuary Marsh (Lake Superior)	B, C
WFn55a	Black Ash-Aspen-Balsam Poplar Swamp (Northern)	A/B, C
WMn82a	Willow-Dogwood Shrub Swamp	B/C
WMn82b	Sedge Meadow	B
DIST	Recently disturbed or open ground[1]	NA
NN	Nonnative plant community[1]	NA
NVMM	Nonvegetated, manmade feature (rail corridor)[1]	NA
OW	Open Water	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

2.5.2 Threats

Threats to the ecological integrity of the Mud Lake project area include invasive plants, particularly in open fields where woody species are struggling to establish (Photo 12 in **Appendix B**). Lack of regeneration of a tree canopy could be due to lack of topsoil, compaction from past industrial use, and/or unsuitable substrate due to chemical characteristics (such as nutrient limitation). In areas already meeting NPC classifications, common buckthorn is a threat to the condition of these habitats. **Figure 4-4** identifies some localized patches of invasive plant species; where invasive plants are more broadly distributed in an NPC, these occurrences are reflected in the condition rank of the community rather than a point location.

2.5.3 Restoration and Management Actions

Tree planting could restore upland forested communities like MHn44, particularly at the boundaries of NPCs with nonnative plant communities. Investigation of soil characteristics and soil amendments, as appropriate, may encourage regeneration of native forested communities. Common buckthorn control will be important to maintaining/improving condition of Mud Lake NPCs. Herbicide treatment or hydrologic/bathymetric restoration may be useful to manage nonnative cattails.

2.6 Munger Landing

2.6.1 Significant Features

The Munger Landing project area extends north and south from the Munger Landing boat launch, and includes the mouth of Stewart Creek.

Munger Landing encompasses plant communities along the Stewart Creek floodplain (see Photo 13 in **Appendix B**), marsh and aquatic communities along the St. Louis River (Photo 14 in

Appendix B), and upland mesic forests at higher elevations. **Figures 2-19** to **2-22** show the locations of NPCs within the Munger Landing project area, and **Table 7** below lists the NPCs with descriptions. Condition of the NPCs in Munger Landing is generally B or "good", with limited disturbance from erosion localized at trails. The marsh communities provide suitable habitat for discoid beggarticks. A few areas at the northern end of the project area rate C or "fair" based on invasive plant occurrences and remaining evidence of past development (e.g., cleared areas that have not regrown a tree canopy). **Figures 3-9** and **3-10** show condition ranks by NPC location.

Munger Landing also contains two rail corridors as well as walking and OHV trails. Similar to roads and railroad grades in other project areas, the railroad causeway may be isolating some areas of marsh from the influence of the Lake Superior seiche, and therefore having the effect of converting MRu94a to MRn83a communities.

Nonnative communities within the Munger Landing project area include both maintained turf and recreational fields in Blackmer Park, as well as old field areas just south of Clyde Avenue and parallel to an OHV/walking trail north of the Munger Landing boat launch.

The southern portion of the Munger Landing project area is contained within a DNR identified site of high biodiversity significance, which extends to the south to cover portions of the Mud Lake project area as well.

Table 7 – NPCs in Munger Landing

NPC Code	Description	Condition Rank
FFn57a	Black Ash-Silver Maple Terrace Forest	B
MHn35a	Aspen-Birch-Basswood Forest	B
MHn44a	Aspen-Birch-Red Maple Forest	B, B/C, C
MHn46b	Black Ash-Basswood Forest	B
MRn83a	Cattail-Sedge Marsh (Northern)	B
MRu94a	Estuary Marsh (Lake Superior)	A/B, B, C
WFn55a	Black Ash-Aspen-Balsam Poplar Swamp (Northern)	B, C
WMn82a	Willow-Dogwood Shrub Swamp	B
WMn82b	Sedge Meadow	B
DIST	Recently disturbed or open ground[1]	NA
INV	Invasive plant species (nonnative common reed)[1]	NA
NN	Nonnative plant community (old field, turf)[1]	NA
NVMM	Nonvegetated, manmade feature (rail corridor)[1]	NA
OW	Open Water	NA
SAq	Shallow Aquatic Community[2]	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

[2] Not an NPC identified in the *Field Guide* (MNDNR 2003), but dominated by native species

2.6.2 Threats

Stands of nonnative common reed (*Phragmites australis*) are present at the northern edge of the project area; this species may be spreading from a larger infestation to the north (**Figure 4-6**).

2.6.3 Management and Restoration

To protect the integrity of the site NPCs, manage nonnative common reed with the goal of eradicating it from this project area. The disturbed corridor paralleling the OHV trail may be a target for restoration to MHn44a or MHn44b with tree planting (including paper birch, red maple, white pine, and/or white spruce). Old field areas near Clyde Avenue may be target for restoration to wet forest such as WFn55b or similar, by planting yellow birch, basswood, and/or red maple.

2.7 Tallus Island

2.7.1 Significant Features

The Tallus Island project area encompasses Tallus Island itself, as well as adjacent shoreline, the Knowlton Creek mouth, and a strip of upland forest parallel to the Western Waterfront Trail. Tallus Island was once connected to the shoreline by built-up sediment from the creek mouth, but is again a distinct island after a restoration and sediment removal project was constructed in 2010. The sediment removal project was part of work to restore the St. Louis River/ Interlake/Duluth Tar (SLRIDT) Superfund Site.

Plant communities in this project area include shallow aquatic communities, various wetland communities, and upland mesic forests (**Table 8** below, Photos 15 and 16 in **Appendix B**). There are disturbed and nonnative (old field) plant communities within the project area, in areas of relatively recent construction and along the Western Waterfront Trail and rail corridors. **Figures 2-22** to **2-24** show the locations of plant communities within the project area. NPCs within the Tallus Island project area rank as B or C condition (**Figures 3-10** and **3-11**), with C or "fair" condition ranks based mostly on the abundance of common buckthorn and/or nonnative cattails.

Other notable observations at Tallus Island are recent restoration in and along Knowlton Creek (see Photo 14 in **Appendix B**). Although this area is currently described as "disturbed" based on open ground and disturbance-adapted plant species, native plants and erosion control measures have been installed. The area will likely classify as an NPC in the near future. Other management/restoration efforts observed in the project area are deer exclosure fences, planted native trees with herbivore protection, and cut/treated stumps of common buckthorn.

The wetland and aquatic habitats in the Tallus Island project area, along with Tallus Island itself, are part of a DNR-identified site of moderate biodiversity significance. This site also extends north to encompass the marsh and aquatic habitats of Kingsbury Bay.

Table 8 – NPCs in Tallus Island

NPC Code	Description	Condition Rank
FPn73a	Alder Swamp	C
MHn44a	Aspen-Birch-Red Maple Forest	B
MHn44b	White Pine-White Spruce-Paper Birch Forest	B
MHn44d	Aspen-Birch-Fir Forest	B
MHn46a	Aspen-Ash Forest	B
MRn83a	Cattail-Sedge Marsh (Northern)	B, C
MRu94a	Estuary Marsh (Lake Superior)	C
WFn55a	Black Ash-Aspen-Balsam Poplar Swamp (Northern)	B
WMn82a	Willow-Dogwood Shrub Swamp	B
WMn82b	Sedge Meadow	B, C
DIST	Recently disturbed or open ground[1]	NA
INV	Invasive plant species (nonnative common reed)[1]	NA
NN	Nonnative plant community (old field, turf)[1]	NA
NVMM	Nonvegetated, manmade feature (trail, rail corridor)[1]	NA
OW	Open Water	NA
SAq	Shallow Aquatic Community[2]	NA
YF_CX	Young forest complex (dense young balsam poplar)[1]	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

[2] Not an NPC identified in the *Field Guide* (MNDNR 2003), but dominated by native species

2.7.2 Threats

Purple loosestrife is common in recently disturbed areas on Tallus Island and in marshes on the nearby shoreline. A large stand of nonnative common reed is located at the southern edge of the Tallus Island project area, extending onto the adjacent private property. Common buckthorn has been treated in some areas near Knowlton Creek, but significant populations still exist in upland forests in the project area. Wild parsnip is present along trails and in old field areas. **Figures 4-6** and **4-7** detail localized concentrations of invasive plants.

2.7.3 Restoration and Management Actions

To maintain or improve the condition of existing NPCs, ongoing monitoring and follow-up treatment of common buckthorn will be important. In marsh and wetland areas, purple loosestrife should be monitored. If increasing in cover, management such as release of biocontrol insects may be appropriate. To ensure wetland and marsh areas continue to classify as NPCs, common reed will need to be controlled. Management should include attempts to coordinate treatment with the adjacent landowner at the area of the large reed stand. Some areas currently classified as disturbed or nonnative communities have been planted with native trees; these plantings could be expanded to the nonnative areas parallel to the Western Waterfront Trail to restore native forest to old fields.

2.8 Kingsbury Bay

2.8.1 Significant Features

The Kingsbury Bay project area is adjacent to the Kingsbury Creek mouth, and includes Indian Point Campground, a portion of the Western Waterfront Trail, and surrounding natural areas.

Plant communities in this project area include various wetland communities, floodplain terrace forest, and upland mesic forests (**Figures 2-25** and **2-26**, and listed in **Table 9** below). Kingsbury Bay has been affected by human disturbance and erosion/sedimentation from flooding, such as the large flood event of 2012. More NPCs in this project area rank as C or D ("fair" or "poor") compared to other locations in the St. Louis River project area (**Figure 3-12**); however, current and planned restoration activities may improve these rankings. Field observations included recently planted trees in floodplain (Photo 17 in **Appendix B**) and on slopes, and cut/treated common buckthorn.

The wetland and aquatic habitats in the Kingsbury Bay project area are part of a DNR-identified site of moderate biodiversity significance.

Table 9 – NPCs in Kingsbury Bay

NPC Code	Description	Condition Rank
FFn57a	Black Ash-Silver Maple Terrace Forest	B
MHn35a	Aspen-Birch-Basswood Forest	C/D
MHn44a	Aspen-Birch-Red Maple Forest	C, C/D, D
MRu94a	Estuary Marsh (Lake Superior)	C
WFn55a	Black Ash-Aspen-Balsam Poplar Swamp (Northern)	C
WMn82a	Willow-Dogwood Shrub Swamp	B, C
WMn82b	Sedge Meadow	B, C
DIST	Recently disturbed or open ground[1]	NA
INV	Invasive plant species (reed canary grass)[1]	NA
NN	Nonnative plant community (turf, old field)[1]	NA
OW	Open Water	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

2.8.2 Threats

A community on the north side of Kingsbury Bay ranks as D condition ("poor") with a sparse ground layer that appears to be negatively affected by earthworms. Anecdotal observations from the field included a lack of humus and leaf litter, and earthworm castings on the ground surface. Some areas along Kingsbury Creek have dense stands of reed canary grass. Farther into the bay, marsh communities are dominated by nonnative cattails (see Photo 18 in **Appendix B**). **Figure 4-8** shows localized concentrations of invasive plants.

2.8.3 Restoration and Management Actions

Monitoring and maintenance of planted trees will help ensure this project area improves in condition rank. Earthworm chemical treatment may be appropriate where the infestation is

severe. Treatment of nonnative cattails will improve the condition rank of marsh and/or restore desirable aquatic communities. A planned restoration project for Kingsbury Bay will deepen areas currently dominated by cattails and may re-establish more diverse MRu94a and shallow aquatic vegetation communities.

Excluding areas maintained for Indian Point Campground facilities, nonnative plant communities in the Kingsbury Bay project area have potential for restoration to forested communities through plantings. These small, open old field and turf areas would be appropriate for restoration to MHn44a or MHn44b with tree planting (e.g., paper birch, red maple, white pine, and white spruce).

2.9 Grassy Point

2.9.1 Significant Features

The Grassy Point project area is located at the Keene Creek mouth, in a former industrial area that deposited significant wood waste in the St. Louis River.

Grassy Point contains wetland and open water communities along Keene Creek and the St. Louis River (**Figure 2-27**, and listed in **Table 10** below). The areas of highest elevation on the west side of Grassy Point contain wetland forest dominated by balsam poplar (see Photo 19 in **Appendix B**), as well as other trees [e.g., tamarack (*Larix laricina),* white cedar (*Thuja occidentalis*), and white spruce (*Picea glauca*)] that appear to have been planted approximately 15-20 years ago. Grassy Point contains suitable habitat for pale sedge (*Carex pallescens* – state endangered) and discoid beggarticks. Condition ranks for the NPCs at Grassy Point are mostly B and C, due to presence of nonnative plant species (**Figure 3-13**).

The wetland and aquatic habitats in the Grassy Point project area are part of a DNR-identified site of moderate biodiversity significance.

Table 10 – NPCs in Grassy Point

NPC Code	Description	Condition Rank
MRn83a	Cattail-Sedge Marsh (Northern)	C
MRu94a	Estuary Marsh (Lake Superior)	B, C
WFn55a	Black Ash-Aspen-Balsam Poplar Swamp (Northern)	B/C, C
WMn82a	Willow-Dogwood Shrub Swamp	A, B, C
WMn82b	Sedge Meadow	B
INV	Invasive plant species (nonnative common reed)[1]	NA
NVMM	Nonvegetated manmade (roadway, gravel)[1]	NA
OW	Open Water	NA

[1] Not an NPC identified in the *Field Guide* (MNDNR 2003), this classification was developed for this report to refer to communities not dominated by native plant species.

2.9.2 Threats

Grassy Point contains a large stand of nonnative, invasive common reed (**Figure 2-27** and **Figure 4-9**), and additional occurrences of nonnative common reed are present outside the project area nearby. Nonnative cattails are common at Grassy Point (Photo 20 in **Appendix B**). Purple loosestrife is scattered throughout the wetland communities on the site.

2.9.3 Restoration and Management Actions

Restoration to remove wood waste is planned for this area, which will improve the substrate for aquatic habitat and remove some of the nonnative cattails. Restoration activities may disturb occurrences of discoid beggarticks; however, habitat improvements through restoration may ultimately improve the area for this special concern species.

Nonnative common reed is a concern for Grassy Point. Management activities should target the existing large stand, and coordination with nearby landowners to manage additional stands of the species may be appropriate. Purple loosestrife should be monitored in this area. If it is observed to increase in cover, management such as release of biocontrol insects may be appropriate.

3 Analysis

3.1 NPC Mapping

Based on data collected, forested communities were most typical of NPCs in the Chambers Grove, Rask Bay, and North Bay project areas. In other locations, forested communities do classify as NPC types, but contained greater abundances of invasive plant species, or had more plant species with low affinity to any particular NPC. The condition of wetland communities was more consistent across the review area, with generally good quality through the corridor except in areas with high cover of nonnative cattails. Some communities were too disturbed to classify as a particular NPC, but may be restorable. Notably, old field areas dominated by nonnative grasses and forbs are likely restorable to forested NPCs typical of the corridor.

In many areas, condition rank was most affected by the presence and abundance of invasive plant species. Generally, management of invasive species has the most potential for preserving or improving NPC condition ranks. Management of the corridor as a whole may improve the likelihood of improving condition rank, as the river provides a corridor for movement of plant propagules – both desirable native plants invasive species. For example, non-native common reed is present in small patches at the northern end of the Munger Landing project area, where it has likely spread from a larger occurrence in the Tallus Island project area.

3.2 SGCN Survey

A number of areas have potential to provide habitat for SGCN encountered during the survey. Other areas may be restorable to communities that could provide additional habitat. The MRu94a community, in particular where it ranked as A or B condition, provides suitable habitat for discoid beggarticks throughout the St. Louis River project area. Planned restoration projects that will create or restore MRu94a in areas dominated by nonnative cattails will likely provide additional suitable habitat.

Similar to management of invasive plant species discussed above, management for SGCN plants is more robust when conducted along the corridor as a whole compared to individual project areas. Discoid beggarticks in particular is an annual plant with habitat in deep marshes along the corridor. Fluctuating water levels likely cause shifts in the location of suitable habitat, and protecting an individual occurrence without considering the context of how the habitat may move in the future could negatively impact the sustainability of populations of discoid beggarticks within the St. Louis River estuary.

4 Bibliography

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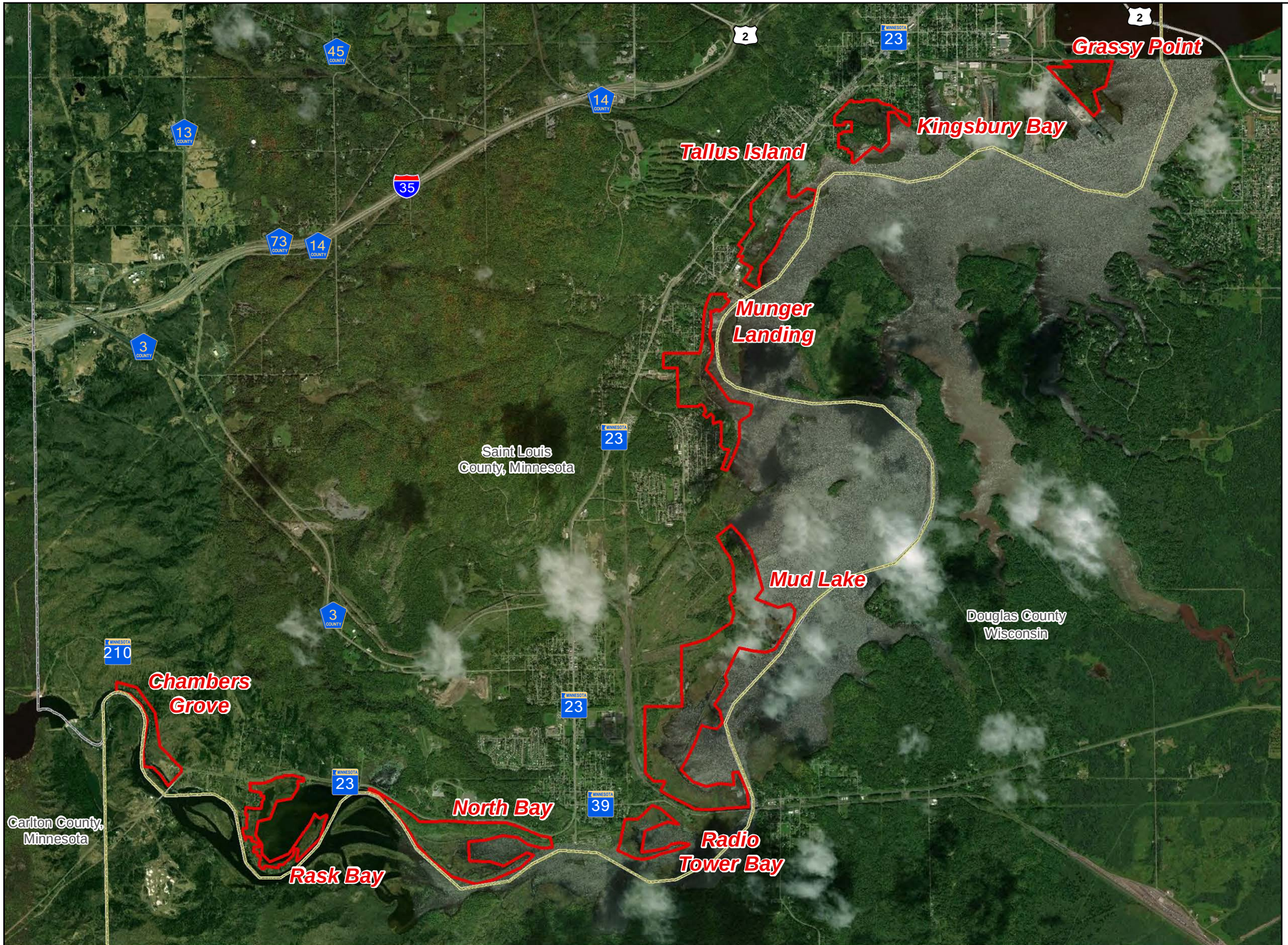
Figures



Legend

St. Louis River project areas

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Print Date: 10/30/2018

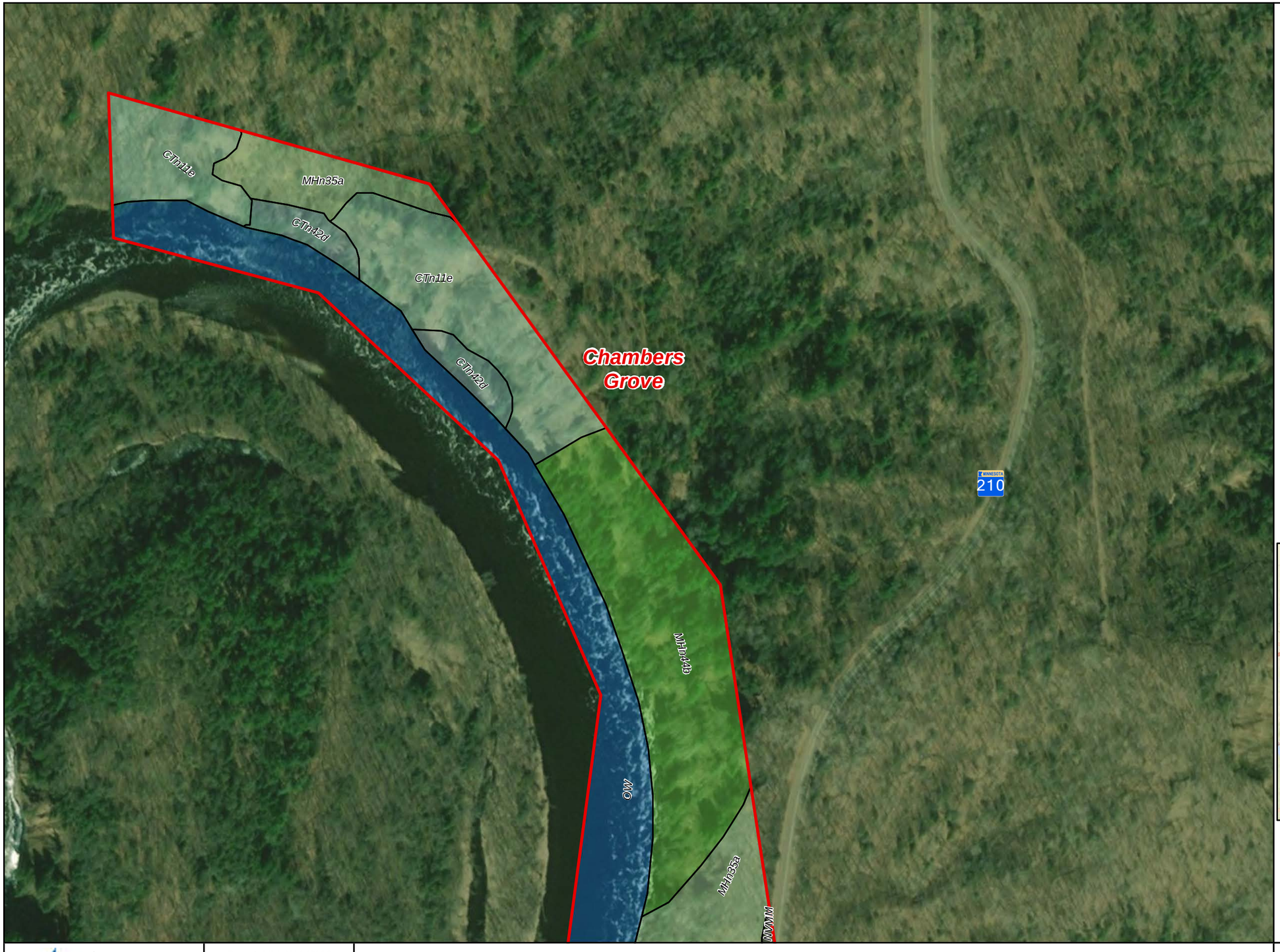
Map by: B. Tolcser
Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: DigitalGlobe 2017

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Project Overview Map

Figure 1



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St. Louis River project areas

Native Plant Community Code

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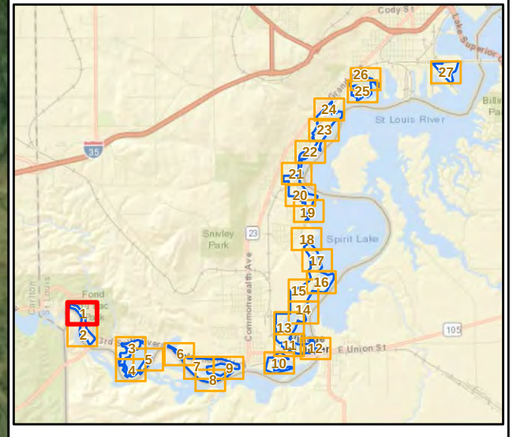
- CTn42d
- MHn35a
- MHn44b
- OW
- NVMM



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

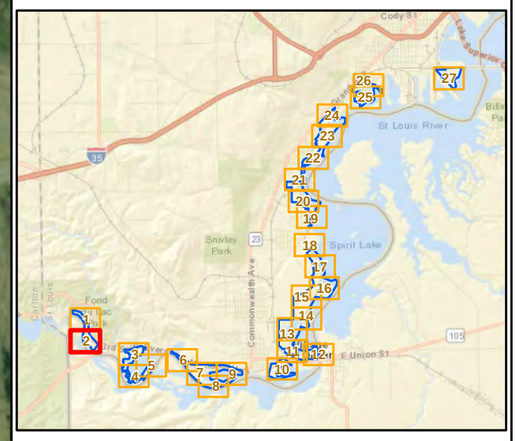
Figure 2-1

Legend

St. Louis River project areas

Native Plant Community Code

- MHn35a
- MHn44b
- MHn46b
- OW
- NVMM
- NN



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

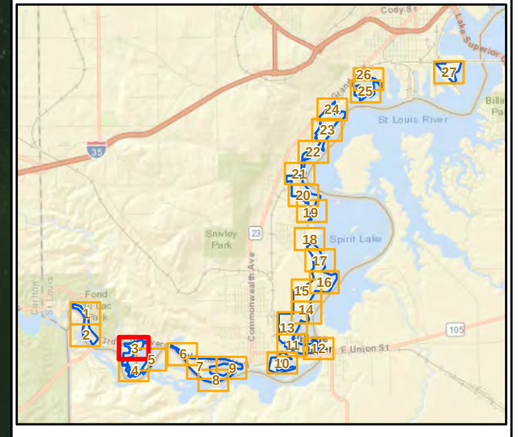
Figure 2-2

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FFn57a
- MHn44a
- WFn55a
- SAq
- DIST
- NN



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

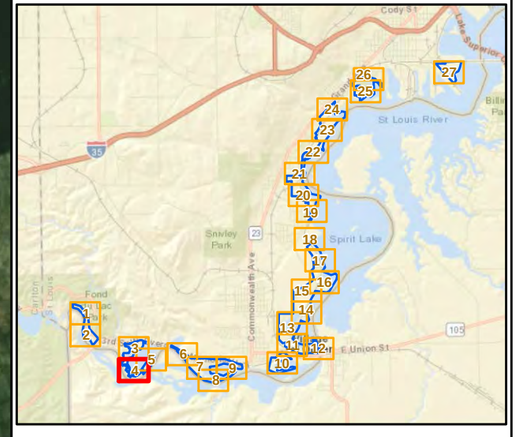
Figure 2-3

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FFn57a
- MHn44a
- SAq
- NN



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

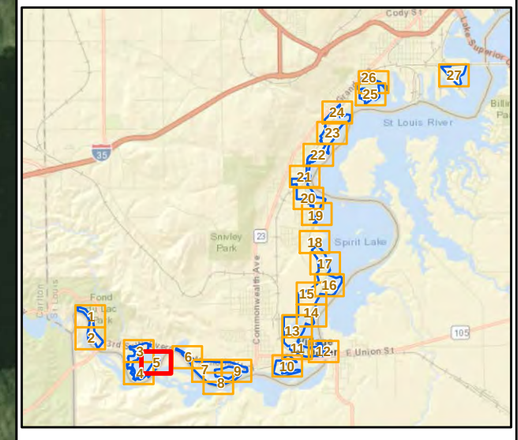
Figure 2-4

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FFn57a
- MHn44a
- SAq



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

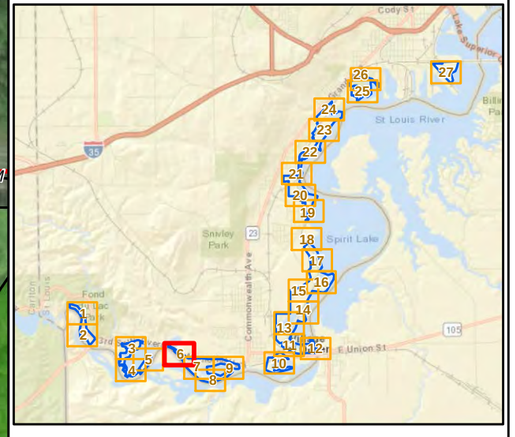
Figure 2-5

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82a
- FPn73a
- FFn57a
- MHn44a
- MHn44d
- OW
- NVMM
- DIST



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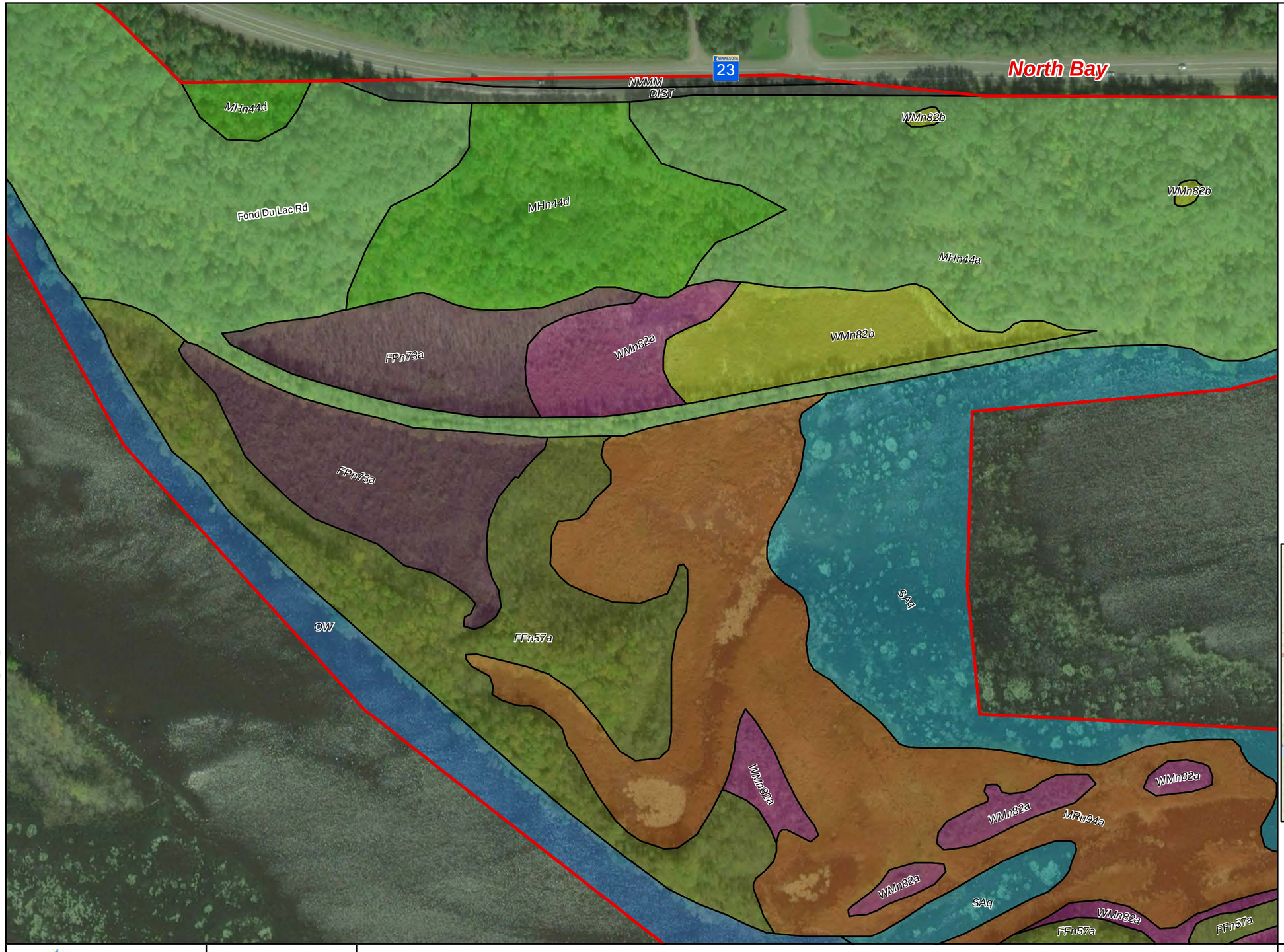
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-6



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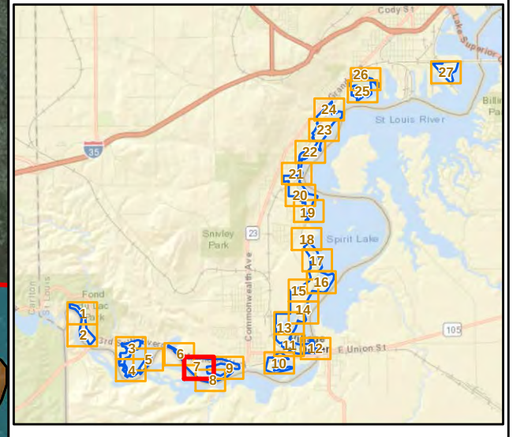
St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRu94a
- WMn82a
- FPn73a
- FFn57a
- MHn44a
- MHn44d
- OW
- SAq
- NVMM
- DIST



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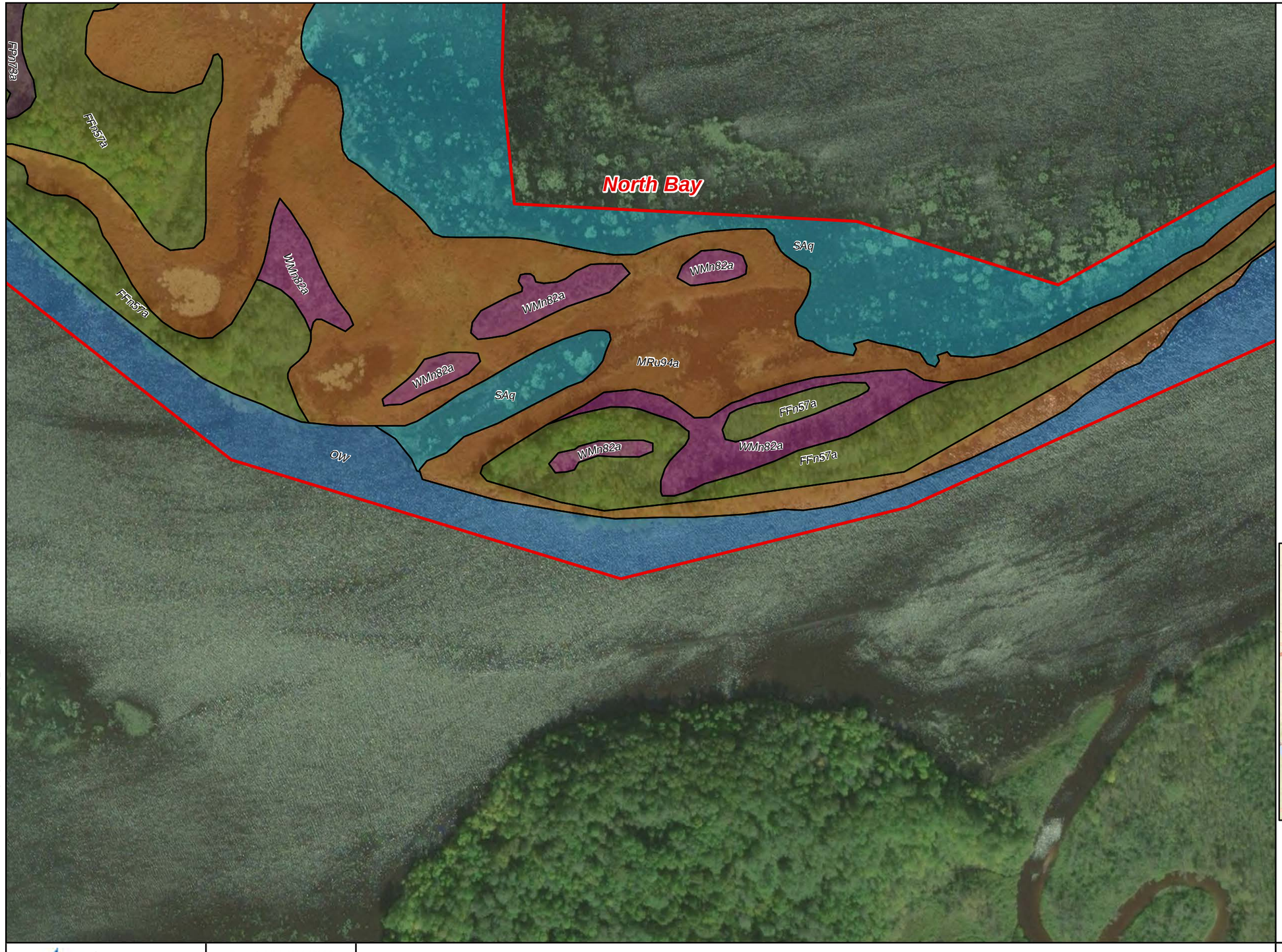
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-7



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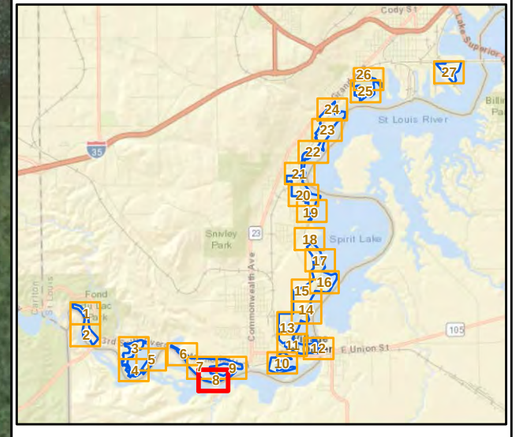
St. Louis River project areas

Native Plant Community Code

- MRu94a
- WMn82a
- FPn73a
- FFn57a
- OW
- SAq



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-8

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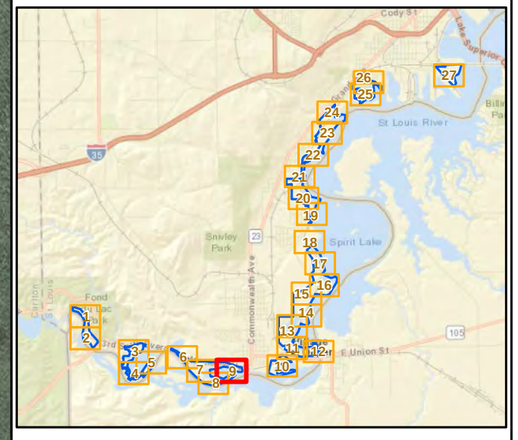
St. Louis River project areas

Native Plant Community Code

- MRu94a
- WMn82a
- FPn73a
- FFn57a
- MHn44a
- MHn46a
- WFn55a
- OW
- SAq
- INV
- DIST
- NN



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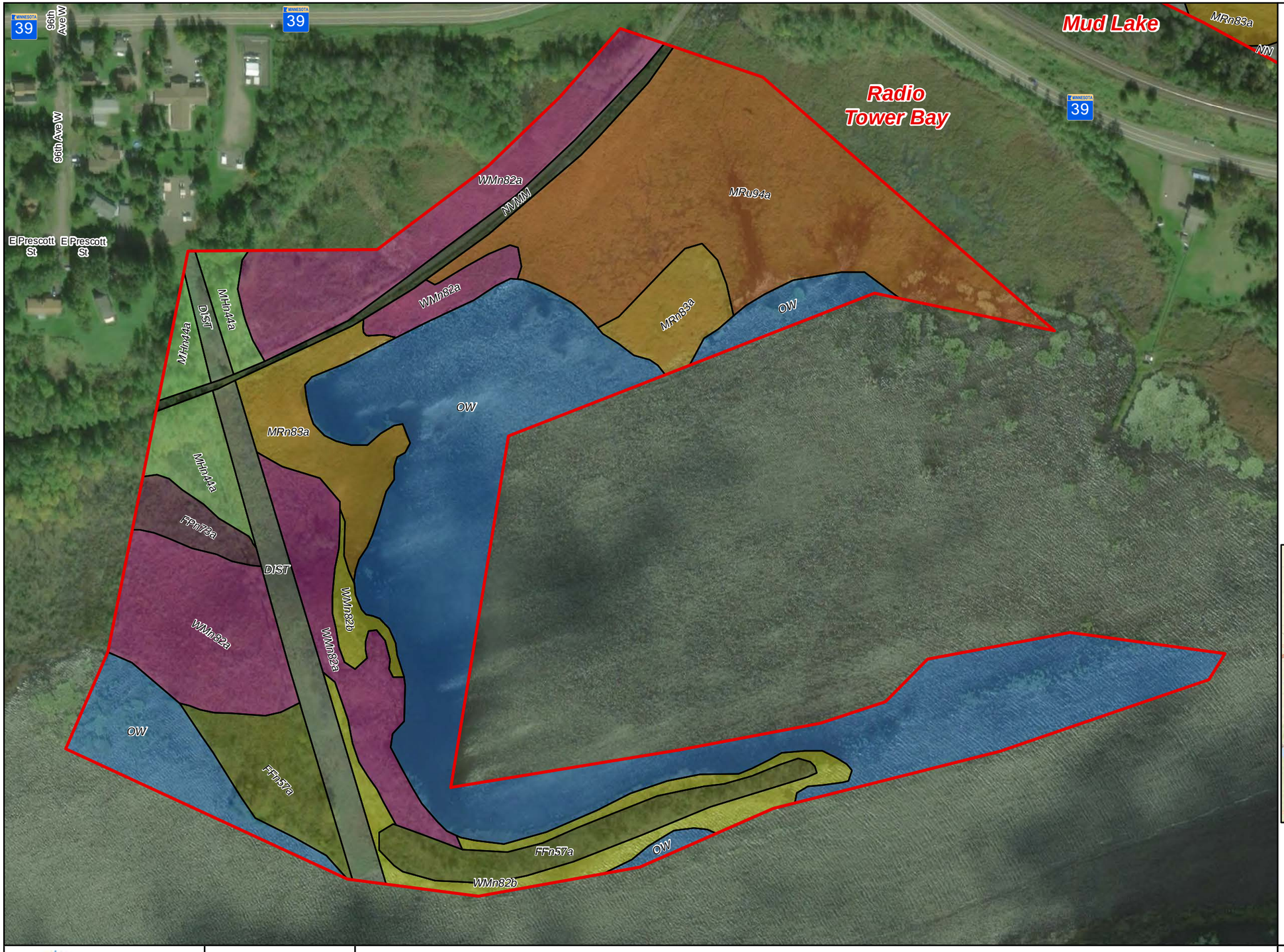
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-9



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St. Louis River project areas

Native Plant Community Code

- WMn82b
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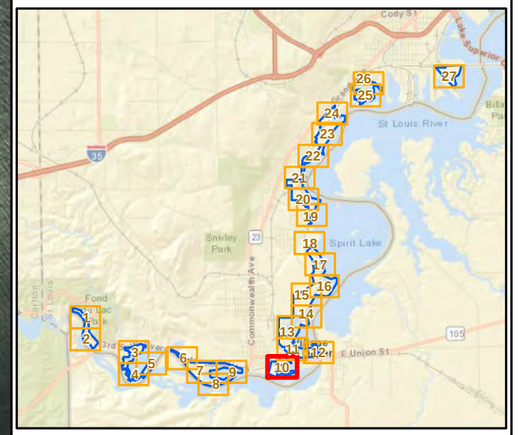
- OW
- NVMM
- DIST
- NN



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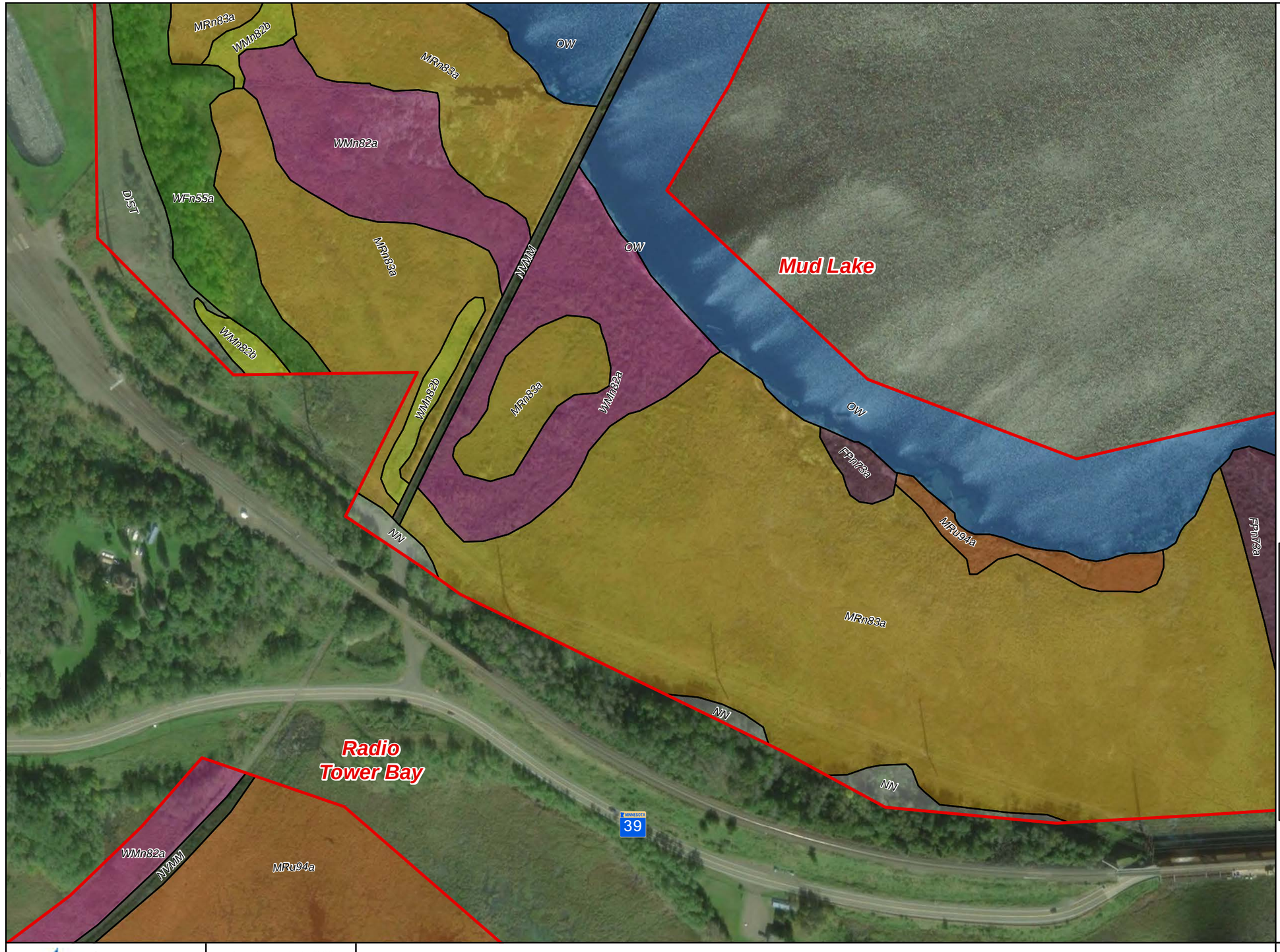
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-10



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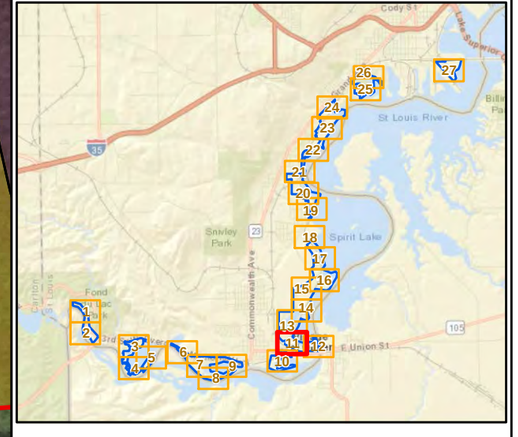
St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FPn73a
- WFn55a
- OW
- NVMM
- DIST
- NN



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

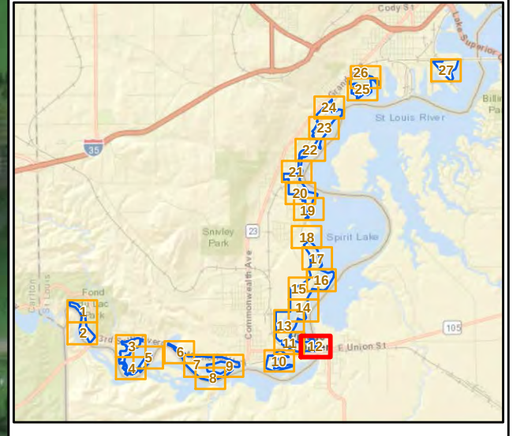
Figure 2-11

Legend

St. Louis River project areas

Native Plant Community Code

- MRn83a
- MRu94a
- WMn82a
- FPn73a
- OW



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

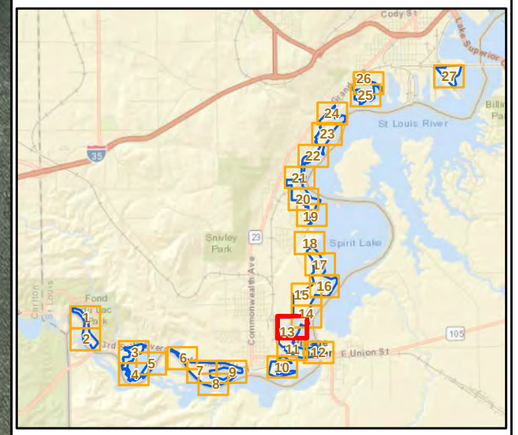
Figure 2-12

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FFn57a
- MHn44a
- MHn46b
- MHn47a
- WFn55a
- OW
- NVMM
- DIST
- NN



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Project: MNLAN 146196
Print Date: 10/31/2018

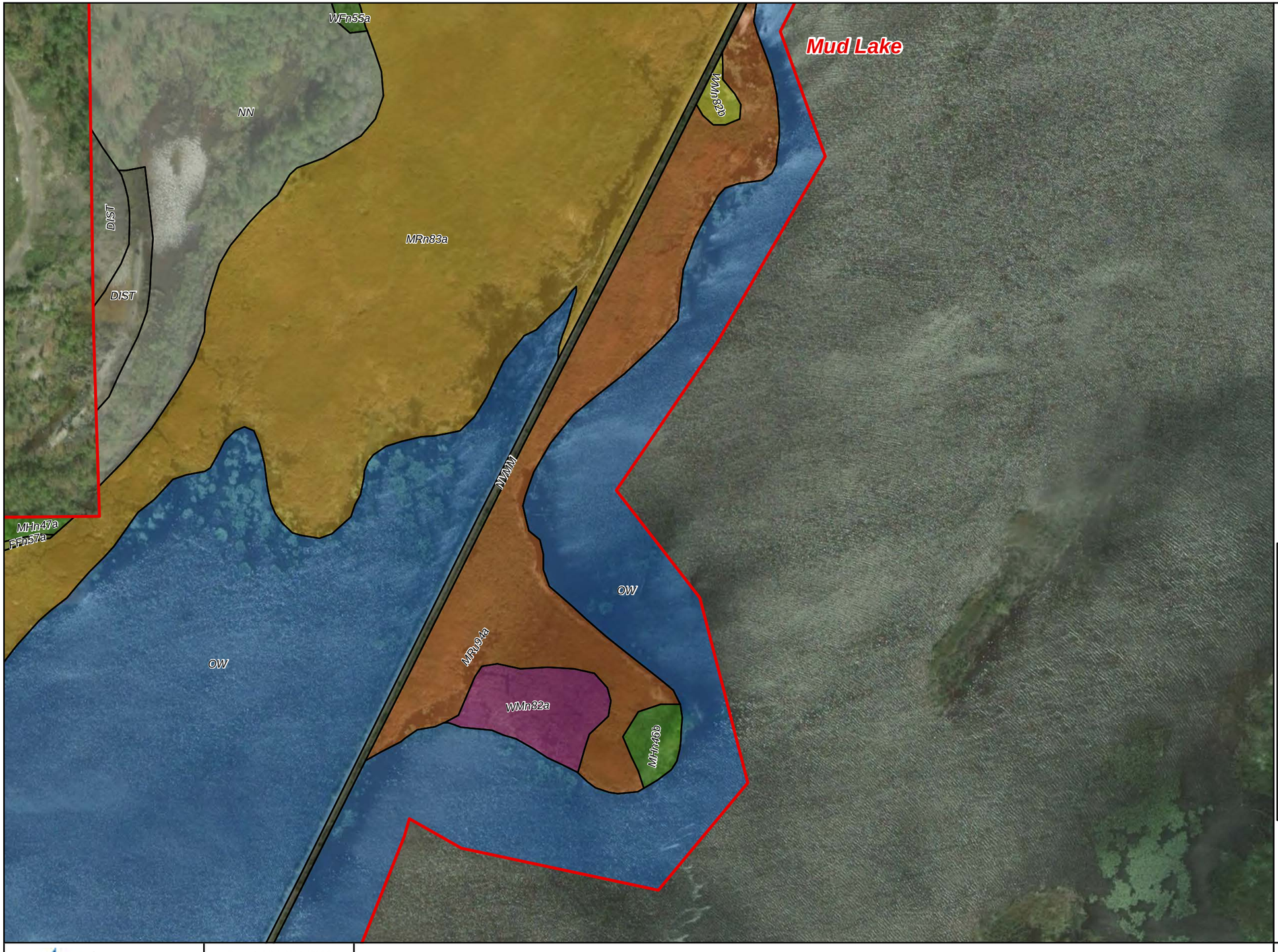
Map by: B. Tolcser
Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-13

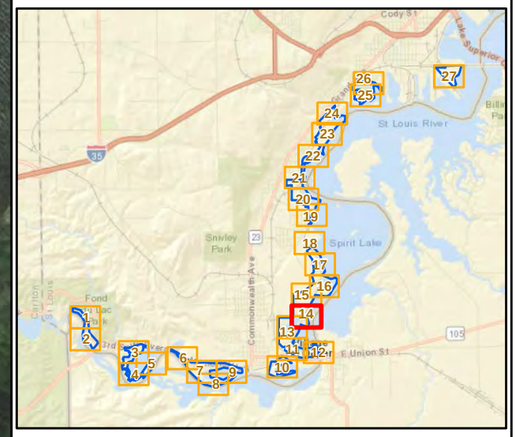


Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FFn57a
- MHn46b
- MHn47a
- WFn55a
- OW
- NVMM
- DIST
- NN



0 250 500 Feet

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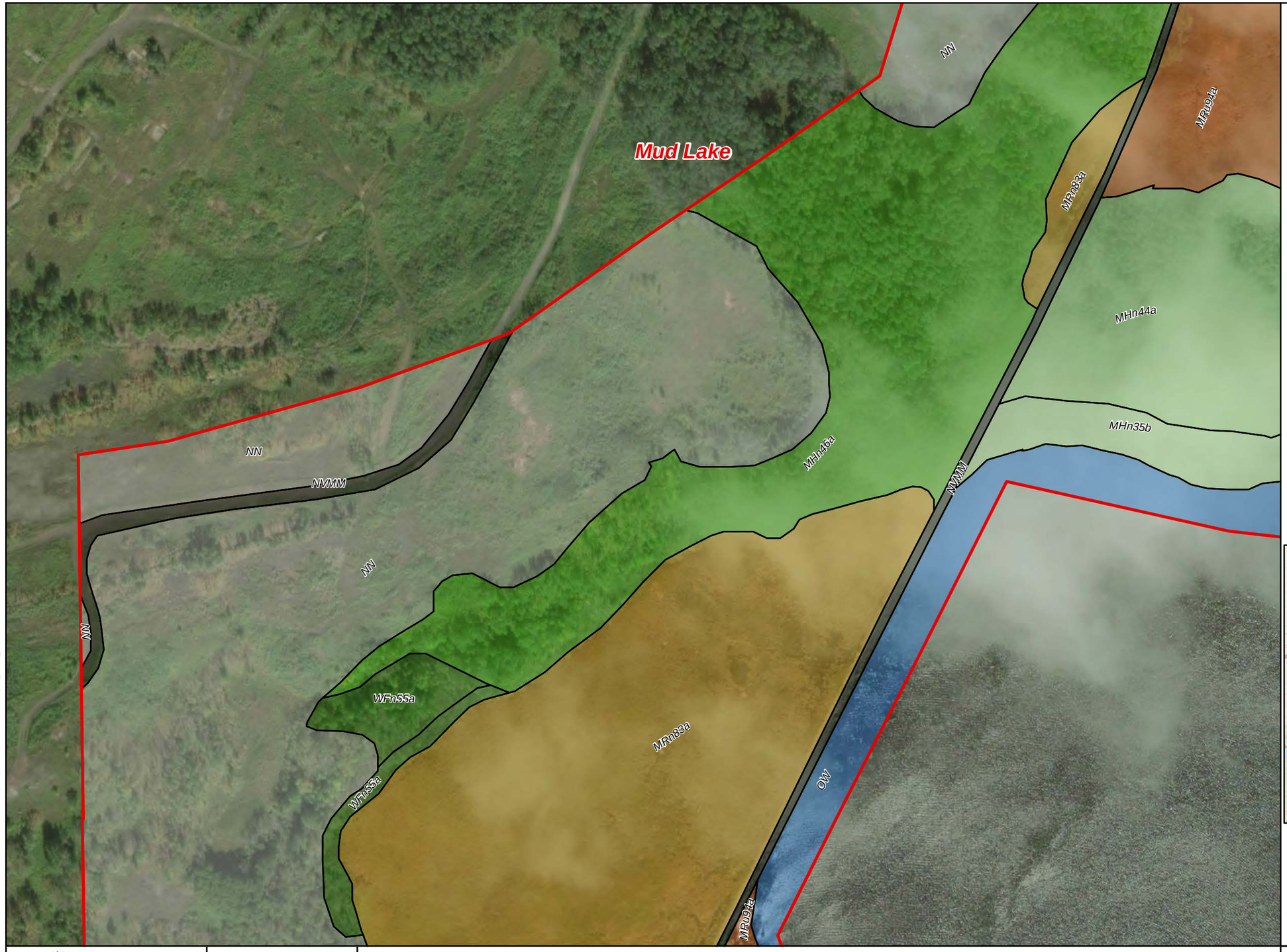
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-14

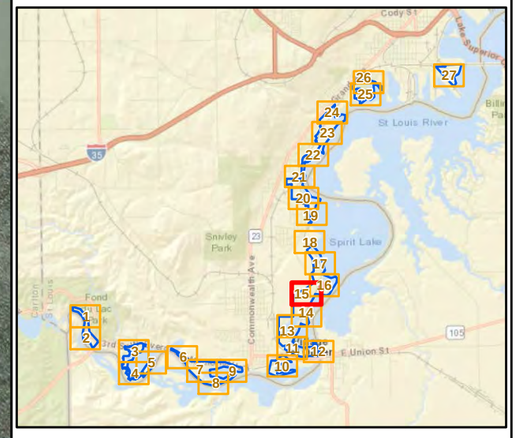


Legend

St. Louis River project areas

Native Plant Community Code

- MRn83a
- MRu94a
- MHn35b
- MHn44a
- MHn46a
- WFn55a
- OW
- NVMM
- NN



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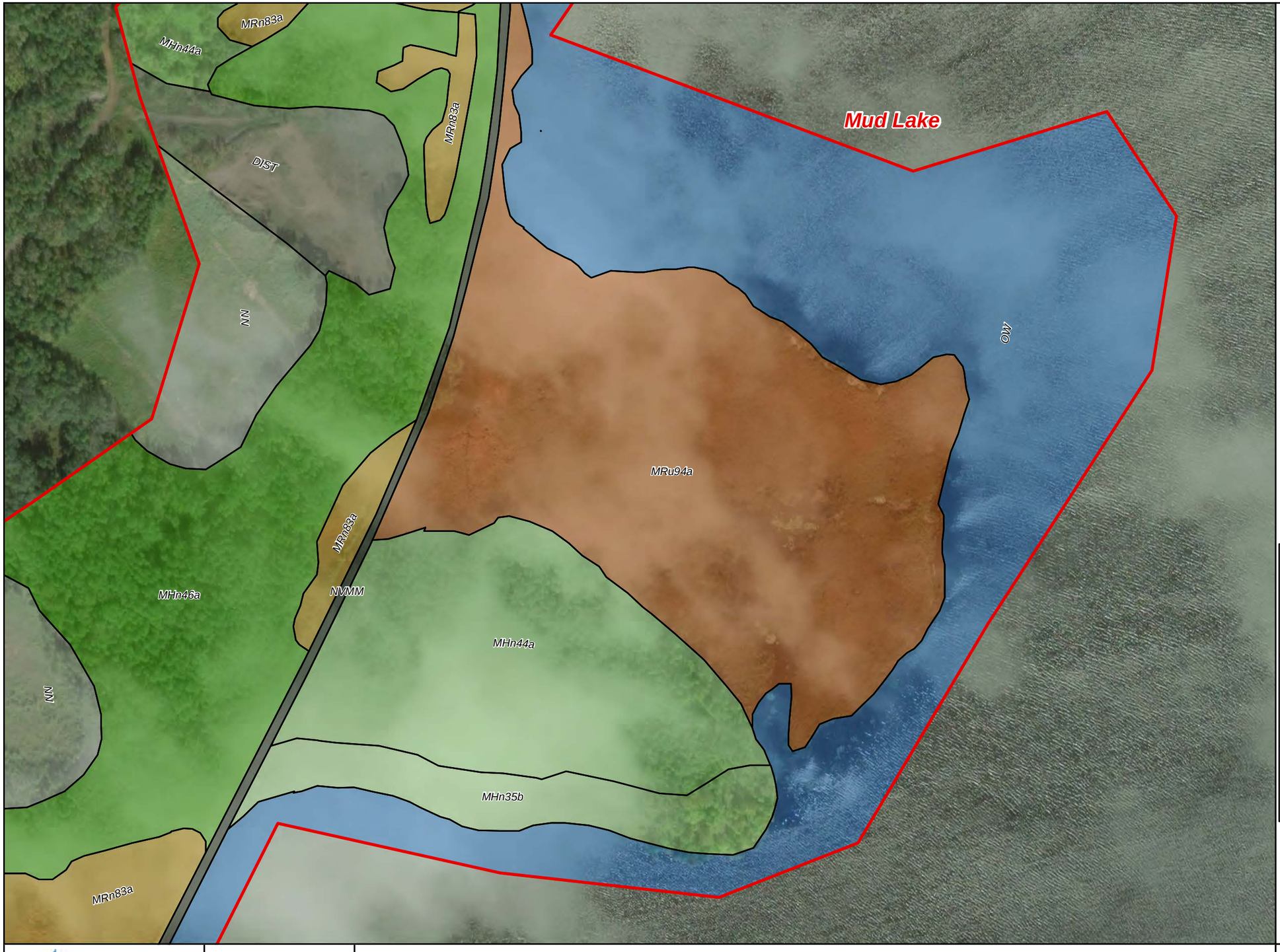
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-15

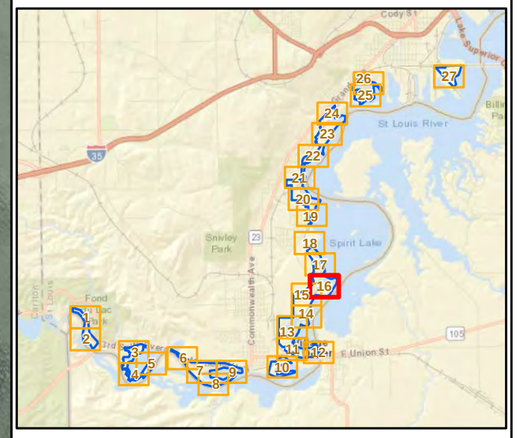


Legend

St. Louis River project areas

Native Plant Community Code

- MRn83a
- MRu94a
- MHn35b
- MHn44a
- MHn46a
- OW
- NVMM
- DIST
- NN



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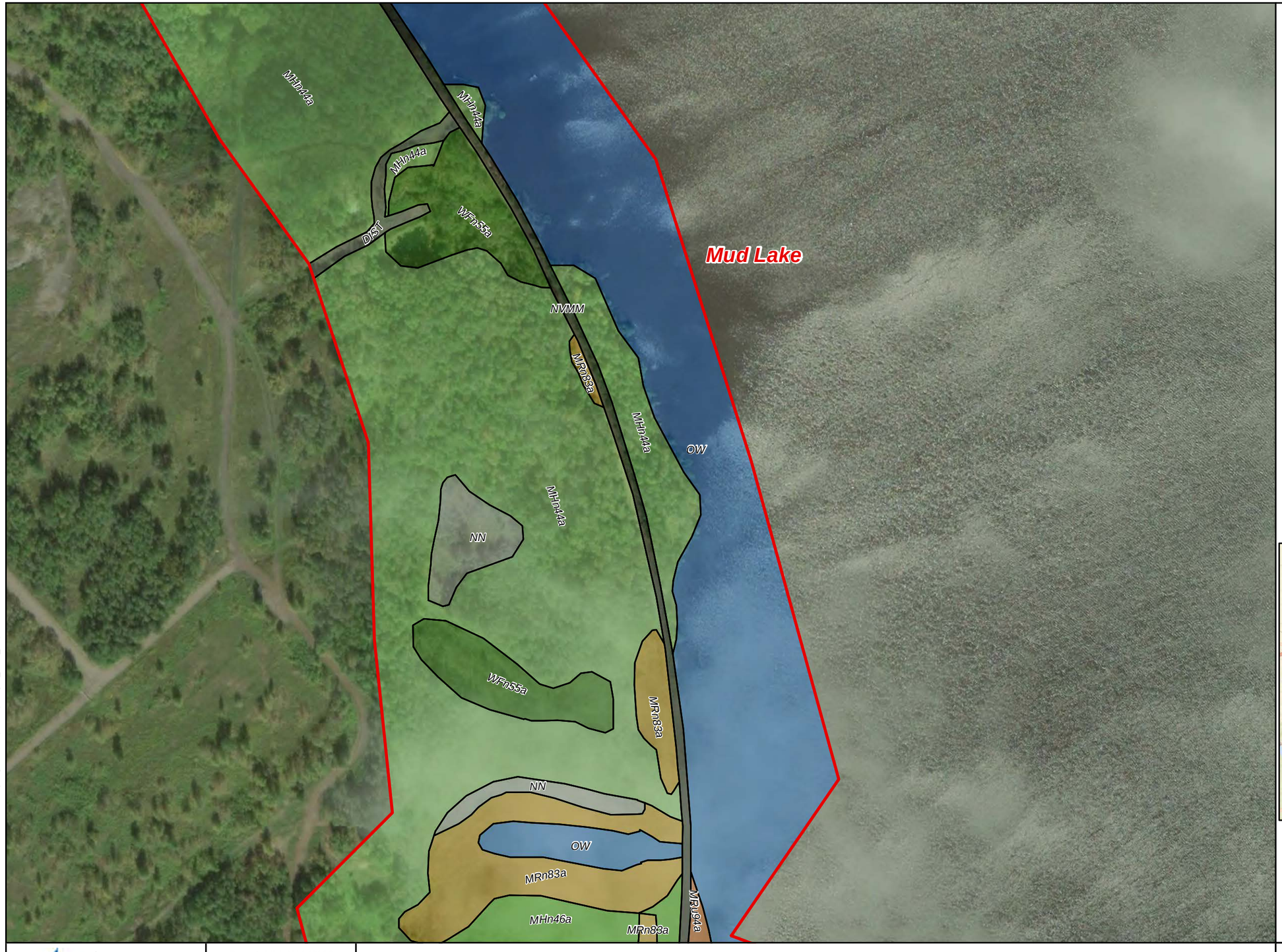
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-16

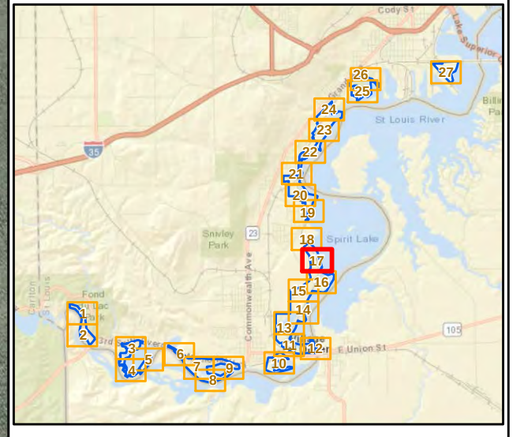


Legend

St. Louis River project areas

Native Plant Community Code

- MRn83a
- MRu94a
- MHn44a
- MHn46a
- WFn55a
- OW
- NVMM
- DIST
- NN



0 250 500 Feet

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Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-17

Legend

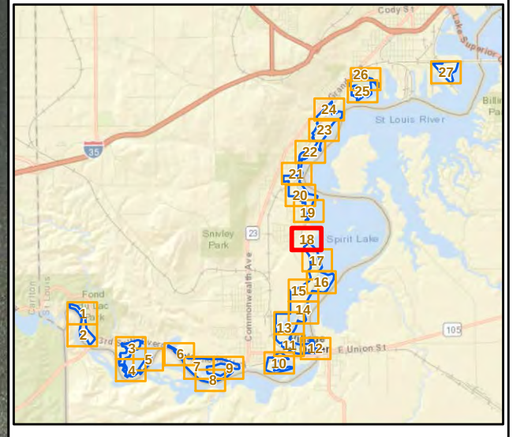
St. Louis River project areas

Native Plant Community Code

MHn44a

OW

NVMM



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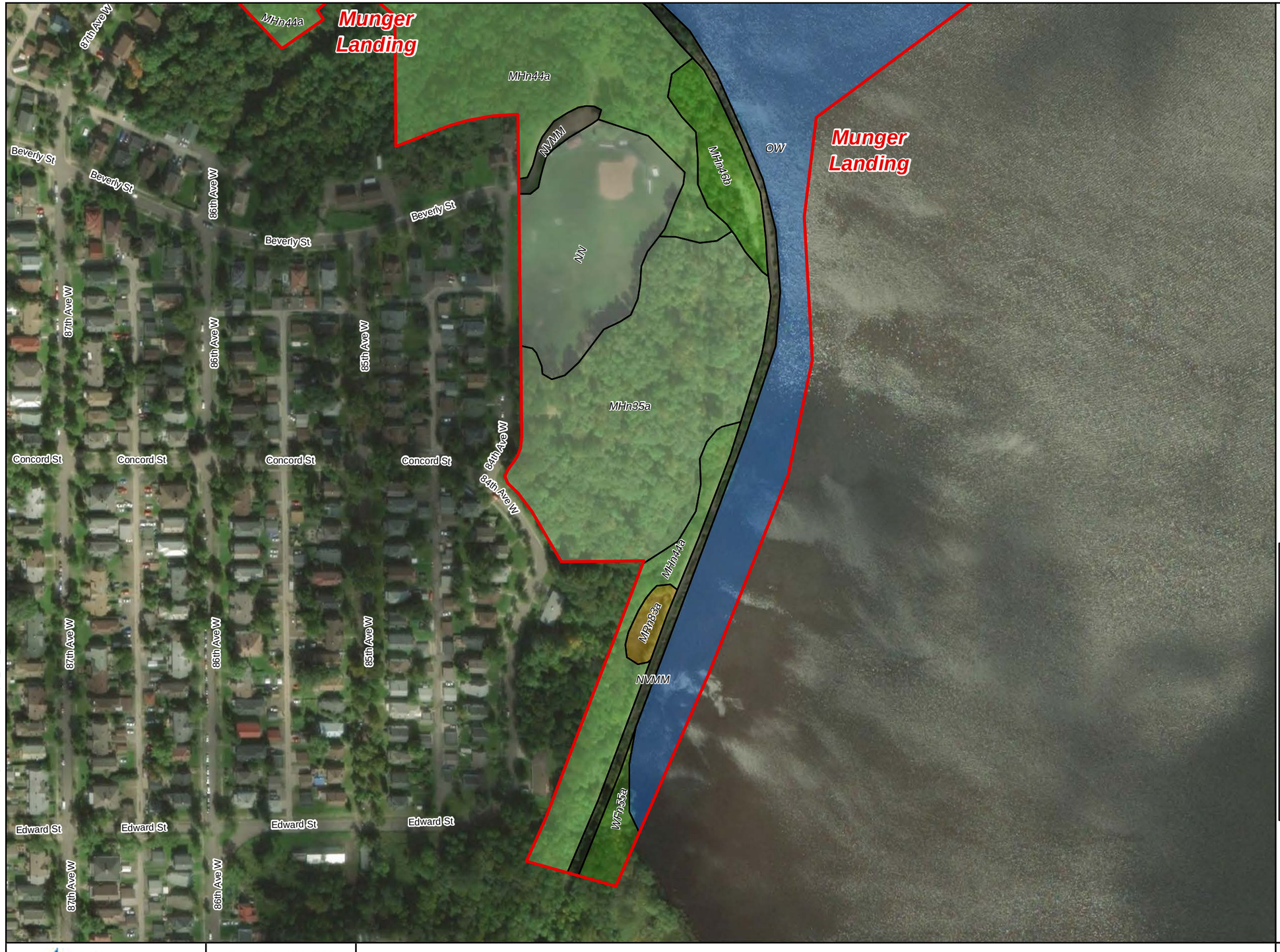
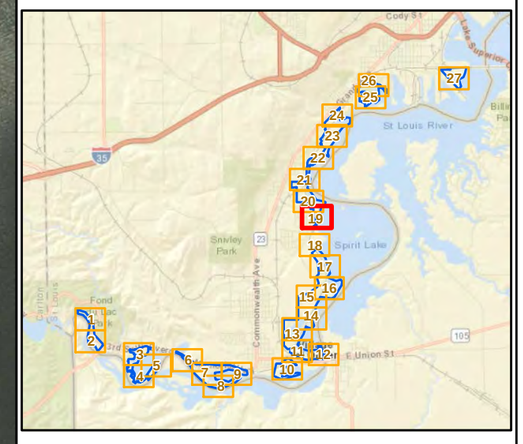
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-18





Legend

St. Louis River project areas

Native Plant Community Code

- MRn83a
- MHn35a
- MHn44a
- MHn46b
- WFn55a
- OW
- NVMM
- NN

0 250 500 Feet

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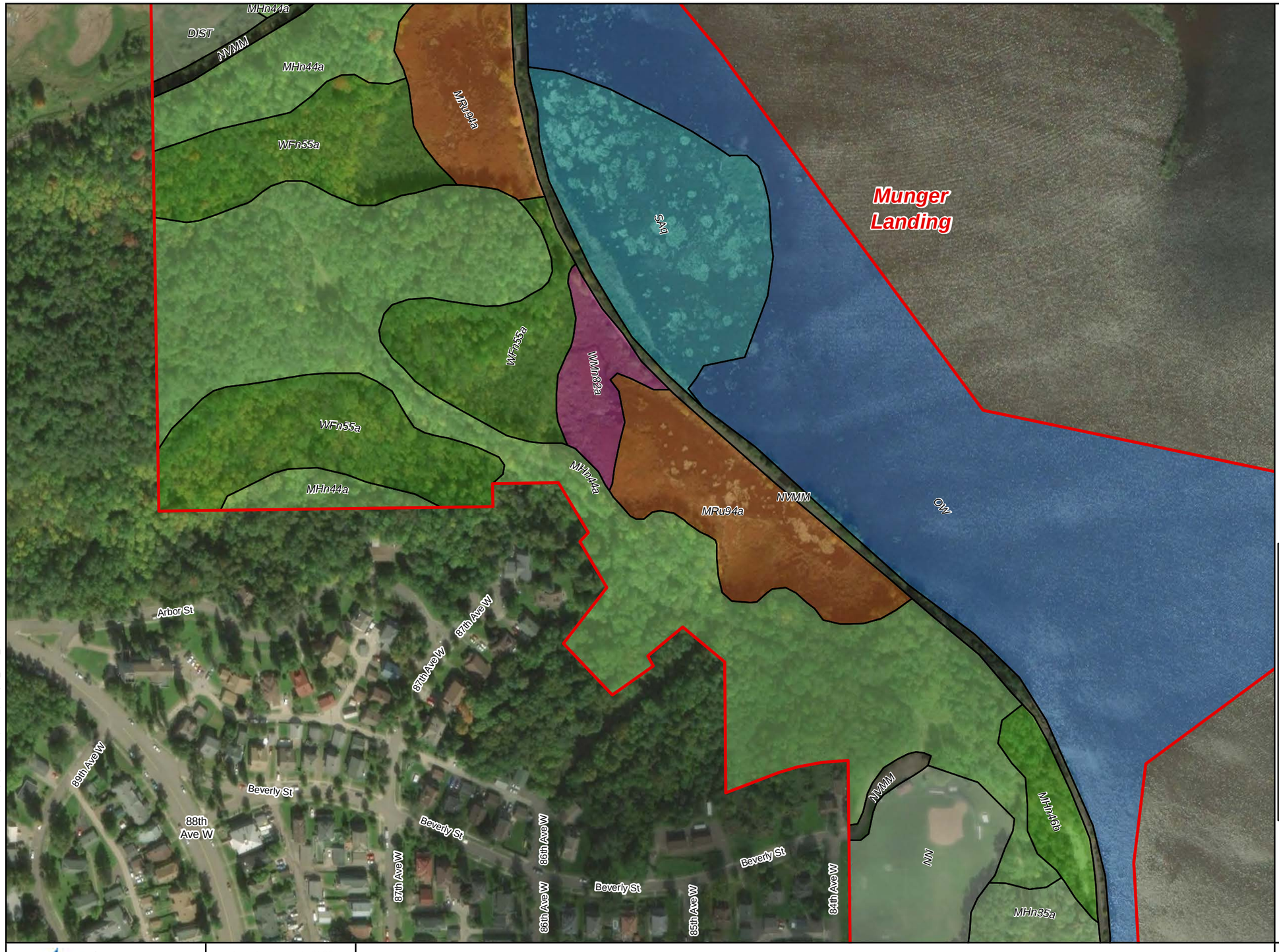
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-19

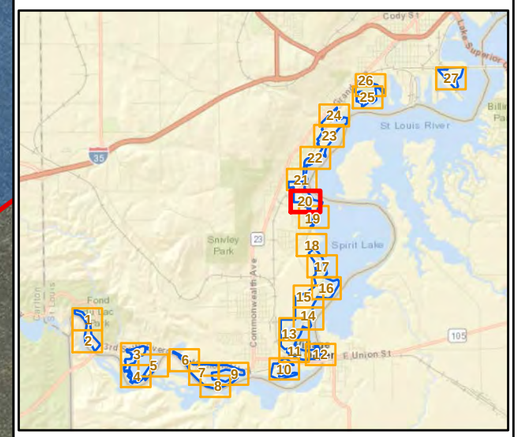


Legend

St. Louis River project areas

Native Plant Community Code

- MRu94a
- WMn82a
- MHn35a
- MHn44a
- MHn46b
- WFn55a
- OW
- SAq
- NVMM
- DIST
- NN



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Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

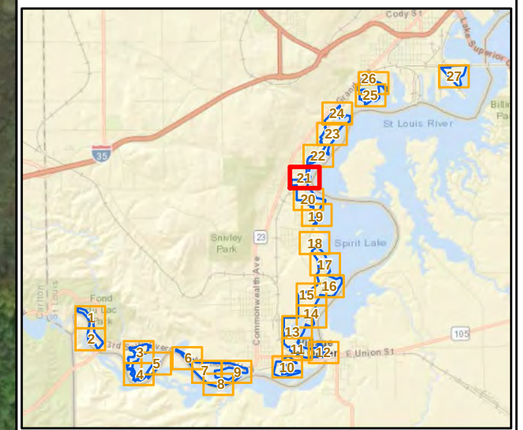
Figure 2-20

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- FFn57a
- MHn44a
- WFn55a
- OW
- NVMM
- DIST
- NN



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

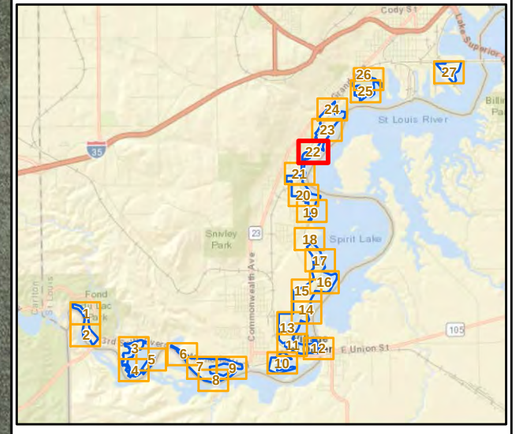
Figure 2-21

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRu94a
- WMn82a
- MHn44a
- OW
- NVMM
- INV
- DIST
- NN



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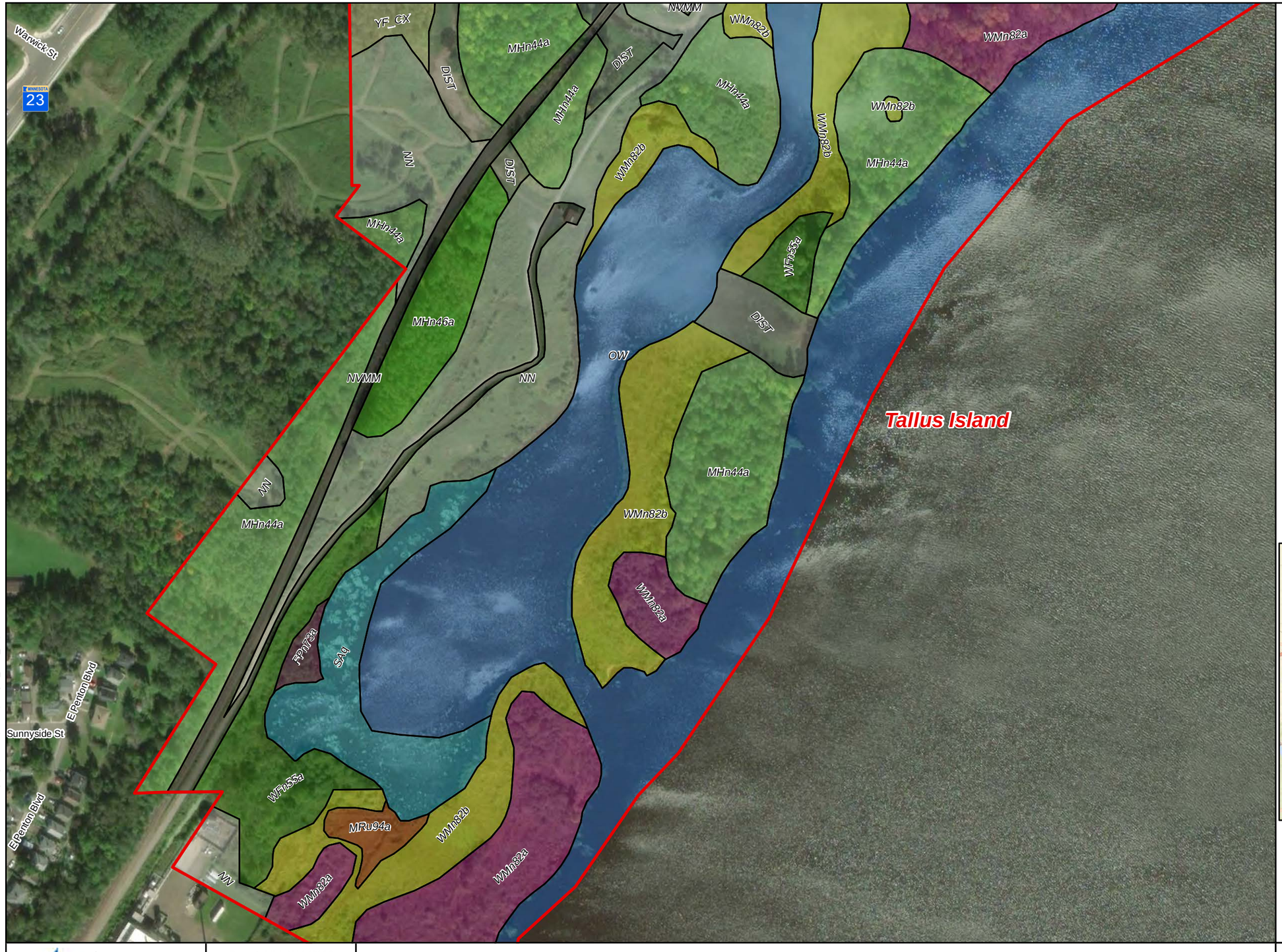
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-22



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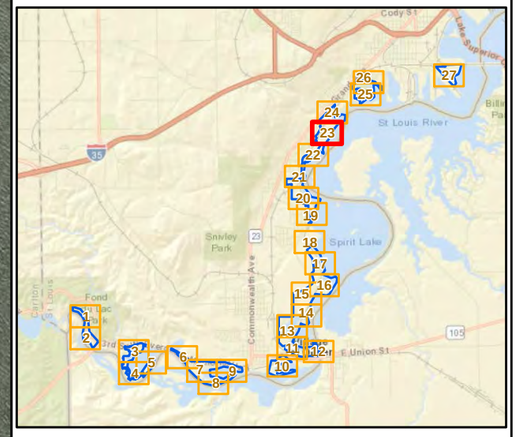
Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRu94a
- WMn82a
- FPn73a
- MHn44a
- MHn46a
- WFn55a
- OW
- SAq
- NVMM
- DIST
- YF_CX
- NN



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

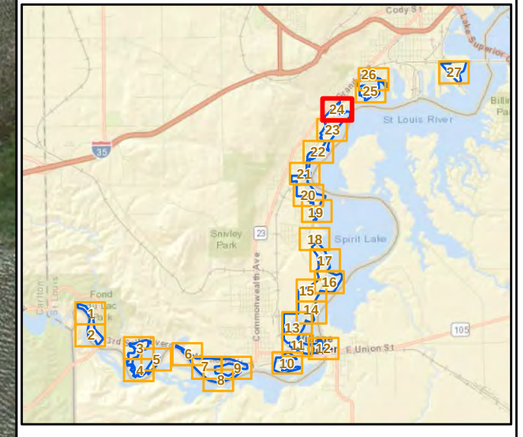
Figure 2-23

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- MHn44a
- MHn44b
- MHn44d
- WFn55a
- OW
- NVMM
- INV
- DIST
- YF_CX
- NN



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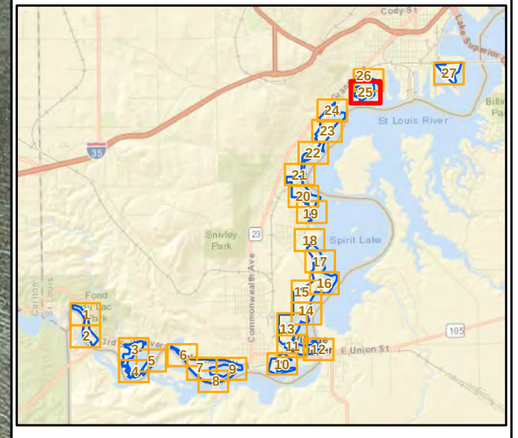
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-24



Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRu94a
- WMn82a
- FFn57a
- MHn35b
- MHn44a
- WFn55a
- OW
- INV
- NN

0 250 500 Feet

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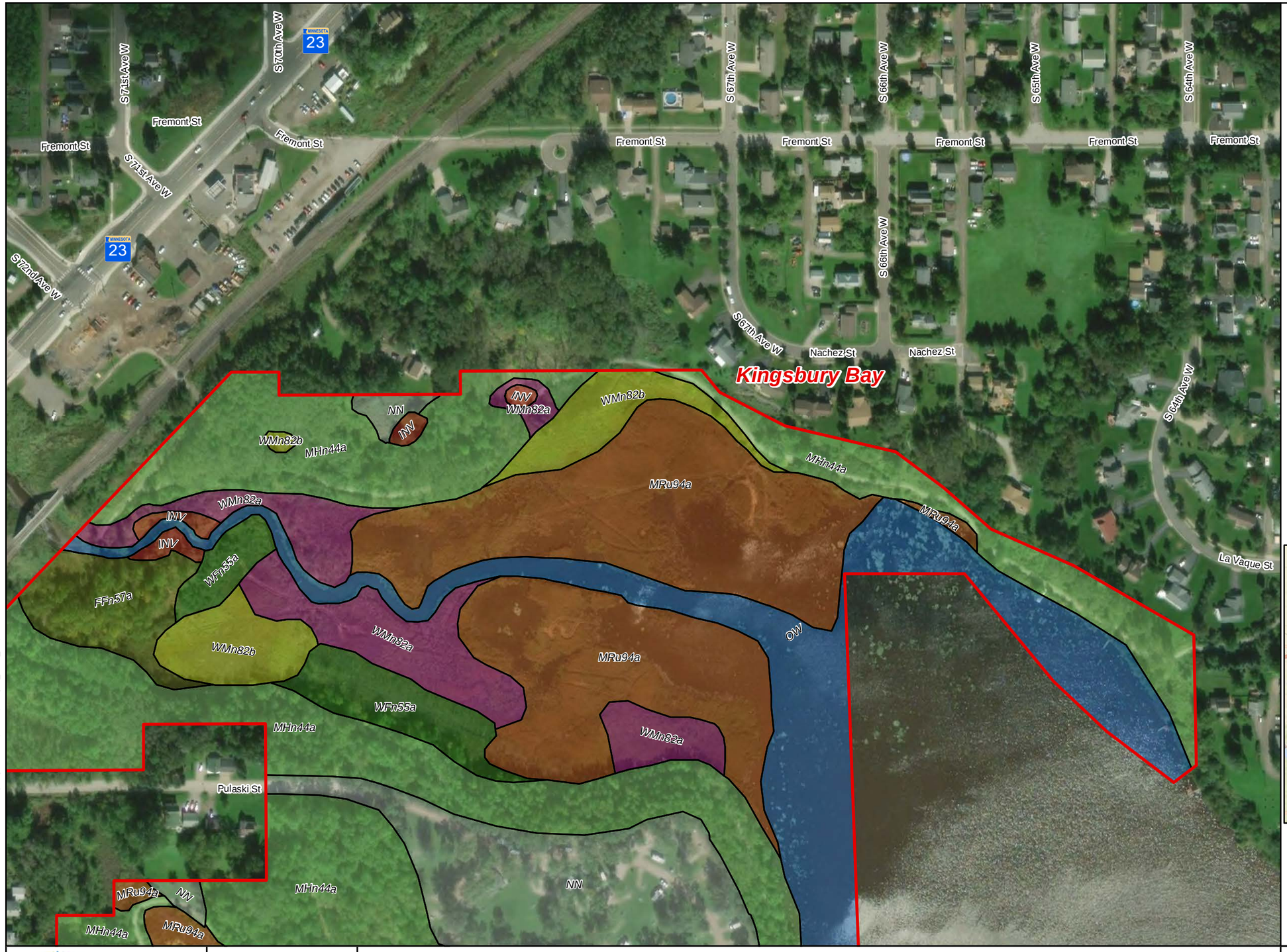
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-25

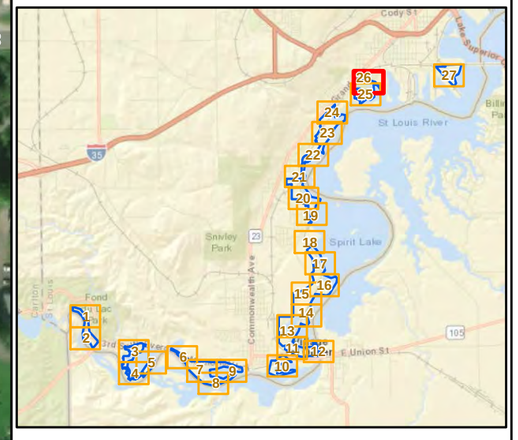


Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRu94a
- WMn82a
- FFn57a
- MHn44a
- WFn55a
- OW
- INV
- NN



0 250 500 Feet

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Project: MNLAN 146196
Print Date: 10/31/2018

Map by: B. Tolcser
Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

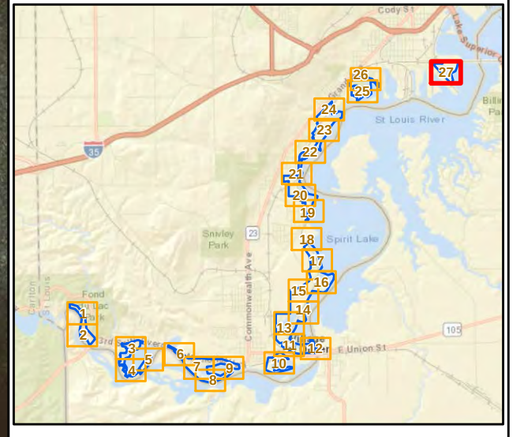
Figure 2-26

Legend

St. Louis River project areas

Native Plant Community Code

- WMn82b
- MRn83a
- MRu94a
- WMn82a
- WFn55a
- OW
- NVMM
- INV



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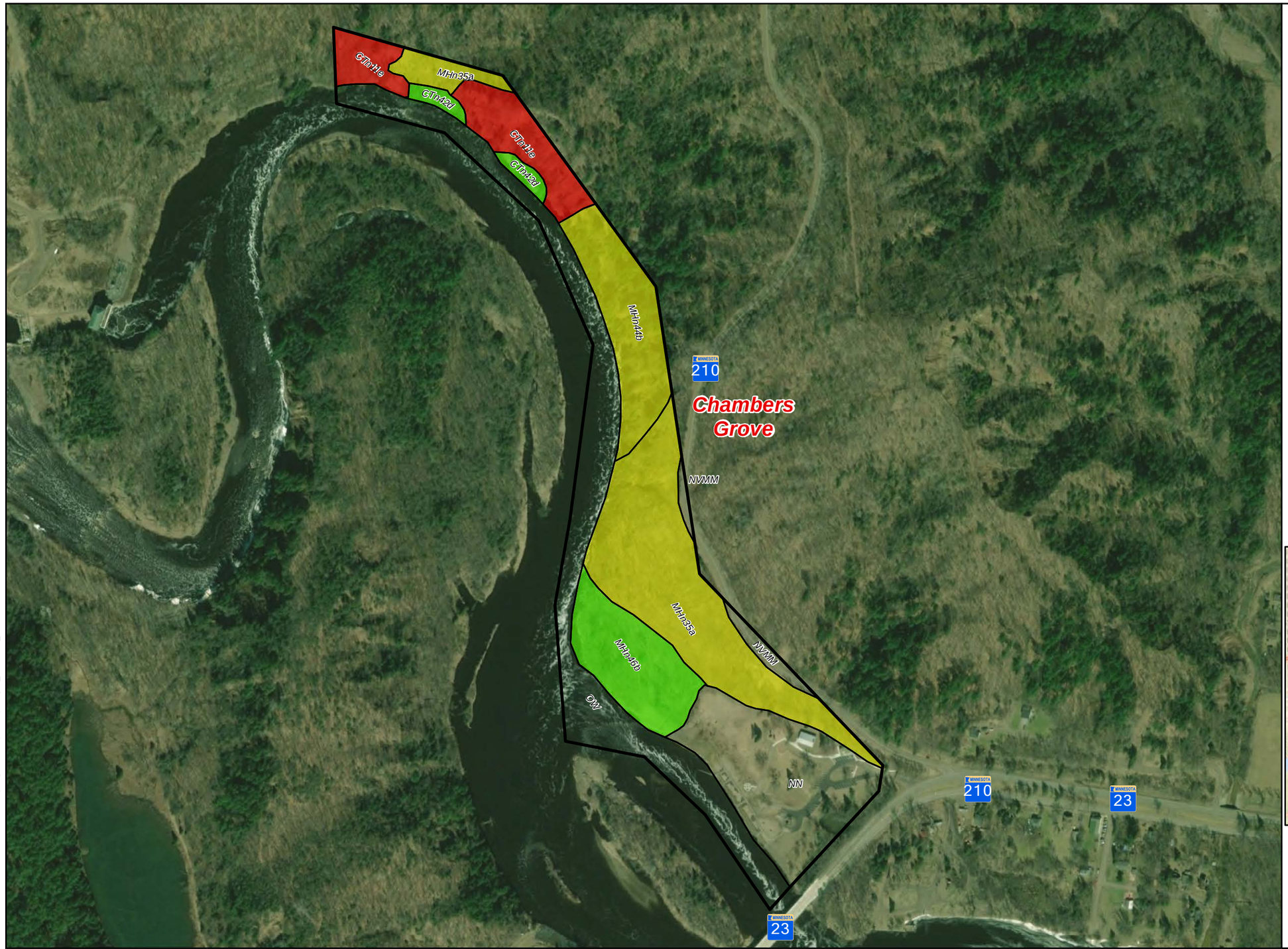
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Native Plant Community Map

Figure 2-27

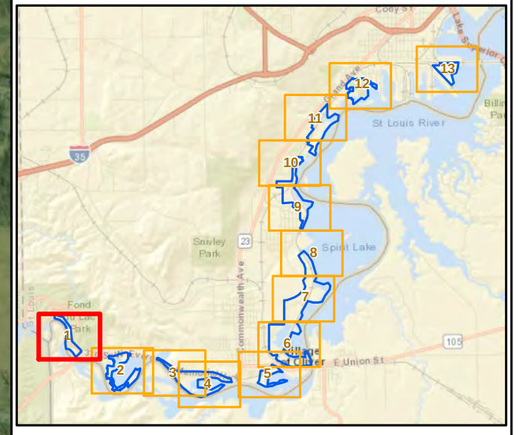


Legend

St. Louis River project areas

NPC Condition Rank

- A
- B
- D
- NA (Non-NPC)



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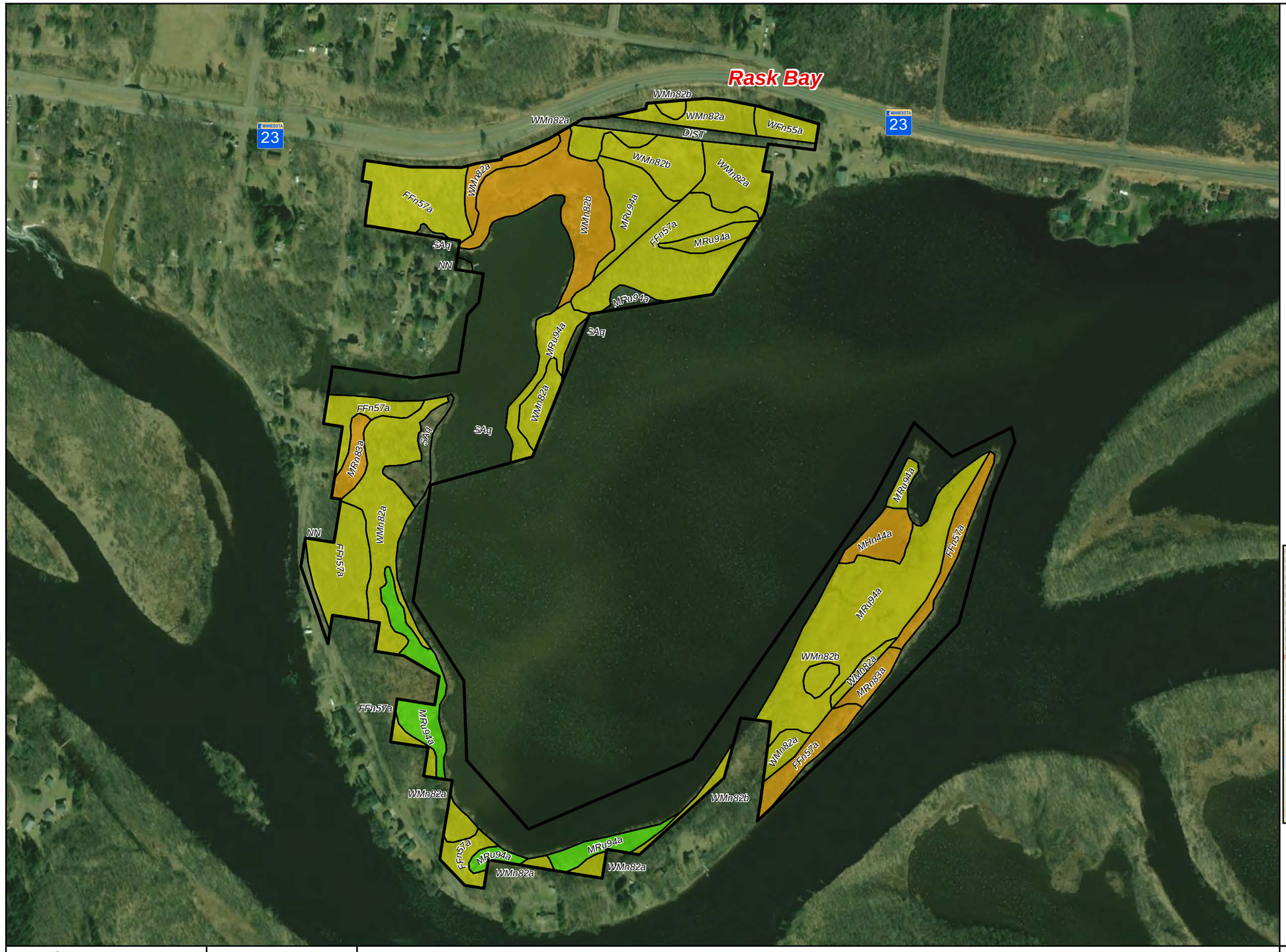
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-1

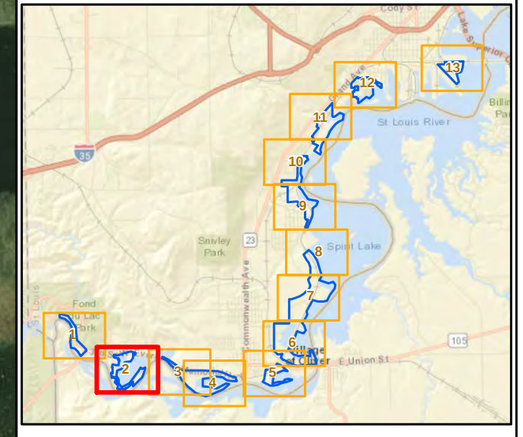


Legend

St. Louis River project areas

NPC Condition Rank

- A
- B
- C
- NA (Non-NPC)



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-2

OW
WMn82a
MHn44a
OW
NVMM
MHn44a
FFn57a
23
DIST
NVMM
North Bay
MHn44d
WMn82b
MHn44d
MHn44a
WMn82b
FPn73a
WMn82a
WMn82b
FPn73a
FFn57a
SAd
MRn94a
WMn82a
OW
WMn82a
WMn82a
SAd
WMn82a
FFn57a
FFn57a
WMn82a

Legend

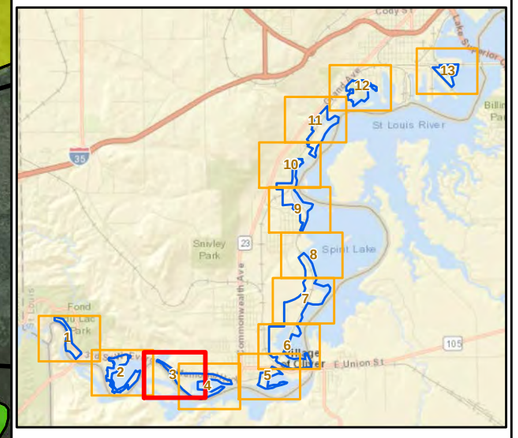
St. Louis River project areas

NPC Condition Rank

A

B

NA (Non-NPC)



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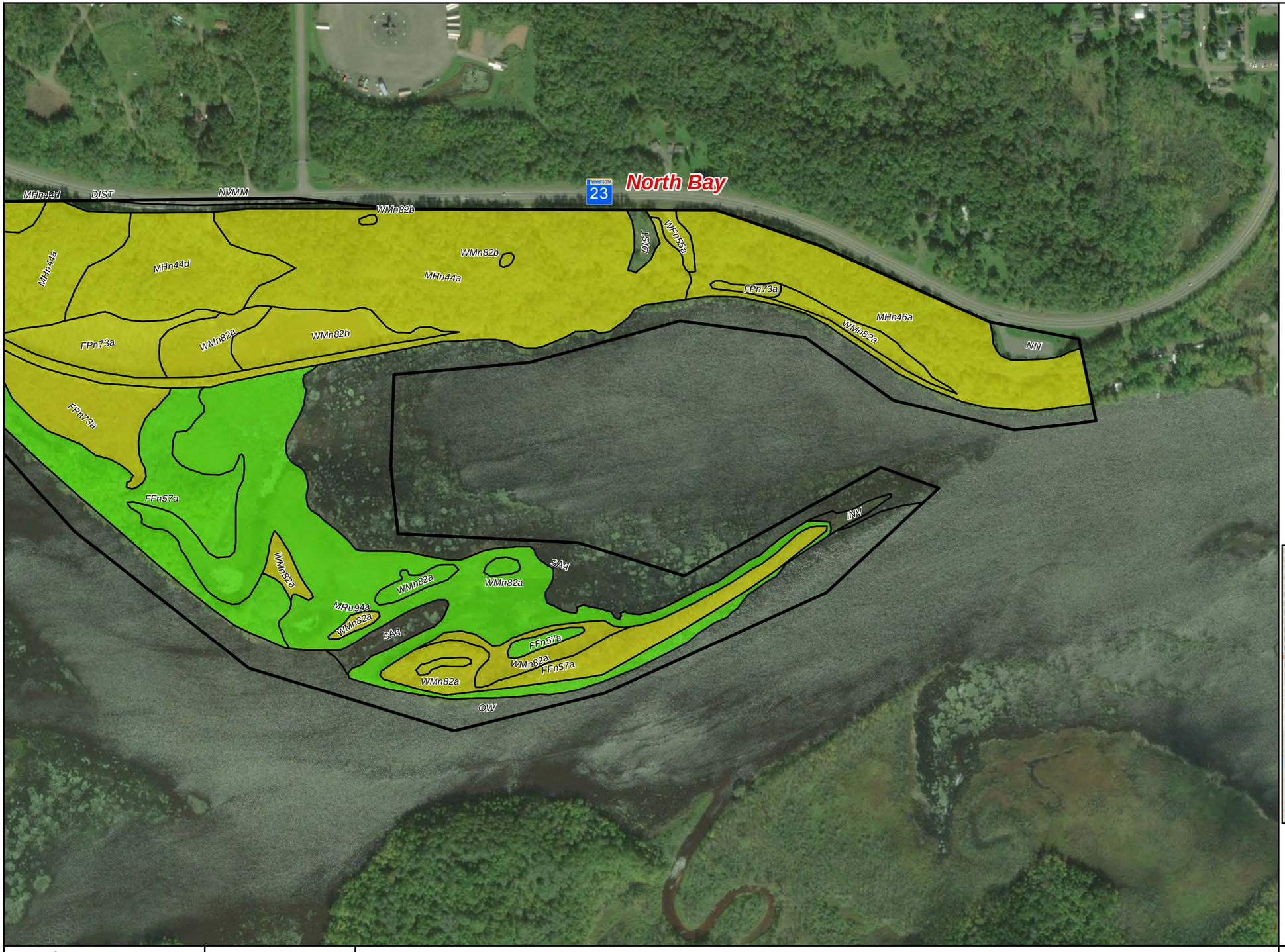
Background: FSA 2017 (CIR)

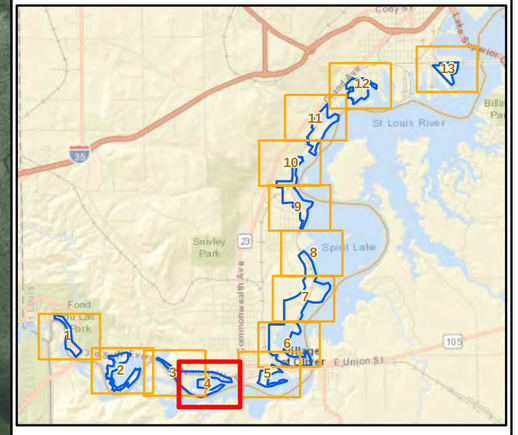
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-3





Legend

St. Louis River project areas

NPC Condition Rank

A

B

NA (Non-NPC)

0 500 1,000 Feet

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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

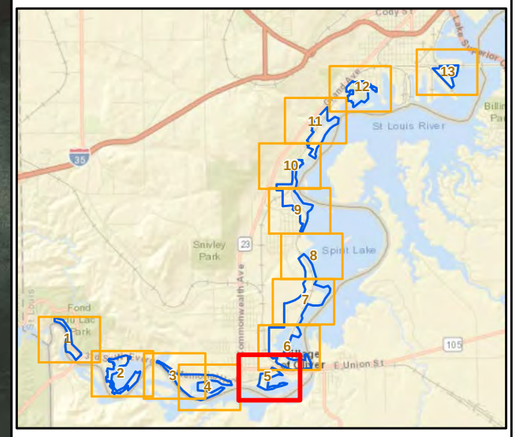
Figure 3-4

Legend

St. Louis River project areas

NPC Condition Rank

- A/B
- B
- C
- NA (Non-NPC)



0 500 1,000 Feet

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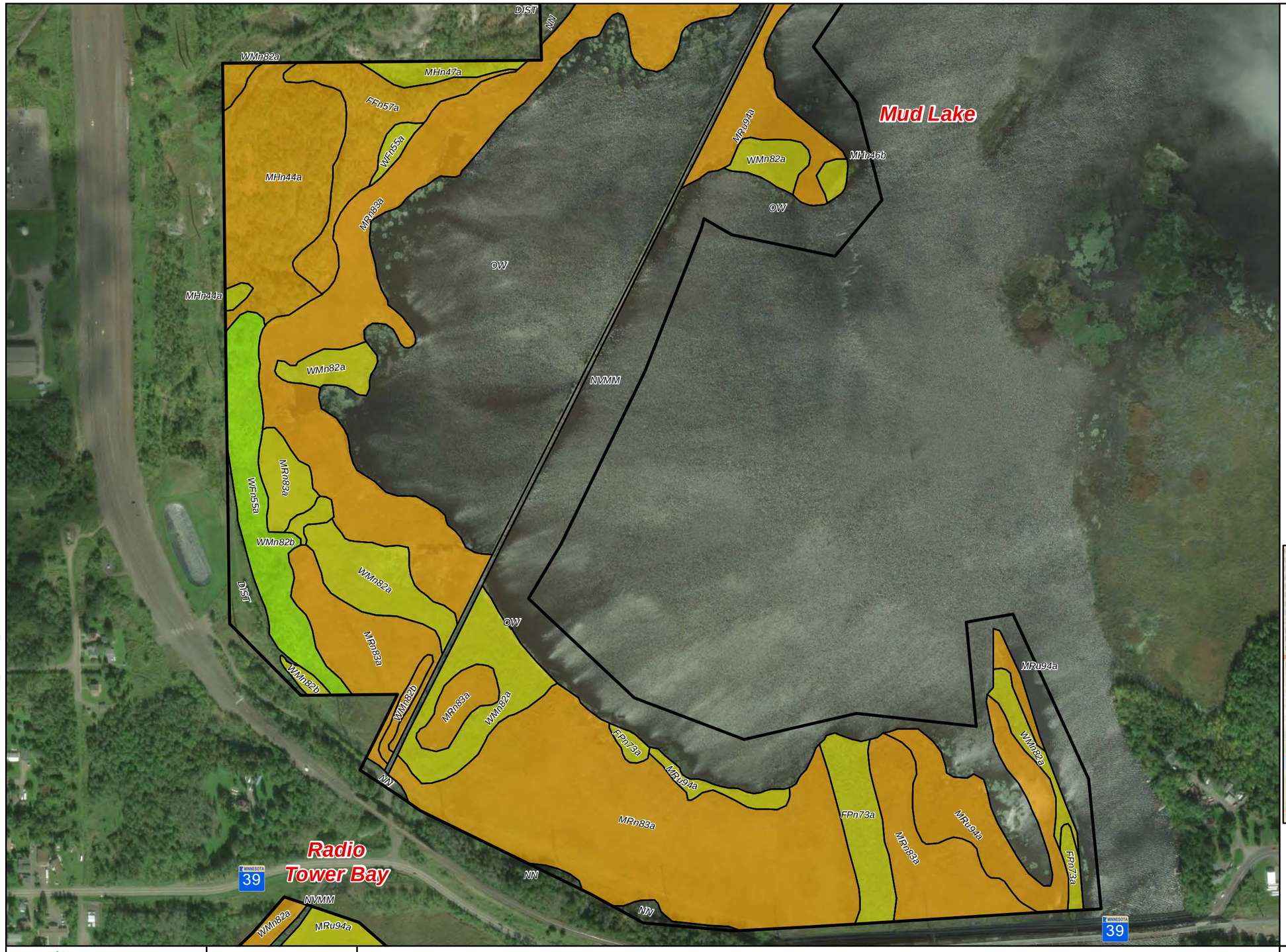
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-5

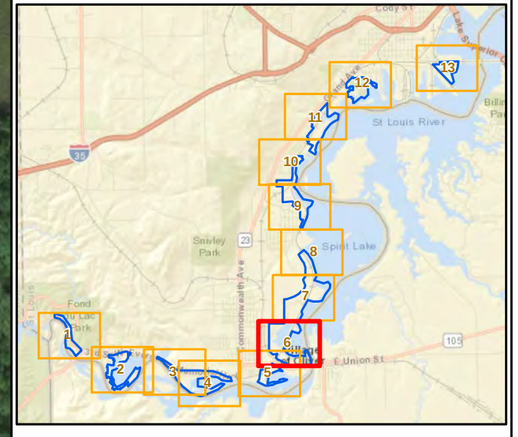


Legend

St. Louis River project areas

NPC Condition Rank

- A/B
- B
- C
- NA (Non-NPC)



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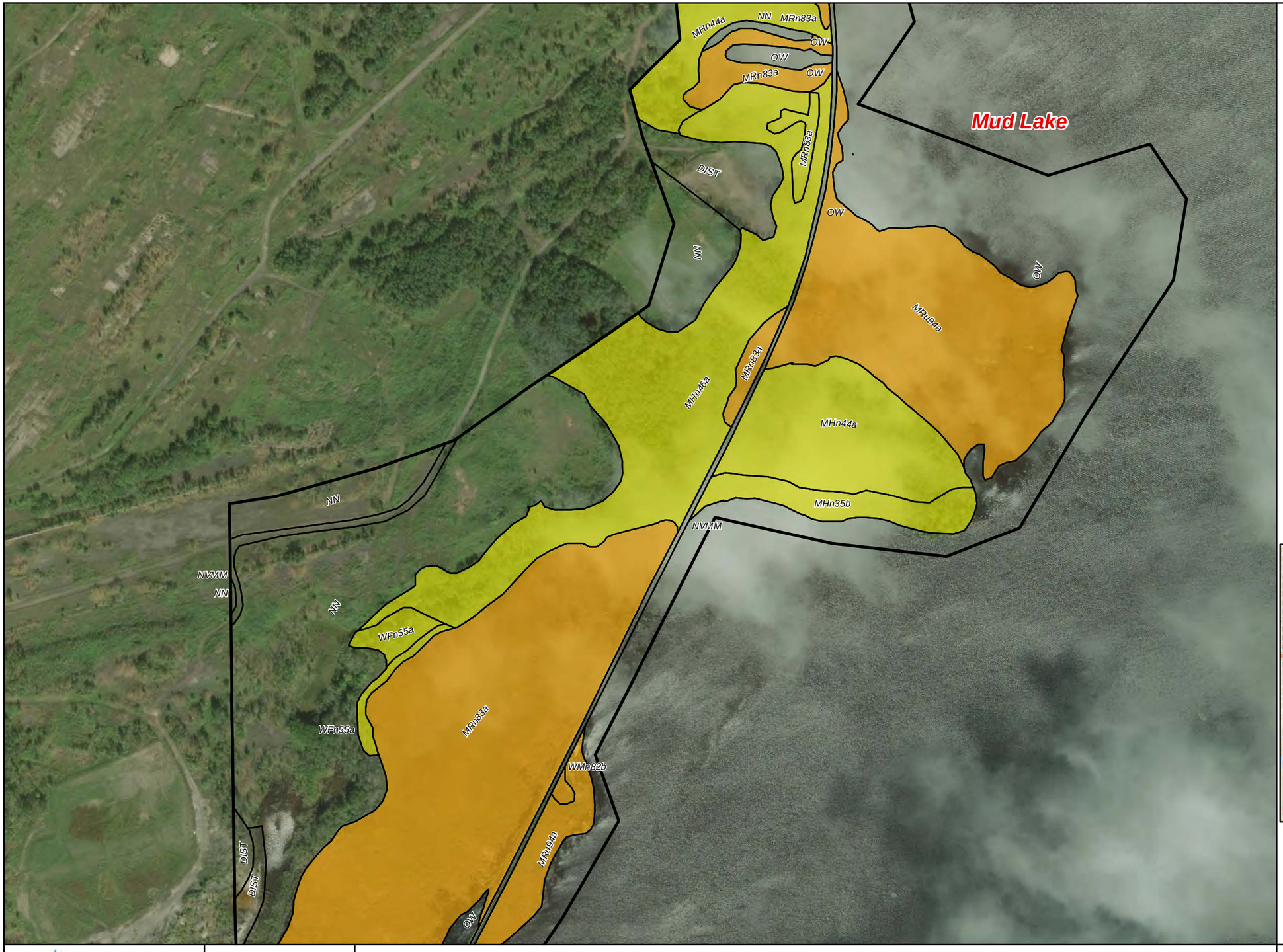
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-6

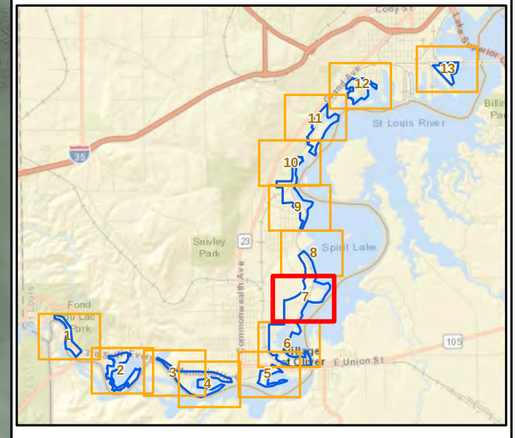


Legend

St. Louis River project areas

NPC Condition Rank

- B
- C
- NA (Non-NPC)



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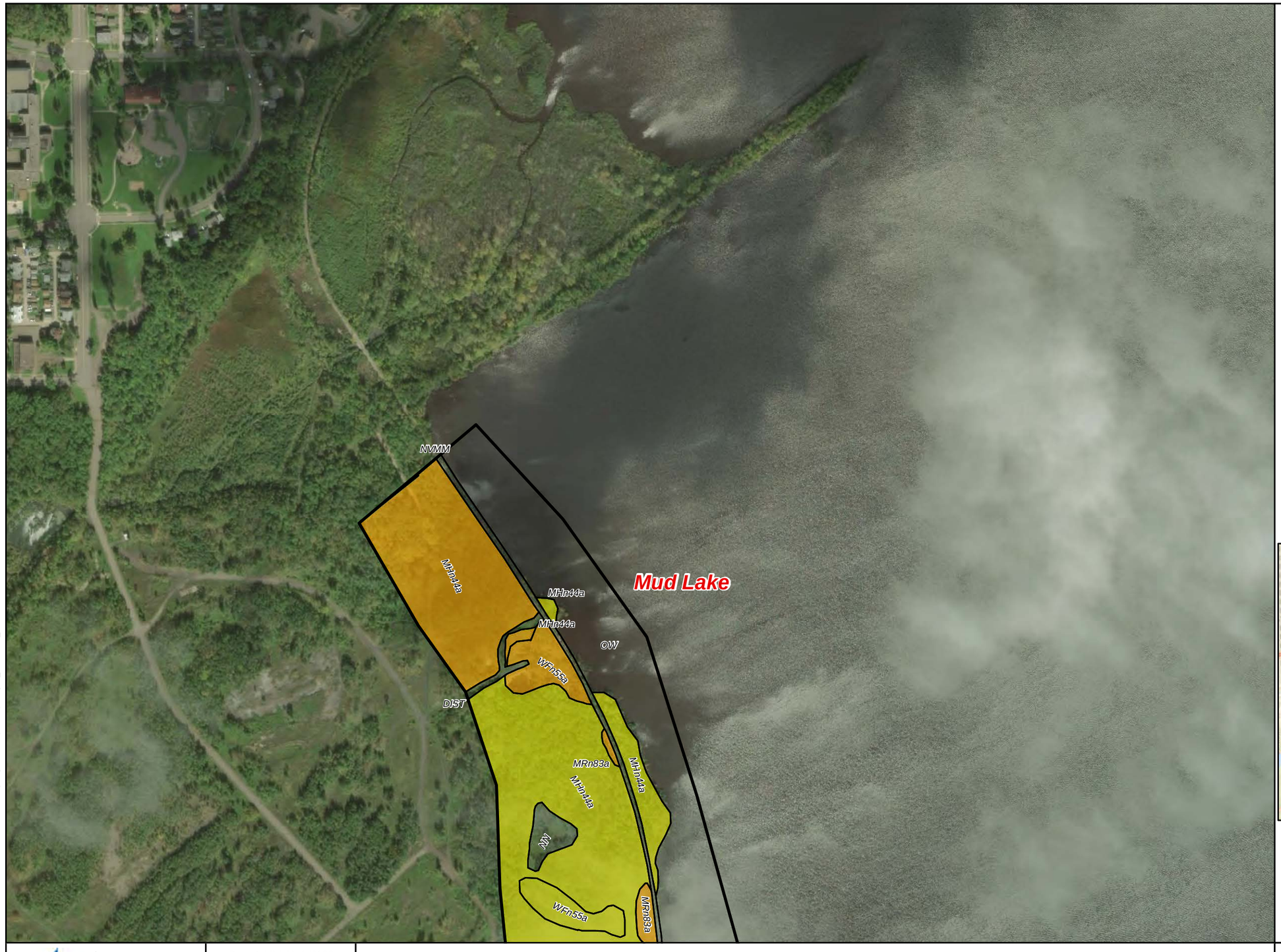
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-7



Legend

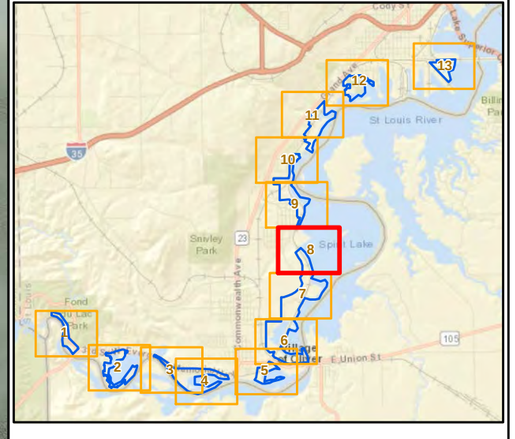
St. Louis River project areas

NPC Condition Rank

B

C

NA (Non-NPC)



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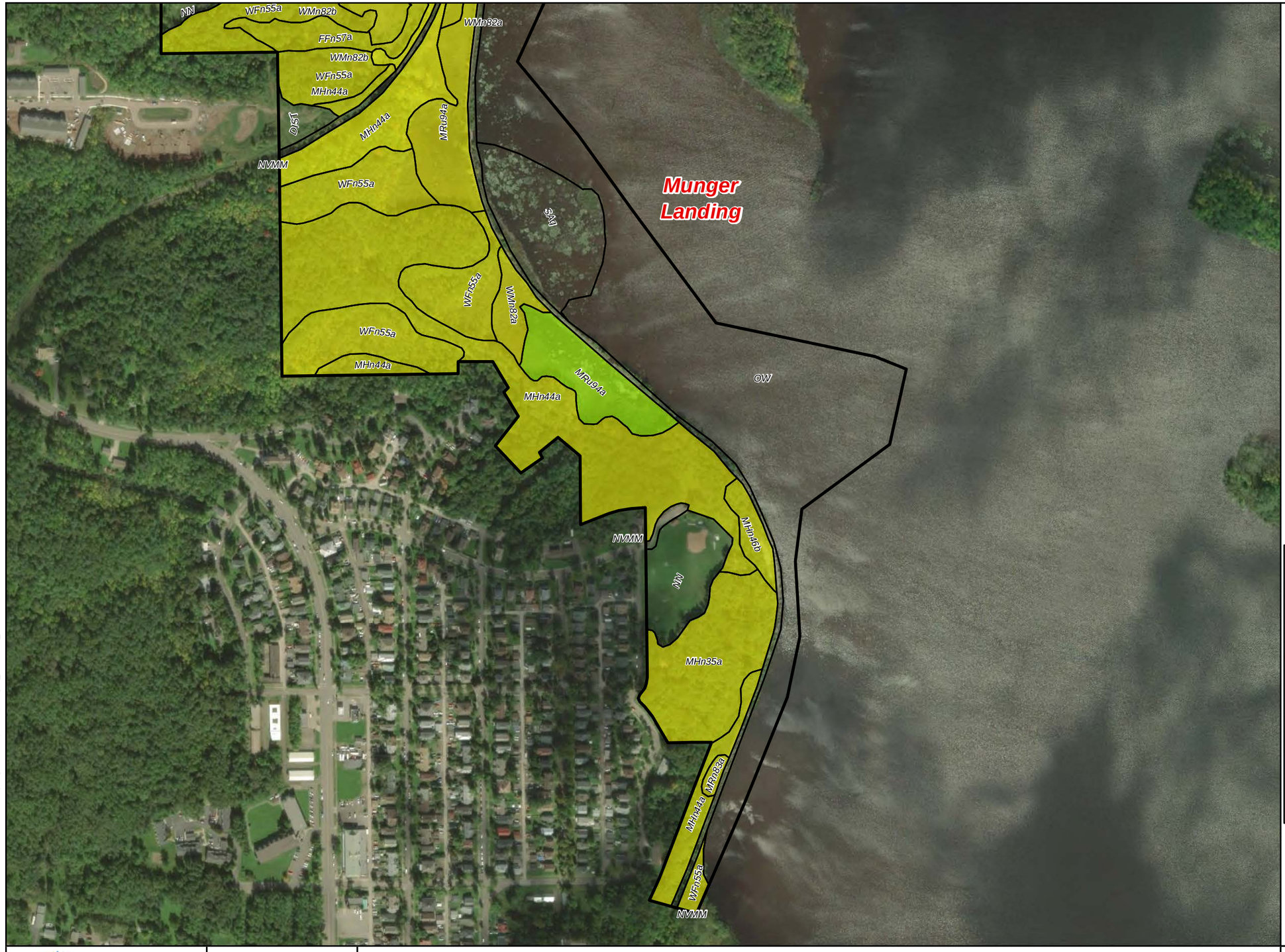
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-8

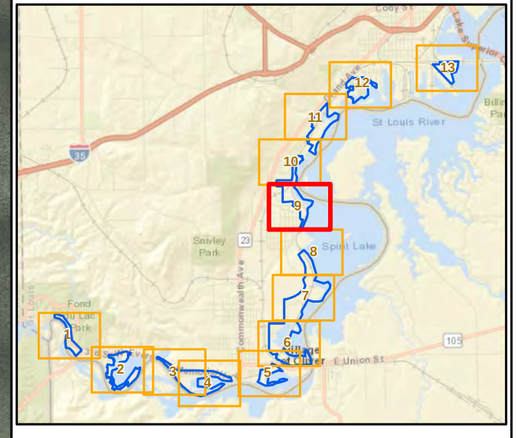


Legend

St. Louis River project areas

NPC Condition Rank

- A/B
- B
- B/C
- NA (Non-NPC)



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

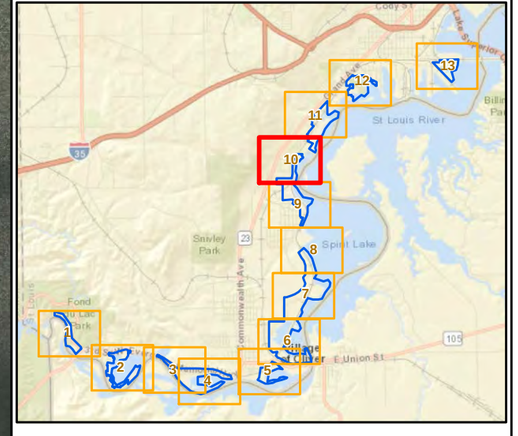
Figure 3-9

Legend

St. Louis River project areas

NPC Condition Rank

- B
- B/C
- C
- NA (Non-NPC)



0 500 1,000 Feet

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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

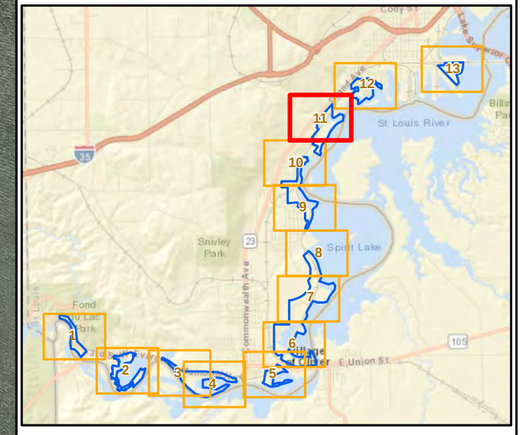
Figure 3-10

Legend

St. Louis River project areas

NPC Condition Rank

- B
- C
- NA (Non-NPC)



0 500 1,000 Feet

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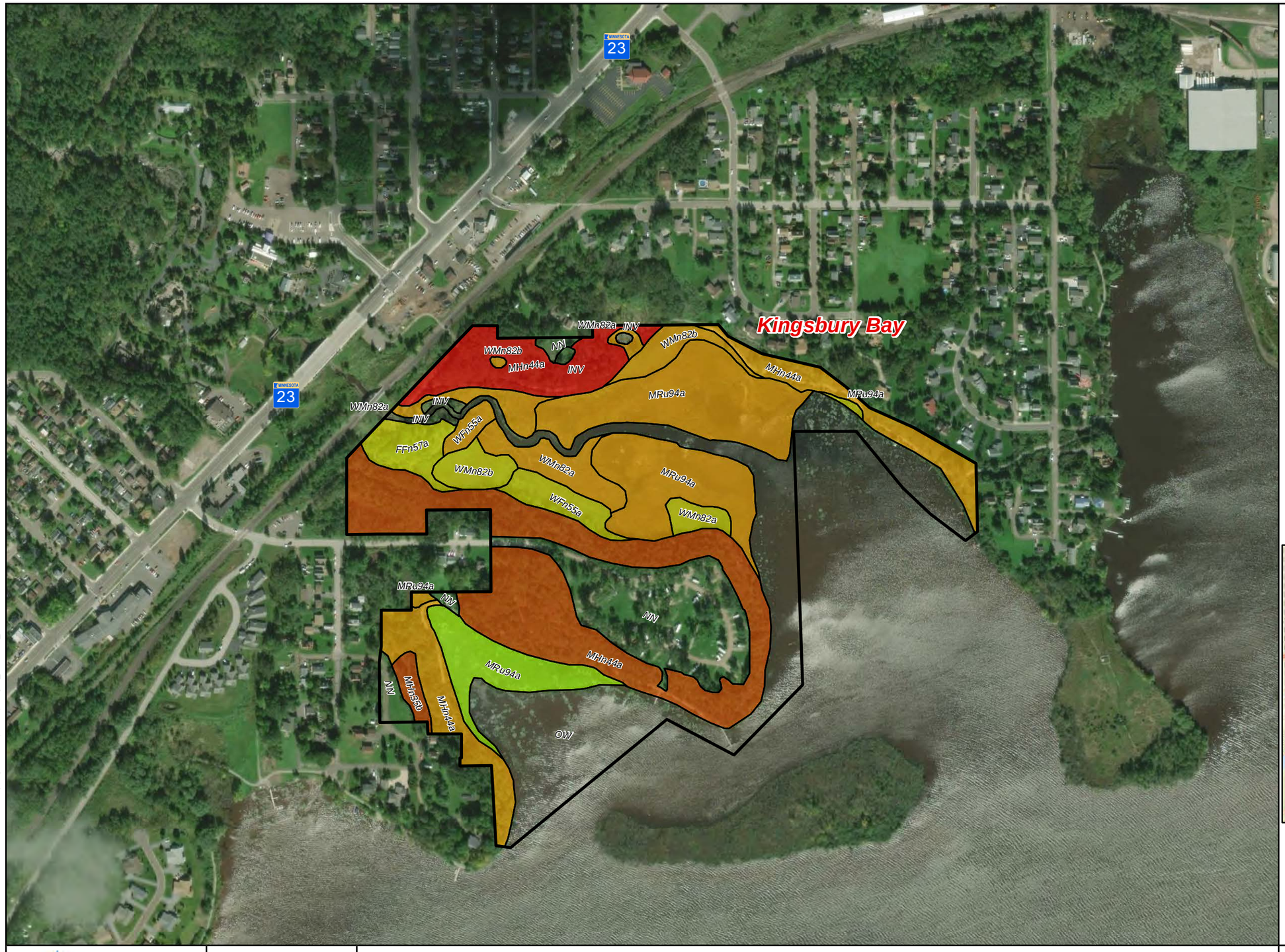
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-11

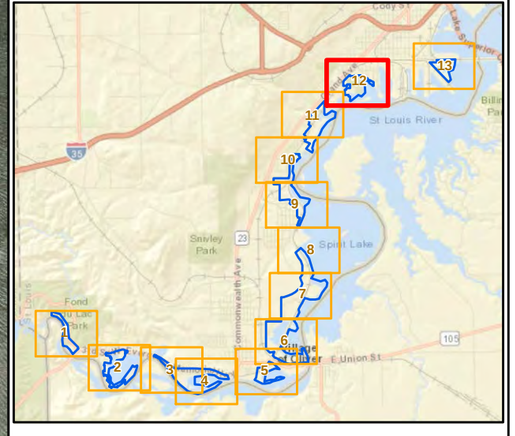


Legend

St. Louis River project areas

NPC Condition Rank

- A/B
- B
- C
- C/D
- D
- NA (Non-NPC)



0 500 1,000 Feet

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Project: MNLAN 146196
Print Date: 10/30/2018

Map by: B. Tolcser
Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

NPC Condition Rankings Map

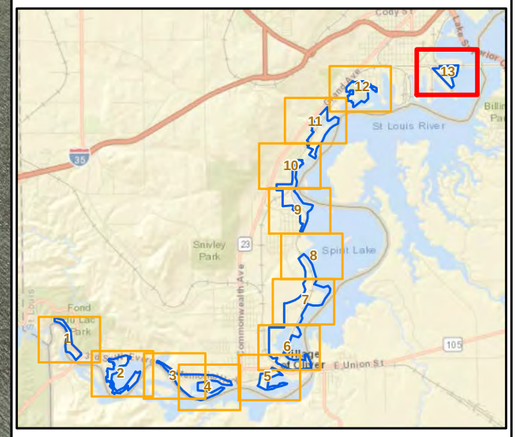
Figure 3-12

Legend

St. Louis River project areas

NPC Condition Rank

- A
- B
- B/C
- C
- NA (Non-NPC)



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ST. LOUIS RIVER NATURAL AREA PROJECT

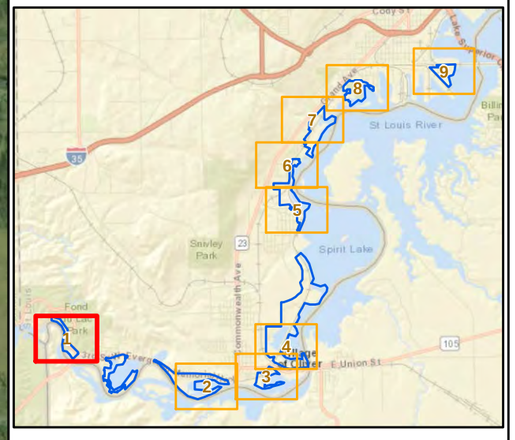
St. Louis County, Minnesota

NPC Condition Rankings Map

Figure 3-13

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Localized Observations



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ST. LOUIS RIVER NATURAL AREA PROJECT

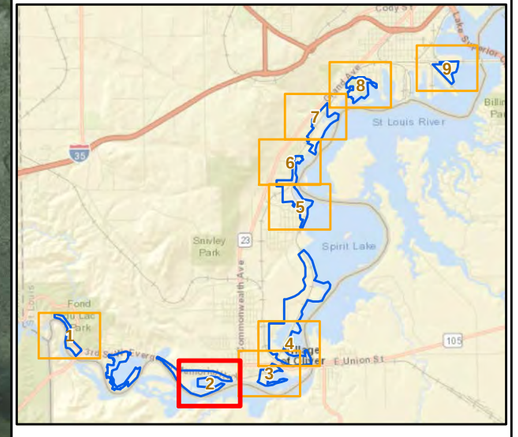
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-1

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Localized Observations
- Invasive Species - Community



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ST. LOUIS RIVER NATURAL AREA PROJECT

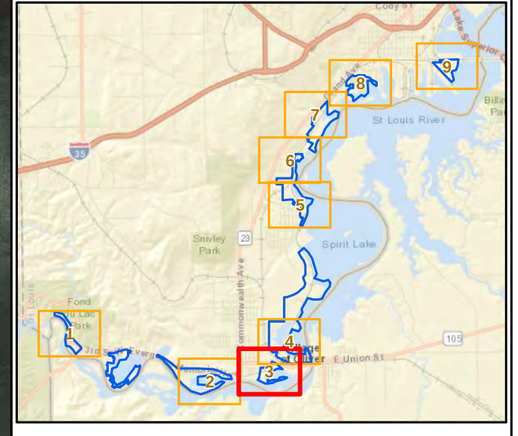
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-2

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Localized Observations
- Invasive Species - Community



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ST. LOUIS RIVER NATURAL AREA PROJECT

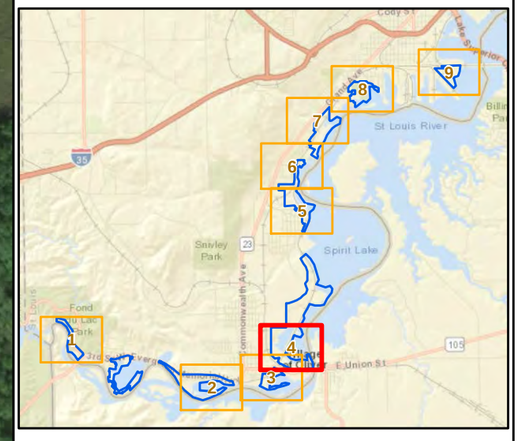
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-3

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Localized Observations



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ST. LOUIS RIVER NATURAL AREA PROJECT

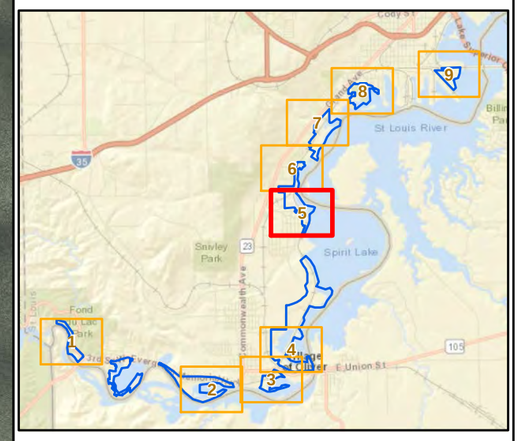
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-4

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Localized Observations



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ST. LOUIS RIVER NATURAL AREA PROJECT

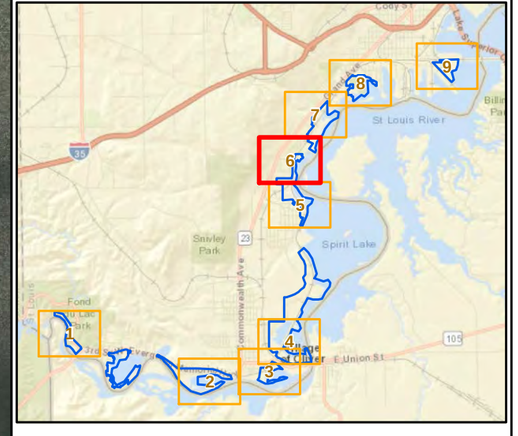
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-5

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Localized Observations
- Invasive Species - Community



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ST. LOUIS RIVER NATURAL AREA PROJECT

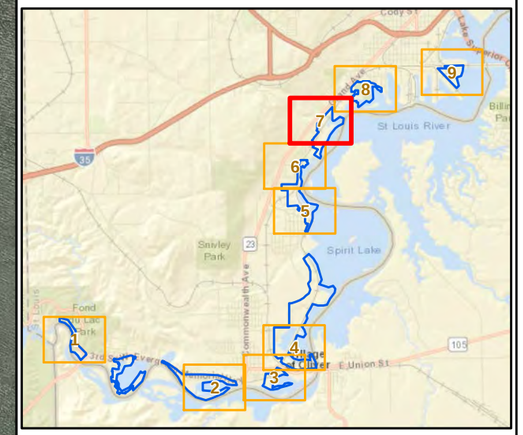
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-6

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Community



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ST. LOUIS RIVER NATURAL AREA PROJECT

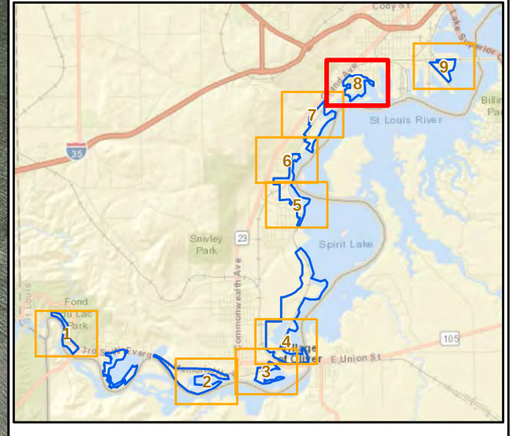
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-7

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Community



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ST. LOUIS RIVER NATURAL AREA PROJECT

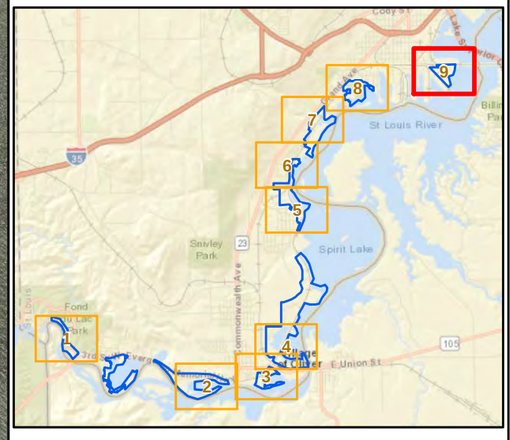
St. Louis County, Minnesota

Invasive Species Observations

Figure 4-8

Legend

- St. Louis River project areas
- NPC Boundaries
- Invasive Species - Community



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Invasive Species Observations

Figure 4-9

Appendix A

Methods

Methods

NPC Mapping

Field staff used methods for mapping Native Plant Communities (NPCs) according to Minnesota's Native Plant Community Classification (Vol 2.), and to document condition rank of each NPC. Documentation of condition rank included disturbances as well as presence and abundance of invasive species.

GIS Remote Sensing

Initial mapping used GIS remote sensing techniques to generate draft NPC boundaries within the areas of interest. The approach consisted of an initial supervised classification using high resolution aerial imagery in both color and near infrared, including band ratios such as the normalized differential vegetation index (NDVI). While elevation itself has not been shown to predict plant communities, other topographic derivatives such as slope, aspect, and wetness indices were used to differentiate and discriminate land cover and plant communities. The results of the classification informed a manual "heads up" digitizing effort to map NPCs, non-native plant communities, and non-vegetated lands. The results were used to compare consistency of vegetative cover within singular NPC polygons as previously mapped by the Minnesota Biological Survey (MBS) in an effort to identify any inclusions of different, smaller NPCs. The minimum mapping unit for the draft NPC boundaries was 1.0 acre. The results of the GIS remote sensing exercise were loaded onto GPS units for field verification. Following field verification, changes in polygon boundaries or in NPC or land cover types were incorporated into the final GIS and report maps.

Field Verification of Mapped Boundaries

Natural resources scientists visited the nine (9) project areas in the field to verify mapping and document any important changes. Inclusions of different NPCs 1.0 acre or larger within a previously mapped unit were documented, as these may have been too small to be included in MBS mapping done at a larger scale. Relevé plots and smaller vegetation data collection plots were placed in the field based on best professional judgement to document typical NPCs in the project areas. Other significant features were documented as observed; these included localized concentrations of invasive plant species and areas of existing restoration and management efforts.

Plot-based Vegetation Data Collection

As described above, scientists collected data in relevé and smaller plots to support the classification of NPCs in the project areas. Scientists used objective placement of the plots, based on the GIS mapping and best professional judgement during field review. The field team used visual (vs. mechanical) estimation of cover within a plot, using a cover class scale. Plot size follows a typical DNR survey design with 20 x 20 meter plots in upland forests and woodlands and wetland forests; and 10 x 10 meter plots in shrub swamps and open wetlands. Plot locations were documented with a sub-meter accuracy GPS unit in UTM coordinates NAD83, Zone 15N. For relevé plots, the field team collected data according to the DNR relevé method handbook (MNDNR 2013a).

In some areas, scientists used streamlined plot-based field methods, modified from methods for documenting representative vegetation (wetland and upland plots) in implementing wetland delineation procedures (USACE 1987). Field scientists selected a representative observation point within a plant community using best professional judgment, based on visual characteristics of the entire community. Streamlined sample points consisted of plots in nested concentric circles, variable in size by vegetation stratum: a 10-meter radius plot for trees, 3-meter radius plot for shrubs, and 1-meter plot for herbaceous species. Similar to relevé data, cover for each species was estimated on a cover class scale and plot locations were documented with a sub-meter accuracy GPS unit in UTM coordinates NAD83, Zone 15N. Vegetation plot locations (both relevé and streamlined plots) are shown on **Figure A-1**.

Reporting

For each previously unmapped NPC, SEH scientists assigned an NPC code according to *Field Guide to the Native Plant Communities of Minnesota: the Laurentian Mixed Forest Province* (MNDNR 2003), and a condition rank (A-D) according to DNR-established ranks for NPCs (MNDNR 2009). For non-NPC plant communities, the report identifies potential restoration target communities based on the existing ecological land type, physical characteristics, and nearby NPCs.

Plant species were recorded using nomenclature according to MNTaxa, the DNR's official checklist of names for vascular plant species in Minnesota (MNDNR 2013b). The field review did not spatially map all invasive species with occurrences less than 0.10 acre in size, unless notable for other reasons, but presence and abundance of invasive species are discussed in report text and inform the condition rank of each NPC. Similarly, important features such as major disturbances (e.g., eroded slopes) have been noted, even if not specifically identified as a target mapping feature.

SGCN Survey

Field staff used focused meanders to survey for target vascular plant species. **Table A-1** below lists target species. The Minnesota Land Trust provided a list of target species based on known occurrences in the area, and SEH understood that additional rare species had potential to be present based on suitable habitat and available Natural Heritage Information System (NHIS) data.

Table A-1: Target SGCN Plants

Common Name	Taxonomic Name	Taxonomic Class	State Status
Discoid beggarticks	*Bidens discoidea*	Vascular plant	Special Concern
Narrow reedgrass	*Calamagrostis lacustris*	Vascular plant	Special Concern
Necklace spike sedge	*Carex ormostachya*	Vascular plant	Special Concern
Pale sedge	*Carex pallescens*	Vascular plant	Endangered
Beach heather	*Hudsonia tomentosa*	Vascular plant	Threatened
Small shinleaf	*Pyrola minor*	Vascular plant	Special Concern
Soapberry	*Shepherdia canadensis*	Vascular plant	Special Concern
Pale false mannagrass	*Torreyochloa pallida*	Vascular plant	Special Concern
Eastern hemlock	*Tsuga canadensis*	Vascular plant	Endangered

Survey and reporting was conducted under the direction of Principal Investigator Allyz Kramer and Field Supervisor Natalie White. Allyz Kramer is qualified by the DNR for survey of general flora and *Botrychium* spp. in the state. Natalie White is also a qualified botanist, and is pre-qualified by the DNR for survey of general flora.

Field survey took place in July-August 2018, when most target species had morphological features necessary for definitive identification (e.g., mature perigynia on *Carex* species, flowers, and/or mature fruits). SEH field scientists used a well-developed search image approach and conducted focused meanders in habitats most suitable for the target species. Selection of target habitats was informed by GIS remote sensing of Native Plant Communities (NPCs) conducted in support of NPC mapping, and field survey particularly targeted NPCs suitable for the target plant species.

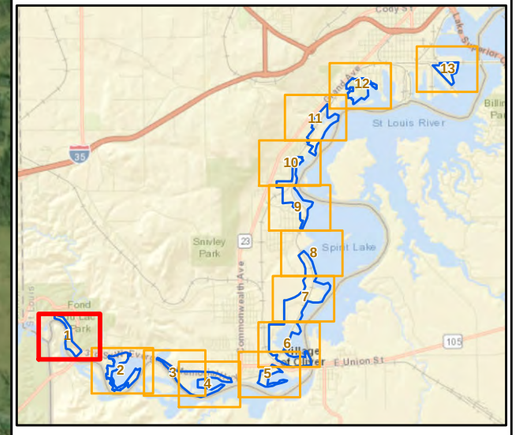
Centroid point locations of rare plant occurrences were documented with a sub-meter accuracy GPS unit in UTM coordinates NAD83, Zone 15N. For species/occurrences for which photographs are adequate for a confirmed identification, there was no plant material collection. For most target species, photographic

documentation of occurrences was sufficient for a verified identification. For pale sedge, collection was limited to the minimum necessary for a verified identification. Collection followed guidelines for vascular plant specimens found in the DNR Division of Ecological and Water Resources publication *Guidance on Documenting and Collecting Rare Plants* (2018), and was completed under Special Permit #23228 issued to Ms. Natalie White. The collected specimen was prepared by drying in a plant press with blotters, ventilators, and newspaper. The specimen was labeled using archival quality paper; the label includes species, location of collection, description of habitat, name of collector, and date of collection as described in the DNR *Guidance*.

SEH sent the prepared specimen to Welby Smith, DNR Botanist, for verification. Additional data related to the survey was provided electronically as a spreadsheet with an accompanying shapefile as described on the Natural Heritage Information System (NHIS) website. Final disposition of the specimen collected was to the University of Minnesota Bell Museum of Natural History.

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

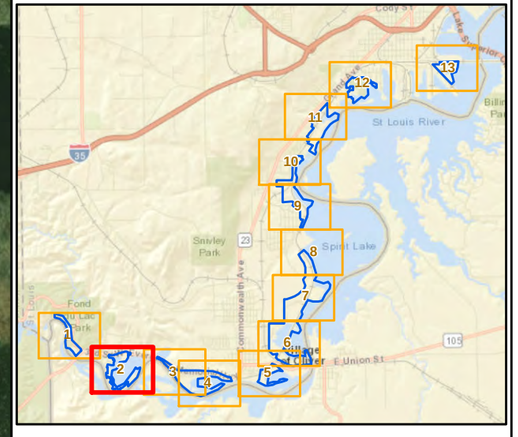
St. Louis County, Minnesota

Data Collection Locations

Figure A1-1

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

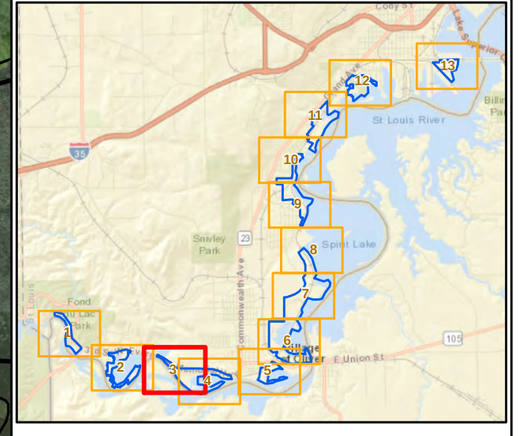
St. Louis County, Minnesota

Data Collection Locations

Figure A1-2

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Data Collection Locations

Figure A1-3

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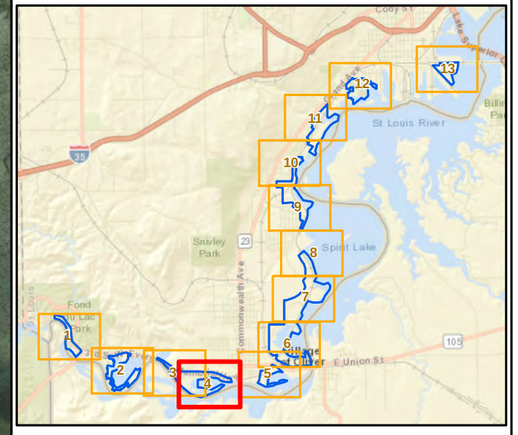
Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

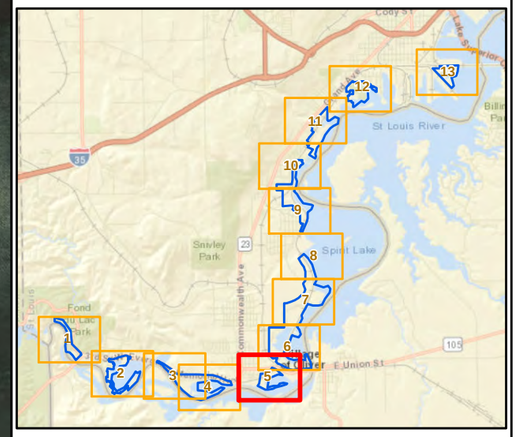
St. Louis County, Minnesota

Data Collection Locations

Figure A1-4

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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www.sehinc.com

Project: MNLAN 146196
Print Date: 10/30/2018

Map by: B. Tolcser
Projection: NAD83 UTM15N
Source: MNDNR, MN Land Trust, SEH
Background: FSA 2017 (CIR)

ST. LOUIS RIVER NATURAL AREA PROJECT

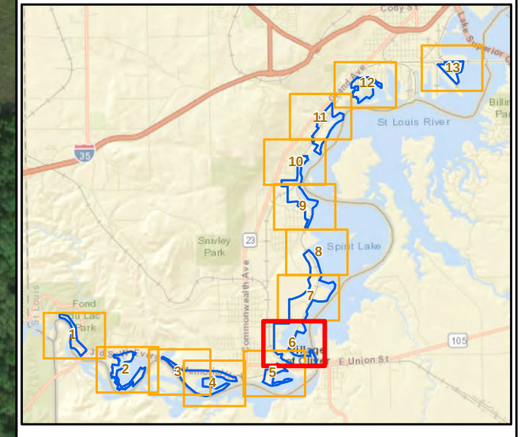
St. Louis County, Minnesota

Data Collection Locations

Figure A1-5

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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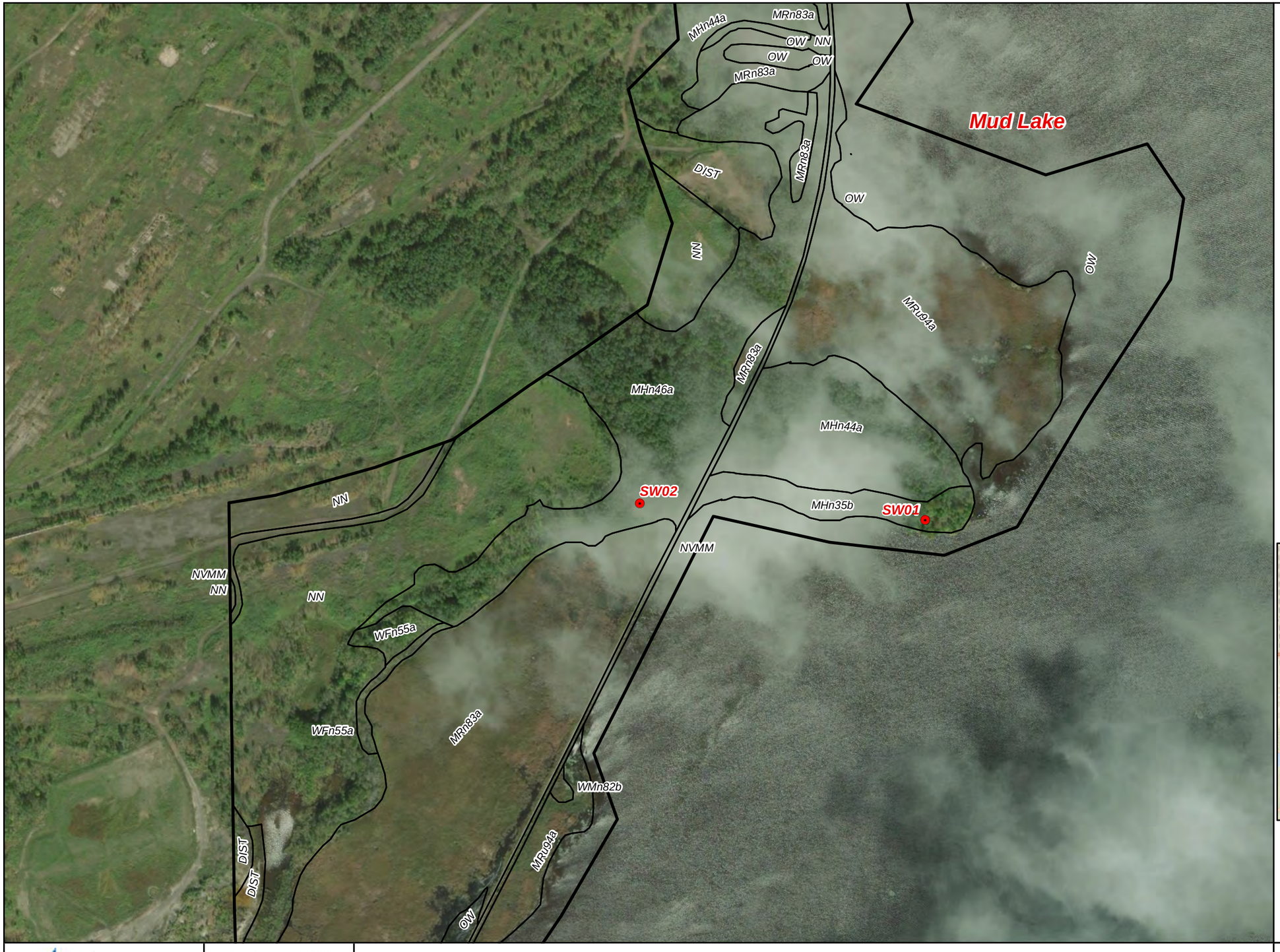
ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

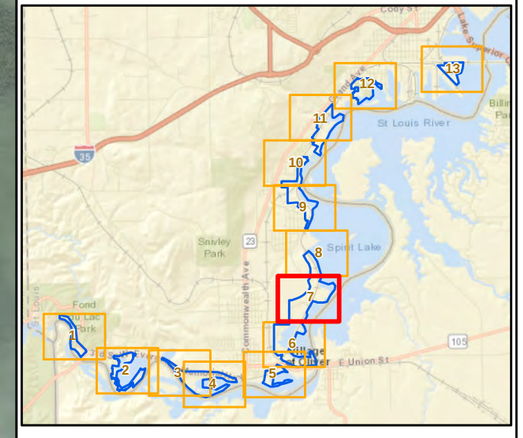
Data Collection Locations

Figure A1-6



Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

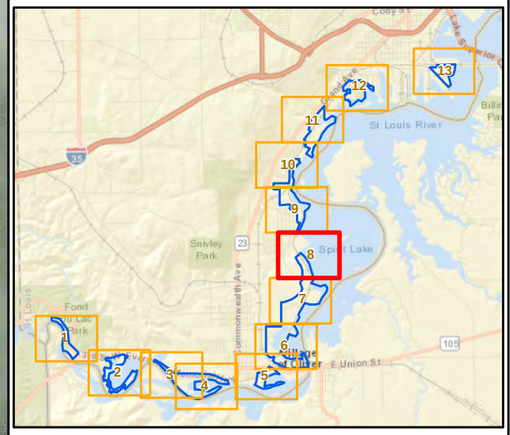
St. Louis County, Minnesota

Data Collection Locations

Figure A1-7

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

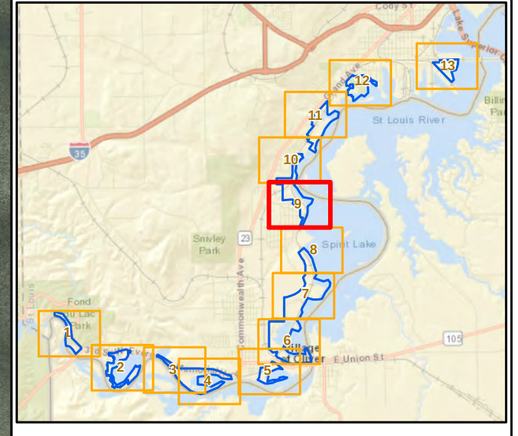
St. Louis County, Minnesota

Data Collection Locations

Figure A1-8

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

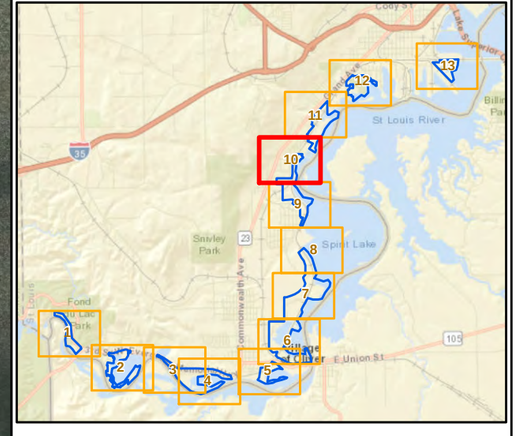
St. Louis County, Minnesota

Data Collection Locations

Figure A1-9

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

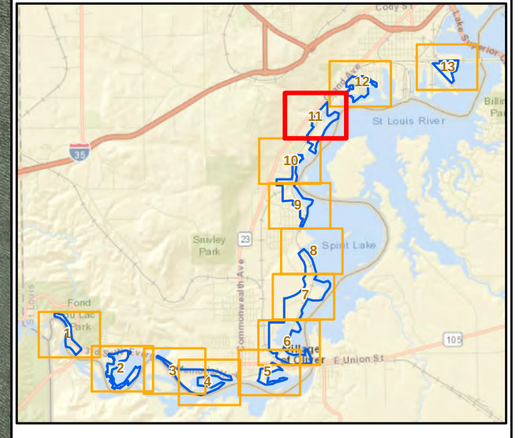
St. Louis County, Minnesota

Data Collection Locations

Figure A1-10

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Data Collection Locations

Figure A1-11

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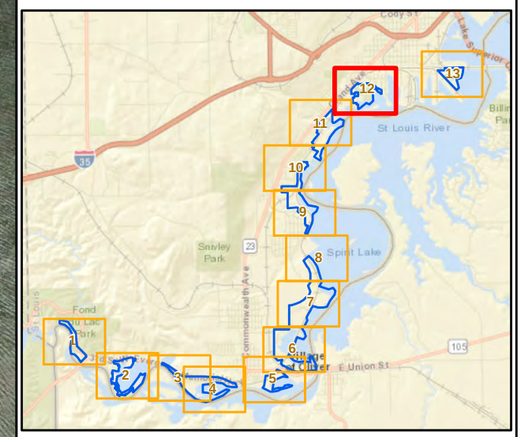
Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

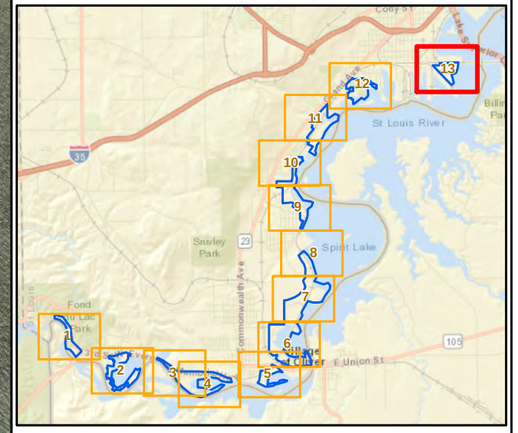
St. Louis County, Minnesota

Data Collection Locations

Figure A1-12

Legend

- St. Louis River project areas
- NPC Boundaries
- Data Collection Points



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ST. LOUIS RIVER NATURAL AREA PROJECT

St. Louis County, Minnesota

Data Collection Locations

Figure A1-13

Appendix B

Photo Pages

Photo 1 Chambers Grove project area – Dry Sandstone Cliff (Northern), CTn11e.

Photo 2 Chambers Grove project area – eroded hillslope.

Photo 3 Rask Bay project area – example of stressed trees, presumably due to high water. Aquatic vegetation community in foreground.

Photo 4 Rask Bay project area – Black Ash-Silver Maple Terrace Forest, FFn57a.

Photo 5 North Bay project area – Estuary Marsh (Lake Superior), MRu94a. Softstem bulrush dominant, few cattails in this area.

Photo 6 North Bay project area – example of wet-mesic forest present in upland areas of North Bay. Basswood and quaking aspen dominate the canopy in this photo.

Photo 7 North Bay project area – Aquatic vegetation community, some grazed stems of wild rice visible.

Photo 8 North Bay project area – OHV/pedestrian trail, in dry area with no obvious erosion.

Photo 9 Radio Tower Bay project area – Cattail-Sedge Marsh, MRn83a, dominated by hybrid cattail.

Photo 10 Radio Tower Bay project area – Estuary Marsh (Lake Superior), MRu94a, a relatively species diverse marsh community.

Photo 11 Mud Lake project area – Red Oak-Sugar Maple-Basswood-(Bluebead Lily) Forest, MHn35b, on south facing slope above the St. Louis River.

Photo 12 Mud Lake project area – example of disturbed/non-native community in former industrial site.

Photo 13 Munger Landing project area – Black Ash-Aspen-Balsam Poplar Swamp (Northeastern), WFn55a.

Photo 14 Munger Landing project area - Estuary Marsh (Lake Superior), MRu94a, grading into aquatic vegetation community in the St. Louis River.

Photo 15 Tallus Island project area – Aspen-Birch-Red Maple Forest, MHn44a, on Tallus Island.

Photo 16 Tallus Island project area – flowering forbs in Willow-Dogwood Shrub Swamp, WMn82a.

Photo 17 Kingsbury Bay project area – Black Ash-Silver Maple Terrace Forest, FFn57a, with planted trees in cages.

Photo 18 Kingsbury Bay project area – Sedge Meadow, WMn82b, in foreground with nonnative cattail-dominated Estuary Marsh (Lake Superior), MRu94a, in background.

Photo 19 Grassy Point project area – Black Ash-Aspen-Balsam Poplar Swamp (Northeastern), WFn55a.

Photo 20 Grassy Point project area - nonnative cattail-dominated Estuary Marsh (Lake Superior), MRu94a.

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