National Science Foundation
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Finding of No Significant Impact:
National Ecological Observatory Network (NEON) Environmental Assessment

The National Science Foundation (NSF) prepared an Environmental Assessment (EA) that evaluates the potential environmental and socioeconomic impacts associated with construction and operation of a National Ecological Observatory Network (NEON), a tool that would allow scientists to analyze, understand, and forecast the nature and pace of biological change at scales ranging from local to continental. It is widely recognized that greater understanding of ecological systems is possible, but only if site-based research can be placed into a larger, more integrated regional or continental context. The attached EA, which is incorporated by reference, was prepared pursuant to U.S. Council on Environmental Quality (CEQ) regulations (Title 40, U.S. Code, Parts 1500-1508) for implementing the procedural requirements of National Environmental Policy Act (NEPA) and 45 Code of Federal Regulations (CFR) 640 for NSF's compliance with the NEPA.

During preparation of the EA, it was determined that no action alternatives other than the Proposed Action would satisfy the scientific purpose and need of the Proposed Action without substantially compromising the science mission and objectives. Accordingly, only the Proposed Action and No Action Alternative were evaluated. The Proposed Action was determined to be the Environmentally Preferred Alternative consistent with definition provided in NEPA and the National Park Service (NPS) Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making and its accompanying Handbook.

Purpose and Need for NEON

The biosphere is the living part of Earth. It is one of the planet's most complex systems, with countless internal interactions among its components and external interactions with the Earth's physical processes and its oceanic and atmospheric environments. A wide range of biotic and physical processes link the biosphere, geosphere, hydrosphere, and atmosphere. Despite this, the understanding of the biosphere does not match the increasingly sophisticated understanding of Earth's physical and chemical systems at regional, continental, and global scales.

The overall purpose of NEON is to provide an integrated research tool for scientists to achieve a better understanding of the biosphere and processes operating at large scales. Further, NEON would establish and sustain the scientific infrastructure needed for research to address critical questions about the effects of land use and climate changes on ecological systems and to evaluate the impacts of those changes on the environment and human culture.

The process for identifying, considering, and selecting sites for deployment of NEON infrastructure considered hundreds of potential sites, involved hundreds of stakeholders, and included multiple evaluation stages. The process has been lengthy, thorough, scientifically and statistically based, considered construction and operations costs and logistics, and included evaluation of environmental considerations at all development stages. Establishing the site criteria and the selection and review processes involved research community workshops, Blue Ribbon committees, and National Research Council (NRC) and NSF merit reviews. NEON, Inc. reviewed all proposed locations with regard to scientific suitability, practicality, and environmental conditions and selected the proposed Core, Relocatable, Aquatic, and STREON Sites. As a result, a single action alternative that would meet the scientific objectives of the NEON Project, in addition to the No Action Alternative, was evaluated in the EA.

Action Alternative for the Proposed NEON Project

Under the Proposed Action, the NSF would establish a continental-scale network of long-term ecological infrastructure deployments called the National Ecological Observatory Network (NEON). The NEON Project would develop the capability to address all the NRC-identified Grand Environmental Challenges in an integrated fashion across the continent. The design divides the U.S. into 20 domains, encompassing the range of environmental variability of the U.S. Collectively, the domains evaluated for the NEON Project represent ecological and climate variability across the continental United States, Alaska, Hawai'i, and Puerto Rico (Figure 1).

Within each domain, the regional footprint would include field study sites and associated field and laboratory facilities. The network of deployments would form a fully integrated continental-scale research platform. Each NEON domain would include multiple components (Table 1), although not all components may be present in each domain.

TABLE 1
Project Components [a]
National Ecological Observatory Network (NEON)

Project Component	Description
Core Site (typically 1 per Domain)	NEON Core Sites would include a standard set of instruments to collect biological, biophysical, biogeochemical, and land use and land management data, three towers, a panelized modular enclosure called an instrument hut, and in some cases an Aquatic Array. A variety of data collection packages would be deployed as subsystems. Core sites would be operational for 30 years.
Relocatable Sites (typically 2 per Domain)	Relocatable Sites would consist of a suite of instruments that could be moved to collect data outside the fixed Core Sites and would include a single Fundamental Instrument Unit (FIU) Tower with fewer Fundamental Sentinel Unit (FSU) sampling plots and productivity transects than Core Sites. Relocatable Sites would be located up to 300 kilometers (km) from a Core Site and would be initially deployed for 5 years at a given location.
Mobile Deployment Platforms (MDPs), total of 10	MDPs consist of instruments on vehicles or on trailers towed by vehicles that would be used to study sudden events on the landscape, such as wildfires, natural catastrophes, disease outbreaks, or the emergence of an invasive species. MDPs would be deployed from a few days to several months at any given location.

TABLE 1
Project Components [a]
National Ecological Observatory Network (NEON)

Project Component	Description
Aquatic Arrays	Aquatic Arrays would be placed in and adjacent to streams or lakes to automatically monitor stream physical, chemical, and biological properties. Each Aquatic Array would collect data from a 500-meter (m) stream reach or comparable lake area. Dataloggers would either store data for download or automatically transmit data to a support facility.
Aerial Observation Platforms (AOPs), total of 2	AOPs would include two aircraft equipped with remote sensing instruments that would provide regional information for scaling and extrapolation. Each domain would be flown once per year during the growing season.
Stream Observatory Network (STREON) Sites, total of 10	STREON experiments would provide an assessment of ecosystem response to predicted future conditions by accelerating known drivers of ecosystem structure and function. STREON experiments would be long-term experiments, planned to be conducted over a 10-year time period.

[a] Components listed above are discussed in detail in Section 2.2.1 of the EA.

NEON is designed to collect data on the natural world and allow scientists to achieve a better understanding of ecosystem-level systems and processes. To that end, NEON, Inc. must minimize the effect on the environment or risk compromising the integrity of the data collected. NEON would include project design features and Best Management Practices (BMPs) to avoid or minimize impacts to the extent practicable.

No Action Alternative

Under the No Action Alternative, the NSF would not fund construction of the NEON network. If NEON is not constructed, the scientific community would not have the opportunity to address many of the nation's most pressing environmental challenges. Without NEON, the capability to conduct ecological research at regional and continental scales would be lost. Without this Project, there would be inability to understand the impacts of land use and climatic change on living systems and loss of ability to provide a predictive understanding of ecological change.

Without the Project, the current design and site locations described in the EA, that were designed to have the highest potential for community and public impact, would not be developed. NEON, Inc. would not develop the capability to address all the NRC identified Grand Environmental Challenges in an integrated fashion across the continent. If the No Action Alternative were chosen, a significant resource for positively impacting multiple scientific, engineering, environmental education, land management, and conservation components of the research community and society at large would be lost.

CEQ regulations for implementing NEPA require consideration of the No Action Alternative (40 CFR 1502.14(d)); therefore, the No Action Alternative is evaluated in the EA. The No Action Alternative would not satisfy the need for the Proposed Action. Inclusion of the No Action Alternative serves as a benchmark for evaluating the potential effects of the Proposed Action.

Public Involvement

The NSF invited public participation in the proposed federal action through the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. All agencies, organizations, and

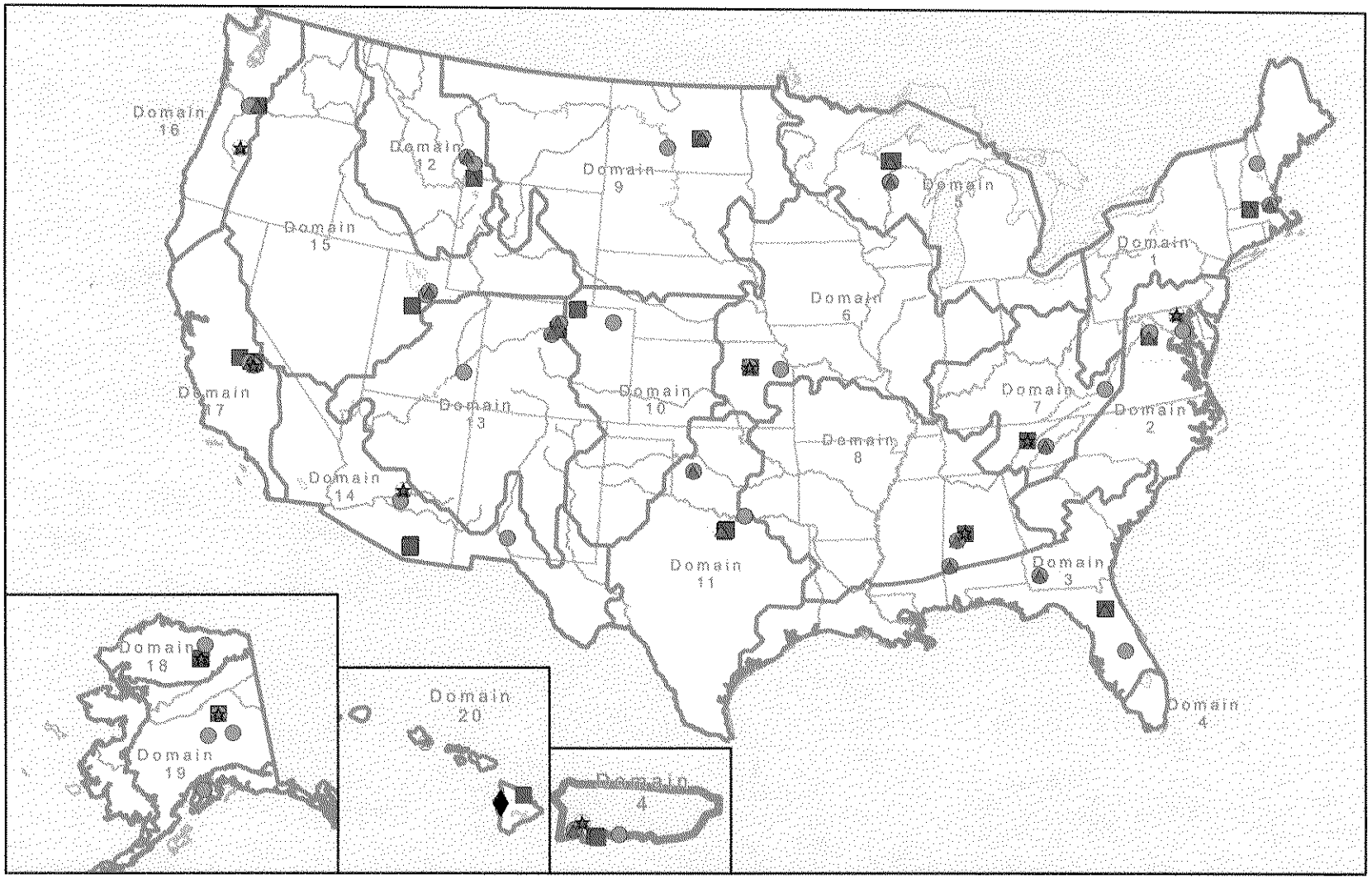

Figure 1
Proposed Site Location Overview
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members of the public having a potential interest in the Proposed Action, including Native American organizations and minority, low-income, and disadvantaged groups, were urged to participate in the decision-making process.

For almost two decades, the ecological sciences research community has been calling for the national ecological research and observation capability (Long Term Ecological Research [LTER], 1990; American Institute of Biological Sciences [AIBS], 2003; NEON, 2006) needed to promote understanding of the biosphere. Two NRC reports, *Grand Challenges in Environmental Science* (2001) and *NEON: Addressing the Nation's Environmental Challenges* (2003), identify Grand Environmental Challenges and the associated research questions that are critically important to address now, cannot be addressed with existing research infrastructure, and require environmental measurements on a regional to continental scale. From 2000 through 2007, the design for this capability evolved through 47 workshops conducted by the research community, the AIBS, the Ecological Society of America, and NEON, Inc. to identify the key scientific questions and hypotheses related to each Grand Challenge area. In this process, the technological and scientific requirements associated with those questions and hypotheses were developed. Since 2007, the design has been refined, re-scoped, and optimized for research on regional to continental-scale ecological questions, thereby enabling the development of the field of large-scale ecology. The scientific, technical, and deployment requirements were derived through additional planning and design activities by NEON, Inc., including a Request for Information and Evaluation Workshops, site visits, and research community evaluation (see: www.NEONInc.org for details).

The process for identifying, considering, and selecting sites for deployment of NEON infrastructure considered hundreds of potential sites, involved hundreds of stakeholders, and included multiple evaluation stages. The process has been lengthy, thorough, scientifically and statistically based, considered construction and operations costs and logistics, and included evaluation of environmental considerations at all development stages. Establishing the site criteria and the selection and review processes has involved research community workshops, Blue Ribbon committees, and NRC and NSF merit reviews. The Site Selection Process is described in detail in Section 2.1 of the EA.

The NSF held two public meetings, one in Arlington, Virginia on September 15, 2009, and the other in Boulder, Colorado on September 17, 2009, to provide public participation opportunities with respect to this EA. The Preliminary Final EA was made available to the public for comment for a period of 30 days. At the end of the 30-day public review period, the NSF considered all comments submitted by individuals, agencies, or organizations. Generally, very few comments were received on the NEON EA. Comments were received from several organizations and agencies such as the NPS and the Central Utah Water Conservancy District suggesting specific revisions in the EA to improve the accuracy of specific domain descriptions in the EA. Comments were also received from individuals and organizations in Domain 20 regarding infrastructure requirements and general impacts. Further, specific comments were received from organizations in Domain 4 to provide clarification on geologic and hydrologic conditions. A few additional comments were received from individuals regarding visual impacts of the Project in specific domains. As

appropriate, the EA was revised to address the comments. In all cases, NSF provided responses to the verbal and written comments submitted to NSF. Comments received and NSF's responses are included in Addendum A of the Final EA. NSF determined that implementation would not result in significant impacts and is executing this Finding of No Significant Impact.

Environmental Consequences

The NEON EA analyzed the potential environmental and socioeconomic impacts that would result from implementation of NEON. The analysis examined construction and installation of proposed NEON infrastructure and subsequent operation by NEON, Inc. for 30 years at Core Sites and 5 years at initial Relocatable Sites. The specific resource areas that are evaluated in the EA are described in detail in Section 3.3 of the EA. The detailed evaluation of Environmental Consequences is presented in Section 3.5 of the EA. The analysis also considered potential impacts that would result from decommissioning NEON infrastructure at the close of the Project. Based on the analysis in this EA and with the condition that appropriate project design features and BMPs would be implemented as needed and additional agency coordination would be completed where necessary, NSF has determined that implementation of NEON would result in no significant impacts to the natural or human environment and would have no effect on public health and safety, land use, topography, hydrogeology and groundwater, demographics, and community resources in any of the 20 domains. Implementation of BMPs would minimize impacts to wetlands, floodplains, and ecological receptors.

The NEON Project is not considered controversial, nor would it result in unique or unknown risks. The Project does not establish a precedent for future actions with significant efforts, nor does it involve significant cumulative effects. Based on this analysis, NSF has determined that implementation of NEON would have no significant impacts which would require analysis in an Environmental Impact Statement (EIS). It also was determined that, even though NEON would not result in a change in demographics, there would be minor short-term and long-term beneficial impacts to the local economies of the areas where infrastructure would be placed through secondary spending by construction crews, maintenance technicians, and researchers. The following paragraphs summarize the environmental consequences of each of the remaining resource areas evaluated in the EA. Unless otherwise noted, the following discussion applies to all 20 Domains evaluated in the EA. Any differences between the domains are pointed out in the following discussion.

Land Use, Topography, Hydrogeology and Groundwater, Demographics, and Community Resources: Analysis indicated that NEON would have no effect on land use, topography, hydrogeology and groundwater, demographics, and community resources in any of the 20 domains. It also was determined that, even though NEON would not result in a change in demographics, there would be minor short-term and long-term beneficial impacts to the local economies in the areas where infrastructure would be placed through secondary spending by construction crews, maintenance technicians, and researchers.

Hydrology and Hazardous and Toxic Substances: NEON would have negligible adverse impacts on hydrology and hazardous and toxic substances that would be similar across all 20 domains. NEON, Inc. would develop and implement spill prevention, control, and countermeasures (SPCC) plans at all sites where hazardous and toxic materials or fuel

would be stored to minimize the potential for adverse impacts. NEON, Inc. also would implement appropriate BMPs, as discussed in Section 2.2.2, to reduce the potential for hydrologic impacts. With the implementation of appropriate BMPs and project design features, impacts to hydrology and hazardous and toxic substances would be less than significant.

Geology: While the Project would have no impact on the underlying geology in any domain, NEON, Inc. would have to account for karst terrain in Domains 3, 4, and 7 and the potential for seismic activity in Domains 4, 17, 18, 19 and 20 in the design and construction of infrastructure. Where NEON infrastructure would be placed in karst terrain, NEON, Inc. would design to avoid sites prone to sinkhole development and would implement appropriate BMPs, as discussed in Section 2.2.2, to reduce the potential for indirect impacts to water quality from runoff entering karst systems. NEON, Inc. would implement designs for infrastructure in Domain 18 and 19 that would minimize the potential for impacts to permafrost areas and that would not contribute to permafrost thawing. In areas where the potential for strong earthquakes is present, NEON, Inc. would design infrastructure to withstand greater stresses from movement of the Earth.

Soils: Implementation of NEON would have minor temporary adverse impacts on soils. For Domains 11 – 14 and 18 - 20, less than 0.01 hectare (ha) would be disturbed. For Domains 1 – 10 and 15 – 17, soils disturbance would be greater than 0.01 ha primarily due to additional disturbance from the extension of utility lines along existing roadways. In these Domains, it is anticipated that soils along existing roadways would have been previously disturbed in most cases. Upon completion of NEON, infrastructure would be removed and the area restored. In areas with sensitive soils (wetlands and arid regions with biological soil crusts), NEON, Inc. would incorporate boardwalks into site design to minimize the potential for impacts during construction and subsequent long-term impacts as a result of data collection and maintenance. It is anticipated that Boardwalks will be used in Domains 1, 3, 5, 12, 13, 15, 18 and 19 to minimize impacts to sensitive soils. In permafrost areas, construction and transport of materials would be done during the time of year when the ground is covered with snow to avoid damage to the sensitive permafrost soils. With the implementation of appropriate BMPs and other project design features, impacts to soils would be less than significant.

Climate: Proposed activities would have no potential to impact climate, but there are areas where NEON, Inc. would have to account for extreme climatic conditions in design and construction of NEON infrastructure. In areas of extreme cold, NEON infrastructure would have to be capable of withstanding the severe winter conditions. In addition, fuel for the two primary generators in Domain 18 would have to remain functional at extremely cold temperatures. In permafrost areas, construction and transport of materials would be done during the time of year when the ground is covered with snow to avoid damage to the sensitive permafrost soils. In areas subject to oceanic storm surge, NEON infrastructure would not be placed in areas where storm surge would be likely. Where extreme lightning events are common, appropriate grounding of equipment and transmission lines would be used to minimize the potential for damage. Domains with the potential for extreme lightning include the following: 3, 4, 6, 8, 9, 10, 12, 13, 14 and 15. With the implementation of appropriate project design features and the anticipation of potential extreme weather-

related events, climate-related impacts associated with NEON infrastructure would be less than significant.

Air Quality: NEON would have minor adverse temporary impacts on air quality in all domains from equipment and vehicle emissions and generation of fugitive dust during construction and operation. During peak sampling periods, up to seven vehicle trips per day would be expected at each site, with four or fewer trips per day anticipated at other times, including construction. This small number of vehicle trips would have a negligible impact on air quality. NEON, Inc. would implement appropriate BMPs, as discussed in Section 2.2.2, to reduce the potential for fugitive dust generation during construction. Routine maintenance throughout the duration of NEON would keep the three primary generators in Domains 13 and 18 and one standby generators in Domain 4 running efficiently and minimize emissions during operation. The operation of primary generators would produce the most emissions during operation, but the amount of emissions at any given location would be minimal.

Airspace: Where NEON infrastructure would be near Federal Aviation Administration (FAA)-regulated airfields, NEON, Inc. would coordinate with FAA in design of infrastructure to be compliant with all applicable FAA regulations and guidance. NEON, Inc. also would obtain any permits or approvals required by FAA in advance of construction. Domains 2, 9, 14, 15 and 20 contain FAA regulated airspace. No impacts on airspace would result.

Noise: There would be short-term negligible direct noise impacts to onsite workers and minor direct noise impacts to wildlife from construction of NEON infrastructure. These impacts would also occur during removal of NEON infrastructure: after 5 years at Relocatable Sites and 30 years at Core Sites. During the operation of NEON, long-term minor impacts to persons and wildlife occupying the area would result from the noise created by the three primary generators, one standby generator, and vehicles used to access sites for data collection. AOP overflights may be a nuisance to persons visiting or occupying the area. Generators and vehicles may be a nuisance to humans visiting the area. Any impacts from noise would be less than significant.

Water Quality: Construction of NEON infrastructure could have the potential to impact water quality during construction from sedimentation or transport of nutrients or other pollutants into receiving waters. During operation of NEON, spills of fuel or chemicals associated with NEON operations would have the potential to introduce contaminants to receiving waters. NEON, Inc. would develop and implement SPCC plans at all sites where fuel or chemicals would be stored to minimize the potential for adverse impacts. In STREON experiments, small concentrations of nitrogen and phosphorus would be added to streams for up to 10 years at a given site. STREON experiments would be carried out in the following Domains: 2, 4, 6, 7, 8, 14, 16, 17, 18 and 19. NEON, Inc. would obtain any necessary permits in advance of construction or STREON experiments, and would comply with all permit conditions during construction and STREON experiments. With the implementation of appropriate BMPs and other project design features, impacts to water quality would be less than significant.

Wetlands: During the final design stage, NEON, Inc. would plan sites to avoid placing infrastructure in wetlands except where necessary to meet scientific goals for data collection

in Domains 1, 3, and 9 or where unavoidable to provide access or power across a wetland necessary to reach an instrument location. During construction, NEON, Inc. would make site-specific adjustments to further minimize any unavoidable encroachment into wetlands. In addition, NEON, Inc. would minimize the size of proposed infrastructure within wetlands by placing support infrastructure outside of wetlands and only placing necessary data collection infrastructure within a wetland. NEON, Inc. also would implement appropriate BMPs, as discussed in Section 2.2.2, to reduce the potential for direct and indirect impacts to wetlands during construction. Where routine access across wetlands is necessary, NEON, Inc. would construct boardwalks to minimize disturbance to wetland soils and vegetation from data collection and maintenance activities. Any emplacement of infrastructure in wetlands would be done in consultation with the U.S. Army Corps of Engineers (USACE).

Floodplains: During the final design stage, NEON, Inc. would plan sites to avoid placing infrastructure in floodplains and other flood prone areas except where necessary to meet scientific goals (data collection from within a stream or site within a floodplain) or where unavoidable (access across floodplains and other flood prone areas necessary to reach instrument location for access or power). During construction, NEON would make site-specific adjustments to further minimize any unavoidable encroachment into floodplains and flood prone areas. When flooding is forecast for an area, NEON, Inc. would temporarily remove sampling equipment from streams and floodplains. Any emplacement of infrastructure in floodplains would be done in consultation with USACE. All infrastructure placed in floodplains and flood prone areas would be removed at project closure and the disturbed areas would be restored. While impacts to floodplains and other flood prone areas would be minimized to the extent practicable, there would be unavoidable minor impacts to wetlands as a result of NEON construction and operation.

Common Vegetation and Plant Communities: Construction, access, and consumptive sampling would have the potential to impact common vegetation and plant communities. Minor clearing of common vegetation would occur to place towers and instrument pads, instrument huts, utility lines, and boardwalks. These impacts would be long-term, lasting until NEON closure, when infrastructure would be removed and vegetation restored. With the implementation of appropriate BMPs and other project design features, impacts to vegetation would be long-term, but less than significant.

Common Fauna: Minor direct impacts to wildlife (i.e., common fauna) could occur from construction and operation of NEON infrastructure. Disturbance would be limited to less than 0.01 ha at any one location. Negligible indirect impacts to wildlife could result from loss of habitat. During construction, wildlife would likely be displaced from construction areas and immediately adjacent areas. Animals would likely return to the areas following construction. No disruption of wildlife breeding would be expected. No population-level impacts would occur. With the implementation of appropriate BMPs and other project design features, impacts to common fauna would be less than significant.

Sensitive Ecological Communities: Impacts to sensitive ecological communities would occur only when NEON infrastructure is placed within a sensitive community specifically to collect data on that community type or when NEON infrastructure is placed within a larger area designated as critical habitat for a species listed under the Endangered Species Act (ESA). Domains 6, 16 and 20 do contain critical habitat designations near proposed NEON

infrastructure. In compliance with the ESA, NEON, Inc. would consult with the U.S. Fish and Wildlife Service (USFWS) prior to any disturbance or alteration of designated critical habitat.

Impacts to sensitive species would be similar to those described for common vegetation and fauna. No population-level impacts to sensitive species would occur. With the implementation of appropriate BMPs and other project design features, and consultation with USFWS where appropriate, impacts to sensitive ecological communities would be less than significant.

Cultural Resources: NEON, Inc. worked with property managers and NSF examined archival records for geomorphologic history, settlement history, and cartographic review within the study areas. According to the archival research, no NEON features would have a significant impact on known cultural resources. NEON, Inc. would select the final position of infrastructure at a site to avoid adverse effects on significant cultural resources, if such resources exist. If infrastructure positioning is unable to avoid impacts to significant cultural resources, as determined in consultation with the State Historic Preservation Office (SHPO) and others, any adverse effects would be mitigated in compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA).

Utilities: NEON would not overly burden the electric power or telecommunications systems or other utilities in any domain. Where there is insufficient existing electrical power infrastructure at the proposed Relocatable Tower in the Moab Desert of Domain 13, the Toolik Lake Core Site (Domain 18), and the Relocatable Tower (R-35) in Domain 18, NEON, Inc. would install and operate generators to provide a full-time power supply. NEON, Inc. would extend existing transmission lines to provide service at the proposed locations. Any impacts to utilities would be less than significant.

Transportation: Construction would be completed in approximately 6 months with a crew of up to 10 workers plus oversight personnel from NEON, Inc. Workers would carpool and construction-related vehicle trips would not be expected to exceed four trips per day. Construction vehicle trips would have a negligible impact on traffic at any proposed NEON location. Similar impacts would be expected at site closure. Minor improvements to field roads would not impact transportation in the region. No new roads would be constructed.

Human Health and Safety: There would be the potential for construction and maintenance workers to injure themselves, which would pose a minor, short-term impact to human health and safety. As appropriate, NEON, Inc. would require that workers follow standard safety practices for the type of work being performed, and would require that workers adopt suitable safety measures, as appropriate, for working at heights, near fall hazards, during cold or hot weather, and around electrical hazards to minimize risk of injury. NEON, Inc. would develop site-specific safety policies, procedures, and plans to address unique hazardous conditions at different locations.

Environmental Justice: Construction and operation of NEON infrastructure would not disproportionately impact minority or low-income populations. All direct impacts would be confined to the proposed locations, where minority or low-income populations do not occur. While there would be limited loss of areas for subsistence hunting and fishing due to NEON, the total area made unavailable would be small at any given location and the impact

on subsistence hunting and fishing would be negligible. Any Environmental Justice impacts would be negligible.

Protection of Children: Where NEON towers would be placed in areas with easy access by unsupervised children, there could be a temptation to try to climb the tower. However, access to the tower would be restricted with secure fencing and locked gates. As a result, no pathway for direct exposure to an environmental health or safety risk would be available to children. No impacts to the environmental health and safety of children would occur. Any impacts related to protection of children would be less than significant.

Recreation: Recreational opportunities at and adjacent to NEON construction sites in nearly all Domains would be constrained for the duration of construction. After construction, recreational activities would not occur on NEON tower sites. However, the area that would be withdrawn from potential recreational use would be small in any one area and the impact on recreation would be negligible.

Aesthetics or Visual Resources: Implementation of NEON would not cause impacts to aesthetics or visual resources in most locations. Towers and powerlines would be the most prominent features added to the visual landscape. Infrastructure typically would be placed in areas that are not routinely viewed for aesthetic quality or in urban lands where aesthetic quality is impaired. Where NEON infrastructure is proposed near national parks or other areas (Domains 7, 10, 12, 13 and 18) where aesthetic and visual resources are important, NEON, Inc. would work with the land manager to eliminate or limit the potential for adverse impacts on visual quality through location of infrastructure and to further reduce impacts by painting infrastructure to blend with the background. Where possible, infrastructure would be located in areas where it would not be visible from usual scenic viewing areas. Where avoidance would not be possible, the locations were selected such that NEON infrastructure would not be a dominant feature of the view from usual scenic viewing areas or co-located with other anthropogenic features, such as along roadways. Impacts to aesthetic and visual resources would be less than significant.

Cumulative Impacts: The environmental effects of NEON would be predominantly short-term, associated with construction, and generally limited to each local NEON site. The NEON site and deployment plans were designed to have minimal individual or cumulative effects. Such modification of the physical and biological environment would compromise the value of ecological observatory data and undermine the fundamental purpose of NEON. Accordingly, there is limited potential for NEON impacts to accrue significantly with those of other past, present, or reasonably foreseeable future actions and result in adverse cumulative impacts.

With implementation of project design features and BMPs (Table 2) specified in the EA and completion of additional site-specific permitting in advance of NEON implementation (discussed below), no significant negative environmental or socioeconomic consequences were identified in the EA as a result of the Proposed Action, including construction and day-to-day operation of the facilities. Site selection minimized and avoided impacts to the extent practicable. Table 1 summarizes BMPs and project design features that would be implemented during project construction to further reduce environmental impacts.

TABLE 2
Project Design Features and Best Management Practices to be Implemented with the Proposed Action
National Ecological Observatory Network (NEON)

Resource Area	Project Design Features/Best Management Practices [a]
Hydrology and Hazardous and Toxic Substances	• Develop and implement SPCC plans at all sites where hazardous and toxic materials or fuel would be stored. • Store toxic materials or fuel to minimize the potential for adverse impacts.
Geology	• Design to avoid sites prone to sinkhole development where NEON infrastructure would be placed in karst terrain. • Implement appropriate BMPs, as discussed under Water Quality, to reduce the potential for indirect impacts to water quality from runoff entering karst systems. • Implement designs for infrastructure in Domain 18 that would minimize the potential for impacts to permafrost and that would not contribute to permafrost thawing. • Design infrastructure to withstand greater stresses from movement of the Earth in areas where the potential for strong earthquakes is present.
Soils	• Use proper erosion, sedimentation, and pollution control plan. • Install silt fencing. • Install retention areas. • Install energy dissipaters. • Install slope breaks along trenched utility lines. • Place ground cover over disturbed soils; where practicable, use vegetative debris created during clearing of paths and project footprint for ground cover and mulch. • Conserve topsoil and use in revegetation and site restoration. • Install erosion control geotextile blankets or jute mesh on steeper slopes and areas with highly erodible soils; use netting that contains biodegradable thread with strands that can move independently (gauze weave) where appropriate to reduce the potential for nontarget impact to snakes from entrapment. • Revegetate disturbed areas as soon as practicable using native seed where feasible or required.
Climate	• In areas of extreme cold, ensure that NEON infrastructure would be capable of withstanding the severe winter conditions. • In permafrost areas, perform construction and transport of materials during the time of year when the ground is covered with snow to avoid damage to the sensitive permafrost soils. • In areas subject to oceanic storm surge, avoid placing NEON in areas where storm surge would be likely. • Where extreme lightning events are common, use appropriate grounding of equipment and transmission lines to minimize the potential for damage.
Air Quality	• Use car- and vanpooling to minimize the number of vehicles and vehicle trips. • Implement measures to reduce the potential for fugitive dust generation during construction. • Obtain and comply with necessary permits to install and operate primary and standby generators.
Air Space	• Coordinate with FAA in design of infrastructure to be compliant with all applicable FAA regulations and guidance. • Obtain any permits or approvals required by FAA in advance of construction. • Coordinate timing and routes of AOP overflights with the FAA and any military installations or other secure air facilities.
Noise	• Use noise-shielded generators (operational noise less than or equal to 70 a-weighted decibels [dBA]) as primary power source to reduce potential disturbance to humans and wildlife from noise of primary generator operation at the three locations where primary generators are proposed.

TABLE 2
Project Design Features and Best Management Practices to be Implemented with the Proposed Action
National Ecological Observatory Network (NEON)

Resource Area	Project Design Features/Best Management Practices [a]
Water Quality	• Install silt fencing. • Install infiltration areas. • Install sedimentation basins. • Install energy dissipaters. • Install slope breaks along trenched utility lines. • Revegetate disturbed areas as soon as practicable using native seed where feasible or required. • Maintain a filter strip of undisturbed soil, vegetation, and forest litter between an area of exposed soils and a body of water or wetland. • Install storm drain inlet protection in areas with storm sewers.
Wetlands	• Use mats to prevent compaction and rutting when working in wetlands. Mats may be stacked if the wetland is deeper than the thickness of one mat. • On sites in permafrost areas, complete construction during frozen conditions. • Use boardwalks for site access to prevent damage to the underlying wetland or permafrost from traffic to these locations.
Floodplains	• Avoid placing infrastructure in floodplains and other flood prone areas except where necessary to meet scientific goals. • Make site-specific adjustments during construction to further minimize any unavoidable encroachment into floodplains and flood prone areas. • Minimize the size of proposed infrastructure within floodplains and other flood prone areas. • Develop and implement SPCC plans at all sites where fuel or chemicals would be stored adjacent to or upslope from floodplains and other flood prone areas to minimize the potential for adverse impacts from accidental spills. • Where routine access across regularly flooded areas is necessary, construct boardwalks to facilitate access for data collection and maintenance activities. • For equipment that must be placed in floodplains and other flood prone areas, secure the equipment to prevent washing away or temporarily remove it in advance of flood events. • Remove all infrastructure placed in floodplains and flood prone areas at project closure and restore the disturbed areas.
Common Vegetation and Plant Communities	• Select Core Sites where the infrastructure in place requires minimal upgrading to meet NEON requirements. • Develop and implement SPCC plans. • Select Core Sites and Relocatable Sites near established access routes. • Use species native to a specific area for revegetation of disturbed soils. • Use certified seed-free straw and mulch to minimize the potential for spread of exotic invasive plant species. • Use certified weed-free gravel, rock, and soil backfill material for all proposed national park sites.
Common Fauna	• Develop site-specific animal welfare plans prior to implementation of small mammal trapping at tower locations. • Develop and implement SPCC plans. • Place daytime visual markers on guy wires in areas of known raptor or waterbird concentration, daily movement routes, major diurnal migratory bird movement routes, and stopover sites to minimize potential for collisions by these diurnally moving species. • If a tower is taller than 60 m, install lights for aviation safety designed to minimize the potential risk to birds.

TABLE 2
Project Design Features and Best Management Practices to be Implemented with the Proposed Action
National Ecological Observatory Network (NEON)

Resource Area	Project Design Features/Best Management Practices [a]
Sensitive Ecological Communities	• Identify and avoid habitat components (such as larval host plants) necessary for completion of life history of sensitive species. • If potential impacts to state listed species could not be avoided, coordinate with the appropriate state agency prior to action at that site. • If potential impacts to a sensitive species designated by the land management agency could not be avoided, coordinate with the land management agency prior to action at that site. • If potential impacts to federally protected species could not be avoided, consult with USFWS prior to action at that site. • If necessary, move infrastructure short distances to avoid impacts to sensitive species. • Enhance natural revegetation through use of propagules of native species collected from within 2.5 km of the proposed NEON infrastructure. • Clean vehicles and equipment to remove invasive species propagules prior to entry into sensitive habitats. • In consultation with the land manager, promptly control invasive exotic species that become established on areas disturbed by NEON, Inc. during construction. • Use surface conduits to extend utility service through sensitive habitats. • Construct boardwalks and bridges to reduce the impact from trampling to access sites in sensitive areas.
Cultural Resources	• Select the final position of infrastructure at a site to avoid adverse effects on cultural resources listed in or eligible for listing in the National Register of Historic Places (NRHP). • If infrastructure positioning is unable to avoid impacts to cultural resources listed in or eligible for listing in the NRHP, implement mitigation as required by the SHPO.
Utilities	• NEON would not overly burden the electric power or telecommunications systems in any domain. • Extend existing transmission lines to provide service at the proposed locations.
Transportation	• Select Core Sites and Relocatable Sites near established access routes. • Use car- and vanpooling to minimize the number of vehicles and vehicle trips.
Human Health and Safety	• As appropriate, require that workers follow standard safety practices for the type of work being performed. • Require that workers adopt suitable safety measures, as appropriate, for working at heights, near fall hazards, during cold or hot weather, and around electrical hazards to minimize risk of injury. • Develop site-specific safety policies, procedures, and plans to address unique hazardous conditions at different locations. • Secure towers with fencing and locked gates to deter unauthorized access. • Clearly mark and flag guy wires to reduce the potential for accidental collision.
Environmental Justice	• Construction and operation of NEON infrastructure would not disproportionately impact minority or low-income populations.
Protection of Children	• Restrict access to the towers with secure fencing and locked gates.
Recreation	• Install water bars angled across trails to divert water from trails. • Use cross-drainage techniques, such as swales, and culverts or open-top culverts to divert water from trails as soon as possible. • Install deflectors, including rubber belting fastened to treated timbers, placed in the ground to deflect water from trails.

TABLE 2
Project Design Features and Best Management Practices to be Implemented with the Proposed Action
National Ecological Observatory Network (NEON)

Resource Area	Project Design Features/Best Management Practices [a]
Aesthetic or Visual Resources	• Where possible, locate infrastructure in areas where it would not be visible from usual scenic viewing areas. • Use non-reflective materials. • Paint the infrastructure to reduce visibility.
Cumulative Impacts	• No adverse cumulative impacts would occur during the operation of NEON.

[a] Additional measures may be developed and implemented as part of the site-specific permitting process.

Permitting

Section 5.0 of the EA evaluates permits required for the NEON Project separately for each domain. National Pollutant Discharge Elimination System (NPDES) permits would be required for implementation of the NEON Project in the 10 domains where STREON experiments would release nutrients into waters of the U.S. over multiple years. These domains include 2, 4, 6, 7, 8, 14, 15, 16, 17, and 19. In situations where NEON sampling would involve animal trapping or collection, individual researchers would develop an animal handling plan that would be approved by the institution with which the researcher is affiliated and all appropriate state or federal regulatory authorities. Where NEON facilities would connect with existing electrical power or telecommunications infrastructure, NEON, Inc. would coordinate with existing providers for authorization of extensions and connections. A Special Use Permit, or other agency-specific permit, would be required to place proposed towers and associated infrastructure in select domains. A Special Use Permit, Scientific Collection Permit, or other agency-specific permit would be required to place proposed towers and associated infrastructure in select domains. Such permits may be required from the U.S. Forest Service (USFS), NPS, USFWS, or Bureau of Land Management (BLM).

NEON, Inc. would obtain all necessary permits and authorizations prior to construction, conducting destructive (harvest) sampling, and implementing manipulative experiments on waterways. Further, NEON, Inc. would comply with all permit conditions, including those associated with Section 7 of the Endangered Species Act, the Clean Water Act, the NPDES, and Scientific Collection Permits. The EA also includes a discussion of the phased approach to be used for maintaining compliance with Section 106 of the NHPA (covered in 36 CFR § 800.4(b)(2)). Where additional site-specific data are needed to determine the extent of impacts, NEON, Inc. would coordinate with appropriate regulatory agencies, collect any needed data, and implement any specified mitigation required by agencies.

The NPS Director's Order 12 and its accompanying NPS handbook outline the procedures by which the NPS carries out its responsibilities under NEPA. To fully comply with NPS Director's Order 12, the NPS may require additional site-specific NEPA documentation of that portion of the action that would be constructed and operated on NPS property.

The Hawai'i Environmental Policy Act of 1974 (Hawai'i Revised Statutes 343, HEPA) requires analysis for any action that proposes to use state lands. The NEON sites proposed

for Domain 20 would be located on state lands. Because of the national scope of the proposed NEON Project, the analysis prepared in this document to meet the requirements of NEPA may not fully satisfy the requirements of HEPA with regard to state concerns. This NEPA analysis may be used to supplement the HEPA process.

The NEON Project would be implemented over a period of years and permitting requirements may change from those discussed in the analysis in this EA. Prior to construction and then operation at a site, NEON, Inc. would verify that all appropriate permits have been obtained and would comply with any additional permitting requirements not specified in this EA.

Conclusion

Based on the analysis in this EA, NSF has determined that implementation of NEON, with the condition that appropriate project design features and BMPs would be implemented as needed and additional agency coordination would be completed where necessary, would result in no significant impacts to the natural or human environment. Therefore, a Finding of No Significant Impact is issued for the Proposed Action and no EIS is required.

Joan P Roskoski 12/9/09

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Acting Assistant Director
Biological Sciences Directorate

Date