

**Environment and Natural Resources Trust Fund
2015 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 082-D

Emerald Ash Borer Ecological/Hydrological Impacts – Phase 2

Category: D. Aquatic and Terrestrial Invasive Species

Total Project Budget: \$ 420,408

Proposed Project Time Period for the Funding Requested: 5 years, July 2015 - June 2020

Summary:

Project assesses impacts of emerald ash borer on ecology and hydrology of black ash forests and develops recommendations for increasing resilience of Minnesota's 10 billion ash trees to this threat.

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Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Minnesota's black ash forests are currently threatened by the introduced emerald ash borer. Project is developing assessments of impacts and strategies to mitigate these impacts.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	



PROJECT TITLE: Emerald Ash Borer Ecological/Hydrological Impacts – PHASE 2

I. PROJECT STATEMENT

Black ash swamps cover over one million acres of northern Minnesota and provide critical habitat for wildlife and serve many important functions, including flood regulation and carbon storage. The ecology and functioning of these swamps is greatly threatened by the introduced, Emerald Ash Borer (EAB), which has been decimating native populations of ash throughout the Lake States and is currently located in Superior, WI on the doorstep of the vast acreages of black ash in northern Minnesota. Although cold winter temperatures may kill some EAB, there is no evidence cold temperatures will stop the spread and survival of this introduced pest in northern Minnesota, an area with over 10 billion black ash trees. This project is a continuation of the Ecological and Hydrological Impacts of Emerald Ash Borer project that received ENRTF funding in 2010. This project has established a large-scale network of research sites in black ash swamps that is assessing potential EAB impacts and evaluating potential mitigation strategies, including establishing non-host tree species in these areas. The initial phase of this work has already identified significant potential impacts of EAB and pre-emptive harvesting on native plants and forest hydrology, including loss of native plant diversity and increased flooding, but continued funding is needed to ensure that additional progress can be made towards developing strategies for increasing the resilience of black ash swamps to EAB, as well as anticipating landscape-level impacts of this insect pest.

The goals of this project are:

1. To increase our understanding of the long-term impacts of EAB on the ecology and hydrology of black ash forests in Minnesota and to develop appropriate strategies for increasing the resilience of these critical habitats to the effects of EAB. The project will achieve this goal by examining the long-term hydrological and ecological response of black ash forests to treatments simulating EAB and evaluating the survival and growth of potential replacement species for black ash.
2. The second goal of this project is to generate an assessment of the vulnerability of northern Minnesota black ash forests and associated infrastructure (i.e., roads) and natural features (streams and lakes) to EAB impacts. The project will accomplish this by mapping the location and extent of black ash swamps throughout northern Minnesota and determining potential changes in hydrology and forest habitats that can be expected once EAB spreads through northern Minnesota.

II. PROJECT ACTIVITIES AND OUTCOMES

The Phase 1 funding was used to establish eight, large-scale research and demonstration sites covering over 200 acres for evaluating the impacts of EAB on native plant communities, the spread of invasive species, and site hydrology. In addition, these sites were designed for testing the survival and growth of 12 non-ash tree species that might be able to mitigate the ecological impacts of losing black ash from Minnesota’s forests. Phase Two of the project will complete the following three activities:

Activity 1: Determine the long-term impact of EAB on native plant communities, spread of invasive species, and hydrology Budget: \$158,191

We will conduct continued monitoring of the research and demonstration sites established in Phase One to assess the long-term impacts of EAB on native plant communities, spread of invasive species, and hydrology. Measurements will occur yearly on 576 sampling plots covering over 200 acres of black ash swamps.

Outcome	Completion Date
1. Measure the long-term impacts of EAB on forest hydrology, including flooding impacts	September 2019
2. Measure the long-term impacts of EAB on native plant communities and spread of invasive plant species	September 2019
3. Final report of activity results submitted	June 2020



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Activity 2: Develop and implement recommendations for mitigating impacts of EAB on black ash forests, including planting suitable non-host tree species Budget: \$85,180

The growth and survival of planted and natural seedlings representing non-host species for EAB, including American elm, northern white cedar, and tamarack, and established in Phase One will be monitored yearly to develop recommendations for species to plant to increase the resilience of black ash forests to EAB. Measurements include over 3,000 seedlings across a range of ash mortality and management conditions.

Outcome	Completion Date
1. Measure the long-term survival and growth of potential replacement species for black ash	September 2019
2. Develop and implement recommendations for increasing the resilience of black ash forests to EAB	January 2020
3. Present recommendations to DNR, Minnesota Legislature, and National Forests	May 2020

Activity 3: Assess the vulnerability of black ash forests and associated resources and infrastructure for northern Minnesota Budget: \$177,037

The distribution and vulnerability of black ash forest wetlands across northern Minnesota will be mapped based on satellite digital data and regional forest inventories. Additional hydrologic monitoring and vegetation sampling will also occur at 30 other black ash swamp sites beyond the Phase One sites to fully represent the range of conditions and vulnerabilities of black ash swamps in the state.

Outcome	Completion Date
1. Develop statewide map of black ash forest wetlands using remote sensing and forest inventory data	June 2018
2. Measure hydrology and vegetation at black ash sites across northern Minnesota	September 2018
3. Assess statewide vulnerability of black ash forest wetlands	September 2019

III. PROJECT STRATEGY

A. Project Team/Partners: The project team largely includes the same partners as Phase One and will be led by scientists at the University of Minnesota, Dept. of Forest Resources, including Professors Anthony D’Amato, Michael Falkowski, and Linda Nagel, and a scientist with the USFS, namely Dr. Brian Palik, and Dr. Rob Slesak of the Minnesota Forest Resources Council. Cooperators will include DNR Ecological and Water Resources and Forestry and the Chippewa and Superior National Forests.

B. Project Impact and Long-Term Strategy: This project is a continuation of the Ecological and Hydrological Impacts of Emerald Ash Borer project that received \$636,000 of 2010 funding from the ENRTF. This work has identified the potential for significant, immediate alterations to native plant communities and the amount of flooding in forested wetlands in northern Minnesota due to EAB. We have begun developing and implementing mitigation strategies for these impacts, including planting non-host tree species; however, additional funding is critical for generating long-term assessments of the effectiveness of these strategies and the duration of EAB impacts. A key product that will be developed from Phase Two will be the development and implementation of recommendations for increasing the resilience of black ash forests to EAB and these will be formalized into statewide guidelines through consultation with the DNR.

C. Timeline Requirements

The duration of the project is five years. The requested time is necessary to generate long-term assessments of EAB impacts on the ecology and functioning of black ash forests, as well as to develop recommendations for mitigating these impacts and determine statewide vulnerability.

2015 Detailed Project Budget

Project Title: Emerald Ash Borer Ecological/Hydrological Impacts - PHASE 2

PIs: Dr. Anthony D'Amato, Dr. Michael Falkowski, Dr. Linda Nagel, University of Minnesota; Dr. Brian Palik, USDA Forest Service; Dr. Robert Slesak, Minnesota Forest Resources Council

IV. TOTAL ENRTF REQUEST BUDGET 5 years

<u>BUDGET ITEM</u> (See "Guidance on Allowable Expenses", p. 13)	<u>AMOUNT</u>
Personnel: Two weeks of faculty summer salary and fringe (0.36) for five years (PI-D'Amato; 0.1FTE)	\$ 37,604
Personnel: Two weeks of faculty summer salary and fringe (0.36) for five years (Co-PI Falkowski; 0.1FTE)	\$ 23,958
Post-doctoral researcher examining impacts of EAB on hydrology and native plant communities; salary and fringe (0.1812) for five years (0.5 FTE)	\$ 161,058
Research associate coordinating collection of ecological field data from black ash forests; Salary and fringe (0.3040) for five years (0.75 FTE)	\$ 145,099
Work-study undergraduate student to assist with data collection and processing; Salary and fringe (0.0743) for 5 years	\$ 26,689
Equipment/Tools/Supplies: supplies for constructing wells for monitoring hydrology at each site (\$10500), Haglof distance measuring equipment (\$700), stake whiskers for marking subplots (\$110), calipers for measuring seedling growth (\$320), supplies for constructing frames for measuring understory vegetation (\$150), diameter tapes for measuring overstory trees (\$150), and data loggers for micrometeorological measurements (\$2070)	\$ 14,000
Travel: Due to the high number of study sites and logistics associated with visiting and measuring black ash wetland sites \$12,000 is budgeted for domestic travel within Minnesota. This money will be used to pay for mileage (75%) and lodging (25%) for researchers, the field technician, and graduate and undergraduate students. Mileage costs are associated with rental of a field vehicle through the University of Minnesota motorpool for four field seasons. Travel reimbursement will follow University of Minnesota protocols.	\$ 12,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 420,408

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period: U.S. Department of Interior, Northeast Climate Science Center. Funds from this source will be used to develop methodology for quantifying regional vulnerability of black ash swamps and will directly complement the research proposed in this LCCMR project. In addition, funds from this source will be used to develop outreach materials related to increasing resilience	\$ 165,000	Secured
In-kind Services During Project Period: In-kind salaries provided by U.S. Forest Service Researcher (0.5 FTE; B. Palik), as well as in-kind use of Forest Service ATV, vehicle, and trailer.	\$ 90,000	Secured
In-kind salaries provided by UMN Researchers (0.01 FTE; L. Nagel)	\$ 10,009	Secured
Funding History: ENRTF: "Ecological and Hydrological Impacts of Emerald Ash Borer." June 2009-2015" M.L. 2010, Chp. 362, Sec. 2, Subd. 6b	\$ 636,000	

Minnesota's black ash forests support the highest level of plant diversity of all forests and provide critical hydrologic functions, including flood regulation



Loss of black ash due to Emerald Ash Borer can shift forested wetlands to grass and sedge-dominated ecosystems and lead to greater amounts of flooding

Ecological Impacts of Emerald Ash Borer – PHASE 2

Project Manager Qualifications

Anthony W. D'Amato

Qualifications

Anthony is an Associate Professor of Silviculture and Applied Forest Ecology in the Department of Forest Resources, University of Minnesota. He conducts teaching, research, and participates in outreach/Extension programs. His research primarily focuses on traditional and experimental silvicultural strategies for meeting diverse forest management objectives ranging from the sustainable production of woody biomass for biofuels to increasing the resilience and resistance of forest ecosystems to future climate and disturbance impacts. His primary outreach audiences are natural resource managers.

Anthony has been the principal investigator and project manager on several large-scale projects aimed at evaluating the effectiveness of different management strategies at conferring resistance and resilience to future environmental changes and disturbances. He has published numerous peer-reviewed and non-technical articles which address the impacts of climate, forest harvesting practices, and natural disturbances on forest growth and development and has been involved with several outreach programs focused on the development of strategies to mitigate the impacts of drought and other extreme events on forests. He served as the project manager on Phase One of the project and has successfully coordinating research activities and outreach associated with this work.

Responsibilities

As Project Manager, Anthony would coordinate and manage the overall project, coordinate long-term assessments of the impacts of EAB on black ash forests in Activity 1, provide oversight for the development of management recommendations for mitigating the impacts of emerald ash borer on black ash wetlands (Activity 2), and provide oversight on the development of maps and statewide vulnerability estimates for black ash forest systems and associated infrastructure (Activity 3). In the coordination and management role, he would convene meetings of project participants throughout the life of the project to facilitate collaborative efforts, share results, discuss future directions, and identify additional outreach opportunities that could be pursued. His research would focus on assessing the impacts of EAB on native plant communities (Activity 1) and developing recommendations to increase resilience of these forests (Activity 2).

Organization Description

The Department of Forest Resources is part of the University of Minnesota.