



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2016 Work Plan

Date of Report: May 29, 2016
Date of Next Status Update Report: November 2016
Date of Work Plan Approval: June 7, 2016
Project Completion Date: June 30, 2019
Does this submission include an amendment request? No

PROJECT TITLE: Elimination of Target Invasive Plant Species – Phase II

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Location: Statewide

Total ENRTF Project Budget:	ENRTF Appropriation:	\$239,000
	Amount Spent:	\$0
	Balance:	\$239,000

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 06e2

Appropriation Language:

\$750,000 the second year is from the trust fund. Of this amount, \$511,000 is to the commissioner of agriculture and \$239,000 is to the Board of Regents of the University of Minnesota to train volunteers and professionals to find, control, and monitor targeted newly emergent invasive plant species. This appropriation is available until June 30, 2019, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Elimination of Target Invasive Plant Species - Phase 2

II. PROJECT STATEMENT: Eliminating highly damaging target invasive plant species before they become widespread prevents ecological and economic damage. Currently, these species have limited distributions in Minnesota. It is feasible to control them before they proliferate by continuing the strategic effort initiated in Phase 1. To date, we trained 521 people to identify target invasives, surveyed over 10,000 acres, initiated control on 450 acres and are developing an invasive species management database system with broad applicability for terrestrial and aquatic invasives. We will continue these activities in Phase 2. In addition, we will expand our training capacity by developing online training, test whether a drone will increase survey efficiency and add to the target species list.

Target Invasive Plant List: Species include but are not limited to the following. They are listed in order of feasibility to eradicate based upon their abundance and distribution. All target species are prohibited noxious and invasive weeds on the eradicate list (Minnesota Statutes, Section 18.78) providing a legal backing.

1. **Black swallow-wort** is a milkweed vine that overgrows other vegetation. Small infestations have been reported in Hennepin and Ramsey Counties and are being controlled. (New in Phase 2)
2. **Dalmatian toadflax** forms dense stands in grasslands and reduces biodiversity, wildlife habitat, and livestock production. Infestations in the Halma and Lutsen areas are reduced but not eliminated yet.
3. **Cutleaf and common teasels** overtakes grasslands and riparian areas reducing species diversity and wildlife habitat. There are scattered infestations in southeastern Minnesota. (Common teasel is new in Phase 2)
4. **Grecian foxglove** is highly toxic to humans, wildlife, and livestock. It also displaces native plants. As of spring 2015, most infestations are in Washington County.
5. **Japanese hops** are annual vines that grow so rapidly that they smother other plants. There is an extensive infestation along the Root River and a small infestation on the Mississippi.
6. **Brown and meadow knapweeds** are spreading across meadows in northern Minnesota. (New in Phase 2)
7. **Oriental bittersweet** is a woody vine that is destroying swaths of forest in Red Wing and Winona by girdling and breaking the trees then covering and shading the remains so that little else grows.

Our long-term goal is to eradicate these problematic species from Minnesota to protect forest and grassland habitats. All of the invasive plants listed harm natural areas and degrade wildlife habitat.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of November 30, 2016:

Project Status as of May 31, 2017:

Project Status as of November 30, 2017:

Project Status as of May 31, 2018:

Project Status as of November 30, 2018:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Train People to Identify and Report Target Invasive Species

Description: University of Minnesota (U of M) will train professionals, volunteers and impacted landowners to prevent, identify, report, monitor and manage target species. The U of M Extension will deliver educational trainings to:

- A. Natural resource professionals to identify terrestrial invasive species of special concern and native plant species that could be confused with these invasives (2 workshops per year),
- B. Natural resource professionals and volunteers will conduct target invasive species surveys (2 surveys/workshops),
- C. Minnesota Master Naturalist Instructor Training - a weekend-long training and field tour dedicated specifically to terrestrial invasive species of special concern, their prevention, identification, reporting, monitoring and management to incorporate this information into Master Naturalist volunteer trainings across the state. (1 event),
- D. Develop supportive, online training and outreach materials for Invasive Blitz volunteers (Master Naturalist and other master volunteers that lead invasive species removal activities in their community). This will include a video with volunteer management considerations like training volunteers, risk assessments and recruiting and maintaining active volunteers.

We will create 5 high quality traveling learning material kits about target invasive species that can be checked-out by natural resource professionals and volunteers.

This work will be done across the state. An effort will be made to find free workshop locations. It may be necessary to charge workshop participants a registration fee to cover room rental (if free room is not available) and food costs for all day and weekend workshops. Registration fees would go to Extension. In the event that workshop registration received exceeds workshop costs, Extension will use these funds for outreach for Environmental and Natural Resources Trust Fund projects. Training partners include the University of Minnesota, Extension, Minnesota Departments of Agriculture, Natural Resources and Transportations, and various local partners.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 204,180
Amount Spent: \$ 0
Balance: \$ 204,180

Outcome	Completion Date
1. 9 Statewide training sessions/workshops/field trainings conducted and evaluated	06/10/2019
2. Develop online training and outreach materials that are publicly available	06/10/2019
3. Create high quality display materials and 5 invasive plant learning kits for check out by educators (schools, nature centers, master gardeners, etc.) and agency staff for outreach	06/10/2019

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

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Final Report Summary:

ACTIVITY 2: Survey, Coordinate Control and Monitor

Description:

Part A (MDA)

Minnesota Department of Agriculture (MDA) will verify reports, survey potentially infested areas and delineate infestations. Conservation Corps Minnesota (CCM) will participate in large area surveys. Presence/absence data for all target species will be collected along assigned survey routes. Surveys will be done in collaboration with agency partners when practical.

MDA will contract with the St. Croix River Association (SCRA) for survey along the St. Croix River main stream and Brown's Creek, a designated trout stream. The St. Croix watershed is a high priority conservation area where Oriental bittersweet and Grecian foxglove have been found. SCRA will monitor approximately 130 river miles by boat. Highest risk areas will be surveyed multiple times and seasons to have the best chance of seeing each target species at its most visible stage. For example, Grecian foxglove is most visible in the summer and Oriental bittersweet in the fall. We will engage SCRA staff, National Park Service partners and volunteers in survey and outreach efforts.

All survey data will be entered into EDDMapS (www.eddmaps.org). MDA will contract and coordinate with CCM and landowners for target species control. This will include writing agreements with landowners where CCM will do control work. Agreements will specify that landowners will monitor the site to prevent reinfestation for at least three years after the control work is completed. The coordinator will train the landowners how to identify and monitor for the species and report any reinfestation issues that arise.

Part B (U of M)

The U of M Unmanned Aerial Vehicle Lab will test its drone fleet with the goal of increasing survey efficiency. Tests will determine best available sensor, concept of operations, and post processing requirements outlined below. We are working with the Federal Aviation Administration on regulatory requirements before we can legally fly outside of our permitted area (currently only covers Umore park in Rosemount, MN.)

Sensor

Every sensor has trade offs in terms of cost, size, weight, resolution, speed, type of data sensed, etc. Often the required sensor drives the choice of aerial platform. We will select the sensors with the best chance of producing useful data for detecting invasive species from the air. The best sensor might not be a camera. If it is a camera we need to determine if our objective is the highest resolution possible, or is it more important to capture a certain band(s) of the visible spectrum.

Concept of Operations

Depending on the aircraft and the sensor choices the time of day and lighting may be an important consideration. We may need to consider sunny vs. overcast conditions and the best season(s) for detecting specific invasive species. We need to think through optimal routes and patterns for data collection. The type of sensor chose may drive the choice of altitude and limit the amount of area that can be covered. If significant terrain is involved, that could complicate flight planning. Is the best vantage point straight down from above (nadir view) or is an oblique view better, or even a side view from below the tree tops?

Post Processing Requirements

Will the data be reviewed manually? Are there computer algorithms that could be leveraged to highlight areas of concern in the data (i.e. some sort of threshold or blob detection?) What characteristics in the data would

indicate a target invasive species is detected? For the longer term, we will evaluate economic factors including the cost to image an area vs. the likelihood or reliability of spotting invasive plants.

Summary Budget Information for Activity 2 Part B:

ENRTF Budget: \$ 25,200
Amount Spent: \$ 0
Balance: \$ 25,200

Outcome	Completion Date
1. Drones will be tested for survey capability. Testing will determine the appropriate sensor, calculate the impact of variable light conditions and chart the optimal flying pattern.	03/01/2018
2. Surveys are conducted and infestations are documented	05/30/2019
3. Treated sites are monitored to determine whether additional control is needed	06/10/2019

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Activity Status as of November 30, 2017:

Activity Status as of May 31, 2018:

Activity Status as of November 30, 2018:

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ACTIVITY 3: Control Target Species

Description: MDA will contract with CCM for trained and equipped field crews to control target invasive species on an estimated 660 acres (75 ac. Dalmatian toadflax, 5 ac teasels, 130 ac Grecian foxglove, 50 ac Japanese hops, 150 ac meadow and brown knapweeds, and 250 ac Oriental bittersweet). CCM crews trained in identification and control of target species will conduct control work starting with known infestations of Oriental bittersweet and continuing with control of other target species. Large infestations of Oriental bittersweet will be controlled using basal bark and/or cut-stump treatment with a systemic triclopyr based herbicide in basal oil which is specific to broadleaf plants and will reduce potential impact on non-target species. Smaller infestations of young plants or infestations in sensitive areas that prohibit use of herbicides will be controlled by hand or mechanical pulling with a focus on removing and properly disposing of all plant parts including all roots and fruit to prevent re-sprouting and/or seeding. Timing of control will focus on late fall and winter when non-target species are dormant to reduce impacts on desirable species. Control of additional target species will involve mechanical and chemical control methods following established best management practices for each species based on size and location of infestations.

Summary Budget Information for Activity 3:

ENRTF Budget: \$ 0
Amount Spent: \$ 0
Balance: \$ 0

Outcome	Completion Date
1. Acres treated are documented	06/30/2019

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Activity Status as of November 30, 2017:

Activity Status as of May 31, 2018:

Activity Status as of November 30, 2018:

Final Report Summary:

ACTIVITY 4: Implement Invasive Species Management Database System from Phase 1

Description: In the field, CCM will use tablets with a database system developed in Phase 1 to collect data on target invasive species control treatments and monitor infestation changes. This platform will enable us to communicate across organizations and efficiently summarize activities and outcomes. Extension will train agencies and other organizations to utilize this system.

- A. Purchase 20 tablet computers; 10 for Extension trainings for database system users and 10 for CCM crews to use while managing and monitoring on target invasive species,
- B. Natural resource manager database system trainings (using the tablets, 2 per year).

Summary Budget Information for Activity 4:

ENRTF Budget:	\$ 9,620
Amount Spent:	\$ 0
Balance:	\$ 9,620

Outcome	Completion Date
1. 6 training workshops will be conducted for vegetation managers	05/30/2019
2. Tablets and software will be utilized for data collection in the field	06/10/2019
3. Summary reports of activities and outcomes will be run	06/10/2019

Activity Status as of November 30, 2016:

Activity Status as of May 31, 2017:

Activity Status as of November 30, 2017:

Activity Status as of May 31, 2018:

Activity Status as of November 30, 2018:

Final Report Summary:

V. DISSEMINATION:

Description: We will communicate about target invasive plant species with the public, natural resource professionals, County Agricultural Inspectors, highway and road crew employees and Cooperative Weed Management Areas. The web will be used for communication with at www.mda.state.mn.us/en/plants/pestmanagement/weedcontrol/targetplants.aspx and www.myminnesotawoods.umn.edu/ (this location may shift as we develop additional online training and

outreach materials and target specific audiences). Communication with the public will be via workshops, news media (print, television, and radio), online and via social media such as YouTube, Facebook, Twitter and Pinterest. We will communicate updates at County Agricultural Inspector meetings and in trade publications such as “The Scoop” published by the Minnesota Nursery Landscape Association. We expect to present this project during at least one peer-reviewed professional conference such as the Association of Natural Resource Extension Professionals Conference or the Upper Midwest Invasive Species Conference (both biannual conferences).

Status as of November 30, 2016:

Status as of May 31, 2017:

Status as of November 30, 2017:

Status as of May 31, 2018:

Status as of November 30, 2018:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$ 185,700	Program coordinator and UAV scientist
Professional/Technical/Service Contracts:	\$ 25,000	For video development and creation of quality display materials
Equipment/Tools/Supplies:	\$ 19,200	
Travel Expenses in MN:	\$ 8,700	
Other: Bus rental	\$ 400	
TOTAL ENRTF BUDGET:	\$ 239,000	

Explanation of Use of Classified Staff: NA

Explanation of Capital Expenditures Greater Than \$5,000: NA

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:

One 3 year full time Program Coordinator = 3 FTE

One single year 25% graduate student = 0.25 FTE

Total = 3.25 FTE

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF

Total FTEs = estimated 90 hours worked by contractors/2080 = 0.04 FTE

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			

Extension will work to procure an additional \$40,000 to support work related to this project from non-state funding sources (likely Federal, \$35,000 and private, \$5000).	\$ 40,000	\$	
State			
In-kind Services During Project Period: U of M: One Extension Educator at 10% time for 3 years (\$18,700)	\$ 18,700	\$	
TOTAL OTHER FUNDS:	\$ 58,700	\$	

A. Project Partners:

Receiving funds: Angela Gupta (U of M) will lead the educational components. Brian Taylor (U of M) will lead the survey drone test. Monika Chandler (MDA) will lead survey, coordination of target species control with CCM and follow up monitoring. Brian Miller (CCM) will lead target species control activities. All organizations will provide in-kind equipment, facilities, and GIS/technical support.

Not receiving funds: We will draw from Extension’s existing statewide base of volunteers which totals over 102,000 active, trained volunteers. We will collaborate with DNR and Mn/DOT, other federal and state agencies, counties, municipalities, and private landowners.

B. Project Impact and Long-term Strategy:

Preventing highly destructive invasive plant species from spreading throughout the state has an enormous impact. All of the selected species would become widespread without intervention. They would overtake habitats and be prohibitively costly to control on a large scale. Controlling these target species across property lines protects the investment by agencies such as Mn/DOT on their lands. Eradication is defined as target species absence for six years after the last seed was produced. Therefore, eradication must be achieved in a long-term effort and ongoing monitoring is critical. ENRTF funds will be leveraged for (1) Extension funding for online training development cost not included in this proposal and (2) federal funding for volunteer training.

Project partners are working closely with other agencies and land management organizations to optimize and integrate the use of the invasive species management software into invasive species work across the state in a variety of landscape. A comprehensive management inventory should help optimize management impacts while reducing costs.

Continued engagement and empowerment of trained volunteers to identify, detect, survey, monitor and manage invasive species as both immediate and long-term impacts. These volunteers are actively training others and management invasive species while also influencing local policies and action. Sustain engagement and additional outreach should continue to grow citizen understanding and action.

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	\$ Amount
LCCMR Elimination of Target Invasive Plant Species (Phase 1) project \$350,000 from ENRTF of which \$135,000 was for MDA and \$150,000 was for CCM and \$65,000 UMN Extension. In-kind was \$85,000 of which \$20,000 was from MDA and \$30,000 from CCM.	07/01/2013-06/30/2015	
	LCCMR	\$ 285,000
	In-kind	\$ 50,000
	Total	\$ 335,000

DNR received \$60,000 for early detection and rapid response invasive plant management. These funds were used for CCM crews to survey for and control some of our joint target plant species such as Japanese hops, cutleaf teasel and Oriental bittersweet.	2014 - 2015	\$ 60,000
Winona Soil Water Conservation District received \$15,000 from the Board of Water and Soil Resources to work on target invasive plant control and site restoration in Winona County	2014 - 2016	\$ 15,000

VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS: NA



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IX. VISUAL COMPONENT or MAP(S):



Conservation Corps controlling Oriental bittersweet in Red Wing



Oriental bittersweet vines overwhelming and killing trees in Red Wing



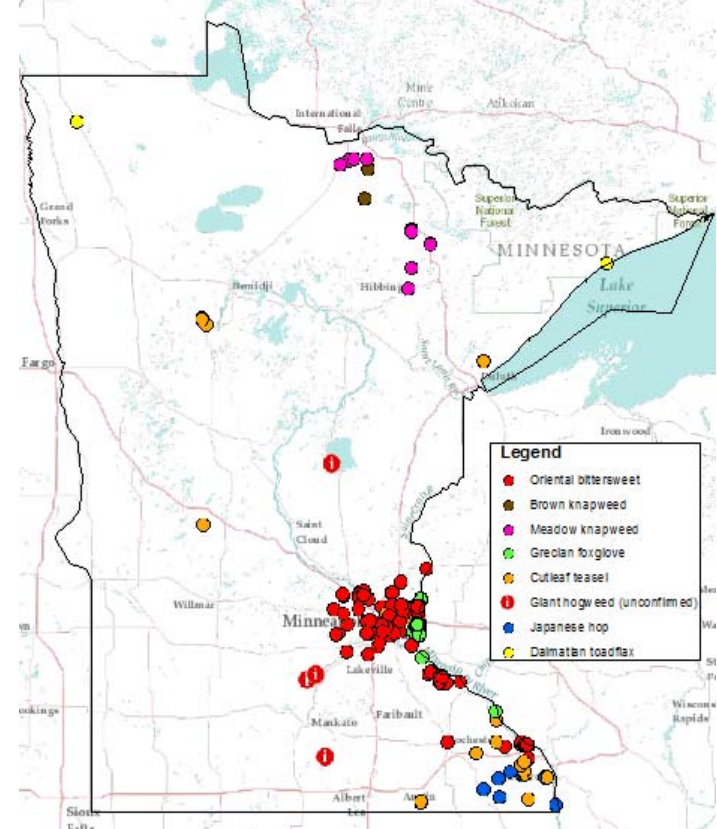
Unmanned Aerial Vehicle Lab students will test a drone for survey



Training people to identify and report target species.

To prevent environmental and economic damage, we will detect, contain and control target species before they become widespread.

Target Invasive Plant Report Locations





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X. RESEARCH ADDENDUM: NA

XI. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted no later than November 30, 2016, May 31, 2017, November 30, 2017, May 31, 2018 and November 30, 2018. A final report and associated products will be submitted between June 30 and August 15, 2019.

**Environment and Natural Resources Trust Fund
M.L. 2016 Project Budget**



Project Title: Elimination of Target Invasive Plant Species – Phase II

Legal Citation: M.L. 2016, Chp. 186, Sec. 2, Subd. 06e2

Project Manager: Angela Gupta

Organization: University of Minnesota

M.L. 2016 ENRTF Appropriation: \$ 239,000

Project Length and Completion Date: 3 Years, June 30, 2019

Date of Report: May 29, 2016

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 3 Budget	Amount Spent	Activity 3 Balance	Activity 4 Budget	Amount Spent	Activity 4 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	<i>Train People to Identify and Report Target Invasive Species</i>			<i>Survey, Coordinate Control and Monitor</i>			<i>Control Target Species</i>			<i>Implement Invasive Species Management Database System</i>				
Personnel (Wages and Benefits)	\$163,000			\$22,700										
Program Coordinator: \$163,000 (73% salary, 27% benefits); 100% FTE each year for 3 years														
UAV Scientist: \$22,700 (66% salary, 34% benefits); 16% FTE for 1 Year														
Professional/Technical/Service Contracts														
Develop video for online training for Activity 1	\$10,000													
Quality display materials and 5 invasive plant learning kits for check out by educators (schools, nature centers, master gardeners, etc.) and agency staff for outreach	\$15,000													
Equipment/Tools/Supplies														
Materials for trainings and volunteer surveys (identification guides and survey equipment such as safety vests)	\$10,200													
Tablets (20 @ \$400 each) for field data collection for Activity 4 for with 10 tablets for Extension training sessions and Extension will provide 10 tablets to Conservation Corps. Tablet purchase is an exception to enable field use of a sophisticated database system.										\$8,000				
Supplies for Activity 2 survey drone test (will use existing U of M drone fleet and sensors)				\$1,000										
Travel expenses in Minnesota														
Travel for Activity 1 program coordination. Milage \$1,500; lodging \$900; meals \$750	\$3,150													
Travel for U of M instructors for Activity 1 & 4 workshops. Milage \$3,000; lodging \$400; meals \$650	\$2,430									\$1,620				
Travel to/from drone test sites. Milage \$1,125 and meals: \$375				\$1,500										
Other														
Bus rental for in-depth field training of 40 Master Naturalist instructors	\$400													
COLUMN TOTAL	\$204,180			\$25,200			\$0			\$9,620			\$239,000	