TOS SITE CHARACTERIZATION REPORT: DOMAIN 016

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CHANGE RECORD

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A	05/01/2018	ECO-05563	Initial Release

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1 DESCRIPTION

1.1 Purpose

Domain and site-specific information collected and described here is used to inform the execution of protocols for the NEON Terrestrial Observation System (TOS), and complements the official NEON TOS data products generated from each site. In addition, the TOS spatial layout and plot allocation is described for each site within the domain.

1.2 Scope

This document includes any site specific characterization methods and the results of characterization efforts for each of the two sites in the Pacific Northwest domain. For more information about the sampling methods, reference the TOS Site Characterization Methods Document (RD[06]). The geographic coordinates for all TOS sampling locations can be found in the Reference Documents area of the NEON Data Portal and are provided with TOS data product downloads.

2 RELATED DOCUMENTS AND ACRONYMS

2.1 Applicable Documents

Applicable documents contain information that shall be applied in the current document. Examples are higher level requirements documents, standards, rules and regulations.

AD[01]	NEON.DOC.004300	EHSS Policy, Program, and Management Plan
AD[02]	NEON.DOC.050005	Field Operations Job Instruction Training Plan
AD[03]	NEON.DOC.000909	TOS Science Design for Ground Beetle Abundance and Diversity
AD[04]	NEON.DOC.000910	TOS Science Design for Mosquito Abundance, Diversity and Phenology
AD[05]	NEON.DOC.000912	TOS Science Design for Plant Diversity
AD[06]	NEON.DOC.000915	TOS Science Design for Small Mammal Abundance and Diversity
AD[07]	NEON.DOC.000914	TOS Science Design for Plant Biomass, Productivity, and Leaf Area Index
AD[08]	NEON.DOC.000001	NEON Observatory Design

2.2 Reference Documents

Reference documents contain information complementing, explaining, detailing, or otherwise supporting the information included in the current document.

RD[01]	NEON.DOC.000008	NEON Acronym List
RD[02]	NEON.DOC.000243	NEON Glossary of Terms
RD[03]	NEON.DOC.000913	TOS Science Design for Spatial Sampling
RD[04]	NEON.DOC.011066	TIS Site Characterization Report
RD[05]	NEON.DOC.001856	AIS Site Characterization Report
RD[06]	NEON.DOC.003885	TOS Site Characterization Methods
RD[07]	NEON.DOC.000481	TOS Protocol and Procedure: Small Mammal Sampling
RD[08]	NEON.DOC.014041	TOS Protocol and Procedure: Breeding Landbird Abundance and Diversity
RD[09]	NEON.DOC.014042	TOS Protocol and Procedure: Plant Diversity Sampling
RD[10]	NEON.DOC.000987	TOS Protocol and Procedure: Measurement of Vegetation Structure
RD[11]	NEON.DOC.014040	TOS Protocol and Procedure: Plant Phenology
RD[12]	NEON.DOC.001709	TOS Protocol and Procedure: Bryophyte Productivity
RD[13]	NEON.DOC.001574	TOS Protocol and Procedure: Measurement of Herbaceous Biomass

2.3 Acronyms

Acronym	Definition
BOLD	Barcode of Life Datasystems
NLCD	National Land Cover Database

3 DOMAIN 16 OVERVIEW: PACIFIC NORTHWEST DOMAIN

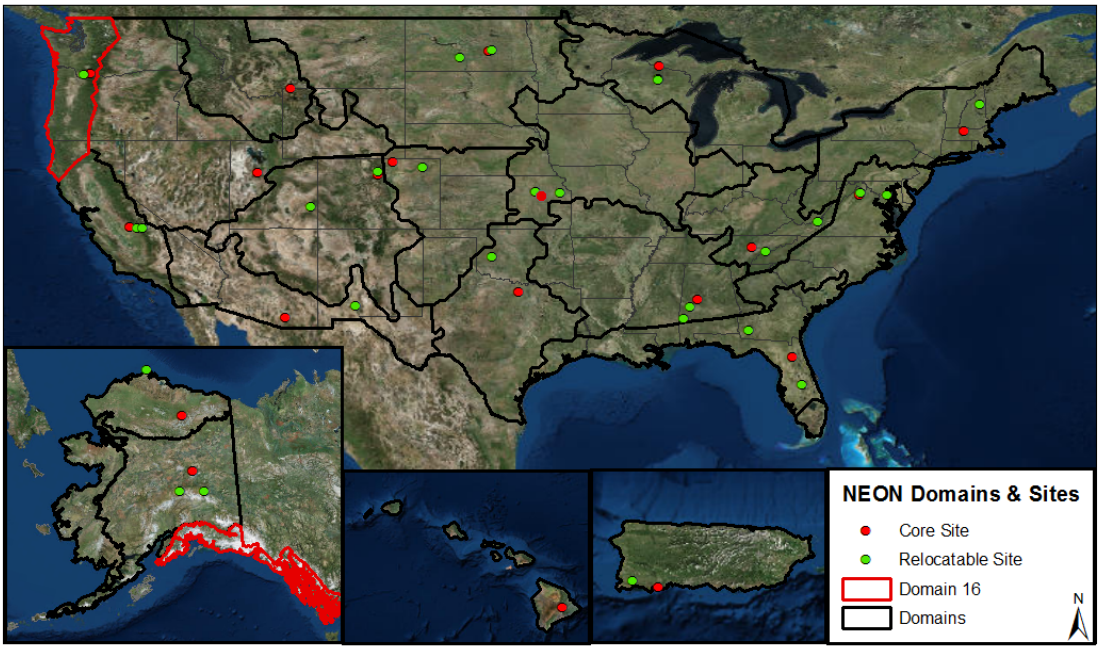

Figure 1: NEON project map with Domain 16 highlighted in red.

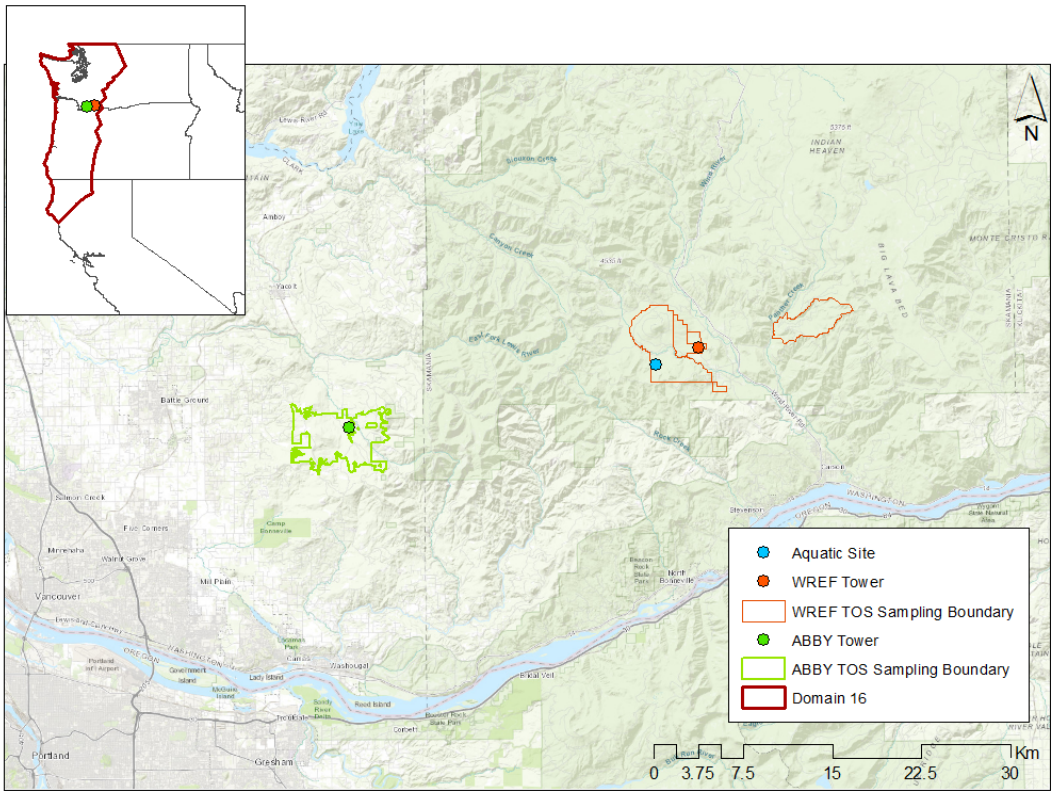

Figure 2: Site boundaries within Domain 16.

The Northwest Domain is a patchwork of forest stands in a dynamic system driven by forest management and wildfires. The two NEON terrestrial sites are located north of the Columbia River Gorge where average precipitation can exceed 2,500 mm annually. Winters tend to be cool and wet while summers are generally warm and dry.

- States included in the domain: Washington, Oregon, California, Alaska
- Core site: Wind River Experimental Forest
- Relocatable 1: ABBY Road
- Science themes: Forest Management

4 CORE SITE- WIND RIVER EXPERIMENTAL FOREST (WREF)

Located 60 km northeast of Vancouver, WA, the Wind River Experimental Forest is within the south central area of the Gifford Pinchot National Forest. While best known for its old growth Douglas fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) stands, the forest is a mosaic of tree ages due to management practices and wildfire history. Also known as the cradle of forestry in the Pacific Northwest, the Wind River Experimental Forest has a long history of ecology and silviculture studies.

Figure 3: Phenocamera image for WREF. The phenocamera is located at the top of the NEON tower and faces north. Phenocamera images are available at https://phenocam.sr.unh.edu/webcam/network/table/.

Key Characteristics:

- Site host: U.S. Forest Service
- Located in: Skamania County, Washington
- Area: 41.93 km^2
- Elevation: 290- 1010m
- Dominant vegetation type: Often more than 450 years old, older stands in Wind River Experimental Forest are dominated by Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and Pacific silver fir (*Abies amabilis*). Canopy species throughout the rest of forest include grand fir (*A.grandis*), noble fir (*A. procera*), Pacific dogwood (*Cornus nuttallii*), Western Red Cedar (*Thuja plicata*), and red alder (*Alnus rubra*). The understory includes vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), and Oregon grape (*Mahonia aquifolium*) (Wind River Experimental Forest, 2016).
- General management: Formally established in 1932, the Wind River Experimental Forest's research history began in the early 1900s and the forest has become the central area for studying Douglas fir forest dynamics (Wind River Experimental Forest, 2016). In particular, the Wind River Research Natural Area (RNA) and the Wind River Canopy crane support long term ecological and silvicultural studies within the old growth forest. The U.S. Forest Service also manages the land for recreational and logging activities.

- The NEON aquatic site Martha Creek is located in adjacent U.S. Forest service property. See the AIS site characterization report for more details (RD[05]).
- Plot Selection: NEON TOS Plots were allocated across the site following NEON standard criteria and avoiding existing research. Due to increased hiking times at this site, plot allocation was constrained to areas near roads and hiking trails.

4.1 TOS Spatial Sampling Design

TOS Distributed Plots were allocated at WREF according to a spatially balanced and stratified-random design (RD[3]). The 2006 National Land Cover Database (NLCD) was selected for stratification because of the consistent and comparable data availability across the United States. TOS Tower Plots were allocated according to a spatially balanced design in and around the NEON tower airshed (RD[03]). The maps below depict the plot locations for the first year of NEON sampling. Some plot locations may change over time due to logistics, safety, and science requirements. Please visit the NEON website (http://www.neonscience.org) for updated plot locations at each site.

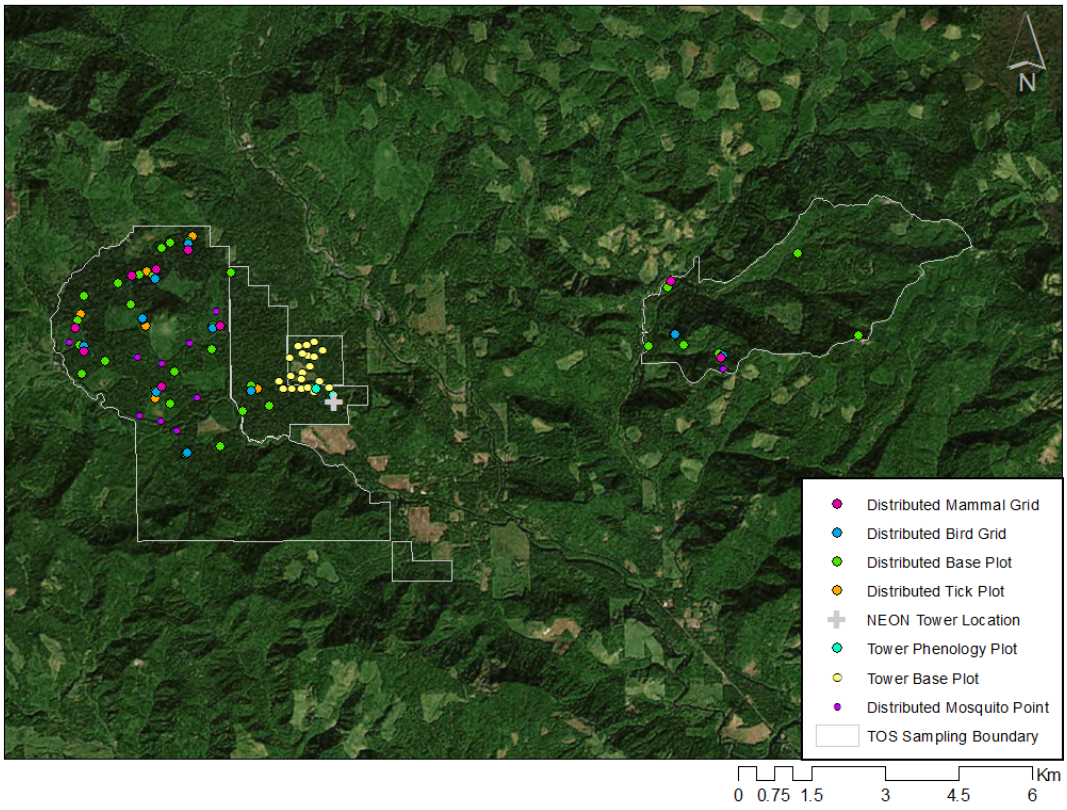

Figure 4: Map of TOS plot centroids within the NEON TOS sampling boundary at WREF.

Note: The boundary lines indicate different management units within Gifford Pinchot National Forest. For a list of

protocols associated with each plot see tables below; for additional spatial design information see RD[03].

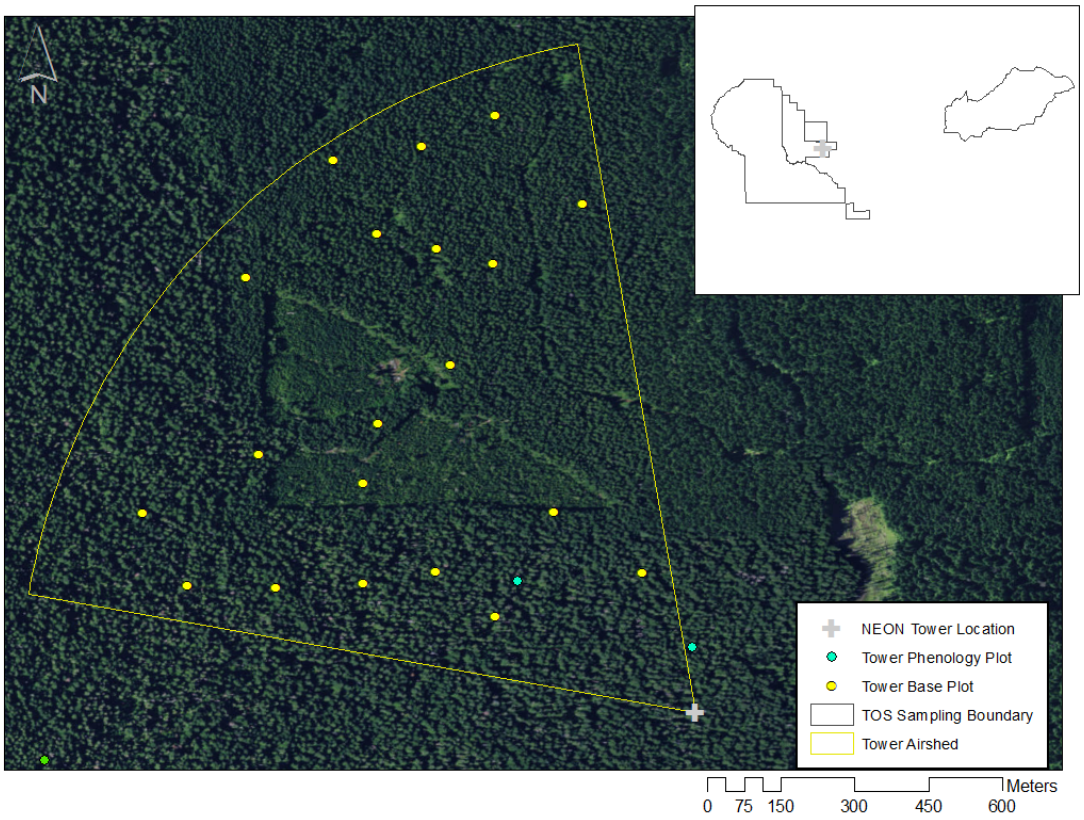

Figure 5: Map of the tower airshed and TOS plot centroids at WREF.

More information about the tower airshed can be found in the FIU site characterization report (RD[04]).

Table 1: NLCD land cover classes and area within the TOS site boundary at WREF.

NLCD Class	Site Area (km^2)	Percent (%)
Evergreen Forest	38.01	93.17
Developed Open Space	1.09	2.67
Shrub Scrub	0.86	2.12
Developed Low Intensity	0.6	1.48
Woody Wetlands	0.1	0.23
Mixed Forest	0.07	0.17
Grassland Herbaceous	0.03	0.08
Deciduous Forest	0.02	0.05
Emergent Herbaceous Wetlands	0.01	0.03

Note: Any NLCD land cover classes less than 5% will not be sampled. Additionally, no sampling will take place in Water, Developed, or Barren Land NLCD classes.

Table 2: NLCD land cover classes and TOS plot numbers at WREF.

Plot Type	Plot Subtype	NLCD Class	Number of Plots Established
Distributed	Base Plot	Evergreen Forest	30
Distributed	Bird Grid	Evergreen Forest	10
Distributed	Mammal Grid	Evergreen Forest	8
Distributed	Mosquito Point	Evergreen Forest	10
Distributed	Tick Plot	Evergreen Forest	6
Tower	Base Plot	NA	20
Tower	Phenology Plot	NA	2

Note: NLCD land cover classes are not used to stratify Tower Plots which are located in and around the NEON tower airshed. The dominant NLCD land cover type within the airshed is evergreen forest.

Table 3: Number of Distributed Base Plots per NLCD land cover class per protocol at WREF.

Plot Type	Plot Subtype	NLCD Class	Protocols	Number of Plots
Distributed	Base Plot	Evergreen Forest	Beetles	10
Distributed	Base Plot	Evergreen Forest	Canopy Foliage Chemistry	10
Distributed	Base Plot	Evergreen Forest	Coarse Downed Wood	20
Distributed	Base Plot	Evergreen Forest	Digital Hemispherical Photos for Leaf Area Index	20

Plot Type	Plot Subtype	NLCD Class	Protocols	Number of Plots
Distributed	Base Plot	Evergreen Forest	Herbaceous Biomass	20
Distributed	Base Plot	Evergreen Forest	Plant Diversity	30
Distributed	Base Plot	Evergreen Forest	Soil Biogeochemistry	6
Distributed	Base Plot	Evergreen Forest	Soil Microbes	6
Distributed	Base Plot	Evergreen Forest	Vegetation Structure	20

Note: Distributed Base Plots typically support more than one TOS protocol; 'Number of Plots' cannot be added to get total TOS Distributed Base Plot number.

Table 4: Number of Tower Plots per protocol at WREF.

Plot Type	Plot Subtype	Protocols	Number of Plots
Tower	Base Plot	Below Ground Biomass Coring	20
Tower	Base Plot	Canopy Foliage Chemistry	4
Tower	Base Plot	Coarse Downed Wood	20
Tower	Base Plot	Digital Hemispherical Photos for Leaf Area Index	3
Tower	Base Plot	Herbaceous Biomass	20
Tower	Base Plot	Litterfall and Fine Woody Debris	20
Tower	Base Plot	Plant Diversity	3
Tower	Base Plot	Soil Biogeochemistry	4
Tower	Base Plot	Soil Microbes	4
Tower	Base Plot	Vegetation Structure	20
Tower	Phenology	Plant Phenology	2

Note: Tower Base Plots typically support more than one TOS protocol; 'Number of Plots' cannot be added to get the total TOS Tower Base Plot number.

4.2 Sampling Season Characterization: WREF

For numerous TOS protocols, the length of the sampling season, the number of bouts, and when those bouts occur is dictated by the seasonal status of the plant community. By monitoring 'greenness' on a 16 day interval, the MODIS/Terra EVI phenology product provides consistent, reliable insight into plant community phenology and intensity at the continental scale. For those protocols for which timing is standardized by greenness transitions and/or peak green status, NEON has utilized these data as the primary means of guiding temporal aspects of TOS sampling at each site.

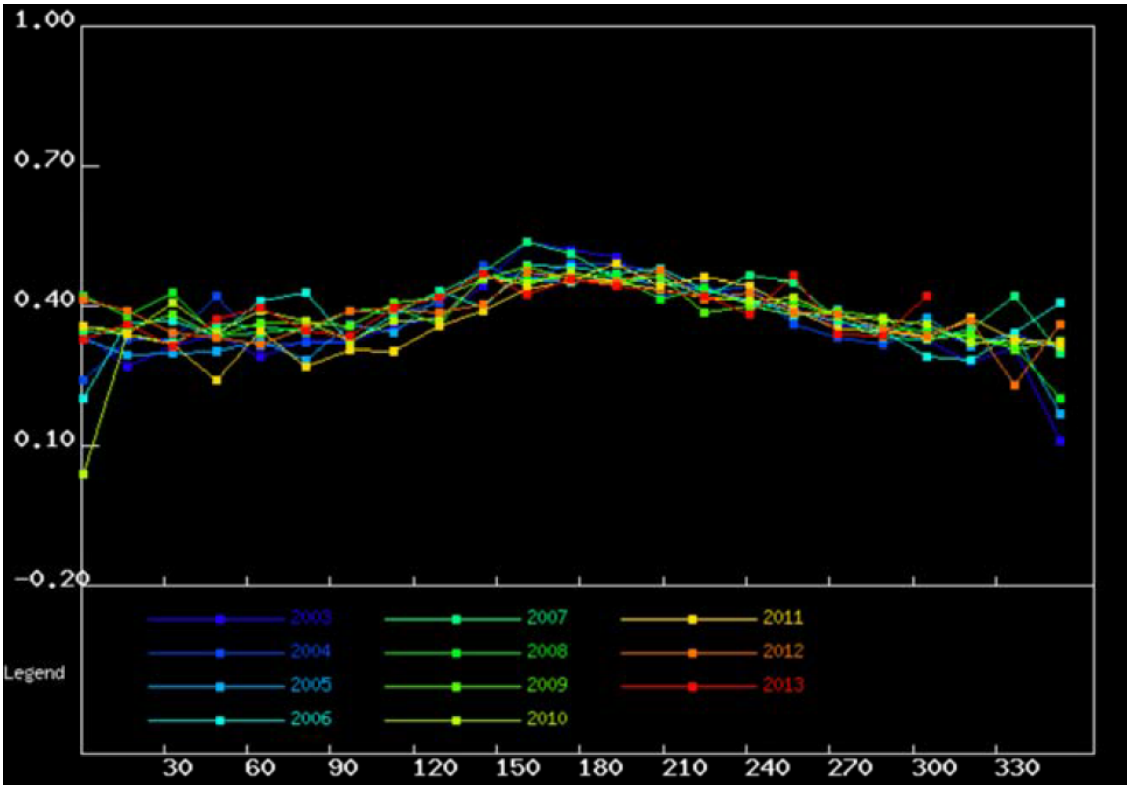

Figure 6: MODIS-EVI greenness (y-axis = EVI ratio) as a function of time (x-axis = DOY) for the years 2003-2013 at the NEON WREF site.

Table 5: Average MODIS-EVI greenness dates for the NEON WREF site, based on data from 2003-2013 (DOY, with MM/DD in parentheses).

Average Increase	Average Maximum	Average Decrease	Average Minimum
115 (04/26)	165 (06/15)	210 (07/30)	290 (10/18)

MODIS Product Details

- Product: MODIS-EVI phenology product, 16 day interval, 250 m grid, data included from all pixels with acceptable quality within user-defined square that roughly overlaps the TOS site boundary.
- Date range: 2003-2013
- User selected area: 28.25 km x 28.25 km box, centroid lat: 45.820946,, centroid long: -121.95253 (WGS84 datum)

4.3 Belowground Biomass

4.3.1 Site-Specific Methods

Belowground biomass characterization data were collected down to a depth of 200 cm by NEON staff in September 2017. Since the NEON protocol for long-term, operational sampling of belowground biomass only collects data to a depth of 30 cm, the belowground biomass site characterization data are critical for scaling belowground biomass measurements to greater depths; see the TOS Science Design for Plant Biomass, Productivity, and Leaf Area Index (AD[7]) for more information. Samples were collected following the standard methods outlined in TOS Site Characterization Methods (RD[6]). Roots were sorted to two diameter size categories ($\leq$ 2 mm and 2-30 mm) and by root status (live or dead). The tables below summarize all the belowground biomass less than or equal to 30 mm diameter; size class data and more information can be found by searching the NEON data portal for the data product numbers in Appendix A.

4.3.2 Results

Table 6: Soil Pit Information at WREF.

Latitude	Longitude	Soil Family	Soil Order
45.81637	-121.95838	Medial - amorphic - mesic Typic Hapludands	Andisol

Soil Profile was described by Natural Resource Conservation Service (NRCS).

Table 7: Fine root mass per depth increment (cm) at WREF.

Upper Depth	Lower Depth	Mean (mg per cm^3)	Std Dev
0	10	41.8	40.69
10	20	6.37	3.63
20	30	2.41	1.88
30	40	1.77	1.58
40	50	2.67	1.93
50	60	6.54	3.91
60	70	1.64	0.34
70	80	4.98	1.85
80	90	2.13	1.14
90	100	1.47	1.8
100	120	0.77	0.6
120	140	0.9	1.45
140	160	0.58	0.69

Upper Depth	Lower Depth	Mean (mg per cm^3)	Std Dev
160	180	0.43	0.63
180	200	0.07	0.07

Table 8: Cumulative fine root mass as a function of depth (cm) at WREF.

Upper Depth	Lower Depth	Mean Cumulative (g per m^2)	Cumulative Std Dev
0	10	4179.8	4068.71
10	20	4817.03	3883.49
20	30	5058.3	4062.39
30	40	5235.73	4202.83
40	50	5502.3	4062.88
50	60	6155.9	3924.57
60	70	6319.57	3893.97
70	80	6817.43	3731.44
80	90	7030.77	3763.24
90	100	7178.07	3943.09
100	120	7331.53	3858.81
120	140	7511.43	3738.05
140	160	7626.93	3653.26
160	180	7712.67	3610.09
180	200	7726.67	3603.03

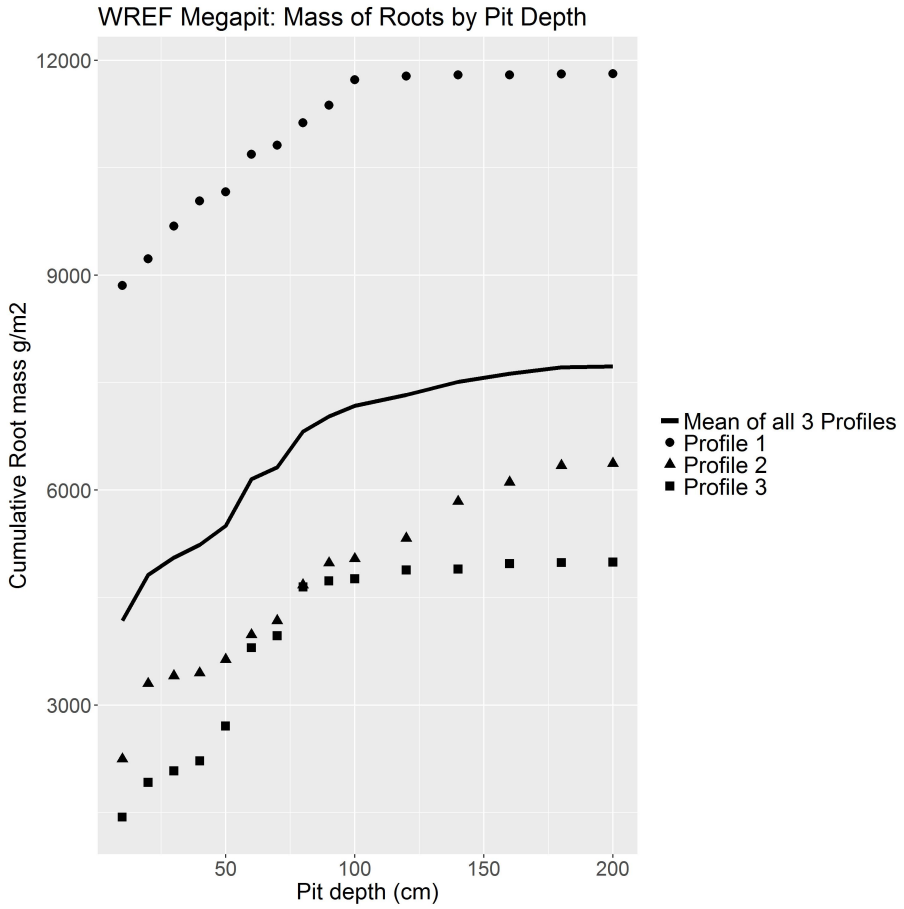

Figure 7: Cumulative root mass by pit depth at WREF.

Table 9: Fine root biomass sampling summary data at WREF.

Total Pit Depth (cm)	200
Total Mean Cumulative Mass at 30cm (g per m^2)	5058.3
Total Mean Cumulative Mass at 100cm (g per m^2)	7178.07
Total Mean Cumulative Mass (g per m^2)	7726.67

4.4 Plant Characterization and Phenology Species Selection

4.4.1 Site-Specific Methods

Plant characterization data were collected by NEON staff. Plant diversity data were collected in July of 2016 and vegetation structure data were collected in October of 2017. Plant characterization data inform sampling procedures for plant phenology and plant productivity protocols.

The overall ranking ("Rank" in the table below) was calculated based on three separate measurements. Overall ranking weights are influenced by the number of species within each grouping.

1. Mean percent cover values were calculated based on species specific cover estimation for all plant species under 3m tall in eight 1m by 1m subplots per plot; see the TOS Protocol and Procedure: Plant Diversity Sampling (RD[09]) for more information.
2. Mean canopy area values were calculated based on all species specific shrub canopy diameter measurements within the entire plot or subplot; see the TOS Protocol and Procedure: Measurement of Vegetation Structure (RD[10]) for more information.
3. Mean ABH (area at breast height) measurements were calculated based on diameter at breast height measurements for all woody vegetation with a diameter greater than 1cm at 130cm height within the entire plot or subplot; see the TOS Protocol and Procedure: Measurement of Vegetation Structure (RD[10]) for more information.

The standard field methods and ranking calculations are further outlined in TOS Site Characterization Methods (RD[6]). For more information on this protocol and data product numbers see Appendix A.

4.4.2 Results

Table 10: Site plant characterization and phenology species summary at WREF.

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
GASH	*Gaultheria shallon* Pursh	1	<1	0.02	<1
PSMEM	*Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*	3	<1	<1	<1
TSHE	*Tsuga heterophylla* (Raf.) Sarg.	4	<1	<1	<1
MANE2	*Mahonia nervosa* (Pursh) Nutt.	5	<1	<1	<1
VAPA	*Vaccinium parvifolium* Sm.	6	<1	0.01	<1
ACTR	*Achlys triphylla* (Sm.) DC.	7	<1	<1	<1
PTAQ	*Pteridium aquilinum* (L.) Kuhn	8	<1	<1	<1
ABAM	*Abies amabilis* (Douglas ex Loudon) Douglas ex Forbes	9	<1	<1	<1
COCOC	*Corylus cornuta* Marshall var. *californica* (A. DC.) Sharp	10	<1	<1	<1

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
THPL	*Thuja plicata* Donn ex D. Don	11	<1	<1	<1
ACCI	*Acer circinatum* Pursh	12	<1	<1	<1
LIBOL2	*Linnaea borealis* L. ssp. *longiflora* (Torr.) Hultén	13	<1	<1	<1
TABR2	*Taxus brevifolia* Nutt.	14	<1	<1	<1
VAOV	*Vaccinium ovalifolium* Sm.	15	<1	<1	<1
CLUN2	*Clintonia uniflora* (Menzies ex Schult. & Schult. f.) Kunth	16	<1	<1	<1
ABGR	*Abies grandis* (Douglas ex D. Don) Lindl.	17	<1	<1	<1
GAHU	*Gaultheria humifusa* (Graham) Rydb.	18	<1	<1	<1
ARCO3	*Arctostaphylos columbiana* Piper	19	<1	<1	<1
RUUR	*Rubus ursinus* Cham. & Schltdl.	20	<1	<1	<1
SYAL	*Symphoricarpos albus* (L.) S.F. Blake	21	<1	<1	<1
VIOLA	*Viola* sp.	22	<1	<1	<1
TRBOL	*Trientalis borealis* Raf. ssp. *latifolia* (Hook.) Hultén	23	<1	<1	<1
ANEMO	*Anemone* sp.	24	<1	<1	<1
VAME	*Vaccinium membranaceum* Douglas ex Torr.	25	<1	<1	<1
TROV2	*Trillium ovatum* Pursh	26	<1	<1	<1
VAHE	*Vancouveria hexandra* (Hook.) C. Morren & Decne.	27	<1	<1	<1
POMU	*Polystichum munitum* (Kaulf.) C. Presl	28	<1	<1	<1
BLSP	*Blechnum spicant* (L.) Sm.	29	<1	<1	<1
MAST4	*Maianthemum stellatum* (L.) Link	30	<1	<1	<1
ROGY	*Rosa gymnocarpa* Nutt.	31	<1	<1	<1

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
PIMO3	*Pinus monticola* Douglas ex D. Don	32	<1	<1	<1
CASC7	*Campanula scouleri* Hook. ex A. DC.	33	<1	<1	<1
FRVE	*Fragaria vesca* L.	34	<1	<1	<1
HISC2	*Hieracium scouleri* Hook.	34	<1	<1	<1
ADBI	*Adenocaulon bicolor* Hook.	36	<1	<1	<1
APAN2	*Apocynum androsaemifolium* L.	37	<1	<1	<1
HIAL2	*Hieracium albiflorum* Hook.	38	<1	<1	<1
XETE	*Xerophyllum tenax* (Pursh) Nutt.	38	<1	<1	<1
CHME	*Chimaphila menziesii* (R. Br. ex D. Don) Spreng.	40	<1	<1	<1
CONU4	*Cornus nuttallii* Audubon ex Torr. & A. Gray	41	<1	<1	<1
FRPU7	*Frangula purshiana* (DC.) A. Gray	42	<1	<1	<1
AMAL2	*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roem.	43	<1	<1	<1
TITRU	*Tiarella trifoliata* L. var. *unifoliata* (Hook.) Kurtz	43	<1	<1	<1
2PLANT	Unknown plant	45	<1	<1	<1
CHUM	*Chimaphila umbellata* (L.) W.P.C. Barton	45	<1	<1	<1
ACMA3	*Acer macrophyllum* Pursh	47	<1	<1	<1
CLSI2	*Claytonia sibirica* L.	47	<1	<1	<1
COMA25	*Corallorhiza maculata* (Raf.) Raf.	47	<1	<1	<1
POACEA	Poaceae sp.	47	<1	<1	<1
STREP3	*Streptopus* sp.	47	<1	<1	<1
COST19	*Corallorhiza striata* Lindl.	52	<1	<1	<1
FEOC	*Festuca occidentalis* Hook.	52	<1	<1	<1

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
GATR2	*Galium trifidum* L.	52	<1	<1	<1
GLST	*Glyceria striata* (Lam.) Hitchc.	52	<1	<1	<1
GOOB2	*Goodyera oblongifolia* Raf.	52	<1	<1	<1
PRHO2	*Prosartes hookeri* Torr.	52	<1	<1	<1
PINACE	Pinaceae sp.	59	<1	<1	<1

Note:Taxon IDs and scientific names are based on the USDA Plants database (plants.usda.gov). Rank 2 was omitted because it is a non-qualifying record. GASH (*Gaultheria shallon*) and MANE2 (*Mahonia nervosa*) to a lesser degree, are most likely over-represented in the dataset due clonal architecture and the difficultly of determining single individuals without destructive sampling (Huffman, 1994). STREP3 is most likely *Streptopus amplexifolius* (STAM2) but could also include *S. lanceolatus* var. *curvipes* (STLAC) which occurs in the area but often at higher elevations.

Table 11: Per plot breakdown of species richness, diversity, and herbaceous cover at WREF.

Plot ID	Species Richness	Shannon Diversity Index	Percent Total Herbaceous Cover	Bryophyte Percent Cover
WREF_070	20	2.14	98	32.06
WREF_071	21	1.74	94	47.44
WREF_073	13	1.95	57	14.75
WREF_074	19	2.09	93	32.88
WREF_075	15	2.03	50	6.69
WREF_076	15	1.71	78	41.25
WREF_077	14	1.61	123	45.44
WREF_078	23	1.86	197	44.62
WREF_079	11	1.61	83	35.62
WREF_080	25	2.34	193	1.25
WREF_081	12	1.5	45	25.62
WREF_082	21	2.24	168	34.5
WREF_083	15	1.41	87	56.12
WREF_084	22	2.43	98	2.89
WREF_085	19	1.84	136	30.38
WREF_086	16	1.9	74	23.25
WREF_087	12	1.34	56	32.25

Plot ID	Species Richness	Shannon Diversity Index	Percent Total Herbaceous Cover	Bryophyte Percent Cover
WREF_088	18	2.19	53	12.25
WREF_089	12	1.84	53	17.25
Bryophyte Mean				28.24

Note: Percent herbaceous cover was measured by species and then added together to calculate the percent total herbaceous cover for each plot. At WREF annual growth in moss species is easily identified and will be clipped as part of the TOS Protocol and Procedure: Measurement of Herbaceous Biomass (RD[13]).

4.5 Beetles

4.5.1 Site-Specific Methods

No beetle site characterization sampling was conducted at WREF. For more information on this protocol and data product numbers see Appendix A.

4.6 Mosquitoes

4.6.1 Site-Specific Methods

No mosquito site characterization sampling was conducted at WREF. For more information on this protocol and data product numbers see Appendix A.

4.7 Ticks

4.7.1 Site-Specific Methods

No tick site characterization sampling was conducted at WREF. For more information on this protocol and data product numbers see Appendix A.

4.8 Species Reference Lists

A review of the literature for taxonomic lists of interest for each site was conducted prior to field work. In the case of vertebrates that NEON may capture (e.g., reptiles, amphibians, small mammals), these lists were often required to secure permits. Key references identified in this effort are listed below. Species lists and associated references for small mammals and breeding landbirds can be found in the appendices of the respective protocols (RD[07], RD[08]).

Bousquet, Y. 2012. Catalogue of Geadephaga (Coleoptera, Adephaga) of America, north of Mexico. ZooKeys, (245), 1-1722.

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5 RELOCATABLE SITE 1- ABBY ROAD (ABBY)

Located approximately 30 kilometers northeast of Vancouver, WA the TOS sampling site is a conglomerate of parcels managed by the Washington Department of Natural Resources (WDNR) and is typical of WDNR land in the area. Different parcels have logging years that range from 1940-2016 allowing for the opportunity to collect NEON data on a dynamically managed forest landscape.

Figure 8: Phenocamera image for ABBY. The phenocamera is located at the top of the NEON tower and faces north. Phenocamera images are available at https://phenocam.sr.unh.edu/webcam/network/table/.

Key Characteristics:

- Site host: Washington Department of Natural Resources
- Located in: Clark County, Washington
- Area: 29.86 km^2
- Elevation: 285- 715m
- Dominant vegetation type: Douglas fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) dominate the upper canopy in older stands, with pockets of red alder (*Alnus rubra*) in mixed forest zones. In recently logged areas, western red cedar (*Thuja plicata*) grows between the planted Douglas fir. The understory varies with succession, short stature vine maple (*Acer cercinatum)* is often found in recently

logged parcels while salmonberry (*Rubus spectabilis*) is more common in shrubby habitats. Salal (*Gaultheria shallon*) and Cascara buckthorn (*Frangula purshiana*) are found throughout ABBY.

- General management: The NEON TOS ABBY site is within the Pacific Cascade region of the WDNR. This regional office manages over 480,000 acres (2000 km^2) of state forest for timber production and recreational activities (DNR Regions and Districts, 2017).
- Plot Selection: NEON TOS Plots were allocated across the site following NEON standard criteria and avoiding existing research. Areas where active logging was scheduled during plot establishment were avoided for safety and logistical concerns (roughly 15% of the site).

5.1 TOS Spatial Sampling Design

TOS Distributed Plots were allocated at ABBY according to a spatially balanced and stratified-random design (RD[3]). The 2011 National Land Cover Database (NLCD) was selected for stratification because of the consistent and comparable data availability across the United States. Due to active logging and seeding that takes place within the NEON TOS sampling boundary a combination of NLCD map and logging years were used to create a vegetation map for stratification. For older stands (1940-2000) the 2011 NLCD map was used to determine NLCD classification, in particular to distinguish areas of evergreen forest, mixed forest, and deciduous forest. For parcels that had been logged after 2000 a combination of logging year and field validation was used to assign a NLCD classification. TOS Tower Plots were allocated according to a spatially balanced design in and around the NEON tower airshed (RD[03]). The maps below depict the plot locations for the first year of NEON sampling. Some plot locations may change over time due to logistics, safety, and science requirements. Please visit the NEON website (http://www.neonscience.org) for updated plot locations at each site.

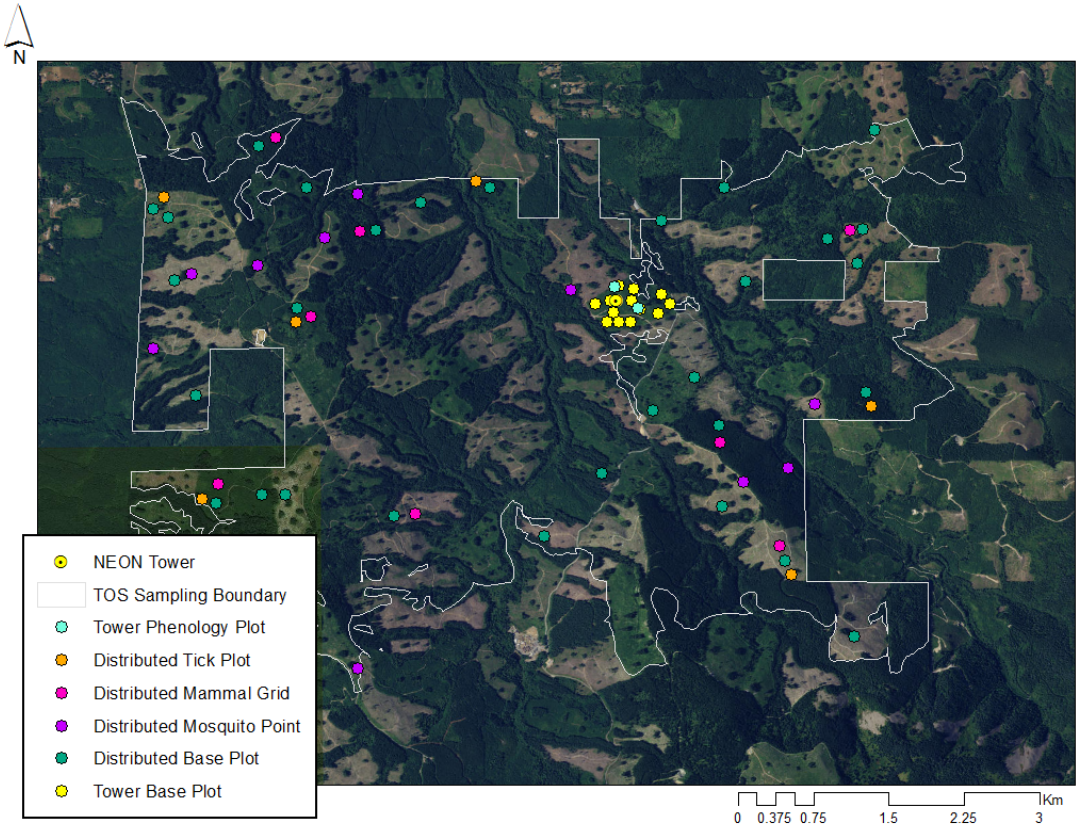

Figure 9: Map of TOS plot centroids within the NEON TOS sampling boundary at ABBY.

For a list of protocols associated with each plot see tables below; for additional spatial design information see RD[03].

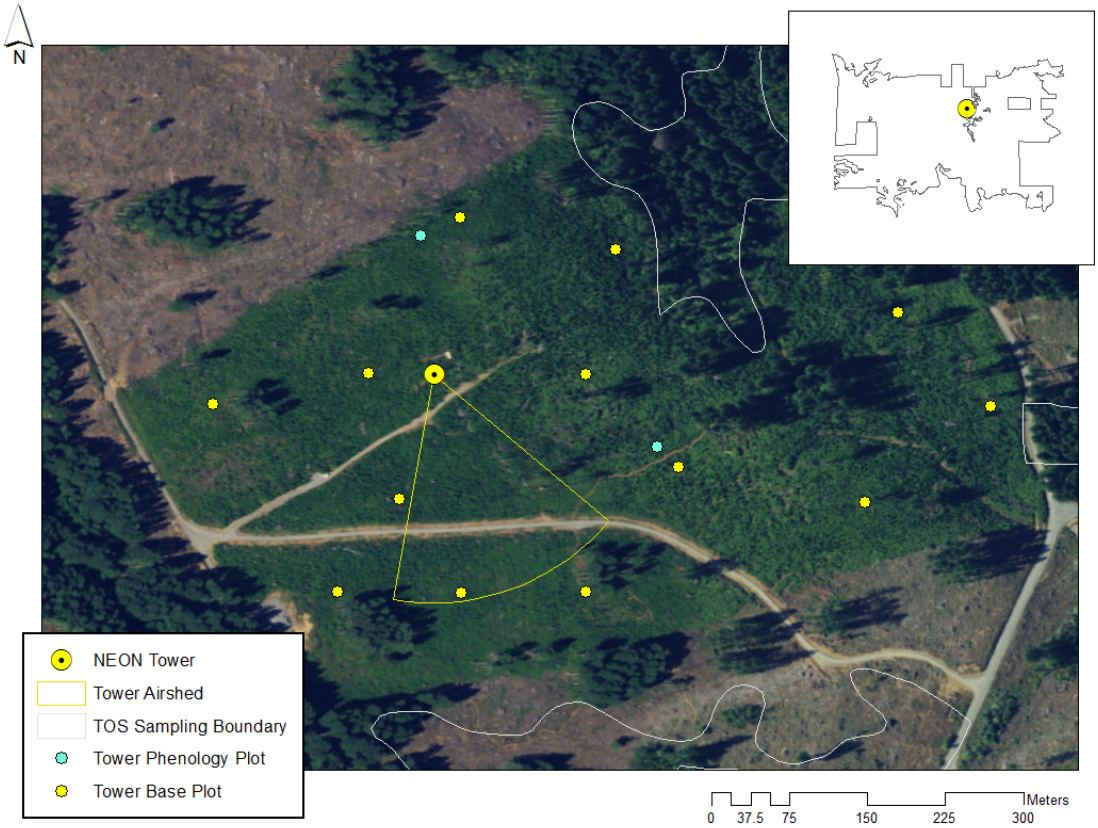

Figure 10: Map of the tower airshed and TOS plot centroids at ABBY.

More information about the tower airshed can be found in the FIU site characterization report (RD[04]).

Table 12: NLCD land cover classes and area within the TOS site boundary at ABBY.

NLCD Class	Site Area (km^2)	Percent (%)
Evergreen Forest	15.17	50.5
Grassland Herbaceous	5.99	19.93
Shrub Scrub	5.74	19.11
Mixed Forest	2.03	6.76
Woody Wetlands	0.95	3.16
Deciduous Forest	0.15	0.49
Emergent Herbaceuous Wetlands	0.01	0.04

Note: Any NLCD land cover classes less than 5% will not be sampled. See the "TOS Spatial Sampling Design" section for more information about how the NLCD map was used at ABBY.

Table 13: NLCD land cover classes and TOS plot numbers at ABBY.

Plot Type	Plot Subtype	NLCD Class	Number of Plots Established
Distributed	Base Plot	Evergreen Forest	11
Distributed	Base Plot	Grassland Herbaceous	7
Distributed	Base Plot	Mixed Forest	5
Distributed	Base Plot	Shrub Scrub	7
Distributed	Mammal Grid	Evergreen Forest	3
Distributed	Mammal Grid	Grassland Herbaceous	1
Distributed	Mammal Grid	Mixed Forest	1
Distributed	Mammal Grid	Shrub Scrub	1
Distributed	Mosquito Point	Evergreen Forest	5
Distributed	Mosquito Point	Grassland Herbaceous	2
Distributed	Mosquito Point	Mixed Forest	1
Distributed	Mosquito Point	Shrub Scrub	2
Distributed	Tick Plot	Evergreen Forest	3
Distributed	Tick Plot	Grassland Herbaceous	1
Distributed	Tick Plot	Mixed Forest	1
Distributed	Tick Plot	Shrub Scrub	1
Tower	Base Plot	NA	13
Tower	Phenology Plot	NA	2

Note: NLCD land cover classes are not used to stratify Tower Plots which are located in and around the NEON tower airshed. The dominant NLCD land cover types within the airshed include: evergreen forest, grassland herbaceous, and shrub scrub. The logging year for the NEON tower parcel was 2006.

Table 14: Number of Distributed Base plots per NLCD land cover class per protocol at ABBY.

Plot Type	Plot Subtype	NLCD Class	Protocols	Number of Plots
Distributed	Base Plot	Evergreen Forest	Beetles	5
Distributed	Base Plot	Grassland Herbaceous	Beetles	2
Distributed	Base Plot	Mixed Forest	Beetles	1
Distributed	Base Plot	Shrub Scrub	Beetles	2
Distributed	Base Plot	Evergreen Forest	Birds	11
Distributed	Base Plot	Grassland Herbaceous	Birds	4
Distributed	Base Plot	Mixed Forest	Birds	1
Distributed	Base Plot	Shrub Scrub	Birds	4

Plot Type	Plot Subtype	NLCD Class	Protocols	Number of Plots
Distributed	Base Plot	Evergreen Forest	Canopy Foliage Chemistry	5
Distributed	Base Plot	Grassland Herbaceous	Canopy Foliage Chemistry	2
Distributed	Base Plot	Mixed Forest	Canopy Foliage Chemistry	1
Distributed	Base Plot	Shrub Scrub	Canopy Foliage Chemistry	2
Distributed	Base Plot	Evergreen Forest	Coarse Downed Wood	10
Distributed	Base Plot	Grassland Herbaceous	Coarse Downed Wood	4
Distributed	Base Plot	Mixed Forest	Coarse Downed Wood	2
Distributed	Base Plot	Shrub Scrub	Coarse Downed Wood	4
Distributed	Base Plot	Evergreen Forest	Digital Hemispherical Photos for Leaf Area Index	10
Distributed	Base Plot	Grassland Herbaceous	Digital Hemispherical Photos for Leaf Area Index	4
Distributed	Base Plot	Mixed Forest	Digital Hemispherical Photos for Leaf Area Index	2
Distributed	Base Plot	Shrub Scrub	Digital Hemispherical Photos for Leaf Area Index	4
Distributed	Base Plot	Evergreen Forest	Herbaceous Biomass	10
Distributed	Base Plot	Grassland Herbaceous	Herbaceous Biomass	4
Distributed	Base Plot	Mixed Forest	Herbaceous Biomass	2
Distributed	Base Plot	Shrub Scrub	Herbaceous Biomass	4
Distributed	Base Plot	Evergreen Forest	Plant Diversity	11
Distributed	Base Plot	Grassland Herbaceous	Plant Diversity	7
Distributed	Base Plot	Mixed Forest	Plant Diversity	5
Distributed	Base Plot	Shrub Scrub	Plant Diversity	7
Distributed	Base Plot	Evergreen Forest	Soil Biogeochemistry	3
Distributed	Base Plot	Grassland Herbaceous	Soil Biogeochemistry	1
Distributed	Base Plot	Mixed Forest	Soil Biogeochemistry	1
Distributed	Base Plot	Shrub Scrub	Soil Biogeochemistry	1
Distributed	Base Plot	Evergreen Forest	Soil Microbes	3
Distributed	Base Plot	Grassland Herbaceous	Soil Microbes	1
Distributed	Base Plot	Mixed Forest	Soil Microbes	1
Distributed	Base Plot	Shrub Scrub	Soil Microbes	1
Distributed	Base Plot	Evergreen Forest	Vegetation Structure	10
Distributed	Base Plot	Grassland Herbaceous	Vegetation Structure	4
Distributed	Base Plot	Mixed Forest	Vegetation Structure	2

Plot Type	Plot Subtype	NLCD Class	Protocols	Number of Plots
Distributed	Base Plot	Shrub Scrub	Vegetation Structure	4

Note: Distributed Base Plots typically support more than one TOS protocol; 'Number of Plots' cannot be added to get total TOS Distributed Base Plot number.

Table 15: Number of Tower Plots per protocol at ABBY.

Plot Type	Plot Subtype	Protocols	Number of Plots
Tower	Base Plot	Below Ground Biomass Coring	13
Tower	Base Plot	Canopy Foliage Chemistry	4
Tower	Base Plot	Coarse Downed Wood	13
Tower	Base Plot	Digital Hemispherical Photos for Leaf Area Index	3
Tower	Base Plot	Herbaceous Biomass	13
Tower	Base Plot	Litterfall and Fine Woody Debris	13
Tower	Base Plot	Plant Diversity	3
Tower	Base Plot	Soil Biogeochemistry	4
Tower	Base Plot	Soil Microbes	4
Tower	Base Plot	Vegetation Structure	13
Tower	Phenology	Plant Phenology	2

Note: Tower Base Plots typically support more than one TOS protocol; 'Number of Plots' cannot be added to get total TOS Tower Base Plot number.

5.2 Sampling Season Characterization: ABBY

For numerous TOS protocols, the length of the sampling season, the number of bouts, and when those bouts occur is dictated by the seasonal status of the plant community. By monitoring 'greenness' on a 16 day interval, the MODIS/Terra EVI phenology product provides consistent, reliable insight into plant community phenology and intensity at the continental scale. For those protocols for which timing is standardized by greenness transitions and/or peak green status, NEON has utilized these data as the primary means of guiding temporal aspects of TOS sampling at each site.

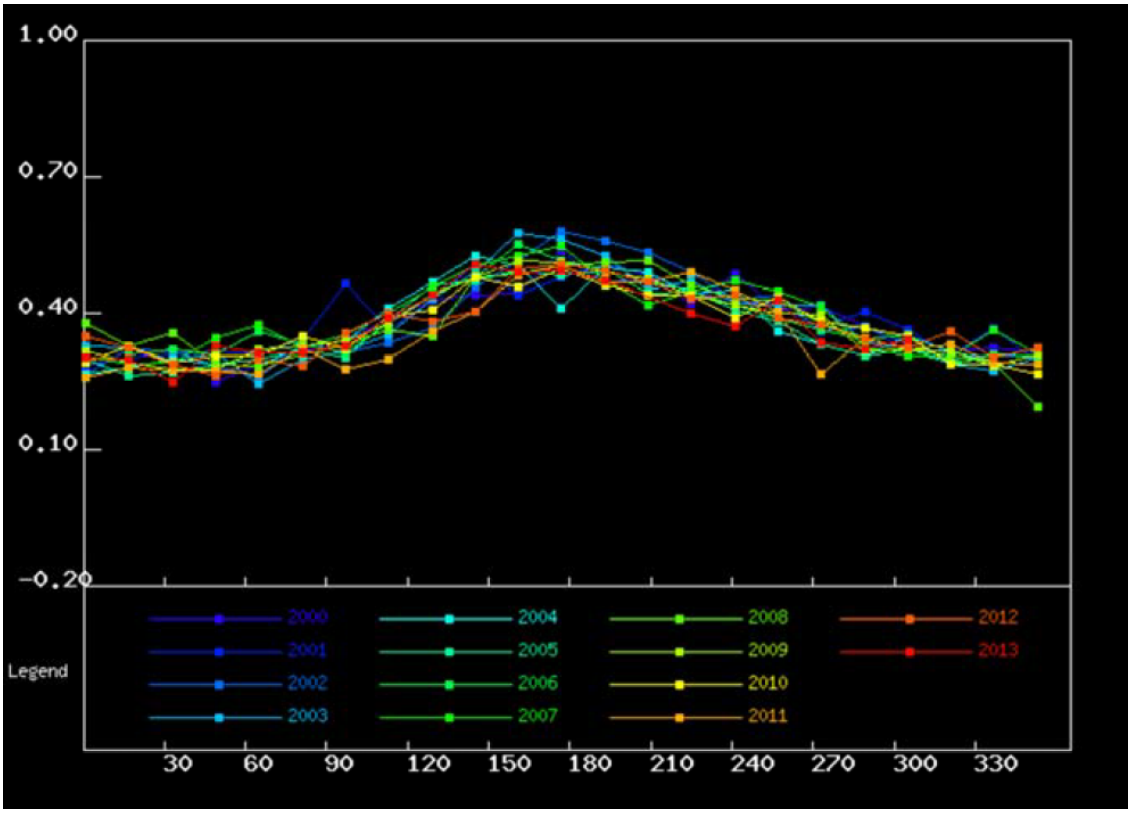

Figure 11: MODIS-EVI greenness (y-axis = EVI ratio) as a function of time (x-axis = DOY) for the years 2003-2013 at the NEON ABBY site.

Table 16: Average MODIS-EVI greenness dates for the NEON ABBY site, based on data from 2003-2013 (DOY, with MM/DD in parentheses).

Average Increase	Average Maximum	Average Decrease	Average Minimum
110 (04/21)	165 (06/15)	205 (07/25)	300 (10/28)

MODIS Product Details

- Product: MODIS-EVI phenology product, 16 day interval, 250 m grid, data included from all pixels with acceptable quality within user-defined square that roughly overlaps the TOS site boundary.
- Date range: 2003-2013
- User selected area: 16.25 km x 16.25 km box, centroid lat: 45.762662„ centroid long: -122.33057 (WGS84 datum)

5.3 Belowground Biomass

5.3.1 Site-Specific Methods

Belowground biomass characterization data were collected down to a depth of 200 cm by NEON staff in June 2015. Since the NEON protocol for long-term, operational sampling of belowground biomass only collects data to a depth of 30 cm, the belowground biomass site characterization data are critical for scaling belowground biomass measurements to greater depths; see the TOS Science Design for Plant Biomass, Productivity, and Leaf Area Index (AD[7]) for more information. Samples were collected following the standard methods outlined in TOS Site Characterization Methods (RD[6]). Roots were sorted to two diameter size categories ($\leq$ 4 mm and 4-30 mm) and by root status (live or dead). The tables below summarize all the belowground biomass less than or equal to 30 mm diameter; size class data and more information can be found by searching the NEON data portal for the data product numbers in Appendix A.

5.3.2 Results

Table 17: Soil Pit Information at ABBY.

Latitude	Longitude	Soil Family	Soil Order
45.7623783	-122.3296716	Fine-loamy - isotic - mesic - Andic Humudepts	Inceptisol

Soil Profile was described by Natural Resource Conservation Service (NRCS).

Table 18: Fine root mass per depth increment (cm) at ABBY.

Upper Depth	Lower Depth	Mean (mg per cm^3)	Std Dev
0	10	12.66	6.29
10	20	4.69	1.15
20	30	5.54	2.8
30	40	4.95	2.97
40	50	1.38	0.68
50	60	2.8	2.28
60	70	1.34	0.19
70	80	0.56	0.27
80	90	0.45	0.22
90	100	0.4	0.15
100	120	0.22	0.05
120	140	0.12	0.05
140	160	0.01	0.01

Upper Depth	Lower Depth	Mean (mg per cm^3)	Std Dev
160	180	0	0
180	200	0.05	0.09

Table 19: Cumulative fine root mass as a function of depth (cm) at ABBY.

Upper Depth	Lower Depth	Mean Cumulative (g per m^2)	Cumulative Std Dev
0	10	1265.76	628.7
10	20	1734.9	524.03
20	30	2289.15	726.09
30	40	2783.96	748.95
40	50	2921.68	773.03
50	60	3202.17	983.51
60	70	3336.09	966.25
70	80	3391.66	967.86
80	90	3436.79	951.21
90	100	3477.06	948.24
100	120	3521.18	941.88
120	140	3544.7	936.69
140	160	3546.93	937.32
160	180	3547.88	937.06
180	200	3557.78	951.66

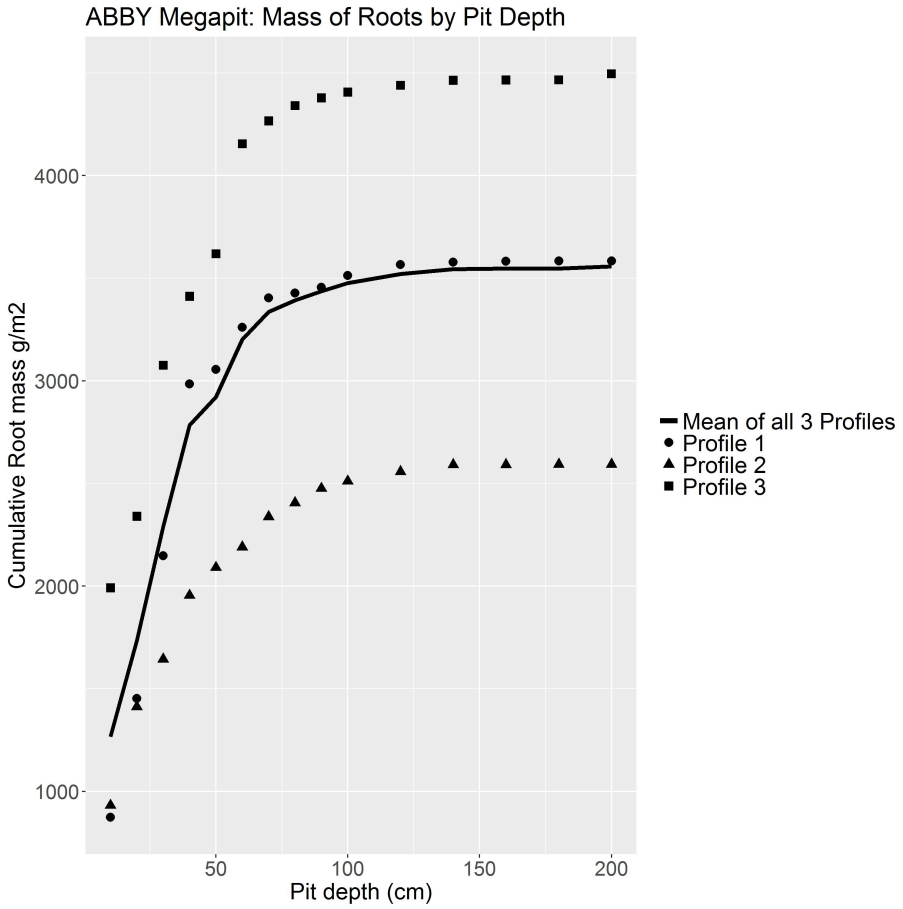

Figure 12: Cumulative root mass by pit depth at ABBY.

Table 20: Fine root biomass sampling summary data at ABBY.

Total Pit Depth (cm)	200
Total Mean Cumulative Mass at 30cm (g per m^2)	2289.15
Total Mean Cumulative Mass at 100cm (g per m^2)	3477.06
Total Mean Cumulative Mass (g per m^2)	3557.78

5.4 Plant Characterization and Phenology Species Selection

5.4.1 Site-Specific Methods

Plant characterization data were collected by NEON staff during July of 2015. Plant characterization data inform sampling procedures for plant phenology and plant productivity protocols.

The overall ranking ("Rank" in the table below) was calculated based on three separate measurements. Overall ranking weights are influenced by the number of species within each grouping.

1. Mean percent cover values were calculated based on species specific cover estimation for all plant species under 3m tall in eight 1m by 1m subplots per plot; see the TOS Protocol and Procedure: Plant Diversity Sampling (RD[09]) for more information.
2. Mean canopy area values were calculated based on all species specific shrub canopy diameter measurements within the entire plot or subplot; see the TOS Protocol and Procedure: Measurement of Vegetation Structure (RD[10]) for more information.
3. Mean ABH (area at breast height) measurements were calculated based on diameter at breast height measurements for all woody vegetation with a diameter greater than 1cm at 130cm height within the entire plot or subplot; see the TOS Protocol and Procedure: Measurement of Vegetation Structure (RD[10]) for more information.

The standard field methods and ranking calculations are further outlined in TOS Site Characterization Methods (RD[6]). For more information on this protocol and data product numbers see Appendix A. .

5.4.2 Results

Table 21: Site plant characterization and phenology species summary at ABBY.

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
GASH	*Gaultheris shallon* Pursh.	1	19	0.09	NA
PSMEM	*Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii*	2	2	0.02	4.55
PTAQ	*Pteridium aquilinum* (L.) Kuhn	3	26	NA	NA
COCOC	*Corylus cornuta* Marshall var. *californica* (A. DC.) Sharp	4	<1	0.02	<1
ACCI	*Acer circinatum* Pursh	5	<1	0.02	<1
RUUR	*Rubus ursinus* Cham. & Schltdl.	6	4	NA	NA
FRPU7	*Frangula purshiana* (DC.) A. Gray	7	<1	0.01	0.01
POMU	*Polystichum munitum* (Kaulf.) C. Presl	8	2	NA	NA
THMO6	*Thermopsis montana* Nutt.	9	1	NA	NA

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
HODI	*Holodiscus discolor* (Pursh) Maxim.	10	<1	<1	NA
LOAB	*Lotus aboriginus Jeps.* Lotus aboriginus Jeps.	11	<1	NA	NA
RUSP	*Rubus spectabilis* Pursh	12	<1	<1	NA
CHAN9	*Chamerion angustifolium (L.)* Holub	13	<1	NA	NA
ALRU2	*Alnus rubra* Bong.	14	<1	<1	0.01
HYRA3	*Hypochaeris radicata* L.	15	<1	NA	NA
SARA2	*Sambucus racemosa L.* Sambucus racemosa L.	16	<1	<1	NA
VAPA	*Vaccinium parvifolium* Sm.	17	<1	<1	NA
IRTE	*Iris tenax Douglas* ex Lindl.	18	<1	NA	NA
HIERA	*Hieracium* sp.	19	<1	NA	NA
POACEA	Poaceae sp.	20	<1	NA	NA
VEOF2	*Veronica officinalis L.* Veronica officinalis L.	21	<1	NA	NA
MYMU	*Mycelis muralis* (L.) Dumort.	22	<1	NA	NA
ANMA	*Anaphalis margaritacea* (L.) Benth.	23	<1	NA	NA
GATR3	*Galium aparine* L.	24	<1	NA	NA
HYPE	*Hypericum perforatum L.* Hypericum perforatum L.	25	<1	NA	NA
THPL	*Thuja plicata* Donn ex D. Don	26	<1	<1	<1
LEVU	*Leucanthemum vulgare* Lam.	27	<1	NA	NA
DIPU	*Digitalis purpurea* L.	28	<1	NA	NA
POACEA	Poaceae sp.	29	<1	NA	NA
CAREX	*Carex* sp.	30	<1	NA	NA
LUZUL	*Luzula* sp.	31	<1	NA	NA
MANE2	*Mahonia nervosa* (Pursh) Nutt.	32	<1	<1	NA

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
SPDOD	*Spiraea douglasii* Hook. var. *douglasii*	33	NA	<1	NA
CIVU	*Cirsium vulgare* (Savi) Ten.	34	<1	NA	NA
TRBO2	*Trientalis borealis Raf.* Trientalis borealis Raf.	34	<1	NA	NA
VIOLA	*Viola* sp.	34	<1	NA	NA
CASC7	*Campanula scouleri* Hook. ex A. DC.	37	<1	NA	NA
2PLANT	Unknown plant	38	<1	NA	NA
EPCI	*Epilobium ciliatum* Raf.	38	<1	NA	NA
STCA	*Stellaria calycantha* (Ledeb.) Bong.	38	<1	NA	NA
PREM	*Prunus emarginata* (Douglas ex Hook.) D. Dietr.	42	<1	NA	<1
RUPA	*Rubus parviflorus* Nutt.	43	NA	<1	NA
TROV2	*Trillium ovatum Pursh* Trillium ovatum Pursh	44	<1	NA	NA
TSHE	*Tsuga heterophylla* (Raf.) Sarg.	44	<1	NA	NA
CLSI2	*Claytonia sibirica L.* Claytonia sibirica L.	46	<1	NA	NA
FRVI	*Fragaria virginiana* Duchesne	46	<1	NA	NA
BLSP	*Blechnum spicant* (L.) Sm.	48	<1	NA	NA
CIVU	*Cirsium vulgare* (Savi) Ten.	48	<1	NA	NA
DIFO	*Dicentra formosa* (Haw.) Walp.	48	<1	NA	NA
RULE	*Rubus leucodermis* Douglas ex Torr. & A. Gray	51	NA	<1	NA
CIAR4	*Cirsium arvense (L.)* Scop.	52	<1	NA	NA
EPMI	*Epilobium minutum* Lindl. ex Lehm.	52	<1	NA	NA
LILIU	*Lilium* sp.	52	<1	NA	NA
RULA	*Rubus laciniatus* Willd.	52	<1	NA	NA
SENEC	*Senecio* sp.	52	<1	NA	NA

Note: Taxon IDs and scientific names are based on the USDA Plants database (plants.usda.gov). HEIRA is likely *Hieracium albiflorum* or *H. scouleri*. SPDO is likely *Spiraea douglasii* Hook. var. *douglasii*. SENEC is likely *Senecio sylvaticus* or *S. jacobaea*. GASH (*Gaultheria shallon*) and MANE2 (*Mahonia nervosa*) to a lesser degree, are most likely over-represented in the dataset due clonal architecture and the difficultly of determining single individuals without destructive sampling (Huffman, 1994).

Table 22: Per plot breakdown of species richness, diversity, and herbaceous cover at ABBY.

Plot ID	Species Richness	Shannon Diversity Index	Percent Total Herbaceous Cover
ABBY_061	13	1.25	64
ABBY_062	36	2.77	112
ABBY_063	32	2.09	127
ABBY_064	33	2.71	107
ABBY_065	24	2.05	102
ABBY_066	21	1.89	76
ABBY_067	22	1.64	98
ABBY_068	25	2.06	76
ABBY_069	25	2.19	158
ABBY_070	26	2.13	135

Note: Percent herbaceous cover was measured by species and then added together to calculate the percent total herbaceous cover for each plot.

Site characterization measurements are used to determine which sites will implement the Bryophyte Productivity Protocol. The protocol will occur at sites where bryophyte cover, for which annual growth is not distinguishable, is 20% or greater averaged across all sampled plots. See TOS Protocol and Procedure: Bryophyte Productivity (RD[12]) for more information. There was no bryophyte cover to record at ABBY.

5.5 Beetles

5.5.1 Site-Specific Methods

Beetle site characterization was conducted in August 2014 by NEON staff following the standard methods outlined in TOS Site Characterization Methods (RD[6]). Beetle site characterization data were collected to start site level teaching collections. For more information on this protocol and data product numbers see Appendix A.

5.5.2 Results

Table 23: Beetle identification results at ABBY.

Sample ID	Scientific Name	Sex
NEON8263	*Nebria brevicollis*	Female

5.6 Mosquitoes

5.6.1 Site-Specific Methods

Mosquito site characterization was conducted in August 2014 by NEON staff following the standard methods outlined in TOS Site Characterization Methods (RD[6]) to test protocol methods and start site level species lists. No pathogen testing was performed. Samples were pooled before identification. For more information on this protocol and data product numbers see Appendix A.

5.6.2 Results

Table 24: Mosquito identification results at ABBY.

Sample ID	Scientific Name	Sex	Count
ABBY.27August2014.SC.1	*Culex pipiens*	Female	8
ABBY.27August2014.SC.1	*Culex tarsalis*	Female	1
ABBY.27August2014.SC.1	*Culiseta incidens*	Female	1

5.7 Ticks

5.7.1 Site-Specific Methods

Tick drags were conducted at ABBY in August of 2012 to test protocol methods and calculate capture rates. No ticks were collected during site characterization sampling. For more information on this protocol and data product numbers see Appendix A.

5.8 Species Reference Lists

A review of the literature for taxonomic lists of interest for each site was conducted prior to field work. In the case of vertebrates that NEON may capture (e.g., reptiles, amphibians, small mammals), these lists were often required to secure permits. Key references identified in this effort are listed below. Species lists and associated references for small mammals and breeding landbirds can be found in the appendices of the respective protocols (RD[07], RD[08]). For statewide references see the WREF Species Reference List section.

Bousquet, Y. 2012. Catalogue of Geadephaga (Coleoptera, Adephaga) of America, north of Mexico. ZooKeys, (245), 1-1722.

Centers for Disease Control and Prevention. (2015). *Geographic distribution of ticks that bite humans.* Retrieved from http://www.cdc.gov/ticks/geographic_distribution.html

Darsie Jr., R. F., and R. A. Ward. 2005. Identification and geographical distribution of the mosquitoes of North America, North of Mexico. University Press of Florida, Gainesville.

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7 APPENDIX A: DATA PRODUCT NUMBERS

For more information on the sampling protocols and the latest observatory data visit http://data.neonscience.org/data-product-catalog and search by name or code number.

Table 25: NEON data product names and descriptions.

Name	Description	Identification Code
Root sampling (megapit)	Fine root biomass in 10cm increments (first 1m depth) and 20cm increments (from 1m to 2m depth) from soil pit sampling	NEON.DOM.SITE.DP1.10066
Soil physical properties (Megapit)	Soil taxonomy, horizon names, horizon depths, as well as soil bulk density, porosity, texture (sand, silt, and clay content) in the <= 2 mm soil fraction for each soil horizon. Data were derived from a sampling location expected to be representative of the area where the Instrumented Soil Plots per site are located and were collected once during site construction. Also see distributed soil data products.	NEON.DOM.SITE.DP1.00096

Name	Description	Identification Code
Soil chemical properties (Megapit)	Total content of a range of chemical elements, pH, and electrical conductivity in the <= 2 mm soil fraction for each soil horizon. Data were derived from a sampling location expected to be representative of the area where the Instrumented Soil Plots per site are located and were collected once during site construction. Also see distributed soil data products.	NEON.DOM.SITE.DP1.00097
Woody plant vegetation structure	Structure measurements, including height, canopy diameter, and stem diameter, as well as mapped position of individual woody plants	NEON.DOM.SITE.DP1.10098
Plant presence and percent cover	Plant species presence as observed in multi-scale plots: species and associated percent cover at 1-m2 and plant species presence at 10-m2, 100-m2 and 400-m2	NEON.DOM.SITE.DP1.10058
Plant phenology observations	Phenophase status and intensity of tagged plants	NEON.DOM.SITE.DP1.10055
Plant foliar stable isotopes	Field collection metadata describing the sampling of sun-lit canopy foliar tissues for stable isotope compositions. Also includes raw data returned from the laboratory.	NEON.DOM.SITE.DP1.10053
Plant foliar physical and chemical properties	Plant sun-lit canopy foliar physical (e.g., leaf mass per area) and chemical properties reported at the level of the individual.	NEON.DOM.SITE.DP1.10026
Non-herbaceous perennial vegetation structure	Field measurements of individual non-herbaceous perennial plants (e.g. cacti, ferns)	NEON.DOM.SITE.DP1.10045.
Ground beetles sampled from pitfall traps	Taxonomically identified ground beetles and the plots and times from which they were collected.	NEON.DOM.SITE.DP1.10022
Ground beetle sequences DNA barcode	CO1 DNA sequences from select ground beetles	NEON.DOM.SITE.DP1.10020
Mosquitoes sampled from CO2traps	Taxonomically identified mosquitoes and the plots and times from which they were collected	NEON.DOM.SITE.DP1.10043
Mosquito-borne pathogen status	Presence/absence of a pathogen in a single mosquito sample (pool)	NEON.DOM.SITE.DP1.10041
Mosquito sequences DNA barcode	CO1 DNA sequences from select mosquitoes	NEON.DOM.SITE.DP1.10038
Ticks sampled using drag cloths	Abundance and density of ticks collected by drag and/or flag sampling (by species and/or lifestage)	NEON.DOM.SITE.DP1.10093
Tick-borne pathogen status	Presence/absence of a pathogen in each single tick sample	NEON.DOM.SITE.DP1.10092