



<i>Title:</i> NEON User Guide to Site Management and Event Reporting (NEON.DP1.10111)	<i>Date:</i> 07/31/2019
<i>Author:</i> Tanya A. Vance	<i>Revision:</i> A

## NEON USER GUIDE TO SITE MANAGEMENT AND EVENT REPORTING (NEON.DP1.10111)

<b>PREPARED BY</b>	<b>ORGANIZATION</b>	<b>DATE</b>
Tanya A. Vance	Science	07/31/2019
		07/31/2019



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## CHANGE RECORD

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## 1 DESCRIPTION

### 1.1 Purpose

This document provides an overview of the data included in this NEON Level 1 data product, the quality controlled product generated from raw Level 0 data, and associated metadata. In the NEON data products framework, the raw data collected in the field, for example, the description of the disturbance event, are considered the lowest level (Level 0). Raw data that have been quality checked via the steps detailed herein, as well as simple metrics that emerge from the raw data are considered Level 1 data products.

The text herein provides a discussion of measurement theory and implementation, data product provenance, quality assurance and control methods used, and approximations and/or assumptions made during L1 data creation.

### 1.2 Scope

This document describes the steps needed to generate the L1 data product, Site management and event reporting - record of land management activities, disturbances, and other incidents of ecological note within a NEON site - and associated metadata from input data. This document also provides details relevant to the publication of the data products via the NEON data portal, with additional detail available in the file, NEON Data Publication Workbook for Site management and event reporting (NEON.DP1.10111.001) (AD[04]), provided in the download package for this data product.

This document describes the process for ingesting and performing automated quality assurance and control procedures on the data collected in the field pertaining to NEON Protocol and Procedure: Site management and disturbance data collection (AD[06]). The raw data that are processed in this document are detailed in the file, NEON Raw Data Ingest Workbook for Site management and event reporting (NEON.DP0.10111.001) (AD[03]), provided in the download package for this data product. Please note that raw data products (denoted by 'DP0') may not always have the same numbers (e.g., '10111') as the corresponding L1 data product.



## 2 RELATED DOCUMENTS

### 2.1 Associated Documents

AD[01]	NEON.DOC.000001	NEON Observatory Design (NOD) Requirements
AD[02]	NEON.DOC.002652	NEON Level 1, Level 2 and Level 3 Data Products Catalog
AD[03]	NEON.DP0.10111.001_dataValidation.csv	NEON Raw Data Ingest Workbook for Site management and event reporting (NEON.DP0.10111.001)
AD[04]	NEON.DP1.10111.001_variables.csv	NEON Data Publication Workbook for Site management and event reporting (NEON.DP1.10111.001)
AD[05]	NEON.DOC.001152	NEON Aquatic Sampling Strategy
AD[06]	NEON.DOC.003282	NEON Protocol and Procedure: Site management and disturbance data collection
AD[07]	NEON.DOC.000913	TOS Science Design for Spatial Sampling
AD[08]	NEON.DOC.000008	NEON Acronym List
AD[09]	NEON.DOC.000243	NEON Glossary of Terms
AD[10]	OS_Generic_Transitions.pdf	NEON Algorithm Theoretical Basis Document: OS Generic Transitions
AD[11]		NEON's Ingest Conversion Language (NICL) specifications



### 3 DATA PRODUCT DESCRIPTION

The Site management and event reporting data product (NEON.DP1.10111.001) provides records of management activities and stochastic disturbances within all NEON sites. Records are reported about activities and disturbances that have the potential to impact or affect data products across all NEON data-generating systems (TIS, TOS, AIS, AOS, and AOP) that are not collected as part of existing data product protocols.

Each NEON site experiences a range of planned and unplanned events at varying temporal and spatial scales. Without context, many of these activities and perturbations could be interpreted by data users as a response to the aforementioned forcings. For example, a site may have a history of applying herbicides to control an invasive plant and, during the course of the study, the landowner ceases these activities and the plant begins to recolonize the study area. Without the knowledge of the changes in land-management practices, the data user could make inferences that are incorrect or that do not account for the other variables that may be causing the observed variation. Equally important are the random events that may impact multiple data products across plots and aquatic reaches or within individual plots and transects. Knowledge of burns, wind damage, flooding, erosional processes, and the like are all important to the integrity and utility of NEON data products.

#### 3.1 Spatial Sampling Design

Site management and event reporting occurs at all NEON terrestrial and aquatic sites (Figure 1). See NEON Aquatic Sampling Strategy (AD[05]), NEON Protocol and Procedure: Site management and disturbance data collection (AD[06]), and TOS Science Design for Spatial Sampling (AD[07]) for further details.



Figure 1: Generic NEON site depicting airborne, aquatic, and terrestrial data collection.

#### 3.2 Temporal Sampling Design

Site management activity and disturbance reporting occurs at the time NEON staff are aware of the planned or unplanned event, either through direct observation during normal scheduled site visits or secondary reports from landowners, site hosts, and other reliable sources. For planned events, reporting is expected to occur only after the management activity has been completed, as the data user is presumed to be not interested in planned activities that did not occur. For unplanned events, data recording takes place as soon as the disturbance is observed

as well as when it is safe to assess the scale and intensity of the impact, preferably within 10 days of the observation. See NEON Aquatic Sampling Strategy (AD[05]) and the NEON Protocol and Procedure: Site management and disturbance data collection (AD[06]).

### 3.3 Variables Reported

All variables reported from the field (L0 data) are listed in the file, NEON Raw Data Ingest Workbook for Site management and event reporting (NEON.DP0.10111.001) (AD[03]). All variables reported in the published data (L1 data) are also provided separately in the file, NEON Data Publication Workbook for Site management and event reporting (NEON.DP1.10111.001) (AD[04]).

Where possible or relevant, field names have been standardized with Darwin Core terms (<http://rs.tdwg.org/dwc/>; accessed 16 February 2014), the Global Biodiversity Information Facility vocabularies (<http://rs.gbif.org/vocabulary/gbif/>; accessed 16 February 2014), the VegCore data dictionary (<https://projects.nceas.ucsb.edu/nceas/projects/bien/wiki/VegCore>; accessed 16 February 2014), where applicable. NEON TOS spatial data employs the World Geodetic System 1984 (WGS84) for its fundamental reference datum and GEOID09 for its reference gravitational ellipsoid. Latitudes and longitudes are denoted in decimal notation to six decimal places, with longitudes indicated as negative west of the Greenwich meridian.

Some variables described in this document may be for NEON internal use only and will not appear in downloaded data.

### 3.4 Spatial Resolution and Extent

The finest resolution at which site management and event reporting data are reported is at the spatial scale at which the planned or unplanned event occurred: at the site, reach or airshed level, at a group of specified plots, or at the level of an individual sampling location. The reporting level is the lowest possible demarcation (such as to plot level, if possible, rather than just a site reporting). The site management and event reporting data capture the NEON assets that were impacted (e.g., plot numbers, airshed, stream reach) and where possible, quantify the extent of the manipulation or disturbance (e.g., square meters, hectares). Small spatio-temporal scale events typically occur at the plot level for TOS, the transect level for AOS, the sensor location for AIS, and the tower for TIS.

Overall, this results in a spatial hierarchy of:

**locationID** (finest spatial resolution, ID of location within site) → **siteID** (ID of NEON site) → **domainID** (ID of a NEON domain).

Shapefiles of all NEON Aquatic and Terrestrial Observation System sampling locations can be found in the Document Library: <http://data.neonscience.org/documents>. If users are interested in the geospatial locations of the data relative to a global coordinate system, those can be retrieved using the NEON data API using the **namedLocation** and the following:

1. The `def.extr.geo.os.R` function from the `geoNEON` package, available here: <https://github.com/NEONScience/NEON-geolocation>
2. The NEON API: <http://data.neonscience.org/api>



### 3.5 Temporal Resolution and Extent

All site management and event reporting data are reported at the temporal resolution of a single planned or unplanned event. If the exact start date and end date of the event are unknown, an estimated date range of the the minimum and maximum start date of the event and the minimum and maximum end date of the event are reported.

The NEON Data Portal provides data in monthly files for query and download efficiency. Queries including any part of a month will return data from the entire month. Code to stack files across months is available here: <https://github.com/NEONScience/NEON-utilities>.

### 3.6 Associated Data Streams

### 3.7 Product Instances

The site management and event reporting data are collected at all 81 NEON Observatory field sites. These 81 sites are divided into 47 terrestrial sites and 34 aquatic sites, consisting of 24 wadeable streams, 3 non-wadeable streams (rivers), and 7 lakes. The number of records per site per year are in flux and dependent on the variable management activities and disturbances at each site.

### 3.8 Data Relationships

The protocol dictates that each site event is reported once, yielding a unique **eventID** (one expected record per eventID in `sim_eventData`). Duplicates and/or missing data may exist where protocol and/or data entry aberrations have occurred; users should check data carefully for anomalies before joining tables.

`sim_eventData.csv` - > One record expected per **eventID**, i.e. one per site per `startDate` (day of year, local time).

Data presented in this data product could potentially relate to any other data product in our catalog-linked through the `siteID` or `locationID` and time range. Users should be aware that the dates may not match exactly.

## 4 DATA QUALITY

### 4.1 Data Entry Constraint and Validation

Many quality control measures are implemented at the point of data entry within a mobile data entry application or web user interface (UI). For example, data formats are constrained and data values controlled through the provision of dropdown options, which reduces the number of processing steps necessary to prepare the raw data for publication. An additional set of constraints are implemented during the process of ingest into the NEON database. The product-specific data constraint and validation requirements built into data entry applications and database ingest are described in the document NEON Raw Data Ingest Workbook for Site management and event reporting (NEON.DP0.10111.001), provided with every download of this data product. Contained within this file is a field named 'entryValidationRulesForm', which describes syntactically the validation rules for each field built





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into the data entry application. Data entry constraints are described in NiCl syntax in the validation file provided with every data download, and the NiCl language is described in NEON's Ingest Conversion Language (NICL) specifications ([AD[12]]).

Data collected prior to 2017 were processed using a paper-based workflow that did not implement the full suite of quality control features associated with the interactive digital workflow.

## 4.2 Automated Data Processing Steps

Following data entry into a mobile application or web user interface, the steps used to process the data through to publication on the NEON Data Portal are detailed in the NEON Algorithm Theoretical Basis Document: OS Generic Transitions (AD[11]).

## 4.3 Data Revision

All data are provisional until a numbered version is released; the first release of a static version of NEON data, annotated with a globally unique identifier, is planned to take place in 2020. During the provisional period, QA/QC is an active process, as opposed to a discrete activity performed once, and records are updated on a rolling basis as a result of scheduled tests or feedback from data users. The Change Log section of the data product readme, provided with every data download, contains a history of major known errors and revisions.

## 4.4 Quality Flagging

The **dataQF** field in each record is a quality flag for known issues applying to the record, added by NEON Science upon data review. At this time, there are no known issues applying to the records in this data product.

## 5 REFERENCES