NEON Mosquito Technical Working Group

2020 Annual Report

1685 38th St., Suite 100 | Boulder, CO 80301 | 720.746.4844 | www.neonscience.org

National Ecological Observatory Network (NEON) is a project sponsored by the National Science Foundation and proudly operated by Battelle.

Introduction

Since its inception, NEON has relied on expertise within the science, education, and engineering communities to advise on key areas impacting the design, construction, and maintenance of the observatory with the goal to optimize its operation. Currently, two types of external advisory bodies support staff and leadership in making key decisions that guide all of NEON's activities: the Science, Technology & Education Advisory Committee (STEAC) and Technical Working Groups (TWGs). Both bodies are comprised of experts nominated to serve in these roles who are selected by NEON staff following a rigorous selection process.

NEON currently relies upon input from 22 TWGs. These groups play an important role by providing input to NEON's data collection and processing methods and ensuring that NEON infrastructure, data, and programs are a valuable community resource. Working groups are participatory and advisory; they are often tasked with providing input on issues that have scientific, educational, engineering, or operational implications.

This document includes a summary of activities, recommendations, and NEON's response to those recommendations for the Mosquito TWG during the 2020 funding year (November 2019-October 2020).

The Mosquito Technical Working Group is comprised of researchers focused on topics including mosquito surveillance, public health, disease ecology, and phenology. The group advises NEON on sampling approaches that will generate data that reveal significant changes in mosquito abundance, diversity, and community composition. A focus of this group is to ensure compatibility of the mosquito dataset with other surveillance infrastructure used to monitor arboviruses in mosquito populations.

Q1 – November 2019-January 2020

Summary of Activities

We continued a discussion surrounding the adequacy of disease vector / pathogen sampling given low capture rates of specific known vector species. We also heard from a TWG member who recommended the separation and possible analysis of bloodmeals from blood fed mosquitoes for both ecological and epidemiological reasons.

TWG Recommendations

The TWG recommended placement of additional traps that target disease vector species, especially gravid traps since they will attract species that have already fed and are thus more likely to be infected. BG sentinel traps were also discussed although the TWG felt that the location of NEON sites may not be well-placed to capture the species those traps target (Aedes aegypti and albopictus). The TWG was also quite positive about the potential for either identifying mosquito bloodmeals or isolating those mosquitoes for interested researchers.

NEON Response

NEON staff are drafting an OS IPT proposal to optimize the mosquito disease vector sampling, including potential additions of different trap types. A TWG member is drafting a proposal and budget that further considers the potential for identifying host bloodmeals from blood-fed mosquitoes.

Q2 – February 2020-April 2020

Summary of Activities

No meeting held in Q2.

TWG Recommendations

The TWG recommendations remain the same as Q1:

The TWG recommended placement of additional traps that target disease vector species, especially gravid traps since they will attract species that have already fed and are thus more likely to be infected. BG sentinel traps were also discussed although the TWG felt that the location of NEON sites may not be well-placed to capture the species those traps target (Aedes aegypti and albopictus). The TWG was also quite positive about the potential for either identifying mosquito bloodmeals or isolating those mosquitoes for interested researchers.

NEON Response

Q1 Response:

NEON staff are drafting an OS IPT proposal to optimize the mosquito disease vector sampling, including potential additions of different trap types. A TWG member is drafting a proposal and budget that further considers the potential for identifying host bloodmeals from blood-fed mosquitoes.

Q3 – May 2020-July 2020

Summary of Activities

Reviewed current mosquito pathogen sampling program and targets.

TWG Recommendations

The TWG recommended that disease sampling be retargeted to better enhance ability to detect pathogens.

NEON Response

NEON staff are preparing a redesign of the pathogen testing program for review by the TWG and NEON internal science committees.

Q4 – August 2020-October 2020

Summary of Activities

Discussed how to retain historical identification when taxon IDs change. We also continued the discussion of which vectors to select for pathogen testing.

TWG Recommendations

The TWG recommended changing the taxonID in the data to the new/updated ID while also marking the record and retaining the original identification in some way. The TWG also recommended a medium-broad testing strategy for vectors that are well-represented in the literature, even when they have not yielded positive tests in the current NEON dataset. Mosquitoes that are not commonly considered vectors in the literature, particularly those with extensive testing and no positives in our dataset can be cut from the testing pools. Additionally, more urbanized vectors such as Aedes albopictus and Aedes aegypti that are not commonly caught at NEON sites and unlikely to test positive for human pathogens in those areas were also cut from the testing pools.

NEON Response

A new identificationHistory table was created for the mosquitoes data product to help retain identifications that have changed for certain records over time. Approval was received to cut the species of mosquitoes that will be sent for testing in the 2020 field season to include only those that are widely regarded as vectors of human pathogens in the literature.