



NEON Technical Working Groups

2023 Biannual Report Quarter 3 and Quarter 4

Table of Contents

Introduction	3
Airborne Remote Sensing TWG	4
Airborne Remote Sensing Data Quality TWG.....	5
Aquatic Biogeochemistry TWG	6
Aquatic Biology TWG.....	7
Atmospheric Stable Isotope TWG.....	8
Biorepository TWG.....	9
Breeding Landbird TWG	9
Community Engagement TWG	10
Data Standards TWG.....	11
Ecological Forecasting TWG	12
Foliar Sampling TWG.....	14
Ground Beetle TWG	15
Microbial TWG	16
Mosquito TWG.....	17
Re-aeration TWG.....	19
Remote Sensing Algorithm Design TWG.....	20
Site Management and Disturbance TWG	22
Small Mammals TWG	23
Soil Sensor TWG	24
Surface Atmosphere Exchange TWG.....	25
Terrestrial Biogeochemistry TWG.....	26
Terrestrial Plant Diversity and Phenology TWG	27
Terrestrial Plant Productivity and Biomass TWG.....	28
Tick Sampling TWG	29

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 (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 24 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 for second half of the 2023 funding year (May 2023-October 2023).

Airborne Remote Sensing TWG

The NEON Airborne Remote Sensing Technical Working Group (TWG) provides feedback to the AOP on its sampling design, flight campaign scheduling, and data collection methodology. It also discusses updates to existing algorithms for processing raw AOP remote sensing data to create higher-level data products, as well as new AOP data products that would support the overarching goals of NEON.

Summary of Activities

Q3: AOP has decided to merge the Airborne Sampling Design/RS Data Quality TWG together with the Remote Sensing Algorithms TWG. The new group will be titled "Airborne Remote Sensing TWG" and will be led by Shashi Konduri, Remote Sensing Scientist with AOP. We anticipate the first meeting of the combined TWG will take place in Fall 2023.

Q4: The first Airborne Remote Sensing TWG meeting was organized on October 31, 2023. This TWG was created by merging the previous AOP TWGs focused on Algorithm Design and Data Quality. The main topics discussed include a recap of the 2023 flight season, a review of the upcoming 2024 flight season, updates to the spectrometer data products (BRDF and topographic corrections for the L1 reflectance data, addressing the edge effect found in the lower order principal components of some of the L1 spectrometer reflectance bands) and an update on the creation of higher-level foliar trait data products. For those who could not attend the meeting on October 31, we sent out an email with a list of questions to both the Airborne Remote Sensing and Foliar Sampling TWGs.

TWG Recommendations

Q3: N/A

Q4: For the foliar trait modeling work, the TWG were asked if they had any suggestions for the various modeling assumptions. Regarding the criteria for selecting pixels for modeling, the TWG suggested using separate thresholds for NDVI, CHM etc. by site instead of a "one size fits all" for all the sites. One of the members suggested the possibility of exploring additional predictors, such as soil moisture and temperature, in the modeling exercise. The TWG also agreed on setting a tighter coupling between the AOP and foliar sampling collect dates for samples flagged as either "leaves still expanding" or "leaves beginning to senesce." to account for drastic changes in the foliar trait values in the shoulder seasons. Regarding outlier detection for foliar traits, the TWG was of the opinion to retain most/all the samples and see what impact it has on the modeling results.

NEON Response

Q3: N/A

Q4: We will incorporate the TWG recommendations into the pipeline and present the preliminary modeling results at the American Geophysical Union (AGU) annual meeting in December 2023.

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

Q3: AOP has decided to merge the Airborne Sampling Design/RS Data Quality TWG together with the Remote Sensing Algorithms TWG.

Q4: Group met as new Airborne Remote Sensing TWG.

TWG Recommendations

Q3: N/A

Q4: N/A

NEON Response

Q3: N/A

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 meetings were held.

Q4: On Oct 26, 2023 reached out to the TWG via e-mail asking for thoughts on what range of wavelengths and what interval we should use for the switch to a full UV-Vis scan of our water chemistry grab samples.

TWG Recommendations

Q3: N/A

Q4: TWG agreed with our proposal of 240-600 nm at 2 nm intervals.

NEON Response

Q3: N/A

Q4: Will work with the external lab to use this range and interval.

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: 1) Requested RFP reviews for vascular and non-vascular plants and aquatic cell counts.

2) Requested feedback on Decontamination protocol.

3) Sent optimization report and got feedback on the D11 BLUE plant point count optimization.

4) Updated the group on fish depletion sampling analysis.

Q4: 1) Vascular plant and bryophytes identification SOWs were reviewed by one Thilina Surasinghe.

2) Communicated with Jennifer Edmonds on TWG after receiving approval to add blanks to the microbe sampling and SOWs per her recommendation earlier in the year.

3) Emailed TWG in September to look for reviewers for the algae and plant chemistry SOW, but got no responses.

TWG Recommendations

Q3: 1) Got 1 reviewer per RFP, cell count recommendations were to add a field blank.

2) There was no interest in reviewing the Decontamination protocol.

3) For BLUE optimization, most respondents were not in favor of decreasing the number of points sampled but recognized the issues that occur because BLUE is a wide stream, it is more difficult for D11 staff to complete the work in a timely manner.

4) Responses agreed with the NEON approach to sample 1 depletion reach and 3 random reaches.

Q4: TWG agreed with our proposal of 240-600 nm at 2 nm intervals.

NEON Response

Q3: 1) Pursuing OS-IPT approval for microbe blanks.

2) Taking comments to OS-IPT.

Q4: Will work with the external lab to use this range and interval.

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 meetings were held.

Q4:

TWG Recommendations

Q3: N/A

Q4:

NEON Response

Q3: N/A

Q4:

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 meetings were held.

Q4: No meetings were held.

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: Collected input on updating bird species lists provided in the protocol appendices based on NEON data, instead of using the nearest breeding bird survey data. The TWG narrowly supports using only the NEON lists, as opposed to combining them. Also discussed potential paper with Morgan Tingley reviewing the differences between NEON, eBird, and BBS lists.

Q4: No meetings were held.

TWG Recommendations

Q3: N/A

Q4: N/A

NEON Response

Q3: N/A

Q4: N/A

Community Engagement TWG

The Community Engagement Technical Working Group (TWG) provides guidance on the ways in which NEON engages with its existing and potential user community. This includes scientists, educators, and students as well as organizations, agencies, institutions, and companies whose activities align with the mission and goals of the NEON program. Members serve as liaisons to the NEON user community while providing input on the program's strategic engagement plan and the activities and outcomes identified in that plan.

Summary of Activities

Q3: No meetings were held.

Q4: No meetings were held.

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 meetings were held.

Q4: No meetings were held.

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 through workshops, educational materials, and code/data product development.

Summary of Activities

Q3: During the June 2023 meeting, we discussed preparation for the Ecological Forecasting Initiative (EFI) 2023 Unconference at NEON HQ later in the month. TWG member feedback was requested for proposed unconference topics. Freya Olson (Virginia Tech) joined the meeting to provide an update on submissions to the EFI NEON forecasting challenge. During the Aug meeting, Quinn Thomas provided an overview of the EFI 2023 Unconference outcomes and products. Participants worked on 10 projects (total) over two days. The TWG discussed educational resources for including ecological forecasting in the classroom, including NEON tutorials. The TWG discussed forecasting related events and activities that would be occurring at the 2023 Ecological Society of America (ESA) meeting later in Aug. Finally, the group discussed cloud computing and cloud storage, including potential updates to NEON's bucket structure, and issues with HDF5 files being too large to load into memory.

Q4: In a meeting on Aug 1, the TWG reviewed outcomes from the EFI RCN unconference that had occurred in June. Notable deliverables from the Unconference include a GitHub repo with ideas and feedback for projects related to the NEON Ecological Forecasting Challenge, 10 of which were became the focus for break-out groups during the unconference, groups focused on developing processes and/or code, all the projects were forecasting related. The TWG also discussed educational resources for educators who wanted to teach ecological forecasting in undergraduate or graduate classrooms. The TWG also discussed coordination for members attending the ESA conference in Aug. Lastly, the TWG discussed end-of year recommendations to communicate to NEON Science leadership. During the second meeting of the quarter, the TWG continued the discussion about end-of-year recommendations to communicate to NEON leadership.

TWG Recommendations

Q3: 1) Provide an index of files in the NEON public bucket on GCS.

2) Publish unzipped HDF5 files so that data users can take advantage of their cloud-native properties.

These files are difficult to work with in the cloud when zipped.

Q4: 1) NEON should coordinate with the EFI RCN to highlight some summary statistics about NEON forecasting challenge submissions and highlight how the availability of near-real-time data accessibility is facilitating forecasts and changing how data are being used.

2) Prioritize the publication of data in a more cloud-friendly format (e.g., parquet for tabular data, HDF5, etc.), with indexing information available in the file format.

3) NEON should coordinate with the EFI RCN to determine a home for educational material created for the NEON Ecological Forecasting challenge.

NEON Response

Q3: Regarding both 1 and 2, we are open to testing these options (and others) to make NEON data more amenable to cloud-native workflows. We will continue to discuss these issues with the EF TWG to get feedback as we make progress in testing how to serve up NEON data in the cloud.

Q4: 1) This falls within the mission of the data portal team to gather and report NEON usage data from partner organizations. We will follow up in AY2024 to determine if/how we can better harvest NEON usage data from the EFI RCN and report it appropriately.

2) The NEON Science and CI teams have an internal working group exploring these options and will continue to reach out to the EF TWG for advice as we develop our strategy.

3) The TWG will continue to explore options for archiving and making these educational resources available to data users. The NEON code hub provides one potential option.

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: The TWG did not meet this quarter but was engaged over email. First, one member of the TWG gave feedback on a 'request for proposals' package for measurements of foliar chlorophyll and carotenoids. Then, the larger group was asked how to approach a set of foliar samples collected at the Mountain Lake Biological Station (MLBS) site which were accidentally and temporarily frozen when they should have been held at 4C before processing.

Q4: The TWG did not meet this quarter but was asked for input on how to handle a data quality situation revealed while auditing an external lab partner. NEON foliar chlorophyll samples should be maintained at ultra-cold temps, either on dry ice or in -80C freezers, until they are analyzed. However, from 2022 through June 2023, the laboratory that analyzed samples for NEON held them at -20C for 1-7 days before they were extracted and analyzed.

TWG Recommendations

Q3: The TWG member had a few minor clarifications to suggest in the chlorophyll and carotenoids documents. Regarding frozen MLBS foliar samples, the TWG suggested we re-sample as many trees as possible but keep and flag samples from trees that could not be re-collected.

Q4: The TWG lead proposed that all samples would be flagged but the data retained. The TWG concurred with this suggestion. No members had a clear sense of how this storage deviation would impact that data, but thought it could be something NEON tests in the future to help users interpret the flagged results

NEON Response

Q3: Both recommendations were acted upon. The chlorophyll and carotenoids documentation was revised and 7 MLBS trees were re-sampled using the Canopy Foliage Sampling protocol. For these samples, NEON is processing the frozen and non-frozen tissue in order to assess how much this handling may have impacted trait measurements. This may be useful for interpreting results for the 13 non-resampled trees.

Q4: A flag was added to all cfc_chlorophyll records in DP1.10026.001 Plant foliar traits collected between Jan 1, 2022, and June 9, 2023, and an issue log was added to the data product documentation. The TWG lead will follow up with NEON leadership on the idea of testing storage temperature effects on foliar chlorophyll results.

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 meetings were held.

Q4: No meetings were held.

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 No meeting was held in this quarter but input on several documents was requested, including SOPs for a new lab with which we are contracting, soil sampling protocols and SOWs. Several TWG members responded to these requests and provided good input.

Q4: No meetings were held.

TWG Recommendations

Q3: All input from TWG members was considered and where appropriate was incorporated into the documents. For the new lab, a TWG member spotted some potential issues with the protocol proposed.

Q4: N/A

NEON Response

Q3: After more discussion with the new lab group, the protocol was changed to address these concerns.

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: The primary focus of this meeting was to consider possible alternatives to our current approach for mosquito pathogen testing which is yielding diminishing returns given the lack of positive virus tests. The alternatives considered were: 1) Narrowing the focus down to West Nile Virus (WNV) testing at 3 domains. This would involve extra sampling to increase sample sizes of *Culex tarsalis* at 7 sites where positive samples have been detected in North Dakota, Kansas, and Colorado and testing of just that vector species for WNV.

2) Broadening the focus to a more general metagenomics approach to characterize the mosquito virome, including surveillance for novel viruses and assessing ecological determinants of mosquito viral community.

3) Analysis of bloodmeals of any opportunistically captured blood fed mosquitoes to determine the host that was fed upon for improved understanding of vector feeding and mechanistic understanding of vector-borne pathogen transmission. Another focus of the meeting was to determine whether to begin using CO₂ canisters instead of dry ice to bait the mosquito traps.

Q4: No meetings were held.

TWG Recommendations

Q3: The take-home from this discussion is that no single option seems to be 'obviously' the best and that more community survey is needed to narrow down or future approach. Next steps are to create a community survey and share it with our networks as well as the Entomological Society of America. While the focal WNV testing has a narrower focus it has the advantage of data continuity at these sites and more robust data that should enable forecasting/modeling approaches. It was noted that many public health departments are already conducting surveillance data in these high intensity regions so the dataset would be less novel; however, it could be interesting to have comparisons between the data from more urban public health sites and rural NEON sites. It is only the rural western portion of the WNV picture in the US since NEON does not have the samples or data from the urban areas in the east where *Culex pipiens* and *quinquefasciatus* are more important to transmission. The metagenomic analysis enables pathogen surveillance with more sophisticated tools and would be a novel open access dataset; however, the majority of viruses detected would be insect specific and fewer samples could be analyzed due to cost. Additionally, it was noted that the sequencing technologies are evolving

so fast that the 'new' methods may be obsolete in 5 years. The counterargument to this is that the diversity data on insect viruses along with archived genetic sequences will still be valuable. The bloodmeal analysis has a lot of community interest and would be a novel dataset; however very few blood fed mosquitoes are captured with our current trapping methods and the diversity of hosts found in preliminary analyses is low. It was also noted that host feeding patterns of mosquitoes depend on the environmental context, and NEON is not monitoring the environmental abundance of some of these hosts (water birds, cattle etc.).

Q4: N/A

NEON Response

Q3: Next steps are to create a community survey and share it with our networks as well as the Entomological Society of America. A survey to gather feedback from a wider portion of the community is being generated. Additionally, the TWG recommended to move forward with switching the observatory to use CO2 canisters instead of dry ice as bait across all sites in the observatory. We are currently seeking budget approval and hope to implement this change in AY24.

Q4: N/A

Re-aeration TWG

The Re-aeration Technical Working Group provides feedback on NEON re-aeration sampling protocols. The TWG is helping to evaluate previously collected data and develop plans to reduce the frequency of re-aeration experiments by strategically targeting certain discharge ranges to complete k-Q rating curves which can be used by data users to estimate re-aeration. The goal is to phase out the use of sulfur-hexafluoride as tracer gas.

Summary of Activities

Q3: No meetings were held.

Q4: No meetings were held.

TWG Recommendations

Q1: N/A

Q2: N/A

NEON Response

Q1: N/A

Q2: N/A

Remote Sensing Algorithm Design TWG

The Remote Sensing Algorithm Design Technical Working Group consists of a group of remote sensing scientists from academia, federal agencies and labs, and the private sector. The technical working group provides guidance to AOP scientists for implementing improvements in data quality or efficiency to the AOP data products produced in the AOP processing pipeline, as well as discuss enhancements to existing products or new remote sensing data products that would support the objectives of NEON. Primary focus of the group will be on AOP data algorithmic updates to products that have been previously suspended to restore high quality data products on the portal.

Summary of Activities

Q3: 1) We implemented BRDF and topographic corrections on hyperspectral data from six NEON sites with diverse land cover types and contacted over 30 external experts on remote sensing and imaging spectroscopy for their feedback in July 2023. We also uploaded the post-corrected reflectance data and the corrected RGB mosaics for the six sites on a Google Cloud Storage (GCS) bucket for them to download and look at. In our email correspondence, we also shared a draft of the ATBD document for the proposed "Topographic and BRDF corrected reflectance product," clearly explaining the overall workflow for implementing the corrections and the results from applying the correction.

2) The AOP TWG leads, Tristan Goulden, John Musinsky, and Shashi Konduri met to discuss the best way to communicate updates to AOP data products and processing methods going forward and the need for multiple TWGs.

Q4: Group met as new Airborne Remote Sensing TWG.

TWG Recommendations

Q3: 1) We received positive feedback from multiple subject experts about the proposed product, including an interest in accessing the corrected data for the six sites on the GCS bucket. The authors of the FlexBRDF approach (used in developing the corrected reflectance product), Natalie Queally and Zhiwei Ye, expressed excitement about the use of their approach and suggested using an "Edge mask" to drop reflectance data from the edges of flight lines. After running a PCA analysis of the NEON reflectance data, they found some odd reflectance values for the edge pixels in the lower order principal components (7,8,9), which don't seem to be the result of either BRDF or topographic effects and recommended dropping them. They also found that these edge effects are more prominent in the NIR and SWIR ranges of the spectra and not so much in the visual range.

2) We decided to merge the two AOP TWGs, one on Data Quality and the other on Algorithm Design,

into one called "Airborne Remote Sensing" TWG and developed a charter for the new TWG. We also decided to refrain from recruiting any new members for the proposed TWG and instead plan on merging the existing members from the two AOP TWGs.

Q4: N/A

NEON Response

Q3: 1) We could recreate the edge effect based on the inputs received. Per our diagnosis, the edge effect stems from the atmospheric correction step. We also decided to resample the band centers of the 426 wavelength bands to ensure consistency across sites and years using the "wavelength resampling" feature in the FlexBRDF approach. The central wavelength may differ slightly for image data collected in different years due to annual sensor calibration.

2) We will notify the members of both the AOP TWGs about the proposed merger and will coordinate with the NEON outreach team regarding creating the new TWG.

Q4: 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

Q3: Held the inaugural meeting in late May. Majority of the meeting was introduction to NEON, SIM protocol and data, and the TWG charter. The second meeting took place in late July and began a protocol review and discussion which will continue at the next meeting.

Q4: On Oct 5, 2023 we had a TWG meeting to continue the protocol review. The discussion was not completed and will extend to the next meeting.

TWG Recommendations

Q3: Protocol discussion so far has included:

- 1) Capturing more information about the severity of an event, weather by photo or utilizing the scales such as the fire severity appendix.
- 2) Community needs for understanding browsing intensity,
- 3) Wish for more spatial information.
- 4) request for a way to quickly see a summary of events at a site, maybe add the site-specific appendixes back in?
- 5) how to decide to record an event (flood for example) vs impact (flood damage).
- 6) include external researchers names in those human disturbance records to provide links to research happening near NEON sampling.

Q4: The TWG discussed the benefits of photos and what specific eventTypes would benefit, a wish list item to have an easy method to summarize eventTypes per site (community driven git repo?), more details about the benefits of spatial data, and an indepth discussion on how often plots are visited and what is feasible for field science.

NEON Response

Q3: The goal for the next meeting is to summarize and prioritize protocol recommendations.

Q4: The goal for the next meeting is to summarize and prioritize protocol recommendations.

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

Q3: We held a TWG meeting to gather input on the optimization recommendations from the variance partitioning results. We also requested feedback to a survey about BOLD barcoding data and to one final analysis regarding dropping to a maximum of 6 plots at all sites.

Q4: Members of the small mammal TWG were asked to review the rodent pathogen RFP before it was sent out for bidding. Unfortunately, despite asking multiple times no one responded with any reviews.

TWG Recommendations

Q3: Because there was not consistency across species and sites in whether time or space explained more variance, we recommended reducing the number of bouts sampled at core sites from 6 to 4 per year and continuing to sample 4 bouts per year at the gradient sites. The rationale is that this had the least impact on diversity estimates and low impacts on capture-recapture estimates and also will bring the frequency of data collection for core and gradient sites into alignment with each other. The TWG agreed with this assessment and noted that cutting low-capture bouts (e.g. early spring) might make sense since it could be hard to get demographic estimates from lower capture rates. The TWG also agreed with the decision to drop 1-2 plots for a maximum of 6 sampled plots per site based on analysis results showing little impacts to diversity and abundance estimates with this approach. Finally a few TWG members responded to a larger survey about what types of sample to send for barcoding and what data to provide.

Q4: N/A

NEON Response

Q3: The TWG recommendations were recently approved by the OS-IPT (pending feedback about whether to sample for 3 or 4 bouts). A KBA describing these changes will be drafted soon. The results of the barcoding survey are still be compiled but we anticipate adding some information about species ID matches to the NEON data for this data product.

Q4: 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 CO₂ 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: We received a Megapit Soil Archive request for >20 g/sample from, which was reviewed by the TWG.

Q4: No meetings held.

TWG Recommendations

Q3: The TWG recommended approving the request with additional feedback provided to the requester.

Q4: N/A

NEON Response

Q3: The feedback was passed on to the requester and the request was approved. The samples were shipped on 18 Jul 2023.

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: No meetings were held.

Q4: No meetings were held.

TWG Recommendations

Q3: N/A

Q4: N/A

NEON Response

Q3: N/A

Q4: N/A

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: The TWG did not meet this quarter but contributed to several activities over email. First, TWG members reviewed several 'request for proposal' packages for analysis of plant and soil biogeochemical properties. This includes inorganic N in KCl extracts, lignin and macro/micro nutrients in plant tissues, and carbon and nitrogen concentrations and stable isotopes in plants and soils. Additionally, the TWG was asked for input on the sampling approach in forest sites with very woody organic horizons.

Q4: The TWG did not meet this quarter but contributed virtually to two efforts. First, four members reviewed the Soil Sampling protocol that is used to generate soil biogeochemical and microbial data products. Next, the entire group was asked for input on storage container types for plant biogeochemistry archive.

TWG Recommendations

Q3: Many helpful suggestions were put forth by TWG members to improve the request for proposal documentation and update NEON procedures to produce more robust data. Additionally, the members had very useful feedback on how the NEON staff should approach classifying and sampling woody O horizons.

Q4: The members who reviewed the Soil Sampling protocol gave many helpful suggestions to improve and clarify the document. In terms of vessel type for archive samples, several members thought it was OK to stick with plastic scintillation vials as NEON is currently using, but one member made a strong case for switching to glass given the tendency of plastic to become brittle and crack over decadal timescales.

NEON Response

Q3: All TWG feedback was incorporated into the request for proposal documentation. A more explicit approach for sampling woody organic horizons is being included in the NEON Soil Sampling protocol as it is being revised for use in 2024.

Q4: All TWG suggestions were incorporated into a revised version of the Soil Sampling protocol that will be released in time for field season of 2024. The TWG lead will pursue approval to change plant archive storage vessel type from plastic to glass.

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: No meetings were held.

Q4: No meetings were held.

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 meetings were held.

Q4: On 2023-08-01 reached out to the TWG via email to discuss plans to measure VST at BLAN earlier than scheduled, leading to uncertain height measurements due to lack of senescence at BLAN at this time.

TWG Recommendations

Q3: N/A

Q4: TWG recommended to spend a minimum amount of time looking for a good vantage from which to measure the height of a crown. No more than 1-2 min. Make the measurement and compare to the previous value. If current height is > 1 m shorter than previous height, measure again, using a different vantage point if possible/reasonable. If both measurements are > 1 m shorter than the previous value, and no damage is obvious, record in the remarks: "Uncertain height measurement".

NEON Response

Q3: N/A

Q4: Worked with Domain 02 staff to implement TWG recommendation.

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: No meetings held.

Q4: Members of the tick TWG were asked to review the tick pathogen RFP before it was sent out for bidding. Two members offered to help. Solny Adalsteinsson reviewed the document herself and Holly Gaff sent the document to a colleague with more direct experience in the techniques. Holly's colleague thought the proposal was good and had no further comments. Solny had a few minor comments that were directly addressed in the revised RFP.

TWG Recommendations

Q3: N/A

Q4: It was recommended that we clarify details in the RFP related to the frequency of sample shipping and responsibilities around pooling samples.

NEON Response

Q3: N/A

Q4: Text was updated prior to sending to labs for bidding.