DRAFT

MANAGEMENT PLAN FOR THE

St. Louis River Natural Area

OF THE DULUTH NATURAL AREAS PROGRAM

DATE: ~~10~~11/~~17~~26/19

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 Waabizheshikana (Marten Trail)~~Western Waterfront Trail~~, ~~Park and Recreation~~Mini-~~-~~Master Plan (final 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 D~~p~~epartment of Natural Resources (WDNR), 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~~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~~Appendix A).

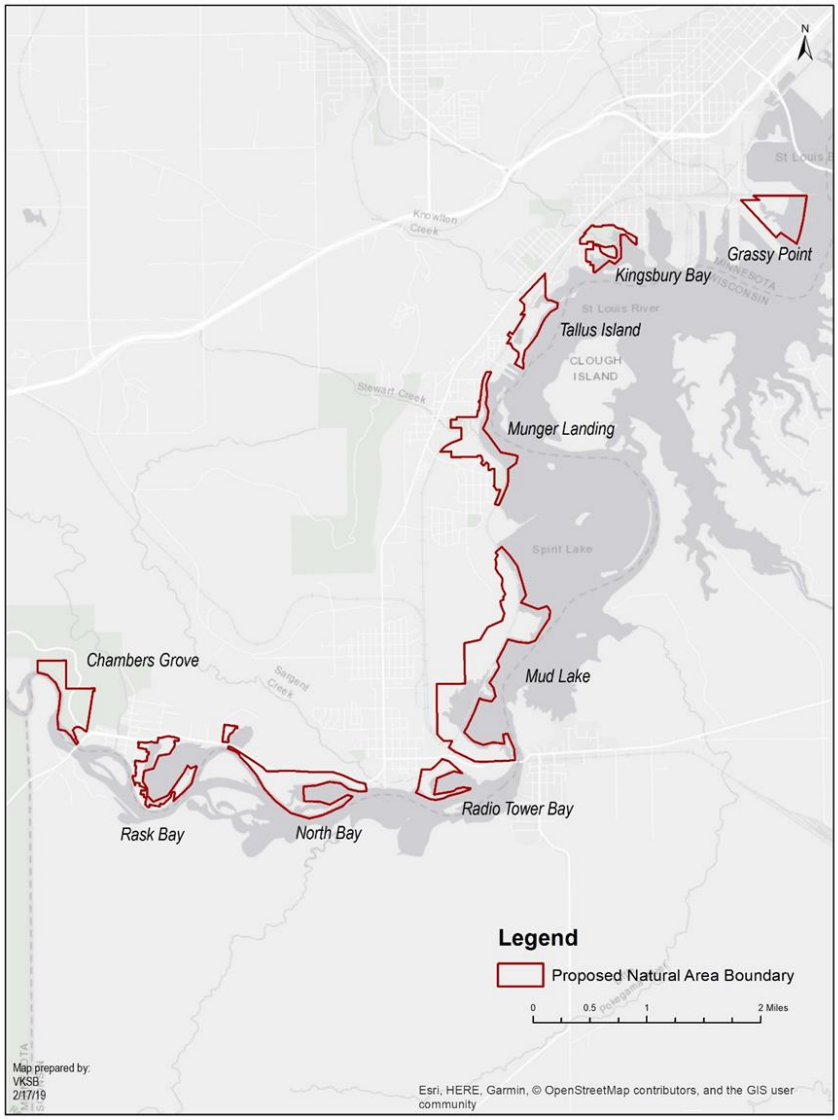

Figure 1: ~~Proposed~~ St. Louis River Natural Area Boundary

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

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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~~Appendix A) for descriptions of the ecological resources within each of these categories. The important features of these resources are summarized in Table 1~~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. Note: the Tallas Island project area includes the future Spirit Landing Park's passive boat launch and infrastructure. ~~Appendix A~~

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	Tallas 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)	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 Waabizheshikana (Marten Trail) ~~Western Waterfront Trail, Park and Recreation~~Mini-Master Plan (~~City of Duluth~~LHB, Inc., 2019) details the planned extension of the Waabizheshikana ~~Western Waterfront Trail~~ from its current end point at Spring Street (just south of the ~~Tallus~~Tallas 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~~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). Note, all trails and amenities will not be located on Tallas Island proper, but only along the shoreline.

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 trails with access to ~~and~~ the Superior Hiking ~~North Country hiking trails~~ Trail (Figure 3~~Figure 3~~)

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

The St. Louis River Estuary National Water Trail (designation pending) is a bi-state trail consisting of a series of paddling routes from Fond du Lac Dam downstream to Styker Bay on the Minnesota side. Trail routes go in and through all of the SLRNA project areas, except Grassy Point. Detailed maps can be found in the water trail master plan (Hoisington, et al. 2017). Recreational infrastructure associated with Waabizheshikana was coordinated with water trail infrastructure needs in the plannint process.

Maps of each project area are provided in the SLRNA nomination report in Appendix A. Locations of the amenities associated with Waabizheshikana can be found in the Waabizheshikana (Marten Trail) Mini-Master Plan located on the city of Duluth website.

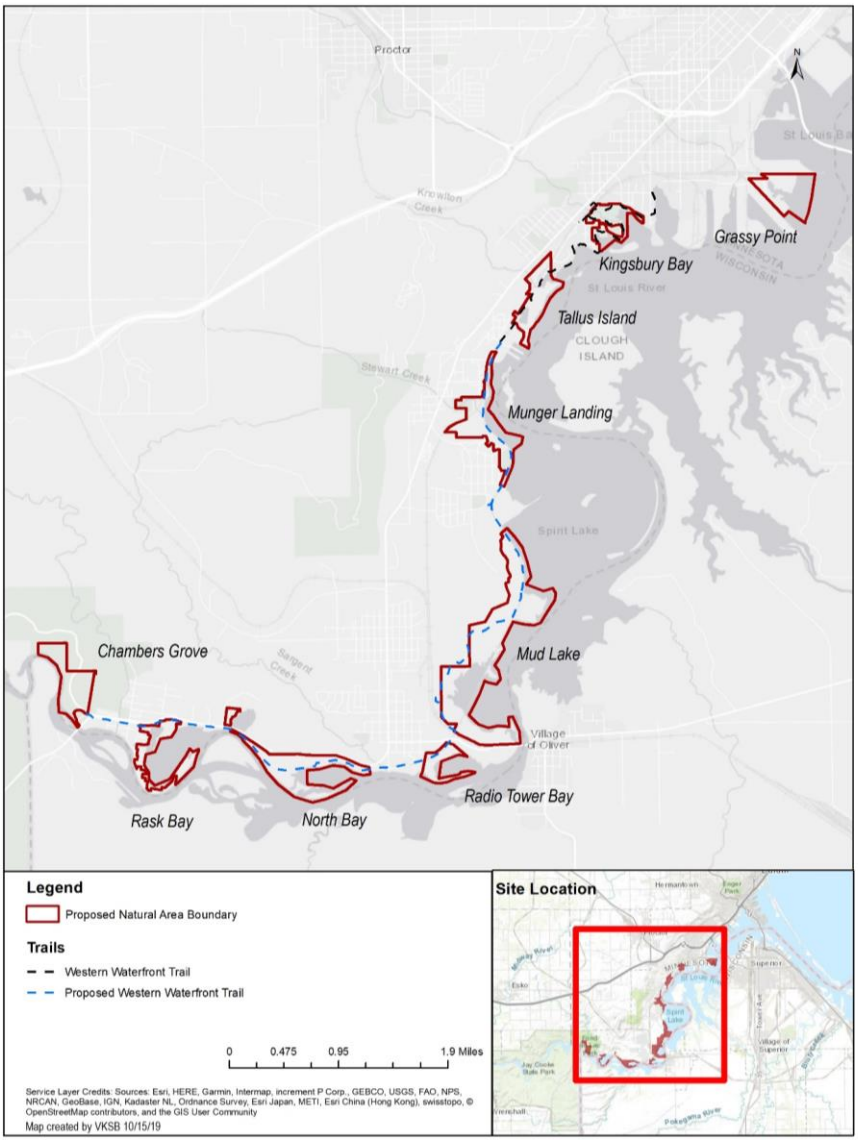

Figure 2: Waabizheshikana ~~Western Waterfront Trail~~ Project Limits

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

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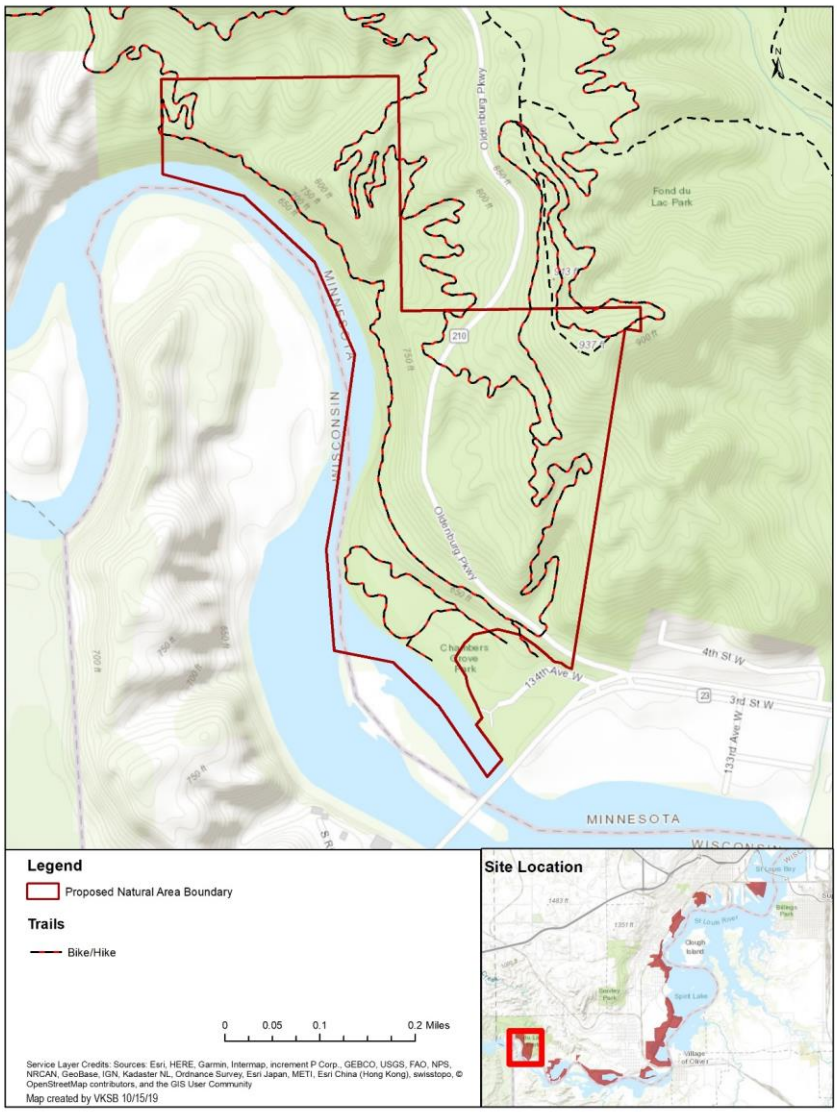

Figure 3: Trails in the Chamber's Grove Project Site

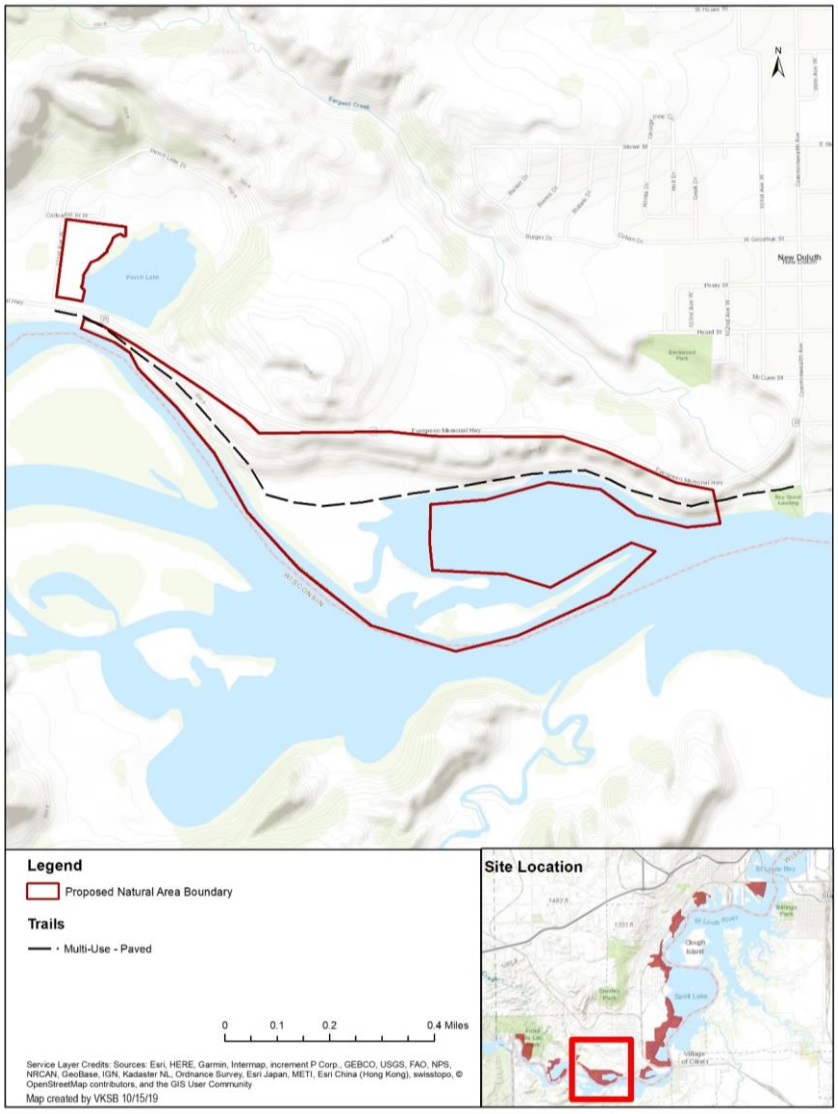

Figure 4: Trails in the North Bay Project Site

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

LAND OWNERSHIP

As described in the SLRNA Nomination (Appendix A), 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~~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~~Tallas 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~~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~~ Trunk 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 (EAB) is a concern for the North Bay and Chamber's Grove project sites, as ash trees are an important component of ~~the site's~~ plant communities in these areas. 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~~Effects on 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~~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~~Tallas Island
False spirea	*Sobaria sorbifolia*	~~Tallus~~Tallas 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~~Tallas 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~~Tallas 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~~ effects 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~~effects on 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~~ effects 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 was listed by the International Joint Commission as one of 43 Great Lakes AOCs in 1987 because it was identified as an area where "…significant impairment of beneficial uses has occurred as the result of human activities at the local level" (Annex 1 of the Great Lakes Water Quality Protocol of 2012). Historical actions such as improper municipal and industrial waste disposal and unchecked landuse practices, including dredging and filling of aquatic habitat and damaging logging practices contributed to the complex set of issues tacing the St. Louis River AOC at the time it was listed. By 1992 discharges were being eliminated or permitted with appropriate treatment as required by the Clean Water Act. The primary concerns for the AOC that remain are legacy contamination and historical habitat degradation. These sources of impairment led to the designation of nine of 14 possible beneficial use impairments (BUIs) as existing in the AOC.

Today, the St. Louis River AOC Remedial Action Plan (MNDNR and WDNR, 2019) describes the actions necessary to officially "delist" the AOC along with the degree of progress; the plan is updated every year. (For future updates go to the Minnesota Pollution Control Agency's website for the St. Louis River AOC). A number of actions still in the Remedial Action Plan are located in the aquatic portions of the river immediately adjacent to the SLRNA (Figure 5), some of which have been completed. The green sites were selected for restoration and/or remediation and remedial decisions are being evaluated for the red sites based on historic habitat degradation and the presence of sediment contamination from

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 the wild rice restoration sites and will be started in the next year at Spirit Lake (Figure 5). Planning for Mud Lake restoration is underway. Remediation has been completed at the St. Louis River/Interlake/Duluth Tar Site and is expected to begin at the US Steel/Spirit Lake site in 2020. Work is underway to make remedial decisions at Mud Lake West and Munger Landing.

The MPCA and MNDNR will be implementing institutional controls and long term monitoring and maintenance plans as appropriate to each completed remediation and restoration sites.

The St. Louis River AOC remediation and restoration work is a huge investment by the community and its' implementing partners including: ~~MN Pollution Control Agency~~MPCA, ~~WI Department of Natural Resources~~WDNR, ~~MN Department of Natural Resources~~MNDNR, and Fond du Lac of Lake Superior Chippewa. The overarching goal~~s~~ for this area is to transform these remediation and restoration projects into sustainable revitalization of the surrounding community by maximizing the positive societal and environmental outcomes. The National Oceanic and Atmospheric Administration recognized this goal by designating ~~it~~the estuary as a Habitat Focus Area. T~~And t~~hrough the SLRNA, the City is providing complimentary work to the AOC by preserving and protecting the terrestrial connection to this amazing aquatic resource. The City's goal is to continue to work with the AOC partners by managing and monitoring the upland and riparian native plant communities along the St. Louis River corr~~or~~idor.

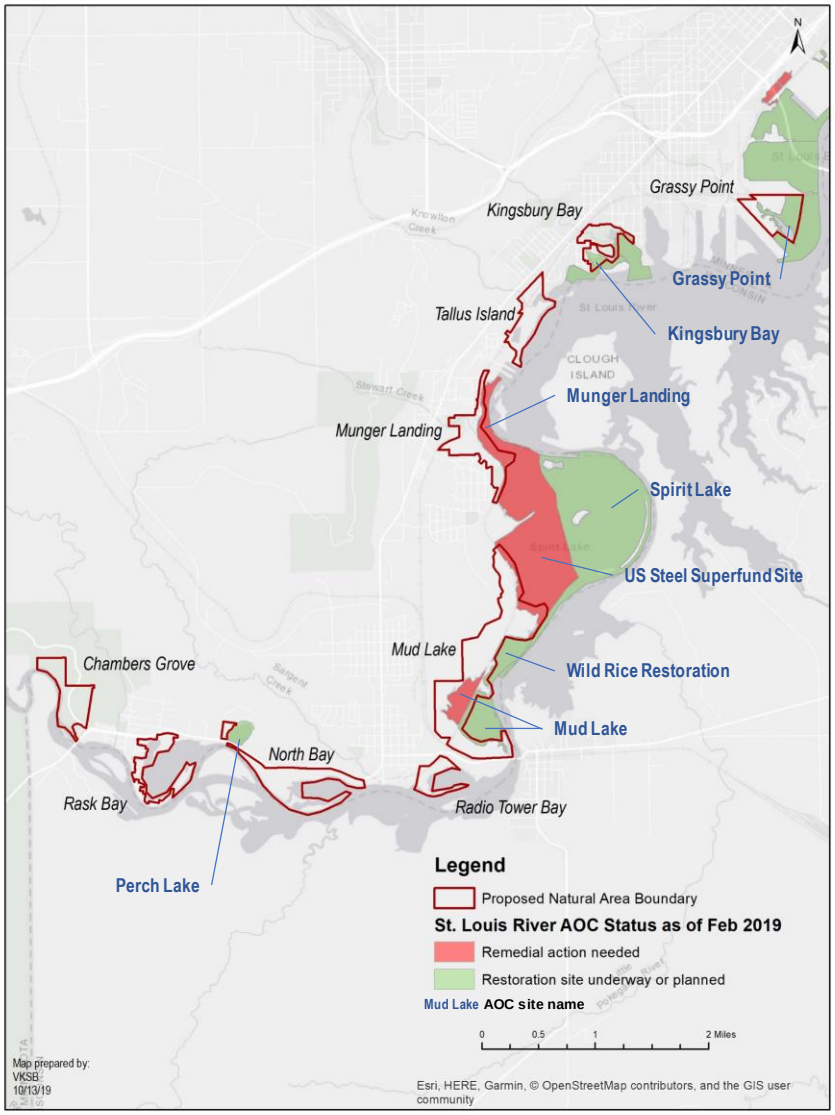

Figure 5: St. Louis River Area of Concern Sites Adjacent to the St. Louis River Natural Area

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

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

Note: this table is updated annually as part of the AOC Remedial Action Plan updates. See the MPCA's website.

Project Name	AOC Action Number	Status	Project Description	Date to be Completed
Perch Lake	9.09	Pre-design	Revitalize biological connection between estuary and Perch Lake and restore optimum bathymetry	2021
Wild Rice Plan and Associated Restoration Sites	9.21	In progress	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	Pre-design	Remediate contaminated sediments, establish more vital hydrologic connection and restore wetland habitat including wild rice; establish deep water.	2022
Mud Lake West	5.18	Remedial decision	Remediate contaminated sediments.	2020
US Steel/Spirit Lake	9.01	Design	Remediate contaminated sediments and restore emergent wetlands.	2023
Munger Landing	5.09	Pre-design	Remediate contaminated sediments.	2021
Kingsbury Bay	9.06	Construction	Restore wetland complex at the mouth of Kingsbury Creek to pre-1961 condition.	2021
Grassy Point	9.04	Construction	Remove nonnative material and restore optimum bathymetry.	2020

Source: St. Louis River AOC 2019 Remedial Action Plan

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~~.

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~~effects on 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 hypothesized to be the~~a~~ result of legacy contamination from historic industrial operations in the watershed. There were also municipal contributions and natural conditions that contributed to the perceived impairments. 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 transformers, and electrical components, as well as paper products such as 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 (*Convallaria 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~~EAB 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~~ SLRNA ~~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~~EAB 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~~EAB 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~~EAB 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. Land use planning that allows for migration of these communities up and down slope as water levels fluctuate can benefit the long term health of the 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 protecting them from human disturbances such as climbing, unauthorized trails, and other direct impacts. However, trails, or other human use in the near these communities, such as the trails through the quarry, do not now have a detrimental effect. ~~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 creeks 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~~ BIRD ~~HABITAT~~HABITAT

The SLRNA is nesting ~~of~~and 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 Waabizheshikana (Marten Trail)~~Western Waterfront Trail, Park and Recreation~~ Mini-Master Plan (~~draft~~City of Duluth, 2019) describes planned extensions of the Waabizheshikana~~Western Waterfront Trail~~ and assoc~~ai~~ated facilities, incuding river access points for the St. Louis River Es~~u~~tuary National Water Trail (designation pending), from ~~Tallus~~Tallas 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 and water-based landings 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. Water access features and education as part of ~~a~~the proposed National Water Trail will be used to help prevent unauthorized landings.

OHV use is strictly prohibited within city limits. Damage to trails from these vehicles can be severe.

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~~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~~ Foundation 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 or other contractor	202~~2~~5
See comment			
Address Unauthorized Trails, Landings, and OHV Use	$7,500	City of Duluth	2022
Grassy Point~~/Kingsbury Bay Restoration~~ Revegetation Project	Funds secured.	Minnesota Land Trust, MNDNR	2022
Coordination with MPCA and MNDNR on St. Louis River AOC Projects	None.	City of Duluth staff	2025
Land Acquisition	~~$YYY~~To be determine by appraisals	City of Duluth	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 and Figure 7). 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 re-treat these areas and re-plant as necessary with native plants. This work is planned for 2020-2022 and is estimated to cost $165,000.

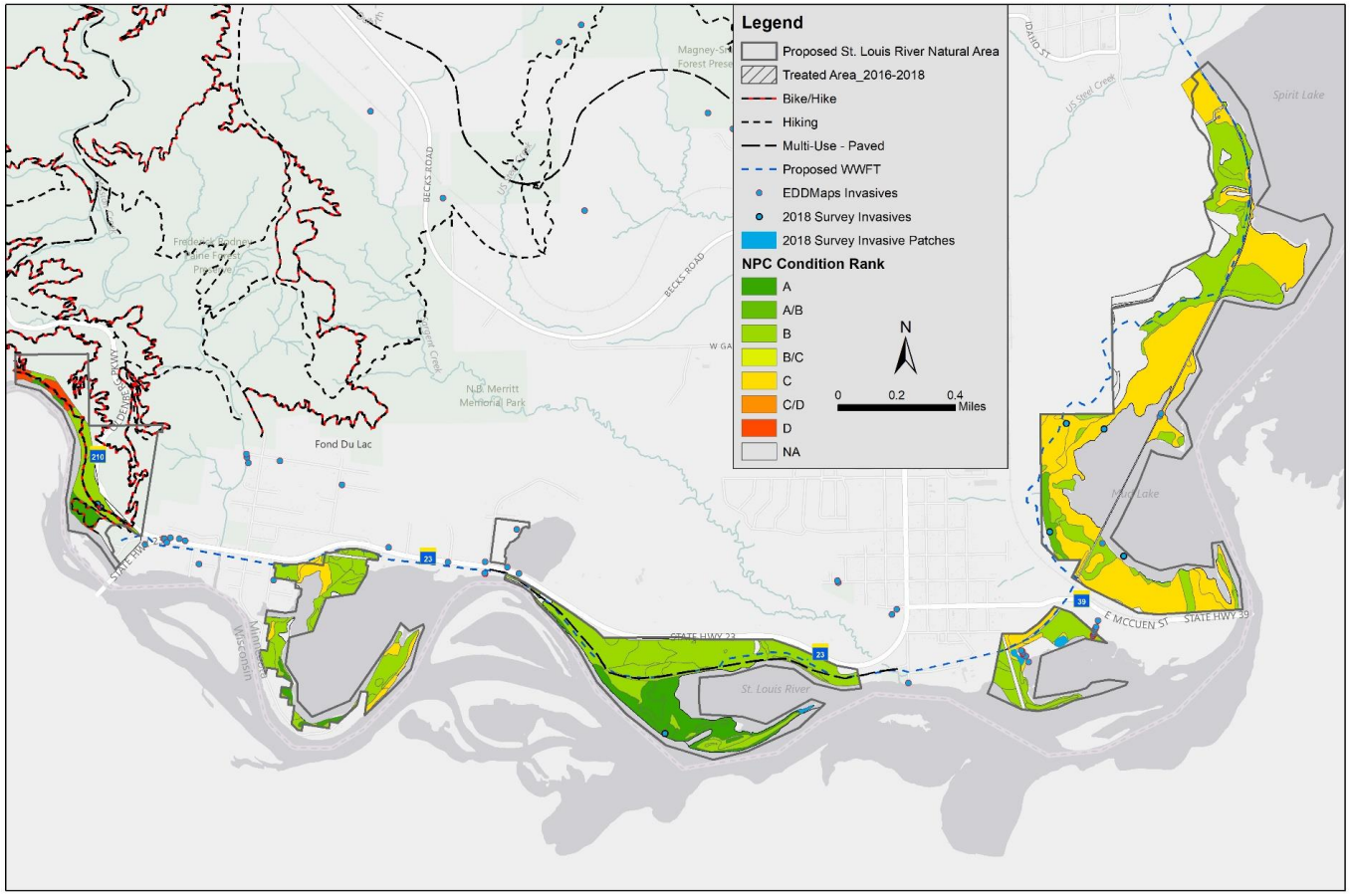

Figure 6: Priority Invasive Species Control Areas for 2020-2021 in the SLRNA

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

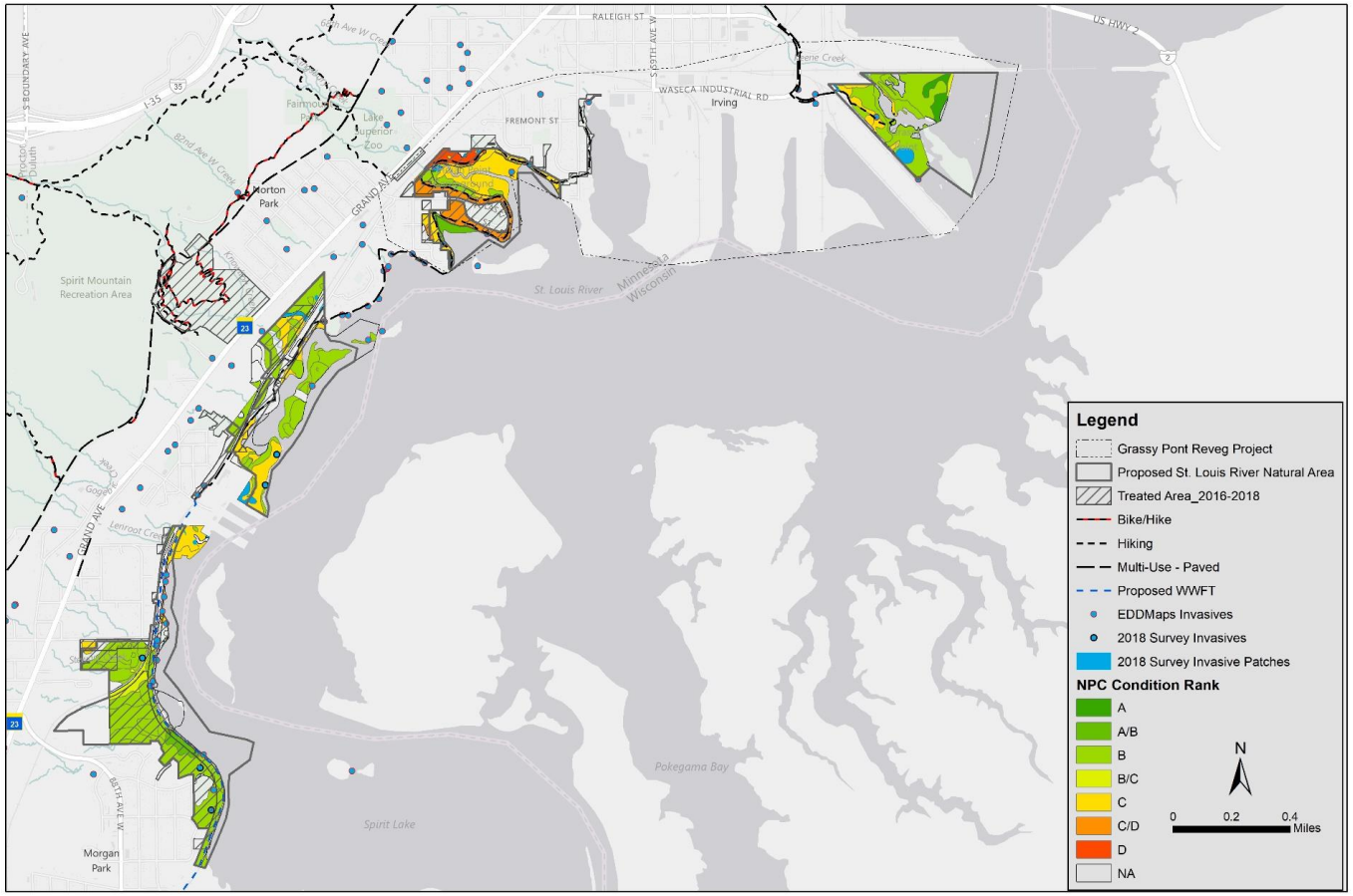

Figure 7: Priority Invasive Species Control Areas for 2020-2021 in the SLRNA

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

Address Unauthorized Trails, Landings 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. In addition, the City is aware that unauthorized foot trails and water landings occur. The City will develop an approach for addressing unauthorized trails, landings and OHV within the natural area, with a focus on these three project sites for OHV and trails and review potential concerns along the corridor for water landings. ~~, that~~ Most ~~will~~ likely this work will 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 or planned for the near future has occurred.~~and trail systems come into use~~.

Coordination with MPCA and MNDNR on St. Louis River AOC Projects ~~Coordination with St. Louis River AOC Remediation and Restoration Projects~~

City staff have been ~~designated~~assigned to ~~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 constructio~~o~~~~i~~n for Grassy Point, Kingsbury Bay, Perch Lake, Mud Lake, US Steel/Spirit Lake, ~~and~~ Munger Landing, and wild rice restoration 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.

Grassy Point~~/Kingsbury Bay Restoration~~ Revegetation Project

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.

Land Acquisition

City staff will work to secure funding for acquisition of private and State of Minnesota tax forfeit properties within the SLRNA. Estimated costs for aquisition of these properities is $X,XXX,XXX. This effort, which is contigent on landowner assent, is anticipated to be complete in 2025.

Commented [VB4]: Diane- insert estimated cost here

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 key messages:
    - 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: Nomination of the St. Louis River Natural Area to the Duluth Natural Areas Program.


DULUTH NATURAL AREAS PROGRAM