



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2018 ENRTF Work Plan (Main Document)

Today's Date: 02/27/2018

Date of Next Status Update Report: 1/31/2019

Date of Work Plan Approval:

Project Completion Date: 06/30/2021

Does this submission include an amendment request? No

PROJECT TITLE: Restoring Wetland Invertebrates to Revive Wildlife Habitat

Project Manager: Dr. Danelle Larson

Organization: Minnesota Department of Natural Resources

College/Department/Division: Fish and Wildlife Division

Mailing Address: 102 23rd St NE

City/State/Zip Code: Bemidji, MN 56601

Telephone Number: 218-308-2289

Email Address: Danelle.Larson@state.mn.us

Web Address: NA

Location: Statewide

Total Project Budget: \$400,000

Amount Spent: \$0

Balance: \$400,000

Legal Citation: M.L. 2018, Chp. xx, Sec. xx, Subd. Xx *Staff will update the legal citation upon work plan approval*

Appropriation Language: *Staff will update the legal citation upon work plan approval*

I. PROJECT STATEMENT:

Amphipods are wetland invertebrates that are key food resources for salamanders, fish, water birds, ducks, and geese. Within the past 30 years, amphipods have substantially declined across the Prairie Pothole Region (PPR), and particularly in Minnesota, for reasons unknown. We will document the habitat characteristics that allow amphipods to thrive and assess the stocking of amphipods to help them successfully re-establish.

Amphipods (also called “scuds”) are critical wildlife food, biological indicators of water quality and ecosystem health, and cherished by duck hunters and anglers. Amphipod decline has been noted in Minnesota, and the loss of amphipods have been blamed as a primary reason for decline of duck harvests. Today, amphipods are unevenly distributed across the PPR and some species are absent from most of Minnesota’s wetlands, while few wetlands have an extremely high abundance (habitats we term “**super-wetlands**”). Amphipods are poor dispersers because they cannot fly, and the increasing distance between super-wetlands may make it difficult to establish in new wetlands. Despite the importance of amphipods, the factors that affect their distribution and abundance are poorly understood. Further, conservation groups and private land owners have been stocking amphipods to improve wetland habitats for 25+ years but the success of these efforts have not been well documented.

The overarching goals of this project are to:

- (1) Identify the habitat characteristics of super-wetlands that make them of great wildlife value. This information will outline why amphipods are in decline, why specific wetlands have naturally high abundance of amphipods, and determine how to restore and manage wetlands towards high-quality habitats that promote amphipod and duck use.
- (2) Document the effects of amphipod stocking to improve understanding of the habitat requirements and the utility of stocking. Experimental stockings will enable some control over factors that might influence success (e.g., size of wetland, fish presence) and further aid in understanding the habitat requirements.

Our diverse project team, which will include expert ecologists, two graduate students and many young-career technicians, will provide valuable information regarding wetland habitat quality and management. We have identified several super-wetlands to study and secured a proprietor to stock amphipods, and are requesting funds to study these sites and stocking practices in more detail.

II. OVERALL PROJECT STATUS UPDATES:

First Update January 31, 2019
Second Update June 30, 2019
Third Update January 31, 2020
Fourth Update June 30, 2020
Fifth Update January 31, 2021
Final Update June 30, 2021

III. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Understand the habitat conditions of super-wetlands with amphipods.

Description: We will identify the factors that affect amphipod abundance to understand why wetlands either have high abundance or no to few amphipods present. Factors will include: Landscape variables (e.g., land use, proximity to other wetlands, etc.) and in-lake variables (e.g., water chemistry, plant abundance, predator abundance).

ENRTF BUDGET: \$206,487

Outcome	Completion Date
1. Choose sites and refine field methods	March 2019
2. Wetland habitat and amphipod sampling	October 2020
3. Data processing in laboratory (water chemistry, plant and invertebrate identification)	March 2021
4. Publications, reports, and presentations	June 2021

First Update January 31, 2019

Second Update June 30, 2019

Third Update January 31, 2020

Fourth Update June 30, 2020

Fifth Update January 31, 2021

Final Update June 30, 2021

ACTIVITY 2: Assess amphipods after stocking in natural and restored wetlands.

Description: We will experimentally stock amphipods in wetlands to determine if they will survive the transplant, reproduce, and become a sustaining population for at least 2 years. We will stock amphipods in two different years (“Trial stockings #1” in January 2018 and “Trial stockings #2” in January 2019) and sample for 2-3 years following the stockings. We will assess rates that amphipods naturally recolonize and reproduce in suitable wetlands relative to stocked wetlands.

ENRTF BUDGET: \$193,513

Outcome	Completion Date
1. Trial stockings #1 (in-kind MNDNR project secured FY 17-18)	February 2019
2. Trial stockings #2 (this proposal)	February 2020
3. Monitor amphipods populations for 2-3 years after stocking	January 2021
4. Data analyses	April 2021
5. Publications, reports, and presentations	June 2021

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Final Update June 30, 2021

IV. DISSEMINATION:

Description:

Danelle Larson will be responsible for data management throughout the project. The water samples will be stored at the Bemidji Wetland Research Station and not discarded until all data is published. Amphipod specimens will be preserved in 95% ethanol and permanently maintained at the Bemidji Wetland Research Station. The data will be permanently archived online using a service such as Dryad.

The Project Research Addendum will be added and updated 2x per year on Danelle Larson’s profile at Research Gate (www.researchgate.net). All presentations and publications will be added to Research Gate when completed.

We will prepare at least 3 peer-reviewed publications in scientific journals with open-access (i.e., freely available to the public).

We will deliver at least 3 poster or oral presentations at professional conferences and MN DNR research and wildlife manager meetings.

- First Update January 31, 2019**
- Second Update June 30, 2019**
- Third Update January 31, 2020**
- Fourth Update June 30, 2020**
- Fifth Update January 31, 2021**
- Final Update June 30, 2021**

V. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview: See attached budget spreadsheet

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Explanation of Use of Classified Staff: N/A

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

Enter Total Estimated Personnel Hours:	TOTAL FTE: 3.25
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Total Number of Full-time Equivalent (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

Enter Total Estimated Personnel Hours:	TOTAL FTE: 3.00
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B. Other Funds:

SOURCE OF AND USE OF OTHER FUNDS	Amount Proposed	Amount Spent	Status and Timeframe
Other Non-State \$ To Be Applied To Project During Project Period:			
N/A	\$	\$	
Other State \$ To Be Applied To Project During Project Period:			
MN DNR Research Section funds for pilot work on Activities 1 and 2. Pilot work included site selection, field methodology trials in summer 2017 and trialing stocking experiments in winter 2018 and 2019.	\$ 90,000	\$	Secured. June 2017 – June 2019.

Past and Current ENRTF Appropriation:			
N/A	\$	\$	
In-kind Services To Be Applied To Project During Project Period:			
MN DNR supplies computers, software, GPS, field tablets (\$5,000), as well as laboratory facilities, microscopes, trucks, boats and trailers (\$60,000). MN DNR supplies 3 years of salary for: 2 assistant managers for field assistance (50 hours*3 years=\$9,000); Danelle Larson (0.35 FTE*3 years=\$82,000); and Fred Bengtson (0.10 FTE*3 years=\$25,000). Bemidji State University supplies office space for students and the facilities and equipment for analytical chemistry (\$60,000) and Issacson's salary (0.15 FTE*3 years; \$27,000). U.S. Geological survey to match Michael Anteau salary (0.10 FTE; \$32,700) and travel to visit field sites and disseminate findings (\$6,000).	\$ 306,700	\$	Secured. June 2017 – June 2021.

VI. PROJECT PARTNERS:

A. Partners receiving ENRTF funding

Name	Title	Affiliation	Role
Dr. Carl Isaacson	Assistant Professor	Bemidji State University	Co-advise students and lead water chemistry analyses.
Barry Thoele	Owner	Lincoln Bait LCC	Will provide consulting, sell and stock amphipods (Activity 2).
Dr. Michael Anteau	Research Scientist	U.S. Geological Survey	Will help design studies, serve on graduate committees, disseminate findings

B. Partners NOT receiving ENRTF funding

Name	Title	Affiliation	Role
Fred Bengtson	Wildlife Manager	MN Dept of Natural Resources	Will assist sampling and stocking and disseminate findings
Dr. Danelle Larson	Research Scientist	MN Dept of Natural Resources	Will be the Project Manager, co-advise graduate students, supervise technicians and interns, disseminate findings.

VII. LONG-TERM- IMPLEMENTATION AND FUNDING: Studying super-wetlands in detail will provide new knowledge about the characteristics of wetlands that support key invertebrates as wildlife food. The stocking survey and experiments will bring awareness and engage citizen scientists to the issue of wetland degradation and restoration options. Our analyses will provide cost-benefit comparisons of wetland enhancement and amphipod stocking for interest groups such as Ducks Unlimited, MN Waterfowl Association, Audubon Society, the many Fishing and Angling groups, and MN DNR.

VIII. REPORTING REQUIREMENTS:

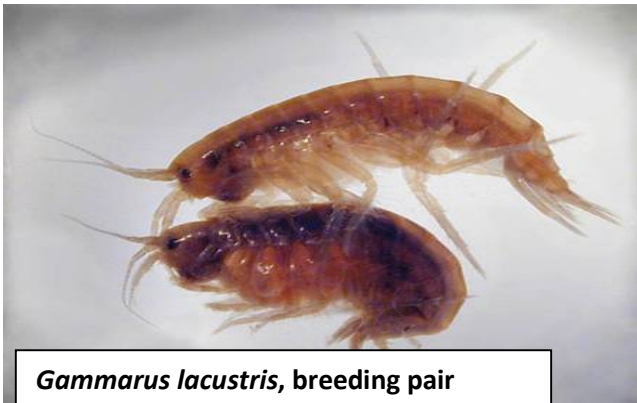
- **The project is for 3 years, will begin on July 1 2018, and end on June 30 2021.**
- **Periodic project status update reports will be submitted January 31 and June 30 of each year.**
- **A final report and associated products will be submitted between June 30 and August 15, 2021.**

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

- A. Budget Spreadsheet - separate document**
- B. Visual Component - attached**
- C. Research Addendum – separate document**

Amphipods are vanishing from Prairie Pothole wetlands but ducks and salamanders are hungry!

Which habitat characteristics support amphipods in Minnesota's wetlands?



Gammarus lacustris, breeding pair



What is the efficacy of stocking amphipods?



Gammarus Lacustris, freshwater shrimp, scuds for wetland restoration, forage or bait. We are the first and only source for Gammarus in MN with over 25 years harvesting, handling and stocking. Contact Barry Thoele 218-296-0446 p-13



**Attachment A:
Environment and Natural Resources Trust Fund
M.L. 2018 Budget Spreadsheet**



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Legal Citation:

Project Manager: Dr. Danelle Larson

Organization: Minnesota Department of Natural Resources

College/Department/Division: Division of Fish and Wildlife

M.L. 2018 ENRTF Appropriation: \$400,000

Project Length and Completion Date: 3 years, June 30, 2021

Date of Report: February 27, 2018

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits) - Overall	\$201,620	\$0	\$201,620
MN DNR Intern. 0.25% FTE. Summer 2018 and 2019. \$15.00/hr and 0.0765% FICA. Two people in position type. Summer field workers to collect data with graduate students. (Total estimated amount \$17,920)			
Carl Isaacson, Bemidji State University. 0.15% FTE. Summer 2018-2020. Co-advise two graduate students, provide office and laboratory space, and run analytical chemistry. (Total estimated amount \$27,000)			
Michael Anteau, U.S. Geological Survey. 0.10% FTE. Summer 2018-2020. Scud expert to help design study, mentor two graduate students, and disseminate findings. (Total estimated amount \$32,700)			
Hire 2 graduate students through Bemidji State U. Environmental Studies Master's of Science Program. \$62,000 per student, which includes tuition, benefits, and salary for 2 years. (Total estimated amount \$124,000)			
Professional/Technical/Service Contracts	\$87,240	\$0	\$87,240
Contract with Lincoln Bait to provide technical consultation regarding Activity 1 and 2. Lincoln Bait will provide ~400 gallons of scuds at a rate of \$60/gallon. Only provider in Minnesota. (Total estimated amount \$29,000)			
Interagency Agreement to Hire 4 Bemidji State University undergraduates to assist with field work and invertebrate counting. BSU has many trained students for invertebrates, and MNDNR has the facilities, microscopes, and invertebrate expertise for supervision. (\$29,120 each of 2 years - Total estimated amount \$58,240)			
Equipment/Tools/Supplies			
Activity 1 and 2: waders, temperature, oxygen, and pH meters and solutions; sampling bottles and nets; reagents for water chemistry	\$45,174	\$0	\$45,174
Travel expenses in Minnesota	\$48,966	\$0	\$48,966
Conferences to present per two activities (\$1333/conference)			
Fleet FY18-20 (25,000 miles @ 0.78/mi; includes loaner and fuel expenses) (Total estimated amount \$19,500)			
Hotels and meal expenses FY18-20 (all personnel) (Total estimated amount \$26,800)			
Other			
Publications in peer-reviewed, open-access journals (4 pubs @ \$2,000 each)	\$8,000	\$0	\$8,000
DNR Direct and Necessary	\$9,000	\$0	\$9,000
COLUMN TOTAL	\$400,000	\$0	\$400,000