

**Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 162-D

Ticks! A Rising Threat in Minnesota

Category: D. Aquatic and Terrestrial Invasive Species

Sub-Category:

Total Project Budget: \$ 300,000

Proposed Project Time Period for the Funding Requested: June 30, 2023 (3 yrs)

Summary:

The Asian longhorned tick will bring disease and economic costs impacting wildlife, livestock, pets, and people. We will build a collaborative surveillance network to detect and limit its spread.

Name: Jonathan Oliver

Sponsoring Organization: U of MN

Job Title: Assistant Professor

Department: Environmental Health Sciences

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Minneapolis MN 55455

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Location:

Region: Metro

County Name: Hennepin

City / Township: Minneapolis

Alternate Text for Visual:

The image shows a graphic of the Asian longhorned tick, some of its wild host animals, and the state of Minnesota.

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



PROJECT TITLE: Ticks! A Rising Threat in Minnesota

I. PROJECT STATEMENT

Introductions of invasive species are increasing, which is well-documented for mosquitoes, and Minnesota has not remained untouched. The detection of Asian longhorned ticks in New Jersey in September, 2017 was a stark reminder that disease carrying arthropods pose a growing threat. Within the year after their initial detection, Asian longhorned ticks had been found in 8 other states: Arkansas, Connecticut, Maryland, New York, North Carolina, Pennsylvania, Virginia, and West Virginia. The arrival of this tick on American soil is predicted to have a major impact on wildlife, livestock, and public health. Because the homeland of this species extends into southern Siberia, it is predicted to survive winters in parts of Minnesota.

This tick is of concern for 3 reasons: 1) Asian longhorned ticks in the US reproduce asexually, so females lay ~2000 viable eggs without the need to mate. Host animals rapidly develop high tick burdens, sufficient to cause anemia through blood loss and reduction in milk production by 25%. 2) The ticks feed on many animals including rodents, deer, birds, pets, livestock, and people. Asexual reproduction combined with broad host preference means a single introduced tick can establish a flourishing population. 3) In Asia, longhorned ticks transmit a wide variety of diseases including Lyme disease. It is uncertain what this tick could transmit in North America, but candidates include deadly Heartland and Powassan virus, Lyme disease bacteria, and blood parasites (*Babesia*), which are closely related to agents the ticks carry in Asia. Vulnerable animal populations, like moose, are also at risk from new parasites and diseases.

We propose a surveillance network in Minnesota to prepare for the Asian longhorned tick. At the same time, this will result in a census and risk map of other human-biting ticks. Our project objectives are:

- 1) Establish a collaborative network between the University of Minnesota, state and city government agencies, and wildlife rehabilitation clinics
- 2) Develop a delivery and identification system for tick samples
- 3) Communicate surveillance results and risks to the Minnesotan public

The principal collaborators will include the University of Minnesota (UMN), MN Department of Health (MDH), MN Department of Natural Resources (DNR), MN Board of Animal Health (BAH), the Metropolitan Mosquito Control District (MMCD), and the Wildlife Rehabilitation Center of Minnesota (WRC) which rehabilitates ~90% of wild animals sent to clinics in Minnesota. Ticks for identification will come from participating wildlife rehabilitation clinics around the state.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: *Establish collaborative early warning network for tick submission and identification.* The principal collaborators will meet and determine the roles of the various organization in the early warning network. Activities include completing planning with WRC, distribution of tick preservation materials, tick species identification, and dissemination of results, with other priorities likely being identified later.

Preservation materials (vials, ethanol, forceps, pre-paid mailing boxes, etc.) will be provided to participating wildlife rehabilitation centers. They will send tick samples together with collection data to the central identification lab at UMN. Tick samples will be identified to genus by staff from UMN and MDH. Samples in the same genus as the Asian longhorned tick will be tested by DNA analysis to determine definitive species identity. Identification will also detect the presence of other invasive tick species expected to arrive in Minnesota, in particular the lone star tick that transmits a severe form of human ehrlichiosis. All tick samples will be preserved for potential future study.

ENRTF BUDGET: \$ 237,426

Outcome	Completion Date
1. Assign project roles to collaborators	8/1/2020
2. Prepare materials for tick submission	9/1/2020
3. Identify ticks using morphologic keys and DNA analyses	6/31/2023



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2020 Main Proposal**

Activity 2: Risk communication and outreach. To inform Minnesotans about risks associated with ticks and spread of the Asian longhorned tick, we will produce online outreach materials hosted at the UMN Department of Entomology and School of Public Health websites, and prepare educational presentations for interested groups (e.g., at meetings of growers’ associations). Additionally, we will produce a printed brochure for state fair distribution.

ENRTF BUDGET: \$ 62,574

Outcome	Completion Date
1. Establish informational websites at UMN departments	8/1/2021
2. Perform presentations for stakeholder groups	6/31/2023
3. Prepare printed brochures	yearly thru State Fair '23

III. PROJECT PARTNERS:

A. Partners receiving ENRTF funding

Name	Title	Affiliation	Role
Jonathan Oliver	Assistant Professor	UMN	Project manager, tick ID, testing
Ulrike Munderloh	Professor	UMN	Tick ID, testing

B. Partners NOT receiving ENRTF funding

Name	Title	Affiliation	Role
David Neitzel	Supervisor	MDH	Tick ID, outreach
Stacey Schwabenlander	Senior Veterinarian	BAH	Outreach
Christopher Jennelle	Research Scientist	DNR	Sampling
Janet Jarnefeld	Tick Vector Services	MMCD	Sampling
Renee Schott	Medical Director	WRC	Sampling

IV. LONG-TERM- IMPLEMENTATION AND FUNDING:

An early warning network for invasive ticks will produce a partnership among multiple state institutions. The relationships built between these groups will persist and result in continuing projects related to tick- and insect-borne diseases and wildlife/livestock health. By the end of the proposed project, we expect that invasive tick species will have arrived in Minnesota, and will switch to control and disease prevention. Data acquired through this project, in the form of the ticks submitted and identified over the course of the project will be valuable for future collaborations, fundable by federal agencies such as the NIH, the CDC, or USDA. The CDC, in particular, intends to increase funding for tick surveillance (<https://www.webmd.com/arthritis/news/20190327/cdc-to-start-tracking-ticks-as-diseases-rise>) and this project will put us in a good position to win funding through them.

V. TIME LINE REQUIREMENTS:

Given the rapid spread of the Asian longhorned tick in the US, it may reach Minnesota soon. We plan to build the project over the course of 3 years. We already have an agreement with some wildlife rehabilitation clinics to provide ticks removed from wild animals, but intend to recruit more clinics from the SE counties within the first year of the program. Outreach will grow gradually as we learn about the tick and the diseases it can transmit. We will prepare materials to aid in participant recruitment when the project begins, and to disseminate to state fair visitors in the first year. Presentations to interested groups on tick-borne disease risk and risks of the Asian longhorned tick, in particular, will be available soon after commencement.

Attachment A: Project Budget Spreadsheet
 Environment and Natural Resources Trust Fund
 M.L. 2020 Budget Spreadsheet



Legal Citation:

Project Manager: Jon Oliver

Project Title:

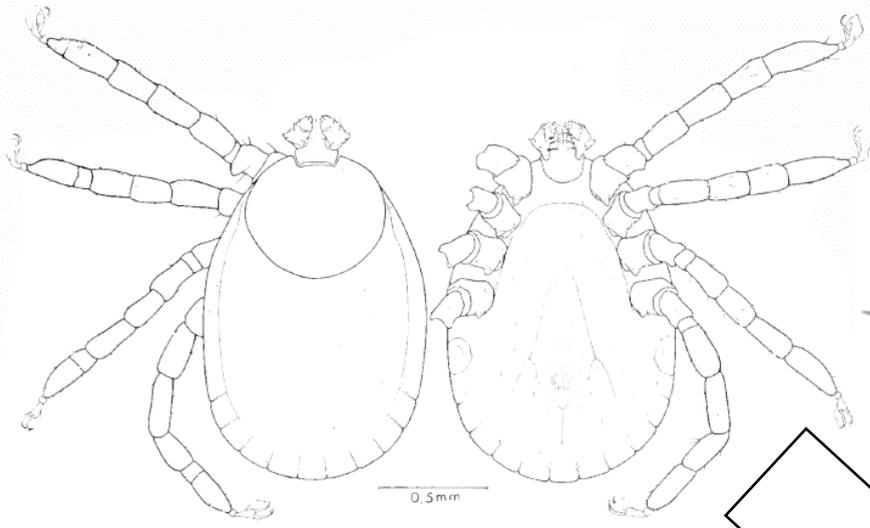
Organization: University of Minnesota

Project Budget: \$462,000 (\$300,000 ENTRF)

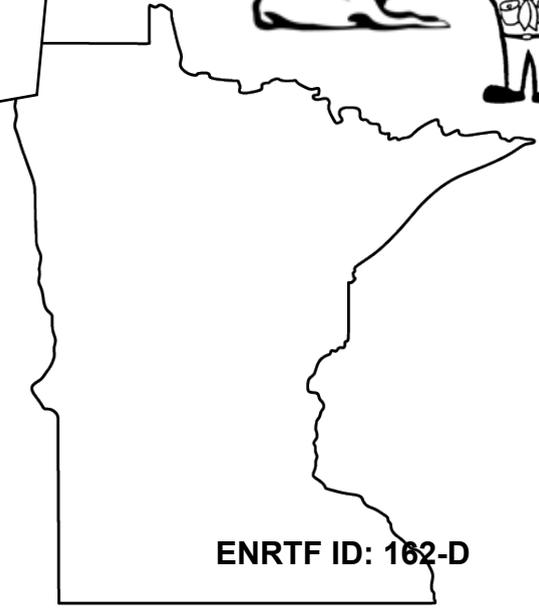
Project Length and Completion Date: 3 years; 06/30/2023

Today's Date: April 01,2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET		Budget	Amount Spent	Balance
BUDGET ITEM				
Personnel (Wages and Benefits)		\$ 276,172	\$ -	\$ 276,172
Jon Oliver, Principal Investigator [10% Salary-Years 1 - 3 + Fringe (36.0%)]				
Uli Munderloh , Co-Investigator [4% Salary-Years 1 - 3 + Fringe (36.0%)]				
Post Doc [50% Salary + Fringe (24.3%)]				
2 Students,[37% salary-Years 1-3 + Fringe (8.2%)]				
Joy Archibald, Web Design [2% salary-Years 1-3 + Fringe (29.5%)]				
Printing		\$ 9,000	\$ -	\$ 9,000
Brochures (\$3,000 [\$1 x 3000 copies] Years 1 -3)				
Other		\$ 14,828	\$ -	\$ 14,828
Lab Supplies (\$4,500 Years 1 - 2; \$4,328 Year 3)				
Lab svcs (\$500 Years 1 - 3)				
COLUMN TOTAL		\$ 300,000	\$ -	\$ 300,000
SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT				
	Status (secured or pending)	Budget	Spent	Balance
Non-State:		\$ -	\$ -	\$ -
State:		\$ -	\$ -	\$ -
In kind: Unrecoverable University Indirect Costs @ 54% MTDC, \$300,000 x 0.54 = \$162,000	secured	\$ 162,000	\$ -	\$ 162,000
Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS				
	Amount legally obligated but not yet spent	Budget	Spent	Balance
		\$ -	\$ -	\$ -



The Asian longhorned tick feeds on wild animals, livestock, pets, and people. It will damage the environment, cost farmers and tax payers, and carry disease. And it is coming to Minnesota.



Dr. Jonathan Oliver is an Assistant Professor in Environmental Health Sciences at the University of Minnesota School of Public Health. He has a PhD in entomology from Iowa State University where his dissertation focused on tick surveillance and tick-borne diseases. He worked in the Department of Entomology studying tick-borne pathogens in the laboratory before becoming a professor in the School of Public Health. Dr. Oliver has 14 years of experience investigating the distribution of ticks and tick-borne diseases in the Upper Midwest as well as experience testing and identifying ticks in the lab. Dr. Oliver is active in the scientific community and has successfully managed projects funded by the NIH and intramural university initiatives.

The University of Minnesota in the Twin Cities is the flagship campus of the state of Minnesota's land grant university. The University houses 18-colleges and brings together a unique combination of agriculture, veterinary, medicine, law, liberal arts, engineering, public health, journalism, business, and design experts. Strong cross-disciplinary collaborations are common and strongly encouraged at the highest levels of University leadership. The **School of Public Health** is currently the 8th ranked public health school by US News and World Reports and 6th in NIH funding with about 130 full-time faculty and 1,500 enrolled students. It offers 19 graduate degrees (15 masters, 4 doctoral) and has 25 research centers collaborated across 4 academic divisions (Environmental Health Sciences, Biostatistics, Epidemiology and Community Health, and Health Policy and Management). The U of M also has vast laboratory capacity, allowing researchers access to any equipment, personnel, or other resources necessary for completing this project.

The Division of Environmental Health Sciences in the School of Public Health provides a rich environment for conducting academic research. Faculty expertise includes exposure science, epidemiology, environmental chemistry, vector-borne diseases, industrial hygiene, and environmental and occupational policy. The Division faculty are extremely collaborative and have vast experience in applying multi-disciplinary approaches to complex environmental and occupational issues. One of the strengths of the Division is the expertise in the development and application of biomarkers to assess exposure. Weekly seminars in the Division of Environmental Health Sciences include nationally- and internationally-known speakers on a wide range of topics ranging from methodological issues to cutting edge approaches to investigate exposure and health effects. The Academic Health Center (including the School of Public Health, Medical School, School of Pharmacy, Nursing School, Veterinary School, and Dental School) and the University of Minnesota encourage multi-disciplinary research and offer many opportunities for such collaborative work.