NATIONAL ECOLOGICAL OBSERVATORY NETWORK (NEON)
www.neonscience.org/

National Ecological Observatory Network Funding
(Dollars in Millions)

			Change over FY 2023 Base Plan	
FY 2023 Base Plan	FY 2024 (TBD)	FY 2025 Request	Amount	Percent
$71.71	-	$82.02	$10.31	14.4%

Brief Description

Funded and overseen in the Directorate for Biological Sciences, NEON is the first observatory of its kind, designed to foster and enable advances in the basic understanding of the complexities of life on Earth at a continental scale, from organisms and populations to the biosphere and from seconds to decades. NEON is designed to operate for 30 years from start of full operations (May 2019). The NEON infrastructure is distributed across the United States (including Alaska, Hawaii, and Puerto Rico), and includes 20 regional eco-climatic domains. NEON collects standardized observations on plants, animals, and biogeochemistry in air, land, and water at 81 sites across these domains using three approaches: on-the-ground organismal sampling, automated instrument measurements, and airborne remote sensing surveys. Following collection and processing of data from instrument and observational systems, NEON makes up to 182 data products available on a centralized portal that is free for all to access and use; it also makes available data tutorials, code packages, and other resources that enable use of NEON data by scientists and the community at large throughout the U.S. and the world. The NEON Biorepository at Arizona State University houses samples and specimens collected at field sites, which are available to the research community, along with the associated metadata.

Meeting Scientific Community Needs

NEON is transforming environmental research by enabling researchers to study the complexity of ecological interactions in natural and human systems, including the impacts of climate and land use change, invasive species, and infectious diseases. Access to large, standardized datasets that inform complex statistical and predictive models allows the synthesis of ecological observations to achieve unprecedented broad-scale understanding, and ecological forecasts. NEON data have informed research that has led to over 800 publications from over 3,659 authors located across 82 countries.

NEON is broadening participation through democratizing access to free and open data and supporting workforce development. NEON leverages its vast geographical footprint to foster numerous high impact outreach and education activities throughout the U.S., including in almost 40 percent of the EPSCoR jurisdictions and at many minority serving institutions. NEON's success at outreach and training is fueled by the Data Institutes, Code Hubs, Tutorials, Teaching Modules, and Faculty Mentoring Networks that it develops and supports.

NEON has fostered partnerships to enable the scaling of its impact through increased data discoverability, accessibility, and interoperability. For example, collaboration with NCAR brought together members of the atmospheric science and ecological communities to advance the capability

of Earth system prediction through the incorporation of terrestrial ecosystem, including biological data, in advanced Earth System models. This partnership, which now includes NSF CI Compass, aims to link NCAR's Community Earth System Model (CESM) and the Community Land Model (CLM) with NEON's tower, soil, and plant measurement data to enable new synergies at the intersection of ecology and Earth science. In addition, NEON is a member of the Global Ecosystem Research Infrastructure partnership, which is dedicated to better understanding ecosystems globally through harmonization and integration of data.

Status of the Facility

Four years into operations, data are being collected as planned at all 81 NEON terrestrial and aquatic sites across the 20 eco-climatic domains. The overall trend in use of NEON data and engagement activities continues to increase. Despite supply chain challenges, which can impact the delivery of infrastructure subsystems or materials required for the ongoing maintenance and operations, and thus the overall functionality of the Observatory, all 18 Domain Support Facilities and the NEON Headquarters in Boulder, Colorado are fully open. Additional challenges with hiring have impacted NEON's operations and engagement activities. Nonetheless, the latter have continued and included presentations, site tours, conference attendance, trainings, and outreach through social media, and in-person and virtual workshops. The groups engaged during these events are from different educational and/or career stages, diverse geographic areas within the U.S., and multiple demographic groups and institution types.

Governance Structure and Partnerships

NSF Governance Structure

Oversight from NSF is led by a program officer in the Division of Biological Infrastructure (DBI) who works cooperatively with staff from BFA's Research Infrastructure Office and Division of Acquisition and Cooperative Support, the Office of the General Counsel, and the Office of Legislative and Public Affairs. The BIO Office of the Assistant Director and the Chief Officer for Research Facilities also provide high-level guidance, support, and oversight.

External Governance Structure

Within Battelle, the NEON Chief Scientist provides overall scientific leadership and serves as the Principal Investigator. A Science, Technology, and Education Advisory Committee (STEAC) and the NEON Innovation Advisory Council, both composed of members of the NEON user community, provide strategic guidance and advice to Battelle, and help ensure that NEON will enable frontier research and education. The work of the STEAC is complemented by that of several Technical Working Groups, comprising over 170 science, education, and engineering experts, that advise Battelle on technical aspects of the project and other issues that have scientific, educational, engineering, or operational implications.

Partnerships and Other Funding Sources

Several federal agencies (the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the Department of Energy, the United States Forest Service, the Environmental Protection Agency, the United States Department of Agriculture, the National Park Service, the Bureau of Land Management, the United States Geological Survey) provide significant in-kind services, including sites for deployment of NEON infrastructure. Formal agreements of

cooperation have been signed with the European Union, including the Integrated Carbon Observing System Ecosystem Thematic Center, Infrastructure for Analysis and Experimentation on Ecosystems, and Czech Climate Change Research Center, and Australia's Terrestrial Ecosystem Research Network. Areas of coordination with the above include planning, design, construction, deployment, environmental assessment, data management, geospatial data exchange, cyberinfrastructure, research, and modeling. Nongovernment Organizations, including the Ecological Society of America, the American Geophysical Union, and the American Indian Higher Education Consortium are assisting to broaden the impact of NEON science and education to the next generation of scientists and educators.

Funding

Total Obligations for NEON
(Dollars in Millions)

				ESTIMATES[1]				
	FY 2023 Base Plan[2]	FY 2024 (TBD)	FY 2025 Request	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Operations & Maintenance	$71.71	-	$82.02	$84.00	$86.60	$90.20	$92.91	$92.91

[1] Outyear estimates are for planning purposes only. The current cooperative agreement ends in October 2028.

The NEON program in the BIO Directorate provides all support for operations, which is estimated at approximately $82.02 million in FY 2025, and includes ongoing recapitalization efforts for NEON sensors and vehicles. Operations and maintenance (O&M) support began in FY 2014. In August 2017, a supplemental operations award was authorized. On November 1, 2023, following the re-competition of NEON O&M, a new 5-year award was made.

Reviews and Reports

The 2022 annual operations review (AOR) focused on Battelle's performance through October 31, 2022, as well as the forthcoming CY 2023 Annual Work Plan (AWP). The panel of external expert reviewers focused primarily on the migration of NEON data to the Google Cloud, sensor and instrumentation life-cycle management, and overall approaches to risk management across the facility. Progress against the annual program plan and towards implementation of review recommendations is also monitored by BIO via monthly teleconferences, triannual interim operations reports, an annual report, and site visits as needed. Due to the competition of NEON O&M between 2021 and 2023, the August 2023 AOR was held internal to NSF and focused on the proposed CY 2024 AWP integrating external recommendations from the proposal reviewed as part of the competition. In addition, a separate closeout review was held that focused on award closeout and the anticipated final spenddown plan for the previous award.

Renewal/Recompetition/Disposition

Funding of the last O&M award was approved (August 2017) for four years, beginning on November 1, 2017 (costs not-to-exceed $262.5 million). That award was extended by two additional years through October 31, 2023 ($138.4M) to accommodate the ongoing competition that was delayed by the COVID-19 pandemic.

The new award for NEON O&M was put in place November 1, 2023 (costs not-to-exceed $420M) and will support the facility for 5 years. Currently there are no plans to dispose of this facility.