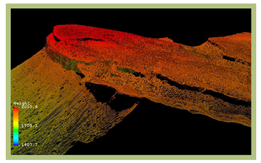
NEON DOMAINS

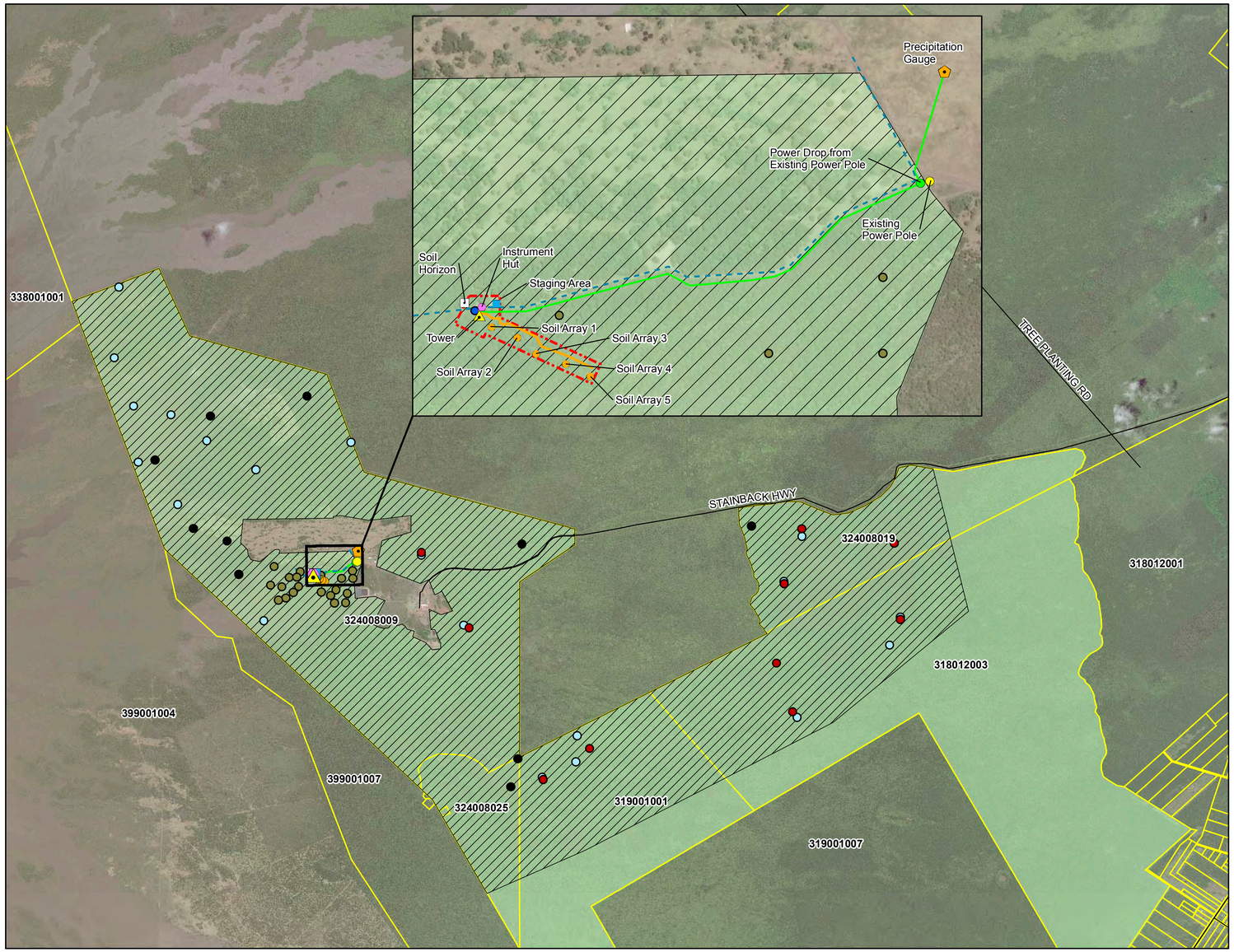


neon | National Ecological Observatory Network

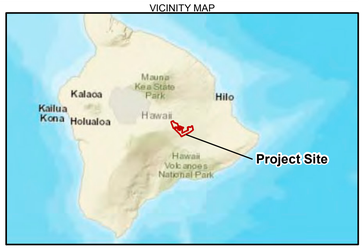
The National Ecological Observatory Network is a program sponsored by the National Science Foundation and operated under cooperative agreement by Battelle.

BATTELLE

PROPOSED FIELD SITE LAYOUT FOR DOMAIN 20



VICINITY MAP



LEGEND

- Precipitation Gauge
- Tower
- Instrument Hut
- Staging Area
- Soil Horizon
- Soil Array
- Existing Power Pole
- Power Drop from Existing Power Pole
- On-grade Electrical Conduit
- Boardwalk
- Existing Access Road
- Extent of Potential Construction Activities
- Extent of Potential Terrestrial Sampling
- Tax Map Key (TMK)
- Pu'u Maka'ala Natural Area Reserve

Proposed Sampling Plots and Grids

- Tower Plot (Center Point)
- Distributed Plot (Center Point)
- Bird Grid (Center Point)
- Phenology Transect (Center Point)
- Mosquito Point

NOTE: It is possible that individual plot or grid locations may be adjusted within the limits of the proposed project area. Any adjustment in plot or grid location would be coordinated with DOFAW/NARS.

Aerial Source: NAIP, 2016

N

0 0.5 1
Miles

T:\NSF\HI_NAR\MAPFILES\PROPOSED_SAMPLING_PLOTS.MXD JQUAN 4/21/2017 12:14:08 PM

ch2m

Section 106 of the National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA) recognizes the nation's historic heritage and establishes a national policy for the preservation of historic properties, including any significant prehistoric or historic district, site, building, structure, or object. Section 106 of the NHPA requires that federal agencies consider the effects of their proposed undertakings on historic properties before making decisions.

The Section 106 review process includes the following steps: (1) initiate the Section 106 process; (2) identify historic properties within the Area of Potential Effects (APE) for the proposed undertaking; (3) assess adverse effects to historic properties; and (4) resolve adverse effects through avoidance, minimization, and/or mitigation.

NHPA Section 106 Consultation Process

Action	Date	Details
Letter from Deputy SHPO/ SHPD (in response to NEPA/HRS Chapter 343 scoping)	September 12, 2016	Letter indicating the additional information needed to determine the potential impacts to historic properties, including information relating to identification and determination of eligibility of historic properties within the APE
Email to SHPD requesting names of NHOs and other potential Consulting Parties	September 22, 2016	Email to SHPD Cultural Historian for Hawai'i Island requesting names of NHOs and others that may be interested in consulting on the proposed project
Response from SHPD with names of NHOs and other potential Consulting Parties*	September 29, 2016	Response from SHPD Cultural Historian for Hawai'i Island with names of NHOs and others that may be interested in consulting on the proposed project
Letters sent to potential Consulting Parties and SHPD (via email)	October 18, 2016	Letter seeking to identify Consulting Parties to be included in Section 106 process; providing notice of upcoming Section 106 Consulting Party meeting; and requesting input on cultural resources in the proposed project area
Section 106 Consultation Meeting	October 26, 2016	Public meeting held in Hilo, Hawai'i. NSF provided an opportunity for individuals and organizations to express an interest in participating in Section 106 process as Consulting Parties. Three individuals attended the meeting.
Section 106 Initiation Letter to SHPD	December 7, 2016	Letter initiating Section 106 consultation with SHPD/SHPO (copies sent to list of potential Consulting Parties)
Email to SHPO/SHPD	January 10, 2017	Email following up on the consultation initiation letter sent December 7, 2016
Email to SHPO/SHPD	March 23, 2017	Email requesting comments related to the consultation initiation letter sent December 7, 2016
Section 106 Concurrence Letter to SHPO/ SHPD	April 24, 2017	Letter transmitting Cultural Resources Assessment of Effects and seeking concurrence with finding of effect (copies sent to list of potential Consulting Parties)
Draft Environmental Assessment Public Meeting	May 25, 2017	Agenda includes overview of Section 106 process and assessment; consulting parties invited to attend and may use the public meeting to consult with NSF's Federal Preservation Officer on historic properties and cultural resources

*Potential Consulting Parties:

- Aha Moku Council
- Keoni Kealoha Alvarez
- Association of Hawaiian Civic Clubs
- Ko'olau Foundation
- George K. Cypher 'Ohana, Kua O Ka Lā
- Hawai'i County Cultural Resources Commission
- Maku'u Farmers Association
- Hawai'i Island Burial Council
- Mauna Kea Watershed Alliance
- Hawai'i Volcanoes National Park/National Park Service
- Hawaiian Civic Club of Hilo
- Office of Hawaiian Affairs
- Historic Hawai'i Foundation
- Protect Kaho'olawe 'Ohana
- Kāko'o 'Ōiwi Piihonua Hawaiian Homestead Community Association
- Kamehameha Schools

Please see Appendix C of the Draft EA to review NSF's Cultural Resources Assessment of Effects. Although there are no known historic properties within the APE, this assessment considers potential impacts to the cultural landscape, archaeological resources, and Traditional Cultural Properties. In summary, with implementation of best management practices to address any unanticipated discovery of buried cultural resources, NSF expects no historic properties to be affected by the proposed undertaking. In addition, due to the nature of the proposed research site components, NSF finds that the undertaking would result in no adverse effects to TCPs such as the cultural landscape, as well as to cultural uses, practices, and properties.

Section 7 of the Endangered Species Act

The Endangered Species Act of 1973 (ESA) provides for the protection and conservation of threatened and endangered species (listed species) of animals and plants, and the ecosystems on which listed species depend. The ESA prohibits federal agencies from funding, authorizing, or carrying out actions likely to jeopardize the existence of listed species through direct taking or through the destruction or adverse modification of critical habitat designated for these species under the ESA. Section 7 of the ESA requires consultation with the United States Fish and Wildlife Service (USFWS) when any listed species under its jurisdiction may be affected by a proposed action.

Endangered Species Act Consultation Process

Action	Date	Details
Letter from USFWS (in response to NEPA/HRS Chapter 343 scoping)	September 12, 2016	Letter offering technical assistance for the proposed NEON project at Pu'u Maka'ala NAR, including list of federally listed species that occur in the project vicinity and measures to avoid and minimize project impacts to those species, and measures to minimize impacts related to Rapid 'Ōhi'a Death
Email to USFWS and other project stakeholders	October 19, 2016	Email inviting USFWS and other project stakeholders (including scientists and researchers conducting work in Pu'u Maka'ala NAR) to consultation meeting, with detailed information regarding the proposed infrastructure and sampling protocols
Consultation meeting with USFWS	October 25, 2016	Meeting to discuss the ESA Section 7 consultation process, potential impacts to federally listed species, and measures to avoid and minimize project impacts to those species
Consultation meeting with USFWS and other project stakeholders	October 26, 2016	Meeting with USFWS and other project stakeholders (including scientists and researchers conducting work in Pu'u Maka'ala NAR) to provide proposed project overview and discuss stakeholder issues to inform ESA compliance
Email to USFWS and other project stakeholders	January 23, 2017	Email to participants of October 26, 2016 meeting conta ining meeting minutes, revisions to terrestrial sampling protocols and proposed mitigation measures developed in response to concerns raised at meeting
Email to USFWS	March 23, 2017	Email transmitting information regarding listed species and preliminary effects analysis
Coordination with USFWS	April 26, 2017	Conference call to obtain input from USFWS on information regarding listed species and preliminary effects analysis

Several threatened and endangered species are known to occur or have the potential to occur within the Pu'u Maka'ala NAR. A list of proposed mitigation measures, including Standard Operating Procedures (SOPs) and Best Management Practices (BMPs), have been developed through consultations with stakeholders, the Hawai'i Department of Fish and Wildlife (DOFAW), and USFWS. These measures, which were developed to mitigate and/or avoid potential impacts to listed species, continue to be refined through consultation with the USFWS. Please see Sections 3.5, 4.5, and Appendix D of the Draft EA to review NSF's analysis relating to threatened and endangered species; the Final EA will include any refinements that occur via the Section 7 consultation process.

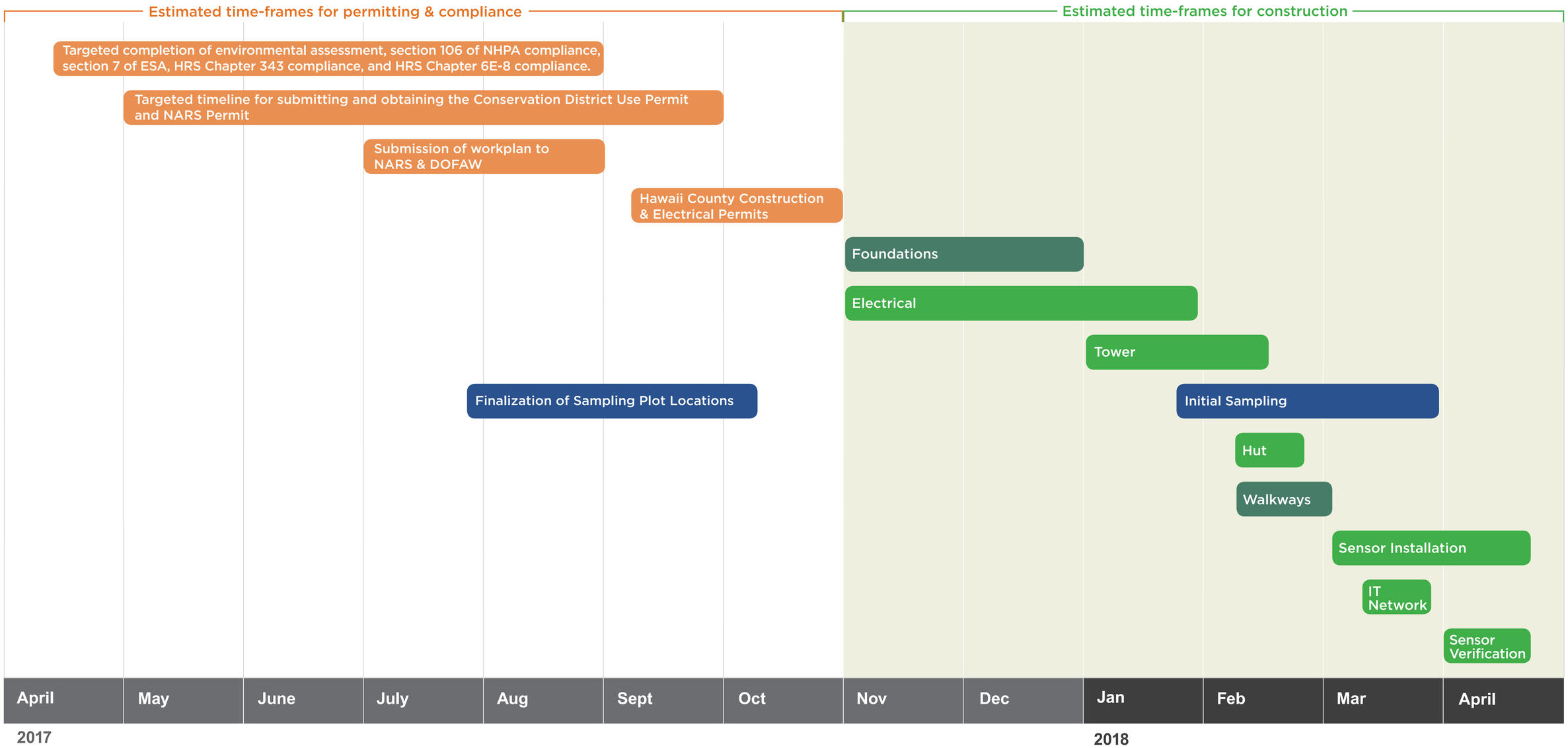
Estimated Timeframes for Proposed Project Implementation

= Environmental Compliance and Permitting

= Sampling Events

= Minimal to No Ground or Vegetation Disturbance

= Potential for Ground or Vegetation Disturbance



Summary of Proposed Terrestrial Sampling Protocols

Type of Sampling	Description of Proposed Field Sampling Activity		Equipment Installed	Plot/Grid Location	Sampling Season	Frequency	Duration of Each Event	No. of Visits to Each Plot per Event	No. of Technicians per Visit
Soil sampling	Three soil samples will be collected at each plot (to a depth of 30 cm or refusal and until 300 g is collected, and diameter ranging between 3.5 and 11 cm); holes will be backfilled at NARS direction	Soil microbes and soil biogeochemistry	None	Tower plots (4); Distributed plots (6)	Oct, Jan, Apr	3 events per year	4-5 days (2-3 plots a day)	1	2
		Soil biogeochemistry: N transformations	Three 35-cm x 5-cm-diameter PVC tubes buried such that 5 cm remain above the soil	Tower plots (4); Distributed plots (6)	Oct, Jan, Apr	3 events every 3 years	2 weeks (1 additional day of sampling 2 weeks after the combined microbe and biogeochemistry sample)	2	2
Plant diversity	Observations of species presence and cover (at 1 m^2) will be made in 400-m^2, multi-scale plots. Observations within these plots are made at eight 1- and 10-m^2 subplots. Vouchers of a subset of representative plant species (approximately 20 per year) will be collected.		None	Tower plots (3)	Jan-Feb	1 event per year	2-3 days (1-2 plots per day)	1	2
				Distributed plots (20)	Jan-Feb	1 event per year	10-20 days (1-2 plots per day)	1	2
Litterfall and fine woody debris	Litter (non-living plant material) will be collected from basket-like traps, and from paired 'ground traps' for woody material < 2 cm diameter, arrayed in 20-m x 20-m plots.		One 0.5-m^2 PVC 'elevated' trap per plot (0.8 m off the ground), and one 1.5-m^2 'ground trap' per plot	Tower plots (20)	Year-round	Elevated traps: 26 events per year Ground traps: One event per year	1 day (20 plots per day)	1	2
Belowground fine root biomass	Two soil cores (7.62 cm diameter, 30 cm depth) will be extracted from each plot to measure fine root live and dead biomass; holes will be backfilled at NARS direction.		None	Tower plots (20)	Jan-Feb	1 event every 5 years	5-10 days (2-4 plots per day)	1	2
Vegetation structure	Measurements such as height and diameter at breast height of woody individuals will be measured. No collection will be made (unless diagnostic plant part is needed to facilitate species identification).		Aluminum tags hung around woody vegetation with loose wire (no nails would be used)	Tower plots (20)	Any time	1 event per year	10-20 days (0.5-1 day per plot)	1	2
				Distributed plots (20)	Any time	1 event every 3 years	20 days (1 plot per plot)	1	2
Coarse downed wood (tally)	Nondestructive tally measurements will be made along three 200-m transects originating from within each plot.		Log tags	Tower plots (20)	Jul-Sep	1 event every 3 years	20 days (1 plot per day)	1	2
				Distributed plots (20)	Jul-Sep	1 event every 3 years	20 days (1 plot per day)	1	2
Coarse downed wood (density)	Disks (5-10 cm width) will be cut from downed logs using a chainsaw or hand-powered bucksaw. A total of 100-200 disks will be cut; the final number will depend on the number of taxa and the number of decay classes encountered.		Log tags	Area surrounding tower	Jul-Sep	2 events total: once in first 3 years and again 5-6 years later	20 days (1 plot per day)	1	2
				Distributed plots (20)	Jul-Sep	2 events total: once in first 3 years and again 5-6 years later	20 days (1 plot per day)	1	2
Canopy foliar chemistry	Sunlit leaves of dominant species will be harvested using a compressed air line-launcher.		None	Tower plot s (4)	Jan-Feb	1 event every 5 years	4 days (1 plot per day)	1	2
				Distributed plots (up to 16)	Jan-Feb	1 event every 5 years	6 days (1 plot per day)	1	2
Leaf area index	Digital hemispherical photographs of understory and overstory vegetation will be taken at multiple points within each plot.		None	Tower plots (3)	Year-round	1 event every 2 weeks (26 events per year)	1 day (3 plots per day)	1	2
				Distributed plots (20)	Jan-Feb	1 event every 3 years	10 days (2 plots per day)	1	2
Herbaceous biomass	Herbaceous material will be clip harvested from one 0.2-m (0.1-m x 2-m) area.		None	Tower plots (20)	Aug-Sep	1 event per year	5-10 days (2-4 plots per day)	1	2
Plant phenology	Phenological status and transitions of plant species will be monitored and recorded. Initially, up to 30 individuals of 3 species will be monitored. Over subsequent years, fewer individuals of 20 species will be monitored.		Aluminum tags wrapped around woody vegetation with loose wire; markers inserted in ground for herbaceous vegetation	Phenology transect along the road (1); Phenology plot North of the tower (1)	Year-round	1 event every 2 weeks (25 events per year)	1 day (2 plots/transects per day)	1	2
Ground beetles	Four pitfall traps at each plot will be deployed and checked at 2-week intervals to capture and describe the diversity and abundance of ground beetles.		Four pitfall traps per plot; each trap consists of a cup buried flush with the ground, filled with a preservative, and shaded by a flat cover	Distributed plots (10)	Oct-Apr	13 events per year	1 day every 2 weeks	1	2
Mosquitoes	CO_2 traps will be deployed for 2 nights (approximately 40 consecutive hours) per sampling event; captured mosquitoes will be retrieved from the trap on three occasions (first morning, second evening, and second morning).		Trap consisting of small insulated cooler (loaded with CO_2 pellets), rain cover, a fan (with 6-volt battery), and catch cup; trap will be hung from a tree or post	Mosquito plots (10), each within 35 m of road	Year-round	1 event per month (12 events per year)	2 days	4	2
Breeding land birds	Bird abundance and diversity data will be collected using binoculars and laser rangefinder; point counts will be conducted for a total of 10 minutes per location		None	Bird grids (10)	Feb-Mar	1 event every three years	5-10 days (1-2 grids per day)	1	2

Summary of Proposed Maintenance Activities

Maintenance Event	Activities to be Conducted	Frequency	Duration of Each Event	No. of Technicians
Standard maintenance of tower sensors	Preventative maintenance including inspecting and cleaning sensors, calibration of non-hazardous CO_2 gas cylinders stored in the hut and troubleshooting/ repairing sensors and systems.	One event every two weeks	2 days	2
Annual maintenance of tower and soil array	Instruments will be removed from the tower and soil array annually and replaced with recently recalibrated instruments.	One event per year	5 days	2-3
Emergency repairs	Emergency repairs to the tower or soil array sensors and infrastructure in the event damage is caused by weather or other unforeseen factor.	As needed	As needed	To be determined

neon | National Ecological Observatory Network

The National Ecological Observatory Network is a program sponsored by the National Science Foundation and operated under cooperative agreement by Battelle.

BATTELLE