

M.L. 2013 Project Abstract

For the Period Ending June 30, 2016

PROJECT TITLE: Elimination of Target Invasive Plant Species

PROJECT MANAGER: Monika Chandler

AFFILIATION: Minnesota Department of Agriculture

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WEBSITES: Project page is

www.mda.state.mn.us/plants/pestmanagement/weedcontrol/targetplants.aspx

Invasive Species Management Tracking System homepage is www.ismtrack.org/index.cfm

FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2013, Chp. 52, Sec. 2, Subd. 06d

APPROPRIATION AMOUNT: \$350,000

Overall Project Outcome and Results

The goals of the Elimination of Target Invasive Plants species were 1) Train volunteers and professionals to find target species; 2) Control these species before they spread; and 3) Monitor to prevent reinfestation. Target species are invasive plants that cause severe ecological harm. There are localized infestations of these plants and controlling them will prevent them from becoming widespread. Target species include Dalmatian toadflax, cutleaf teasel, Japanese hops, Oriental bittersweet and Grecian foxglove. We completed Phase 1 of this project and will expand the effort in Phase 2.

University of Minnesota Extension led education and outreach. A total of 34 workshops educated 772 people about target plants. Invasive Blitz was a workshop with 12 sessions across the state that trained volunteers to organize and conduct invasive species removal events. Volunteers reported 434 service events with management activities that impacted 9,582 acres in 30 counties.

Minnesota Department of Agriculture led survey and project coordination. A total of 1,542 road miles and 125 river and trail miles were surveyed with a multitude of volunteers and agency partners. Distribution data for target species can be accessed at www.eddmaps.org. Coordination with private landowners and crew leaders was necessary. An agreement was written with each private landowner where crews worked to ensure clarity about expectations and activities. We wrote agreements with 162 landowners.

Conservation Corps Minnesota led the effort to control target invasives. There were 144 unique and 194 total (some returning members) crew members who worked on this project. Together, they treated 1,360 acres of target invasives.

This project was about eradicating plants, but people were key to success. Project achievements were due to the involvement of hundreds of volunteers, landowners, crew members and state and local partners. Engaging people has vital for long-term success.

Project Results Use and Dissemination

In addition to 34 workshops with 772 participants, there were 4 field tours, 10 presentations, 8 articles, 3 media events and mailings to hundreds of private landowners. Weed of the Month articles were run in local papers throughout the state. Overall, this dissemination reached thousands of Minnesotans.

Other Extension materials created to support this work, often funded with other grant and internal Extension funds including those generated from participant fees from workshops sponsored by the this project include:

- [Oriental Bittersweet Fact Sheet](#) (Extension produced)
- [Bittersweet ID for Crafters \(short version\)](#) (Joint funded: Extension & NRTF)
- [Bittersweet ID for Crafters \(long version\)](#) (Joint funded: Extension & NRTF)
- [Defeating a Killer Vine: Oriental bittersweet](#) (Farm Bill funded, via MDA)
- [Going Rogue: The Story of Japanese Barberry](#) (Farm Bill funded, via MDA)
- [Keep a Lookout for New Invasive Plants in Minnesota](#) flyer (MDA funded)
- Five 3D printed invasive plant models of Grecian foxglove (2), Japanese hops (2) and black swallow-wort (1) were produced (Farm Bill funded via MDA). To our knowledge, this is the first time 3D printing has been used to generate invasive plant models. This work is being received very well in by natural resource professionals.

If the live links to videos do not work, please go to the University of Minnesota Extension YouTube channel.



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2013 Work Plan Final Report

Date of Status Update Report: August 15, 2016
Date of Next Status Update Report: Final Report
Date of Work Plan Approval: June 11, 2013
Project Completion Date: June 30, 2016 **Is this an amendment request?** Yes

PROJECT TITLE: Elimination of Target Invasive Plant Species

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Location: Statewide

Total ENRTF Project Budget:	ENRTF Appropriation:	\$ 350,000
	Amount Spent:	\$ 350,000
	Balance:	\$ 0

Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 06d

Appropriation Language:

\$350,000 the first year is from the trust fund to the commissioner of agriculture to train volunteers and professionals to find, control, and monitor targeted newly emergent invasive species. This appropriation is available until June 30, 2016, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Elimination of Target Invasive Plant Species

II. PROJECT STATEMENT:

It is cheapest, easiest, and least harmful to find and control small populations of invasive plants before they become widespread and damaging. We propose to detect, survey, control, and monitor target invasive plant species with the goal of protecting forest and grassland (including prairie) habitats. This is a statewide project on public and private lands that will stop target species before they proliferate.

Target Species 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.

1. **Dalmatian toadflax** overtakes grasslands and reduces biodiversity, wildlife habitat, and livestock production. It is beginning to spread in northwestern Minnesota.
2. **Cutleaf teasel** forms dense stands in grasslands and riparian areas reducing species diversity and wildlife habitat. There are scattered infestations in different areas of the state.
3. **Japanese hops** are annual vines that grow so rapidly that they smother other plants. There are two known infestations in southeastern Minnesota.
4. **Oriental bittersweet** is a woody vine that is destroying swaths of forest in Stillwater, Red Wing and Winona by girdling and breaking the trees then covering and shading the remains so that little else grows.
5. **Grecian foxglove** is highly toxic to humans, wildlife, and livestock. It also displaces native plants. As of spring 2012, most infestations are in Washington County.

Prevent and Detect Target Species: The University of Minnesota Extension (U of M) will train professionals and volunteers to identify, report, and prevent the spread of target species using a combination of field-based training sessions, workshops, and a new annual statewide "Invasive Blitz" (similar to BioBlitz plant and animal survey events but with a focus on removing invasive species).

Survey and Delineate: The Minnesota Department of Agriculture (MDA) will use established survey methods to search areas surrounding known infestations and delineate infestations.

Control Target Species: Conservation Corps Minnesota (CCM) field crews will be contracted for target species control including initial containment and control of extensive Oriental bittersweet infestations. Crews are located throughout the state and can work across property lines.

Monitor Sites and Follow-up: After initial control of target species at a site, the site will be adopted by volunteers. U of M will train these volunteers in workshops to monitor the sites long-term, collect and enter data, and provide follow-up control such as missed plants or re-sprouting.

III. PROJECT STATUS UPDATES:

Project Status as of November 27, 2013

Our project was initiated with executed contracts with U of M and CCM, target species identification and reporting training workshops scheduled for 2014, and an Invasive Blitz event was held. A full-time Noxious Weed Eradication Coordinator was hired at MDA. Homeowner group meetings were held with Oriental bittersweet impacted landowners. We are organized for our project to proceed well.

Project Status as of May 30, 2014

Strong progress has been made with outreach and education about and surveying for target invasive species. The nine training workshops that were held have already resulted in numerous invasive plant control activities. The 20 days of survey were necessary to inform efforts for controlling and monitoring target species. Agreements were written with 24 private landowners to enable control of target species on their lands and engaged the landowners in the ongoing effort. Control of Oriental bittersweet and Grecian foxglove was initiated. Plans for additional control work are in development. We are evaluating database options for efficient long-term monitoring and treatment tracking of target invasives. Our project is progressing well.

Project Status as of November 26, 2014

Surveying for and controlling target invasives was the main focus during the summer and fall field seasons. Stands of Dalmatian toadflax and Grecian foxglove were significantly reduced. Oriental bittersweet was the prime target of fall treatments. We are moving forward on a database system to tracking invasive species treatments and monitoring. Outreach and education are on track. We plan to create a project webpage to communicate our efforts and make available educational resources that were developed for Invasive Blitz.

Our partnerships with DNR, MnDOT and the newly formed Winona Cooperative Weed Management Area are synergistic. Jaime Edwards, a nongame wildlife specialist with DNR, used our project as a model and received \$60,000 for early detection and rapid response invasive plant management. She used these funds for a CCM crews to survey for and control some of our joint target plant species such as Japanese hops, cutleaf teasel and Oriental bittersweet. MnDOT treated cutleaf teasel infestations. Daryl Buck with the 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. These partnerships add momentum, efficiency and efficacy. These funds were from sources other than LCCMR.

Project Status as of May 29, 2015

Outreach, survey and planning were the focus during this project period. There were 13 presentations and workshops to teaching the identification and reporting of target invasives. A project webpage was created at www.mda.state.mn.us/plants/pestmanagement/weedcontrol/targetplants.aspx. Survey efforts better delimited the extent of Oriental bittersweet in Minnesota. Control treatment planning is exacting and time consuming but was more involved than usual with Japanese hops. Hops infestations are on the banks of the Root River so careful planning and execution is needed to minimize herbicide application (time when plants can be hand-pulled or only small areas are herbicide treated) and protect rare species (8 plants, 1 beetle and 1 frog) in the area. We have benefitted from many expert advisors, including a DNR rare plant ecologist, about Japanese hops management. We are making good progress with Invasive Species Management Tracking software and CCM will begin testing a rudimentary version in the field.

Amendment Approved June 15, 2015:

We originally anticipated completing our project on 11/30/15. We would like to formally complete the project on 06/30/2016 which is the end of the appropriation. If this is acceptable, a progress rather than final report will be submitted on 11/30/15.

Activity 1 budgetary changes: Workshop deliverables for this part of the project are complete. We have been very frugal with our travel money, often carpooling and rooming together for workshops. As a result we have significant travel money remaining. We would like to use these remaining travel funds and signage funds from Activity 4 to accomplish more.

We propose to do the following.

- Teach 4 additional workshops: 2 Invasive Blitz workshops and 2 Target Invasive Identification workshops
- Make resources developed for Invasive Blitz workshops available online. The Invasive Blitz program has been very successful. Both Extension and MDA receive many requests for materials developed for these workshops and would like to make them publically available online.
- Conduct a thorough analysis of Invasive Blitz program impacts.
- Install permanent informational signage at partner locations across the state addressing invasive species prevention and management. We propose combining the signage efforts of Activity 1 and Activity 4 by creating and installing Play Clean Go signs (www.playcleango.org/signage.html) with partner and ENRTF logos on them. These educational signs are durable and would long outlast this project. Signage locations would be at nature centers and trailheads at county and municipal parks.

To accomplish these proposed changes, we would like to hire an AmeriCorps member at 25% time for 12 months to make newly developed Invasive Blitz materials available online for the public; work with program

partners to distribute invasive species signs; and do a program evaluation of the Invasive Blitz program. This AmeriCorps member is currently contracted by the U of M Master Naturalist program. We would pay for a quarter of her time to accomplish our objectives. The Master Naturalist program is agreeable to this arrangement and values the work that would be accomplished. This same AmeriCorps member would also be hired for tasks in Activity 4 that are listed under the Activity 4 budgetary changes heading.

We request permission for the following Activity 1 budget changes:

1. Move \$5,550 from Activity 1 Travel to U of MN Contract Services. These funds would be used to hire an AmeriCorps member at 25% time for 12 months.
2. Move \$2,050 from Travel to Equipment/Tools/Supplies and add 2,750 from Activity 4 Equipment/Tools/Supplies to provide training materials needed for 4 additional workshops and make up for current deficit.
3. Move \$50 from Activity 4 contract for web database to Activity 1 contract to create a line item for \$50 room rental for a workshop at Hartley Nature Center.
4. Add \$2,300 from Activity 4 Other (signage) to Activity 1 Other (signage).

Activity 4 budgetary changes: The development of Invasive Species Management Tracking software is an integral part of this activity. We request permission to do the following activities in support of this effort.

- Equip CCM crews to trial software. CCM crews will begin testing a rudimentary version of this software that was developed for University of Wisconsin Extension. We would like to support the CCM crew trials of this software. Extension is willing to pilot 7 tablet computers and 3 wireless hotspots with CCM crews. However we need an additional 4 wireless hotspots plus funding for 6 months of data plans for each hotspot/tablet (7 total). CCM will input their invasives control activities for this and other invasive species projects. This will generate a valuable control activity dataset for us to evaluate. CCM has a policy for appropriate use of mobile devices.
- Monitoring sites where CCM controlled target invasives using the Invasive Species Management Tracking system to test the system and generate a monitoring dataset for us to evaluate.
- Train CCM and Master Volunteers to use the Invasive Species Management Tracking system. Training would be conducted by an AmeriCorps member who would also work on Activity 1 tasks. This training would be face to face.
- Subcontract with UW Extension for the development of online training modules for Invasive Species Management Tracking software. The amount for this training is already in the contract line so this is not a budget change but is a substantial change to the work plan.
- Because online training would be available, we propose fewer (2-4) face-to-face workshops than the 6 in the original work plan.

We request permission for the following budget changes.

1. Move \$1,925 from Activity 4 Travel and \$850 from Activity 4 Equipment/Tool/Supplies to Contract Services to hire an AmeriCorps member to work on Activity 4 (an additional 25% time for 6 months to the Activity 1 amount).
2. Use \$2,800 of Equipment/Tools/Supplies to trial the Invasive Species Management Tracking software with CCM crews with tablets, mobile hotspots and data connectivity.
3. Move \$2,300 from Activity 4 Other (signage) to Activity 1 Other (signage).
4. See numbers 2 and 3 of Activity 1 budget changes for movement of funds from Activity 4 to Activity 1.

Project Status as of November 30, 2015:

An AmeriCorps member was hired and worked on making Invasive Blitz materials available online and field testing ISMTrack.

Early detection and rapid response to a new Oriental bittersweet find in Wabasha County demonstrated that efforts at education and outreach and a coordinated response are working well. A forester with a private tree

care company found and reported the bittersweet. Within a few weeks, the area had been surveyed and the vines controlled. This is a good example of how we would like to operate with new finds.

We are making progress with the most severe Oriental bittersweet infestation in Minnesota. This infestation is decades old with an impenetrable tangle of vines stressing trees to create a dangerous situation due to the probability of falling trees. Crews cannot work in this situation. DNR Forestry assessed the situation and wrote a plan for controlling the vines that included utilizing a forestry mower for the severely infested areas. The Winona Soil and Water Conservation District provided cost-share to the landowner to contract for a forestry mower. Mowing started in late November and is working well. Crews are working in less infested areas where hand work is appropriate. It is taking a combination of expertise, tools and funding sources to get a handle on this infestation.

Surveys for and treatments of other target species proceeded as planned. It was difficult to access Japanese hops on the Root River but crews demonstrated high skill with the canoes that were used to reach the infestations. The work was challenging but crews persevered and treatments were very effective.

In order to continue Activity 2 for the entire project period, MDA charged a salary and fringe total of \$33,993 for Activity 2 to general fund during this project period.

Amendment Request August 15, 2016

In order to balance final project funding by activity and category, the following changes are requested.

Activity 1 budgetary changes

- Increase the supply budget by \$2,026 from the Activity 4 budget. The new total would be \$16,426.

Activity 2 budgetary changes

- Move \$162 from supplies and \$7,367 from travel to personnel. Personnel would increase by \$7,529 to \$126,529. The activity total would not change.

Activity 4 budgetary changes

- Move \$2,026 from Activity 4 supplies (\$715) and travel (\$1,311) to Activity 1 supplies.

Overall Project Outcomes and Results:

We developed and began implementation of a strategy for eradicating highly damaging invasive plant populations before they could spread. This had not been attempted at a statewide level prior to this project and our target plants had been spreading for years, sometimes decades. We are pleased that our combination of outreach and education, survey and coordination, control of target invasive plants and data management proved successful.

Great progress has been made with cutleaf teasel and Dalmatian toadflax control. We are managing seedbanks and controlling plants before they produce seed. Grecian foxglove infestations are reduced and treatments were effective but new populations were found during the course of this project that still need treatment. Treatments for Japanese hops were very effective but will take some years in Phase 2 of this project to reach the stage of seedbank management. Oriental bittersweet is the most difficult of the target plants to manage because of the number, size and spread of infestations and because birds vector seed to new locations. The most severe bittersweet infestation in the state was controlled thanks to the Winona Cooperative Weed Management Area providing cost-share for the landowner to use heavy equipment – in the end, a bulldozer was needed for this infestation. Crews have controlled more manageable infestations but still have much work ahead in Phase 2.

A total of 34 workshops educated 772 people about target plants. Surveys totals are 1,542 road miles and 125 river and trail miles. Agreements were written with 162 private landowners for initial treatment on their lands. Many landowners have done follow up treatment on their own. A total of 1,360 acres were treated by crews. There were 144 unique and 194 total (some returning) individual crew members on this project. Over 60 agency

and local government partners were involved. ISMTrack was developed and crews have begun testing it. This project directly reached many hundreds and had a big impact.

We learned much during the course of this project. Lessons include:

- Begin outreach and education as soon as possible. First train the trainers who can ramp up outreach. We started engagement in year one and were able to improve our education and data management systems repeatedly throughout subsequent years. This iterative engagement created credibility and broad scale buy in.
- Delineate and map infestations as soon as possible. Share data effectively.
- Designate a point person for communication between control crew leaders and landowners and remain disciplined about maintaining this structure.
- Plan control activities far in advance (6 months to 1 year) to ensure crews are properly equipped and available.
- Invest time in building and maintaining partnerships with local entities. Local partners are essential to long-term success and communication with county boards and city councils.
- Agency communication and collaboration were critical to meet the landscape and ecosystem challenges presented by target plants in our large, great state.

We had a good start in Phase 1 of this project and look forward to continued progress in Phase 2.

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Prevent and Detect Target Species

Description: Terrestrial invasive species detection and monitoring hinges on being able to identify species of concern; the University of Minnesota Extension will deliver training to three different audiences:

- A. Natural resource professionals will be trained to identify terrestrial invasive species of special concern and native plant species that could be confused with these invasives (2 workshops per year),
- B. Forest and tree care professionals and master volunteers will be trained to become First Detectors to look for and report new infestations (6 workshops per year), and
- C. Master volunteers will be trained to recognize common invasives and strategies to coordinate volunteer work days to effectively remove target species (4 workshops per year). These master volunteers will also be asked to host local invasive species removal events in the spring and/or fall with a goal of 5 “Invasive Blitz” removal events each year.

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 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. Trainings partners include the University of Minnesota, Extension, Minnesota Departments of Agriculture and Natural Resources and various local partners.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ ~~32,300~~
ENRTF Budget: \$ 34,326
Amount Spent: \$ 34,326
Balance: \$ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. 28 Training sessions/workshops throughout state conducted and evaluated	06/30/2015	\$ 25,250 \$27,276
2. Hold Invasive Blitz events at 50 or more locations statewide and make Invasive Blitz materials available online	06/30/2015	\$7,050

Activity 1 Status as of November 27, 2013

A contract between U of M and MDA for Activities 1 and 4 for \$65,000 was executed.

A training workshop was held in Duluth on 10/16/13 for natural resource professionals and master volunteers committed to early detection of invasive pests including Oriental bittersweet. A bittersweet identification factsheet targeting holiday crafters that use bittersweet was completed and a video on this topic is available on YouTube at www.youtube.com/watch?v=0kvqotEFI48&list=PL48613CF8B45F3C25 (short version) and www.youtube.com/watch?v=w2pG2WbY048&list=PL48613CF8B45F3C25 (long version).

Training workshops were scheduled for 02/19/14 (Metro), 02/25/14 (St. Cloud), 04/05/14 (Metro), 03/12/14 (Grand Marais), 03/14 (Bemidji) and 04/25/14 (Rochester) for First Detector volunteers. Workshops for natural resource professionals are in the planning stage with proposed sessions in the metro and Alexandria in late April.

Invasive Blitz workshops are in the process of being scheduled. An invitation for collaboration was sent to statewide partners and received robust responses. An Invasive Blitz event was held at Elm Creek Park, Three Rivers Park District, on 11/01/13. Participants surveyed for Oriental bittersweet and found previously unreported infestations.

Activity 1 Status as of May 30, 2014

U of M Extension and partners completed: 1 Invasive Blitz workshop (14 participants, mostly Master Naturalist and Master Gardeners), 2 Target Invasives Identification Workshops (86 professionals); and 6 Forest Pest First Detector workshops (104 Master Volunteers and tree and forestry professionals). Evaluations were very positive about all of the workshops.

The Invasive Blitz program was reported on at a peer reviewed, blind jury selected Association of Natural Resource Extension Professionals national conference, in Sacramento, CA (no LCCMR funds were used to support conference attendance) that reached 50 natural resource professionals. Extension did a phone survey of 15 of the first 24 Invasive Blitz participants. We learned that 86% had engaged in invasive species management work and 43% had volunteered specifically on eradication and removal projects. These volunteer leader activities resulted in 375 volunteer hours (30.25 hours/volunteer) which represents \$9,116.25 (as calculated using Independent Sector) in public value. Approximately 30 acres were treated and 20 homeowners were influenced to manage for target invasive species.

Activity 1 Status as of November 26, 2014

U of M Extension and partners completed: 4 Invasive Blitz workshops (41 participants, mostly Master Naturalist and Master Gardeners) and 1 Forest Pest First Detector workshop (30 participants). On September 29th the Master Naturalist program coordinated a variety of Invasive Blitz work projects in support of National Public Lands Day. Approximately 100 volunteers worked at five public lands locations around the state to remove woody invasives such as buckthorn, Oriental bittersweet and Japanese Knotweed at the following locations: Carver Park Reserve, Minnesota Valley National Wildlife Refuge, Indian Heights Park, Northland Arboretum and William Berry Woods.

An additional 5 Invasive Blitz workshops were requested and are scheduled. Four additional Forest Pest First Detector workshops are scheduled for late winter 2015. An Oriental bittersweet identification and control workshop was held on 10/09/14 (photo right). Target Invasives Identification Workshops are being planned for spring sessions.



Workshops for people to learn about identifying and controlling target invasive plants.

Activity 1 Status as of May 29, 2015

UMN Extension completed 3 Invasive Blitz workshops for Master Volunteers reaching 39 individuals; 4 Forest Pest First Detector workshops for Master Volunteers and tree and forestry professionals reaching 104 participants and 2 Target Invasives Identification trainings reaching 125 professionals (for both workshops we had to close registration because we reached room capacity). We have one more Invasive Blitz workshop scheduled for September 2015 and one additional request.

UMN Extension has completed the original contracted deliverable of 8 Invasive Blitz workshops, but has one additional Invasive Blitz scheduled. We have also completed all 12 Forest Pest First Detector and 4 Target Invasives Identification workshops in our work plan. Although, because of the success of the Target Invasives Identification workshops we plan to offer 2 more during the spring of 2016. We are seeking other (not ENRTF) funding to continue the Forest Pest First Detector program in 2016.

We committed to having at least 10 invasive species removal events as a result of the Invasive Blitz programming partnered with the Minnesota Master Naturalist program. We are very pleased that in this reporting period alone, Master Naturalists have self-reported: 61 invasive species removal projects led by 18 individuals. The total public value of this effort is \$4,105. These events managed invasive species on 1,715 acres of land and reached over 230 youth.

Activity 1 Status as of November 30, 2015:

Invasive Blitz activities continued during this project period. One Invasive Blitz workshop was held in Hastings on 09/15/15 with 18 participants. Summary information from Master Naturalists involved with Invasive Blitz was pulled from the Master Naturalist website database. From June to November 2015, 27 Master Naturalist volunteers reported 359 hours of invasive species work that impacted at least 2,430 acres. The value of this volunteer service is estimated at \$8,913 (based on www.IndependentSector.org). These numbers do not reflect the full impact of Invasive Blitz because not all Invasive Blitz participants are Master Naturalists and many volunteers wait until the end of the year to report their service hours. Many volunteers don't report their service activity at all. A more in-depth survey of past Invasive Blitz participants is planned.

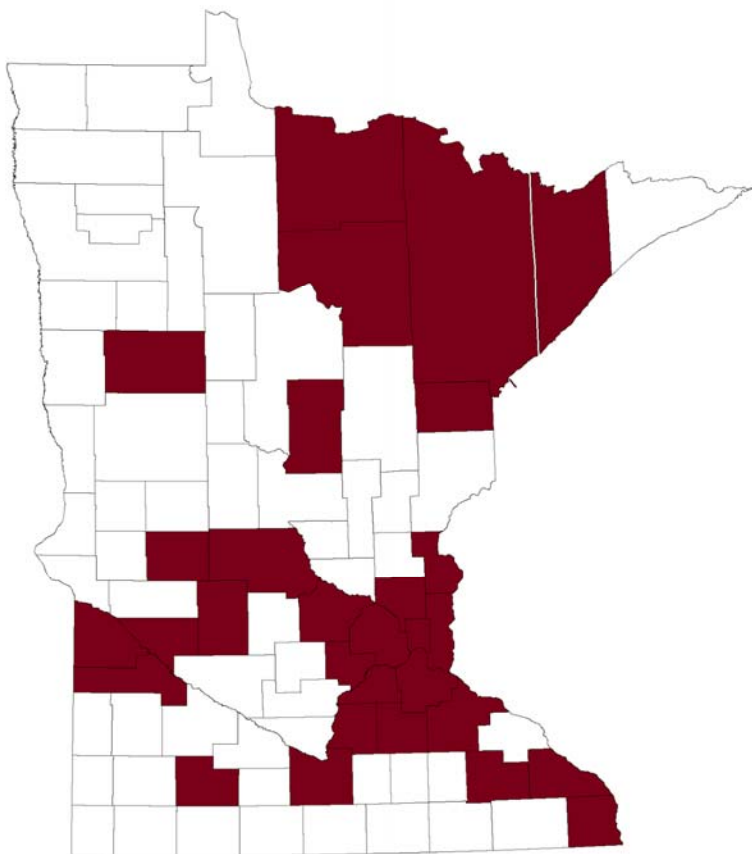
An AmeriCorps member was hired and tasked with making Invasive Blitz resources available on the web. They are in a temporary location <http://z.umn.edu/invasiveblitz>. Extension recognizes the need for a better web presence for this material. Extension is developing an Invasive Species team that will create a website to host this information by the end of May 2016.

Starting in January 2016, the AmeriCorps member will work on Invasive Blitz evaluations and invasive species signage.

Activity 1 Final Report Summary:

The AmeriCorps workers on this project during the reporting period studied comparative ways to calculate volunteer value to capture the volunteer efforts of Invasive Blitz participants. As a result we have a better method to more accurately report this project’s public impact value.

In total, 158 Minnesota Master Naturalist volunteers and others participated in 12 Invasive Blitz sessions across the state. Participants then volunteered 1,197 hours, providing a public value, according to Independent Sector, of \$27,614. Volunteers reported 434 service events, including leading student groups in invasive removal projects. These management activities impacted 9,582 acres in 30 counties. If professionals performed the same invasive species management activities as volunteers, it would have cost an estimated \$3,358,800. Given the \$7,050 Invasive Blitz budget compared to the estimated value of volunteer management activities, the cost-benefit of the program was 1:428. Data are limited due to the fact that 30% of Invasive Blitz participants did not report service data to the Minnesota Master Naturalist website.



Minnesota counties with Invasive Blitz activities.

An AmeriCorps worker made available the Invasive Blitz program materials via the Minnesota Master Naturalist website (www.minnesotamasternaturalist.org/invasivespecies/). Please note the Story Map at the bottom of this website. It is a new and innovative way to highlight Invasive Blitz program development and impacts. In addition, 22 PlayCleanGo signs were distributed to select Invasive Blitz participants for installation at 10 sites around Minnesota with an estimated in kind contribution of \$2,424 for materials and labor.

In total all Activity 1 deliverables are complete:

- 6 Weed ‘Em Out workshops reaching 286 natural resource professionals

- 18 Forest Pest First Detector events including Oriental bittersweet reaching 350 tree care professionals and master volunteers
- 10 Invasive Blitz workshops reaching 120 Master Naturalist and other dedicated volunteers (please note the public impact data reported above includes 2 Invasive Blitz workshops that preceded this ENRTF project; the summary was done on the whole program).

Workshop Title	Date	Location	# of Participants
Weed 'Em Out	4/29/2014	Blaine	56
Weed 'Em Out	5/6/2014	Marshall	30
Weed 'Em Out	4/9/2015	Rochester	72
Weed 'Em Out	4/16/2015	Grand Rapids	53
Weed 'Em Out	4/13/2016	Itasca State Park	34
Weed 'Em Out	4/21/2016	Waite Park	41
Forest Pest First Detector	10/16/2013	Duluth	28
Forest Pest First Detector	2/19/2014	Chaska	26
Forest Pest First Detector	2/25/2014	St. Cloud	23
Forest Pest First Detector	3/5/2014	Maplewood	18
Forest Pest First Detector	3/12/2014	Grand Marais	17
Forest Pest First Detector	3/14/2014	Bemidji	9
Forest Pest First Detector	4/25/2014	Rochester	11
Forest Pest First Detector	11/5/2014	Rochester	30
Forest Pest First Detector	2/19/2015	Hutchinson	16
Forest Pest First Detector	2/26/2015	Alexandria	10
Forest Pest First Detector	3/3/2015	Cloquet	30
Forest Pest First Detector	3/4/2015	Shoreview	48
Forest Pest First Detector (OB)	3/9/2015	Minneapolis	11
Forest Pest First Detector	2/17/2016	Marine on St. Croix	16
Forest Pest First Detector	2/18/2016	Mankato	15
Forest Pest First Detector	2/24/2016	Carlton	11

Workshop Title	Date	Location	# of Participants
Forest Pest First Detector	2/25/2016	Fergus Falls	19
Forest Pest First Detector	3/18/2016	Leech Lake BIA	18
Forest Pest First Detector (OB)	4/25/2016	Stillwater	5
Invasive Blitz (predate project)	3/16/2013	Winona	14
Invasive Blitz (predate project)	5/5/2013	Cedar Creek	16
Invasive Blitz	3/15/2014	Bloomington	16
Invasive Blitz	6/25/2014	Brainerd	12
Invasive Blitz	9/14/2014	Spicer	10
Invasive Blitz	9/20/2014	Rochester	12
Invasive Blitz	10/04/2014	Duluth	9
Invasive Blitz	2/21/2015	Forest Lake	13
Invasive Blitz	4/18/2015	St. Paul	21
Invasive Blitz	5/14/2015	Grand Rapids	11
Invasive Blitz	9/15/2015	Hastings	16
Invasive Blitz	6/8/2016	Granite Falls	8

In addition to these defined deliverables two blind juried, peer reviewed, presentations about this work were presented at two different Association of Natural Resource Professional National Conferences (CA in 2014 and VT in 2016) reaching a total of 77 natural resource Extension professionals across the nation. During the most recent Vermont presentation, our project and ENRTF support were called out specifically by several session participants as examples of national leadership including the well-coordinated and collaborative effort of Minnesota's early detection and rapid response to eradicate invasive plants.

Other Extension materials created to support this work, often funded with other grant and internal Extension funds including those generated from participant fees from workshops sponsored by the this project include:

- [Oriental Bittersweet Fact Sheet](#) (Extension produced)
- [Bittersweet ID for Crafters \(short version\)](#) (Joint funded: Extension & ENRTF)
- [Bittersweet ID for Crafters \(long version\)](#) (Joint funded: Extension & ENRTF)
- [Defeating a Killer Vine: Oriental bittersweet](#) (Farm Bill funded, via MDA)
- [Going Rogue: The Story of Japanese Barberry](#) (Farm Bill funded, via MDA)
- Five 3D printed invasive plant models of Grecian foxglove (2), Japanese hops (2) and black swallow-wort (1) were produced (Farm Bill funded via MDA). To our knowledge, this is the first time 3D printing has been used to generate invasive plant models. This work is being received very well in by natural resource professionals.

If the live links to videos do not work, please go to the University of Minnesota Extension YouTube channel.

ACTIVITY 2: Survey and Delineate Target Species Then Coordinate Control

Description:

Survey: MDA will perform a comprehensive survey of target species distribution and infestation density. A handheld GPS unit will be used to mark infestation points. These data will be entered into a GIS and will be available on the web at EDDMapS (www.eddmaps.org/), a national database.

Verification: MDA will continue to follow up on target species reports from the public and partner agencies.

Control Coordination: MDA will contract and coordinate with landowners and CCM 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.

A new position will be created in the Plant Protection Division at MDA for Activity 2 work.

Summary Budget Information for Activity 2:

ENRTF Budget: \$ 135,000
Amount Spent: \$ 135,000
Balance: \$ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. Preliminary survey completed of known infestations and infestation control effort coordinated with CCM	12/15/2014	\$ 100,000
2. Data are available on the web in a national database to promote data sharing	06/30/2015	\$ 35,000

Activity 2 Status as of November 27, 2013

Meetings with homeowner groups with Oriental bittersweet infested properties were on 09/18/13 and 09/24/13. Landowners learned about Oriental bittersweet biology and management options.

Working group meetings were held in Winona (09/18/13) and Red Wing (10/10/13). The working groups are comprised of MDA, U of M, DNR, MnDOT, city foresters, county resource managers and agricultural inspectors, soil and water conservation districts, Winona State University, Master Gardeners, green industry representatives, and US Fish and Wildlife partners. We are working together to manage target invasive species. The focus of both meetings was our combined effort to control Oriental bittersweet.

MDA hired Emilie Justen as the project’s Noxious Weed Eradication Coordinator and will start 12/02/13. She will start with survey and site assessments of infested areas. Then she will write agreements with landowners and coordinate control with CCM.

Activity 2 Status as of May 30, 2014

Oriental bittersweet

We are positioning for a large-scale control effort in fall 2014. In preparation, we have been surveying infestations, educating landowners, writing agreements with impacted private landowners and meeting with other agency project partners.

- MDA and cooperators spent 14 days surveying Oriental bittersweet in Red Wing and Winona. Verified reports were entered into the Early Detection and Distribution Mapping System (www.eddmaps.org) to begin delineating the infestations in both areas.
- Agreements were written with 21 private landowners with Oriental bittersweet infestations in Red Wing.
- A meeting was held on 04/24/14 with the multi-agency/organization Winona Invasive Species Working Group to discuss plans to eradicate area Oriental bittersweet. Members of this group held a follow-up

meeting to develop reporting, mapping, and outreach plans. These plans include a local media release in June 2014 followed by a second media release in the fall and a mailing to landowners with Oriental bittersweet on their property. The Winona County Planning Department is helping to coordinate the mailing. An Oriental bittersweet control demonstration field day will be scheduled.

- A meeting with private landowners who have substantial Oriental bittersweet infestations in Winona neighborhood was held on 05/20/14 to discuss landowner agreements and to answer any questions about the eradication project. A meeting will also be set up in the coming months with a group of landowners in another neighborhood to discuss the project and work moving forward.

Grecian foxglove

MDA spent four days in April and May surveying Grecian foxglove infestations in Washington County and following up on reports. Most reports were from the Washington Conservation District and the County Agricultural Inspector. Landowner agreements were written for three private landowners with Grecian foxglove infestations on 47 parcel acres. These infestations are adjacent to Afton State Park which has some sizeable Grecian foxglove infestations that were mapped by DNR. Crews treated both public and private infestations in and around the park in late May.

Dalmatian toadflax

In response to a Dalmatian toadflax report received during the winter, MDA and MnDOT joined the Cook County Invasive Team for a one day Dalmatian toadflax survey in Lutsen and Schroder areas on 05/14/14. Two infestations were documented. One infestation covers less than a quarter acre along Highway 61. This infestation was treated on 05/27/14 and follow up treatments will be applied as necessary. The second infestation is along Cramer Road in Schroeder with scattered plants in the rocky ditch located in approximately 300 yards of the county right-of-way. Crews will treat this infestation in June. The Cook County Invasive Team members are informing area landowners and land managers of the infestation and asking them to report new sightings.

Cutleaf teasel

MDA and MnDOT spent one day surveying cutleaf teasel in Houston County. Herbicide treatments in the MnDOT right-of-way were organized and the infestations were treated on May 20, 2014. Adjacent and other area private land with potential infestations will be surveyed this summer and subsequent herbicide treatments will be organized.

A survey of Japanese hops along the Root River will be planned for mid-July when the vines are most visible.

Activity 2 Status as of November 26, 2014

Oriental bittersweet

Oriental bittersweet survey and control was a major focus. MDA has agreements with 82 landowners for crews to work across property lines to control Oriental bittersweet.

- A meeting was held on 09/18/14 with the multi-agency/organization Winona Invasive Species Working Group to discuss plans to eradicate area Oriental bittersweet. A media release and field workshop about Oriental bittersweet identification and control were planned. The Winona City Council and County Board were informed of plans.
- On 10/15/14, MDA and cooperators surveyed 41 miles of the Cannon River and did not find Oriental bittersweet on the river. This was a relief because some Oriental bittersweet plants had been found on the nearby Cannon Valley Trail. DNR funded CCM crews and outfitted the survey participants that included multiple agency and volunteer partners.
- On 11/07/14, a targeted mailing was sent to 49 households in Oriental bittersweet impact neighborhoods in Red Wing. Over half of the households responded directly to the letter and many expressed concern that Oriental bittersweet is spreading on their properties despite their own control efforts.

Grecian foxglove

Five days were spent surveying in Washington County to delineate Grecian foxglove infestations. MDA has agreements with 11 landowners and coordinated Grecian foxglove treatments in September and October.

Dalmatian toadflax

MDA facilitated Dalmatian toadflax treatments near Halma in Kittson County in the summer and fall. MDA has agreements with five landowners. After years of treatments, the Dalmatian toadflax population was greatly reduced. There were very few flowering plants but they were scattered over a large area so diligence was required to find each plant. Infestations in Lutsen and Schroder were treated in June and July.

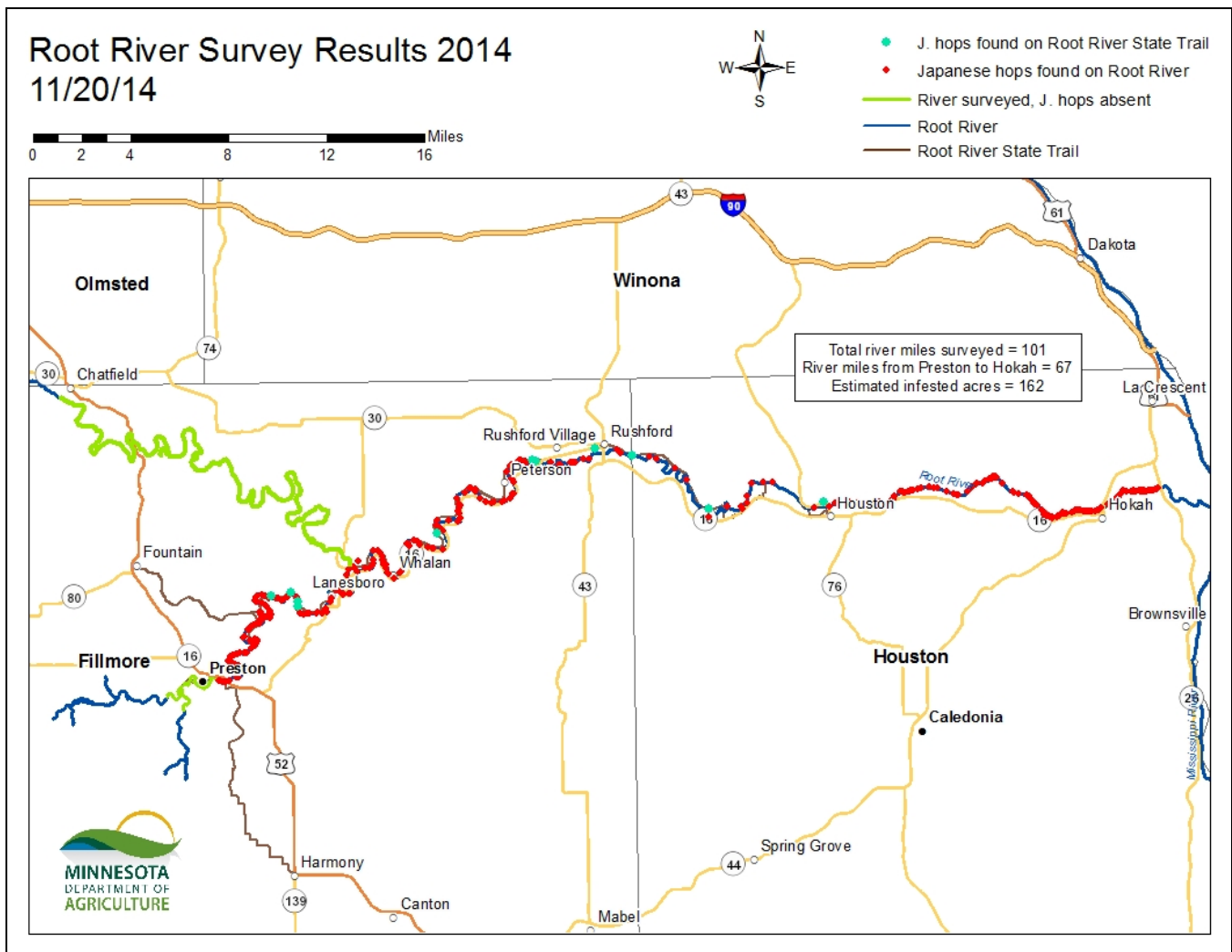
Cutleaf and common teasels

MDA spent one day with project cooperators at MnDOT surveying for cutleaf teasel in Houston County. MDA has agreements with three landowners in Money Creek Township. MnDOT treated three acres of private land and right of way and DNR treated two acres of private land. MnDOT also treated one acre of right of way in Mower County. Partnership with MnDOT and DNR is essential for long-term successful management of this species.

A closely related species, common teasel, was documented along Pine Creek in Winona County by US Fish and Wildlife. This is the first confirmed report of common teasel in Minnesota. Because this infestation is along a trout stream and may have been accidentally introduced by anglers, an effort will be made to educate anglers about invasive plants.

Japanese hops

The Bell Herbarium contains a single sample of Japanese hops collected in 1992 on the Root River. It was decided to survey a 44 mile section of the Root River State Trail on 07/24/14 to see whether Japanese hops are still present. A few Japanese hops infestations were found, most notably a large infestation in Rushford that was visible from Highway 16. The survey group decided that a river survey was necessary to view the banks, prime habitat for Japanese hops. On 08/14/14, the group surveyed 40 river miles. Unfortunately, there were numerous hops infestations. On later dates, our DNR partners surveyed additional areas to determine the extent of the infestations and the upriver source of seed. This is important because seed spreads downriver so the control effort will seek to eliminate upriver seed sources first. Infestations are concentrated from Preston to Hokah then decrease between Hokah and the Mississippi River. Although the frequency and density of hops are daunting, infestations appear to be limited to this single stretch of the Root River and are not on tributaries surveyed. DNR funded CCM crews and outfitted the survey participants that included multiple agency and volunteer partners.



In preparation for early summer treatments, project partners are receiving advice about herbicide best practices for application in riparian areas and lists of people to notify.

Activity 2 Status as of May 29, 2015

Oriental bittersweet

MDA has agreements with 105 landowners for crews to work across property lines to control Oriental bittersweet. Crews treated private land in Red Wing in April. Four areas were surveyed for Oriental bittersweet in March and April 2015 to determine presence/absence of Oriental bittersweet infestations.

- On 03/09/15, with the help of volunteers and funding from Farm Bill, 24 miles of public road and trails were surveyed along the Mississippi River in the Prospect Park and Seward neighborhoods of Minneapolis. A positive infestation was recorded in Prospect Park in 2014. The group found 33 suspect Oriental bittersweet infestations, and one positive infestation on private property. Follow-up surveys will be conducted when plants are flowering and/or leafed out to identify the species.
- Volunteers and funding from Farm Bill also supported a survey in Rochester on 03/10/15. The group surveyed 65 miles of public road and trails. Only eight suspect Oriental bittersweet infestations were recorded, with follow-up survey resulting in one positive infestation reported. Further monitoring will be conducted when plants are flowering and/or leafed out to identify the species.
- On 04/22/15 – 04/23/15, a road survey to delineate the Oriental bittersweet infestation in southeastern Minnesota was conducted in Winona, Fillmore, and Houston counties. No additional infestations were recorded, and one suspect infestation on DNR land in Houston County will be revisited when the plants can be identified.

- Road surveys were conducted on 04/24/15 and 05/01/15 to begin delimiting the infestation in Red Wing. A follow-up survey will be conducted to identify suspect plants and delineate the infestation.
- MDA, in collaboration with Washington Conservation District, surveyed a one acre infestation on private property near other known infestations in Washington County.
- An Oriental bittersweet management plan for the Twin Cities Metropolitan area was written as a guide for County Agriculture Inspectors, Three Rivers Park District and the Minnesota Departments of Agriculture, Natural Resources and Transportation.

Grecian foxglove

One day was spent surveying sites that were treated in 2014, and a 75% reduction in the density of rosettes was observed. MDA has agreements with 13 landowners and treatments will be scheduled for early fall, if funding is available.

Dalmatian toadflax

Project partners in Cook County spent two days scouting for Dalmatian toadflax rosettes. Infestations, which in 2014 were scattered over three acres of state and county rights-of-way, are reduced to three small plants along Highway 61 near Lutsen and six small plants along Cramer Road in Schroeder. In Kittson County, MDA has agreements with 5 landowners and treatments will be scheduled for mid-summer, if funding is available.

Cutleaf and common teasels

Two days were spent monitoring teasel infestations near Money Creek, Rushford, and La Crescent. Cutleaf teasel infestations have been reduced an estimated 70%, based on density of rosettes, from May 2014. MDA has agreements with four landowners in Winona and Houston counties and crews were able to treat rosettes in May. A common teasel report from October 2014 was monitored near Rushford, and a few scattered plants were found growing in a pasture along a trout stream. A follow up survey will be planned to delineate the infestation and schedule treatments, if funding is available.

Japanese hops

Preparations for summer treatments of Japanese hops infestations along the Root River was a major focus. Two days were spent surveying sites with positive Japanese hops infestations to monitor plant growth. The data will be used to fine tune treatment timing for Japanese hops. MDA has 18 agreements with landowners along the Root River in preparation for treatments to begin in June. Treatment planning has been complex and involved consultation with multiple expert advisors about treatment options and protection of rare species in the area.

Activity 2 Status as of November 30, 2015:

MDA has agreements with 105 landowners for crews to work across property lines to control Oriental bittersweet. Multiple areas were monitored and surveyed to confirm reports.

- On 06/01/15 and 06/02/15, MDA followed up on unconfirmed reports of Oriental bittersweet in the Twin Cities metropolitan area. Three infestations were positively identified and entered into the Early Detection and Distribution Mapping System (EDDMapS).
- Treatment areas were scouted in Winona and Red Wing on 10/08/15 and 11/12/15 in preparation for fall treatments.
- A multi-agency survey was conducted in Whitewater Wildlife Management Area (WMA) on 10/28/15. Several suspect plants were identified and a previously recorded infestation was mapped for future eradication.
- A confirmed report in Wabasha County was mapped on 11/05/15. Because the report was the first in the county, a sample was taken to press for the U of M Bell Herbarium records.
- Several suspect plants were monitored on 11/06/15 in the west metro, but lacked the fruit necessary for positive identification.
- One day was spent scouting previously treated sites in Red Wing on 11/12/15, and one day was spent scouting at Whitewater WMA on 11/18/15.

- In collaboration with DNR Forestry and the Winona Soil Water Conservation District (SWDC), we are tackling the most severe Oriental bittersweet infestation in Minnesota. One day was spent flagging property in Winona in cooperation with the DNR on 11/16/15. The flagging delimited areas where CCM crews could control vines by hand. Other areas of the site are so heavily infested that they are too dangerous for crews to access due to the risk of falling trees. In these areas, a forestry mower is cutting and grinding the vines and pushing over hazard trees. Mowing will be completed in early December. The forestry mowing is contracted by the landowner. He will be reimbursed by the Winona SWCD which has Cooperative Weed Management Area funding to cover these costs.

Grecian foxglove

MDA has agreements with 13 landowners in Washington County. Three days were spent scouting and surveying on 08/05/15, 08/16/15, and 08/18/15. Reductions in the densities of rosettes were observed.

Dalmatian toadflax

MDA has agreements with five landowners in Kittson County. Project partners in Cook County scouted previously treated areas for one day. Two days were spent surveying in Kittson County on 7/27/15 and 7/28/15, and a reduction of the density of rosettes was observed.

Cutleaf and common teasels

MDA has agreements with eight landowners in Houston, Mower, and Winona Counties. One day was spent monitoring teasel infestations on 10/20/15. MDA cooperators at MNDOT have recorded infestation reductions along their rights-of-way in Winona and Houston Counties.

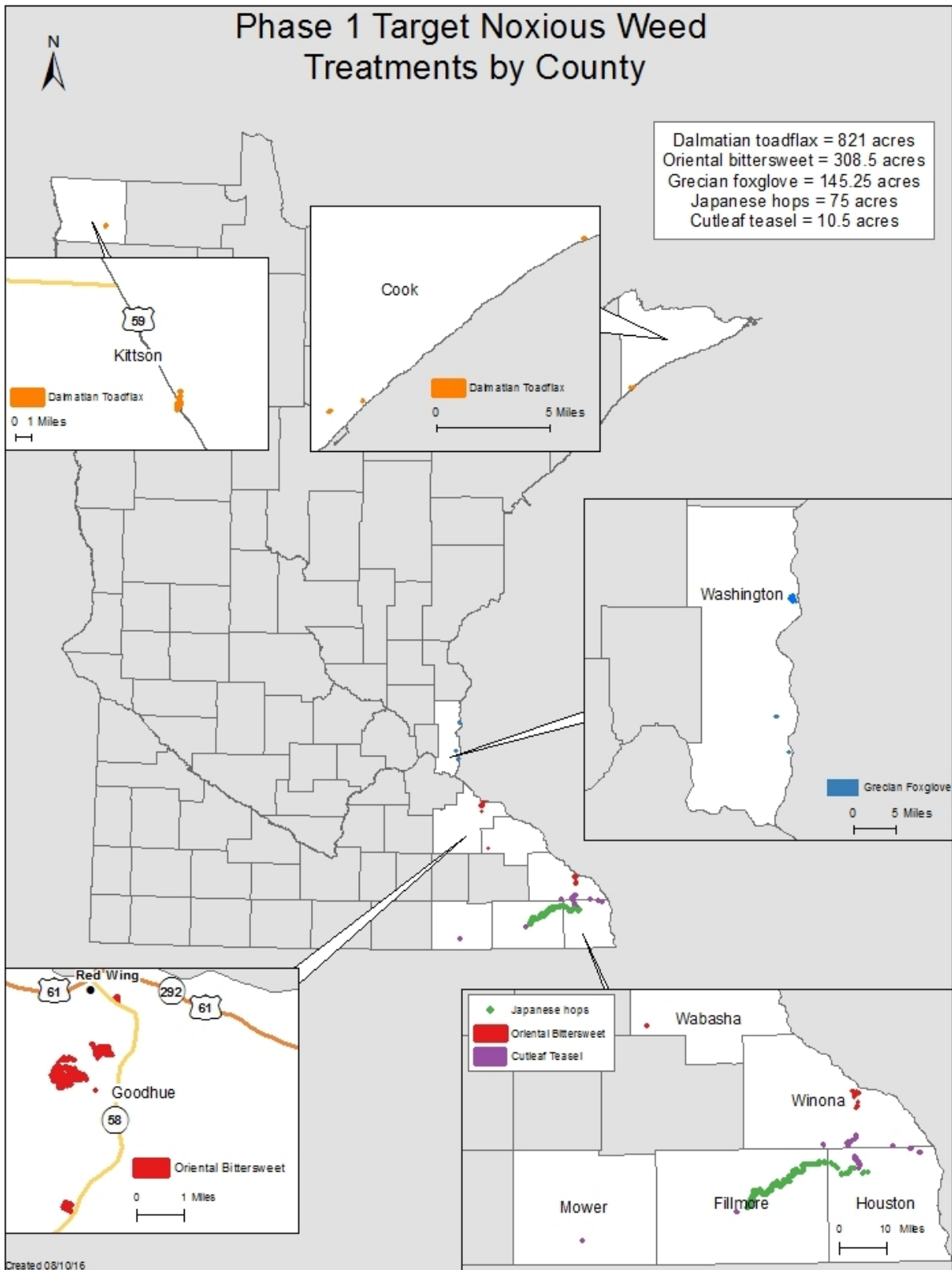
Japanese hops

MDA has agreements with 34 landowners along the Root River. Infestations were monitored on 08/26/15 and 10/20/15.

Activity 2 Final Report Summary:

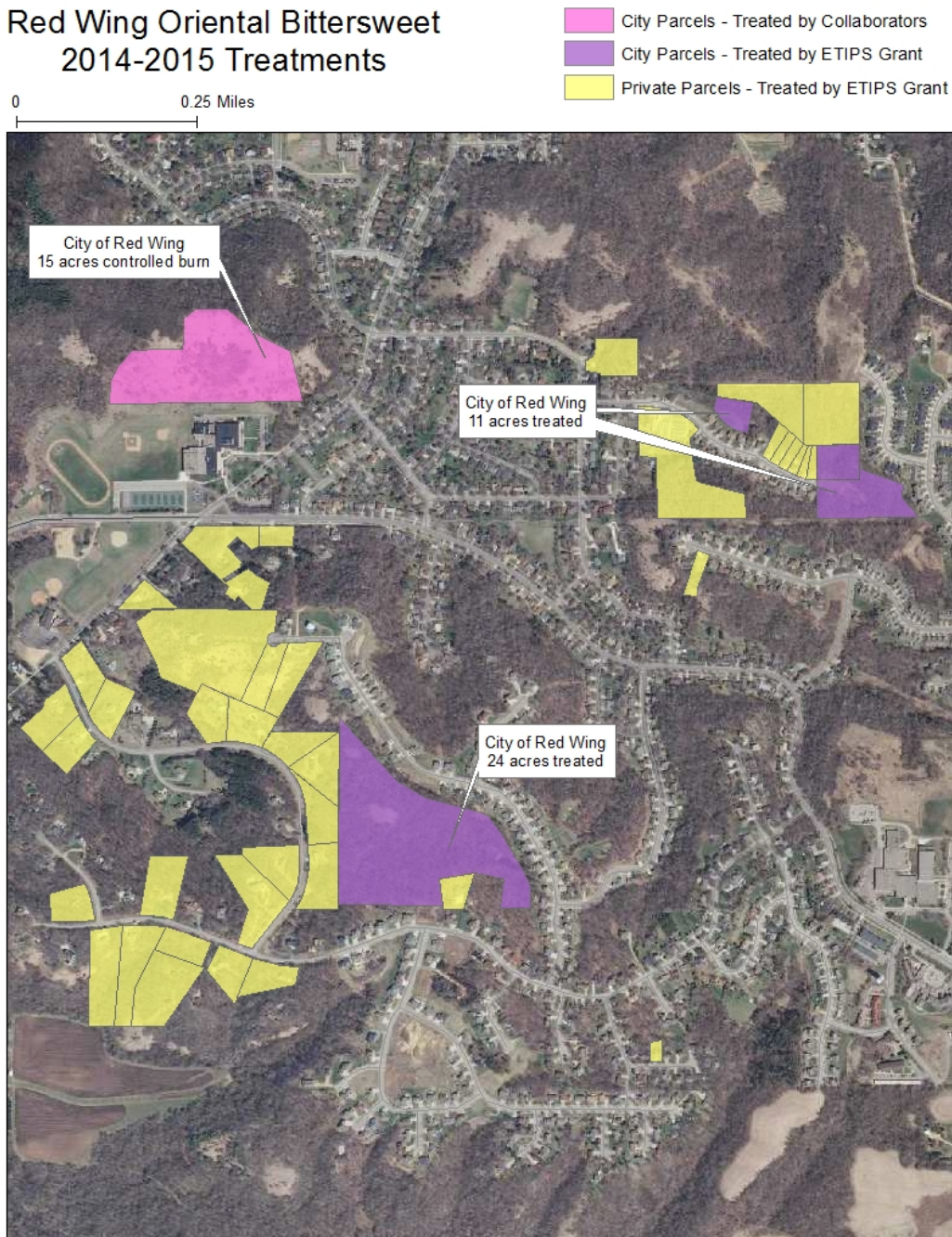
Infestations of the five target species were contained as a result of this project. Treatments were initiated in 2014 and will continue in Phase 2 of the project. 1,360 total acres were treated in nine counties: Cook, Fillmore, Goodhue, Houston, Kittson, Mower, Wabasha, Washington, and Winona. The MDA completed 162 landowner agreements for treatments.

An estimated 80% reduction in rosettes of Grecian foxglove, Dalmatian toadflax, and cutleaf teasel was observed after the 2014 treatments. Treatment of Japanese hops in 2015 reduced infestations by 75%. Oriental bittersweet treatments of the most severe infestations in southeast Minnesota have helped contain the invasive plant.



Our project worked across property lines. This is necessary for eradication and to prevent reinfestation from neighboring lands. The map below illustrates collaboration with the city of Red Wing and private landowners for Oriental bittersweet management.

Red Wing Oriental Bittersweet 2014-2015 Treatments



Surveys were conducted throughout the state to map infestations. Eight multiagency and volunteer surveys were conducted, covering 1,542 road miles and 125 river and trail miles. All positive reports were verified and bulk uploaded to the national database (www.eddmaps.org). Meetings and trainings were held with landowners and local leaders at multiple sites to demonstrate how to identify, monitor, and treat target plants to prevent reinfestation. The impact of this project is far-reaching, with landowners continuing control work on their own lands, county weed management areas and watershed districts funding cost-share programs to assist landowners with invasive plant control, and the countless people recognizing and reporting invasive plants around the state.

Per the request of multiple counties, an interactive map of target species was created and is at <http://mnag.maps.arcgis.com/apps/webappviewer/index.html?id=2e248e0a57fc486fb2493dcf4d5eab4c>.

People can view distribution and easily create their own maps with almost real time data. Data in EDDMapS are downloaded nightly then served in an ArcGIS Online map app.

ACTIVITY 3: Control Target Species

Description: 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: \$ 150,000
Amount Spent: \$ 150,000
Balance: \$ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. Initial control of target Oriental bittersweet infestations completed	04/30/2015	\$100,000
2. CCM crews controls remaining target species (Dalmatian toadflax, cutleaf teasel, Japanese hops, and Grecian foxglove)	06/30/2015	\$50,000

Activity 3 Status as of November 27, 2013

A contract between MDA and CCM for Activity 3 for \$150,000 was executed.

We hoped to schedule a Dalmatian toadflax treatment this fall. Timing with the right weather conditions was an issue. There will be 2014 treatments. This is a continuation of previous treatments by MnDOT on public land and The Nature Conservancy on private land (2011 and 2012) followed by the Kittson Soil and Water Conservation District treatments on both public and private lands (2013). The infestation is definitely decreasing and will be eradicated with diligent effort in upcoming years.

We will be assessing Oriental bittersweet infestations in Red Wing in early December in preparation for winter/spring 2014 treatments.

Activity 3 Status as of May 30, 2014

Oriental bittersweet

We are positioning for a large-scale Oriental bittersweet control effort in fall 2014. In preparation, three crews were trained in Red Wing to control Oriental bittersweet, a woody invasive vine very different from other invasives that CCM has experience with. This training and initial control work resulted in the treatment of 41.5 infested acres on 50 parcel acres during the weeks of March 24, March 31 and April 14. We will evaluate these spring treatments prior to our fall treatments and make any necessary adjustments to improve treatment efficacy. Infestations were treated on private lands and at Memorial Park. The city of Red Wing is working with the US Fish and Wildlife Service, Audubon and local volunteers to reduce invasives and restore native vegetation at Memorial Park. Eliminating Oriental bittersweet and replacing it with native vegetation is a part of this synergistic effort. There were 840 hours of crew time (140 hours by Rochester crews and 700 hours by St. Paul crews) spent on Oriental bittersweet control.

Grecian foxglove

Grecian foxglove treatments were initiated at Afton State Park and surrounding private lands in Washington County on 05/28/14 and will continue on 05/29/14 for a total of 170 hours of crew time.

Treatments are in the planning stage for Dalmatian toadflax in Kittson and Cook Counties and for cutleaf teasel in Winona and Houston Counties.

Activity 3 Status as of November 26, 2014

Oriental bittersweet

Several crews have devoted 2,030 hours to Oriental bittersweet control. Landowners have been appreciative to have crews bring bittersweet infestations down to more manageable levels.

- Treatments that were completed last spring in Red Wing were evaluated. We were pleased that the treatments were very effective and the forested areas look better than anticipated. Many of the vines that had been in the trees fell to the ground where they are decomposing. Trees that had been smothered with vines leafed out and are recovering. A few vines had been missed in the spring and were treated this fall.
- A total of 53.5 acres in Red Wing and 66 acres in Winona were treated between 10/06/14 and 11/20/14.



Oriental bittersweet infested area in Red Wing where crews treated vines in spring 2014. (Photo 11/2014)



Adjacent infested area where crews have not treated vines yet. (Photo 11/2014)

Grecian foxglove

Grecian foxglove populations are visibly reduced in Washington County. Treatments occurred 06/05/14, 06/09/14 and between 09/02/14 and 10/02/14 at Afton State Park, Belwin Conservancy and on private lands. A total of 89 acres were treated. Once crews began controlling Grecian foxglove across property lines, the likelihood of reinfestation was reduced. Landowners could justify putting more of their resources into their own control efforts because reinfestation was no longer inevitable.

Dalmatian toadflax

Dalmatian toadflax treatments near Halma in Kittson County were completed on 06/17/14, 07/29/14 and 09/30/14. A total of 133 acres were spot treated. Infestations scattered over four acres in Lutsen and Schroder were treated on 06/24/14 and 07/29/14. Additional treatments in the late spring 2015 would be ideal if funds are available.

Cutleaf teasel

The following treatments were not funded by this project but are important for elimination of this target species. MnDOT treated three acres of private land and right of way on 09/24/14 and DNR treated two acres of private land on 08/06/14. MnDOT also treated one acre of right of way in Mower County in September.

Activity 3 Status as of May 29, 2015

Oriental bittersweet

Oriental bittersweet control efforts continued with 440 additional hours in December and April for a total of 3,320 hours thus far. In Winona, 4 acres were treated on 12/01/14. In Red Wing, 17 acres were treated between 04/06/15 and 05/01/15. Treatments from fall 2014 will be evaluated in both Red Wing and Winona to determine if follow-up treatments will be necessary. A large control effort is planned for the fall at sites that have not been treated yet.

Cutleaf teasel

Cutleaf teasel treatments were initiated in Winona and Houston counties on 05/11/15. Scattered plants were treated over a two acre area. Cutleaf teasel treatments continued on 05/27/15 and 05/28/15 for a total of 100 crew hours. MNDOT continues to spot-treat cutleaf teasel rosettes in the highway rights-of-way and visible infestation reductions are being recorded.

Control efforts are in the planning stage for Dalmatian toadflax in Kittson and Cook Counties, Grecian foxglove in Washington County and Japanese hops in Fillmore and Houston Counties.

Activity 3 Status as of November 30, 2015:

Oriental bittersweet

Crews in Winona initiated treatments on 11/02/15 and treated 8 acres. A one acre, new county find in Mazeppa, Wabasha County was treated on 11/23/15. A private forester found and reported the infestation. Treatment of the Wabasha site was prioritized because the infestation was small and isolated – a good example of early detection and rapid response.

Grecian foxglove

In Washington County, treatments occurred 09/14/15-09/17/15 and 09/21/15-09/24/15 for a total of 400hrs and 61 acres of control. Infestations on both private and public lands have been reduced.

Dalmatian toadflax

Treatments in Kittson County took place 07/27/15-07/28/15 and 09/14/15-09/15/15 for a total of 180hrs and 240 acres treated. In Cook County, MDA cooperators at Cook County Invasive Team and MnDOT monitored and treated two very small infestations.

Cutleaf and common teasels

Crews treated cutleaf teasel infestations near La Crescent on 06/09/15, 06/23/15, 08/06/15, and 08/07/15 for 230 hours and a total of 9 acres. MDA cooperators at MnDOT continued to treat cutleaf teasel infestations in their rights-of-way in Money Creek (Winona and Houston Counties) and Adams (Mower County).

Japanese hops

Crews worked along the Root River to treat Japanese hops growing on the riverbanks throughout the months of July and August for 770hrs and a total of 68.5 acres. Infestations were greatly reduced and follow up treatments were conducted on areas with regrowth.

Activity 3 Final Report Summary:

This project provided many unique opportunities for members to work on identification and control of new invasive species they would not otherwise have worked with. This experience gave them valuable skills for potential future employment and unique skill sets likely to set them apart from other applicants. In addition to gaining exposure to new species and control methods members appreciated the opportunity to work across property lines and jurisdictions to have a larger and more effective impact on control as well as the opportunities this provided for interactions with both public and private landowners. The size and scope of the project also provided an opportunity for members from across Minnesota to collaborate and create new relationships with fellow AmeriCorps members and natural resource professionals. The project also proved useful for all involved parties to learn many lessons about the best methods for planning schedules across multiple agencies and learning the most effective and efficient methods for planning treatments, scheduling crews, conducting control of invasives, and evaluating effectiveness which will increase knowledge and effectiveness for future work.

Crews did the hardest work on this project and treated target invasive plants on 1,360 acres throughout the state. Many individuals (194 total, 144 unique) worked on this project. In some situations, efficiencies were gained from utilizing multiple crews on target infestations in the same area.

Target Species	Acres Treated	No. Crew Members	Total Labor Hours	Total Labor Cost	Labor cost/acre
Dalmatian toadflax	821.00	31	579	\$12,159	\$15
Cutleaf teasel	10.50	5	330	\$6,930	\$660
Japanese hops	75.00	20	770	\$16,170	\$216
Oriental bittersweet	308.50	108	4,390	\$92,190	\$299
Grecian foxglove	145.25	30	870	\$18,270	\$126
Total	1,360.25	194 total, 144 unique	6,939	\$145,719.00	

Summary table of control activities and costs

ACTIVITY 4: Monitor Sites and Follow-up

Description:

We will develop a convenient and user-friendly internet based system for trained volunteers to report presence and growth and development of target invasive as well as associated species. Because an important component of site rehabilitation after eradication is the establishment of native species on the site, the monitoring and reporting will include species in addition to those targeted for eradication. In addition to training volunteers on in-field site monitoring, we will train them on the use of the online reporting system. We will also gather feedback from volunteers on ideas to improve the system.

Summary Budget Information for Activity 4:

ENRTF Budget: ~~\$ 32,700~~
\$ 30,674
Amount Spent: \$ 30,674
Balance: \$ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. Online training modules will be created	06/30/2016	\$9,414

2. Internet based reporting system developed	06/30/2016	\$15,736
3. CCM tests a rudimentary version of reporting software in the field	06/30/2016	\$2,800
4. Volunteers and CCM are trained in a minimum of 2 workshops	06/10/2016	\$800
5. Volunteers and AmeriCorps member monitor sites, report observations, and control target species	06/30/2016	\$3,950 \$1,924

Activity 4 Status as of November 27, 2013

A contract between U of M and MDA for Activities 1 and 4 for \$65,000 was executed.

We have begun scoping work on Activity 4 and expect further progress on this item in the next quarter.

Activity 4 Status as of May 30, 2014

We have been working with partner organizations to explore options to modify existing reporting systems. This has not resulted in direct expenditures of LCCMR funds on the internet-based reporting contract to date. We are working with partners in an effort to reduce duplication and waste of funds as well as confusion for users resulting from multiple similar reporting systems. This development work will not be done by June 30 but we are making progress and are confident of a favorable outcome. As the planning tool and resource manual are closely tied to the reporting system, they too are behind schedule.

Activity 4 Status as of November 26, 2014

We plan to start tracking invasive plant treatments and monitoring with this project, but we have a larger objective of contracting for software that will enable us to track treatments and monitoring for all invasive species at a statewide level. It would likely be years before state agencies could implement this detailed tracking. It is helpful to start much smaller with our project, but include others who may eventually implement the system. Pest managers and geodatabase specialists from Extension, MnDOT, MDA, DNR, Belwin Conservancy and The Nature Conservancy are testing demonstration software that was developed for University of Wisconsin Extension. The software works with the Early Detection and Distribution Mapping System (www.eddmaps.org) that most of us use for data sharing invasive plant distribution information. We will jointly evaluate the software and determine the customization needs. Standardizing invasive species treatment and monitoring data will benefit researchers at the new Center for Terrestrial Invasive Plants and Pests at the U of M.

Activity 4 Status as of May 29, 2015

We named and developed specifications for software. It will be called Invasive Species Management Tracking. We will build upon a product developed for Wisconsin Extension for tracking invasive plant treatments. Project funds will be used to add many features such as adding fields for landowner agreement date ranges, detailed query functions, details of the weather conditions at the time of treatment, treatment applicator identification number, ability to work live in the field with tablets, assign inventory reports to specific sites and the functionality to compare infestation size (polygons) changes over time. This work has been done in close communication with other agencies so that this tracking system can be evaluated for adoption by state agencies dealing with invasive species.

The Minnesota Aquatic Invasive Species Research Center (MAISRC) will evaluate the software developed for this project and consider adding additional features they require and we cannot afford to include. Adoption of this tracking system by MAISRC will further the aim of a consistent system for tracking invasive species management activities in Minnesota and Wisconsin.

CCM will begin testing the Wisconsin Extension system later this year. They will use a small number of Minnesota Extension tablet computers with a data connection in the field. This will generate a dataset and provide feedback as we work through the development process.

Given the great and ongoing need for training people to use this system, we decided that developing online training modules would best address this need. The Mark Renz lab at the University of Wisconsin has the knowledge base and capacity to create this online training. Because the online training will be available, we anticipate holding 2-4 in-person workshops than 6 workshops originally planned.

A contract for adding functions to the Wisconsin Extension product is in progress with [Invasive Plant Control, Inc.](#), the company that originally paid for the development of IPC Connect that Wisconsin's product is based on. All of the software was developed by with The University of Georgia Center for Invasive Species and Ecosystem Health programmers. Invasive Plant Control will subcontract with The University of Georgia Center for Invasive Species and Ecosystem Health for adding software functions. Invasive Plant Control will also subcontract with Wisconsin Extension to develop online training modules.

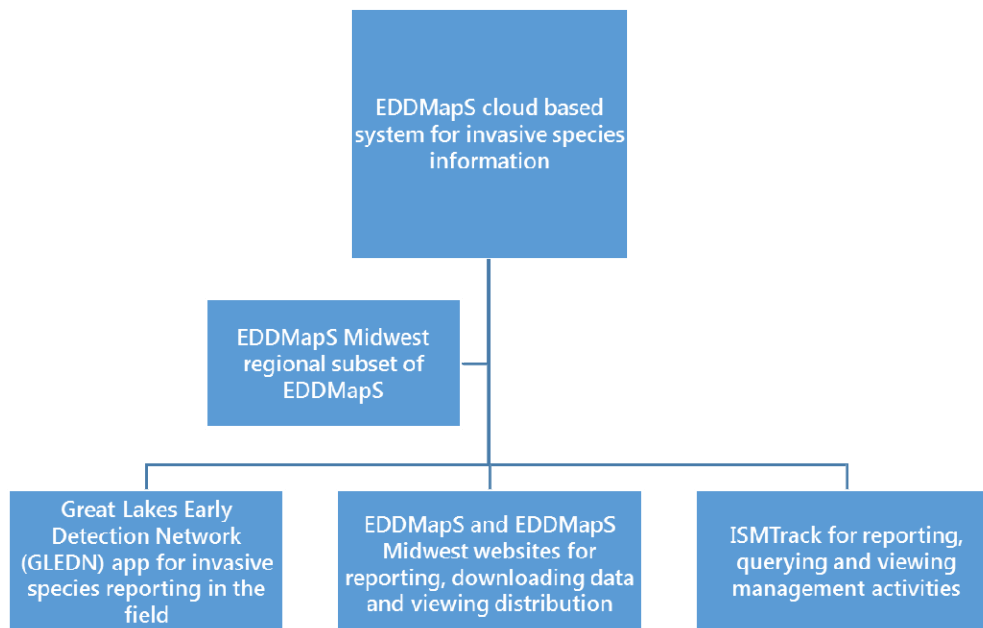
Activity 4 Status as of November 30, 2015:

A visual manual of ISMTrack instructions was created to assist new software users. Two ISMTrack training sessions were completed. The first was in St. Paul on 08/28/15 for 20 resource managers. The second was in Rochester on 09/10/15 for CCM crews (15 people). An ISMTrack Google Group with 26 members was created to document user questions and concerns.

We scheduled a visit with Chuck Barger, ISMTrack developer with the University of Georgia, on 01/26/16. It will be helpful to work in person on this development. Meeting participants will include U of M researchers and Extension educators, MN Dept of Ag, Natural Resources and Transportation IT and resource managers and Three Rivers Parks. Our colleagues from U of WI Extension who are developing the online training materials will also participate in the meeting. No ENRTF funding will be used for travel costs for Chuck Barger and WI Extension colleagues.

Activity 4 Final Report Summary:

We focused on developing the Invasive Species Management Tracking System (ISMTrack) so that crews could begin using it this season. The graphic below shows the relationship of ISMTrack to other products.



We completed the following tasks.

Collaboration

- ✓ Considerable time and energy went into collaborating with and building consensus amongst agencies including MN Departments of Transportation (MnDOT) and Natural Resources (DNR) for future ISMTrack adoption. We deliberated and jointly made decisions about agency requests for features.
- ✓ Worked closely with DNR and Minnesota Aquatic Invasive Species Research Center (MAISRC) to encourage aquatic invasive species professionals and researchers to use this system as well.
- ✓ Extension provided tablets and internet accessibility and data plans for several Conservation Corps Minnesota crews to pilot and use ISMTrack in their invasive species management work across the state. This was done in close collaboration with DNR and MDA.

Development

- ✓ Purchased the web domain for ISMTrack.
- ✓ Improved ISMTrack and EDDMapS (Early Detection and Distribution Maps) online “branding images” to reduce user confusion between these two linked systems. This included using consistent colors, logos layout and data field names.
- ✓ Significantly improved ISMTrack user interface to make it intuitive.
- ✓ Enhanced components specifically for Minnesota such as the ability to separate efforts of volunteers from professionals.
- ✓ Created a Yelp-like mapping feature within ISMTrack, using EDDMap data points, to quickly locate invasive species reports using a mobile device. This feature has been very well received and is used for terrestrial invasive species, including insects, and aquatic invasives. This feature further allows landscape level, cross agencies and organizations collaboration in real time using immediate access to confirmed invasive species report data.

Training

- ✓ Contracted with University of Wisconsin Extension to create the following online tutorials to help users quickly learn how to use the system that are available at www.ismtrack.org/index.cfm?action=training.

Getting Started (10 min)

- Introduction to Getting Started (0:29)
- Creating an EDDMapS Account (0:58)
- Requesting access to ISMTrack and Adding EDDMapS Users to ISMTrack (2:09)
- Creating Sites and Adding Users (3:36)

Collecting field data (GLEDN app) (15 min)

- Collecting field data intro (0:53)
- Downloading the App and Logging in (1:44)
- Managing the Site List (1:30)
- Creating A Custom Species List (1:33)
- Collecting point/polygon data (6:50)
- Correct Identification and Information Regarding Species (1:19)
- Negative survey (1:58)
- Uploading and Editing reports (1:34)
- Reporting Data through ISMTrack Website (2:08)

Adding observations to sites and creating management activities (10 min)

- Introduction of Management Activities and Observations within Sites (0:32)
- Adding and Changing Observations to a Site (5:20)
- Creating a Management Activity (11:44)
- Viewing and Editing management activities (1:19)

Generating reports (10 min)

- Intro

- How to conduct a query of management activities
- Create/view results on a map
- How to download/export data

V. DISSEMINATION:

Description: We will communicate about target invasive plant species with the public, tree care professionals, County Agricultural Inspectors, Cooperative Weed Management Areas, and land managers. The web will be used for communication with all www.mda.state.mn.us/plants/badplants/noxiouslist.aspx and www.myminnesotawoods.umn.edu/. Communication with the public will be via workshops, news media (print, television, and radio) and social media such as Facebook and Twitter. We will communicate updates at County Agricultural Inspector meetings and in trade publications such as “The Scoop” published by the Minnesota Nursery Landscape Association. The final project report will be presented at Upper Midwest Invasive Species Conference (LCCMR funds will not be used for registration and any out-of-state travel).

Status as of November 27, 2013

- Target species presented and an Oriental bittersweet infestation included in a tour for the annual Minnesota Association of County Agricultural Inspectors in Red Wing, MN, July 15-16, 2013.
- Oriental bittersweet presented at a U of M Arboretum tour for the national Pesticide Applicator and Certification Training annual meeting in St. Paul, MN, August 5, 2013.
- Oriental bittersweet was presented on the field tour for the North Central Forest Pest Workshop in Frontenac and Red Wing, MN, September 25, 2013.
- Oriental bittersweet and other invasive ornamentals were discussed at the multi-state/agency/organization Invasive Ornamental Plant Symposium and Working Group at the Chicago Botanic Garden in Highland Park, IL, October 3, 2013.
- Tours of an Oriental bittersweet infestation and a similar American bittersweet vine (native) were open to the public and held at Stone Point Park in Winona, MN, October 23 and 26, 2013. The tours were conducted by our Winona Invasive Species Working Group. MDA used social media to promote the tours.
- An article “Oriental bittersweet threatens native species” with supporting information, quotes and images ran in the St. Cloud Times on October 24, 2013 www.sctimes.com/article/20131024/LIFE03/310240035/ then ran in many other publications.
- The article “What do the Holidays and Invasive Species have in common? Oriental bittersweet” by Angela Gupta (U of M) and Monika Chandler (MDA) was submitted for the Winter 2013 Minnesota Resorters publication.
- The article “What do the Holidays and Invasive Species have in common? Oriental bittersweet” was made into a fact sheet and is available at www.myminnesotawoods.umn.edu/wp-content/uploads/2011/08/gupta.chandler.2013.UMN-Extension.oriental-bittersweet.v1.1.pdf. A video on this topic is available on YouTube at www.youtube.com/watch?v=0kvqotEFI48&list=PL48613CF8B45F3C25 (short version) and www.youtube.com/watch?v=w2pG2WbY048&list=PL48613CF8B45F3C25 (long version).
- Dalmatian toadflax eradication is featured for the month of March in the 2014 Minnesota Invasive Species Advisory Council calendar.

Status as of May 30, 2014

- U of M Extension, as an invited presenter taught about Oriental bittersweet to 1 Master Gardener workshop (80 participants), 1 Master Naturalist chapter meeting (16 participants), 1 Cascade Meadows Wetlands & Environmental Learning Center speaker series (25 concerned citizens) and the Minnesota Family Woodland Conference (20 woodland owners).
- A “Weed of the Month” series was created. Articles are published first in MDA’s Plant Pest Insider newsletter then released to media, particularly outstate newspapers. The articles highlight noxious weeds

on the eradicate list (our target invasives) and are housed at www.mda.state.mn.us/plants/badplants. To date, articles have been written on finding and reporting Minnesota's noxious weeds, Grecian foxglove, and Dalmatian toadflax.

- An online Oriental bittersweet publication was created for the Tree Care Registry and made available online at www.mda.state.mn.us/~media/Files/plants/weeds/oribiterad.ashx
- An article titled "Introduction to Weed Eradication" was published in the Minnesota Nursery and Landscape Association's monthly magazine, SCOOP, in February 2014. The article was republished in the Department of Natural Resources Forest Insect and Disease Newsletter in March 2014.
- Community notices were created for Oriental bittersweet, Grecian foxglove, Dalmatian toadflax, and cutleaf teasel to distribute to private landowners. The notices briefly explain the eradication project and give contact information to report suspected infestations of targeted weeds. The notices were distributed in Red Wing, Winona, Afton, Lutsen, and Houston, and have been shared with MDA cooperators for distribution in other areas with known targeted noxious weed infestations.
- Targeted noxious weeds were the topic of an invasive plant presentation at a Master Gardener education day on March 15, reaching 150 Master Gardeners in the St. Croix River Valley.
- Oriental bittersweet awareness was presented at the Prospect Park and East River Road community meeting on 03/24/14.
- A media event about Oriental bittersweet identification and control was held on 04/03/14 and received good coverage in print media and some radio coverage. A CCM crew demonstrated control methods.
- "Oriental Bittersweet: Progress in Red Wing" was the topic of a talk given at the 04/21/14 Minnesota Invasive Species Advisory Council meeting.
- Oriental bittersweet and other woody invasives were presented to 20 woodland owners in Red Wing on 04/26/14. This included a CCM crew demonstration of woody invasive control methods. The event was hosted by Audubon and focused on preserving wildlife habitat from the threat of invasive plants.
- Minnesota's Noxious Weed Advisory Committee (formal multi-agency/organization committee) received a project update on 05/27/14.

Status as of November 26, 2014

- KTTC in Rochester ran a news segment on the Oriental bittersweet treatments in Winona on 10/6/14.
- Oriental bittersweet treatment methods were the topic of a workshop for landowners and industry professionals in Winona on 10/9/14. The workshop had 23 participants and was a collaboration between MDA, CCM, and UMN Extension.
- Master Gardeners in Winona organized a workshop on Oriental bittersweet identification attended by Master Gardeners and landowners on 10/25/14.
- Japanese hops and cutleaf teasel were the Weed of the Month topics for the Plant Pest Insider for July and August.
- All of the five targeted noxious weeds have been featured as Weed of the Month articles since the series began in April. The monthly articles have been picked up by publications across the state from International Falls to Marshall.
- An article on project progress was published in the Plant Protection Review, the quarterly publication of the Plant Protection Division at MDA.
- A community notice was created for Japanese hops. The notices for Oriental bittersweet and Grecian foxglove have been distributed extensively to homeowners in an effort to increase awareness about infestations in those neighborhoods.
- Media releases for Oriental bittersweet in Winona and Japanese hops in Houston County were created and distributed.
- KBJR/KDLH news in Duluth ran a short segment featuring the Invasive Blitz workshop in Duluth. View the story at <http://www.northlandsnewscenter.com/news/local/Volunteers-take-part-in-Invasive-Blitz-workshop-at-Hartley-Nature-Center-278139791.html>
- A presentation about the Invasive Blitz workshops took place at the (national) Association of Natural Resource Outreach and Service Programs conference in Las Vegas for leaders of Master Naturalist-type

programs in other states. Note: no LCCMR funds were used to pay for travel to or participation in this conference.

- Gupta, A. 2014. Communicating forestry through citizen science and invasive species. National Society of American Foresters Convention and Canadian Institute of Forestry/Instiut forestier du Canada Conference in Salt Lake City, UT, October 8-11, 2014.
- Gupta, A. 2014. Using volunteers for emerald ash borer and terrestrial invasive species early detection and management. Canadian Institute of Forestry webinar, November 19, 2014. (575 Canadian participants)

The following presentations were given at the Upper Midwest Invasive Species Conference in Duluth, MN, October 20-22, 2014. There were over 650 conference participants.

- Gupta, A. Engaging volunteers in early detection and management.
- Justen, E. Dalmatian toadflax management success with local partners

Status as of May 29, 2015

Presentations and workshops

- On 2/19/15 in Hutchinson (16 attendees), 2/26/15 in Alexandria (10 attendees), 3/3/15 in Cloquet (30 attendees) and 3/4/15 in Shoreview (48 attendees) Master volunteers and tree and forestry professionals received a full day of Forest Pest First Detector training including Oriental bittersweet identification and reporting.
- On 2/21/15 in Forest Lake (11 attendees), 4/18/15 in St. Paul (18 attendees) and 5/15/15 in Grand Rapids (10 attendees) Master Volunteers participated in a full day workshop on invasive species, include targeted early detection species, identification, reporting, invasive species management and volunteer management.
- On 03/31/15, a talk titled “Invasive Plant Early Detection” was given at the annual meeting of townships in Todd County to 100 attendees.
- On 04/07/15, a talk on Japanese hops was given at the annual meeting of townships in Fillmore County to 100 attendees.
- On 04/09/15 and 04/16/15, vegetation managers in Grand Rapids (53 attendees) and Rochester (72 attendees) received a full day training on target invasive plants.

Articles and mailings

- “Weed of the Month” articles were written for the knapweeds, yellow starthistle, leafy spurge, thistles, and wild parsnip. The articles are sent to publications across Minnesota and are housed at www.mda.state.mn.us/plants/pestmanagement/weedcontrol/wom.aspx.
- Project status updates in a newsletter form were created and sent to 113 landowners who participated in the project in 2014. Landowners appreciated the update and being included in outreach efforts.
- 80 landowners along the Root River in Fillmore County received a packet of information detailing the project and process for setting up landowner agreements. As a result, over 35 landowners have expressed interest in setting up agreements to have control work on Japanese hops.

Other

- The MDA Noxious and Invasive Weed Program website was overhauled and updated www.mda.state.mn.us/en/plants/pestmanagement/weedcontrol.aspx. The plant species on the Noxious Weed List were reformatted and updated to be consistent throughout. Outdated information was removed and species pages were created for those that were missing.
- A new webpage was created for the *Elimination of Target Invasive Plant Species* project was created at www.mda.state.mn.us/plants/pestmanagement/weedcontrol/targetplants.aspx. Information about the target plants, prevention, survey, control, and outreach materials is available at the website.
- A display box for Oriental bittersweet was created to use for noxious weed trainings and other outreach activities.

Status as of November 30, 2015:

Presentations and workshops

- At the Rhubarb Festival on 06/06/15 in Lanesboro, Monika talked with 205 people about the Japanese hops eradication project along the Root River.
- 07/22/15 in Maple Grove (60 attendees), professional land managers and members of MISAC heard talks on a variety of invasive species topics, including Oriental bittersweet identification and control.
- 07/29/15 in Chaska, (20 attendees), professionals from the Poison Control Center heard descriptions of the toxicity of Grecian foxglove and wild parsnip.
- On 09/15/15 in Hastings (18 attendees) received a full day of Invasive Blitz training.
- Two ISMTrack training sessions were held in St. Paul on 08/28/15 (20 attendees) and 09/10/15 (15 attendees).

Other

- With funds from Farm Bill, a video titled "Oriental Bittersweet Management" was created and is housed at <https://www.youtube.com/watch?v=7wmZ1Zuho1c&feature=youtu.be>
- Created ISMTrack Google Group with 26 members to test the ISMTrack and help improve the software
- Created the Google Drive folder with Invasive Blitz resources: <http://z.umn.edu/invasiveblitz>
- Justen, E. 2015. Scouting for and reporting cutleaf and common teasel. *Plant Protection Review* 13(3):9.

Status as of June 30, 2016

Presentations and workshops

- 03/22/16 at the St. Croix River Association Summit (50 attendees), a talk titled "Grecian Foxglove Management Success: A Collaborative Effort" was given.
- 04/12/16, an update on invasive plants was given at the Beltrami County local weed inspector training.
- 04/13/16 and 4/21/16, vegetation managers in Itasca and St. Cloud received a full day training on target invasive plants.
- 04/29/16 an update on invasive plants was given at Winona's Arbor Day event.
- 05/26/16, an update on invasive plants was given to County Agricultural Inspectors.

Articles and mailings

- March 2016, the annual *Elimination of Target Invasive Plant Species* stakeholder report was sent to the 162 landowners who participated in the project. The stakeholder report summarized the activities, including acres treated and areas surveyed.
- In May 2016, an updated *Keep a Lookout* flyer was completed. The flyer focuses on the eradicate list species of Minnesota and has been widely distributed.

Other

- In May 2016, an interactive online map of the Minnesota Eradicate list species was developed and made available at <http://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/eradicatemap.aspx>.
- A mapping project was developed with Winona County focusing on county-wide invasive plants.
- On 06/01/16, MDA staff field tested the new ISMTrack software to record Grecian foxglove infestations at Afton State Park. Staff also monitored infestations and cut seedheads to prevent the spread of the plant.
- Samples of the first reports in new counties were collected of target weeds in Wright and Wabasha counties.

Final Report Summary:

Outreach was a vital part of this project. In addition to 34 workshops, there were 4 field tours, 10 presentations, 8 articles, 3 media events and mailings to hundreds of private landowners. Weed of the Month articles were run in local papers throughout the state. Overall, this dissemination reached thousands of Minnesotans.

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget:

Minnesota Department of Agriculture

Budget Category	\$ Amount	Explanation
Personnel:	\$ 119,000	One 2 year FTE Research Scientist 1 with mean salary \$40,000/yr plus fringe benefits at 52% for Activity 2 survey and project coordination
Professional/Technical/Service Contracts:	\$ 150,000	\$150,000 contract for invasive plant control with CCM
Equipment/Tools/Supplies:	\$ 1,000	Activity 2 supplies include tags, flags, and herbarium supplies for \$1,000.
Travel Expenses in MN:	\$ 15,000	Mileage for vehicle rental and fuel and approximately 120 days of meals and 20 overnight lodging for Activity 2 and project coordination is \$15,000.
TOTAL MDA BUDGET:	\$ 285,000	

University of Minnesota Extension

Budget Category	\$ Amount	Explanation
Professional/Technical/Service Contracts:	\$ 25,200	\$25,200 for web database development for invasive plant monitoring
Equipment/Tools/Supplies:	\$ 16,000	Resource manuals (\$4,000); samples, materials, and small tools for workshops (approx. \$200/workshop*30 workshops = \$6,000) and to provide to volunteers (\$6,000).
Travel Expenses in MN:	\$ 19,500	Lodging and meals (\$300/workshop) and mileage (\$350/workshop) for U of M instructors for 30 workshops for Activity 1 (24 workshops) and Activity 4 (6 workshops) = \$19,500 for at least 2 instructors/workshop
Other:	\$ 4,300	Signage to inform public about activities and raise awareness of target invasive species. Heavy-duty signs: 50 for the Activity 1 InvasiveBlitz at approx. \$15/sign = \$800 and 175 for Activities 1 and 4 at \$20/sign = \$3,500
TOTAL U OF M EXTENSION BUDGET:	\$ 65,000	

TOTAL ENRTF BUDGET = \$350,000

Explanation of Use of Classified Staff: NA

Explanation of Capital Expenditures Greater Than \$3,500: NA

Number of Full-time Equivalent (FTE) funded with this ENRTF appropriation:

One 2 year full-time Research Scientist 1 = 2 FTE

Number of Full-time Equivalent (FTE) estimated to be funded through contracts with this ENRTF appropriation:

MDA will contract with CCM for target invasive plant control. Crews will work an estimated 7,700 hours.

U of M internet based reporting system development contract will be for approximately 180 hours of labor and U of M will contract to hire an AmeriCorps member for 780 hours.

Total hours = 7,700 + 180 + 780

Total FTEs = 8,660/2080 = 4.16 FTE

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
State			
In-kind Services During Project Period: MDA: Field equipment, computing/software, GIS and data management, and project management for 2 years (\$20,000); U of M: Two Extension Educators at 6% time for 2 years and one Extension Educator at 12% time for 2 years (\$35,000); and CCM: Approximately \$4/hr difference between actual cost per member (\$23.50/hr) and billing rate (\$19.50/hr) = \$30,000	\$ 85,000	\$ 85,000	
MDA general fund for salary and fringe for Activity 2		\$ 33,993	
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.	\$ 60,000	\$ 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	\$ 15,000		
TOTAL OTHER FUNDS:	\$ 155,000	\$ 178,993	

VII. PROJECT STRATEGY:

A. Project Partners:

Receiving funds: Angela Gupta with U of M will lead the education and monitoring components. Monika Chandler with MDA will lead survey and delineation and coordination of target species control with CCM. 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 in the Master Naturalist, Woodland Advisor, MN Women’s Woodland Network, Master Gardener, Tree Care Advisor, Minnesota Phenology Network, and Forest Pest First Detector programs, which together total over 103,000 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 of agencies such as Mn/DOT to control these species on their lands and increases the probability of successful eradication.

This is the first phase of eradicating target species. 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 the ongoing monitoring and follow-up by volunteers is critical. The second phase involves a continuation of activities, but will not require as substantial of investment for control of existing infestations since maintenance is less labor intensive than initial control. State funds will be leveraged in proposals for federal funding for volunteer training and control of target species.

C. Spending History:

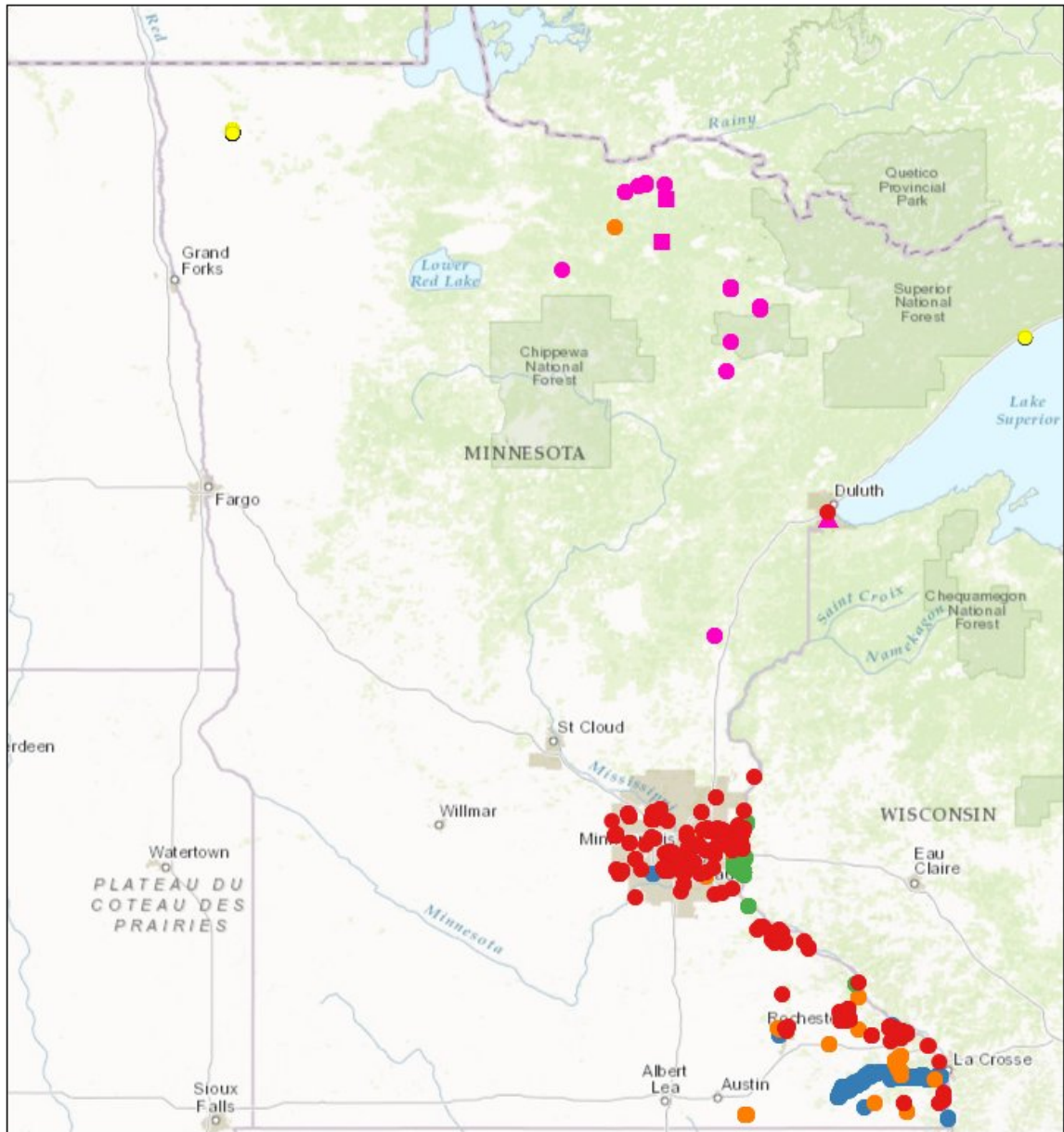
Funding Source	M.L. 2007 or FY08	M.L. 2008 or FY09	M.L. 2009 or FY10	M.L. 2010 or FY11	M.L. 2011 or FY12-13
U of M Extension received a total of \$162,000 in federal and state grant funding for the award winning MN Forest Pest First Detector volunteer program development and past activities		\$150,000 (RREA*)	\$15,000 (RREA*)		\$6,200 (RREA*)
Farm Bill					\$10,000

*RREA = Rapid Agricultural Response Fund – Extension\$

VIII. ACQUISITION/RESTORATION LIST: NA

IX. MAP(S): Target Invasive Plant Species Distribution in Minnesota

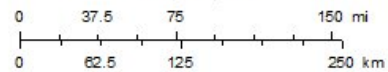
Minnesota Prohibited Noxious Weed Eradicate List Map



August 15, 2016

1:4,622,324

- Oriental bittersweet
- Grecian foxglove
- Brown knapweed
- Cut leaf teasel
- Meadow knapweed
- Japanese hops
- ▲ Diffuse knapweed
- Dalmatian toadflax
- Black swallow wort



Sources: Esri, HERE, DeLorme, Intermap, InCREMENT P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Minnesota Department of Agriculture (MDA) Web Map
EDDMapS and Minnesota Department of Agriculture (MDA) | Esri, HERE, DeLorme, FAO, NOAA, USGS, EPA, NPS |

Locations of target plant species. This project is focused on Oriental bittersweet, Grecian foxglove, cutleaf teasel, Japanese hops and Dalmatian toadflax.

X. RESEARCH ADDENDUM: NA

IX. REPORTING REQUIREMENTS:

Periodic work plan status update reports will be submitted not later than November 27, 2013, May 30, 2014, November 26, 2014 and May 29, 2015, November 30, 2015. A final report and associated products will be submitted in summer 2016 as requested by the LCCMR.

Attachment A: Budget Detail for M.L. 2013 Environment and Natural Resources Trust Fund Projects

Project Title: Elimination of Target Invasive Plant Species																	
Legal Citation: M.L. 2013, Chp. 52, Sec. 2, Subd. 06d																	
Project Manager: Monika Chandler																	
M.L. 2013 ENRTF Appropriation: \$350,000																	
Project Length and Completion Date: June 30, 2016																	
Date of Final Report: August 15, 2016																	

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Revised Activity 1 Budget 08/15/16	Amount Spent	Balance	Activity 2 Budget	Revised Activity 2 Budget 08/15/16	Amount Spent	Balance	Activity 3 Budget	Amount Spent	Balance	Activity 4 Budget	Revised Activity 4 Budget 08/15/16	Amount Spent	Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Prevent and Detect Target Species				Survey and Delineate Target Species Then Coordinate Control				Control Target Species			Monitor Sites and Follow-up					
Personnel (Wages and Benefits)																	
MDA: One 2 year FTE Research Scientist 1 with mean salary \$40,000/yr plus fringe benefits at 52% for Activity 2 survey and project coordination					419,000	126,529	126,529	0								126,529	0
Professional/Technical/Service Contracts																	
MDA will contract with Conservation Corps Minnesota for \$150,000 contract for invasive plant control									150,000	150,000	0					150,000	0
U of M Extension will contract for web database development for invasive plant monitoring (\$25,200)												25,150	25,150	25,150	0	25,150	0
U of M Extension will contract for an AmeriCorps member at 25% FTE for 6 mo and 50% for 6 mo	5,550	5,550	5,550	0								2,775	2,775	2,775	0	8,325	0
U of M Extension: Room rental for workshop	50	50	50	0												50	0
Equipment/Tools/Supplies																	
MDA: Activity 2 supplies include tags, flags, and herbarium supplies					1,000	838	838	0								838	0
U of M Extension: Resource manuals, materials and supplies for workshops and data connectivity for software trials in the field	14,400	16,426	16,426	0								2,800	2,085	2,085	0	18,511	0
Travel expenses in Minnesota																	
MDA: Milage and approximately 120 days of meals and 20 overnight lodging for Activity 2 and project coordination					45,000	7,633	7,633	0								7,633	0
U of M Extension: Lodging, meals and milage for workshops for 2 instructor and AmeriCorps member activities	8,000	8,000	8,000	0								4,975	664	664	0	8,664	0
Other																	
U of M Extension: Signs selected from Play Clean Go templates for a variety of sizes and locations.	4,300	4,300	4,300	0								0	0	0	0	4,300	0
COLUMN TOTAL	\$32,300	\$34,326	\$34,326	\$0	\$135,000	\$135,000	\$135,000	\$0	\$150,000	\$150,000	\$0	\$32,700	\$30,674	\$30,674	\$0	\$350,000	\$0

Invasive Species Management Matrix

Species	Timing				Chemical treatments*** (see important note below)			Notes
	Winter	Spring	Summer	Fall	Cut stump	Basal bark application	Foliar spray (before leaf-out of natives)	
Buckthorn								
Cut & Treat	cut and treat stump		cut and treat stump	cut and treat stump - best time	20-25% glyphosate or 12.5% triclopyr			Can work for all sizes but is a must for plants larger than 6" in diameter
Basal Bark Treatment	treat stem		treat stem	treat stem - best time		12.5% triclopyr with penetrating oil		Works well for stems less than 6" in diameter. Can treat only one side for stems less than 2" in diameter.
Foliar Spray			spray foliage	spray foliage			1.5% glyphosate or 1% triclopyr with water; surfactant required	Best to avoid native vegetation, best to do in fall after natives have dropped their leaves but invasives retain foliage
Burn*		burn to kill seedlings in fire-adapted communities; may require frequent burns						burn to deplete seedbank; seedlings will need repeated burns
Pull**	can pull small stems when soil is moist							
Honeysuckle								
Cut & Treat	cut and treat stump - best time when using triclopyr		cut and treat stump	cut and treat stump - best time	20% glyphosate or 12.5% triclopyr			cut stems can resprout so its important to hang them in trees to allow them to dry out
Basal Bark Treatment	treat stem		treat stem			12.5% triclopyr with penetrating oil		Using penetrating oil to be most effective
Foliar Spray		spray foliage - best time	spray foliage	spray foliage			Metsulfuron-methyl plus surfactant or 1.5% glyphosate	Less effective than other methods
Burn*	burn in spring to deplete seed bank seedlings							Will need to repeat burn to be effective
Pull**	can pull small stems when soil is moist							Metsulfuron-methyl plus surfactant or 1.5% glyphosate
Multiflora rose								
Cut & Treat	cut and treat stump				20% glyphosate			
Bark Treatment	treat stem					12.5% triclopyr with penetrating oil		
Foliar Spray			July-Sept spray foliage with fosamine				2% fosamine in water	fosamine spray results won't be seen until following summer; must cover well but not dripping
Burn*	burn in spring							will need follow-up treatment to address resprouting and establishment of new plants
Pull**	can dig from soil							must get all of the roots or it will sprout
Oriental bittersweet								
Cut & Treat		cut and treat vine		cut and treat vine	20% glyphosate or 12.5% triclopyr			should wait until after natives have dropped their leaves or in early spring before emergence of spring ephemerals
Bark Treatment								
Foliar Spray				after first hard frost spray foliage			2,4 D or triclopyr	on severely disturbed sites spray after first hard frost in the fall
Pull**	can pull or dig out small infestations							

Species	Timing				Chemical treatments*** (see important note below)			Notes
	Winter	Spring	Summer	Fall	Cut stump	Basal bark application	Foliar spray (before leaf-out of natives)	
Garlic mustard								
Foliar Spray		1-2% glyphosate, 1% triclopyr or 2,4 D near lawns and grassy areas		1-2% glyphosate but only AFTER a hard frost and when the temperature is above 50				must be applied in early spring before native vegetation emerges, can use leaf blower to expose additional plants, will require follow-up pulling for any plants that were missed, must be sure to keep children and pets away from the area until chemicals have broken down
Burn*		burn		burn - better because there's more fall leaf litter to carry the fire				will require 3-5 years of repeated burning; spring burning must be done early to minimize damage to early spring wildflowers
Pull**		pull before seeds are mature						it is important to pull the whole plant and dispose of, or burn, seed heads so they do not continue to develop on the forest floor; best to prioritize infestations and weed one spot well than weed the whole area poorly, try to minimize soil disturbance as it can lead to additional seed germination, disposal needs to be considered carefully
Cut		can be done but cutting height and timing is critical and results are mixed						studies show varying results, best results seem to come from cutting stems very close to ground after flower stalks have elongated but before flowers have opened, significant re-sprouting can be a problem
Cultural	Clean shoes, pants, gear, tires and equipment carefully before transporting. Seeds are small and move easily and are viable for up to 7 years.							

***Burn:** should only be done in fire-adapted native plant communities, such as prairies, grasslands, herbaceous wetlands, and oak-dominated

****Pull:** only pull when the soil is not frozen and moist enough to minimize soil disturbance

***** Chemical Treatment:** It's important to distinguish between the triclopyr amine and the ester. The amine is the water-soluble form (i.e., Garlon 3A) whereas the ester should be mixed with oil/diesel (i.e., Garlon 4). Garlon 3A is most commonly used in foliar application but can be applied to stumps as well. Garlon 4 is most commonly used in basal bark treatment and cut stump (can be used in foliar but should be minimized--i.e., spraying diesel all over).

Compiled by Angela Gupta, Forestry Extension Educator University of Minnesota Extension, agupta@umn.edu

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Invasive Species Project Planner

Directions: This worksheet is a tool to help you think through and record the many aspects of an invasive species removal project. Use it as a discussion guide when you sit down with the natural resource professional who will advise you on your project. Record your decisions, plans and activities here for future reference.

THE LOCATION

Name of work site _____

Location of work site _____

Natural resource professional advisor for this project _____

Advisor's contact information _____

INVASIVE SPECIES WORK PLAN

What invasive species will I target at this site? _____

Describe the state of the invasion before I begin work (*acres impacted, density, types of invasives, work done to date*): Date _____

Description:

What laws and regulations influence my work on this site?

What work will I do in each season:

	SPRING	SUMMER	FALL	WINTER
YEAR 1				
YEAR 2				
YEAR 3				

Will chemical applications be a part of my removal plan? If yes, who/how?

How will I dispose of the invasive plants?

Note: If burning is part of the plan, be sure to double check burning regulations for the area.

What ecological restoration activities will I undertake to help prevent new invasive species infestations?

Additional documents: You may also want a map of the work site, aerial photograph, photos, and/or site management plan.

VOLUNTEERS

Note: *Volunteers serve on behalf of the site or sponsoring agency, not the University of Minnesota (unless it's a U of M facility or property). Because liability falls on the sponsoring agency/organization, the sponsor's safety rules must be adhered to. Check with the sponsor to identify relevant rules.*

Where can I find volunteers to help with this work?

Group _____ Contact info _____

Group _____ Contact info _____

Group _____ Contact info _____

Group _____ Contact info _____

How will I communicate volunteer needs to these groups?

Will I limit volunteer participation to adults?

YES – how will I communicate this?

NO – what tasks can younger participants help with? Who will supervise youth?

For whom are these volunteers volunteering? *(Stated another way: What agency/organization accepts the liability for volunteers at this site?)* Does this agency/org require volunteer screening?

What education or training will I provide to volunteers ahead of time? *(plant identification, tool safety, etc.)*

What steps will I take to minimize risk for participants? *(See Risk Management Plan worksheet)*



WORK EVENTS

Spring: PlayCleanGo Day is _____

Fall: Public Lands Day is _____

Take alongs for each Invasive Blitz Work Event:

- First aid kit
- Cell phone
- Tools/Gloves
- Safety equipment
- Camera
- Outreach materials
- Sign in form

Invasive Blitz Work Event 1 | Date:

BEFORE	
Start time	
End time	
Volunteers <small>(who? # needed?)</small>	
Tasks	
Additional arrangements necessary? <input type="checkbox"/> Bathrooms? <input type="checkbox"/> Water? <input type="checkbox"/> Shade? <input type="checkbox"/> Tools? <input type="checkbox"/> Risks? <input type="checkbox"/> Other:	
What educational activities can be incorporated into this event?	

AFTER	
Hours worked	
Number of ADULT volunteers who worked	
Numer of YOUTH volunteers who worked	
Work completed - Volume of material removed - Acres affected	
Anecdotal description of accomplishments:	

Invasive Blitz Work Event 2 | Date:

BEFORE	
Start time	
End time	
Volunteers <small>(who? # needed?)</small>	
Tasks	
Additional arrangements necessary? <input type="checkbox"/> Bathrooms? <input type="checkbox"/> Water? <input type="checkbox"/> Shade? <input type="checkbox"/> Tools? <input type="checkbox"/> Risks? <input type="checkbox"/> Other:	
What educational activities can be incorporated into this event?	

AFTER	
Hours worked	
Number of ADULT volunteers who worked	
Numer of YOUTH volunteers who worked	
Work completed - Volume of material removed - Acres affected	
Anecdotal description of accomplishments:	

Invasive Blitz Work Event 3 | Date:

BEFORE	
Start time	
End time	
Volunteers (who? # needed?)	
Tasks	
Additional arrangements necessary? <input type="checkbox"/> Bathrooms? <input type="checkbox"/> Water? <input type="checkbox"/> Shade? <input type="checkbox"/> Tools? <input type="checkbox"/> Risks? <input type="checkbox"/> Other:	
What educational activities can be incorporated into this event?	

AFTER	
Hours worked	
Number of ADULT volunteers who worked	
Numer of YOUTH volunteers who worked	
Work completed - Volume of material removed - Acres affected	
Anecdotal description of accomplishments:	

NOTES

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WHERE DO I START?!

Prioritizing Invasive Plant Control

Article reprinted courtesy of Ellen Jacquart, Indiana Chapter of The Nature Conservancy

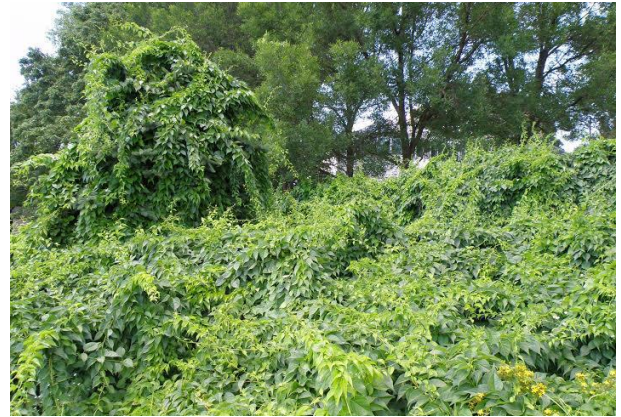
It's important to think through a plan for managing invasive plants on your land **before** you start the attack. Without a plan, it's easy to underestimate the time and resources it will take to control a species and end up overwhelmed, giving up in frustration.

An important part of planning is to prioritize the work ahead of you, deciding what species you should start on first, and where you should attack first. That way, at least you'll know that what you have accomplished was more important than what you didn't have time or resources to complete. Here are some helpful hints for prioritizing invasive plant control.

PRIORITIZING BY SPECIES

You walk through your woodlot and wince when you see the garlic mustard, which looks like it's spread considerably since last year. Then you notice the buckthorn shrubs in the understory, and realize your neighbor's landscaping has made itself at home in your woods. And that vine...those orange berries...geez, where did the Oriental bittersweet come from?!

Like potato chips, it seems nobody can have just one invasive plant species. There are usually multiple species invading a given area, which can make the job of managing a site much more difficult. Where do you start when you have more than one species to deal with? A lot of us have struggled with this, and fortunately there are a few easy rules of



*Oriental bittersweet infestation Roseville, MN.
Photo credit: MnDOT*

thumb to help sort out which species to go after first. What follows is a simplified version of a prioritization template by The Nature Conservancy which can be found at <http://www.invasive.org/gist/products.html> by clicking on the Weed Management Plan Template. Many other resources on the identification and control of invasive plants can be found on that site.

Before you start prioritizing, though, you need to know three things:

First, know what you have. Use a good field guide or a knowledgeable botanist friend to double-check that you've identified a real invasive plant, rather than an innocent look-a-like.

Second, know how much you have. The priority you place on 50 plants of garlic mustard will be very different from 5 acres, as you'll see in a moment. Map the invasive plants, circling each area of infestation and

estimating what percent within the circled area is invasive species versus native. A handy way to do this is to use Google Earth to zoom in on your property and print out an aerial photo. Draw your property boundary on the aerial, and then walk through your property in a grid-like fashion and mark what you see. Those of you with GPS units and GIS software on your computers are welcome to do it the high-tech way.

Third, know what you want. This may be very easy for you, or very difficult. What do you most want to protect on your land? Is it the ovenbirds that nest there? The bluebells that bloom each spring by the creek? The deer habitat? The ability to walk through the woods without having to fight thorny shrubs? Deciding what you want to manage your land for is important. Think this through, and even map the areas you most want to protect against invasive plant species.

Now you're ready.

The following four questions will tell you which species should be your top priority. You should already know the answers to number one and two from figuring out above how much you have and what you want to protect. Numbers three and four are answered by reading information about each invasive species or talking to professionals who work with invasive species in your area.

For each species, answer these questions and add the points:

1. *How much do you have?*

- 1 pt - I don't have any, but it's near my land
- 2 pts - Just a small amount, but it's spreading
- 3 pts - A fair amount, and it's still spreading
- 4 pts - A LOT! It's covering the whole area completely



Garlic mustard in flower. Photo credit: Flickr user hspauldi

2. *What's the value of the habitat being invaded?*

- 1 pt - it's invading my favorite area that has the stuff I want to protect
- 2 pt - it's invading the disturbed edge or areas that I don't care as much about

3. *What impacts is it causing?*

- 1 pt - all is lost; it changes the area so much that few species survive
- 2 pts - it invades undisturbed areas and outcompetes native species
- 3 pts - it doesn't outcompete native species, but natives don't regenerate
- 4 pts - it invades disturbed areas like edges

4. *How hard is it to control?*

- 1 pt - not too bad, one treatment and it's pretty much gone
- 2 pts - takes multiple treatments, but eventually it's gone and natives replace it
- 3 pts - takes multiple treatments and natives don't come back in readily
- 4 pts - no effective treatment has been found



Buckthorn berry. Photo credit: Flickr user posixeleni

Now add the total points for each species.
The lower the score, the higher the priority.

To summarize it another way - **cheap and easy is very often your top priority!** It is very common to be mesmerized by the acres of garlic mustard in bloom and completely miss the one Oriental bittersweet vine that snuck in while you weren't looking. If you have unlimited time and money,

congratulations! Hire a big crew and go after them both. If, like most of us, you have limited time and money, turn your back on the garlic mustard and kill the Oriental bittersweet. Nipping it in the bud, so to speak, means you can spend a very small amount of time and money and keep it from becoming a huge infestation a few years from now. When it's dead, then go work on the garlic mustard.

PRIORITIZING AT THE SITE

Alright, you say bravely, the Oriental bittersweet vine is dead and I'm ready to tackle this huge area of garlic mustard. But it's a big project, and I'm not sure where to start. Here are a few more rules of thumb to help prioritize where to work first at a site.

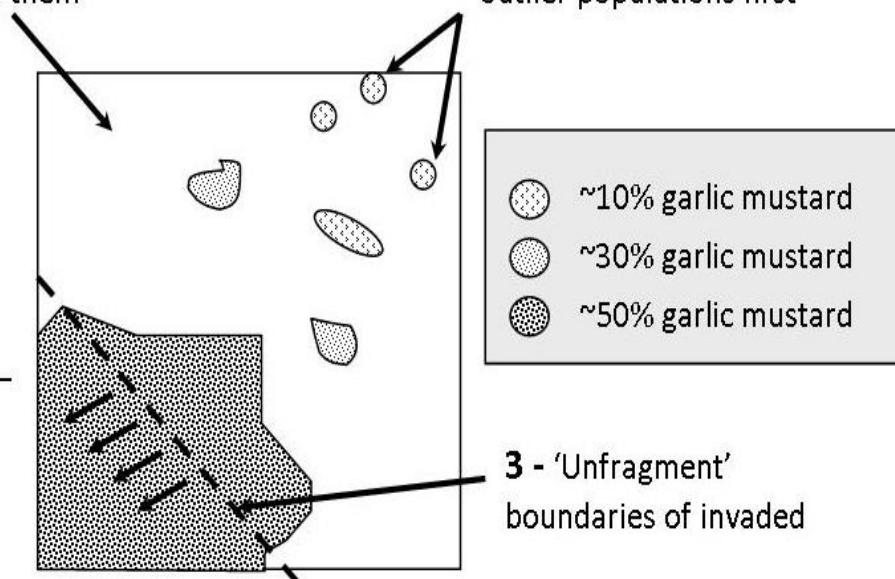
First, identify and map invaded and un-invaded areas as shown in Figure 1. Then follow steps 1 through 4.

Figure 1. A map of the garlic mustard in my woods.

1 - Focus on large blocks of un-invaded areas – and keep them un-invaded

2 - Control small, younger outlier populations first

4 - Reverse the invasion – expand the un-invaded area outward.



3 - 'Unfragment' boundaries of invaded



Oriental bittersweet. Photo credit: Martin LaBar

A few last things to keep in mind

- If the invasive plant produces bird-dispersed fruits like berries, control the large seed source populations first (which in a forest will usually be along the edge where there is more light), then follow the above rules.
- All roads, trails, and watercourses are invasive corridors; survey them regularly to detect new invaders quickly
- If the invasive species is coming from adjacent land (like, for instance, the garlic mustard in Figure 1 appears to be coming from the land to the southwest), it's time to have a conversation with your neighbors to see if they will also work to control their infestation. I suggest bringing chocolate chip cookies as incentive.



Taking a before picture of your management area can help you see the impact you made later. Photo credit: Eli Sagor

- Keep your focus on what you are managing *for*, not against – just removing invasive plants may not be enough. The unfortunate reality is that invasive plants aren't the only threat to your land. If you love the bluebells that bloom at the creek each year and have worked hard to control the garlic mustard to protect them, keep in mind it's still possible an overpopulation of deer may browse them all away. Don't lose sight of the big picture and other things that impact your land.

Controlling invasive plants can be challenging, but prioritizing your battles before you begin will make your success much more likely. Go get 'em!

Learn more at extension.umn.edu/woodlands

Jacquart, E. (2009, Summer). Where Do I Start?! Prioritizing Invasive Plant Control. *Indiana Native Plant and Wildflower Society Journal*. <http://www.inpaws.org/biodiversity/prioritizing-invasive-plant-removal/> or <http://www.inwoodlands.org/where-do-i-start-prioritizing/>