Lessard-Sams Outdoor Heritage Council

Knife River Habitat Rehabilitation-Phase III

Laws of Minnesota 2018 Final Report

General Information

Date: 06/28/2023

Project Title: Knife River Habitat Rehabilitation-Phase III

Funds Recommended: $927,000

Legislative Citation: ML 2018, Ch. 208, Art. 1, Sec. 2, subd 5(k)

Appropriation Language: $927,000 the second year is to the commissioner of natural resources for an agreement with Zeitgeist, in cooperation with the Lake Superior Steelhead Association, to enhance trout habitat in the Knife River watershed. A list of proposed enhancements must be provided as part of the required accomplishment plan.

Manager Information

Manager's Name: Tony Cuneo and Kevin J. Bovee
Title: Exec. Dir. & Project Manager
Organization: Zeitgeist and Lake Superior Steelhead Association
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Location Information

County Location(s): Lake.

Eco regions in which work will take place:

- Northern Forest

Activity types:

- Enhance

Priority resources addressed by activity:

- Wetlands
- Forest
- Habitat

Narrative

Summary of Accomplishments

We assessed, designed rehabilitation features and permitted 7200 linear feet of river reach in prime spawning areas. We completed construction on over 2200 linear feet of the reach.

SPECIFIC ITEMS:
*Installed approx. 400 feet of toewood bench.
*Graded approx. 500 feet of shoreline to allow river access to floodplain.
*Installed multiple log rollers/habitat structures.
*Installed multiple grade control structures.
*Created new riffles.
*Rehabilitated the riparian zone in the 2200' stretch using:
*Certified riparian zone seed mix.
*Deciduous species: silver maple, yellow birch, mt. ash.
*Coniferous species: tamarack, cedar, white & red pine.
*Multiple pollinator specie shrubs and native flowers.

Process & Methods

The goal of PH III-Knife River Habitat Rehabilitation project was to improve instream habitat, stabilize slumping streambanks and restore the riparian tree canopy.

Site Selection:

The LSSA conducted a rapid stream survey to determine the Knife River's overall condition. As stream impacts were identified during the survey, impaired stream reaches were photographed and mapped using GPS. The LSSA also monitor water temperatures to determine where trout survival is the highest. Finally, biological data was collected to determine the quality of in-stream trout habitat. This data was combined to rank and prioritize restoration areas where the worst stream impacts are restored, that reside in coolest water zones, within the best habitat corridors. This data concluded that "first-priority reaches" were located in the upper main Knife River. This also achieves our goal of a top-down restoration approach

Riparian planting sites were determined by site accessibility, construction activity and stream assessment using procedures listed above. Specified project riparian species were determined by the existing riparian habitat, upland or wetland conditions and exposure to sunlight.

Restoration Techniques:

Natural Channel Design (NCD) utilizes a science-based process to bring an unstable eroding stream reach back to a stable state. This method surveys an impacted stream reach to collect data to compare it to several stable stream sections. All survey work is performed using a geomorphic trained Stream Specialist. The assessment data that is collected includes: stream width to depth ratios, floodplain elevation, erosion calculations, longitudinal profile, cross-section elevation, pebble count and vegetation cover. This assessment data is entered into a computer program called Geomorph to create plans and specifications that will redesign the impacted steam channel profile, dimensions and shape to mimic stable reaches within the Knife River Watershed. These plans create the basis for the construction project by depicting channel reconfiguration, placement of structures, location of streambed excavation, location and elevation of the floodplain and realignment of the channel.

The LSSA's NCD process also features a top/down restoration approach. This approach extends the habitat corridor downstream in three ways:

* Downstream habitats are protected because the upstream sediment load is reduced.
* Instream trout spawning success is more productive.
* Newly constructed stream channels are reconnected to the floodplain.

Riparian Zone Rehabilitation:

The species of trees/shrubs/seed mixes being incorporated into the planting plan depends on the area to be planted, based upon wetness and soil types.

*. All seed mixes used in our projects are state certified for that specific area.
* Wet area species include: white spruce, tamarack, swamp white oak, river birch, silver maple and speckled alder.
* Higher elevation/dryer area species include: red pine, white pine, red maple, silver maple, bur oak, red oak, northern mountain ash, sand bar willow and speckled alder.
* Shrubs/Pollinator Species That Are Utilized: viburnum, red twig dogwood, black chokeberry, snowberry, downy arrow-wood.
* Several species listed above can be utilized in multiple planting locations.
*. LSSA utilized dormant willow staking in this reach with good success.
* The LSSA uses locally procured stock for all of our plantings.

How did the program address habitats of significant value for wildlife species of greatest conservation need, threatened or endangered species, and/or list targeted species?

The Knife River Habitat Rehabilitation Project meets many needs from instream areas to improved riparian zones.

*The primary beneficiary is the instream fishery populations and the first specie to benefit is the native brook trout. The enhancement of brook trout is very important to the MN DNR and to Minnesota anglers. Anadromous species that will benenfit are steelhead and brown trout. Our project provides habitats needed for complete life cycles for these species: spawning, rearing and adult stages through the construction of riiffles, pools, habitat structures, improved tailout sections and great overhead cover in the the toewood bench areas. Not only do these game fish species benefit but also the local non-game fish species benefit, including dace, shiners, chubs, sticklebacks and mudminnow.

*Macroinvertebrates also greatly benefit from the various instream habitats created throughout our project area. These species may included snails, crayfish, insects and worms. A very important part of this group are the mayflies, stoneflies and caddisflies.

*We have noticed a very large increase in frog populations after the completion of stream reach construction activities. We have even had a wood turtle in our work zone.

*Riparian zone improvements include a variety of tree species that benefit local wildlife throughout the year. From the Mt. Ash fruit that birds of all sort consume to flowering shrubs and native flowers that benefit pollinator species. A healthy riparian zone improves the quality of the entire watershed and all species that are found in it.

How did the program use science-based targeting that leveraged or expanded corridors and complexes, reduced fragmentation, or protected areas in the MN County Biological Survey.

Phase III of the Knife River Habitat Rehabilitation project used Natural Channel Design (NCD) methodology in our assessment, design and construction processes. NCD philosophy is based on the river having access to its entire floodplain in high water events minimizing severe watershed impacts. In rising water levels, the river will access the flood plain initially via a properly graded inside point bar. If the waters continue to rise, the river will run into the toewood placed on the outside bends. This toewood will dissipate the erosionary energy that is being created by rising levels. If the water level is high enough to crest the toewood, the protected bank will have much less erosion due to the processes mentioned above. This in turn will decrease the sedimentation that enters the stream and will greatly improve instream habitats downstream of the project. Excess sedimentation was the primary factor in the MNPCA listing of the Knife River on their impaired waters list. Less sedimentation carried downstream improves all fish habitat (juvenile, mid-life and adult) and invertebrate habitats.

PH III riparian planting plans also included science-based ideas. Not only did we utilize known local species (both deciduous and coniferous) we researched studies that predicted tree species that would survive during the warming climate due to global climate change. One tree specie that we are utilizing is the silver maple. Not only is this species expected to migrate into our area but a study performed by the Fon du Lac tribal natural resources department stated that the silver maple would be the best sited tree to replace black ash throughout the watershed if the emerald ash borer (EAB) continues to spread throughout the watershed and the entire northern part of the state. Not only are we losing trees to the EAB but the spruce bud worm has wreaked havoc in the watershed. Our riparian plantings include a diverse planting array so that if there are future invasive pests, the riparian zone will be able to withstand the onslaught and continue to provide shade to cool the water, decrease evaporation, and provide large woody debris.

Explain Partners, Supporters, & Opposition

The Knife River Habitat Rehabilitation Phase III project had three major parts, instream habitat design/construction work, sediment reduction, and riparian zone rehabilitation:

Instream Habitat Design/Construction and Sediment Reduction Work: Partners include the MN DNR-Area Stream Specialist, Duluth Area Fisheries and Ecological and Water Resources; Lake County Soil and Water Conservation District; Lake County Forestry; U.S. Army Corps of Engineers. The LSSA and design engineers/construction contractor worked very closely together on critical components to the project.

Riparian Rehabilitation: Partners include MN DNR; Conservation Corps MN; ; Hammer Nursery; Boreal Natives; Lake County Forestry; St. Louis County Forestry.

Exceptional challenges, expectations, failures, opportunities, or unique aspects of program

A major factor always encountered when working in this environment is the affect that weather can have. Days of rain can affect the work schedule in various ways from localized thunder/lightning requiring an immediate cease to a heavy rain that can raise the river for several days after stopping.

A very unique aspect of this project was the use of an underwater drone. This drone was floated two times a year for two years after completion of the toewood benches. We were able to actually visualize our underwater work and to monitor changes that may occur throughout the year. The drone was used after the annual spring runoff subsided and again later in the fall going into freeze-up. We recorded many fish (both game and non-game species) utilizing this great overhead cover.

Acres exceeded due to larger riparian buffer area being affected.

What other dedicated funds may collaborate with or contribute to this program?

- Other : LCMR, GLRI, DNR
- Clean Water Fund

How were the funds used to advance the program?

NA

What is the plan to sustain and/or maintain this work after the Outdoor Heritage Funds are expended?

Using the Natural Channel Design (NCD) engineering parameters as required for permitting, projects should be self maintaining if the initial assessment/data obtained were sound, the plans derived from that data were designed properly and the construction was according to the design plans, elevations and specs. This is one of the reasons that we take such particular care in the data collection portion of the project. And this is why we try to have the engineers onsite as much as needed to ensure quality construction processes and final outcomes.

The MN DNR, through their annual beaver flights in the entire Knife River watershed, will alert us to any incursion into the construction areas by beaver and to any potential problems that may occur once the beaver are established. The MN DNR flies all named tributaries in the Knife River watershed after leaf drop in the fall. If active beaver dams are encountered in the flight areas (which include all of our work zones) the state pays APHIS (federal trappers) to go in and trap the beaver and notch the dams to allow fish passage.

Finally, the Lake Superior Steelhead Association (LSSA) volunteers walk the entire length of productive spawning water in the Knife River each spring and these walks will alert us to any impacts to the project work areas, both instream work and riparian work. Plus this information gives us a picture of the annual run and spawning activity.

Budget

Totals

Item	Requested	AP Amount	Spent	Leverage	Received Leverage	Leverage Source	Original Total	Final Total
Personnel	$170,000	-	$170,000	$7,500	$7,500	Private Source-LSSA	$177,500	$177,500
Contracts	$635,000	$726,500	$635,000	$17,000	$17,000	Private Source-LSSA & Zeitgeist	$652,000	$652,000
Fee Acquisition w/ PILT	-	-	-	-	-	-	-	-
Fee Acquisition w/o PILT	-	-	-	-	-	-	-	-
Easement Acquisition	-	-	-	-	-	-	-	-
Easement Stewardship	-	-	-	-	-	-	-	-
Travel	-	-	-	$7,100	$7,100	Private Source-LSSA &Zeitgeist	$7,100	$7,100
Professional Services	-	$131,700	-	$10,000	$10,000	Private Source-LSSA & Zeitgeist	$10,000	$10,000
Direct Support Services	-	-	-	-	-	-	-	-
DNR Land Acquisition Costs	-	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-	-
Other Equipment/Tools	$12,000	-	$12,000	$2,500	$2,500	Private Source-LSSA	$14,500	$14,500
Supplies/Materials	$110,000	$68,800	$110,000	$1,300	$1,300	Private Source-LSSA	$111,300	$111,300
DNR IDP	-	-	-	$60,000	$60,000	MN DNR-Fisheries (Enhancement-100%)	$60,000	$60,000
Grand Total	**$927,000**	**$927,000**	**$927,000**	**$105,400**	**$105,400**	**-**	**$1,032,400**	**$1,032,400**

Personnel

Position	Annual FTE	Years Working	Funding Request	Leverage	Leverage Source	Total
Project Fiscal Lead	0.3	4.0	$85,000	-	-	$85,000
Project Site Manager	0.3	4.0	$85,000	$7,500	Private Source-LSSA	$92,500

Explain any budget challenges or successes:
We were able to spend down our complete budget as described in the AP so that is considered a success.

Total Revenue: $0

Revenue Spent: $0

Revenue Balance: $0

Of the money disclosed above, what are the appropriate uses of the money:

- E. This is not applicable as there was no revenue generated.

Output Tables

Acres by Resource Type (Table 1)

Type	Wetland (AP)	Wetland (Final)	Prairie (AP)	Prairie (Final)	Forest (AP)	Forest (Final)	Habitat (AP)	Habitat (Final)	Total Acres (AP)	Total Acres (Final)
Restore	0	0	0	0	0	0	0	0	0	0
Protect in Fee with State PILT Liability	0	0	0	0	0	0	0	0	0	0
Protect in Fee w/o State PILT Liability	0	0	0	0	0	0	0	0	0	0
Protect in Easement	0	0	0	0	0	0	0	0	0	0
Enhance	0	0	0	0	0	0	356	467	356	467
Total	**0**	**0**	**0**	**0**	**0**	**0**	**356**	**467**	**356**	**467**

Total Requested Funding by Resource Type (Table 2)

Type	Wetland (AP)	Wetland (Final)	Prairie (AP)	Prairie (Final)	Forest (AP)	Forest (Final)	Habitat (AP)	Habitat (Final)	Total Funding (AP)	Total Funding (Final)
Restore	-	-	-	-	-	-	-	-	-	-
Protect in Fee with State PILT Liability	-	-	-	-	-	-	-	-	-	-
Protect in Fee w/o State PILT Liability	-	-	-	-	-	-	-	-	-	-
Protect in Easement	-	-	-	-	-	-	-	-	-	-
Enhance	-	-	-	-	-	-	$927,000	$927,000	$927,000	$927,000
Total	**-**	**-**	**-**	**-**	**-**	**-**	**$927,000**	**$927,000**	**$927,000**	**$927,000**

Acres within each Ecological Section (Table 3)

Type	Metro / Urban (AP)	Metro / Urban (Final)	Forest / Prairie (AP)	Forest / Prairie (Final)	SE Forest (AP)	SE Forest (Final)	Prairie (AP)	Prairie (Final)	N. Forest (AP)	N. Forest (Final)	Total (AP)	Total (Final)
Restore	0	0	0	0	0	0	0	0	0	0	0	0
Protect in Fee with State PILT Liability	0	0	0	0	0	0	0	0	0	0	0	0
Protect in Fee w/o State PILT Liability	0	0	0	0	0	0	0	0	0	0	0	0
Protect in Easement	0	0	0	0	0	0	0	0	0	0	0	0
Enhance	0	0	0	0	0	0	0	0	356	467	356	467
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**356**	**467**	**356**	**467**

Total Requested Funding within each Ecological Section (Table 4)

Type	Metro/ Urban (AP)	Metro/ Urban (Final)	Forest / Prairie (AP)	Forest / Prairie (Final)	SE Forest (AP)	SE Forest (Final)	Prairie (AP)	Prairie (Final)	N. Forest (AP)	N. Forest (Final)	Total (AP)	Total (Final)
Restore	-	-	-	-	-	-	-	-	-	-	-	-
Protect in Fee with State PILT Liability	-	-	-	-	-	-	-	-	-	-	-	-
Protect in Fee w/o State PILT Liability	-	-	-	-	-	-	-	-	-	-	-	-
Protect in Easement	-	-	-	-	-	-	-	-	-	-	-	-
Enhance	-	-	-	-	-	-	-	-	$927,000	$927,000	$927,000	$927,000
Total	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**$927,000**	**$927,000**	**$927,000**	**$927,000**

Target Lake/Stream/River Feet or Miles

Achieved 2200 lineal feet of enhancement per plan..

Outcomes

Programs in the northern forest region:

- Healthy populations of endangered, threatened, and special concern species as well as more common species ~ *The major way the outcome can be measured is through return numbers to the weir operated by the MNDNR on the lower Knife River. And through annual shocking data as carried out by MNDNR. To access the more fertile spawning areas, anadromous fish pass through the weir, including coaster brook trout, brown trout and steelhead trout. MDNR try and capture all anadromous during their spawning runs.*

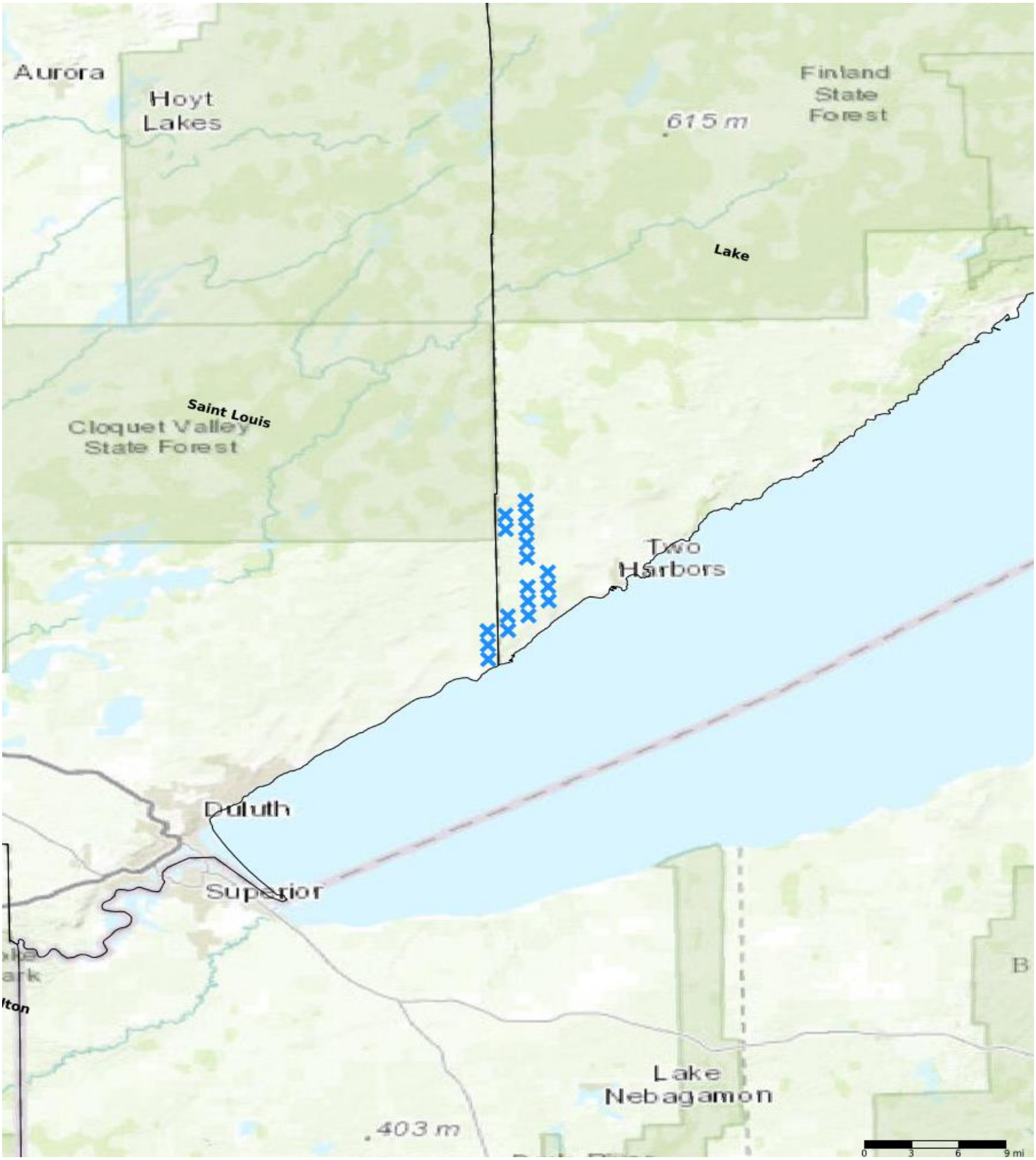
Parcels

Sign-up Criteria?
No

Restore / Enhance Parcels

Name	County	TRDS	Acres	Est Cost	Existing Protection
Knife River	Lake	05212224	25	$49,732	Yes
Knife River	Lake	05211218	37	$71,614	Yes
Knife River	Lake	05311208	28	$55,670	Yes
Knife River	Lake	05211208	58	$115,378	Yes
Knife River	Lake	05311220	33	$65,646	Yes
Knife River	Lake	05212236	15	$29,839	Yes
Knife River	Lake	05211217	22	$43,764	Yes
Knife River	Lake	05211209	1	$1,989	Yes
Knife River	Lake	05211219	37	$73,603	Yes
Knife River	Lake	05212225	35	$69,624	Yes
Knife River	Lake	05211204	37	$73,603	Yes
Knife River	Lake	05311205	29	$57,689	Yes
Knife River	Lake	05311217	9	$17,903	Yes
Knife River	Lake	05311207	5	$9,946	Yes
Knife River	Lake	05211205	4	$7,957	Yes
Knife River	Lake	05311229	27	$53,710	Yes
Knife River	Lake	05311233	45	$89,517	Yes
Knife River	Lake	05311218	20	$39,785	Yes

Parcel Map



- Protect in Easement
- Protect in Fee with PILT
- Protect in Fee W/O PILT
- Restore
- Enhance
- Other