

Development and Implementation of an Adaptive Permitting and Compliance Strategy

Spirit Lake Sediment Remediation and Habitat Restoration Project

St. Louis River Area of Concern

Duluth, Minnesota

Presented at the 2023 WEDA Environmental Summit

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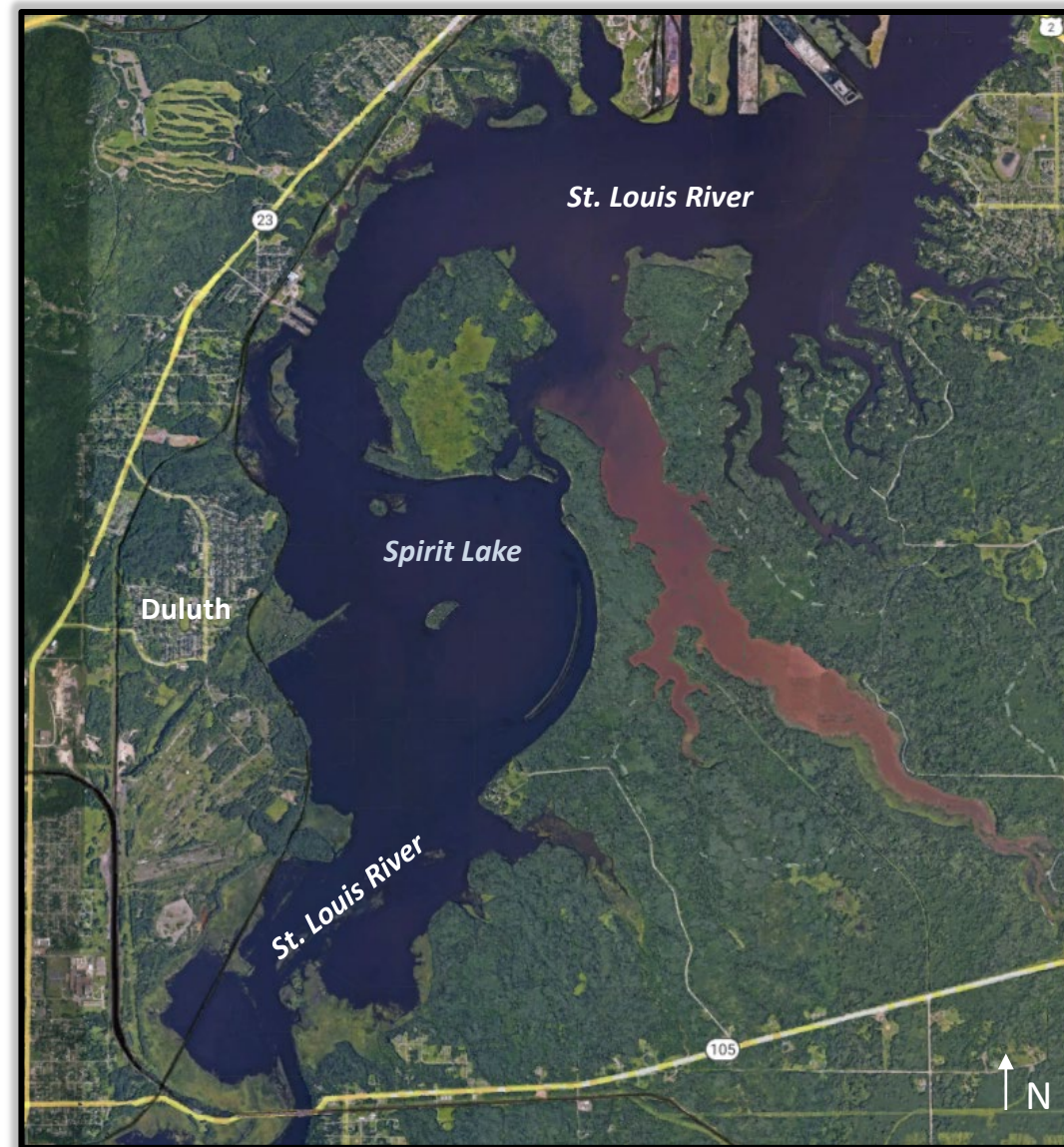
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Spirit Lake Location and History

- Spirit Lake is a widening in the St. Louis River in Duluth, Minnesota 8 miles upstream from Lake Superior
- Area is historically significant and a place of high cultural importance to tribes in this region
 - Lake Superior and Mississippi Railroad runs along western shoreline of Spirit Lake
 - Spirit Island in the center of Spirit Lake is sacred to the Anishinaabe people
- Active operations at the United States Steel (USS) Duluth Works Site along the western shoreline between the early 1900's and late 1980's
 - Steel operations along with other upstream industry grew the economy of Duluth in the 20th century; however, impacts to Spirit Lake were discovered during site investigations in the 1980's and 1990's, primarily PAHs and metals



Design and Implementation through the Great Lakes Legacy Act Partnership

USEPA and U. S. Steel entered into a project agreement to complete the project under the Great Lakes Legacy Act (GLLA)



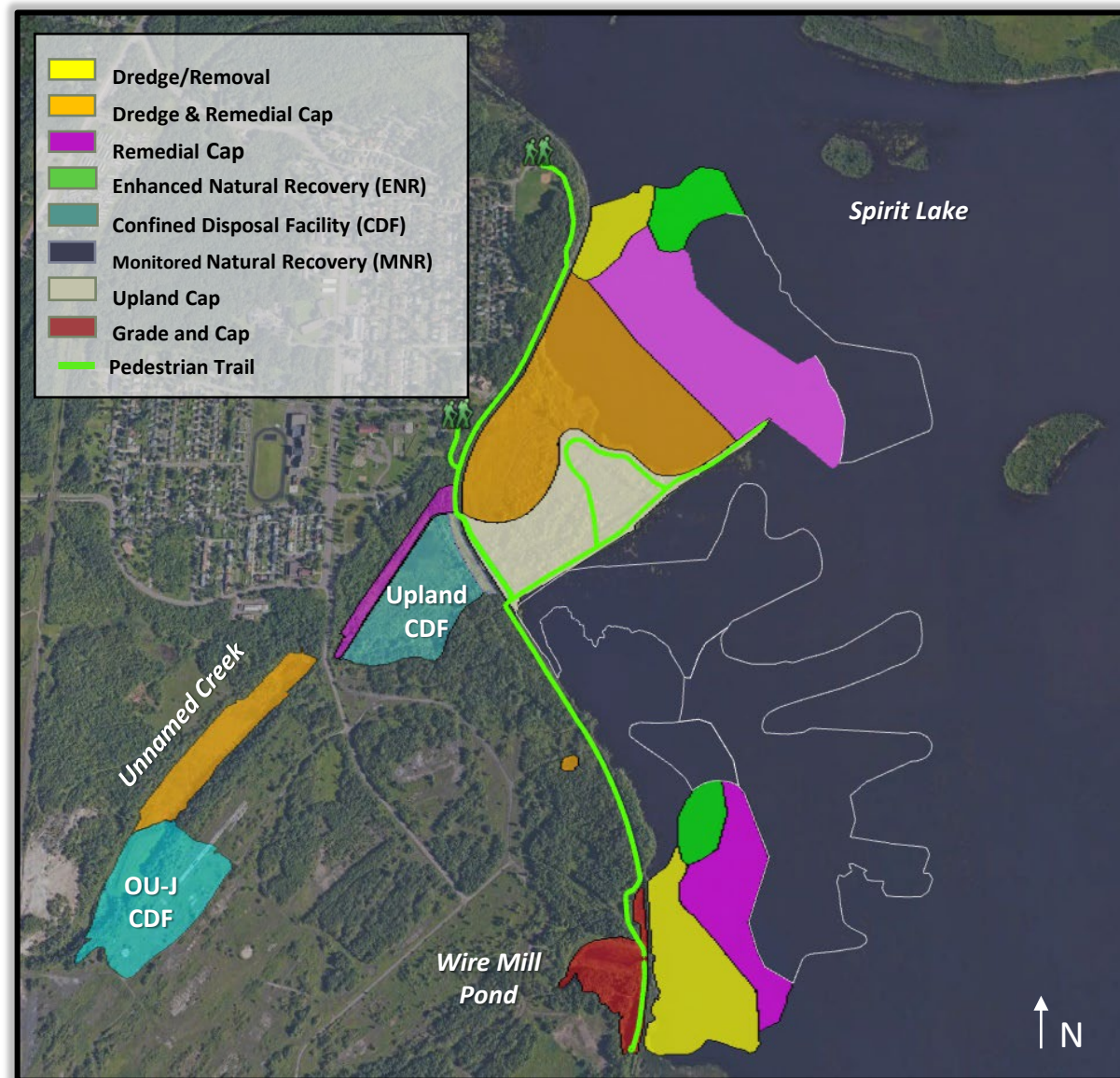
USEPA-USS Partnership Benefits

- The Great Lakes Restoration Initiative (GLRI) authorizes and provides federal funding to accelerate efforts to protect and restore the Great Lakes
 - The Great Lakes Legacy Act (GLLA) is a voluntary cost-share program used to accelerate remediation of impacted sediments in Areas of Concern (AOCs)- there are 43 AOCs in the Great Lakes, Spirit Lake is within the St. Louis River AOC
 - USS is the Non-Federal sponsor of the Spirit Lake Sediment Remediation Project under GLLA
 - USS provides 51% of the funds necessary to implement the project
 - ✓ Cost-share of project total \$186M for site investigation, remediation and restoration –reach project goals of addressing impacts in sediment and restoring habitat faster
 - ✓ USS partnership under the GLLA provides the opportunity to increase waterfront access in the Spirit Lake area and construct recreational features
- **The project at Spirit Lake demonstrates successful implementation of the public-private partnership model through FS, pre-design, multiple construction phases and design modifications**
- **Collaboration in the partnership allowed for remedy completion in 2022 and ongoing habitat restoration in 2023**

Remedy and Restoration Design Overview

Remediation is complete at Spirit Lake

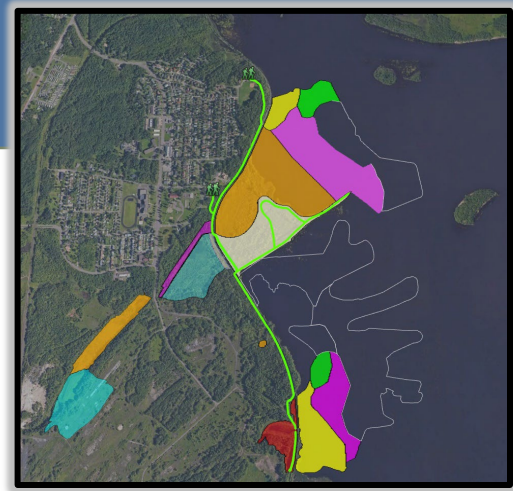
- **Dredging** across 80 acres; 460,000 CY removed hydraulically and mechanically
- **Dredge and cap** approach to create a new shallow sheltered bay and restored creek and floodplain
- **Capping** across 88 acres in Spirit Lake and 10 acres in the Unnamed Creek and floodplain
- **Grade and cap** at Wire Mill Pond
- **CDF Construction**- two onsite CDFs covering 25 acres
- **Enhanced Natural Recovery**- 12 acres
- **Monitored Natural Recovery**- 115 acres
- **Upland capping** to create area for trail and recreational features
- **Shoreline protection** throughout the site



Remedy and Restoration Design Highlights

Dredging across 80 acres

- Mechanical and hydraulic
- Above and below OHWL



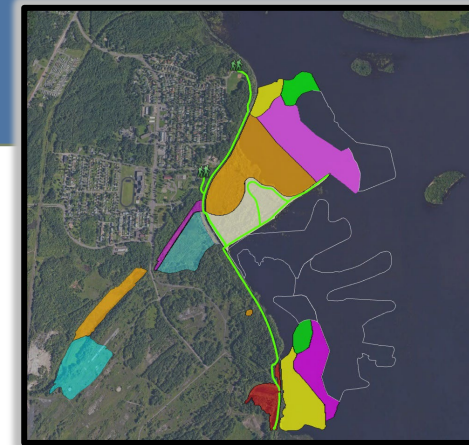
Hydraulic dredging in Wire Mill Delta



Mechanical dredging above OHWL portion of the area to become a new shallow sheltered bay

Remedy and Restoration Design Highlights

Dredge and cap approach to create a new shallow sheltered bay and restored creek and floodplain



Unnamed Creek before (2020) and after construction (June 2023)

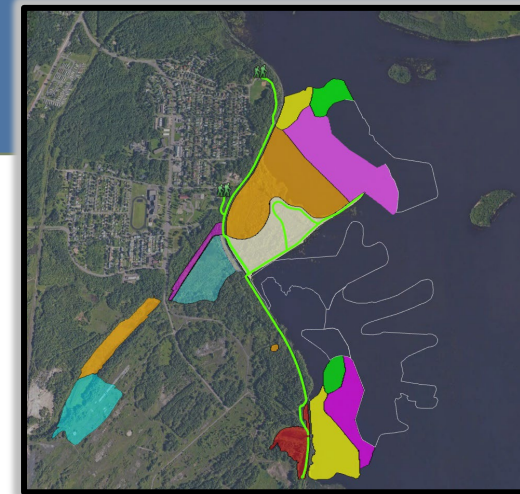


Unnamed Creek Delta/Shallow sheltered bay before and after construction

Remedy and Restoration Design Highlights

➤ CDF Construction

- Upland CDF- use of Geotubes®- 10 acres
- Operable Unit J CDF- 14 acres



Upland CDF with Geotube® bag field in progress (2021)



Upland CDF with final cap being placed (2023)

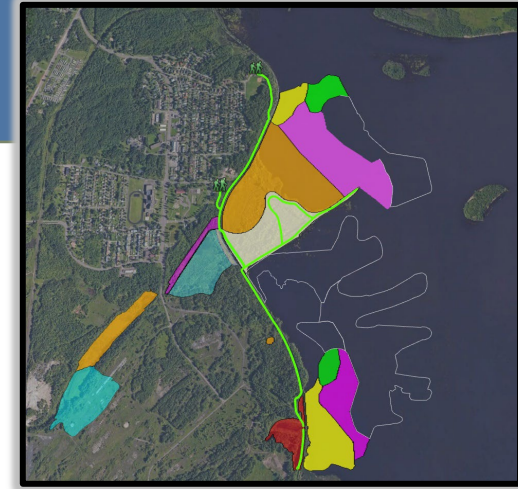
Remedy and Restoration Design Highlights

➤ Natural Recovery

- **Enhanced**- 12 acres; thin layer sand placement to accelerate natural recovery
- **Monitored**- 115 acres; long-term monitoring plan in development

➤ Shoreline protection-

- Combination of critical, intermediate, and softened shoreline



Shoreline protection along with Wire Mill Delta shoreline



Critical shoreline protection in areas prone to high erosion



Transition from intermediate to softened shoreline
in the shallow sheltered bay

Remedy and Restoration Design Highlights

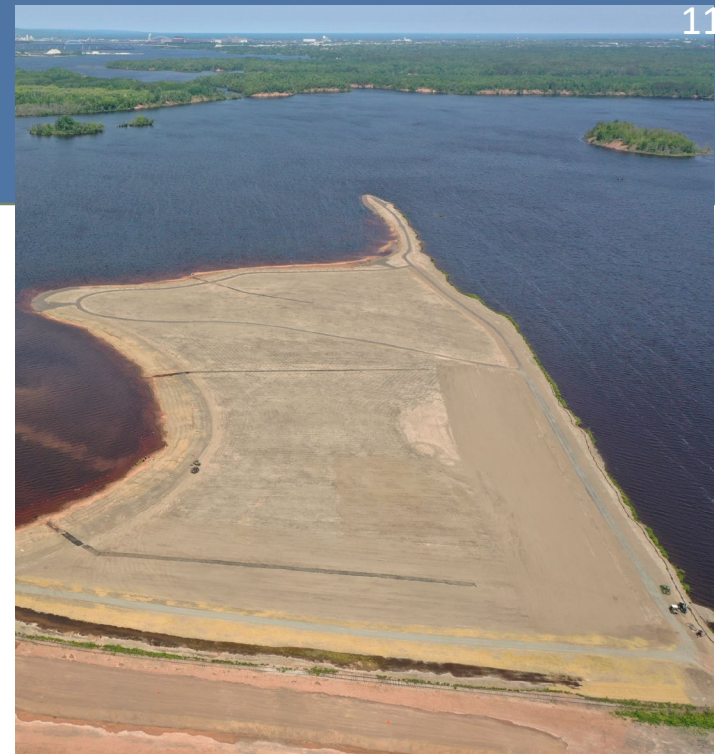
Recreational features are partially complete at Spirit Lake



Over 2 miles of pedestrian trail will be available to the public with interpretive signage



Section of completed trail along the north shore of the shallow sheltered bay



A section of the pedestrian trail loops onto the Delta Cap providing access to fishing stones, pause points, and a kayak landing (in progress)



Completed fishing stones and pause points on the Delta Cap

Remedy and Restoration Design Highlights

Habitat Restoration is in progress at Spirit Lake

- Habitat restoration is underway in
 - 138 acres of aquatic areas
 - Upland areas including the CDFs and slopes of Wire Mill Pond (over 70 acres)
- Aquatic plantings designed with agency coordination and adjusted to match conditions at time of planting, as needed
- Habitat restoration creates new open water and restores a variety of water depths to the estuary, along with a mosaic of wetland types

Zone Number	Restored and/or Enhanced Habitat Zone Type
1	Deep water (>6 ft)
2	Shallow, open water wetland (SAV) (4 to 6 ft)
3	Shallow, open water wetland (SAV and floating vegetation), (2 to 4 ft)
4	Shallow, emergent marsh, (0 to 2 ft)
4a	Shoreline fringe marsh, OHWL to 0 ft depth
5	Stream Channel- Riparian
6/7	Upland planting native mix (CDFs, Delta Upland Cap)

Habitat zones being planted for the in-water and upland project areas

Remedy and Restoration Design Highlights

Some restoration highlights include:

- Planting of aquatic plants from the OHWL to up to 4-5 ft of water depth using various methods
- Realignment and restoration of the existing Unnamed Creek stream channel to improve sinuosity and restore the adjacent floodplain
- Creation of 14 acres of new open water as a shallow sheltered bay
- Creation of sheltered and softened shorelines



Planting in shallow sheltered bay with predation exclusion fencing



Planting shoreline fringe marsh species in the shallow sheltered bay (June 2023)

Need for an Adaptive Permitting and Compliance Strategy

- Strategy began before preparation of any permits and was driven by:
 - Large geographic scale and scope of remedy
 - Complex regulatory landscape
 - Designing while balancing regulatory/stakeholder needs and challenging site conditions
 - Consideration of level of coordination with agencies and public necessary to successfully complete the project

Permits/Approvals Obtained

Federal

- USACE Section 404/10 and Section 401 Water Quality Certificate
- Consultation with USFWS under Section 7 of the Endangered Species Act

State

- Minnesota Department of Natural Resources (MNDNR) Work in Public Waters Permit
- MNDNR Water Appropriation Permit
- MNDNR Dam Safety Permit
- MNDNR Aquatic Plant Management Permit
- MNDNR Natural Heritage Inventory Review
- MNDNR Coastal Zone Consistency Determination
- MN State Historic Preservation Office and Tribal Historic Preservation Office Section 106 Consultation

Local (City of Duluth)

- Minnesota Pollution Control Agency (MPCA) NPDES Construction Stormwater Permit
- Environmental Assessment Worksheet
- Wetland Conservation Act Permit
- Special Use Permit
- Historic Construction Permit
- Fill and Grading Permit
- Shoreland Permit
- Erosion and Sediment Control Permit
- Stormwater Pollution Prevention Plan

Spirit Lake Regulatory Landscape

➤ Overall, this project engaged ten individual agency and stakeholder groups due to the breadth of resources in the project area

- Natural resources
- Cultural resources
- Community considerations

RIVER PLACES

Spirit Lake Remediation

RESTORING A HISTORIC WETLAND

The U.S. Environmental Protection Agency (EPA) and United States Steel Corporation (USS), and others have partnered to clean up impacted sediment and soil in the Spirit Lake area of the St. Louis River in Duluth. The cleanup began in Fall 2020 and was completed in 2023. The project provides significant habitat restoration and enhancement, as well as improved recreational access for the community.

The in-water remediation process involves selective dredging in impacted areas, covering sediment with a cap, or a combination of both. Lesser impacted areas are covered with a thin layer of clean sand.

The constructed upland capped area is a park with walking trails, overlooks, fishing spots and kayak launches.

The streams in affected areas were capped and covered with clean sand and planted with aquatic and riparian vegetation to support river life.

Impacted sediments & soils are placed in upland capped areas, and planted with prairie grass.

Waabizheshikana (The Marten Trail)

DULUTH M.I.N.N.E.S.O.T.A.

WABANONKI RESERVATION

Great Lakes RESTORATION

m DNR

Sea Grant ILLINOIS-INDIANA

m MPCA

USS

Example of an interpretive sign to be constructed along the pedestrian trail highlighting the remedy and nexus of natural and cultural resources and the local community

Spirit Lake Regulatory Landscape

➤ Spirit Lake Natural Resources

- In-water and onshore remedy areas, with impacted above and below OHWL habitats
- Multiple jurisdictional authorities
 - MN public waters
 - Waters and wetlands under U.S. Army Corps of Engineers jurisdiction
 - Above OHWL wetlands under the Wetland Conservation Act
- MN Department of Natural Resources (MNDNR) and MPCA critical regulatory authorities for permit issuance as well as stakeholders in the AOC
 - Protection of human and ecological health
 - Protection of public waters and benefits from those waters

Spirit Lake Regulatory Landscape

➤ Spirit Lake Cultural Resources

- Consultation under Section 106 with the MN State Historic Preservation Office
 - Spirit Island and waters of Spirit Lake sacred to tribes in the region- Spirit Island and bottom lands owned by the Fond du Lac Band of the Lake Superior Chippewa
 - LSMRR coordination for direct and indirect impacts from remediation to historic structure and operations
- City of Duluth
 - Historic construction approvals
- Tribal coordination
 - Critical to selection of a remedy and developing restoration goals



View of a section of the LSMRR pre-project construction



Aerial view of Spirit Island in Fall 2022

Spirit Lake Regulatory Landscape

➤ Spirit Lake Community Considerations

- Spirit Lake project area is directly adjacent to the residential neighborhood of Morgan Park built in the early 1900's to house steel workers
- Currently over 600 residences in Morgan Park
- Early design and permitting work identified that significant community involvement and outreach would be necessary



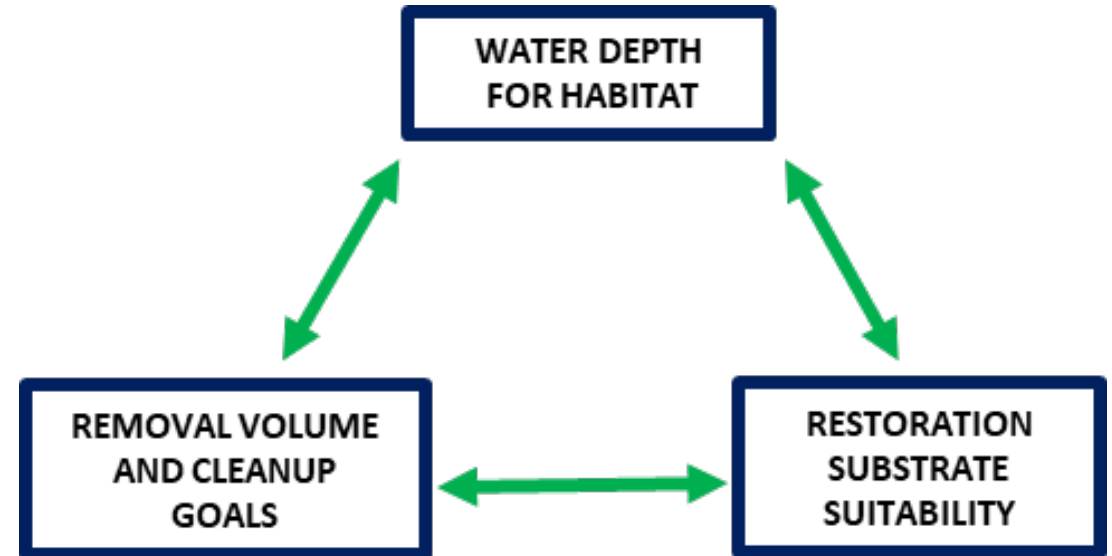
View of a section of Morgan Park adjacent to the Upland CDF

Design and Permitting- Stakeholder Needs and Site Conditions

- A significant effort and challenge for the project was to develop a design (and eventually work through design changes) that:
 - Balanced multiple regulatory needs
 - Achieved remedy and habitat goals
 - Overcame challenging site conditions
- This drove need for an adaptive regulatory strategy

Design and Permitting- Stakeholder Needs and Site Conditions

- Challenge: Balancing remedial and habitat goals
- Considerations:
 - Need to balance sediment removal goals, create desired water depth, and have suitable substrate for habitat goals
 - Ecological resource interests balanced with protectiveness
 - Fisheries habitat and inclusion of habitat features to support spawning
 - Substrate suitability for restoration planting and establishment
 - Cap design, thickness, and protectiveness
 - Early coordination and eventual agency agreement on habitat restoration as compensatory mitigation specifically for conversion of habitat



Design and Permitting- Stakeholder Needs and Site Conditions

- Challenge: Need for extensive coordination under Section 106
- Coordination with the SHPO, regional tribes, and the LSMRR organization was necessary during design, permitting, and construction
- Key considerations:
 - Specialized reports for work on/near LSMRR
 - Maintaining historic aesthetic of railroad while restoring to current standards
 - New and restored railroad bridges required extensive coordination and provide significant benefit to the rail and to water exchange at the openings
 - Early coordination and significant project partner effort on developing and eventual compliance with Memorandum of Agreement with LSMRR and the Fond du Lac Band of the Lake Superior Chippewa



Construction of the new railroad bridge at the opening of Unnamed Creek and the new shallow sheltered bay

Design and Permitting- Stakeholder Needs and Site Conditions

- Challenge: Water management
- Considerations:
 - Significant water production requiring treatment identified early (close to 1 billion gallons)
 - Early and close coordination with MPCA on design of onsite water treatment plant
 - Water use tracking and proactively identifying when water usage may increase



Aerial of the onsite water treatment plant

Design and Permitting- Stakeholder Needs and Site Conditions

➤ Challenge: Desired future use

➤ Key considerations:

- Coordination with City of Duluth on not only project permits, but alignment of the design with desired future use of the area
- USEPA-USS partnership allowed for inclusion of recreational features that were
 - Remedy compatible
 - In sync with Duluth's efforts to increase waterfront recreation and tourism and connect trail segments outside of the Spirit Lake area to the pedestrian trail designed for the project

➤ Challenge: Community involvement and outreach

➤ Key considerations:

- Early planning for the outreach approach
- Need for Community Involvement Plan
- Keeping residents informed of design progress and expectations during construction
- Allowing for avenues for questions and comments from the public

Developing an Adaptive Permitting and Compliance Strategy- How was it accomplished?

➤ Development of an adaptive permitting and compliance strategy was focused on:

- **Building pathways and relationships** that would allow the project to move forward from pre-design, through design implementation and project changes efficiently
- **Developing communication and coordination steps** that could be used throughout all stages of the project



**Spirit Lake
Adaptive
Permitting
Strategy
Keystone**

Developing an Adaptive Permitting and Compliance Strategy- How was it accomplished?

Spirit Lake
Adaptive
Permitting
Strategy
Keystones

EARLY INITIATION

Begin agency/stakeholder coordination early

PROACTIVE RESEARCH

Gather information and identify key contacts

- These components are about figuring out the W's → **who** are the key individuals, **what** are their concerns and needs, **where** are the potential sticking points and **why** are they important to each entity, and **when** are key decisions and buy-ins needed
- Initiated as early as possible with regulatory agencies, tribal parties, and other project stakeholders was critical to developing project alternative
- Identified the specific permit leads proactively and to engage and understand the regulatory framework – also helped to build a collaborative team in later project phases
- Proactive research also helped to anticipate the outcomes of reviews and allowed for preparation and distribution of additional information

Developing an Adaptive Permitting and Compliance Strategy- How was it accomplished?

**Spirit Lake Adaptive Permitting Strategy
Keystones**

BUILDING A COLLABORATIVE TEAM
Form working group of permit leads and stakeholders



Successful Restoration of Spirit Lake

- Collaboration with agencies and stakeholders began during the FS and early permitting phases
- Continued with formation of the Project Coordination Team (PCT) when design changes led to the need for efficient, regular communication between the design team and regulatory authorities
- The PCT has met biweekly on conference calls since 2021, held 4 in person working group meetings, and continues to meet today (more than 50 meetings)

Developing an Adaptive Permitting and Compliance Strategy- How was it accomplished?

**Spirit Lake
Adaptive
Permitting
Strategy
Keystones**

UNDERSTANDING PRIORITIES

Identify multiple party/competing restoration interests

BALANCED PLANNING

Early and adaptive planning to balance project goals

- There were multiple and often competing interests for restoration beginning early in the Spirit Lake project
- Gained understanding of priorities and how to balance them through progressive collaboration
- Allowed for adaptive development of design changes in consideration of the key stakeholder priorities
- Some examples include:
 - Balancing water depth for fish habitat and substrate for planting regimes
 - Balancing the need for specific recreational features with the desired habitat types
 - Balancing restoration of historic features with need to design access to future public areas

Developing an Adaptive Permitting and Compliance Strategy- How was it accomplished?

Spirit Lake
Adaptive
Permitting
Strategy
Keystones

CONTINUING ENGAGEMENT

Progressive coordination through design and permitting

ADAPTIVE MANGEMENT

Create process for efficient design change approvals

- Continuing engagement included not only progressive engagement with **regulatory agencies** but also outreach with the **local community**
- **Continued regulatory engagement:**
 - This component was critical to work through design changes after construction began, it remains critical today during the project's final phase of restoration
- Allowed for adaptive management with the PCT as means to engage regularly and communicate about small and large potential project changes
- In the field evaluation of alignment of changes with project authorizations was manageable given the efficient avenue in place for discussion with key agency staff

Developing an Adaptive Permitting and Compliance Strategy- How was it accomplished?

Spirit Lake Adaptive Permitting Strategy Keystones

CONTINUING ENGAGEMENT Progressive coordination through design and permitting

➤ Continued community engagement involves:

- Developed a project specific Community Involvement Plan
- Monthly Outreach Team conference calls (20+ and continuing)
- Installation and quarterly update of project kiosk posters
- Mailing of fact sheets to nearby residents and project stakeholders
- Weekly posting of photos on EPA’s Spirit Lake public website
- Public meetings (4 to date) at the Morgan Park Community Center



EPA
United States Environmental Protection Agency

Spirit Lake Environmental Cleanup Continues Under GLRI
Duluth, Minnesota July 2021

For more information
For questions or concerns regarding this site, please contact:
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Web: <http://www.epa.gov/great-lakes-act-cleanup>

Cleanup possible through GLRI

The Great Lakes Restoration Initiative, or GLRI, was launched in 2010 to accelerate efforts to protect and restore the Great Lakes. Sixteen federal partners work together on five priorities:

- Cleaning up Great Lakes Areas of Concern
- Preventing and controlling invasive species
- Reducing nutrient runoff that contributes to harmful/toxic algal blooms
- Restoring habitat to protect native species
- Conducting education and outreach for future restoration efforts

GLRI’s funds provide up to 65% of the cost of cleanup with a non-federal entity contributing the balance through a Great Lakes Legacy Act partnership – under which the Spirit Lake work is being done. GLLA partnerships have cleaned up 27 sites in six Great Lakes states and remediated 4.6 million cubic yards of contaminated sediment.

2020 Work Activities
In October and November 2020, tree clearing and construction of temporary staging areas offshore were done to prepare the site for remediation activities. (Continued on reverse page.)

The purpose of the project is to address chemical constituents of concern, primarily polycyclic aromatic hydrocarbons, or PAHs, and associated heavy metals including lead, copper and zinc in the Spirit Lake area. The large environmental cleanup includes dredging, capping and monitoring impacted sediment. The cleanup will support the eventual delisting of the St. Louis River AOC and will result in benefits to people and the ecological system.

The cleanup operations began in October 2020. They are being performed by contractors to EPA and U.S. Steel.

Site restoration highlights: Before dredging and after dredging remediation and restoration of the Unnamed Creek. Plantings along the channel and in the floodplain will be completed in early summer 2021.

Environmental Protection Agency

Search EPA.gov

CONTACT US

Spirit Lake Remediation Photo Gallery

Remediation Work Week of August 16, 2021

The field crew prepares for dredging activities by placing a silt curtain in the water around the work area with lights to warn boaters not to enter the work area. The curtain will prevent sediment from leaving the work area.



Spirit Lake Great Lakes Legacy Act Remediation Project

Monthly Outreach Team Call

April 27, 2023

Summary and Key Lessons Learned

- We've learned a lot from the Spirit Lake project about what works when implementing a project of this scope in a dynamic environment
- We learned how to evaluate and design changes, construction conditions, and stakeholder preferences through the lens of remediation as the primary project goal
- The main things that allowed this to happen were:
 - Using knowledge from early initiation and research to anticipate resource impact concerns
 - Understanding priorities and creative approaches to balance these priorities
 - A working group approach that is and remains critical to the success of a large-scale remediation and restoration project should be prioritized
 - Effective and clear community outreach tools used in a consistent fashion can raise awareness and support for the project and is important for a wholistic approach to regulatory compliance and community engagement



Habitat restoration in progress in the shallow sheltered bay



Thank you!

Many thanks to co-authors Mike Ciarlo, Mark Loomis, and Jamie Beaver and to the entire Spirit Lake Project Team

**For more information on the Spirit Lake Sediment Remediation Project visit the EPA Spirit Lake Website:
www.epa.gov/great-lakes-aocs/spirit-lake-great-lakes-legacy-act-cleanup**

