

**2010 Environmental and Natural Resources Trust Fund ENRTF
Work Program**

Date of Report: November 24, 2009
Date of Next Status Report:
Date of Work program Approval:
Project Completion Date: June 30, 2013

I. PROJECT TITLE: Biological Control of European Buckthorn and Garlic Mustard

Project Manager: Luke Skinner
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Location: State, county, and federal parks, forests, nature preserves and wildlife management areas; roadsides private woodlots and agricultural lands statewide.

Total ENRTF Project Budget:	ENRTF Appropriation:	\$	300,000
	Minus Amount Spent:	\$	0
	Equal Balance:	\$	300,000

Legal Citation: M.L. 2010, Chp. 362, Sec. 362, Subd. 6a

Appropriation Language:

\$300,000 is from the trust fund to the commissioner of natural resources in cooperation with the commissioner of agriculture to continue the development and implementation of biological control for European buckthorn and garlic mustard. This appropriation 14.2 is available until June 30, 2013, by which time the project must be completed and final products delivered.

II. PROJECT SUMMARY AND RESULTS:

Buckthorn and garlic mustard are invasive species of highest priority for development of long-term management solutions, such as biological control. This research will help determine 1) if there are suitable insects that can be used to reduce impacts caused by buckthorn and 2) implement introduction of insects to control garlic mustard and assess their establishment and success.

Buckthorn. Researchers from the CABI Europe- Switzerland will continue to locate, identify and collect potential natural enemies of *Rhamnus cathartica* and *Frangula alnus* of *Rhamnus* spp in Europe. Host specificity studies (make sure the insects will not eat plants native to MN and the U.S.) will continue on the high priority insect species. Insects will be prioritized based on their perceived potential to cause damage to buckthorn by impairing growth and/or reproduction,

reduce vigor, or cause structural damage. Expected results include a priority list of potential control agents with information of their host specificity to native buckthorn species and other plants as determined. This information will guide future research and eliminate candidate insects that are not good potential agents.

Garlic mustard. The focus of this our work will include 1) development rearing methods for garlic mustard biological control insects to accelerate introductions in the field, 2) introduce control agents to selected field sites in Minnesota, and 3) evaluate the establishment of the first garlic mustard biological control agents in the field.

III. PROGRESS SUMMARY AS OF (date):

Update (02/28/08):

Update (08/30/08):

Update (02/28/09):

Update (08/30/09):

Update (02/28/10):

IV. OUTLINE OF PROJECT RESULTS:

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

Description: Researchers from the CABI Europe-Switzerland will continue to locate, identify and collect potential natural enemies of *Rhamnus cathartica* and *Frangula alnus* of *Rhamnus* spp in Europe. Host specificity studies (make sure the insects will not eat plants native to MN and the U.S.) will continue on the high priority insect species. Insects will be prioritized based on their perceived potential to cause damage to buckthorn by impairing growth and/or reproduction, reduce vigor, or cause structural damage. These factors can potentially lead to buckthorn mortality. Expected results include a priority list of potential control agents with information on their host specificity to native buckthorn species and other plants as determined. This information will guide future research and eliminate candidate insects that are not good potential agents. Testing is done in Europe due to availability if insects and reduce risk of importing any species prior to release. Most species are collected from the wild as cuttings or as seed. Precautions are taken to ensure no soil or other plant parts are shipped with the test plants. The plants are then grown by the researcher in Switzerland and used in testing the insects. Testing procedures are determined once the insects have been identified.

Summary Budget Information for Result/Activity 1:

ENRTF Budget	\$150,000
Amount Spent	\$0
Balance	\$0

Deliverable/Outcome	Completion Date	Budget
Field collection and host specificity testing of agents in 2010 and annual report summarizing results for 2010	2/28/11	\$30,000
Field collection and host specificity testing of agents in 2011	9/30/11	\$30,000
Annual report summarizing results for 2011	2/28/12	\$30,000
Field collection and host specificity testing of agents in 2012	9/30/12	\$30,000
Final report with findings and recommendations	6/30/13	\$30,000

Completion Date: 6/30/13

Result Status as of (02/28/11):

Result Status as of (9/30/11)

Result Status as of (2/28/12)

Result Status as of (9/30/12)

Result Status as of (6/30/13)

Final Report Summary:

Result/Activity 2: Introduction and evaluation of Garlic Mustard biological control agents in MN

Description: 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. In anticipation of biological control agents becoming available for garlic mustard, 12 field sites have been selected in different habitat types to implement a biological control program in Minnesota. At these chosen sites, we will continue to collect data on the abundance of both garlic mustard and native plants prior to release, to establish a baseline for assessing the long-term impact of introduced biological control insects. Work will also take place to develop rearing methods for control agents. Once biological control insects are introduced, we will evaluate insect establishment and plant community response to the biological control.

Summary Budget Information for Result/Activity 2:

ENRTF Budget	\$150,000
Amount Spent	\$
Balance	\$0

Deliverable/Outcome	Completion Date	Budget
Introduction of first biological control agent	2/28/11	\$20,000
Monitor release sites; implement rearing	9/30/11	\$40,000
Insect rearing protocol completed	2/28/12	\$30,000
Monitor release sites; implement rearing	9/30/12	\$40,000
Final report with findings and recommendations	6/30/13	\$20,000

Completion Date: 6/30/13

Result Status as of (02/28/11):

Result Status as of (9/30/11)

Result Status as of (2/28/12)

Result Status as of (9/30/12)

Result Status as of (6/30/13)

Final Report Summary:

V. TOTAL TRUST FUND PROJECT BUDGET:

Contract Services: \$300,000 (CABI for buckthorn research; and Univ. of MN for garlic mustard implementation)

TOTAL ENRTF PROJECT BUDGET: \$300,000

VI. PROJECT STRATEGY:

A. Project Partners:

Dr. Andre Gassmann, CABI Europe-Switzerland, Delemont, Switzerland will be under contract to continue the ongoing buckthorn research (\$150,000). 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 carryout garlic mustard biological control research under contract (\$150,000). This amount may change based on future role of Minnesota Department of Agriculture; see below). Drs. Becker and Ragsdale will spend 5% and 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. Project Impact and Long-term Strategy:

Development and implementation of biological control for buckthorn could take up to ten years. This research will 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 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. 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 2010. Our time will be spent over the next 5-7 years evaluating the success of the insects introduced. 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 LCCMR process.

C. Other Funds Proposed to be Spent during the Project Period:

An estimated \$3,500 in-kind directly related to this project (e.g. general fund-supported project manager staff time) is expected to be contributed to this project (but not tracked for reporting purposes). Approximately \$42,000 in Department Operations and Division

Support charges accruing to this project will be covered by Division general funds or other eligible Division funds (see Attachment B.)

Buckthorn related spending: The Department of Natural resources will contribute approximately \$30,000 in additional funding towards this project.

D. Past Spending:

Buckthorn related spending: 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.

Garlic mustard related spending: 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) and 135,000 (2007) for garlic mustard research.

VII. DISSEMINATION: It is expected that the results of this project will be published in peer-reviewed scientific journals and also in special publications and newsletters. Results also will be presented at national, regional and state scientific meetings to peers in the field, as well as to resource managers and planners who will use the results of this project.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than February 2011, September 2011, February 2012 and September 2012. A final work program report and associated products will be submitted by June 30, 2013.

Attachment A: Budget Detail for 2010 Projects								
Project Title: Biological Control of European Buckthorn and Garlic Mustard (111-D)								
Project Manager Name: Luke Skinner								
Trust Fund Appropriation: \$ 300,000								
1) See list of non-eligible expenses, do not include any of these items in your budget sheet								
2) Remove any budget item lines not applicable								
2010 Trust Fund Budget	Result 1 Budget:	Amount Spent <i>02/28/11</i>	Balance <i>02/28/11</i>	Result 2 Budget:	Amount Spent <i>02/28/11</i>	Balance <i>02/28/11</i>	TOTAL BUDGET	TOTAL BALANCE
	Buckthorn biological control-Europe			Garlic Mustard biological control				
BUDGET ITEM								
Contracts	\$ 150,000	\$ -	\$ 150,000	\$ 150,000	\$ -	\$ 150,000	\$ 300,000	\$ 300,000
Professional/technical (with whom?, for what?)	CABI-Europe-Switzerland : research in Europe			Univ of MN: Research in MN				
COLUMN TOTAL	\$150,000	\$0	\$150,000	\$150,000	\$0	\$150,000	\$ 300,000	\$ 300,000