NEON Small Mammal Technical Working Group

2020 Annual Report

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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 Small Mammal TWG during the 2020 funding year (November 2019-October 2020).

The Small Mammal Technical Working Group provides expert input and advice regarding the science design and protocols related to NEON small mammal abundance, diversity, and pathogen sampling.

Q1 – November 2019-January 2020

Summary of Activities

We discussed the vouchering plan for opportunistically collected small mammal mortalities as well as the potential for a targeted vouchering program. We also made plans to re-consider which fecal samples (fresh or trap) to collect for sample storage.

TWG Recommendations

The TWG agreed with the biorepository and NEON's assessment that the cost and time associated with preparing all vouchers as study skins and skeletons is not warranted. It was suggested that preparing a subset as skins/skeletons with the rest preserved individually in ethanol would provide a good balance. Future discussion of which tissues to extract will occur in the February call. Generally, trap fecal samples are thought to be useful due to their greater quantity and future discussion will determine the best way to implement.

NEON Response

I have shared the TWG's recommendations with Laura Steger at the biorepository. Our February call will include additional discussion of the vouchering plan and will inform any final decisions made. Once additional discussion of fecal sampling changes occurs an OS-IPT proposal will be submitted.

Q2 – February 2020-April 2020

Summary of Activities

Conducted an email discussion regarding resumption of small mammal sampling in light of COVID19.

TWG Recommendations

The majority of the TWG concurred that the likelihood of the virus jumping between species is low, with most currently known examples of viral spillback from humans to animals involving felines. Most also recommended the use of cloth masks to further reduce the risk of pathogen transfer to small mammal populations. Some also expressed concern about NEON setting a precedent of trapping cessation for the community without substantial evidence that it is warranted, especially considering the likelihood that this virus may pose a hazard on the scale of years rather than months. That being said, one TWG member recommended a short-term halt to small mammal sampling to prevent spread to North American small mammals.

NEON Response

NEON staff recommended that all small mammal technicians wear a cloth (or N95 as required per protocol) mask over the nose and mouth, gloves and eye protection during sampling. Sanitizer should be used before putting on gloves to reduce risk of pathogen transmission to outside of gloves. Staff also recommended that field staff should not conduct trapping activities if they have any symptoms of illness or have a known exposure to COVID-19 in the past 14 days. When possible, small mammal bouts should be scheduled later in the field season (July/August) to allow more time for the current epidemic to subside and additional research regarding small mammal transmissibility to emerge.

Q3 – May 2020-July 2020

Summary of Activities

Discussed data-driven ideas for optimizing sampling efforts. We reviewed impacts of reduced bouts, nights-per-bout, sample grids, and traps per grid on Capture-Recapture analyses completed by TWG members Dr. Roland Kays and Dr. Arielle Parons, as well as diversity estimates.

TWG Recommendations

The most cost-effective strategy with the least impact on diversity and abundance estimates is likely to be reducing the total number of bouts at a site (either by making Core = Relocatable = 4 or dropping one early season bout per site). The other strategy with low data impacts was reducing the number of traps per grid, but this might make continuity of models more challenging and realize less cost savings.

NEON Response

We are currently completing analyses of the DNA barcoding product and plan one additional meeting prior to recommending changes to the small mammal sampling protocol.

Q4 – August 2020-October 2020

Summary of Activities

Discussed final biorepository storage of small mammal blood samples that will be pathogen tested, further considered optimization efforts to reduce small mammal sampling efforts and considered the utility of the DNA barcoding data.

TWG Recommendations

A popular recommendation was to split blood samples in half so that the same sample could be stored as both whole blood and DNA extracts to allow for a broader variety of uses including serology and DNA analyses; however there may be logistical hurdles to this recommendation. We also determined that the best sampling reduction strategies with minimal impact to data quality for small mammals are either reducing the total number of bouts or reducing the size of trapping grids. More analyses on the effects for life history estimates need to be examined before making a final decision. Finally, the DNA barcoding data were deemed to be quite useful and popular and it was recommended that a longer discussion about improving its use as a quality assessment tool be continued next year.

NEON Response

Discussion of optimal blood sample handling and use of DNA barcoding will continue into 2021. Additional optimization analyses are also being performed to assess how sampling changes would impact life history estimates in the data. Resolution of these topics are expected in 2021.