

## Lessard-Sams Outdoor Heritage Council

### Laws of Minnesota 2012 Accomplishment Plan

**Date:** 10/18/11

**Program Title:** Knife River Habitat Rehabilitation

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**Title:** President

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**Funds Recommended: \$380,000.00**

**Legislative Citation: ML 2012, Ch. X, Art. X, Sec. X, Subd. 5 (g):** *(to be completed when signed by Governor)*

#### Abstract:

Degradation to trout habitat in the upper Knife River Watershed has occurred from past forestry practices resulting in uncontrolled beaver colonization. The result is unfavorable rearing habitat for juvenile trout.

#### Program Narrative

##### Knife River Watershed

Situated on the St Louis/Lake County border in NE MN, the Knife River has over 181 miles of stream length within its watershed. The Knife River watershed consists of approximately 54,000 acres, of which 29,000 acres are owned by the State of Minnesota, St. Louis County and Lake County. Approximately 25,000 acres are privately owned and of this privately owned property 6,200 acres, or approximately 25%, are enrolled in stewardship plans. The Knife River has the best and most available steelhead spawning habitat on Minnesota's Northshore.

##### History of the Knife River

The Knife River once held one of the largest populations of natural reproducing steelhead in the Great Lakes and provided spawning habitat in its upper watershed to thousands of steelhead each spring. Since the late 1970's, the Knife River steelhead population has seen a dramatic decrease. Where thousands of steelhead once traveled upstream to spawn now only seven hundred make this same journey. One of the primary reasons for the decrease in the Knife River's steelhead population is the degradation to the upper Knife River watershed riparian habitat.

The Knife River lacks significant spring-fed flow and is kept cool in the summer by the shade of riparian trees along the stream bank. Without cold water, juvenile trout migrate downstream in search of

suitable cold water habitat or perish. According to a DNR fisheries study, the increased water temperature and lack of stream flow causes juvenile steelhead to prematurely migrate to Lake Superior. When these smolts migrate prematurely (before age 2) to Lake Superior they are significantly preyed upon. According to the DNR, 1 out of every 600 juvenile trout that migrate prematurely to Lake Superior return to spawn in the Knife River. In contrast, 1 out of every 10 two-year old smolts (non-early migrants) return from Lake Superior to spawn as adults. This is a primary limiting factor to the recovery of the steelhead population on the Knife River.

### **Habitat Degradation and its Results to the Upper Knife River Watershed**

The historic forest composition within the Knife River watershed was old growth coniferous trees. Extensive clear-cut logging removed the old growth coniferous trees throughout the Knife River watershed, which were replaced by large stands of second growth aspen. This large-scale forest alteration attracted unprecedented beaver populations to the watershed because of the new food source. Once beavers colonized this area, dams were built blocking the stream flow and flooding the riparian tree cover. The flooded trees and shrubs along the riparian zone quickly died resulting in open water ponds. The impoundment of shallow water and lack of tree cover associated with the beaver pond caused the water temperature to quickly warm and has led to an increase in evaporation. This increase in beaver activity has resulted in 30 plus years of habitat degradation to the upper Knife River watershed.

### **DNR Habitat Work and Studies Conducted in the Upper Knife River Watershed**

Recognizing the threat to the upper river, the DNR started performing limited stream improvement projects involving the removal of beavers, breaching of beaver dams and limited improvement to fish passageways in the late 1990s. However, the DNR did not have the resources to restore the original fish passageways or the riparian habitat that originally existed prior to the beaver activity. Today hundreds of areas exist within this upper watershed that contain beaver meadows, dead trees, dam remnants, small woody debris, sediment impoundments and collapsed stream banks.

Various DNR studies have determined this habitat degradation to the upper watershed has resulted in poor rearing conditions for juvenile trout in the summer months. These poor rearing conditions (increase in water temperature, increase in evaporation and decrease in stream flows) are the direct result of beaver activity/habitat degradation in the Knife River watershed.

The DNR has conducted an annual aerial survey of the upper Knife River watershed since the mid 1990's to locate beaver dams, which were funded by the LSSA for several years. As previously stated, each year the DNR has trapped beavers and performed limited beaver dam removal, but has not rehabilitated the resulting habitat damage caused to the streambed and adjacent riparian cover due to lack of funds. The damage that remains to the watershed is the loss of overhead tree canopy, siltation of the streambed, debris in the water, stream flow blockage and stream bank erosion.

### Phase I Stream Restoration

The LSSA proposes to use the DNR's existing aerial data and beaver dam location maps to locate and assess the beaver impacted areas on the upper Knife River. The LSSA will discuss and rank the locations for rehabilitation. The area of focus will start with the primary spawning tributary in the Knife River watershed, which is the West Branch of the Main Knife River. An additional focus will be the second falls barrier in the main branch of the Knife River that limits passage to the West branch tributary. Only site on public land will be considered for this project. There will not be any work performed on private land.

A field reconnaissance will be conducted to determine the stream section's condition and to design the rehabilitation project. The preliminary data that will be collected may include:

- Review aerial photo and GIS maps of beaver impacted areas.
- Mark GPS location of habitat degradation.
- Determine proximity to access points.
- Measure the area of impacted stream.
- Survey the depth of sediment deposition.
- Determine length and thickness of remnant dam(s).
- Survey the stream elevations.
- Quantify the amount of large and small woody debris.
- Calculate the percent of shade covering various stream sections.
- Monitor water temperature.
- Document visual evidence of juvenile fish or adult spawning activity.
- Identify collapsed banks or erosion areas.
- Construct cross-section diagrams.

The design parameters will enable us to:

- Remove barriers that limit migration.
- Restore stream flow.
- Repair or stabilize eroded stream banks.
- Removal of small woody debris.

- Placement of large woody debris.
- Clear impounded siltation of the streambed.
- Planting of trees to restore the overhead canopy.

The project data and design parameters will be incorporated in a project permit and submitted for approval to the DNR and Army Corp. of Engineers. Once the permit(s) are approved, the LSSA will implement restoration on a portion of the beaver meadows identified for restoration.

### **Equipment Usage and Project Site Access**

The goal of this project is to restore beaver impacted areas within the upper Knife River watershed. To accomplish this goal, mechanical equipment will be used in specified areas that have vehicle access. In areas with vehicle access to the watershed, heavy equipment will be mobilized to remove dams, stabilize stream banks, placement of large woody debris and plant mature trees. These areas will be given a high priority because rehabilitating these stream sections can provide an almost immediate benefit to the watershed.

However, the LSSA realizes that many areas we are proposing to restore have no vehicle river access. In these areas, the LSSA will not build temporary roads, import fill or mobilize heavy equipment, but be relegated to using hand equipment for improvement work. The LSSA does not want to cause more damage to the watershed than what we will be restoring. Thus much of our restoration efforts in remote areas will be limited and consist of a reduced scope of work.

### **Tree Planting**

Tree planting will be a critical component of this restoration project. Tree planting will be focused on the riparian area of the stream or watershed. In remote areas of the watershed tree planting may be the only reasonable method of restoration employed due to lack of heavy equipment access. Plantings will vary between coniferous and deciduous trees and shrubs. The proposed species will consist of a various arrangement of bare root, potted and large root bundled trees. Some of the tree species that may be utilized include: white spruce, black spruce, tamarack, red pine, silver maple, red maple, willows and speckled alder. This new riparian zone will ultimately be a mix of fast growing shrubs and smaller tree species intermixed with slower growing larger trees. The planting of shrub species will provide an immediate canopy, while the tree plantings will provide long-term shade and large woody debris.

### **Phase II Second Falls Enhancement**

The second falls is located on the main stem of the Knife River approximately 3 miles upstream from Lake Superior. This falls acts as a migration barrier to steelhead, lake run browns and coaster brook trout in some water conditions. This project phase aims to modify the falls to resemble its original form so fish can more readily pass upstream in all water conditions.

### **Phase III Knife River Watershed Black Ash Stand Replacement Planting**

Black ash stands currently comprise a large percentage of the riparian forest community in various sections of the Knife River watershed, most notably in the headwaters where young trout rear. The State of Minnesota and the Minnesota DNR expect that all ash stands in the state to eventually experience high to total mortality due to an infestation of the emerald ash borer. This project aims to attempt to retain shade cover for the upper Knife River watershed by planting additional tree species within the riparian corridor to diversify the forest. Forest comprised primarily of black ash will be targeted for this component of the project.

According to GIS data provided from the Laurentian RC & D, nearly 10 miles of major Knife River tributary riparian forest stands are comprised primarily of ash. This component of the riparian rehabilitation project on the Knife River will target stands located on public land along the West Branch of the Knife River in St Louis County. The proposed plan will plant a wide variety of trees that will be selected for each location based on site conditions. Preemptive understory tree planting is proposed to utilize tree species including tamarack, silver maple, white spruce, white cedar, white pine, red pine, basswood, etc. Additional GIS and onsite survey work will be utilized to select specific ash stands and locations, as well as target additional locations within the watershed for future plantings.

### **Tree Planting**

Tree planting in remote Knife River watershed headwaters will not be easy. As such, a variety of different planting techniques will be attempted during this project. These techniques include planting larger trees, using a variety of bare root, containerized trees and locally harvested trees, using matting to keep weed growth down, using both caging and tree tubes to inhibit browsing. The success of different techniques will be evaluated to aid in planting additional ash stands during future projects.

### **Planning**

This project has been designed and is consistent with the DNR's Lake Superior Management Plan and the DNR's Rainbow Trout Plan. Both of these DNR management plans place a high priority in habitat conservation and rehabilitation.

## Relationship to Other Constitutional Funds

Clean Water Fund money is being used for the Knife River Watershed's middle sections (clay bank sections). This money is being used to stabilize slumping clay banks as part of the TMDL implementation plan. This money has been provided to the South St. Louis Soil and Water Conservation District (SWCD). The LSSA and SWCD are working cooperatively on separate sections of river to insure the entire watershed is improved. The LSSA is primarily working on the upper river spawning and rearing tributaries exclusively on public land, while the SWCD is working on the middle river sections (clay bank section) and concentrating primarily on private lands.

## Relationship to Current Organizational Budget

The LSSA has provided approximately \$750,000 since 1985 to rehabilitate steelhead runs in the Knife River. The LSSA used non-profit gaming (pull tabs) as a revenue source for these Knife River projects. Unfortunately, non-profit gaming revenues are significantly down and the LSSA does not have a revenue stream that can finance this project or other large habitat projects in the foreseeable future.

## Sustainability and Maintenance

A critical component of this project is to insure beaver do not re-impact areas of the West Branch of the Knife River that have been rehabilitated. To insure that the project areas on the West Branch are maintained after the project is complete, annual flights will be conducted to insure beavers do not re-colonize this area. These beaver flights will be conducted in late autumn by the DNR as they have been previously for the past 10 to 15 years. If dams or beaver activity is noted in the annual flight, the DNR will contract trappers to remove the beaver. This has also been performed for the past 10-15 years. The estimated cost of the flight and beaver removal throughout the entire Knife River watershed is \$15,000.

If the DNR loses funding for this project, the TMDL implementation plan has budgeted \$35,000 annually for this task. Included in this budget is beaver flights and trapping, but also other tasks not included in the DNR budget. These other tasks are re-planting of trees, beaver dam removal and bank repair. These other tasks may not be necessary to be performed or funded annually, but have been listed in the TMDL plan in the event future maintenance and funding is necessary.

## Outcomes

Qualitative outcomes include short, intermediate and long term outcomes.

### Short Term Qualitative Outcomes (3 to 5 years)

- Improve in-stream habitat
- Re-establish hydraulic connectivity
- Provide education and awareness to user groups

### Intermediate Term Qualitative Outcomes (6 to 10 years)

- Reduce erosion
- Restore overhead tree/shrub canopy

Long Term Qualitative Outcomes (20+ years)

- Increase smolt retention time in the upper watershed (higher percentage of juvenile steelhead smolting at age 2 ).
- Observe a higher percentage of repeat adult spawners.
- Restore the forest composition to coniferous trees.

Accomplishment Timeline

Activity	Milestone	Date completed
Site walk-through/Baseline Data Collection/Prepare Permit Application	Permit Approval	7/1/12 - 12/31/13
In-stream Fieldwork	Dam Removal/Bank Restoration	12/31/13-6/30/15
Site Preparation/Tree Planting	Riparian Zone Replanted	6/30/15-6/30/16

Table B-2. Other Outcome Table

N/A				

Attachments (on spreadsheet workbook – 3 separate tabs):

- A. Budget
- B. Proposed Outcome Tables
- C. Parcel List

*No Map is needed for the accomplishment plan*

**Attachment A. Budget Spreadsheet**

**Name of Proposal:** Knife River Habitat Restoration

**Date:** 10/18/2011

[Link HERE to definitions of the budget items below.](#)

**Total Amount of Request** \$ 380,000 *From page 1 on the funding form.*

**Personnel**

Position breakdown here	FTE	Over # of years	LSOHC Request	Anticipated Cash		Total
				Leverage	Cash Leverage Source	
<i>Manager of Programs</i>	0.5	4	\$ 30,000			\$ 30,000
<i>Admin Asst</i>						\$ -
<i>position 3</i>						\$ -
<i>position 4</i>						\$ -
<i>position 5</i>						\$ -
<i>position 6</i>						\$ -
<i>position 7</i>						\$ -
<b>Total</b>	<b>0.5</b>		<b>\$ 30,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 30,000</b>

**Budget and Cash Leverage** *(All your LSOHC Request Funds must be direct to and necessary for program outcomes.)*

*Please describe how you intend to spend the requested funds.*

Budget Item	LSOHC Request	Anticipated Cash		Total
		Leverage	Cash Leverage Source	
<b>Personnel - auto entered from above</b>	\$ 30,000	\$ -	\$ -	\$ 30,000
<b>Contracts</b>	\$ 250,000			\$ 250,000
<b>Fee Acquisition w/ PILT (breakout in table 7)</b>				\$ -
<b>Fee Acquisition w/o PILT (breakout in table 7)</b>				\$ -
<b>Easement Acquisition</b>				\$ -
<b>Easement Stewardship</b>				\$ -
<b>Travel (in-state)</b>	\$ 5,000			\$ 5,000
<b>Professional Services</b>	\$ 30,000			\$ 30,000
<b>Direct Support Services</b>	\$ -			\$ -
<b>DNR Land Acquisition Costs (\$3,500 per acquisition)</b>				\$ -
<b>Other</b>				\$ 65,000
Capital Equipment <i>(auto entered from below)</i>	\$ -	\$ -		\$ -
Other Equipment/Tools	\$ 15,000			\$ 15,000
Supplies/Materials	\$ 50,000			\$ 50,000
	\$ 380,000	\$ -	\$ -	\$ 380,000

**Capital Equipment** *(single items over \$10,000 - auto entered into table above)*

Item Name	LSOHC Request	Leverage
<i>Item 2 enter here</i>		
<i>Item 3 enter here</i>		
<i>Item 4 enter here</i>		
<i>Item 5 enter here</i>		
<i>Item 6 enter here</i>		
<i>Item 7 enter here</i>		
<i>Item 8 enter here</i>		
<b>Total</b>	-	-



## Attachment B. Output Tables

<b>Name of Proposal:</b>	Knife River habitat Restoration
<b>Date:</b>	10/18/2011

*Table 1 and Table 3 column totals should be the same AND Table 2 and Table 4 column totals should be the same*

*If your project has lakes or shoreline miles instead of land acres, convert miles to acres for Tables 1 and 3 using the following conversion:*

*Lakeshore = 6 acres per lakeshore mile / Stream & River Shore = 12 acres per linear mile, if both sides*

### Table 1. Acres by Resource Type

Describe the scope of the project in acres (use conversion above if needed)

	Wetlands	Prairies	Forest	Habitats	Total
Restore					0
Protect Fee					0
Protect Easement					0
Protect Other					0
Enhance				204	204
<b>Total</b>	0	0	0	204	

Total Acres (sum of Total column)  
Total Acres (sum of Total row)

204  
204  
*These two cells should be the same figure.*

### Table 2. Total Requested Funding by Resource Type

	Wetlands	Prairies	Forest	Habitats	Total
Restore			\$ -	\$ -	\$ -
Protect Fee					\$ -
Protect Easement					\$ -
Protect Other					\$ -
Enhance				\$ 380,000	\$ 380,000
<b>Total</b>	\$ -	\$ -	\$ -	\$ 380,000	

Total Dollars (sum of Total column)  
Total Dollars (sum of Total row)  
Check to make sure this amount is the same as the Funding Request Amount on page 1 of Main Funding Form.

\$ 380,000  
\$ 380,000  
*These two cells should be the same figure.*

### Table 3. Acres within each Ecological Section

	Metro/Urban	Forest/Prairie	SE Forest	Prairie	Northern Forest	Total
Restore					204	204
Protect Fee						0
Protect Easement						0
Protect Other						0
Enhance						0
<b>Total</b>	0	0	0	0	204	

Total Acres (sum of Total column)  
Total Acres (sum of Total row)  
Total Acres from Table 1.

204  
204  
204  
*These three cells should be the same figure.*

**Attachment B. Output Tables**

**Table 4. Total Requested Funding within each Ecological Section**

	Metro/Urban	Forest/Prairie	SE Forest	Prairie	Northern Forest	Total
Restore						\$ -
Protect Fee						\$ -
Protect Easement						\$ -
Protect Other						\$ -
Enhance					\$ 380,000	\$ 380,000
<b>Total</b>	\$ -	\$ -	\$ -	\$ -	\$ 380,000	

Total Dollars (sum of Total column)      \$ 380,000  
 Total Dollars (sum of Total row)      \$ 380,000  
 Check to make sure these amounts are the same as the Funding Request Amount on page 1 of Main Funding Form.

*These two cells should be the same figure.*

**Table 5. Target Lake/Stream/River Miles**

# miles of Lakes / Streams / Rivers Shoreline

**Table 6. Acquisition by PILT Status (enter information in acres)**

	Wetlands	Prairies	Forests	Habitats	Total
Acquired in Fee with State PILT Liability					0
Acquired in Fee w/o State PILT Liability					0
Permanent Easement <i>PILT Liability</i> <i>NO State</i>					0
	0	0	0	0	

**Table 7. Estimated Value of Land Acquisition by PILT Status (enter information in dollars)**

	Wetlands	Prairies	Forests	Habitats	Total	
Acquired in Fee with State PILT Liability					\$ -	\$ -
Acquired in Fee w/o State PILT Liability					\$ -	\$ -
Permanent Easement <i>PILT Liability</i> <i>NO State</i>					\$ -	\$ -
	\$ -	\$ -	\$ -	\$ -		

*FYI: should match total in budget table that is auto entered below*

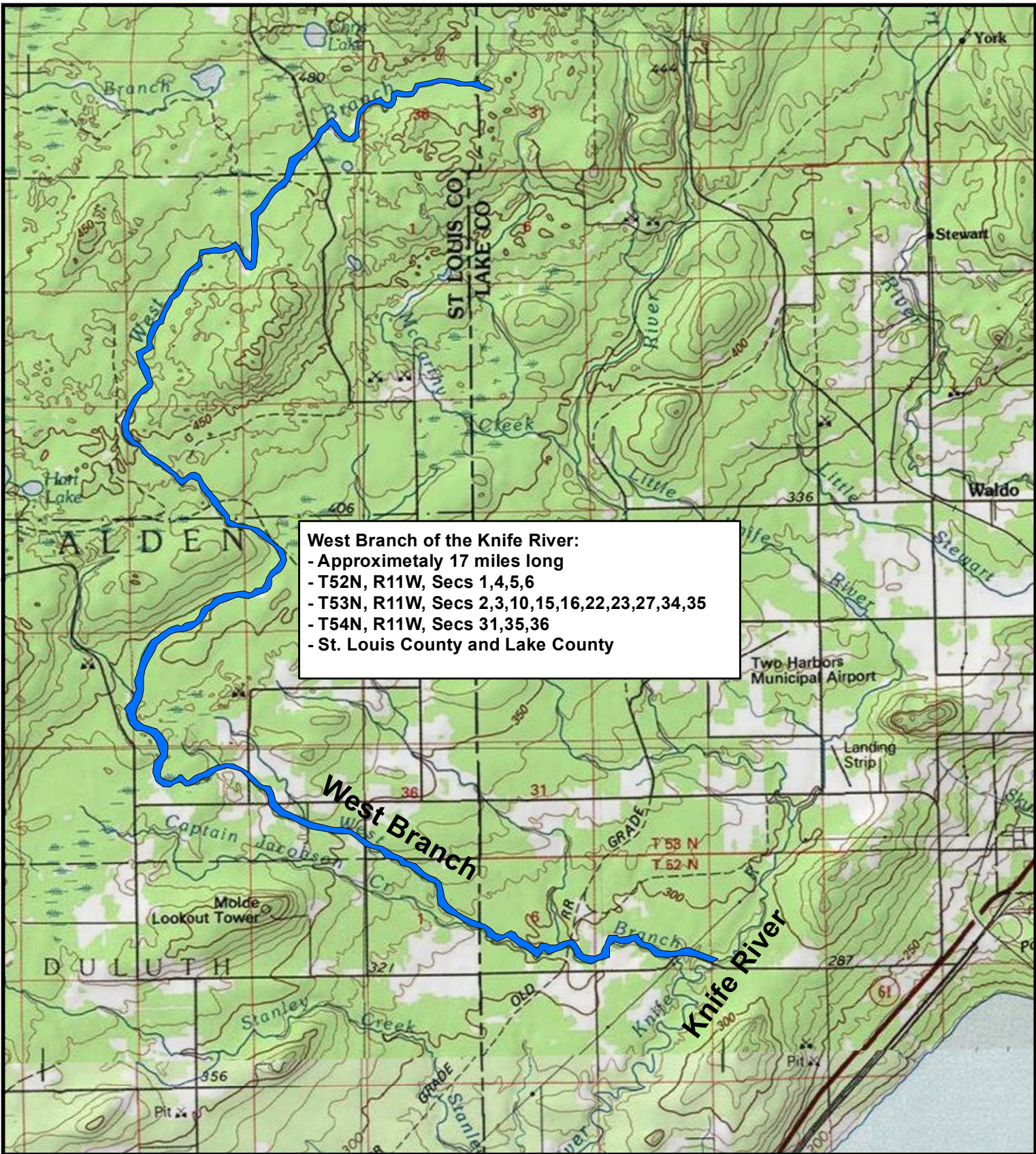
Attachment C. Parcel List

Name of Proposal:  
7/14/2011  
Knife River Habitat Restoration

County	Township (25-258)	Range (01-51)	Direction	Section (01 thru 36)	TRDS	# of acres	Budgetary Estimate (includes administrative, restoration or other related costs and do not include matching money contributed or earned by the transaction)	Description	Activity PF=Protect Fee PE=Protect Easement PO=Protect Other R=Restore E=Enhance	If Easement, what is the easement cost as a % of the fee acquisition?	Any existing protection? (yes/no)	Open to hunting and fishing? (yes/no)		
St. Louis	T52 N T53N T54N	R11W R11W R11W	All work will be done within St. Louis County	portions of	2	204	\$380,000	Streambed and stream bank	E	n/a	Yes see DNR easements link	Yes		
				Sec 1,4,5,6		17 Miles			See watershed map					
				Sec 2,3,10,15,16										
				Sec 22, 23,27,34,35 Sec 31,35,36										

Information provided will be used to map project locations. Incomplete or inaccurate information will result in that parcel or program not being mapped.





**Legend**

 West Branch



SCALE: 1/72,000  
1 inch = 6,000 feet



**FIGURE 1**

West Branch Location Map

Knife River  
Minnesota

PROJECT #: 11-Knife River	
DATE: 10/18/2011	CREATED BY: JMM
FILE NAME: //GIS/2011Projects/11-Knife River /Figure1	

