NEON Technical Working Groups

2023 Biannual Report Quarter 1 Quarter 2

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National Ecological Observatory Network (NEON) is a project sponsored by the National Science Foundation and proudly 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 (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 first half of the 2023 funding year (November 2022-April 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

Q1: TWG met on Nov. 1. Discussions focused on:

1) the 2022 flight campaign and 2023 campaign preview;

2) Galaxy lidar issues.

3) BRDF correction of AOP reflectance imagery.

4) update on Google Earth Engine (GEE) and GEE tutorials in Learning Hub;

5) NEON response to Pau et al. 2022; and 6) sampling optimizations at sites with significant disturbance.
Q2: No meetings were held.

TWG Recommendations

Q1: 1) AOP should share BRDF corrected datasets for different sites with the TWG for review

2) AOP may want to track usage of remote sensing data in GEE, if possible

3) Kyla Dahlin is willing to review/provide feedback to the NEON response to Pau et al. 2022

4) Andrew Fricker would like to share the SOAP burn severity data with a colleague who has produced soil burn severity data for the area
Q2: N/A

NEON Response

Q1: AOP is investigating the process for sharing samples of BRDF-corrected reflectance data with the TWG. Tristan Goulden has circulated Pau response paper to certain TWG members for review. John Musinsky has shared the GEE script and SOAP burn severity data with Andrew Fricker. NEON science staff and D17 domain staff are scheduling an internal meeting to discuss how best to approach phenological changes at SOAP, and will reach out to local researchers following the results of this meeting.
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 meetings were held.
Q2: Requested review of water chemistry, chlorophyll, nutrients and isotope RFPs.

TWG Recommendations

Q1: N/A
Q2: TWG made several minor suggestions.

NEON Response

Q1: N/A
Q2: Suggestions were incorporated into the water chemistry, nutrients and isotope RFPs.

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 meetings were held.
Q2: 1) Requested troubleshooting for Laragen macroinvertebrate metabarcoding contract.

2) Requested review for chlorophyll RFP.

TWG Recommendations

Q1: N/A
Q2: 1) 1 response from group for metabarcoding, suggestions mostly followed other experts in the field that were contacted in that we may need to consider an update to the primer.

2) No one from this TWG volunteered, found a volunteer from the Aquatic Biogeochemistry TWG

NEON Response

Q1: Algae questions were answered via email, and fish questions were answered via email.
Q2: 1) Response will be incorporated into new RFP.

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: We had discussions with TWG chair Dr. Rich Fiorella about the logistics of incorporating his code update to exclude additional data at the beginning of each averaging interval. We collaborated on a GitHub pull request in the NEON-FIU-Algorithm repository and merged the TWG contributions to our operational processing code.
Q2: No meetings were held.

TWG Recommendations

Q1: There were no additional recommendations this quarter, all work was centered around implementing the recommendations and updates from last quarter.
Q2: N/A

NEON Response

Q1: All CO2 isotope data have been reprocessed with the updated code in preparation for the 2023 data release.
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: The Biorepository TWG met in December 2022. NEON staff provided an update on the status of the NEON Biorepository and solicited feedback on a recent, novel request for a permanent or long-term loan of NEON specimens. The NEON Biorepository proposed that such a loan would support research and education and help foster a community of NEON science supporters and will grow NEON's impact in the longer term. If supported, the NEON Biorepository ask for recommendations from the TWG on the type of loan agreement and any other recommendations.
Q2: No meetings were held.

TWG Recommendations

Q1: The TWG agreed that providing small loans of whole organisms to collaborating institutions would be valuable and encouraged an agreement with the receiving institution that would maintain the data and metadata linkages and enable reporting on sample use as per NSF NEON requirements. The TWG discussed the options of consumptive, permanent, or long-term but time restricted (e.g., 5-year) loans and gifts. Given that NSF or, in some cases, the National Park Service, retains ownership of specimens, a gift was not deemed feasible. The TWG did not support treating it as a consumptive loan. The TWG recommended a repository agreement to define the terms outlining the agreement for the transfer of custody, including addressing issues of ownership and shared an example of such an agreement.
Q2: N/A

NEON Response

Q1: The TWG agreed that providing small loans of whole organisms to collaborating institutions would be valuable and encouraged an agreement with the receiving institution that would maintain the data and metadata linkages and enable reporting on sample use as per NSF NEON requirements. The TWG discussed the options of consumptive, permanent, or long-term but time restricted (e.g., 5-year) loans and gifts. Given that NSF or, in some cases, the National Park Service, retains ownership of specimens, a gift was not deemed feasible. The TWG did not support treating it as a consumptive loan. The TWG recommended a repository agreement to define the terms outlining the agreement for the transfer of custody, including addressing issues of ownership and shared an example of such an agreement.
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: Bird TWG met on Oct 25th, 2022. We discussed the updated online technician protocol quiz, feedback from Bird Conservancy of the Rockies subcontractors provided through the subcontractor survey, and the autonomous recording unit (ARU) Assignable Assets proposal that Justin Kitzes and Morgan Tingley are working on. We also discussed proposed protocol changes for the upcoming 2024 revision. We approved three new members for the TWG beginning in 2023: Jennifer Timmer, Greg Levandoski, and John Quinn, and made minor updates to the charter to reflect a more flexible meeting schedule.
Q2: Reopened discussion of potential ARU AA project with Justin Kitzes and Morgan Tingley. Unknown if they have followed up with the AA team.

TWG Recommendations

Q1: The TWG recommended that NEON proceed with the proposed protocol changes that have been identified so far.
Q2: N/A

NEON Response

Q1: We will continue soliciting feedback on protocol changes as the process continues.
Q2: 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

Q1: Recapped outreach events NEON conducted, including the LTER scientist meetings, data skills webinars, etc. Discussed the AOR recommendations from NSF and what NEON should prioritize out of its strategic engagement pillars.
Q2: No meetings were held

TWG Recommendations

Q1: No official recommendations, but there was an unofficial recommendation regarding what strategic engagement pillars should be prioritized. The TWG felt that data skills is mission critical and should not be cut, but that the TEX program could be dropped and the ambassador program could be re-tweaked so that less time is spent on the program.
Q2: N/A

NEON Response

Q1: We will bring their thoughts to the next EEOC Team meeting and discuss next steps for prioritization.
Q2: 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

Q1: No meetings were held.
Q2: The TWG met 2023-03-10. We discussed the request from the Data Skills team to provide input on cloud computing.

TWG Recommendations

Q1: N/A
Q2: 1) It would be nice to be able to retrieve data via ACCESS Jetstream - investigate ACCESS Maximize to get more resources.

2) Investigate leveraging Cyverse for better tooling and user interface

3) Provide a better timeline for when microbial sequences will be available

4) Provide tools to download joined tables across multiple data products; one use case is to download data by plot id... or at least provide more documentation on how to join data across data products.

5) Require more information from users who want to access data from buckets directly - an API key and rationale.

6) Provide extremely transparent and clear documentation for accessing data from buckets. There is some concern that cloud-based data is already hard to access and understand from NASA's holdings.

7) It is difficult to figure out which orthorectified hyperspectral data to download across large regions. And some information is lost when data are resampled to WGS84 for GEE. No recommendation here, just observations that NEON should consider.

NEON Response

Q1: N/A
Q2: These comments have been relayed to Data Skills, GCP for Science, and AOP team

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: Recruited 4 new members and awaiting confirmations from 2 of those chosen that they will join the TWG.

Blog from Aug - EFI-NEON forecasting challenge in the classroom
https://www.neonscience.org/impact/observatory-blog/efi-neon-forecasting-challenge-classroom

The TWG has been discussion how NEON might work with the EFI RCN to develop a role for Eco Forecasting NEON Ambassadors.

TWG members expressed interest in more guidance on how to get started in teaching Eco forecasting. The TWG might be willing to compile educational resources relevant to NEON and the NEON EF challenge and using NEON for forecasting more broadly.

Many of the TWG members are interested in learning more about educational resources on how to implement Eco Forecasting into teaching. Folks from the EFI community are interested and willing to provide a workshop for the TWG on educational materials and/or how to make and submit a simple forecast to the "competition." This would benefit all parties involved as the TWG members are eager to provide outreach once for NEON and the NEON Forecasting Challenge once they have more hands-on experience.

The TWG recommended raising better awareness of ecological forecasting among outreach liaisons at the domains.

Quinn Thomas (EFI RCN lead-PI) provided updates about synergies between NEON and EFI RCN, including building out the EF challenge to all NEON sites that are possible for all data streams; serving up “targets” for all 47 sites with flux towers, processing every day and making the time series available; viewing the NEON forecasting challenge that is a wrapper around the NEON data products that make data available for forecasting (folks can then decide what sites they want to focus on).

EFI RCN is providing the CI to generate time series (with 5 day latency) and scoring infrastructure. All 47 pheno cams now access aquatics data with 2- day latency. Everything that could be low latency is now exposed via the challenge “target” data. Benefits to the low-latency data that EFI RCN is already realizing include: GLEON - workshop run on Sunday, they will submit forecast, and on Thurs, someone will get a sticker for best forecast; Classes – a course can submit and get feedback multiple times over the course of a semester.

The EFI RCN infrastructure provides a platform to help folks generate and evaluate forecasts using NEON data We will bring their thoughts to the next EEOC Team meeting and discuss next steps for prioritization.
Q2: On 28 Feb 2023, we held a workshop to provide and introduction for TWG members on how to submit a forecast to the Ecological Forecasting Initiative (EFI) NEON forecasting challenge (https://ecoforecast.org/efi-rcn-forecast-challenges/). The workshop was taught by Dr. Freya Olson, a postdoc at Virginia Tech with TWG members EFI RCN steering committee members Cayelan Carey and Quinn Thomas. Olson provided a code-along overview on how to retrieve necessary data, fit a simple model, and submit a forecast for evaluation to the EFI RCN cyberinfrastructure.

On 4 Apr 2023, the TWG met with Claire Lunch (NEON Data Products lead) to hear about NEON's migration to Google Cloud Storage (GCS) for data storage, and how NEON is in the process of migrating compute to Google Cloud Platform (GCP). This meeting provided an opportunity to discuss how NEON can leverage movement to GCS/GCP to best support the user community.

TWG Recommendations

Q1: 1) Develop resources with guidance on how to get started in teaching Eco forecasting. Multiple TWG members are interested in working through macrosystems EDDIE tutorials,

2) Raise awareness among outreach liaisons at domains (and NEON staff at HQ) about the EFI RCN NEON challenge,

3) Work to implement NEON EF ambassadors, likely implemented beginning AY 24, but would need to plan during the upcoming year, and

4) Workshop for EF TWG members (presented by EFI) on how to create and submit a forecast to the challenge… my understanding is it would be ~1.5 hrs and we would each potentially have a submission by the end. This might be a good hands-on opportunity for the TWG and open some opportunities.
Q2: Multiple TWG members were interested in bucket-based access generally, and the possibility of NEON publishing data in parquet formats with a file organization that allows access using Apache Arrow (e.g., the arrow package for R).

NEON Response

Q1: RE1: Multiple TWG members keep expressing interest in a focused meeting on this topic. It could facilitate the development educational resources and/or "ambassadors" for the use of NEON data in forecasting in the classroom.

RE2: This was a blind spot for lead Eric Sokol that the TWG pointed out. At the very least, it would be good to have someone from the EFI RCN give a virtual internal seminar on the challenge for both HQ and Domain staff, so everyone is more aware of the challenge/opportunities. Potentially, some interested folks could also attend the hands-on workshop that EFI is interested in running for the TWG members (item 4 in the list).

RE3: This is an ongoing discussion with NEON science leadership and EFI. We all think it's a really good idea. It all just depends on how the timing for the next cohort for the NEON Ambassador program.

If this opportunity begins to materialize, then the TWG will be able to provide some feedback on how NEON and the EFI RCN implement the program.

RE4: This could be a good focus for a TWG meeting (for interested TWG members) because it would provide a professional development opportunity for the TWG members, but also provide NEON and the EFI RCN with a larger pool of "ambassadors" to promote the use of NEON data in forecasting, with working examples. The TWG would provide a good venue for coordinating outreach opportunities/efforts once the TWG members have some hands-on experience. We could also open the meeting/workshop up to NEON staff (e.g., RE2).
Q2: We have relayed the TWG comments to the NEON Google Cloud Platform Working Group to help inform their planning.

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

Q1: No meetings were held. TWG lead contacted members via email to determine interest in continuing another term. Two members stepped down; all others are continuing. In addition, four new members will be joining for next award year. A kick-off meeting is scheduled for Dec 19, 2022.
Q2: The TWG was engaged twice over email. In the first case, members were asked to give input on high foliar iron values at the BARR site, and whether these were trustworthy data or likely due to soil contamination. For the second request, the TWG was asked to sign up to review 'Request for Proposal' packages. NEON will soon be sending these out to secure contracts with external laboratories for foliar chemistry sample analysis.

TWG Recommendations

Q1: N/A
Q2: Regarding high iron values in BARR tissues, the TWG did not have a definitive answer but did share some literature and personal experiences suggesting the values were plausible. Regarding RFP review, one member signed up to give input on the Pigments analysis package.

NEON Response

Q1: N/A
Q2: Given these initial conversations around high foliar Fe with TWG members, the TWG lead conducted further research and spoke with an expert at Oak Ridge National Lab. The final outcome was that the values were indeed plausible and no flagging for 'soil contamination' was needed. Regarding document review, the TWG lead prepared materials for dissemination. The actual review will occur in the next quarter.

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 meetings were held. We recruited new members and accepted Kayla Perry and Kari Norman.
Q2: No meetings were held.

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: Our TWG met once in Q4. New lead Hugh Cross introduced himself to the group at his first TWG meeting. TWG discussed:

1) NEON development of improved data analysis pipeline;

2) NEON moving to the Google Cloud platform;

3) integration of metagenomic data with NMDC;

4) impact of future technologies on NEON microbial data products; and

5) advancement of proposed plan to develop soil reference standards for long-term data analysis.

Q2: In March, Hugh Cross met with the TWG to go over the results of fungal ITS sequencing development that had been performed by Stefan Green's lab at Rush University in Chicago. Prior to the meeting, Dr Green and I prepared a report on the results of my analysis of the Green lab data and sent it to the TWG. The report and the results were discussed at the meeting, which was joined by Dr. Green, as well as Mary Schrock and Julian Digialleonardo, representing Battelle, and who are responsible for organizing new lab contracts

TWG Recommendations

Q1: 1) Members had some technical suggestions for pipeline development, though more in-depth discussion will come once the pipeline is ready.

2) Members differed on what area of new technologies would be best to pursue, with some pushing for more work on transcriptomics (i.e., extracting RNA instead of DNA from the environment), which has the advantage of studying active processes (RNA degrades fast, so any fragments recovered will represent what is most recent, as opposed to DNA, which can persist a long time in the environment. Others thought that RNA recovery involves a lot of challenges, and long-read sequencing showed more promise soon. As the name implies, long-read sequencing technologies give much longer DNA sequences, which provide greater information, and advances in this field make this a relatively low-cost option. 3) Some of the TWG members had contributed to the original proposal to develop a soil reference standard and were keen to see this completed.

Q2: The response to the report and Dr. Green was overwhelming and all agreed that the Green lab should proceed with taking over fungal ITS sequencing for NEON. A few questions came up over minor technical points, and overall, it was very informative.

NEON Response

Q1: RE1: As TWG lead Hugh Cross continues to develop the data analysis pipeline for google cloud, he will seek out feedback from the TWG.

RE2: As both technologies promoted by the TWG show promise, whether in the near or far term, Cross will be developing small grants to find funding to explore both options. The priority will be on long-read sequencing, as that would be of most benefit for the near term.

RE3: Cross has raised issues with internal NEON working group. While the proposal had been approved (over two years ago), the current funding situation may necessitate putting this on hold for now. If the soil reference standard can be advanced, it would be the first of its kind; it would represent another area in which NEON leads the way:

1) The main priority will be to analyze the Rush fungal samples and discuss these results with the TWG. The analysis of these and other data will also inform the discussion on positive controls.

Q2: Mary Schrock, Julian DiGialleonardo, and Hugh Cross have proceeded to contract the Green lab to run not only the fungal ITS sequencing, but also the bacterial 16S marker gene sequencing. The three of us met with Dr. Green and his lab manager to discuss the specifics. As of this date we are awaiting a final quote but the work should begin soon.

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 meetings were held. We recruited new members and accepted Allison Parker, Chris Stone, and Michael Wimberley.
Q2: We had one meeting and I requested review of the mosquito protocol over email.

TWG Recommendations

Q1: N/A
Q2: The TWG agreed that we can stop reporting the subsample bycatch weight. They also recommended maintaining the cold chain on a subset of Hawaii mosquitoes rather than pinning them all now that greater numbers are collected. The TWG all thought that the data do not warrant continuing with the status quo for mosquito pathogen testing. They thought that even narrowing to a focus on only testing for West Nile virus would be unlikely to yield enough positives to answer meaningful disease ecology questions that require prevalence estimates. Two divergent pathways were discussed for the future, both were major scope changes. The first would be to analyze blood meals from blood fed mosquitoes to understand what hosts were fed upon and provide some of the ecological linkages that are missing from current datasets and that NEON is already monitoring (mammals/birds). The other would be to focus on novel pathogen surveillance via metagenomic sequencing rather than the current PCR-based testing for specific known pathogens.

NEON Response

Q1: N/A
Q2: We will no longer collect bycatch weight from the mosquito taxonomy labs. We are working with the Bishop museum who archives our Hawaii mosquitoes to determine if they have the capacity to maintain the cold chain. We are performing in depth research of three potential paths forward to make changes to the mosquito pathogen testing data product including either: 1) bolstering sampling to provide West Nile virus - focused data product, 2) switching gears to provide bloodmeal analysis of host-feeding data and 3) looking into options for a metagenomics pathogen testing product.

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

Q1: No meetings held.
Q2: Requested review of water isotope RFPs

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

Q1: No meetings held.
Q2: We decided to terminate the LiDAR TWG and start a new TWG focused on Remote Sensing Algorithm Design. All members of the LiDAR TWG agreed to be part of the new TWG. Tristan Goulden reviewed all the member nominations and selected 5 new external members for the Algorithm Design TWG. Shashi Konduri helped create the TWG charter, coordinated with Carol Martin to set up the MS Teams SharePoint site for TWG members to share documents, and reached out to TWG members to fill out a doodle poll for scheduling the TWG meeting. We organized the first TWG meeting for the Algorithm Design TWG on April 11. Topics discussed include updates to canopy height model algorithm, BRDF- and topographic-corrections for the reflectance data, and foliar trait products. We will soon be sharing the BRDF- and topographic-corrected reflectance created for a few NEON sites with the TWG members for their feedback.

TWG Recommendations

Q1: N/A
Q2: The TWG approved all proposed updates to the existing products.

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: N/A
Q2: Reviewed nominations and selected 10 external applicants for the TWG. Set up teams and external webpage.

TWG Recommendations

Q1: N/A
Q2: N/A

NEON Response

Q1: N/A
Q2: N/A

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 meetings were held. We recruited new members and accepted Nick Green.
Q2: Emailed to schedule a Q3 meeting.

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: No meetings were held. We recruited several new members for the coming TWG year: Kyle Jones, Yakun Zhang, John Zobitz, and Santosh Palmate.
Q2: No meetings held.

TWG Recommendations

Q1: N/A
Q2: N/A

NEON Response

Q1: N/A
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 meetings were held. The TWG had an active email discussion (October 14-25, 2022) regarding results from a NEON-led analysis that was recommended by the TWG in a previous discussion. This analysis focused on whether storage fluxes calculated with one tower level missing from the profile due to sampling pump failure could still be used to generate a good Net Surface-Atmosphere flux.
Q2: No meetings were held.

TWG Recommendations

Q1: The TWG recommended that NEON should allow storage fluxes calculated with one level missing to remain unflagged in data processing because the uncertainty resulting from this is far less that would result from data gaps once end users filter out all data with a raised final quality flag. The TWG also recommended that we consider performing the analysis on all NEON data, not only those with sufficient atmospheric turbulence, because of the accumulation that happens within the canopy when turbulence is low that then gets flushed out when turbulence develops again the next morning. Other future directions for this study that were recommended were considering cases where more than one level was missing as well as determining the importance of which level was missing. These recommendations were identified as enhancements and not required to move forward with the NEON data quality flagging change.
Q2: N/A

NEON Response

Q1: NEON implemented a change to the data QA/QC algorithm following the TWG suggestion and this version of the code was used to reprocess data in preparation for the 2023 data release. NEON will consider the recommendations for future work; NEON will aim to work on these collaboratively with the TWG and broader science community.
Q2: 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

Q1: No meetings were held. The TWG lead contacted members via email to determine interest in continuing another term. Only one member stepped down, all others are continuing. In addition, two new members will be joining for next award year. A kick-off meeting is scheduled for Dec 6, 2022. Feedback was requested over email on a proposed process for rinsing specimen cups used for soil inorganic nitrogen extractions. NEON tested ultrapure water vs 5% HCl and determined that, while the acid rinse removed more N contaminant, it was also more complex and time consuming, and the ultrapure water rinse yielded nitrogen levels at or below the detection limit. The TWG was asked if the water rinse was sufficient or if HCl was required.
Q2: Over email, the TWG was asked to sign up to review 'Request for Proposal' packages. NEON will soon be sending these out to secure contracts with external laboratories for terrestrial biogeochemistry sample analysis.

TWG Recommendations

Q1: N/A
Q2: Many TWG members agreed to participate and signed up to review specific analysis types.

NEON Response

Q1: N/A
Q2: The TWG lead prepared the documentation and charge questions for dissemination. The actual reviews will occur in the next quarter.

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: TWG members were presented with Optimization data and report and asked to provide input on best path forward.
Q2: No meetings were held.

TWG Recommendations

Q1: This might still be a work in progress, more details to come. Apologies. There were also numerous emails associated with the meetings.
Q2: N/A

NEON Response

Q1: Science TWG leads are working with science leadership on the best path forward that will yield the best data in the face of funding constraints.
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: No meetings were held.
Q2: Emailed TWG members regarding specific issue of aggrading forest at BLAN site, and proposed actions:
1)Raise the tower (expensive, probably don't have funds...)

2)Accept the flux data quality reduction (would it even make sense to keep collecting the data?)

3)Thin the taller areas of the canopy

TWG Recommendations

Q1: N/A
Q2: TWG members were generally in favor of raising the Tower if we are going to continue to collect eddy flux data at BLAN. Consensus that there is no real purpose to collecting flux data with a tower that is not sufficiently high. There was some support for thinning or cutting the trees if the Tower cannot be raised, but one member felt strongly that if the site no longer meets design criteria, it should be retired and we should collect no flux data.

NEON Response

Q1: N/A
Q2: Passed response to NEON Project Scientist for further evaluation.

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: No meetings held.
Q2: On March 1, 2023 an email was sent about requesting input on using boardwalks at woody wetland tick plots since they could impact mammal behavior

TWG Recommendations

Q1: N/A
Q2: There were few responses to the inquiry. One TWG member thought that any adjustments to the walking surface would impact the immediate area and potentially mammals/ticks so did not have strong recommendations on one being better than any other.

NEON Response

Q1: N/A
Q2: I passed the email response along to Ashley Spink in D05 who is helping coordinate the effort.