

# Request for Funding

## Lessard-Sams Outdoor Heritage Council Fiscal Year 2016 / ML 2015

**Program or Project Title:** Biological Control of Invasive Plants

**Funds Requested:** \$453,500

**Manager's Name:** Monika Chandler

**Title:** Biocontrol Coordinator

**Organization:** Minnesota Department of Agriculture

**Street Address:** 625 Robert Street North

**City:** St. Paul, MN 55155

**Telephone:** 651-201-6537

**E-Mail:** Monika.Chandler@state.mn.us

**Organization Web Site:**

**County Locations:** No Counties Listed

### Ecological Planning Regions:

- Northern Forest
- Forest / Prairie Transition
- Southeast Forest
- Prairie
- Metro / Urban

### Activity Type:

- Enhance

### Priority Resources Addressed by Activity:

- Wetlands
- Prairie
- Habitat

## Abstract:

We will accelerate implementation of biological control for leafy spurge, spotted knapweed and purple loosestrife infestations on public natural area lands. This will provide ongoing management of these highly damaging invasive plants.

## Design and Scope of Work:

We propose to use biological control to reduce statewide populations of target invasive plants in natural areas of Minnesota. We will accomplish this by reuniting the target plants with the insects that keep them in check their native range. All of these non-native invasive plant species are serious threats to grasslands (leafy spurge and spotted knapweed) and wetlands (purple loosestrife). They overtake native vegetation and reduce species diversity and wildlife habitat. The goal of biological control is to reduce the target pest population and its corresponding impact to an acceptable level. The Minnesota Departments of Agriculture (MDA) and Natural Resources (DNR) have successfully controlled leafy spurge, spotted knapweed and purple loosestrife with biological control. Over the past 15 years, we have increased our knowledge of biological control methods for these targets. However, current invasive plant biological control programs need to be vitalized with the establishment of field insectary sites to provide biological control insects for future releases, assessments of infestations to determine biological control needs, monitoring of existing sites and equipping and training land managers. Biocontrol insects are not distributed to all infestations yet. Biological control is a cost-effective, long-term, sustainable strategy to manage leafy spurge, spotted knapweed and purple loosestrife. Biological control is an efficient means of managing large target plant infestations and does not harm native plants in the process.

This is an important tool for restoring wildlife habitat and reducing the spread of these harmful invasive plants.

We will begin by reviewing DNR's invasive plant data to learn about the approximate infestation size and location of target species. Sites potentially suitable for biological control will be assessed to further describe the infestations at the sites and in the surrounding areas. Land managers will be consulted to determine if biological control is consistent with their management objectives. Multiple large, stable infestations will be selected to establish field insectary sites where large amounts of biological control agents can be collected in future years. Biological control agents will be obtained through field collections, rearing and purchase depending on the bioagent species. Bioagent releases will be made at priority release sites. Both the bioagent populations and the target invasive plants will be monitored at these sites. Images taken at photo points before and after release will document changes in the infestations. Land managers will be equipped and trained to continue practicing biological control.

The deliverables are implementation of biological control at priority sites, the establishment of at least four field insectary sites per invasive plant species, a "how to" manual will be created and available online, and laminated field guides of what to look for when monitoring bioagents will be created and distributed.

#### Species:

##### Leafy spurge, *Euphorbia esula*

- Grassland perennial plant native to Eurasia
  - Introduced to Minnesota in 1890 with a bushel of oats from Russia
  - By 1992, it was estimated that there were 800,000 infested acres resulting in loss of plant species diversity, wildlife habitat and pasture.
  - Six natural enemies of leafy spurge were tested for their host-specificity then imported from Europe and released in North America. One beetle species, *Aphthona lacertosa*, is particularly effective at controlling leafy spurge and the efficacy has been well documented in long-term studies.
- We will field collect leafy spurge beetles in June then release them at high priority sites. Two to three years later, sites will be sampled using sweep nets to determine whether the beetles established.

##### Spotted knapweed, *Centaurea stoebe* ssp. *micranthos*

- Grassland perennial plant native to Eurasia
- Spotted knapweed was first recorded in North America in 1893 (possibly from alfalfa seed shipments) and in Minnesota in 1918.
- Chemically inhibits the growth of other plant species allowing it to spread into infestations that span vast acreages.
- Infestations decrease plant diversity and wildlife forage. Many herbivores such as elk are documented to avoid heavily infested areas.
- Soil erosion increased in spotted knapweed infestations resulting in topsoil loss and water quality degradation from the increased sediment runoff.
- Nicknamed "The Wicked Weed of the West" because a 1996 study determined that spotted knapweed causes annual losses of 42 million in Montana.

In Minnesota, the predominant biological control agents used are seedhead weevils (*Larinus minutus*) and root-boring weevils (*Cyphocleonus achates*). They work in conjunction to control spotted knapweed. Seedhead weevils are good fliers and can move to infestations on their own. Seedhead weevils will be field collected in Minnesota and released at sites where they are not already present. Root weevils are highly effective, but their populations increase and spread slowly. Root weevils will be purchased from private vendors in Montana and released at priority sites, accelerating their distribution. Knapweed plants will be sampled three years after release to determine whether weevils established.

##### Purple loosestrife, *Lythrium salicaria*

- Wetland perennial plant native to Eurasia
- Introduced to eastern North America as an ornamental in the early 1800s then spread westward.
- Infestations degrade wetlands by overtaking areas where fish and wildlife feed, seek shelter, reproduce and rear young.
- An estimated 470,000 acres of wetlands, marshes, pastures and riparian meadows are affected in North America each year, with an economic impact of millions of dollars. Minnesota presently has over 58,000 acres infested with purple loosestrife.

The primary biological control agents used are two species of beetles that feed on the plant foliage (*Galerucella pusilla* and *G. californiensis*). A combination of field collection, insect rearing and purchasing from private vendors will be used to obtain these beetles for release at priority sites. We will try to obtain and rear a root weevil (*Hylobius transversovittatus*) for release at priority sites. Loosestrife plants will be examined two years after release for a specific type of feeding damage to indicate beetle establishment.

We will work statewide at public natural areas but our focus will be the prairie region where a concentration of infestations occurs. Federal and county natural areas may be included but we anticipate the bulk of the work will be done on state lands. The work will be done by a plant health specialist assisted by a student worker.

## How the request addresses MN habitats:

Leafy spurge and spotted knapweed overtake grasslands reducing forage for wildlife and plant diversity.

- Elk, deer and other wildlife avoid eating these plants. This in turn increases pressure on the remaining forage.
  - Prairie chickens do not nest in monotypic stands of spotted knapweed.
  - Most herbaceous grassland plant species are vulnerable to leafy spurge and spotted knapweed infestations.
- Purple loosestrife infestations overtake wetlands decreasing plant diversity and fish and wildlife habitat.
- Reduce suitable habitat for many wetland bird species including black tern, least bitterns, pied-billed grebes and marsh wrens.

## Please explain the nature of urgency:

Many infestations are suitable for biological control but have not received bioagents to date. This is due to the lack of available collection sites and knowledgeable staff to monitor sites to discern the right moment for bioagent collection from that site. Our project will address these issues and decrease infestations.

## Planning

### MN State-wide Conservation Plan Priorities:

- H5 Restore land, wetlands and wetland-associated watersheds

### Plans Addressed:

- Minnesota DNR Strategic Conservation Agenda
- Minnesota Prairie Conservation Plan

## Please describe the science based planning and evaluation model used:

We will use established methods for determining bioagent establishment. Infestation size and percent cover will be recorded at initial assessment and when monitored. Differences will be calculated. Changes in infestations and other vegetation will be photo-documented with established photo points at each site.

### LSOHC Prairie Section Priorities:

- Restore or enhance habitat on public lands

### LSOHC Forest Prairie Transition Section Priorities:

- Protect from long-term or permanent endangerment from invasive species

### LSOHC Northern Forest Section Priorities:

- Protect from long-term or permanent endangerment from invasive species

### LSOHC Metro Urban Section Priorities:

- Protect from long-term or permanent endangerment from invasive species

### LSOHC Southeast Forest Section Priorities:

- Protect from long-term or permanent endangerment from invasive species

## Accelerates or Supplements Current Efforts:

This project would accelerate Minnesota’s current invasive plant biological control effort by increasing the number of release sites and starting field insectary sites that will be valuable collection sites in the future and providing the materials and training needed for a sustained effort.

An online survey of potential biocontrol practitioners informed us that lack of training and equipment are major impediments to implementation. Without training, land managers do not know how to determine which sites are suitable for biocontrol, when, where and how many bioagents to release on a given infestation size, how to obtain bioagents and monitor populations. We will create an online manual explaining the “how to” of invasive plant biocontrol. We will also create and distribute a laminated field guide of what to look for when monitoring for bioagents. These tools combined with training sessions will accelerate the number of practitioners in the state. We will purchase and distribute nets, sorters and containers for collecting bioagents so that land managers have the needed tools to implement biological control.

The increased number of biocontrol sites and practitioners will speed implementation.

**Non-OHF Money Spent in the Past:**

Appropriation Year	Source	Amount
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**Sustainability and Maintenance:**

Once bioagents are established at a site, they provide ongoing invasive plant control. The aim is to have small populations of the target plant and bioagent population remain indefinitely. In some situations, this has worked perfectly. In other situations such as where there is a disturbance event, the target plant population rebounds and some additional tweaking may be necessary. An example might be to collect bioagents in one area of a site and transfer them to another area within the same site to ensure ideal distribution. Trained and equipped land managers can do this.

We will continue to collect bioagents from insectary sites and transfer them to new sites. This is particularly important for species that reproduce slowly and/or do not fly to find new infestations.

**Maintain Project Outcomes:**

Year	Source of Funds	Step 1	Step 2	Step 3
Ongoing	General	Bioagent populations will be managed with collection and distribution to new sites.		

**Applicable Criteria:**

*If funded, this proposal will meet all applicable criteria set forth in MS 97A.056? - Yes*

**Best Management Practice:**

*Will restoration and enhancement work follow best management practices including MS 84.973 Pollinator Habitat Program? - Yes*

**Permanent Protection:**

*Is the activity on permanently protected land per 97A.056, subd 13(f), tribal lands, and/or public waters per MS 103G.005, Subd. 15? - Yes (WMA, WPA, SNA, AMA, County/Municipal, Refuge Lands, State Wilderness*

## Accomplishment Timeline

Activity	Approximate Date Completed
Assess and prioritize potential invasive plant biological control sites. This includes documenting the infestation site and density. Then site specific vegetation management objectives and resources will be discussed with individual land managers. The best field insectary sites will be determined.	September 2018
Collect and purchase biological control agents (insects) then release at priority sites. The primary objectives are to establish field insectary sites and to release for target species management at priority sites that small but valuable such as Scientific and Natural Areas.	August 2018
Monitor existing sites	June 2020
Train and equip land managers to practice invasive plant biological control. Training materials will be created and training sessions held.	June 2020

## Outcomes

### Programs in the northern forest region:

- Improved availability and improved condition of habitats that have experienced substantial decline *Infestation size and percent cover will be recorded at initial assessment and when monitored. Differences will be calculated. Changes in infestations and other vegetation will be photo-documented with established photo points at each site.*

### Programs in forest-prairie transition region:

- Protected, restored, and enhanced aspen parklands and riparian areas *Infestation size and percent cover will be recorded at initial assessment and when monitored. Differences will be calculated. Changes in infestations and other vegetation will be photo-documented with established photo points at each site.*

### Programs in metropolitan urbanizing region:

- Habitat will be enhanced. Infestation size and percent cover will be recorded at initial assessment and when monitored. Differences will be calculated. Changes in infestations and other vegetation will be photo-documented with established photo points at each site.

### Programs in southeast forest region:

- Habitat will be enhanced. Infestation size and percent cover will be recorded at initial assessment and when monitored. Differences will be calculated. Changes in infestations and other vegetation will be photo-documented with established photo points at each site.

### Programs in prairie region:

- Restored and enhanced upland habitats *Infestation size and percent cover will be recorded at initial assessment and when monitored. Differences will be calculated. Changes in infestations and other vegetation will be photo-documented with established photo points at each site.*

## Relationship to Other Funds:

- Environmental and Natural Resource Trust Fund

LCCMR supported the research and development of purple loosestrife, leafy spurge and spotted knapweed biological control.



# Budget Spreadsheet

**Total Amount of Request: \$453,500**

## Budget and Cash Leverage

Budget Name	LSOHC Request	Anticipated Leverage	Leverage Source	Total
Personnel	\$360,000	\$32,700	DNR in-kind, MDA in-kind	\$392,700
Contracts	\$0	\$0		\$0
Fee Acquisition w/ PILT	\$0	\$0		\$0
Fee Acquisition w/o PILT	\$0	\$0		\$0
Easement Acquisition	\$0	\$0		\$0
Easement Stewardship	\$0	\$0		\$0
Travel	\$35,000	\$0		\$35,000
Professional Services	\$0	\$0		\$0
Direct Support Services	\$0	\$0		\$0
DNR Land Acquisition Costs	\$0	\$0		\$0
Capital Equipment	\$0	\$0		\$0
Other Equipment/Tools	\$500	\$0		\$500
Supplies/Materials	\$58,000	\$0		\$58,000
DNR IDP	\$0	\$0		\$0
Total	\$453,500	\$32,700	-	\$486,200

## Personnel

Position	FTE	Over # of years	LSOHC Request	Anticipated Leverage	Leverage Source	Total
Plant Health Specialist	1.00	5.00	\$320,000	\$0		\$320,000
Student Worker (summer)	0.23	5.00	\$40,000	\$0		\$40,000
DNR staff	0.04	5.00	\$0	\$12,700	DNR in-kind	\$12,700
MDA staff	0.05	5.00	\$0	\$20,000	MDA in-kind	\$20,000
Total	1.32	20.00	\$360,000	\$32,700	-	\$392,700

Amount of Request: \$453,500

Amount of Leverage: \$32,700

Leverage as a percent of the Request: 7.21%

## Output Tables

**Table 1a. Acres by Resource Type**

Type	Wetlands	Prairies	Forest	Habitats	Total
Restore	0	0	0	0	0
Protect in Fee with State PILT Liability	0	0	0	0	0
Protect in Fee W/O State PILT Liability	0	0	0	0	0
Protect in Easement	0	0	0	0	0
Enhance	300	550	0	50	900
Total	300	550	0	50	900

**Table 1b. How many of these Prairie acres are Native Prairie?**

Type	Native Prairie
Restore	0
Protect in Fee with State PILT Liability	0
Protect in Fee W/O State PILT Liability	0
Protect in Easement	0
Enhance	250
Total	250

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

Type	Wetlands	Prairies	Forest	Habitats	Total
Restore	\$0	\$0	\$0	\$0	\$0
Protect in Fee with State PILT Liability	\$0	\$0	\$0	\$0	\$0
Protect in Fee W/O State PILT Liability	\$0	\$0	\$0	\$0	\$0
Protect in Easement	\$0	\$0	\$0	\$0	\$0
Enhance	\$150,000	\$276,500	\$0	\$27,000	\$453,500
Total	\$150,000	\$276,500	\$0	\$27,000	\$453,500

**Table 3. Acres within each Ecological Section**

Type	Metro/Urban	Forest/Prairie	SE Forest	Prairie	Northern Forest	Total
Restore	0	0	0	0	0	0
Protect in Fee with State PILT Liability	0	0	0	0	0	0
Protect in Fee W/O State PILT Liability	0	0	0	0	0	0
Protect in Easement	0	0	0	0	0	0
Enhance	100	250	50	450	50	900
Total	100	250	50	450	50	900



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

Type	Metro/Urban	Forest/Prairie	SE Forest	Prairie	Northern Forest	Total
Restore	\$0	\$0	\$0	\$0	\$0	\$0
Protect in Fee with State PILT Liability	\$0	\$0	\$0	\$0	\$0	\$0
Protect in Fee W/O State PILT Liability	\$0	\$0	\$0	\$0	\$0	\$0
Protect in Easement	\$0	\$0	\$0	\$0	\$0	\$0
Enhance	\$50,000	\$122,500	\$27,000	\$227,000	\$27,000	\$453,500
Total	\$50,000	\$122,500	\$27,000	\$227,000	\$27,000	\$453,500

**Table 5. Average Cost per Acre by Resource Type**

Type	Wetlands	Prairies	Forest	Habitats
Restore	\$0	\$0	\$0	\$0
Protect in Fee with State PILT Liability	\$0	\$0	\$0	\$0
Protect in Fee W/O State PILT Liability	\$0	\$0	\$0	\$0
Protect in Easement	\$0	\$0	\$0	\$0
Enhance	\$500	\$503	\$0	\$540

**Table 6. Average Cost per Acre by Ecological Section**

Type	Metro/Urban	Forest/Prairie	SE Forest	Prairie	Northern Forest
Restore	\$0	\$0	\$0	\$0	\$0
Protect in Fee with State PILT Liability	\$0	\$0	\$0	\$0	\$0
Protect in Fee W/O State PILT Liability	\$0	\$0	\$0	\$0	\$0
Protect in Easement	\$0	\$0	\$0	\$0	\$0
Enhance	\$500	\$490	\$540	\$504	\$540

**Target Lake/Stream/River Feet or Miles**

0

# Parcel List

## Section 1 - Restore / Enhance Parcel List

Name	TRDS	Acres	Est Cost	Existing Protection?
Specific sites/parcels will be selected after an assessment process that is part of this project	2	0	\$0	

## Section 2 - Protect Parcel List

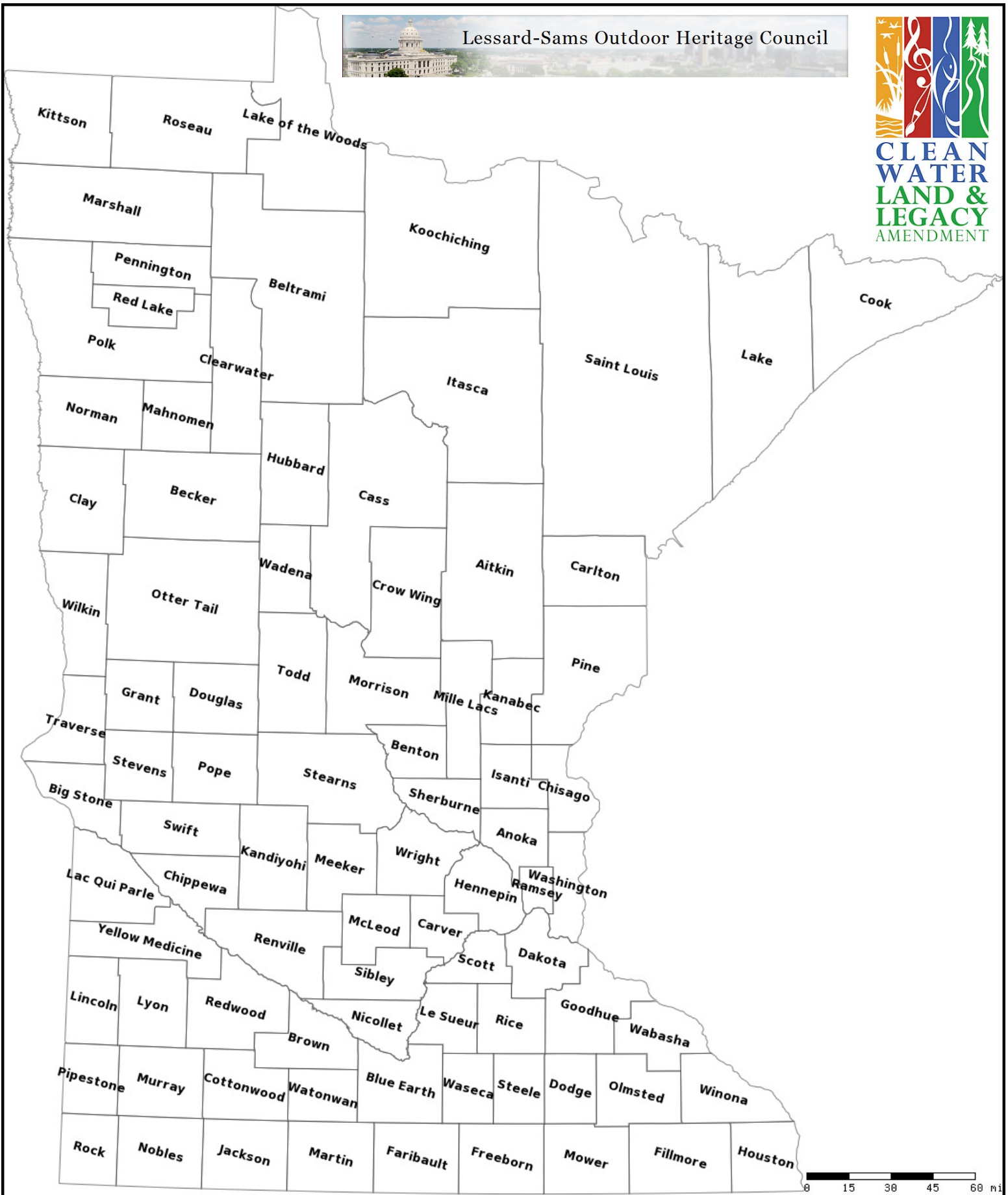
No parcels with an activity type protect.

### Section 2a - Protect Parcel with Bldgs

No parcels with an activity type protect and has buildings.

## Section 3 - Other Parcel Activity

No parcels with an other activity type.

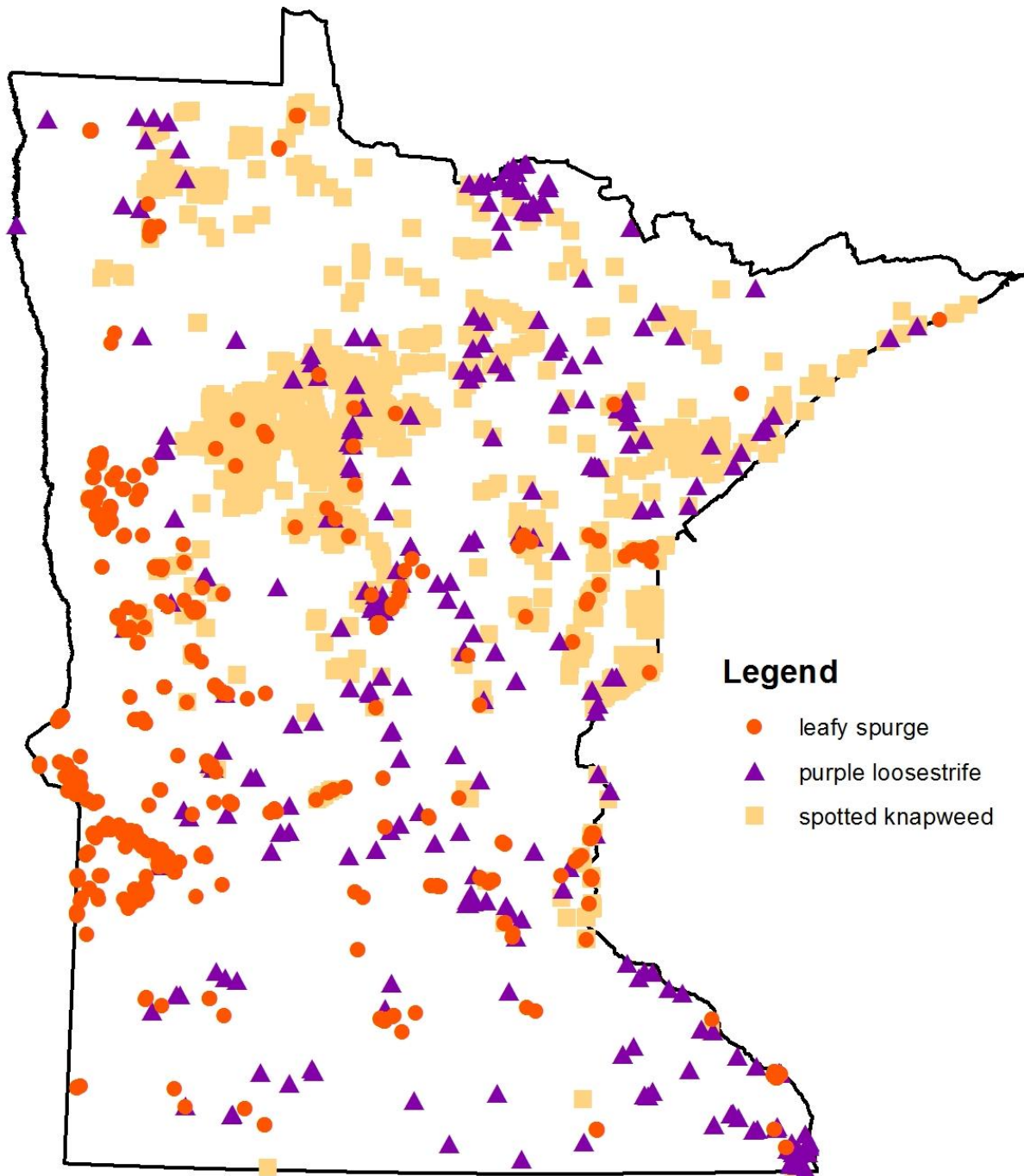


## Biological Control of Invasive Plants

### Legend

- Protect in Easement
- ▲ Protect in Fee with PILT
- Protect in Fee W/O PILT
- ★ Restore
- ✕ Enhance
- + Other

## Target Invasive Plant Distribution on Public Lands



There are 1,342 leafy spurge, 7,052 spotted knapweed and 463 purple loosestrife infestations reported on public lands.

Proposal Title: Biological Control of Invasive Plants

## **Biological Control Site Assessment Criteria**

We will query DNR target infestation data then determine which sites would be used as field insectary sites and which sites would be appropriate for biological control implementation without the expectation that they would be insectary sites.

### **Field insectary sites**

Sites will be selected to produce large numbers of biological control agents that can be collected and moved to new sites in future years.

- Large infestations (> 5 acres preferred)
- Dense infestation (> 50% cover of target invasive plant species)
- Stable sites that will not be disturbed (except for prescribed fire) for at least 5 years
- Biological control is consistent with the land manager's objectives

### **Biological control implementation sites**

- Reasonably large infestations (> 0.5 acre)
- Reasonably dense infestation (> 25% cover of target invasive plant species)
- Stable sites that will not be disturbed (except for prescribed fire) for at least 5 years
- Biological control is consistent with the land manager's objectives
- Priority will be given to high value sites to protect habitat for species of concern such as prairie chicken.