

Battelle Response to NEON STEAC Spring 2021 Advisory Report

According to its Bylaws, the STEAC is “primarily an advisory body to the NEON Project and will provide strategic advice to Battelle, the NEON Principal Investigator (PI), and NEON Project staff on the planning, construction, and operation of the NEON Project and other relevant programs.” This response to the STEAC report from April 19 and 21, 2021 also combines the input of several members of the program team responsible for the execution of the NEON project. Battelle appreciates the thoughtful comments that the STEAC provided during their virtual April meeting and the formal recommendations in this Advisory Report. Following are our responses to the key recommendations.

STEAC Recommendations:

- 1. Participation Guidelines: The participation guidelines can be improved by defining the NEON community, specifying when and where guidelines should be followed, describing kind, professional behavior, and having a designated contact to address complaints at all NEON events.**

We appreciate the input of the STEAC on this draft and thank them for the helpful references to other such documents and training programs. We have modified the document to indicate who the NEON community is (anyone who participates in a NEON event and/or otherwise engages with the NEON program) and when and where the guidelines should be followed (in-person events and online spaces). We added the expectation of ‘kind’ and ‘professional’ behavior, and we added that illegal behaviors will be reported to law enforcement. We added a section to describe what will happen to violators of professional guidelines. As presented, the Battelle Ethics Hotline is the appropriate entity to which to report unacceptable behavior, including any that are potentially illegal or unlawful. For behaviors that are disruptive and deter from the goal of the event and the collaborative community the event is intended to build, we are working to set up an internal NEON contact to whom such complaints can be addressed.

- 2. Fostering communication to reduce project redundancy: Amplify and advertise collaborative workspaces (e.g., Slack channels) for NEON data users, for example through coordination with the TWGs and by linking to virtual workspaces on the NEON website.**

We appreciate the STEAC's recognition of the challenge involved in community knowledge transfer to avoid duplication of scientific effort. We agree that supporting community-driven efforts to better connect individuals using NEON data is important, and we appreciate that technologies such as SLACK present at least a better opportunity than the NEON community message board. On the STEAC recommendation, we will terminate the message board and move to incentivize the development of SLACK channels, using, as suggested, the TWGs to help develop these community spaces. We hope to work closely with future NSF Center for Advancement and Synthesis of Open Environmental Data and Sciences to interface the NEON community platform and channels with their planned approach.

3. Data citation: Consider devoting at least some resources to encouragement/enforcement of proper citation of NEON data sets. Outreach to journals, NSF program officers/Data Management Plans, updated data citation guidelines, and modifications of the API and R packages could produce useful results without a major expenditure of time.

As noted by the STEAC, proper citation of publicly available datasets is an ongoing challenge for research networks, and though we now have DOIs for NEON data products, the community still needs to cite them. Through our partnerships with RDA and AGU and others, we are working to encourage author citation. We appreciated the wide-ranging discussion on this topic and recognize that a multi-faceted approach is desirable, including checking papers and interacting with authors and reaching out to journal editors, and we will look into how to implement these. We will relay the STEAC's suggestions to the NSF as recommended.

The STEAC further recommended that [NEON data citation guidelines](#) be updated to provide information about alternative places to reference NEON data products and DOIs outside of the "Literature Cited." We think this is sufficiently addressed but remain open to additional suggestions. Specifically, the current NEON citation guidelines offer two examples of how to cite NEON data, either in the references section or as a table in the manuscript. We feel that this already satisfies the STEAC recommendations but, of course, remain open to alternative suggestions.

The STEAC also recommended that NEON might also consider ways to make it easier for users to assemble the citations/DOIs for the datasets they've used. We appreciate the STEAC's suggestion and have begun looking into ways to provide pre-assembled citations via the API, in addition to the existing citations on data product details pages. We will report back to

the STEAC on the timeline for implementation once we have fully scoped the effort and prioritized it within the software development team's workplan.

4. Engagement: The STEAC commends the development of Domain Specific Engagement Plans and encourages NEON to track metrics that help identify which activities have the greatest impact.

We thank the STEAC for recognizing the recent success with Domain outreach and for understanding the need to balance domain staff commitment. The collection of high-quality data is NEON's top priority, and this is emphasized to the domain staff. We are working to find the balance across this year and tracking metrics of impact through collection of quantitative (via reporting tool) and qualitative data. Currently, NEON's Outreach Coordinator meets monthly with each Domain's Outreach Liaison where they discuss successes, challenges and activities to prioritize in the upcoming month. In October, the Outreach Coordinator will conduct an end-of-year review of engagement for each Domain which will cover engagement metrics (e.g., number of activities, audience types, number of hours dedicated to outreach, etc.), perceived impact of activities, challenges in balancing field work responsibilities, and priorities for engagement over the next year. We have also developed an evaluation plan for the new Thriving Earth Exchange program. The evaluation plan includes periodic surveys asking for feedback from NEON Fellows on their experience and broad program impacts. Lastly, NEON plans to implement a new Customer Relationship Management platform to create customized, interactive dashboards that will allow us to better assess our existing community engagement strategy and ways to improve it moving forward.

5. Visiting Scientist Program: The STEAC recommends that NEON proceed with the Visiting Scientist Program, look for opportunities to provide need-based funding, and consider opportunities for visiting scientists to reside at NEON facilities other than NEON Headquarters.

As per the STEAC recommendation, we will continue development of a NEON Visiting Scientist Program, including pursuing the option of providing limited need-based funding to help offset travel and housing costs. Similar to the call for NEON postdocs, we will seek to enhance the diversity of NEON data users. We will also investigate opportunities for visiting scientists at NEON facilities other than NEON Headquarters. Although we do not anticipate issuing a call for

this program in the near-term, given continuing COVID restrictions, we will move forward with preparations and look forward to continuing to engage the STEAC on these preparations.

6. Biorepository: The STEAC sees good progress and recognizes that in time the repository will be fully discovered and more highly used. The STEAC recommends that NEON think about how to reach out to additional communities likely to leverage these resources (e.g. systematists).

The STEAC suggestion to more closely include the Biorepository in social media is currently being acted upon. The NEON social media team is working on creating posts highlighting the Biorepository in general, as well as specific examples of available sample types. Blog posts involving the Biorepository (including an upcoming one to be published on May 26) are also being highlighted and, when possible and relevant, shared by the Entomological Society of America on their blog. In 2020 and 2021, NEON, including ASU, did co-organize and advertise the webinar around the JGI/EMSEL/FICUS funding call (as suggested by STEAC), and we are open to suggestions on additional means of increasing the reach of such efforts. We are also planning to conduct a webinar focused on Biorepository resources prior to the next NSF Macrosystems program funding call. We agree that focused outreach to systematists is critical and will seek and report back to the STEAC for input on potential additional opportunities. We have been attending meetings for years of such groups as American Society of Mammalogists, iDigBio Digital Data, the Entomological Society of America, and the Biodiversity Information Standards (TDWG) group. In the latest conference attendance plan, we have added, with additional support from the ASU Biorepository staff, participation in the annual meetings of the Society for Integrative and Comparative Biology, Society for the Study of Evolution, and the Society of Systematic Biologists moving forward. We appreciate the STEAC's encouragement to continue the Biorepository's focus on tool development. NEON has indeed acted as a driver for new Symbiota software platform development. While much of this is NEON-specific (e.g., handling the data flow for incoming NEON shipping manifests), other developments focus on improving sample/data access and interconnections. For instance, NEON has motivated the development of a new module to create and publish data associations between samples, specimens, and derivative products (DNA, trait data, images, etc.). In this sense, NEON is focusing the Biorepository team to innovate and refine new functions relative to samples managed in the portal that are consistent with the "extended specimen concept" that is being promoted through the greater biodiversity data community.

7. Training materials: The STEAC is supportive of the idea of NEON sharing training materials with the wider community.

We are excited that the STEAC encourages sharing our ‘impressive’ internal training materials with the wider community. We agree that the effort would promote positive outcomes, including the ones itemized such as encouraging the collection of more standardized, interoperable, and NEON-compatible data across the community, helping users better use and interpret NEON data (i.e., details about protocols), and being used more broadly in the training of future ecologists (e.g., in field or lab courses). We are interested in exploring the suggestions to consider offsetting the costs of training by charging for training.

In the short term, we will pursue supporting NEON TEX Fellow proposals that include training community members on use of NEON protocols. The majority of TEX proposals are still in development, but two that are moving ahead involve water chemistry sampling and training. With minimal resources, we can re-work the video and presentation components of our training content for this protocol for external use. Feedback on these materials from our TEX Fellows and the program participants can help inform our next steps for developing a comprehensive plan for sharing our training externally. Another early step in this process, is to identify and prioritize our target audience for external training, and STEAC advice will be very valuable in this effort. In the long term, we will develop an actionable plan on how best to launch a full external training program for this target audience.

8. Battelle NEON responses to other STEAC comments and suggestions:

- a. We were pleased to report on our collaborative work with Environmental Data Initiative (EDI) to facilitate data discovery and integration across biodiversity datasets from the LTER program and NEON. We fully agree that the noted synthesis activities will surface needs and positively drive the science of the community. We see the future NSF Center for Advancement and Synthesis of Open Environmental Data and Sciences as taking on this role in the future.
- b. We appreciated the STEAC’s attention to ways to make an individual PI’s Assignable Asset data more available and discussion on this topic with the NSF program officer (Dr. Roberts). As directed by Dr. Roberts, the STEAC provided several recommendations. Regarding the first, that NEON should explore standards that AA PIs could voluntarily adopt that would allow such data to achieve a higher level of FAIRness, we agree that the default expectation on an AA

project should be that data are delivered to PIs using formats, names, and units that maximize interoperability with NEON data – and that embargo time periods should follow community standards. The STEAC also suggested that NEON should point users to EDI or some other open repository that is interoperable with NEON so that the existence and location of AA data could be made discoverable from within the NEON CI. NEON is actively collaborating with EDI to define the requisite infrastructure to enable this functionality and provide explicit guidance for users. A draft of these guidelines was provided to the STEAC and will be discussed further in a future meeting. Finally, the STEAC suggested that a TWG could be tasked with developing standards for metadata that would facilitate the discoverability of any AA data collected at a NEON. NEON staff have been working with a Data Standards TWG for years to assist with request such as these. The guidance we ultimately provide to AA users will be vetted through this group prior to publication.

- c. We also appreciate the STEAC's suggestion that having periodic meetups of NEON users at conferences and other events could help build communities. We do often assemble TWG members together at such events, alongside the formal organized sessions, town halls, and workshops we organize. We will explore less structured and inexpensive meet-ups. We look forward to further exploring the options and ideas that the STEAC have to potentially revise our strategy to date.