

What NEON Is

The National Ecological Observatory Network (NEON) is a continental-scale research platform for discovering and understanding the impacts of climate change, land-use change, and invasive species on ecology.

NEON will gather long-term data on ecological responses of the biosphere to changes in land use and climate, and on feedbacks with the geosphere, hydrosphere, and atmosphere.

NEON is a national observatory, not a collection of regional observatories. It will consist of distributed sensor networks and experiments, linked by advanced cyberinfrastructure to record and archive ecological data for at least 30 years. Using standardized protocols and an open data policy, NEON will gather essential data for developing the scientific understanding and theory required to manage the nation's ecological challenges.

NEON Benefits

Society depends on ecosystems in the same way it depends on the weather, water resources, and agriculture. Long-term NEON data will allow better ecological forecasting to optimize natural resource management and provide early warning of biological natural hazards.

NEON will support the first continental-scale comparisons of research transects focused on some of the nation's most pressing ecological challenges:

- Continental-scale climate change
- Effects of urban and exurban development
- Forest management
- Agriculture and biofuels
- Invasive species and infectious disease
- Climate change effects through the water cycle (rain or snow, permafrost, runoff)
- Nitrogen deposition
- Ecohydrology

NEON will also enable better understanding of the management and impacts of biofuels, watersheds, grazing lands, coastal ecosystems, and other vital systems. The Observatory will provide data streams for next-generation ecological forecasting capability, catalyzing the use of ecological forecasts for resource decisions and adaptive management in a range of situations. NEON will support an early warning system for the impacts of climate change, invasive species, and emerging diseases.

NEON education is fully integrated with the Observatory science program. It is designed to translate scientific data into meaningful information that citizens can understand and use. It will provide the environment for people to collaborate, investigate, and learn. NEON education will also support the professional development opportunities that scientists and educators need to become more effective researchers and teachers.

Where is NEON?

After considering community responses to its Request for Information, NEON, Inc., has proposed Candidate Core Sites for each ecoclimatic domain in the network. Preliminary site visits are under way to further evaluate the scientific and logistical issues associated with these proposed locations.

How NEON Works

NEON partitions the United States into 20 ecoclimatic domains using a statistical analysis of ecoclimatic state variables and wind vectors. Each domain hosts one fully instrumented NEON Candidate Core Site located in a wildland area. Collectively, the domains represent ecological and climate variability across the continental United States, Alaska, Hawaii, and Puerto Rico.

Every NEON Candidate Core Site includes a standard set of instruments to collect biological, biophysical, biogeochemical, and land-use and land-management data. A variety of instrument packages will be deployed:

- The Fundamental Instrument Unit consists of fixed towers supported by sensor arrays. It will provide comprehensive data on climate and canopy microclimate, air pollution and air quality, carbon cycle, soil characteristics, and water quality.
- The Fundamental Sentinel Unit will measure soil and aquatic biochemistry and track patterns and changes in organisms, including small mammals, insects, birds, fish, soil microbes, plants, and algae.
- The Relocatable Tower System is a suite of instruments that can be moved to collect data outside the fixed Core Sites. Relocatable Tower Systems will support extended and periodic campaigns that expand measurements of environmental variability and gather ecological data along gradients of elevation, precipitation, and land use. They will be deployed for several months to several years, then relocated as needed.
- Rapid Deployment Systems (instruments on vehicles or towed by vehicles) will be used to study sudden events on the landscape, such as wildfires, natural catastrophes, disease outbreaks, or the emergence of an invasive species. They can also be used to conduct social research and will serve as an educational resource. They can be deployed for a few days or for several months.



1. Northeast site anchored at the Harvard Forest, Petersham, MA
2. Mid-Atlantic site (to be determined)
3. Southeast site based at the Ordway-Swisher Biological Station, Gainesville, FL
4. Atlantic Neotropical site located at the Guánica Forest, Puerto Rico
5. Great Lakes site (to be determined)
6. Prairie Peninsula site at the Konza Prairie Biological Station, Manhattan, KS
7. Appalachians/Cumberland Plateau site located in the Walker Branch Watershed, Oak Ridge, TN
8. Ozarks Complex site anchored in the Talladega National Forest, AL
9. Northern Plains site at the Woodworth Field Station, ND
10. Central Plains site at the Central Plains Experimental Range, CO
11. Southern Plains site located at the LBJ Grasslands, TX
12. Northern Rockies site based in the Yellowstone Northern Range, WY
13. Southern Rockies–Colorado Plateau site at Niwot Ridge, CO
14. Desert Southwest site anchored at the Santa Rita Experimental Range, AZ
15. Great Basin site located at Onaqui-Benmore, UT
16. Pacific Northwest site at the Wind River Experimental Forest, WA
17. Pacific Southwest site based at the San Joaquin Experimental Range, CA
18. Tundra site at Toolik Lake, AK
19. Taiga site located at Caribou-Poker Creeks Research Watershed, AK
20. Pacific Neotropical site anchored at the Laupahoehoe Forest Unit of the Hawaii Experimental Tropical Forest, HI

The Airborne Observation Platform with remote sensing instruments will provide regional information for scaling and extrapolation from sites. The Land Use Analysis Package will support comprehensive assessment and analysis of patterns, changes, and drivers of land use, land cover, and land management. In addition, NEON is considering experiments conducted at a strategically chosen set of sites across domains. Experiments will operate at various time horizons, using coordinated measurements and standardized infrastructure (such as rainout shelters) so that differences in responses across ecoclimatic domains can be studied.

Why NEON?

The National Research Council has identified seven environmental Grand Challenges for the United States: biodiversity, biogeochemical cycles, climate change, hydroecology, infectious disease, invasive species, and land use. NEON addresses these challenges by gathering data focused on two overarching questions:

- How are ecosystems across the United States affected by changes in climate, land use, and invasive species over time? How do they respond and at what rates?
- How do biogeochemistry, biodiversity, hydroecology, and biotic structure and function interact with changes in climate, land use, and invasive species across the nation? How do these feedbacks vary with ecological context and scale over time?

NEON is a critical step toward forecasting how ecosystems and organisms interact with changes in climate and land use, and what the impact of these changes might be on people and their enterprises. NEON data will be readily available to researchers, teachers and students, and all citizens with an interest in ecological science and environmental processes.

NEON will be a sentinel system for environmental change, a national laboratory focused on understanding complex ecological processes at the continental scale. It will be the first initiative in the biological sciences considered by the National Science Foundation’s Major Research Equipment and Facilities Construction fund. NEON is designed to serve as a US terrestrial contribution to the proposed Global Earth Observation System of Systems.

NEON Memberships

More than 50 US and Canadian universities, national laboratories, and scientific organizations have been approved as Founding and Institutional Members of NEON. A recently added NEON founding member is the Science and Engineering Alliance (SEA), a nonprofit educational consortium dedicated to creating opportunities for the access and inclusion of historically black colleges and universities in the federal R & D enterprise. The SEA will facilitate the involvement of minority- serving institutions in NEON ecological research. For a current list of member organizations and details about becoming a NEON Institutional Member, see www.neoninc.org

NEON Partnerships

Partners are integral to all NEON activities. The Observatory is currently forging partnerships with US federal agencies—for example, the US Geological Survey, National Park Service, US Department of Agriculture Forest Service, National Oceanic and Atmospheric Administration, and the National Aeronautics and Space Administration—to prepare for coordinated research and logistical activities and effective sharing of data resources.



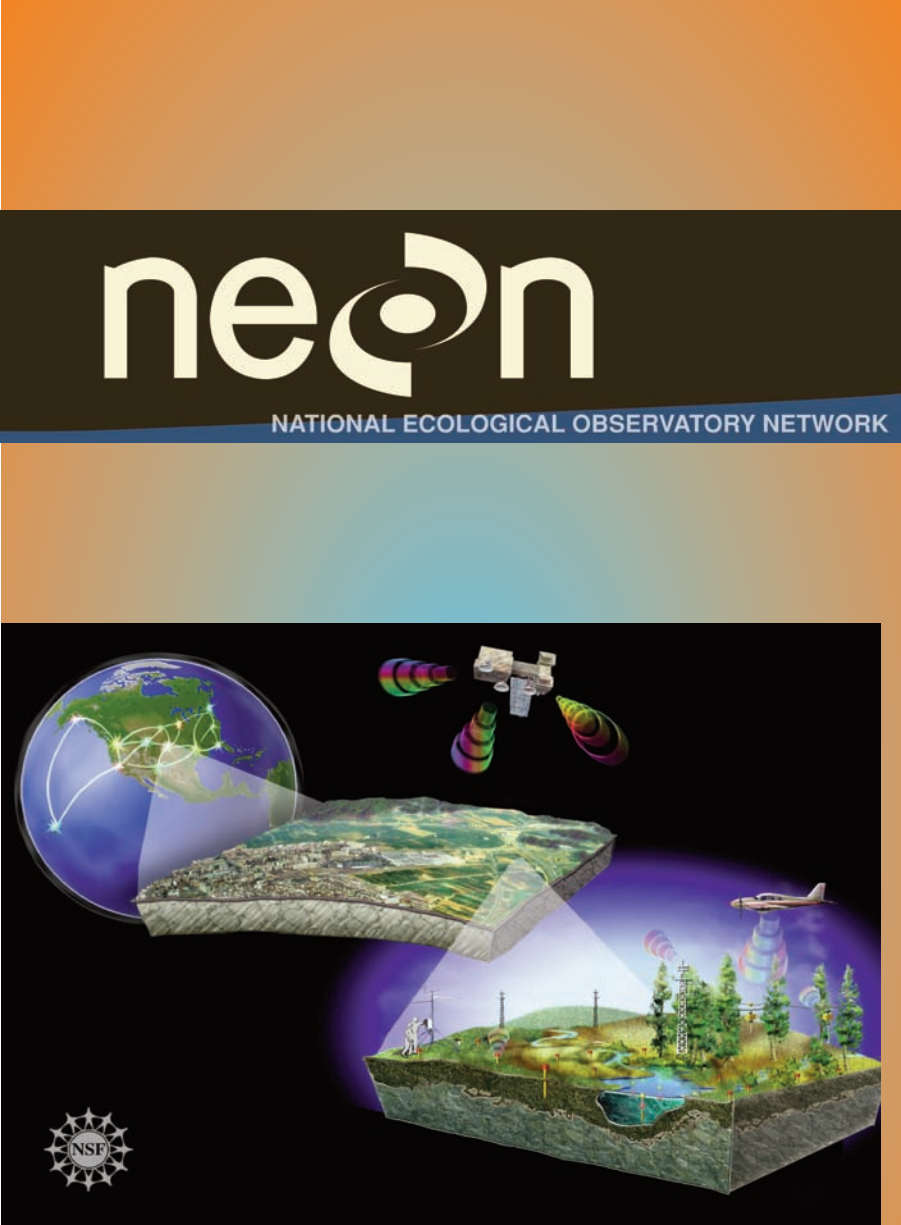
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**A Sentinel System
 for Ecological Change**