NEON Technical Working Groups

2025 Biannual Report Quarter 3-Quarter 4

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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 21 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 second half of the 2025 funding year (April 2025- September 2025).

Airborne Remote Sensing TWG

The Airborne Remote Sensing 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

Q3: We engaged in a productive discussion covering a range of topics, including the 2025 Flight campaign, the generation of bidirectional reflectance data for the years 2022-2024, AOP data in Earth Engine, updates on the development of foliar trait products, and potential adjustments to the foliar chemistry sampling schedule to optimize AOP collections.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: We received feedback on the foliar trait modeling work, including the generation of additional performance metrics (RMSE) for the scatterplots that display observed vs. predicted percent nitrogen values, along with suggestions specific to the machine learning-based needle and non-needle classification effort.
Q4: N/A

NEON Response

Q3: We incorporated the suggestions from the TWG members, updated our results, and shared them with all members in an email sent after the meeting.
Q4: 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

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: 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

Q3: Continued working on surface water cell count optimization with help of Jennifer Edmonds on the TWG.
Q4: Surface water microbe cell count optimization completed.

TWG Recommendations

Q3: Recommendations were incorporated into the analyses performed for optimization.
Q4: N/A

NEON Response

Q3: N/A
Q4: Surface water cell counts proposed for discontinuation.

Atmospheric Deposition TWG

The NEON Atmospheric Deposition Technical Working Group TWG will focus on the project that performs sampling of precipitation for chemical analysis and isotope concentrations as well as particulate size distribution. Potential scenarios where input from the TWG would be requested include refinement of current procedures, algorithms, sensor obsolescence and replacement or the elimination, modification, or addition of data products, and infrastructure issues related to deposition.

Summary of Activities

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: N/A

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

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: We are continuing to collect data following a TWG recommendation to conduct monthly low humidity dependence characterizations for the Picarro L2130 instrument which produces the atmospheric water isotopes data product. Once sufficient results are available, we will bring this back to the TWG to determine next steps.
Q4: We are continuing to collect data following a TWG recommendation, as described above.

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

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: 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

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A.
Q4: N/A

Data Standards TWG

The Data Standards Technical Working Group is tasked with making recommendations about effective ways to provide NEON's data products to the broader scientific, educational, and policy communities. Topics may include 1) principles, standards, and policies for open data and software; 2) data discovery, exploration, and delivery mechanisms; 3) improvement of data products to increase utility; and 4) monitoring impact of NEON data use on research.

Summary of Activities

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: 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

Q3: The EF TWG had a call on June 13, 2025, that included a report out from the EFI 2025 meeting that was held at Virginia Tech (May 2025). The EFI meeting was a success with over 100 participants, 3 keynotes, 20+ talks, 30+ posters, 8 training sessions, 4 working groups, a NEON day, including a keynote from Kate Thibault, a NEON enabled forecasting session, and a tour of the NEON MLBS site. The group discussed how the EFI RCN grant (for the NEON forecasting challenge) is wrapping up in September, and paths forward to keep up momentum on the collaboration. Eric provided an update on the NEON Beetles HDR ML Challenge (a collaboration with the Imageomics Institute), which may be of interest to the group. John Zobitz (Augsburg University) was a guest presenter at the meeting (recruited from the EFI meeting earlier in the year) to present on a new challenge them for the NEON forecasting challenge focusing on soil fluxes, using the neonSoilFlux R package. This provides an additional use case for NEON data in the NEON Forecasting Challenge infrastructure that Dr. Zobitz has been developing with students and NEON staff (including Ed Ayres).

Q4: The EF TWG met on Sept 3 in Q4 and Claire Lunch provided an overview of new neonUtilities features that use Apache Arrow functionality to allow more cloud-native functionality with tabular NEON data. We provided an overview of this functionality to the EF TWG because this is the group that has expressed desire in this type of functionality. Overall, the group was very positive about the new cloud-native features in neonUtilities. The group also discussed additional directions forward to embrace cloud-native data formats (e.g., moving away from hdf5 in SAE data), but no specific recommendations were made.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: N/A

Foliar Sampling TWG

The Foliar Sampling Technical Working Group provides expert input and advice related to sampling sunlit plant foliage, with a key goal of linking field measurements to remotely-sensed observations of vegetation chemical and physical properties.

Summary of Activities

Q3: No TWG interaction this quarter.
Q4: After many years of fruitful contributions leading to a very stable protocol for plant foliar sampling, we decided to disband this advisory group.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: N/A

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

Q3: No TWG interaction this quarter.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: 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

Q3: Emails were sent to selected TWG members individually for advice on the Microbe Community Taxonomy (MCT) and Microbe Metagenome Sequencing (MMS) data products.
Q4: Met with individual members to get advice for the Microbe Community Taxonomy (MCT) and Microbe Metagenome Sequencing (MMS) data products.

TWG Recommendations

Q3: Selected TWG members provided advice on moving forward with MCT and MMS data products.
Q4: N/A

NEON Response

Q3: For the community taxonomy (MCT) data products, I discussed at length with two TWG members how best to proceed with clustering Operational Taxonomic Units (OTUs) and how to maintain a group of OTUs in subsequent years even with new data being added. A TWG member organized a meeting with another expert in this field, who provided some advice about adding data to existing OTUs (typically in this kind of study a new set of OTUs is clustered with each new batch of data, but this would not be sustainable over the life of NEON.) For metagenomes, the discussion was primarily around what new fields to use in NEON ingests to link to NEON samples at the Joint Genome Institute (JGI). They concurred on my suggestion to use two fields from the Genomes Online Database (GOLD): the GOLD BioSampleID and the GOLD Sequencing Project ID.
Q4: 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

Q3: One email question was sent to the group: How important do you feel that it is to retain information at the trap-level as opposed to the aggregated site-level for individual mosquito specimens that have been pinned for archive at the biorepository?

Q4: We discussed the results of the pilot project for mosquito RNA sequencing to replace the PCR based pathogen testing protocol. I also sent an email to the TWG in September to determine whether they thought the color of the mesh bags that are used on the light traps for collecting mosquitoes would impact the mosquito captures. I also met separately with a new TWG member to get additional suggestions for avoiding cross-contamination during mosquito sampling to ensure the robustness of our mosquito virus RNA sequencing protocol.

TWG Recommendations

Q3: The TWG indicated that it was important to retain trap-level, rather than site-level information on pinned mosquito specimens.

Q4: In the meeting, we discussed why the results using different host depletion methodologies resulted in completely different and non-overlapping detection of viruses. The TWG suggested that we ensure that negative controls are run on the samples and recommended a probe-based approach to enrich viruses prior to completing the RNA sequencing. Via email the TWG concurred that there was no reason to think that color of the mesh bag used would impact the mosquito trapping success. Additionally, the TWG member recommended wiping petri dishes and forceps down with ethanol in between samples to prevent cross-contamination.

NEON Response

Q3: We are working with the taxonomy laboratory that provides site-level information of pinned specimens to ensure that all future pinned animals will have plot-level information. To ensure a good seasonal distribution of specimens, this taxonomy laboratory had been selecting the pinned specimens at the end of the season after aggregating the mosquitoes collected into vials of the same species and bout (e.g., all ten plots' worth of the same species were grouped together). This laboratory has elected to maintain the specimens in storage at the species-plot level rather than aggregating to the bout level after identification. This way the laboratory can continue optimizing the selection of specimens across the season while still retaining plot-level information. The storage capacity at the facility has been large enough to accommodate this shift.

Q4: We worked with our analysis laboratory to confirm that proper cross-contamination procedures are being used and that negative control samples are also being run. We also worked with the laboratory to

develop a comprehensive list of all known mosquito-associated viruses. We are in process of developing a probe with a probe synthesis company and will complete analysis of 2023 and 2024 mosquito samples using this approach. I also advised the field teams that they could use any color of mesh collection cup bags. Previously we had received only a green-camouflage color but one domain had received white bags upon reordering. Teams will be using any color that is received from the company moving forward.

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

Q3: Introduced the summer intern supporting NEON to develop tools for these site management (SIM) data. NEON provided updates on new SIM specific functions in the R packages, geoNEON and neonUtilities. The group discussed possible sources for a sensitivity index and reviewed a series of SIM photos and the accompanying tabular data to create examples of use to bring to the OS-IPT (internal change board reviewing proposes changes to the data product).
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: The TWG acknowledged that creating a sensitivity index based on data not already available is out of scope for NEON and so discussed how NEON might use data already available. They recommended to start by indicating which plots have known trampling issues and continuing to investigate other map sources including NASA's new NISAR image. The TWG recommends NEON deliver photos to end users citing use in manuscripts, the ability to provide context or determine specific disturbance type nuances (100% clear cut vs seed trees left, clear cut method), provide ground truth for AOP images, provide the end user the ability for the end user to determine fire severity, and potential AI/visual learning applications at plots that have frequent disturbances (time series data).
Q4: N/A

NEON Response

Q3: We will continue our discussion with the OS-IPT about the sensitivity index and photos to evaluate what can be done with available resources.
Q4: N/A

Small Mammals TWG

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

Summary of Activities

Q3: Emailed a request for feedback regarding a shift of 2 small mammal sampling grids at the TEAK site to avoid a safety hazard and mitigate accessibility issues.
Q4: Emailed the TWG to get feedback about best practices for ensuring that all traps are accounted for when leaving a field site.

TWG Recommendations

Q3: The TWG agreed that the impact of the plot shift would be minimal.
Q4: The TWG recommended strict counting protocols as well as labeling the locations of each trap to avoid confusion during the trap collection process.

NEON Response

Q3: The two plots at TEAK have been shifted.
Q4: The protocol was updated to require only a single individual to collect traps on any given row to ensure accuracy of counts. Additionally, all but the sites where it is not possible to have permanent trap location markers are now required to mark the location of the trap at each grid.

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

Q3: Feedback was requested from the TWG via Teams Chat on 21 April 2025 on collecting intact soil cores during the planned new sensor installation to allow soil-specific calibrations to be performed, if the transfer of the soil-specific calibration from the Sentek sensor fails to meet the accuracy requirement. The TWG also considered, if cores are collected, how many soil plots and depths they should be collected from per site. While these cores may not be needed, they represent a risk mitigation approach since collecting the cores is more cost-effective during sensor installation than if a separate sampling trip is required. The soil temperature, water content, and electrical conductivity intercomparison plan was also shared with the TWG.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: The consensus recommendation was to collect a single core from each sensor installation depth up to 50 cm (i.e., 5 and 10, 20, 50 cm) at each site.
Q4: N/A

NEON Response

Q3: The recommendation is being prepared to present to the NEON Instrument Systems-IPT once information on the cost of generating new soil-specific calibrations for the new sensor (if the risk is realized) has been gathered.
Q4: 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

Q3: We held a meeting with the TWG at the beginning of the quarter to discuss 3D wind data motion corrections using the AMRS instrument, inform the TWG about Ameriflux/Integrated Carbon Observation System and NEON intercomparison studies, present results of the Ameriflux Portable Eddy Covariance System intercomparison, and discuss priorities for 2025.
Q4: We inquired with the TWG about the tower shadowing flagging of SAE sonic anemometer DP01 data and DP04 flux data. We sent the TWG analysis and our derived recommendation for 30-degree exclusion angles based on impact 2D rotation coefficients. We also shared the potential plans to reorient booms to reduce tower shadow impacts on the data at certain sites.

TWG Recommendations

Q3: The TWG supported NEON addressing the issues found in the Ameriflux intercomparison and suggested data analysis to perform. In particular, the TWG suggested a way to assess data quality concerns for wind directions where the tower structure might influence atmospheric turbulence. The TWG also suggested a few additional analyses they would like to see before making a recommendation about the importance of the 3D wind motion correction.
Q4: The SAE TWG followed up with several detailed questions regarding our analysis and choice of 30 degrees for use as exclusion angles. Specific questions included: (1) what were the mounting differences between AmeriFlux PECS and the NEON installed sonic anemometer, (2) why horizontal rotation angles, (3) why group by 20 degrees, (4) it was recommended we filter out data coming from behind CSAT, and (5) questions about orientation of CSAT at some specific sites. There was also a thought on whether it was feasible to potentially raise the sonic above the tower using a pulley system.

NEON Response

Q3: We have completed the suggested data analysis and will discuss results with the TWG next quarter.
Q4: The SAE team followed up via email to address these questions based on previous analysis. Some specifics: (1) mounting was done to minimize interference between the two systems, (2) horizontal angles were chosen because they were much more impacted, (3) 30 degree angles were chosen as 20 degrees appeared too small with multiple bins impacted, (4) 30 degrees appeared to achieve this goal without losing too much data, also motivated boom reorientation at towers where it is needed.

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

Q3: Over email, the TWG was asked about the lack of soil bulk density data in ~ 60% of NEON periodic soil sampling plots. Bulk density is a key variable for converting concentrations of elements like carbon and nitrogen to stocks. The group was asked if they thought missing plot-level bulk density data were a major concern, and if so, how NEON might go about filling in these missing measurements.

Q4: Over email, the group was asked for input on a soil handling error. NEON staff in Domain 18 were supposed to oven-dry soils from site BARR for total C and N analyses at 65 C, but instead the soils were dried at 105 C.

TWG Recommendations

Q3: Most TWG members agreed that it would be highly valuable to have plot-level bulk density data instead of having to model or extrapolate in a large number of plots. The group proposed a combination of methods, including quantitative mini-pits in rockier soils and in-tact cores for less rocky ones. They felt that NEON must quantify coarse fragments in the sampled volume and suggested that measurements could be infrequent, perhaps once a decade or so.

Q4: The TWG was asked if NEON should analyze the soils dried at 105C or create replacement samples from frozen or air-dried material. The group felt all of these options were reasonable but had a slight preference for using the air-dried soils.

NEON Response

Q3: Given that this effort would add significant labor hours to already full field schedules, NEON leadership requested more precise quantification of the scope of the problem. For example, an estimation of soil bulk density using various methods in plots where we do in fact have it to see the error rate, and how that compares to other sources of uncertainty in stocks such as spatial variation in carbon and nitrogen concentrations. The TWG lead has committed to work on this and engage the TWG for input as analyses proceed.

Q4: The staff in Domain 18 were advised to create replacement samples from air-dried soils, which they did. In addition, previous soil protocol guidance to freeze the total C and N subsample if it could not be placed in a 65C drying oven immediately after collection was removed, in favor of keeping the sample chilled (4C) and field-moist with transfer to the drying oven within 7 days of collection.

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

Q3: Over email and subsequent exchanges: an announcement that Katie Jones was departing NEON, Dave Barnett is now leading this TWG, and some general updates about sampling status.
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: N/A
Q4: N/A

NEON Response

Q3: N/A
Q4: 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

Q3: No TWG interaction this quarter.
Q4: The group was consulted over email to help determine how height data should be recorded for leaning individuals or for downed individuals that are still alive.

TWG Recommendations

Q3: N/A
Q4: The TWG recommended standard measurements of height be recorded for leaning individuals - i.e., the top of the crown relative to the root point - and that a 'heightQualifier' be recorded of "leaning greater than 45 degrees", which would make NEON data recording for individuals like this consistent with forestry best practices.

NEON Response

Q3: N/A
Q4: A heightQualifier option of "leaning greater than 45 degrees" was added to the Fulcrum app.

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

Q3: Meeting on July 7, 2025, to discuss best practices for flagging tricky areas of tick sampling and recording when portions of samples are lost in the field
Q4: No TWG interaction this quarter.

TWG Recommendations

Q3: The TWG recommended flagging the ground underneath dense shrubs since that is where the tick-carrying animals will be traveling. They also recommended sampling the ground underneath downed logs on both sides. For lost or partially complete samples, the TWG recommended indicating when the lost sample is more or less than 10% of the total sample.
Q4: N/A

NEON Response

Q3: The tick protocol was updated with the guidance on best practices for flagging difficult sampling areas. A new sampleCompromised field was added to indicate when less than or greater than 10% of a sample has been lost during sampling.
Q4: N/A