TOS SITE CHARACTERIZATION REPORT: DOMAIN 12

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See configuration management system for approval history.

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CHANGE RECORD

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A	12/07/2018	ECO-05914	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 the one site in the Northern Rockies 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 Document Library 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 and Productivity
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.011061	TIS Site Characterization Report
RD[05]	NEON.DOC.001669	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

2.3 Acronyms

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

3 DOMAIN 12 OVERVIEW: NORTHERN ROCKIES DOMAIN

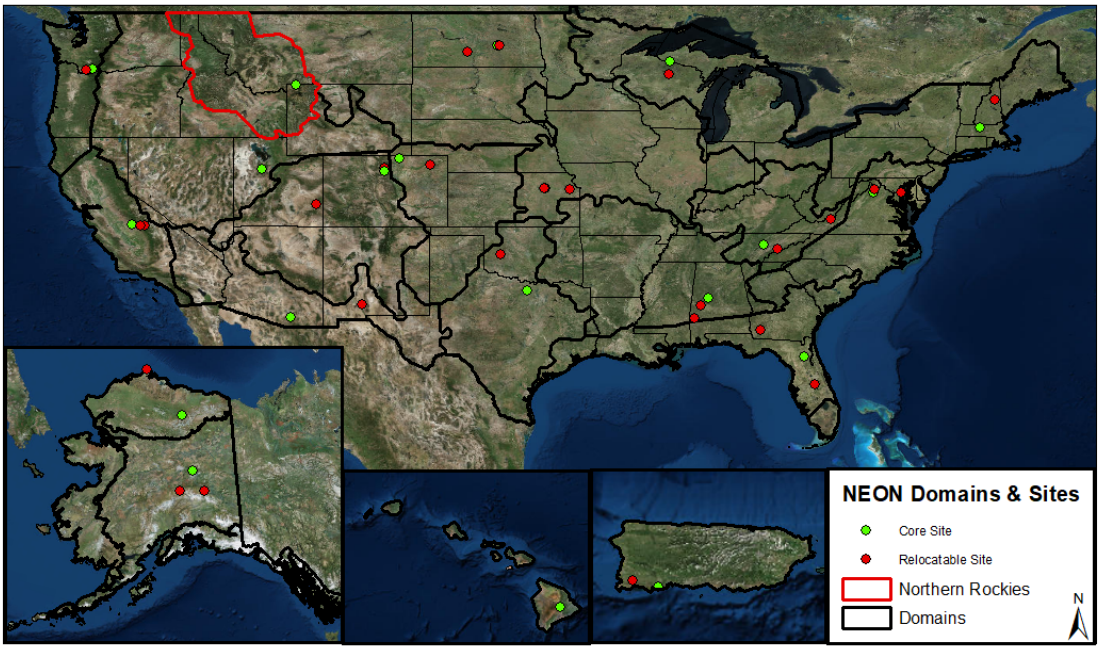

Figure 1: NEON project map with Domain 12 highlighted in red.

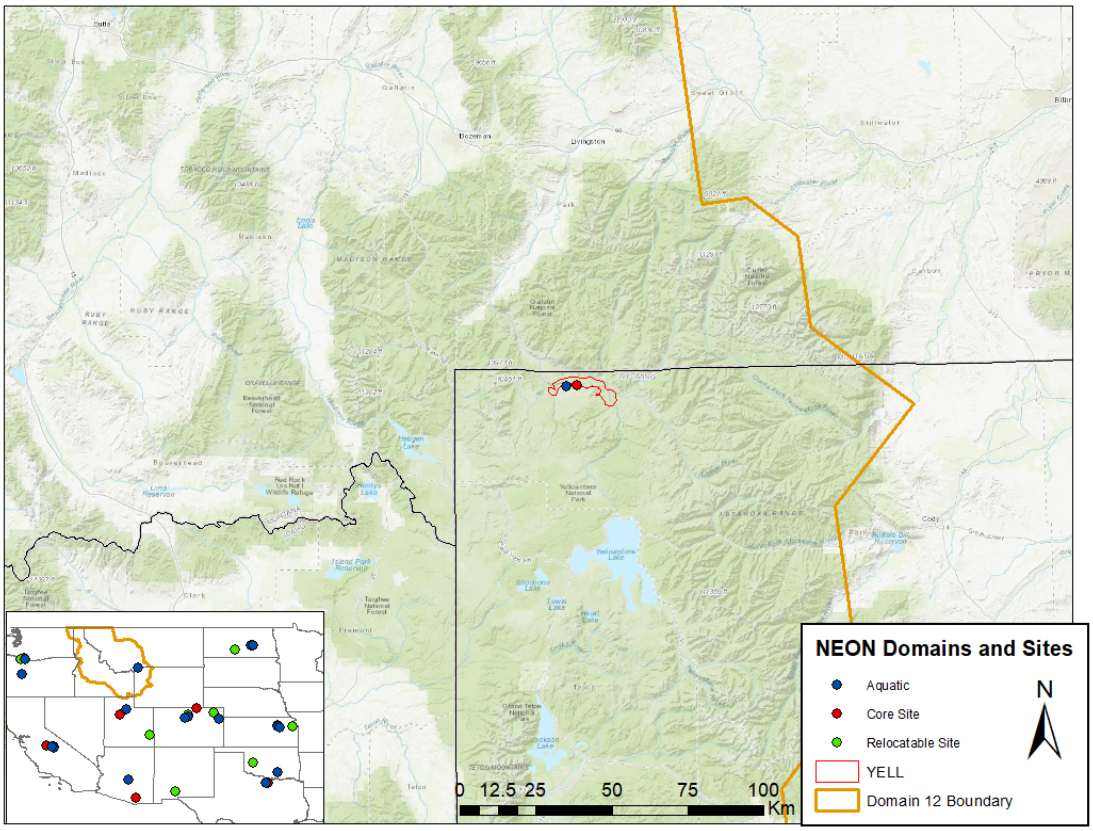

Figure 2: Site boundaries within Domain 12.

The Northern Rockies Domain is a patchwork of grassland, forest, and agricultural communities set in a harsh climate with rugged topography. Grazing and fire alter the landscape.

- States included in the domain: Idaho, Montana, Washington, Wyoming
- Core site: Yellowstone Northern Range
- Science themes: Climate Impacts

4 CORE SITE- YELLOWSTONE NORTHERN RANGE (YELL)

Located 100 kilometers southeast of Bozeman, the YELL site is within the northern reaches of Yellowstone National Park. The terrain consists of rolling hills with small wetlands in the bottom of the depressions. The NEON site is a mosaic of pine-dominated forest mixed with open swaths of sage and grass.

Key Characteristics:

- Site host: National Park Service
- Located in: Park County, WY
- Sampling Area: 72.64 km^2
- Plot Elevation: 1840-2245m
- Dominant vegetation type: Vegetation communities of Yellowstone National Park include over 1,200 species of native plants and include groups typical of both the Rocky Mountains and the Great Plains. Douglas-fir (*Pseudotsuga menziesii*) and lodgepole pine (*Pinus contorta*) dominate the canopy while mountain big sagebrush (*Artemisia tridentate* var. *vaseyana*) and Idaho fescue (*Festuca idahoensis*) occur throughout sagebrush-steppe (Plants- National Park Service, 2017).
- General management: Yellowstone National Park was founded as the world's first national park in 1872 and continues its mission to conserve the park's resources for the enjoyment of all. The NEON tower and aquatic sites are within one of the Park's bear management areas which includes seasonal closure to minimize bear-human interactions (Management- National Park Service, 2017). The Park monitors for white-bark pine beetles and manages nonnative species, especially near developed areas (Plants- National Park Service, 2017).
- The Blacktail Deer Creek Site is located west of the NEON tower. 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. See the "TOS Spatial Sampling Design" section for site specific deviations.

4.1 TOS Spatial Sampling Design

TOS Distributed Plots were allocated at YELL 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 visibility concerns from roads and trails, mosquito points were allocated up to 200m from the roads instead of the standard 35m. TOS Tower Plots were allocated according to a spatially balanced design in and around the NEON tower airshed (RD[03]). Due to seasonal closures around the NEON tower, the primary phenology plot is located outside of the tower airshed area to facilitate sampling throughout the entire growing season. The phenology plot location was determined by matching vegetation, soil, elevation, slope, and aspect variables to the tower area. 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.

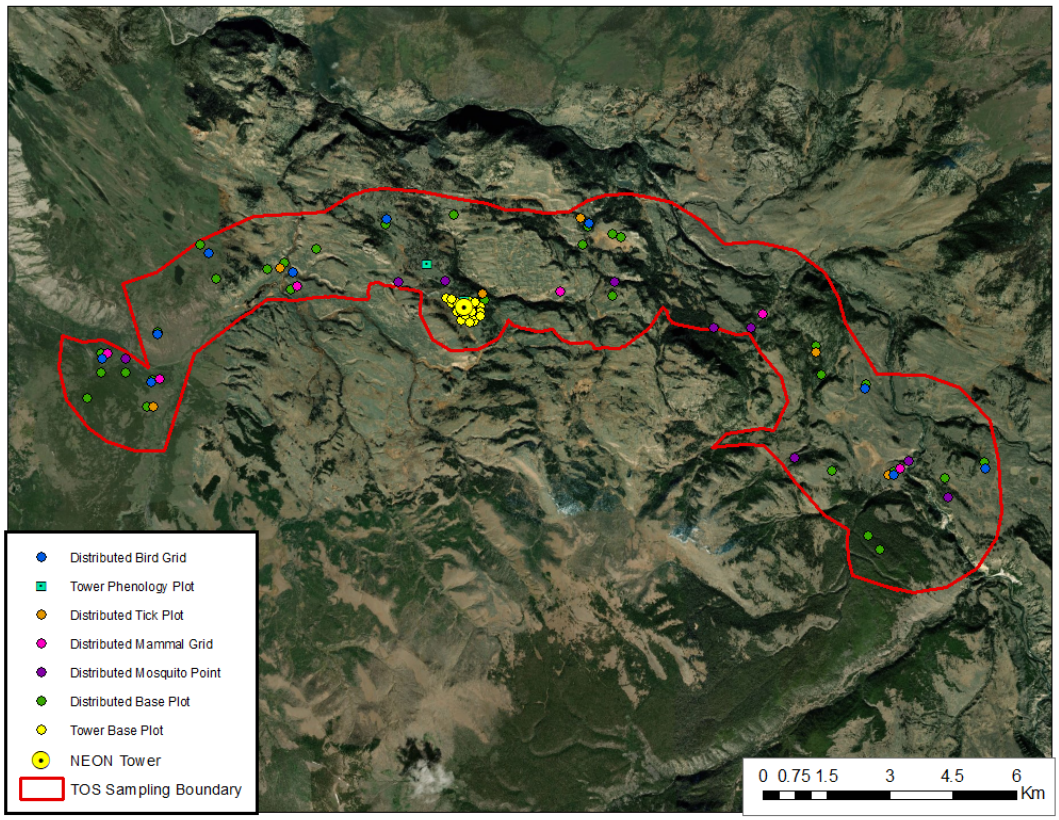

Figure 3: Map of TOS plot centroids within the NEON TOS sampling boundary at YELL.

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

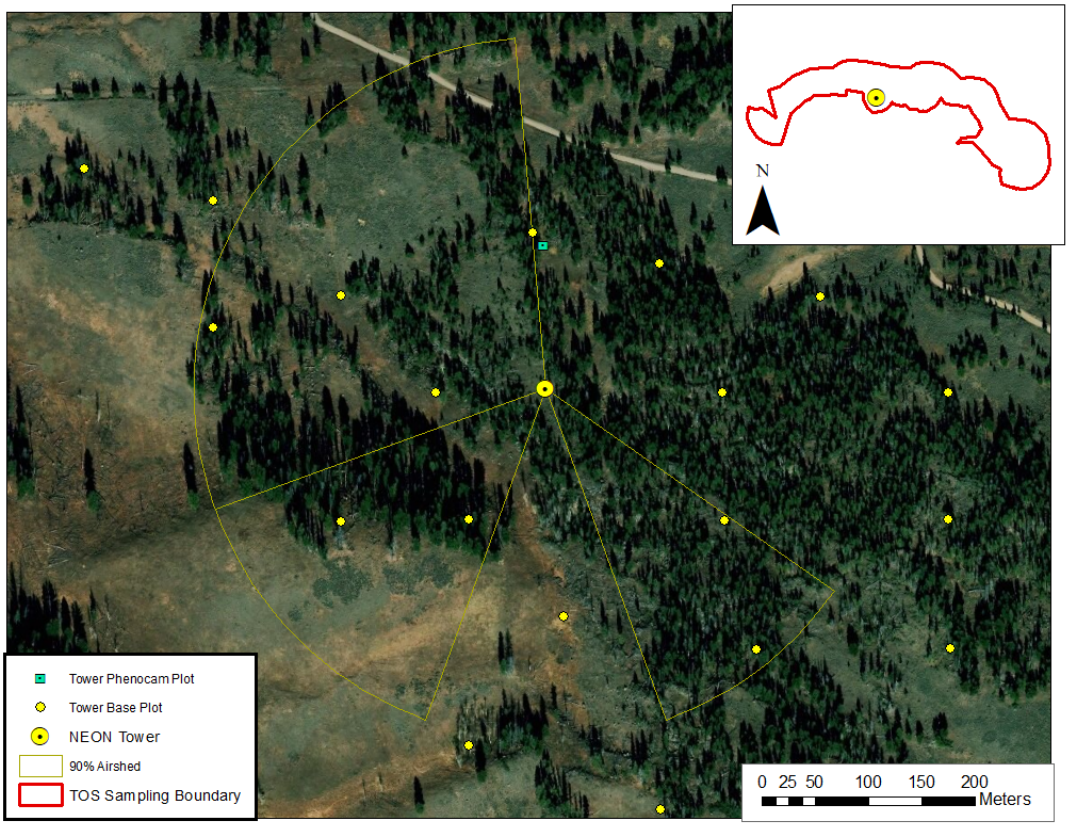

Figure 4: Map of the tower airshed and TOS plot centroids at YELL.

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 YELL.

NLCD Class	Site Area (km^2)	Percent (%)
Shrub Scrub	45.42	56.98
Evergreen Forest	22.17	27.81
Grassland Herbaceous	8.72	10.94
Developed Open Space	1.66	2.09
Emergent Herbaceous Wetlands	0.65	0.82
Open Water	0.6	0.76
Pasture Hay	0.18	0.23
Woody Wetlands	0.13	0.16
Barren Land	0.07	0.09
Mixed Forest	0.07	0.09
Deciduous Forest	0.03	0.04

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 YELL.

Plot Type	Plot Subtype	NLCD Class	Number of Plots Established
Distributed	Base Plot	Evergreen Forest	10
Distributed	Base Plot	Grassland Herbaceous	6
Distributed	Base Plot	Shrub Scrub	14
Distributed	Bird Grid	Evergreen Forest	3
Distributed	Bird Grid	Shrub Scrub	7
Distributed	Mammal Grid	Evergreen Forest	2
Distributed	Mammal Grid	Shrub Scrub	4
Distributed	Mosquito Point	Evergreen Forest	3
Distributed	Mosquito Point	Shrub Scrub	6
Distributed	Tick Plot	Evergreen Forest	2
Distributed	Tick Plot	Shrub Scrub	4
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 types within the airshed include: evergreen forest, grassland

herbaceous, and shrub scrub.

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

Plot Type	Plot Subtype	NLCD Class	Protocols	Number of Plots
Distributed	Base Plot	Evergreen Forest	Beetles	3
Distributed	Base Plot	Grassland Herbaceous	Beetles	1
Distributed	Base Plot	Shrub Scrub	Beetles	6
Distributed	Base Plot	Evergreen Forest	Canopy Foliage Chemistry	3
Distributed	Base Plot	Grassland Herbaceous	Canopy Foliage Chemistry	1
Distributed	Base Plot	Shrub Scrub	Canopy Foliage Chemistry	6
Distributed	Base Plot	Evergreen Forest	Coarse Downed Wood	6
Distributed	Base Plot	Grassland Herbaceous	Coarse Downed Wood	2
Distributed	Base Plot	Shrub Scrub	Coarse Downed Wood	12
Distributed	Base Plot	Evergreen Forest	Digital Hemispherical Photos for Leaf Area Index	6
Distributed	Base Plot	Grassland Herbaceous	Digital Hemispherical Photos for Leaf Area Index	2
Distributed	Base Plot	Shrub Scrub	Digital Hemispherical Photos for Leaf Area Index	12
Distributed	Base Plot	Evergreen Forest	Herbaceous Biomass	6
Distributed	Base Plot	Grassland Herbaceous	Herbaceous Biomass	2
Distributed	Base Plot	Shrub Scrub	Herbaceous Biomass	12
Distributed	Base Plot	Evergreen Forest	Plant Diversity	10
Distributed	Base Plot	Grassland Herbaceous	Plant Diversity	6
Distributed	Base Plot	Shrub Scrub	Plant Diversity	14
Distributed	Base Plot	Evergreen Forest	Soil Biogeochemistry	2
Distributed	Base Plot	Grassland Herbaceous	Soil Biogeochemistry	1
Distributed	Base Plot	Shrub Scrub	Soil Biogeochemistry	3
Distributed	Base Plot	Evergreen Forest	Soil Microbes	2
Distributed	Base Plot	Grassland Herbaceous	Soil Microbes	1
Distributed	Base Plot	Shrub Scrub	Soil Microbes	3
Distributed	Base Plot	Evergreen Forest	Vegetation Structure	6
Distributed	Base Plot	Grassland Herbaceous	Vegetation Structure	2
Distributed	Base Plot	Shrub Scrub	Vegetation Structure	12

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 YELL.

Plot Type	Plot Subtype	Protocols	Number of Plots
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 Belowground Biomass	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: YELL

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.

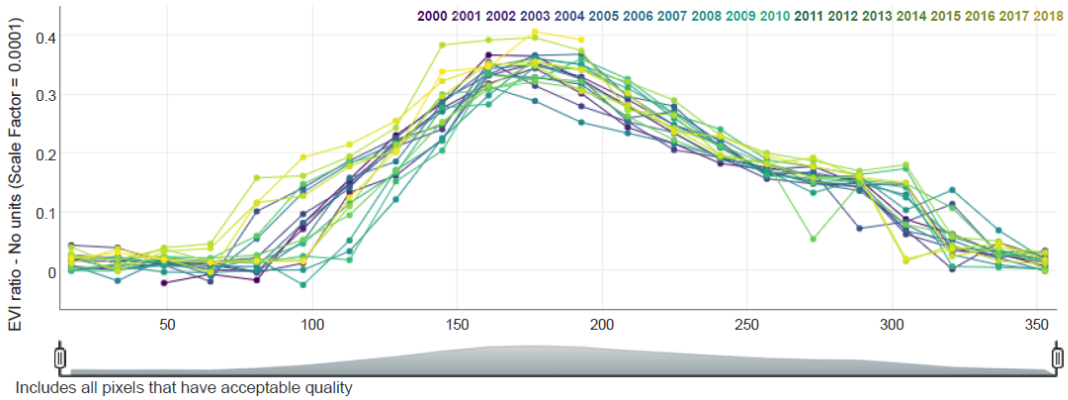

Figure 5: MODIS-EVI greenness (y-axis = EVI ratio) as a function of time (x-axis = DOY) for the years 2001-2018 at the NEON YELL site.

Table 5: Average MODIS-EVI greenness dates for the NEON YELL site, based on data from 2005-2014 (DOY, with MM/DD in parentheses).

Average Increase	Average Maximum	Average Decrease	Average Minimum
125 (5/5)	169 (6/18)	193 (7/12)	269 (9/17)

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: 2005-2014
- User selected area: 10.25 km x 10.25 km box, Centroid Latitude: 44.95348, Longitude: -110.53914 (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 July 2018. 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 and Productivity (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: Fine root mass per depth increment (cm) at YELL.

Upper Depth	Lower Depth	Mean (mg per cm^3)	Std Dev
0	10	4.64	2
10	20	1.81	0.11
20	30	2.17	1.39
30	40	1.2	0.5
40	50	0.86	0.31
50	60	0.49	0.13
60	70	0.44	0.16
70	80	0.48	0.44
80	90	0.22	0.22
90	100	0.54	0.25
100	120	0.17	0.08
120	140	0.2	0.19
140	160	0.04	0.01
160	180	0.03	0.04
180	200	0.01	0.01

Table 7: Cumulative fine root mass as a function of depth (cm) at YELL.

Upper Depth	Lower Depth	Mean Cumulative (g per m^2)	Cumulative Std Dev
0	10	463.59	199.51
10	20	645.08	195.23
20	30	862.24	197.47
30	40	982.5	200.82
40	50	1068.07	187.06
50	60	1117.12	175.63
60	70	1161.27	174.28
70	80	1209.08	130.62
80	90	1231.35	108.62

Upper Depth	Lower Depth	Mean Cumulative (g per m^2)	Cumulative Std Dev
90	100	1285.31	103.05
100	120	1319.5	86.6
120	140	1359.66	49.04
140	160	1368.05	46.05
160	180	1374.51	49.86
180	200	1377.02	47.95

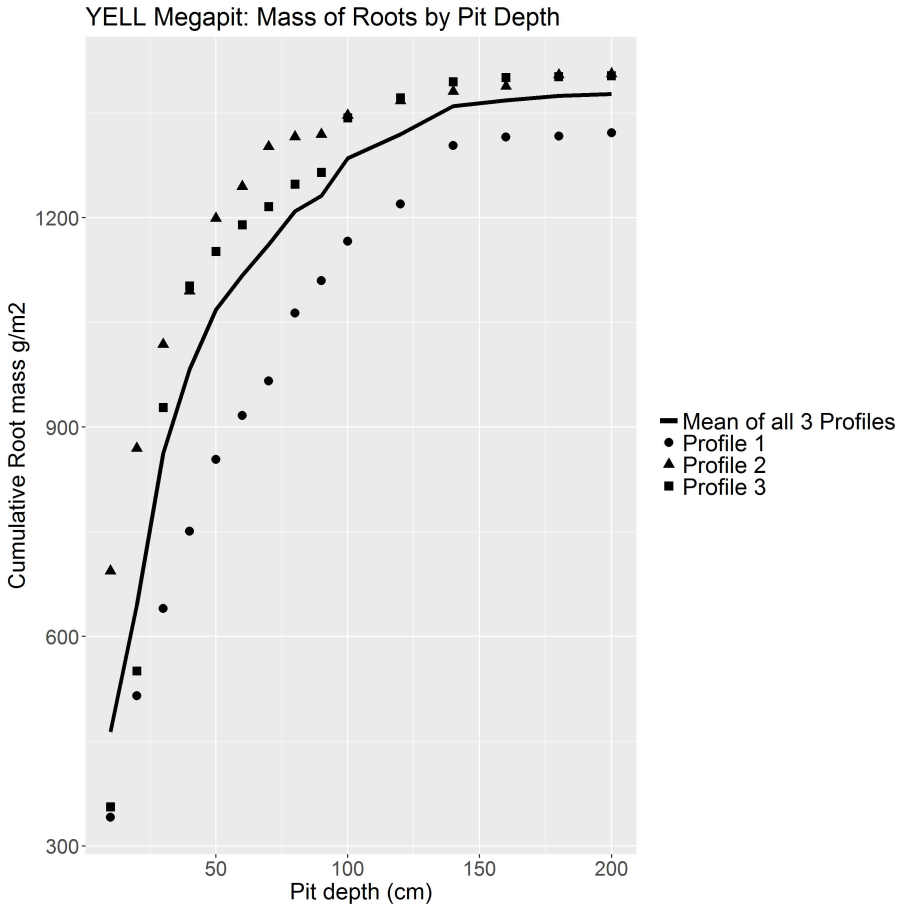

Figure 6: Cumulative root mass by pit depth at YELL.

Table 8: Fine root biomass sampling summary data at YELL.

Total Pit Depth (cm)	200
Total Mean Cumulative Mass at 30cm (g per m^2)	862.24
Total Mean Cumulative Mass at 100cm (g per m^2)	1285.31
Total Mean Cumulative Mass (g per m^2)	1377.02

4.4 Plant Characterization and Phenology Species Selection

4.4.1 Site-Specific Methods

Plant characterization data inform sampling procedures for plant phenology and plant productivity protocols. Plant characterization data were collected by NEON staff. Vegetation structure measurements were collected during May of 2018 and plant diversity data were collected June-August 2018. Vegetation site characterization took place at five Distributed Base Plots instead of the standard Tower Base Plots due to seasonal closures around the tower airshed. The five Distributed Base Plots were selected by best matching vegetation, soil, elevation, slope, and aspect variables to the tower area.

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 9: Site plant characterization and phenology species summary at YELL.

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
ARTR2	*Artemisia tridentata* Nutt.	1	8	0.13	<1

Taxon ID	Scientific Name	Rank	Mean Percent Cover	Mean Canopy Area (m^2 per m^2)	Mean ABH (cm^2 per m^2)
PSME	*Pseudotsuga menziesii* (Mirb.) Franco	2	<1	<1	4.77
PICO	*Pinus contorta* Douglas ex Loudon	3	2	<1	1.97
POACEASPP	Poaceae sp.	4	7	<1	<1
FESTUSPP	*Festuca* sp.	5	2	<1	<1
ERUM	*Eriogonum umbellatum* Torr.	6	1	<1	<1
SYAL	*Symphoricarpos albus* (L.) S.F. Blake	7	1	<1	<1
GEVI2	*Geranium viscosissimum* Fisch. & C.A. Mey. ex C.A. Mey.	8	<1	<1	<1
FESTU	*Festuca* sp.	10	<1	<1	<1
POACEA	Poaceae sp.	11	<1	<1	<1
LUPIN	*Lupinus* sp.	12	<1	<1	<1
LIRU4	*Lithospermum ruderale* Douglas ex Lehm.	13	<1	<1	<1
CHAN9	*Chamerion angustifolium* (L.) Holub	14	<1	<1	<1
ANTEN	*Antennaria* sp.	15	<1	<1	<1
PHLOX	*Phlox* sp.	17	<1	<1	<1
ERIGE2	*Erigeron* sp.	18	<1	<1	<1
EUCO36	*Eurybia conspicua* (Lindl.) G.L. Nesom	19	<1	<1	<1
ERIGE2SPP	*Erigeron* sp.	20	<1	<1	<1
MARE11	*Mahonia repens* (Lindl.) G. Don	20	<1	<1	<1
ACMI2	*Achillea millefolium* L.	22	<1	<1	<1
PHPR3	*Phleum pratense* L.	22	<1	<1	<1
ANTENSPP	*Antennaria* sp.	24	<1	<1	<1
ASTERA	Asteraceae sp.	24	<1	<1	<1
CHVI8	*Chrysothamnus viscidiflorus* (Hook.) Nutt.	26	<1	<1	<1
SYMPH	*Symphoricarpos* sp.	26	<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)
GETR	*Geum triflorum* Pursh	28	<1	<1	<1
CHRYS9SPP	*Chrysothamnus* sp.	29	<1	<1	<1
LUPINSPP	*Lupinus* sp.	29	<1	<1	<1
ASTERASPP	Asteraceae sp.	31	<1	<1	<1
CAREX	*Carex* sp.	31	<1	<1	<1
LITHO3	*Lithospermum* sp.	33	<1	<1	<1
ASTRASPP	*Astragalus* sp.	34	<1	<1	<1
CHENOSPP	*Chenopodium* sp.	34	<1	<1	<1
FRAGA	*Fragaria* sp.	36	<1	<1	<1
CASTI2SPP	*Castilleja* sp.	37	<1	<1	<1
COPA3	*Collinsia parviflora* Lindl.	37	<1	<1	<1
ERNA10	*Ericameria nauseosa* (Pall. ex Pursh) G.L. Nesom & Baird	37	<1	<1	<1
LIDA	*Linaria dalmatica* (L.) Mill.	37	<1	<1	<1
PHLOXSPP	*Phlox* sp.	37	<1	<1	<1
POTEN	*Potentilla* sp.	37	<1	<1	<1
ROSA5SPP	*Rosa* sp.	37	<1	<1	<1
TAOF	*Taraxacum officinale* F.H. Wigg.	37	<1	<1	<1
POTENSPP	*Potentilla* sp.	45	<1	<1	<1
BRASSI	Brassicaceae sp.	46	<1	<1	<1
COLLO	*Collomia* sp.	46	<1	<1	<1
FABACESPP	Fabaceae sp.	46	<1	<1	<1
PODO4	*Polygonum douglasii* Greene	46	<1	<1	<1
CARO2	*Campanula rotundifolia* L.	50	<1	<1	<1
CASTI2	*Castilleja* sp.	50	<1	<1	<1
COMAN	*Comandra* sp.	50	<1	<1	<1
ACOC3	*Achnatherum occidentale* (Thurb.) Barkworth	53	<1	<1	<1
ANSE4	*Androsace septentrionalis* L.	53	<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)
ARDR	*Arabis drummondii* A. Gray	53	<1	<1	<1
BORAGI	Boraginaceae sp.	53	<1	<1	<1
CARYOP	Caryophyllaceae sp.	53	<1	<1	<1
EPBR3	*Epilobium brachycarpum* C. Presl	53	<1	<1	<1
HEVID	*Heterotheca villosa* (Pursh) Shinners var. *depressa* (Rydb.) Semple	53	<1	<1	<1
ACHNA	*Achnatherum* sp.	60	<1	<1	<1
ACHNASPP	*Achnatherum* sp.	60	<1	<1	<1
ARFR4	*Artemisia frigida* Willd.	60	<1	<1	<1
ASTRA	*Astragalus* sp.	60	<1	<1	<1
BRAR5	*Bromus arvensis* L.	60	<1	<1	<1
CAREXSPP	*Carex* sp.	60	<1	<1	<1
CHDO	*Chaenactis douglasii* (Hook.) Hook. & Arn.	60	<1	<1	<1
CHER2	*Chaetopappa ericoides* (Torr.) G.L. Nesom	60	<1	<1	<1
CISC2	*Cirsium scariosum* Nutt.	60	<1	<1	<1
COUM	*Comandra umbellata* (L.) Nutt.	60	<1	<1	<1
ELYMUSPP	*Elymus* sp.	60	<1	<1	<1
ERICA2	*Ericameria* sp.	60	<1	<1	<1
ERICA2SPP	*Ericameria* sp.	60	<1	<1	<1
ERIOG	*Eriogonum* sp.	60	<1	<1	<1
FABACE	Fabaceae sp.	60	<1	<1	<1
PHMU3	*Phlox multiflora* A. Nelson	60	<1	<1	<1
VIOLAC	Violaceae sp.	60	<1	<1	<1

Note:Taxon IDs and scientific names are based on the USDA Plants database (plants.usda.gov). Moss was the number nine ranked group and removed from the list of possible species for phenology sampling.

Table 10: Per plot breakdown of species richness, diversity, and herbaceous cover at YELL.

Plot ID	Species Richness	Shannon Diversity Index	Percent Total Herbaceous Cover	Bryophyte Percent Cover
YELL_002	26	2.03	99	0.86
YELL_006	24	2.31	69	0
YELL_013	23	2.17	79	1.36
YELL_016	34	2.37	103	2
YELL_020	30	2.22	95	0.7
Bryophyte Mean				0.984

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

Bryophyte percent cover data were used to determine which sites qualify for implementation of the Bryophyte Productivity protocol. However, bryophyte productivity sampling was discontinued in 2018 and NEON no longer implements this protocol.

4.5 Beetles

4.5.1 Site-Specific Methods

No beetle site characterization was conducted at YELL. 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 was conducted at YELL. 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 was conducted at YELL. 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]).

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6 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 11: 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
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

Name	Description	Identification Code
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