



Environment and Natural Resources Trust Fund

M.L. 2020 Approved Work Plan

General Information

ID Number: 2020-020

Staff Lead: Corrie Layfield

Date this document submitted to LCCMR: August 13, 2021

Project Title: EAB And Black Ash: Maintaining Forests And Benefits

Project Budget: \$700,000

Project Manager Information

Name: Alexis Grinde

Organization: U of MN - Duluth - NRRI

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Project Reporting

Date Work Plan Approved by LCCMR: August 13, 2021

Reporting Schedule: April 1 / October 1 of each year.

Project Completion: June 30, 2026

Final Report Due Date: August 14, 2026

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 06e

Appropriation Language: \$700,000 the second year is from the trust fund to the Board of Regents of the University of Minnesota to use ongoing experiments to determine statewide long-term emerald ash borer impacts on water, vegetation, and wildlife; to determine optimal replacement species and practices for forest diversification; and to develop criteria for prioritizing mitigation activities. This appropriation is available until June 30, 2026, by which time the project must be completed and final products delivered.

Appropriation End Date: June 30, 2026

Narrative

Project Summary: Utilize ongoing experiments to determine impending EAB impacts on water, vegetation, and wildlife; optimal replacement species and practices for forest diversification; develop indicators and criteria for prioritization of mitigation activities.

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Black ash wetlands are an extensive and ecologically significant part of Minnesota's landscapes, covering approximately 1.2 million acres in the northern forested region. Black ash wetlands are seriously threatened by EAB, which causes complete mortality of black ash following infestation.

We have been assessing the potential impacts of emerald ash borer (EAB) in black ash wetlands for ten years, using a combination of experimental studies (Phase 1) and monitoring sites across the state (Phase 2) that were established with previous allocations from the Environment and Natural Resources Trust Fund (ENRTF). Our proposed Phase 3 project focuses on mitigation of the threat from EAB and will utilize our previous work and conduct new research to develop and prioritize strategies to minimize EAB impacts in the northern forested region of the State. Given the history of ENRTF support for this work and expertise of the project team, we are uniquely poised to generate meaningful solutions to addressing the challenges posed by the threat of EAB to black ash wetlands and associated wildlife resources. This proposal was tentatively recommended for funding in 2020; the urgency of issue and our ability to address it have only worsened since that time.

What is your proposed solution to the problem or opportunity discussed above? i.e. What are you seeking funding to do? You will be asked to expand on this in Activities and Milestones.

We will identify strategies that maintain critical services and benefits currently provided by black ash wetlands. Our objectives are to:

- Quantify long-term impact of EAB on water, timber resources, vegetation, wildlife and carbon. Many black ash forests will not be actively managed or monitored, yet it is imperative to understand impacts to forest resources following EAB. The experimental sites from our previous work are at a critical point in development; it is important we utilize these previous investments to understand what happens next and forecast longer-term impacts.
- Develop a refined list of suitable replacement tree species and establishment practices to maintain black ash wetlands in a forested condition. Current recommendations are limited and do not include assessment of practices to improve overall growth and survival of replacement trees beyond the first several years. Managers urgently need more information to ensure planting success across a wide range of site conditions.
- Establish site susceptibility metrics and prioritization criteria for mitigation activities. Actual impacts of EAB on black ash wetlands will vary, and we need easily measured and understandable indicators on what the impacts will be on a site by site basis, and where mitigation efforts will be most effective.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

Our results to date indicate that black ash loss will change site hydrology and water quality, alter forest structure and vegetation dynamics, including timber species, and reduce habitat with impacts to wildlife species. Mitigation may be possible at some sites using a combination of management practices and planting of alternative tree species. However, we need more information in order to prioritize what actions we should take and where we should take them to have the greatest success in mitigating EAB impacts. Our proposed research will provide this information, allowing managers to act and mitigate impacts to black ash wetland ecosystems.

Project Location

What is the best scale for describing where your work will take place?

Region(s): NE, Central, NW,

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Activities and Milestones

Activity 1: Determine long-term impacts of EAB on wetland ecosystem functions.

Activity Budget: \$300,000

Activity Description:

We will continue to assess impacts of simulated EAB and adaptation approaches at a large scale experimental study (Phase 1) established in 2010, and monitor baseline conditions across a wide range of black ash forests established in Phase 2 of the project. These measurements include 1) continuous measurement of water table dynamics (all Phase 1 sites and a subset of Phase 2 sites), 2) annual assessments of wildlife presence and abundance (all sites), 3) measurement of all vegetation including dominant trees, shrubs, and plant communities (all Phase 1 sites; subset of Phase 2 sites), and measurement of above- and below ground carbon pools (Phase 1 sites). Results will be used to determine EAB effects on site hydrology, wildlife, trees and vegetation, and carbon storage and sequestration. Data from remeasured Phase 2 will be combined with Phase I results to estimate long-term impacts of EAB on water, wildlife, vegetation, and carbon.

Activity Milestones:

Description	Completion Date
Complete girdling maintenance activities at experimental (phase 1) treatment sites.	August 31, 2021
Deploy wells for water table measurement at Phase 1 and subset of Phase 2 sites	July 31, 2022
Quantify bird, small mammal, and herptile diversity in black ash research sites	November 30, 2023
Vegetation surveys and carbon pool assessments complete	October 31, 2024
Long-term site-level impacts to water, wildlife, vegetation, and carbon quantified	December 31, 2025

Activity 2: Replacement tree species and practices to maintain wetland forests

Activity Budget: \$280,000

Activity Description:

We will measure survival and growth of 12 tree species planted in 2010 as part of Phase 1. These findings and others will be used to identify a subset of promising target species for more intensive test practices to improve establishment and growth. The intensive practices we will assess include the use of browse control, planting of larger seedling stock than typically used, and practices to control competing vegetation. Target species and intensive practices will be implemented at 15 of the monitoring sites. Survival and growth of target species will be measured annually, and effectiveness of the intensive establishment practices will be determined and recommendations made at projects end.

Activity Milestones:

Description	Completion Date
Identify and order seedling stock for replacement tree species	October 31, 2021
New tree species planted and establishment practices implemented at Phase 2 sites	September 30, 2022
Survival and growth assessment of Phase 1 replacement species completed	September 30, 2025
Final recommendations on optimal species and practices to maintain wetland forests	June 30, 2026

Activity 3: Site susceptibility criteria and prioritization of mitigation actions

Activity Budget: \$120,000

Activity Description:

We will utilize findings from Activity 1 to identify easily measured site characteristics that can be used to predict the

relative impact of EAB on water, vegetation, wildlife, and carbon. We will utilize findings from Activities 1 and 2 combined with other relevant data (e.g., proximity to mills, volume, site access) to determine which sites have a greatest likelihood of mitigation success and management action. These data will be combined with a map of black ash developed during Phase 2 to rank all stands and identify priority locations for mitigation activities. We will develop recommendations on a coordinated statewide response to mitigate EAB impacts in ash wetlands.

Activity Milestones:

Description	Completion Date
Site susceptibility metrics for water, vegetation, wildlife, and carbon established	December 31, 2025
Prioritization tool completed	March 31, 2026
Recommendations on statewide/ multi-ownership prioritization framework	June 30, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Rob Slesak	USDA Forest Service- Pacific Northwest Research Station	Dr. Slesak will continue to lead all aspects of the project related to wetland hydrology and soil, contributing to each of the activities outlined in this proposal. Slesak will also supervise research associates, mentor graduate students, and engage with stakeholders and external partners through the Minnesota Forest Resources Council.	No
Dr. Brian Palik	USDA Forest Service- Northern Research Station	Primarily responsible for Activity 2, including maintaining Phase I sites and replacement tree evaluation activities in Phase I and II sites. Contributes to Activity 1 through measurements of vegetation and logistic support at Phase I and II sites.	Yes
Dr. Tony D'Amato	University of Vermont	Primarily responsible for Activity 2, including translating research findings into management guidance to minimize impacts of black ash loss on forest hydrology and diversity. Also contributes to Activities 1 and 3 through assistance with analyses and translation of findings to outreach materials.	No

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.

We expect that our results will quantify how EAB-induced mortality of black ash trees and adaptation strategies in the face of this impact modify wildlife habitat, allowing for the development of approaches to mitigate impacts in this extensive forest ecosystem. The findings and products developed from this project will be directly conveyed to project stakeholders through formal and informal meetings and incorporated into adaptive management strategies that are updated as new information becomes available. We will disseminate results that will help inform and prioritize black ash wetland management efforts and provide information regarding site-level metrics (i.e., habitat characteristics) that should be considered for wildlife habitat within black ash stands. We will acknowledge the ENRTF funding in publications, signage, and other public communications and outreach related to work associated with the project using the trust fund logo or inclusion of language attributing support from the trust fund as appropriate.

Scientific publications: We expect that this project will produce at least 3 peer reviewed journal articles focusing on wildlife, vegetation, and carbon storage.

Presentations: Results will be disseminated through local, regional, and national conferences.

Data: Publicly available data will be hosted through the Natural Resources Research Institute website.

Project partners will use the results of this study to identify and improve practices to benefit Minnesota's forest resources. Recommendations for tree replacement species and establishment practices along with site prioritization for mitigation activities will be provided to public and private land managers.

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this be funded?

This research is of great interest to all stakeholders in the forest resources and management communities as project results will be used to actively address the EAB threat that these communities face. We will engage directly with practitioners and policy makers in natural resource management to communicate key messages, provide assessment tools, and deliver broad recommendations. The project team has extensive experience working with these audiences, including numerous workshops, presentations, and reports as part of earlier, related projects on EAB and black ash funded by the ENRTF. We are committed to pursuing support from both state and federal sources.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Evaluation of Tree Retention Guidelines Pertaining to Wildlife	M.L. 2016, Chp. 186, Sec. 2, Subd. 03p	\$232,000
Determine Impacts on Wildlife From Emerald Ash Borer Infection of Black Ash Forests	M.L. 2016, Chp. 186, Sec. 2, Subd. 03q	\$334,000
Conserving Minnesota's Forest Birds of Management Concern	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 03g	\$500,000
Mapping Avian Movement in Minnesota	M.L. 2018, Chp. 214, Art. 4, Sec. 2, Subd. 03h	\$200,000

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Alexis Grinde, Wildlife Ecologist		Principal investigator; Project management and coordination.			26.7%	0.5		\$62,556
Research Associate (P&A)		Project management and data acquisition for carbon, vegetation, tree replacement, and hydrology portions of the project.			26.7%	4		\$242,100
Research Scientists (CS)		Project management, data acquisition and analysis for wildlife portion of the project.			24.1%	0.75		\$54,051
Graduate student 1 (tree and carbon stocks)		Graduate research associate position for tree replacement and carbon stocks portion of the project. 3 years (salary, fringe, and tuition reimbursement).			46.1%	1.5		\$141,786
Graduate student 2 (wildlife)		Graduate research associate position for wildlife portion of the project. 2 years (salary, fringe, and tuition reimbursement).			46.1%	0.75		\$74,746
Undergraduate students- field technicians		Assist with data collection. Three summer work study students (3 each for 2 years).			0%	1.36		\$27,705
							Sub Total	\$602,944
Contracts and Services								
USDA Forest Service- Northern Research Station	Sub award	Primarily responsible for maintaining Phase I sites and replacement tree evaluation activities in Phase I and II sites. These are costs incurred by the USFS when work is being conducted by USFS personnel (in kind) and by UMN staff who will be housed at the USFS research station.				0		\$35,000
							Sub Total	\$35,000
Equipment, Tools, and Supplies								
	Tools and Supplies	Vegetation and and carbon measurements and analysis including Hagloff height/distance	This equipment is needed for field measurements and monitoring.					\$21,221

		equipment (\$600), tree calipers (\$300), volumetric soil samplers (\$997), supplies for sampling frames and litter collection (\$740), soil temperature sensors (\$1,365), wildlife survey equipment (\$6,077) and C and N measurements (\$11,142).						
	Tools and Supplies	Replacement water table sensors (25 total - \$10,000, \$400/each) at experimental study (Phase 1)	Used to monitor changes in hydrology in research sites.					\$10,000
	Tools and Supplies	1500 commercial seedlings, 500 larger tree stock, browse control tubes and supplies for competition control.	Trees and supplies for underplantings to assess potential black ash replacements.					\$9,600
							Sub Total	\$40,821
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Mileage (75%) and lodging (25%) for frequent travel to experimental sites from Phase 1 and among 30 monitoring sites from Phase 2 per UMN travel policy (3% inflation rate). \$4000 per year (Lodging + per diem= 12 nights @ \$110.00 / night = \$1320; Mileage 4785 miles @ .56/ mile (U of M rate) = \$2680) * 5 years of surveys.	Travel costs associated with field work.					\$21,235
							Sub Total	\$21,235
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-

Other Expenses								
							Sub Total	-
							Grand Total	\$700,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
In-Kind	University of Vermont	The in-kind support will be provided by the University of Vermont for Anthony D'Amato's in-kind salary + fringe for each year of the project (0.10 FTE). See attached letter.	Secured	\$68,600
In-Kind	USDA Forest Service-Northern Research Station	The FS-NRS will continue its 10+ years of support for this research by providing in-kind support for effort by Palik and technician, in-kind use of Forest Service ATV and trailer and office and laboratory space throughout the project. In addition, existing black ash EAB adaption experiments on the Chippewa National Forest will again be available for the project.	Secured	-
In-Kind	UMN unrecovered indirect costs are calculated at the UMN negotiated rate for research of 55% modified total direct costs.	Indirect costs are those costs incurred for common or joint objectives that cannot be readily identified with a specific sponsored program or institutional activity. Examples include utilities, building maintenance, clerical salaries, and general supplies. (https://research.umn.edu/units/oca/fa-costs/direct-indirect-costs)	Secured	\$338,847
In-Kind	USDA Forest Service- Pacific Northwest Research Station	The in-kind support will be provided by the USDA Forest Service- Pacific Northwest Research Station for Rob Slesak's in-kind salary + fringe for each year of the project (0.10 FTE) plus travel costs for his travel to meetings and site visits. See attached letter.	Secured	\$79,000
			Non State Sub Total	\$486,447
			Funds Total	\$486,447

Attachments

Required Attachments

Visual Component

File: [0736ed07-08f.pdf](#)

Alternate Text for Visual Component

Text reads: "Problem: Black ash wetlands are critically threatened by EAB, which causes complete mortality of black ash following infestation."

Text reads: "Project Outcomes: Utilize ongoing experiments to mitigate impending EAB impacts on the 1 million acres of black ash wetlands in Minnesota."

Picture shows green insect (Emerald Ash Borer) and map of black ash abundance in Minnesota.

Text reads: "Activity 1. Utilize network of existing sites established in Phase 1 and Phase 2 to determine I..."

Optional Attachments

Support Letter or Other

Title	File
D'Amato In-kind Letter	801e458b-e3c.doc
Slesak In-kind Letter	9ffd04bb-f25.pdf
Background Check Certification Form	e898f2c9-a68.pdf

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

We updated the years and altered the budget from the original \$774,000 to the recommended funding of \$700,000.

We added additional milestones to Activity 1 and 2.

We added language associated with ENTRF acknowledgement in the dissemination section.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

N/A

Do you agree travel expenses must follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I agree to the UMN Policy.

Does your project have potential for royalties, copyrights, patents, or sale of products and assets?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

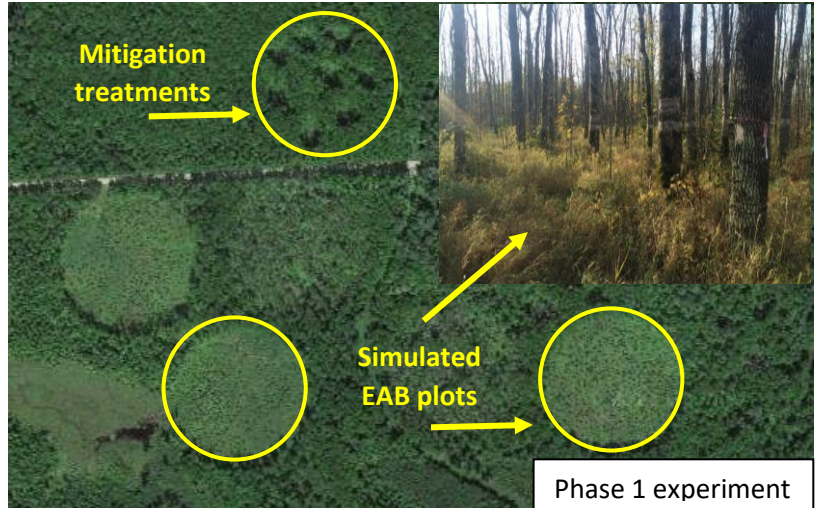
No

EAB and black ash: maintaining forests and benefits

Objective: provide practical information on what actions to take to mitigate impacts of EAB in black ash wetlands and identify areas where management efforts will be most effective to maintain wetland forests and their benefits

Activity 1: Utilize Phase 1 and 2 plots to determine long term impacts on:

- Hydrology / water quality
- Vegetation / biodiversity
- Wildlife habitat and species
- Carbon storage and dynamics



Swamp white oak



Northern white cedar

Activity 2: identify optimal replacement tree species to diversify black ash forests

Identify practices to increase survival and growth needed for successful conversion:

- Competition / browse control
- Seedling stock size / condition
- Planting site location / modification

Activity 3: identify site conditions and locations where mitigation efforts will be most effective (prioritization)

- Sites with greatest potential for diversification success
- Conditions where ecological impacts are greatest
- Locations which can be feasibly managed and treated

