

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 111-D

Project Title:

Biological Control of European Buckthorn and Garlic Mustard

LCCMR 2010 Funding Priority:

D. Invasive Species

Total Project Budget: \$ \$300,000

Proposed Project Time Period for the Funding Requested: 3 years, 2010 - 2013

Other Non-State Funds: \$ \$40,000

Summary:

This project continues the development and implementation of biological control for European buckthorn and garlic mustard. This includes screening of buckthorn insects and introduction and assessment of garlic mustard insects.

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Sponsoring Organization: DNR

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Location:

Region: Statewide

County Name: Statewide

City / Township:

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

MAIN PROPOSAL

PROJECT TITLE: Biological Control of European Buckthorn and Garlic Mustard

I. PROJECT STATEMENT

European buckthorn and garlic mustard are non-native invasive plant species that are severely threatening native plant communities and degrading habitat for wildlife in forests and riparian zones. The Minnesota Departments of Natural Resources and Agriculture, and other entities involved in invasive species management, consider buckthorn and garlic mustard the plant species of highest priority for development of long-term management solutions, such as biological control. Successful bio-control is now being achieved on two previous high priority species, purple loosestrife and leafy spurge, due in part, to past LCMR recommended funding.

Buckthorn and garlic mustard biological control efforts are currently ongoing and funded in part by the LCCMR (2003, 2005, 2007). This research is crucial in 1) determining if there are suitable insects that can be used to reduce impacts caused by buckthorn and garlic mustard and 2) implement introduction of insects to control garlic mustard and assess their establishment and success.

Buckthorn research is focused on testing previously selected high priority insects for their potential as biological control agents. One of the main objectives is to make sure the insects would be safe (only eat and develop on European buckthorn) to introduce into Minnesota. The next three years are key to knowing the future of buckthorn biological control.

Garlic mustard biological agents are close to being approved for release in the United States. The Federal Technical Advisory Group (TAG) recently reviewed a petition to release control agent into the U.S. and suggested that a few additional plant species be tested before approval will be recommended. This work will be completed in 2009 and anticipated release of first of garlic mustard biological control agents in 2010. The focus of our work will be to develop rearing methods for biological control insects to accelerate introductions in the field and to introduce and evaluate the first garlic mustard biological control agents in the field.

Result 1: Investigate potential insects as biological control of European Buckthorn.

Budget: \$150,000

Researchers will continue to collect potential control agents of European buckthorn in its native range (in Europe). High priority insects species will be studied for their potential to control buckthorn and be host specific (eat only European buckthorn).

Deliverable

1. Field collection and host specificity testing of agents in 2010
2. Annual report summarizing results for 2010
3. Field collection and host specificity testing of agents in 2011
4. Annual report summarizing results for 2011
5. Field collection and host specificity testing of agents in 2012
6. Final report with findings and recommendations

Completion Date

9/30/10
2/28/11
9/30/11
2/28/12
9/30/12
6/30/13

Result 2. Introduce and evaluate Garlic Mustard biological control agents in Minnesota

Budget: \$150,000

Research activities will include selection of potential release sites, collection of pre-release plant community data, development of rearing methods for control agents, introduction of control agents and initial evaluation of establishment of agents.

Deliverable	Completion Date
1. Introduction of first biological control agent	2/28/11
2. Monitor release sites; implement rearing	9/30/11
3. Insect rearing protocol completed	2/28/12
4. Monitor release sites; implement rearing	9/30/12
5. Final report with findings and recommendations	6/30/13

III. PROJECT STRATEGY

A. Project Team/Partners

Dr. Andre Gassmann, Center for Applied Bioscience International (CABI), Delemont, Switzerland will be under contract to continue the ongoing buckthorn research. CABI has been working on buckthorn biological control since 2001. CABI is responsible for research on purple loosestrife bio-control agents and many leafy spurge bio-control agents that are currently used in the U. S. and Canada.

Drs. David Ragsdale, Roger Becker and Elizabeth Stamm Katovich, University of Minnesota, will carry out garlic mustard biological control research under contract. Drs. Becker and Ragsdale will spend 10% of their time on this project. Dr. Katovich will spend 60% of her time on garlic mustard.

Monika Chandler, MN Department of Agriculture, will work closely with DNR staff to rear biological control agents and implement evaluations of garlic mustard biological control in the field. Ms. Chandler will spend ~5% of her time (in-kind) on this project.

B. Timeline Requirements

This project is proposed for three years. Biological control development and implementation can take years to complete. Providing funding over several year-period for projects such as this allow researchers to work collect and grow the plants needed to test the insects. This process can take several years and consistent funding is required complete the work.

C. Long-Term Strategy

Development and implementation of biological control for buckthorn could take up to ten years complete. The research on the development of garlic mustard biological is at the point of implementation. Several insects for garlic mustard control are near completion of host specificity testing and one or more species are expected to be approved for introduction in the United States in 2009-2010. The focus is on rearing and assessing new introductions of garlic mustard biological control agents. Our time will be spent over the next 5-7 years evaluating the success of the insects introduced. The buckthorn research is focusing on the development of biological control agents including research to determine whether there are suitable bio-control agents, whether further research into these potential agents is warranted, and make recommendations for future work. If potential buckthorn control agents are found, further research would be needed to continue screening the insects to ensure they are host specific and won't feed on other plants. Both European buckthorn and garlic mustard biological control efforts will follow research processes similar to those used for highly successful purple loosestrife and leafy spurge programs that have been funded through the LCMR process.

Project Budget

Biological Control of European Buckthorn and Garlic Mustard

IV. TOTAL PROJECT REQUEST BUDGET (3 years)

BUDGET ITEM <i>(See list of Eligible & Non-Eligible Costs, p. 13)</i>	AMOUNT
Contracts:	
Result 1: Contract with the CABI Bioscience to continue to carryout develop ment of buckthorn biological control research. This include all field collections and host specificity testing of potential control agents	\$ 150,000
Result 2: Contract with the University of Minnesota to carry out effort to introduce and evaluate Garlic Mustard biological control agents in Minnesota. This include the development of rearing guidelines for potential control agents	\$ 150,000
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$ 300,000

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period: USDA - Forest Service has provided additional funding for garlic mustard biological control for the past 5 years. We anticipate that they will continue to help fund the work	\$ 40,000	<i>Pending</i>
Other State \$ Being Applied to Project During Project Period: For the buckthorn biological control result, we anticipate using some of the General fund invasive species appropriation to supplement this project request, pending on 2009 legislature.	\$ 40,000	<i>Pending</i>
Remaining \$ from Current Trust Fund Appropriation (if applicable): M.L. 2007, Chap. 30, Sec.2 Subd. 4(i). Biological Control of European Buckthorn and Garlic Mustard. This appropriation is available until June 30, 2010	\$ 300,000	<i>Partially spent and the rest Obligated</i>
Funding History: <u>Buckthorn related spending:</u> The DNR spent \$20,000 in 2001 to initiate research on buckthorn bio-control. The DNR received \$125,000 from the U.S. EPA (2001-2005) to continue the buckthorn research. LCMR funding \$109,000 (2003) and \$110,000 (2005) recommended funding along with an additional \$30,000 from the United States Fish and Wildlife Service (through Minnesota Department of Natural resources) is being used to continue this research. The Department of Natural Resources contributed an additional \$30,000 in 2007. <u>Garlic mustard related spending:</u> The DNR spent \$25,000 in 1999 supporting garlic mustard biological control research. Between 2002 and 2008, the DNR received \$265,000 from the U.S.D.A.-Forest Service to continue host specificity testing of garlic mustard agents. LCCMR funded \$90,000 (2005) for garlic mustard research.	\$ 774,000	Spent

LUKE C. SKINNER

CURRENT EMPLOYMENT (1990-present)

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St. Paul, MN 55155-4025

EDUCATION

Ph.D. Entomology (2004) University of Minnesota
Bachelor of Science Degree (1987) University of Minnesota

FUNDED PROPOSALS

2005-2010 Legislative-Citizen Commission on Minnesota Resources- Research on Biological Control of European Buckthorn and Garlic Mustard, \$500,000 (2005 and 2007 appropriations)
2002-2009 USDA-Forest Service- Biological Control of Garlic Mustard, \$265,000
2003-2005 Legislative Commission on Minnesota Resources- Research on Biological Control of European Buckthorn, \$109,000
2003-2005 U.S. EPA-GLNPO- Research on Biological Control of Buckthorn, \$50,000
2002-2003 U.S. EPA-GLNPO- Research on Biological Control of Buckthorn, \$75,000
1997-2003 Legislative Commission on Minnesota Resources- Research on Biological control of Eurasian Watermilfoil and Purple Loosestrife, \$315,000 (3 bienniums)
1996-2001 USFWS FED-AID and NAWCA- Nationwide Rearing and Distribution of Insects for Biological Control of Purple Loosestrife, \$645,000
1993-1997 Legislative Commission on Minnesota Resources- Research on Biological Control of Purple Loosestrife, \$300,000 (2 bienniums)

SELECTED JOURNAL PUBLICATIONS AND TECHNICAL REPORTS

Gerber, E., G. Cortat, H.L. Hinz, B. Blossey, E. Katovich and **L. Skinner**. 2009. Biology and host specificity of *Ceutorhynchus scrobicollis* (Curculionidae; Coleoptera), a root-crown mining weevil proposed as biological control agents against *Alliaria petiolata* in North America. *Biocontrol Science and Technology*. 19:2 pp. 117-138.

Skinner, L.C., D.W. Ragsdale, R.W. Hansen, M.A. Chandler, and G. Spoden. 2006. Phenology of first and peak emergence of *Aphthona lacertosa* and *A. nigriscutis*: Two leaf beetles introduced for biological control of leafy spurge, *Euphorbia esula* L. *Biological Control*, 37: 382-391.

Bourchier, R., R. Hansen, R. Lym, A. Norton, D. Olson, C. Bell Randall, M. Schwarzlaender and **L. Skinner**. 2006. Biology and Biological Control of Leafy Spurge. United States Department of Agriculture-Forest Service, Forest Health Technology Enterprise Team, WV, 125 pages.

Skinner, L.C. and D.W. Ragsdale. 2005. Future needs in developing biological control for buckthorn. 2005. In L.C. Skinner (ed), Proceedings: Symposium on the Biology, Ecology and Management of Garlic Mustard (*Alliaria petiolata*) and European Buckthorn (*Rhamnus cathartica*) 17-18 May 2005, University of Minnesota, St. Paul, Minnesota, USA. Pp. 62-63.

Katovich, E., R.L. Becker, D.W. Ragsdale and **L.C. Skinner**. 2005. Host range testing of garlic mustard (*Alliaria petiolata*) biocontrol insects in Minnesota. In L.C. Skinner (ed), Proceedings: Symposium on the Biology, Ecology and Management of Garlic Mustard (*Alliaria petiolata*) and European Buckthorn (*Rhamnus cathartica*) 17-18 May 2005, University of Minnesota, St. Paul, Minnesota, USA. Pp. 17-18.

Skinner, L. and W.J. Rendall. 2001. New study assesses potential for biocontrol of buckthorn. *Ecological Restoration* 19:4 pp. 263-264.

LCCMR Project Manager Responsibilities: Write contracts with the researchers to carry out objectives, oversee researchers to ensure objectives are met, write LCCMR status reports and present results to LCCMR.

