**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**

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| **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 |

**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**

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| **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**

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| --- | --- | --- | --- |
| **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**

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| --- | --- | --- | --- |
| **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.