# NEON Technical Working Groups

## *2026 Biannual Report Quarter 1-Quarter 2*

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The National Ecological Observatory Network (NEON) is a major facility fully funded by the U.S. National Science Foundation and operated by Battelle.

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# 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 of optimizing 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 (TWG). 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 18 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 each TWG during the first half of the 2026 funding year (October 2025-March 2026).

# Airborne Remote Sensing Data Quality TWG

The Airborne Remote Sensing Data Quality Technical Working Group provides expert input and advice regarding NEON's airborne sampling design, data collection requirements and constraints, campaign scheduling, data products and algorithms, and reported quality metrics.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: Email regarding scope changes (i.e., discontinuation of L1 waveform data) sent Jan 2026.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Aquatic Biogeochemistry TWG

The Aquatic Biogeochemistry Technical Working Group (ABTWG) provides experience and expert knowledge across the fields of Aquatic Biogeochemistry, including water chemistry, solute and sediment transport, nutrient cycling and metabolism. The scope of the NEON ABTWG includes both the Aquatic Observation System (AOS) and the Aquatic Instrument System (AIS). The expertise of this group is intentionally broad and is intended to represent the diverse set of data users interested in utilizing NEON data to address research questions within the various subfields of aquatic biogeochemistry.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: Email regarding scope changes (i.e., reduced sampling frequency of stream morphology) sent Jan 2026.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Aquatic Biology TWG

The Aquatic Biology Technical Working Group provides expert knowledge across the fields of organismal sampling in aquatic systems. The scope of the NEON Aquatic Biology Technical Working Group includes data products generated by the Aquatic Observation System (AOS). The expertise on this group is intentionally broad within the field of aquatic biology and ecology. The group is intended to represent a broad set of NEON data users and experts in various subfields of aquatic biology and ecology, who can:

1) take a broad and complete view of the aquatic program, and

2) provide scientific guidance on design, prioritization, and value of the components of the Project.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: Email regarding scope changes (i.e., discontinuation of several aquatic microbial products) sent Jan 2026. The group also met virtually on 2/24/26 to introduce Madie Ritter as the new fish protocol lead, discuss, answer questions about NEON scope changes, and mention upcoming protocol reviews and optimizations for which TWG feedback may be requested.

## TWG Recommendations

Q1: N/A

Q2: Discussion and questions about algal taxonomy collection came up, and if there is a possibility of continuing to archive a preserved subsample. The other point of discussion from the TWG was about how NEON data and samples are advertised, which could explain small download or sample request numbers for some aquatic products.

## NEON Response

Q1: N/A

Q2: Jennifer Edmonds asked both members with these discussion questions to send her emails that she could take to the STEAC meeting in March. It was very helpful to have Jennifer's perspective on the scope changes at this meeting.

# Atmospheric Stable Isotope TWG

This group provides guidance regarding sensor designs and assemblies, data products, and field and lab procedures and protocols to measure atmospheric stable isotopes of $^{13}C$ in $CO^2$ and $^{18}O$ and 2H in water vapor and precipitation water.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: Email regarding scope changes (i.e., suspension of atmospheric stable isotope product while we pursue a new, more efficient collector) sent Jan 2026.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Biorepository TWG

The Biorepository Technical Working Group is comprised of curation, archival and museum collections experts as well as ecologists and others who would make use of the NEON Biorepository. The group advises NEON on curation best practices, and discoverability of and ready access to biological samples and specimens for future scientific research. A particular focus is to broaden the availability and use of museum assets for regional to continental-scale ecological research.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: No TWG interactions this quarter.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Breeding Landbird TWG

The Breeding Landbird Technical Working Group provides expert input and advice regarding the science design and protocols related to NEON breeding landbirds sampling.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: No TWG interactions this quarter.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Ecological Forecasting TWG

The Ecological Forecasting TWG provides recommendations to NEON on how to best support ecological forecasting. This may include facilitating community discussions around forecasting needs, providing guidance for data product development, and identifying opportunities for NEON to engage with the forecasting community though workshops, educational materials, and code/data product development.

## Summary of Activities

Q1: Email communication to plan Q2 meeting to coordinate workshop proposal submissions for the EFI 2026 Conference.

Q2: The group met on Jan 13, 2026, to coordinate our presence at the EFI 2026 conference (in August) and proposal submission for workshops and special sessions. The group decided it was important to leverage work from the EFI RCN and NEON Forecasting Challenge infrastructure for two workshops to use NEON data in forecasts (beetles and soil carbon fluxes). The TWG welcomed John Zobitz as a new member.

## TWG Recommendations

Q1: N/A

Q2: Submit workshop proposals to the EFI Conference.

## NEON Response

Q1: N/A

Q2: NEON staff appreciate the enthusiasm from the EF TWG and have worked with TWG members to submit workshop proposals to the EFI Conference.

# Ground Beetle TWG

NEON collects ground beetle observations and archival samples at all terrestrial field sites to capture how ground beetles (Carabidae) communities change in different habitats and ecosystems over time. This TWG determines targets for sampling that generate data that can reveal significant changes in beetle abundance, diversity, and community composition.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: No TWG interactions this quarter.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Microbial TWG

The Microbial Ecology Sampling Program encompasses measurements of soil and aquatic microbial diversity, composition, and abundances that are deemed critical for understanding long-term changes in biodiversity and ecosystem function. The tools used for measuring microbial diversity in the environment develop and change rapidly. NEON relies on input and guidance from the Microbial Technical Working Group to advise on questions related to methods and analyses, as well as best practices for ensuring data quality, accessibility, and usability.

## Summary of Activities

Q1: Met with individual members to get advice for microbial marker gene (MMS) and microbial community taxonomy (MCT) data products.

Q2: The group met on February 17, 2026, to go over recent changes to microbe data products and discuss education and grant possibilities.

## TWG Recommendations

Q1: N/A

Q2: The group encouraged follow up on grants. One member advised on changes to ASM (American Society of Microbiology) meetings.

## NEON Response

Q1: N/A

Q2: N/A

# Mosquito TWG

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.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: No TWG interactions this quarter.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Site Management and Disturbance TWG

The Site Management and Disturbance Technical Working Group (SIM TWG) provides experience and expert knowledge related to Disturbance Ecology, particularly in reporting disturbance events and metadata. The scope of the NEON SIM TWG includes capturing disturbance events for all NEON Science subsystems (AIS, AOP, AOS, TOS, TIS). The group advises NEON on SIM data accessibility, quality, and usability as well as identifying areas of improvement within our budget. This group is also tasked with providing guidance on disturbance monitoring methods and best practices for reporting impacts to other ongoing data collection at our sites.

## Summary of Activities

Q1: Email sent mid-December providing updates about the new SIM neonUtilities R package function, SIM QAQC progress, and the summer internship. TWG members were tasked to review the field definitions and data for the new sim_locationsDescription table which provide information about visits per year, mitigation strategies, and parameters that might influence a locations sensitivity (NLCD type, slope, soil order) by mid-January.

Q2: Received feedback from 3 members from the review sent in mid-December to review the field definitions and data for the new sim_locationsDescription table which provide information about visits per year, mitigation strategies, and parameters that might influence a locations sensitivity (NLCD type, slope, soil order).

## TWG Recommendations

Q1: N/A

Q2: Overall, though current format was clear, TWG thought the addition of NLCD type and other fields was useful and made this information easier to find. Previously we were tallying the number of times “samplingCancelledForVulnerability” for TOS sites only and wondered why we were not doing that for aquatic sites. A member also wondered if it was possible to provide more detail for aquatic locations (currently just site level).

## NEON Response

Q1: N/A

Q2: We updated the table and code to count “samplingCancelledForVulnerability” for terrestrial and aquatic sites. As far as aquatic sites and sampling disturbances, since there are fewer sampling locations at aquatic sites and there are designated paths to reach the site and main infrastructure, there are less "spontaneous" trampling concerns like we see at terrestrial plots. We currently have another project to create AGOL (ArcGIS Online) layers of the hiking paths to aquatic sites and can perhaps make those public once created. Science leadership considered what level of detail to report for aquatic sites and settled on reporting at the site level given the above. We plan to re-visit if feedback indicates more detailed visit numbers would be useful.

# Small Mammals TWG

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.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: No TWG interactions this quarter.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Soil Sensor TWG

The Soil Sensor Technical Working Group, provides feedback on all aspects of sensor measurements made in the TIS soil plots, including soil temperature, soil moisture and salinity, soil $CO_2$ concentration, soil heat flux, throughfall, soil surface photosynthetically active radiation (PAR), net longwave radiation, and soil surface/litter/vegetation infrared temperature measurements. In addition, the Soil Sensor TWG provides recommendations on approving or disapproving requests for large amounts of soil from the NEON Megapit Soil Archive.

## Summary of Activities

Q1: Requested input on the preferred averaging interval and data collection frequency for the soil moisture and soil temperature data products. Input was also sought from external preferential flow researchers, who typically require higher frequency data than most other users.

Q2: No meetings were held.

## TWG Recommendations

Q1: The TWG and external researchers recommended changing from 1- and 30-minute averages to 5- and 30-minute averages for both the soil temperature and soil moisture data product. They also recommend changing the sampling frequency from every 10 seconds to every 30 seconds.

Q2: N/A

## NEON Response

Q1: The NEON IS-IPT (12 Nov 2025) and Data Quality IPT (9 Dec 2025) approved the recommendations to change the 1-minute averaging interval to a 5-minute averaging interval. This will be implemented during the switch to the new data processing pipeline planned for 2026 ahead of the 2027 release to minimize additional work. The IPTs also approved switching to a 30-second sampling frequency for the new combined soil moisture and temperature sensor.

Q2: N/A

# Surface Atmosphere Exchange TWG

NEON measures the surface-atmosphere exchange of momentum, heat, and several climate-relevant trace gases. This Technical Working Group advises on the operation of NEON's surface-atmosphere exchange assets, development of novel, scale-aware data products, adaptive algorithms, and usability tools, and active contribution to network science. The Technical Working Group accomplishes these tasks by working closely with NEON's Surface-Atmosphere Exchange Group. This includes prioritizing quarterly developments, pre-reviewing new resources, and bringing forward community input.

## Summary of Activities

Q1: No TWG interactions.

Q2: FY2026 virtual kickoff meeting held.

## TWG Recommendations

Q1: N/A

Q2: The group agreed to the removal of the 3D wind attitude and motion reference (AMRS) data product from the Eddy Covariance bundled files but suggested that data remain available upon request.

## NEON Response

Q1: N/A

Q2: The SAE team took the recommendation to the IS Data Quality IPT to determine the best path forward. It was determined that the historical AMRS dp00 data will be available in parquet files that can be shared upon request by the user community. We have proceeded with removing the AMRS structure from the bundled HDF5 files for the next release reprocessing.

# Terrestrial Biogeochemistry TWG

The Terrestrial Biogeochemistry Technical Working Group provides expert input and advice regarding the science design and protocols related to measurements of plant and soil biogeochemistry within the NEON Observational System (e.g., not sensors).

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: Email regarding scope changes (i.e., deferral of 5-year TOS protocol sampling from 2026 to 2027) sent Jan 2026.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Terrestrial Plant Diversity and Phenology TWG

Membership of the Terrestrial Plant Diversity and Phenology Technical Working Group includes researchers and practitioners from universities, federal and regional government agencies, and coordinated research networks. This group represents the community of plant diversity and phenology data users that NEON aims to serve; members provide expert input and advice regarding the science design, protocols, and data quality issues related to NEON plant diversity and phenology sampling.

## Summary of Activities

Q1: No TWG interactions this quarter.

Q2: Email regarding scope changes (i.e., suspension of plant diversity sampling for 2026 and suspension of plant phenology sampling at gradient sites for 2026 and beyond) sent Jan 2026.

## TWG Recommendations

Q1: N/A

Q2: N/A

## NEON Response

Q1: N/A

Q2: N/A

# Terrestrial Plant Productivity and Biomass TWG

The Terrestrial Plant Productivity Technical Working Group advises which methods, protocols, and equipment are employed to create robust ground-based estimates of live and dead woody biomass, woody and herbaceous productivity, coarse downed wood volume and density, fine and coarse litterfall, belowground plant biomass, and leaf area index across a suite of different vegetation types. The TWG also considers optimal spatial and temporal integration of ground-based measurements with remote-sensing hyperspectral and LiDAR datasets (i.e., the NEON AOP system), and with data streams generated by the NEON Terrestrial Instrument System. Finally, the TWG is also deeply invested in determining how NEON Plant Biomass and Productivity data products can be optimized to enhance usability and value for the NEON end-user community.

## Summary of Activities

Q1: In Q2 of AY25, the TWG was consulted to help determine what data should be recorded for "height" when the top of a tree is not directly observable. Based on TWG feedback, a new 'heightQualifier' field was added to the published 'vst_apparentindividual' data with an option of "tree top not visible", and 'height' measurements were no longer required for individuals with tops occluded from visibility. In Q1 2026, the TWG was engaged again regarding 'height' measurements, specifically to discuss how height should be recorded for leaning individuals and also downed individuals that are still alive but with crowns that may be resting on or near the ground.

Q2: Email regarding scope changes (i.e., deferral of 5-year TOS protocol sampling from 2026 to 2027) sent Jan 2026. The TWG was emailed again in February 2026 for advice from members regarding resources for C3/C4 graminoid classification by species.

## TWG Recommendations

Q1: The TWG recommended that for individuals leaning >45˚ off the vertical, the height should be recorded in the normal way for the sake of consistency, and the new 'heightQualifier' field should have an option added, "leaning greater than 45 degrees". Moving forward, this new 'heightQualifier' option should enable end-users to identify when height measurements may need to be filtered out for allometric biomass estimation purposes.

Q2: TWG member Adam Mahood recommended the Manual of Grasses for North America by Barkworth (https://www.jstor.org/stable/j.ctt4cgkq1). This reference should have C3/C4 designations in the descriptions for each species, and it covers the entire continent.

## NEON Response

Q1: A new "leaning greater than 45 degrees" LOV option was added to the 'heightQualifier' field in the 'vst_apparentindividual' table, and the Vegetation Structure protocol, Fulcrum application, and Fulcrum Manual were updated with guidance describing when to use the new 'heightQualifier' option.

Q2: The TWG recommendation for a reference to classify graminoids to C3/C4 was shared with the Herbaceous Clip Harvest protocol author. Should the reference provide standardized C3/C4

classification information that would be helpful for NEON Field Ecologists, it will be incorporated into the protocol and shared with field teams via the Sharepoint ‘All Collaboration Library’.

# Tick Sampling TWG

The Tick Technical Working Group provides expert input and advice regarding the science design and protocols related to NEON tick abundance, diversity, and pathogen sampling.

## Summary of Activities

Q1: Requested feedback on techniques to reduce the amount of time sampling larval ticks during times when there are excessive numbers (well over 1,000 ticks at a plot).

Q2: No TWG interactions this quarter.

## TWG Recommendations

Q1: One recommendation was to leave the ticks on tape and examine all of them to reduce the time spent removing them from the tape used to collect them. They did indicate that estimating the numbers to the nearest 100 when there are more than 100 larvae is a common practice.

Q2: N/A

## NEON Response

Q1: Our taxonomy laboratory did not prefer to keep the ticks on tape so that suggestion could not be implemented. We did decide to move forward with estimating a small portion of the sample that could not be removed from the tape adhesive successfully to the nearest 100.

Q2: N/A