



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2017 LCCMR Work Plan

Date of Submission: September 14, 2016
Date of Next Status Update Report: November 30, 2017
Date of Work Plan Approval: 06/07/2017
Project Completion Date: June 30, 2020
Does this submission include an amendment request? No

PROJECT TITLE: Tactical Invasive Plant Management Plan Development

Project Manager: Monika Chandler
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Location: Statewide

Total ENRTF Project Budget:	ENRTF Appropriation:	\$296,000
	Amount Spent:	\$0
	Balance:	\$296,000

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 06e

Appropriation Language:

\$296,000 the first year is from the trust fund to the commissioner of agriculture in cooperation with the Board of Regents of the University of Minnesota to develop regional priorities and an interagency action plan for invasive plant management to protect and promote habitat and native species. This appropriation is available until June 30, 2020, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Tactical Invasive Plant Management Plan Development

II. PROJECT STATEMENT:

Integrated planning for invasive plant management will facilitate protection of habitat and native species. Most invasive plant management decisions are made at the local level without the benefit of regional prioritization of targeted species and coordinated management across municipalities and counties. Existing plans produced by the National Invasive Species Council, Minnesota Invasive Species Advisory Council and Minnesota Department of Agriculture (MDA) outline prevention, early detection and rapid response, control and management, and restoration in general terms. None of these plans provides regional, species specific recommendations for invasive plant management that would inform state, county and municipal decision making.

We will analyze the current and predicted distributions of invasive plants and their economic impacts to inform priorities and management strategies. This has not been done before in Minnesota. A statewide invasive plant management plan with regional recommendations will be written. The plan will be available in interactive webpages and summarized in outreach materials. To educate about invasion fronts and priority species, regional workshops with field tours will be scheduled for Cooperative Weed Management Area (CWMA) partners and other land managers. Species selected for distribution and economics analyses are regulated, widespread and threaten managed landscapes and natural areas.

buckthorn	Japanese knotweed	narrowleaf bittercress	spotted knapweed
Canada thistle	leafy spurge	plumeless thistle	tansy
garlic mustard	multiflora rose	purple loosestrife	wild parsnip

Improved access for counties, townships and municipalities to shared invasive plant data and data management tools will result from this project. This will improve coordination of state and local management efforts.

Agencies and County Agricultural Inspectors are project partners. Invasive plant management roles are defined below.

- **Minnesota Department of Agriculture’s (MDA) Noxious and Invasive Weed Program**
MDA has a mandate to protect the environment, public health, public roads, crops, livestock, or other property in Minnesota from injurious plant species (Minnesota Statutes 18.75). The Noxious and Invasive Weed Program oversees the review and regulation of injurious plant species. It works closely with counties regarding the training and enforcement of the noxious weed law.
- **County Agricultural Inspectors (CAI)**
Counties have noxious weed law enforcement responsibilities. All invasive plant species selected for this project are noxious weeds (regulated plants) so counties have a direct role in noxious and invasive plant management. Each county has a county agricultural inspector or county designated employee to oversee township and municipal weed law training and enforcement. Additionally, CAIs are important local contact persons within a county for state and federal agencies working on noxious and invasive plants. CAIs often have extensive knowledge about the local plant conditions, land ownership and history.
- **Minnesota Department of Natural Resources (DNR)**
The mission of the Minnesota Department of Natural Resources (DNR) is to work with citizens to conserve and manage the state’s natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. Terrestrial invasive plants impact many of these goals and directly impact many of the lands that the DNR manages. The DNR is the regulatory authority for invasive aquatic plants and wild animals.
- **Minnesota Board of Water and Soil Resources (BWSR)**
BWSR Coordinates the Cooperative Weed Management Area Grant Program that aids the establishment and management of local weed management organizations to manage invasive species across ownership boundaries within counties or multiple counties. These groups conduct a wide range of activities including outreach/education, mapping, management and monitoring. BWSR also conducts outreach on invasive species management to guide the stewardship of conservation easements, pollinator plantings, stormwater management projects and wetland conservation and mitigation on private lands.

- **Minnesota Department of Transportation (MnDOT)**

It has long been recognized that road corridors are a pathway for invasive terrestrial plant species. In an effort to protect the natural resources of Minnesota, MnDOT manages road corridors across Minnesota to control and when possible eradicate noxious weed infestations by utilizing a variety of management tactics. MnDOT cooperates with state agencies, tribal groups, advisory boards, CWMAs, counties, townships and citizen groups on many levels to facilitate invasive species management on and off State controlled rights-of-way.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of November 30, 2017:

Project Status as of May 31, 2018:

Project Status as of November 30, 2018:

Project Status as of May 31, 2019:

Project Status as of November 30, 2020:

Overall Project Outcomes and Results:

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Facilitate data sharing and write a statewide invasive plant management plan

Description: State agencies share invasive plant data in EDDMapS, an online database. Counties and municipalities would also benefit from data sharing but are not familiar with the reporting and data management tools available. Some have data on paper forms, in spreadsheets and in geodatabases. We will connect with all 87 counties, all CWMAs and large municipalities. If counties have data to share, we will prepare and upload these data into EDDMapS. Additionally, we will offer informal training and support for the use of EDDMapS and related apps. Work will be done by a Plant Health Specialist at MDA.

Risk assessment, distribution and economic information will be integrated with best management practices into a management plan with regional recommendations for each regulated species. Logic modeling to define impact and outcome indicators (success indicators) and scale will be utilized. Angela Gupta (Extension) will facilitate logic model development and Robert Venette (U of M) will be consulted.

Roger Becker (U of M), David Hanson Kenneth Graeve (MnDOT), Laura Van Riper (DNR) Dan Shaw (BWSR) and Monika Chandler (MDA) will be consulted about best management practices drawing from a number of sources including the Midwest Invasive Plant Control Database (<https://mipncontroldatabase.wisc.edu/>).

The plan will be written in plain language. All project partners will review the plan. Work will be done by a Plant Health Specialist at MDA.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 106,000
Amount Spent: \$ 0
Balance: \$ 106,000

Outcome	Completion Date
1. Discuss data tools, availability and formats with all counties and large municipalities	06/30/2018
2. Accept data in multiple formats then prepare and bulk upload into EDDMapS	06/30/2018

3. Draft plan and send through review by project partners.	04/01/2020
4. Finalize plan and post on the MDA website.	06/30/2020

Activity 1 Status as of November 30, 2017:

Activity 1 Status as of May 31, 2018:

Activity 1 Status as of November 30, 2018:

Activity 1 Status as of May 31, 2019:

Activity 1 Status as of November 30, 2020:

ACTIVITY 2: Define invasion fronts, predict spread and conduct economic analysis

Description: We will analyze current and projected species distribution and density using a variety of datasets depicting the presence and abundance of invasive plants. In doing so, we will define invasion fronts by using data collected at various scales. The presence of invasive plant species will be acquired through EDDMapS (www.eddmaps.org) and Forest Inventory and Analysis invasive plant species databases (www.nrs.fs.fed.us/fia/maps/Invasive-maps/default.asp). We will create habitat suitability models for the invasive plants species listed through using maximum entropy (Maxent) species distribution models using three primary variables: (1) current presence and abundance of invasive plants, (2) land use category (e.g., forest agricultural land, or settlement), and (3) environmental parameters such climate variables and soil characteristics. Analyses of these data will predict invasive plant distribution throughout Minnesota based on suitable habitat. This work will be led by Dr. Matthew Russell (UMN Department of Forest Resources) with assistance from Dr. Senait Senay (UMN Department of Applied Economics) and will initiate in the summer of 2017. Collaborators with ongoing research projects funded through the Minnesota Invasive Terrestrial Plants and Pests Center will be consulted to ensure no duplication of work in this effort.

We will identify species-specific input parameters to conduct an economic analysis of each invasive plant species. This work will be led by Dr. Matthew Russell and conducted by a post-doc located in the UMN Department of Forest Resources and will be hired in 2017. A project collaboration team including Dr. William Lazarus (UMN Department of Applied Economics) and Dr. Roger Becker (UMN Department of Agronomy and Plant Genetics) will assist in the post-doc’s analyses. Species-specific input parameters included in the modeling effort, in addition to management costs of invasive plants, will be identified and data will be delivered in tabular and spatial forms.

A series of economic models will be run on each invasive species by county. We will use the modeling results in combination with the identified species-specific parameters to determine the direct and indirect economic impacts of invasive plant species distribution and their management. This work will be led by Dr. William Lazarus (UMN Department of Applied Economics) with assistance from Brigid Tuck (UMN Extension) and will be completed by the spring of 2020.

Summary Budget Information for Activity 2:

ENRTF Budget: \$ 130,300
Amount Spent: \$ 0
Balance: \$ 130,300

Outcome	Completion Date
1. Analyze current and projected species distribution and density. Define invasion fronts.	07/01/2019
2. Develop species specific economic model input parameters.	07/01/2019
3. Run economic models and analyze results with a breakdown by county.	06/30/2020

Activity 2 Status as of November 30, 2017:

Activity 2 Status as of May 31, 2018:

Activity 2 Status as of November 30, 2018:

Activity 2 Status as of May 31, 2019:

Activity 2 Status as of November 30, 2020:

ACTIVITY 3: Develop user-friendly educational materials and communicate the plan and develop an app for evaluating invasive plant management outcomes

Description: The MDA will develop webpages to communicate species management objectives, practices, and coordination. These webpages will be housed on MDA’s Noxious and Invasive Weed Program’s website (www.mda.state.mn.us/weedcontrol). Monika Chandler will oversee development of these webpages. Maps of the suitable habitat produced in Activity 2 will be a core component displayed in these webpages. Intended audiences are agricultural and natural resource professionals working in county, state, federal, and tribal agencies.

We will translate the statewide invasive plant management plan to the field and foster cooperation by holding six regional workshops with field tours to see invasion fronts and high priority infestations. These workshops will be sponsored by UMN Extension (Angela Gupta and Matthew Russell). Target regions for these workshops, offered in 2019 and 2020, will be at least one in each of Minnesota’s four biomes spanning agricultural and forest land uses. In addition, outreach materials (e.g., fact sheets and invasive plant management summaries) will be created and distributed by UMN Extension using both printed and web resources through UMN Extension’s webpage (<http://www.extension.umn.edu/>) and MyMinnesotaWoods (<http://www.myminnesotawoods.umn.edu/>).

ISMTrack, an invasive species management tracking system, was developed in the *Elimination of Target Invasive Plants* LCCMR project. ISMTrack is a cloud based software system to help land managers track invasive species management across sites and over time. ISMTrack is integrated with EDDMapS, an invasive species inventory, mapping and tracking system. ISMTrack can be used to track many invasive species management activities including: staffing, treatment method, travel time, volunteer or crew hours, weather conditions, completion dates and other critical information. Data can be shared, downloaded and analyzed to increase efficiency and improve invasive species management by a team and across organizations.

We will improve work flow processes and add query and reporting features to analyze and summarize changes in infestation size and density over time. Finally, we will create an app that works consistently offline on a mobile device. This will allow land managers access records of what has been done at a site. This will inform decisions in the field. Work will be contracted through Extension.

Summary Budget Information for Activity 3:

ENRTF Budget: \$ 59,700
Amount Spent: \$ 0
Balance: \$ 59,700

Outcome	Completion Date
1. Define and develop outreach materials	05/30/2020
2. Hold 6 regional workshops with field tours	06/30/2020

Activity 3 Status as of November 30, 2017:

Activity 3 Status as of May 31, 2018:

Activity 3 Status as of November 30, 2018:

Activity 3 Status as of May 31, 2019:

Activity 3 Status as of November 30, 2020:

V. DISSEMINATION:

Description: We will communicate about plan development with the public, CWMAs, land managers, and researchers. Webpages will be developed for communication. Communication with the public will be via news media (print, television, and radio) and social media such as Facebook and Twitter. Updates and findings will be presented at a University of Minnesota seminar, the 2018 Upper Midwest Invasive Species Conference, and other meetings (LCCMR funding will not be used for meetings).

Status as of November 30, 2017:

Status as of May 31, 2018:

Status as of November 30, 2018:

Status as of May 31, 2019:

Status as of November 30, 2020:

Final Report Summary:

VI. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview:

***This section represents an overview of the preliminary budget at the start of the project. It will be reconciled with actual expenditures at the time of the final report.**

Budget Category	\$ Amount	Overview Explanation
MDA Personnel:	\$ 102,000	One 3 year 50% time Plant Health Specialist 2 estimated salary \$34,000/yr plus fringe benefits @ 50% for Activities 1 and 3 invasive plant data sharing and plan writing
MDA Travel Expenses in MN:	\$ 4,000	Travel for Activity 1 for Plant Health Specialist and project manager. Mileage \$2,400, lodging \$1,000; meals \$600
Contract with U of M	\$ 190,000	
U of M Personnel:	\$ 130,300	One year Research Associate (postdoc) salary \$57,761/yr and fringe @ 22.4% for Activity 2 economic analysis; One 10% time Research Associate salary \$6,900 and 33% fringe for 1 year for Activity 2 invasive plant distribution modeling; Two faculty one month summer salary \$9,000 plus fringe 17% @ for 2 years for Activity 2 economic analysis and 3 years for invasive plant distribution modeling and outreach

U of M Professional/Technical/Service Contracts:	\$ 53,000	Contract to UMN to build capacity of ISMTrack (Invasive Species Management Tracking System) to evaluate management activity outcomes (\$10,000/year for 3 years) and to create an app that can work offline (\$20,000) graphic design for outreach materials (\$3,000)
U of M Printing:	\$ 2,700	U of M outreach materials and printing
U of M Travel Expenses in MN:	\$ 1,600	Meals (\$35/workshop and field tour) and mileage (\$200/workshop and field tour) for U of M instructors for 6 workshops = \$1,410 and 4 overnight lodging (\$550) for Activity 4 outreach workshops and field tours
U of M Other:	\$ 2,400	Six regional field tours of invasion fronts and priority species for land managers. Anticipated attendance is 50 per regional tour = 300 total. Bus rental estimated \$400/tour
TOTAL ENRTF BUDGET:	\$ 296,000	

Explanation of Use of Classified Staff: NA

Total Number of Full-time Equivalent (FTE) Directly Funded with this ENRTF Appropriation: 1.5

Total Number of Full-time Equivalent (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

Contract with U of M = 1.5

U of M Subcontract: 1,160 hours/2080 = 0.56

Total = 2.06

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
	\$	\$	
State			
MDA: Computing/software, GIS and data management, and project management for 3 years (\$15,000) U of M: One Extension Educator and 2 faculty for 2 weeks/year for 3 years (\$36,200)	\$ 51,200	\$	
TOTAL OTHER FUNDS:	\$ 51,200	\$	

VII. PROJECT STRATEGY:

A. Project Partners:

Partners receiving ENRTF funding

- Monika Chandler, Research Scientist (Invasive Species Specialist), MDA, \$106,100, will oversee data sharing with counties and municipalities, writing a statewide management plan, creating webpages for communicating the plan and providing overall project coordination.

University of Minnesota, \$190,732

- Matthew Russell, Assistant Professor, with assistance from Senait Senay, Research Associate, and Roger Becker, Professor, will conduct invasive plant distribution analysis and predictive modelling.

Matthew Russell will be the project leader for U of M. Roger Becker will also provide expertise with best management practices.

- William Lazarus, Professor, and Brigid Tuck, Researcher 5, will conduct an economic analysis of the invasive plant species listed for this project.
- Angela Gupta, Extension Professor, with Matthew Russell will lead the development of educational materials and plan communication.

Partners NOT receiving ENRTF funding

The following persons will provide technical expertise and review the invasive plant management plan.

- Trent McCorkle, Rice County Agricultural Inspector, Minnesota Association of County Agricultural Inspectors
- Laura Van Riper, Terrestrial Invasive Species Coordinator, DNR
- Kenneth Graeve, Roadside Vegetation Manager, MnDOT
- David Hanson, Roadside Vegetation Manager, MnDOT
- Daniel Shaw, Senior Ecologist/Vegetation Specialist, BWSR
- Robert Venette, Minnesota Invasive Terrestrial Plants Pest Center Director, U of M
- James Calkins, Government Relations, Minnesota Nursery Landscape Association

B. Project Impact and Long-term Strategy:

State and local partners jointly developed this proposal and will create an invasive plant management plan that is workable. CWMAs are an excellent vehicle for implementation. If there is a need, we would submit a future proposal to develop cohesive regional strategies and timelines with the CWMA program. After the plan is implemented, we anticipate more efficient and coordinated control of priority species. This will result in better protection of habitat and native species from invasive plants. We also anticipate that research and mapping needs will be identified. The plan framework will be valid for at least 10 years. The plan will be a dynamic document online with embedded live maps of invasion fronts to show changes based upon new invasive plant reports over coming years. Project partners will review the plan every five years. Ideally, the invasive plant distribution predictions and economic analysis would be updated every decade if funding permitted.

C. Funding History:

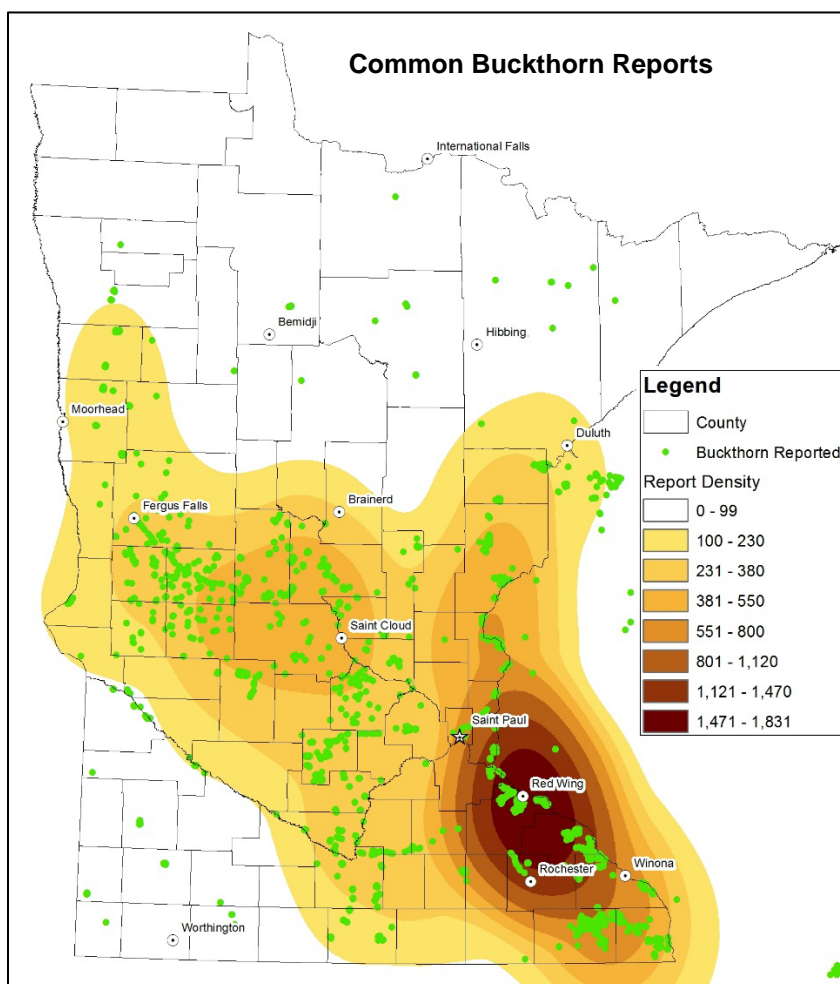
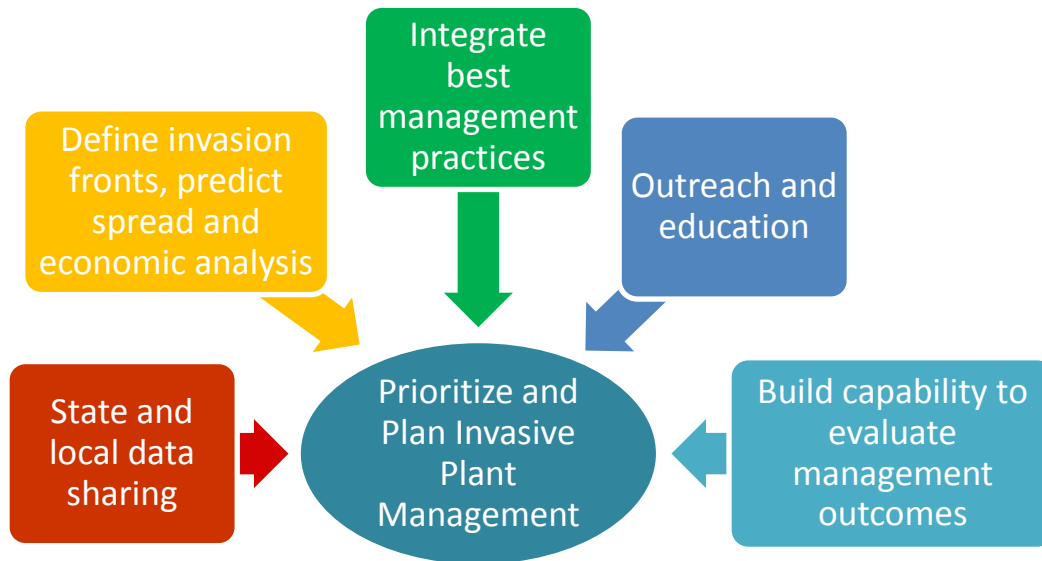
Funding Source and Use of Funds	Funding Timeframe	\$ Amount
Elimination of Target Invasive Plant Species Phase 1 project \$350,000 from ENRTF, 33,993 MDA general fund for salary, \$50,000 MDA in-kind and \$35,000 U of M in-kind. This project was early detection and rapid response to emerging invasive plants. The focus on widespread species in proposed project is different.	07/01/2013 – 06/30/2016	\$ 468,933
Elimination of Target Invasive Plant Species Phase 2 project is recommended for funding \$750,000 from ENRTF and \$92,050 in-kind (\$30,000 MDA, \$20,830 CCM, \$22,500 St. Croix River Assoc. and \$18,700). The focus on widespread species in proposed project is different.	07/01/2016 – 06/30/2016	\$ 842,030
		\$ 1,310,963

VIII. REPORTING REQUIREMENTS:

- The project is for 3 years, will begin on 07/01/2017, and end on 06/30/2020.
- Periodic project status update reports will be submitted November 30 and May 31 of each year.
- A final report and associated products will be submitted between June 30 and August 15, 2020.

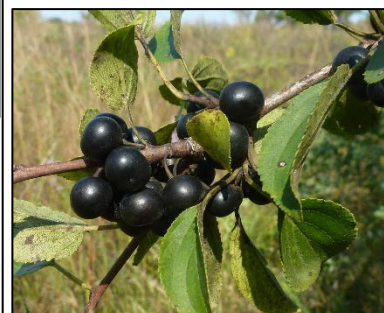
IX. VISUAL COMPONENT or MAP(S):

Tactical Invasive Plant Management Plan Development



This heat map of common buckthorn reports shows it is abundant in some areas of the state, but is an early detection target in northern and southwestern Minnesota.

We aim to predict the spread of buckthorn and other species based upon habitat suitability and do an economic analysis to inform decision making about priorities.



Buckthorn fruit with seed

**Environment and Natural Resources Trust Fund
M.L. 2017 Project Budget**



Project Title: Tactical Invasive Plant Management Plan Development

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 6e

Project Manager: Monika Chandler

Organization: Minnesota Department of Agriculture

M.L. 2017 ENRTF Appropriation: \$

Project Length and Completion Date: 3 Years, June 30, 2020

Date of Report: September 14, 2016

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 3 Budget	Amount Spent	Activity 3 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	<i>Data management & plan development</i>			<i>Define invasion fronts, predict spread & economic analysis</i>			<i>Outreach and app creation</i>				
Personnel (Wages and Benefits)	\$102,000		\$102,000							\$102,000	\$102,000
One 3 year 50% time Plant Health Specialist 2 estimated salary \$34,000/yr plus fringe benefits @ 50% for Activity 1 invasive plant data sharing and plan writing											
Travel expenses in Minnesota											
Travel for Activity 1 for Plant Health Specialist and project manager. Milage \$2,400, lodging \$4,500; meals \$4,300	\$4,000		\$4,000							\$4,000	\$4,000
Professional/Technical/Service Contracts											
Contract with U of M total is \$ 190,000											
U of M Personnel (Wages and Benefits)				\$130,300		\$130,300				\$130,300	\$130,300
Research Associate (postdoc) salary for 1.25 years at \$57,761/yr and fringe @ 22.4% for Activity 2 economic analysis											
One 10% time Rearch Associate salary \$6,900 and 33% fringe for 1 year for Activity 2 invasive plant distribution modeling											
One faculty one month summer salary \$9,000 plus fringe 17% @ for 3 years for invasive plant distribution modeling and outreach											
U of M Subcontract											
Activity 3: Build ISMTrack (Invasive Species Management Tracking System) capacity to evaluate management outcomes (\$10,000/year for 3 years) and create an app (\$20,000)							\$50,000		\$50,000	\$50,000	\$50,000
Graphic design for outreach materials							\$3,000		\$3,000	\$3,000	\$3,000
U of M Printing											
Outreach materials printing							\$2,700		\$2,700	\$2,700	\$2,700
U of M Travel expenses in Minnesota											
Meals (\$35/workshop and field tour) and mileage (\$200/workshop and field tour) for U of M instructors for 6 workshops = \$1,410 and 4 overnight lodging (\$550)							\$1,600		\$1,600	\$1,600	\$1,600
U of M Other											
Six regional field tours of invasion fronts and priority species for land managers. Anticipated attendance is 50 per regional tour = 300 total. Bus rental estimated \$400/tour							\$2,400		\$2,400	\$2,400	\$2,400
COLUMN TOTAL	\$106,000	\$0	\$106,000	\$130,300		\$130,300	\$59,700	\$0	\$59,700	\$296,000	\$296,000