NEON PROTOCOL AND PROCEDURE: SITE MANAGEMENT AND DISTURBANCE DATA COLLECTION

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1 OVERVIEW

Background

NEON has been designed to observe and collect data on ecosystem responses to changes in climate, land-use and invasive species over a thirty-year period. These observations will come from 20 different domains, each having sites that experience a range of management activities and stochastic disturbances occurring 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. This protocol and the associated standard operating procedures provide the means for documenting site-specific management activities and disturbances.

Scope

This document provides a change-controlled version of Observatory protocols and procedures. Documentation of content changes (i.e. changes in particular tasks or safety practices) will occur via this change-controlled document, not through field manuals or training materials.

1.1.1 NEON Science Requirements and Data Products

This protocol fulfills Observatory science requirements that reside in NEON's Dynamic Object-Oriented Requirements System (DOORS). Copies of approved science requirements have been exported from DOORS and are available in NEON's document repository, or upon request.

Execution of this protocol procures samples and/or generates raw data satisfying NEON Observatory scientific requirements. These data and samples are used to create NEON data products, and are documented in the NEON Scientific Data Products Catalog (RD[03]).

2 RELATED DOCUMENTS AND ACRONYMS

Applicable Documents

Applicable documents contain higher-level information that is implemented in the current document. Examples include designs, plans, or standards.

AD [01]	NEON.DOC.004300	EHSS Policy, Program, and Management Plan
AD [02]	NEON.DOC.004316	Operations Field Safety and Security Plan
AD [03]	NEON.DOC.000724	Domain Chemical Hygiene Plan and Biosafety Manual
AD [05]	NEON.DOC.050005	Field Operations Job Instruction Training Plan
AD [06]	NEON.DOC.000001	NEON Observatory Design
AD [07]	NEON.DOC.004104	NEON Science Performance QA/QC Plan

Reference Documents

Reference documents contain information that supports or complements the current document. Examples include related protocols, datasheets, or general-information references.

RD [01]	NEON.DOC.000008	NEON Acronym List
RD [02]	NEON.DOC.000243	NEON Glossary of Terms
RD [03]	NEON.DOC.002652	NEON Level 1, Level 2 and Level 3 Data Products Catalog
RD [04]	NEON.DOC.001271	NEON Protocol and Procedure: Manual Data Transcription
RD [05]	NEON.DOC.002984	NEON Standard Operating Procedure: Minimizing Site Disturbance During Aquatic and Terrestrial Observation System Sampling

Acronyms

Acronym	Definition
GIS	Geographic Information Systems
SOP	Standard Operating Procedure

Definitions

Event Type: broad category used in this protocol to describe a variety of anticipated planned management activities and unplanned disturbances

Primary Observation: an observation by NEON domain staff of the implementation or results of site management activities or unplanned disturbances

Secondary Observation: a report to NEON domain staff by an external party of the occurrence of an event, planned or unplanned, at one or more NEON sampling locations

3 METHOD

This protocol provides methods to document ecologically notable events, including both land management activities (planned) and disturbances (unplanned), which occur within NEON sites. This important information will be provided to the NEON data user. The Standard Operating Procedures (SOPs) described below capture such events across spatial scales: at the site, reach or airshed level, at a group of specified plots, or at the level of an individual sampling location. SOP A describes the process of identifying, tracking, and recording long term, large scale, planned site management activities that are likely to impact NEON data products. SOP B incorporates information pertaining to unplanned events and the associated consequences across spatial scales. Additional considerations are provided with respect to the particular terrestrial or aquatic NEON system being impacted. Although the SOPs describe different approaches to organizing and reporting the diversity of potential events, all data shall be entered into one mobile data application, described in SOP C.

This protocol is not intended to yield documentation of every event that occurs at a NEON site, but rather, those activities, either planned or unplanned, that likely affect a NEON data point and of which NEON staff are aware, either through direct observation or secondary reports from landowners, site hosts, and other reliable sources. While this reporting is not expected to capture all important activities, it provides a means to capture as much of the useful on-the-ground information as possible, to ultimately provide to the NEON data user. Moreover, some protocols provide a means of reporting some of these impacts as part of the data product, and these impacts are not expected to be reproduced here. For example, the TOS small mammal sampling data product provides data pertaining to traps disturbed for potential incorporation into mark-recapture models or other analyses. Although the cause of the disturbance (e.g., black bear (*Ursus americanus*)) is not necessarily included in the data product, these disturbance events should not be reported again here.

The Field Operations Domain Manager will be responsible for gathering required data for each SOP. Domain Managers are also responsible for compiling necessary reports, maps, and datasheets for ingest from readily available materials to complete this reporting function. Field Operations Technicians will report on disturbances they observe that impact plot-level data and sampling, along with larger disturbances and management activities that may occur across the site. The primary goal is to collect information 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 some AOP) that are not collected as part of a data product. To this end, observations outside permitted boundaries or those that do not have potential impacts to NEON data products will not be collected.

Standard Operating Procedures (SOPs), in Section 7 of this document, provide detailed step-by-step directions, contingency plans, sampling tips, and best practices for implementing this sampling procedure. Use NEON's problem reporting system to resolve any field issues associated with implementing this protocol.

The value of NEON data hinges on consistent implementation of this protocol across all NEON domains, for the life of the project. It is therefore essential that field personnel carry out this protocol as outlined in this document. In the event that local conditions create uncertainty about carrying out these steps, it is critical that managers or technicians document the problem and enter it in NEON's problem tracking system.

Planned Site Management Activities

Long term, large scale, planned site management activities are reported using the procedure outlined in SOP A. This procedure pertains to site management activities that are planned and occur regularly as part of the site host's land management plan, including planting schedule, livestock rotation, or other land-use activities. The Domain Manager will be responsible for gathering as much information as is reasonably possible from, site hosts, farmers, ranchers, and other stakeholders on activities that are planned to occur during the upcoming field season. At the end of the field season or year-end, where applicable, the Domain Manager will verify, where possible, that these land use activities have been accurately reported as an occurrence at the plot or site level. The reporting level is to be to the lowest possible land demarcation (such as to plot level if possible, rather than just a site reporting). Reporting is expected to occur only after the activity has been completed, as the data user is likely not interested in planned activities that did not occur. It is important to balance the scientific need for this information with the equally important task of maintaining a positive relationship with the site host. At a minimum, this report should attempt to (a) quantify the scale of the activities (e.g., square meters, hectares), (b) capture the NEON assets that were impacted (e.g., plot numbers, airshed, stream reach), and (c) record the type of manipulation.

Examples include:

- Grazing regimes (cattle stocking rates, extent, timing)
- Logging/maceration (Logging type, level of disturbance)
- Burning regimes (extent, season, frequency)
- Agricultural practices (planting, fertilizing, pesticide use and application rate)

Unplanned Disturbances

Unplanned disturbances, regardless of the scale of impact, are documented using the procedures outlined in SOP B. For large-scale disturbances involving multiple sampling locations, the Domain Manager, with input from Domain staff, should quantify the extent of each disturbance or manipulation and the assets that were possibly impacted annually (e.g., at the start of each field season). The areal extent can be determined through desktop Geographic Information System (GIS) tools and then verified via visual plot level inspection, if possible, during the next scheduled visit to the plots or assets thought to be impacted.

Examples of large-scale, unplanned events include:

- Wildfire (Location, intensity)
- Flooding event (Extent, effect)
- Blowdown
- Vandalism (Location, type, effect)

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. Observations should be made each time a new disturbance is discovered during normal scheduled visits to sampling locations. The nature of the disturbance will be chosen from a menu in the mobile application, and then the technician will determine the areal impact as a percentage of the plot area and determine which sub-plots are most affected. Note that these observations are not to include impacts caused by NEON activities (See NEON DOC.002984 – SOP for Site Disturbance RD[05]).

Examples of small-scale, unplanned events include:

- Fallen tree
- Animal disturbance
- Vandalism

4 SAMPLING SCHEDULE

Sampling Frequency and Timing

SOP A: In many domains, timing of this SOP will be dependent on the site host, their land-use plan, and when the desired information will become available. The Domain Manager should determine sensible start and end dates for each management cycle (e.g., fiscal year, calendar year, beginning of sampling season, beginning of grazing season). Frequency of data collection within the management cycle is at the discretion of the Domain Manager. At a minimum, domain staff should verify that the planned activities have been completed at the end of the cycle and reported accordingly.

SOP B: The Domain Manager should review annually which large scale disturbances are likely to occur across the sites within each domain and communicate these to the field staff at the beginning of the year or field season (e.g. flooding, wildfire, wind damage). Data recording should take place as soon as the disturbance is observed and it is safe to assess the scale and intensity of the impact, preferably within 10 days of the observation. For small-scale disturbances, observations should be made, as necessary, during each visit to a plot, transect, point or other designated sampling location throughout the sampling season. Field technicians should review recently recorded disturbance information records

to assess that they are only reporting new activities or impacts (e.g., dead cow in plot is only reported once). Multiple reports could imply multiple observed impacts if larger area locations are selected (e.g., multiple reports of dead cow at "reach" location would not necessarily be understood as same dead animal reported multiple times.) All observations for a sampling location are expected to be entered while at the sampling location using the mobile application and to the best, most exact location detail.

5 SAFETY

This document identifies procedure-specific safety hazards and associated safety requirements. It does not describe general safety practices or site-specific safety practices.

Personnel working at a NEON site must be compliant with safe field work practices as outlined in the Operations Field Safety and Security Plan (AD[02]) and EHSS Policy, Program, and Management Plan (AD[01]). The Field Operations Manager and the Lead Field Technician have primary authority to stop work activities based on unsafe field conditions; however, all employees have the responsibility and right to stop their work in unsafe conditions.

6 PERSONNEL AND EQUIPMENT

Equipment

All required materials and equipment to implement this protocol are considered standard field and laboratory supplies such as charging stations, first aid kits, notebooks, etc. Therefore, this section is intentionally left blank.

Training Requirements

All technicians must complete required safety training. Additionally, technicians must complete protocol-specific training for safety and implementation of this protocol as required in Field Operations Job Instruction Training Plan (AD[05]).

Training for this protocol may involve GIS software to delineate site boundaries and affected areas where the skills and resources exist in specific domain support facilities and where that facility deems this tool necessary. Fulcrum application training may also be necessary.

Estimated Time

The time required to implement a protocol will vary depending on a number of factors, such as skill level, system diversity, environmental conditions, and distance between sample plots. The timeframe provided below is an estimate based on completion of a task by a skilled two-person team (i.e., not the time it takes at the beginning of the field season). Use this estimate as framework for assessing progress. If a task is taking significantly longer than the estimated time, a problem ticket should be submitted.

This protocol is expected to take no more than 6 hours per site per year. Some of the more intensively managed sites may require more time, up to an additional 6 hours per site per year. It is expected that

set-up for this protocol may take longer at a first year site. Time should be scheduled to provide quick data processing to accommodate fast turnaround in data availability to the user. Field observation time is not expected to be in addition to relevant subsystem protocol tasking, but rather, an observation completed while executing other protocol efforts. Therefore, the time estimate is for compiling the reports at the domain support facility.

SOP A Planned Site Management Activity Reporting

A.1 Collecting data on planned site management activities

1. Gather NEON site boundaries and sampling locations as provided by the NEON GIS specialist.

    1) Examples include:
        a) Airshed maps
        b) Plot boundary locations with associated named locations
        c) Aquatic reach boundary with associated sampling points as named locations

2. Research management plans for the site at least once annually. Gather as much relevant information as possible on each site management activity (e.g., date, duration, area, amount of fertilizer used, number of cows grazed), using any or all of the following methods:
    a. Collect spatial data on management activities via maps provided by the site host, the NEON GIS specialist, or satellite imagery, such as that provided by Google Earth.
        1) Examples include:
            a) Site specific land use maps
            b) Site specific burn maps
            c) Site specific farming plots

    b. Request site management plans, if available.
    c. Request formal or informal communications with site hosts, as appropriate
        1) Examples include:
            a) requesting a phone call of intention to spray herbicides
            b) requesting the intention to burn schedule
    d. Participate in annual planning meetings (e.g., land use committee meetings)
    e. Additional details on timing and frequency are described in Section 4.

Site management data are reported only as high as the site-level and as low as a specific NEON sampling location. There is no requirement to create spatial data layers in a GIS to manage the information, but this approach may be desirable.

3. Determine which NEON sampling locations are planned to be impacted, according to the available spatial information on site management activities.

a. Recognize that depending on the quality and or accuracy of the information, it may be desirable to include or even qualify those plots that are in the direct path of the management activity rather than trying to resolve if a plot is NOT included in a specific management activity.

- Examples include:
    - translate site Burn Unit map into TOS plot IDs
    - translate parcel map of farming plats into TOS plot IDs

Do your best to determine the NEON named location that is being influenced. Data users will be interested in connecting data collection points to site management activities or disturbance events. But this may not always be possible for you to identify to plot or sample collection point location. You can select larger areas (e.g. airshed, reach) but please default, if possible, to more specific named locations to produce robust data linkages.

4. Confirm that the planned management actions were implemented according to plan, at least once annually, as a function of an annual plot visit when a different protocol is being executed.

    a. Compile primary observations by domain staff of management actions at NEON sampling locations.
    b. Note any discrepancies between the management plans and direct observations and confirm with site host.
        1) Examples include:
            a) Trees are observed on the ground, but it is unclear if they fell naturally or were cut. Confirm with site host.
            b) Broad swath of vegetation is found dead; confirm if herbicide was applied, and, if so, the date, chemical composition, etc.
    c. Use any or all of the methods in Step 2 above to obtain confirmation.

5. Report management actions using the mobile application, as described in SOP C, upon completion.

Remind field technicians to be on the lookout for management activities when they visit a plot. Have them report observations via the Fulcrum application when they see recent management activities.

A.2 Reporting on planned site management activities

Details to report vary with the activities (referred to herein in as 'event type'). Table 1 provides descriptions and general instructions for reporting by event type. Table 2 provides further guidance on the suggested details to be reported for each event type. Reporting by event type will also vary across sites based on availability of information. Good faith efforts to acquire the details suggested herein are expected, but successful collection of all of the information in all cases is not.

Table 1. Descriptions of event types of planned management activities and instructions for reporting.

Event type	Description	Reporting instructions
ownership Change	Change of legal ownership or lessor of any of NEON's permitted terrestrial and aquatic sites.	An initial record should be created for each site to document the baseline. Thereafter, a record only needs to be created when a change occurs.
human Disturbance	Catch-all category for damage to sampling areas due to all remaining human-caused disturbance events not included in other event types.	For construction activities, report all construction occurring within 100 m of a NEON sampling location, as well as the approximate distance from the nearest sampling location (rounded to the nearest 10-20 m increment).
fire	Prescribed fire deliberately set as part of management action. Also includes unplanned wildfire.	Report severity class at the reach and individual plot level, if NEON staff visit these sampling locations following a fire and can assess. See Appendix C for descriptions of severity classes. Report the full extent of the actual fire, even if it went outside the prescribed area (if applicable).
grazing	Intentional human introduction of animals to NEON sites or sampling locations as livestock or to control vegetation.	
plant Addition	Intentional human introduction of plants to NEON sites or sampling locations.	Report only during the initial transplant/seeding event, e.g., annually for planting of annual agricultural crops; only at initial introduction for perennials and/or trees (orchards and plantations). If planting of perennials and/or trees occurred prior to NEON sampling, an initial record should be created to document the baseline. Scientific name field is free-form in this application, so common names or taxon codes can be entered temporarily in the field. Please be sure to copy and paste scientific names (especially for plants) from NEON master taxon lists prior to finalizing record. If a taxon is not in a NEON list, please copy and paste from www.itis.gov.
chemical Application	Intentional introduction of chemicals to a plot or stream reach.	Used for fertilizer, pesticide, herbicide, rodenticide, including experimental manipulations that introduce these elements to NEON sampling areas. For areas that are regularly treated over the course of a growing season, it is adequate to report the approximate start/end of the treatment season and not track down information on each time fertilized.
plant Reduction	Physical removal of plants.	Use for harvesting or any other physical plant removal. For chemical removal of plants, use chemicalApplication - herbicide. It is anticipated that, at agricultural sites, data will be entered annually (or more frequently, if there is a winter cover crop or extended growing season). Also, be sure to note each time if the biomass is left in place or removed. Scientific name field is free-form in this application, so

Event type	Description	Reporting instructions
		common names or taxon codes can be entered temporarily in the field. Please be sure to copy and paste scientific names (especially for plants) from master taxon lists prior to finalizing record. If a taxon is not in a NEON list, please copy and paste from www.itis.gov.
animal Reduction	Physical removal of animals	Use for hunting, trapping, exclosure, or any other physical removal of animals. For chemical removal of animals, use chemicalApplication - insecticide/rodenticide. Recreational hunting does not need to be captured. Rather, targeted, large-scale removal of animals that is managed by the site host, other research entities, state or federal agency should be captured. Exclosures installed as part of the core NEON program (e.g., herbaceous clip harvest exclosures) should not be recorded.
tillage	Tilling of the soil for agricultural purposes	
biocontrol	Intentional human introduction of organisms for biocontrol	Use only when informed by site host or another reliable source that this has occurred. It is not expected that primary observations could reliably deduce this event. Record should capture the organism that has been introduced to the site, rather than the target for biocontrol. Use of large animals such as goats to control brush should be captured under grazing. Scientific name field is free-form in this application, so common names or taxon codes can be entered temporarily in the field. Please be sure to copy and paste scientific names (especially for plants) from master taxon lists prior to finalizing record. If a taxon is not in a NEON list, please copy and paste from www.itis.gov.
irrigation	Intentional irrigation of NEON sampling areas. This event type also includes intentional drainage of NEON sampling areas.	For areas that are regularly irrigated over the course of a growing season, it is adequate to report the approximate start/end of the treatment season and not track down information on each time irrigated.
other	Event type to be used when none of the other event types fits your disturbance. Ideally, there will be very few of these and we can update the list to include more use cases. Example is fish addition in efforts to restock native population.	

Table 2. Suggested details to report for each planned event type with associated choice lists

Event type	Detail types to report (if possible)	Valid Choices (if applicable)	Example Entry (if not choice list)	Sample Use Case
ownership Change	name		University of California, Riverside	part or all of NEON site sold to new manager
fire	severityClass	noneOrNegligible		ash in plot, but not burned
		low		low burn severity fire
		medium		medium burn severity fire
		high		high burn severity fire
	method/type	fire-controlledBurn		intentionally set fire as part of a management action. Report the full extent of the actual fire, even if it went outside the prescribed area (if applicable)
grazing	scientificName		Bison bison	presence of bison grazing in vicinity of TOS plots at KONZ
	otherQuantitative Measurement - value		30	
	otherQuantitative Measurement - units		head per acre	3 calf cow pairs per acre
plant Addition	method/type	livePlants		Planting of seedlings or live plants that physically protrude from the soil
		seeds		Planting of seeds (no visible plant protruding from the soil)
	scientificName		Zea mays L.	crops planted at CPER
chemical Application	method/type	fertilizer-organic		manure applied
		fertilizer-inorganic		N,P,K mix applied
		fertilizer –unknown		unknown fertilizer applied
		fire retardant		planes dump fire retardant on plots.
		pesticide - fungicide		researcher applies fungicide to corner of plot
		pesticide - herbicide		roundup for invasive removal
		pesticide - insecticide		dumped an entire bottle of DEET in plot
		pesticide - rodenticide		dispersing mouse bait
	name (brand name or active chemical ingredient)		MiracleGro	garden tomato plot

Event type	Detail types to report (if possible)	Valid Choices (if applicable)	Example Entry (if not choice list)	Sample Use Case
	area (value + units)		1 acre	
	other (if only partial details are available)		nitrogen-based	corn field fertilizer
plant Reduction	scientificName		Zea mays L.	corn harvest
	method/type	removal-clearCut		all timber harvest
		removal-cropHarvest		corn harvest
		removal-mowing		mowing with grass left in place
		removal-pruning		lopping branches
		removal-thinning		selective timber harvest
	biomassRemoval	Yes		corn harvest by combine
		No		mowing with grass left in place
animal Reduction	scientificName		Rattus rattus	kill-trapping for invasive predator removal in Hawaii
	method/ type	animalReduction - huntTrapEtc		kill-trapping for invasive predator removal in Hawaii
	otherQuantitative Measurement - value + units		400 trap stations	
tillage	method/type	conservation		any method of soil tilling that leaves crop residue left behind after harvest on the field to reduce soil erosion and runoff
		conventional		disking, plowing and other methods of tilling that bury crop residue left behind after harvest
		other		other methods of tilling not covered by above choices
	area (value + units)		1 acre	
Biocontrol	scientificName		*Ceutorhynchus litura*	stem-mining weevil introduced to control Dalmation toadflax
irrigation	method/type	irrigation - flood		
		irrigation - sprinkler		
		irrigation - drainage		
	remarks		Flood irrigated regularly from Jan - October, ground saturated during	

Event type	Detail types to report (if possible)	Valid Choices (if applicable)	Example Entry (if not choice list)	Sample Use Case
			most of that period	
human Disturbance	method/type	soilDisruption		soil disruption not related to tilling for agriculture, e.g. digging a pit
		vandalism		deliberate damage of NEON sampling areas or equipment, details to be added to the remarks
		construction - structure		Land owner builds a small shed in tower airshed
		road - dirt		evidence of a new road that bisects a plot, likely no new material addition but obvious vehicle disturbance of vegetation
		road - asphalt		new road construction, with asphalt as top layer, either poured or recycled
		road - gravel		new road construction, with gravel base as top layer, either compacted or loose, material is foreign to the site
		other		
	width - value + units		2.7 m	max width of road in reported area
	percentExtent		20%	percent of instrument hut exterior vandalized
	otherQuantitative Measurement - value + units		50 m	
	remarks		distance from nearest plot	

SOP B UNPLANNED DISTURBANCE REPORTING

B.1 Collecting data on unplanned site disturbances

Observations should be made during each visit to a plot, transect, point or other designated sampling location throughout the sampling season. All observations about a site impacting event for a sampling location should be entered into a mobile device while at the site, whenever possible.

B.2 Reporting on unplanned site disturbances

Details to report vary with the activities (referred to herein in as 'event type'). **Table 3** provides descriptions and general instructions for reporting by event type. **Table 4** provides further guidance on the suggested details to be reported for each event type. Reporting by event type will also vary across sites based on availability of information. Good faith efforts to acquire the details suggested herein are expected, but successful collection of all of the information in all cases is not.

Table 3. Description of event types of unplanned activities and instructions for reporting.

Event type	Description	Reporting instructions
human Disturbance	Catch-all category for damage to sampling areas due to all remaining human-caused disturbance events not included in other event types.	For construction activities, report all construction occurring within 100 m of a NEON sampling location, as well as the approximate distance from the nearest sampling location (rounded to the nearest 10-20 m increment).
fire	Wildfire.	Report severity class at the reach and individual plot level, if NEON staff visit these sampling locations following a fire and can assess. See Appendix C for descriptions of severity classes.
population Spike	Unusual spike in activity of any organism (e.g., invertebrates, pathogens), including the first observations of the presence of an invasive species of particular local concern, sudden population growth of any of these, outbreak.	Report based on primary observations or secondary reports from a reliable source (e.g., site host, federal or state agency). Scientific name field is free-form in this application, so common names or taxon codes can be entered temporarily in the field. Please be sure to copy and paste scientific names (especially for plants) from master taxon lists prior to finalizing record. If a taxon is not in a NEON list, please copy and paste from www.itis.gov.
obstruction	Detritus left in plot or stream reach, either natural of human-made	Use for trash, old cars, large animal carcasses, and the like that are left in stream reach and/or plot. Use only for in plot/in reach objects, not obstructions that prevent access to the sampling location. Use only when obstruction impacts sampling or may impact data and is not otherwise reported via established mechanisms in the affected protocol.
otherNatural Disturbance	Catch-all category for damage to sampling areas due to all remaining natural disturbance events not included in other event types, particularly weather-related.	Use to report ice damage, windthrow, flooding, or other natural disturbances.
wildlife Disturbance	Wildlife-caused damage of NEON sampling areas or equipment	Use professional judgment to attribute the cause of damage to a taxonomic group, if possible, and use additional detail types, such as percent extent, and remarks to describe the nature of the damage. If data entry mechanisms provided for affected protocols capture the key impacts to the data (e.g., small mammal trap status of 'disturbed'), there is no need to report here.
pollutant	Unusual deposition of pollution from a point source	Do not report ambient pollution from vehicles and nearby urban areas; this category is intended for capturing unusual events. Use for ash deposition in fires where the plot itself didn't burn but deposition from nearby is observable. Ignore smoke.
drought Perceived	Landscape-scale drought conditions reported in the region containing the site and causing marked impacts on data quality	Report when drought conditions are confirmed by National Weather Service or similar, and ability to conduct field work is compromised. For example, report if taxonomic identification of plants is inhibited by lack of growth and/or reproductive parts as a result

Event type	Description	Reporting instructions
		of known drought conditions. No estimation of drought severity is expected.

Table 4. Suggested details to report for each unplanned event type.

Event type	Detail types to report (if possible)	Valid Choices (if applicable)	Example Entry (if not choice list)	Sample Use Case
fire	severityClass	noneOr Negligible		ash in plot, but not burned
		low		low burn severity fire
		medium		medium burn severity fire
		high		high burn severity fire
	method/type	fire-controlled Burn		intentionally set fire as part of a management action
		fire-wildfire		fire that results from any cause other than a deliberate management action
population Spike	method/type	animal - invertebrate		widespread defoliation due to unknown insect herbivore
		animal - vertebrate		
		plant		
		fungus		
		pathogen		
		other		
	scientificName		Dendroctonus ponderosae	mountain pine beetle infestation
obstruction	none, just use remarks		large (1m x 1.5m) sheet of rusty metal near point 21 but not covering plant diversity subplots	
other Natural Disturbance	method/type	iceDamage		ice storm
		frostDamage		
		windDamage		
		flood		
		earthquakes		
	depth (value + units)		32 cm	max depth of flooding in reported area (centimeters preferred)
	other Quantitative Measurement - value		6.7	earthquake
	other Quantitative Measurement - units		Other - richter scale	
	scientificName		*Sus scrofa*	feral pigs rooting in plot

Event type	Detail types to report (if possible)	Valid Choices (if applicable)	Example Entry (if not choice list)	Sample Use Case
wildlife Disturbance	percentExtent		65	percent of plot disturbed by pigs
human Disturbance	method/type	soil Disruption		soil disruption not related to tilling for agriculture. e.g. digging a pit
		vandalism		deliberate damage of NEON sampling areas or equipment, details to be added to the remarks
		construction - structure		
		road - dirt		
		road - asphalt		
		road - gravel		
		other		
	width - value + units		2.7 m	max width of road in reported area
	percentExtent		20%	percent of instrument hut exterior vandalized
	other Quantitative Measurement - value + units		50 m	
	remarks		distance from nearest plot	
pollutant	method	deposition - atmospheric		volcanic ash in plot
		deposition - spill		spilled antifreeze in plot
	type	pollutant - ash		volcanic ash in plot
		pollutant - hydrocarbon		oil spill in stream reach
		pollutant - acid		HCl spill in plot
	area - value + units		0.5 acres	acres of site estimated to be impacted
	percentExtent		25	percent of the plot covered
	other Quantitative Measurement - value + units		3000 gallons	oil estimated to have spilled into stream

Event type	Detail types to report (if possible)	Valid Choices (if applicable)	Example Entry (if not choice list)	Sample Use Case
drought Perceived	none, just use remarks			

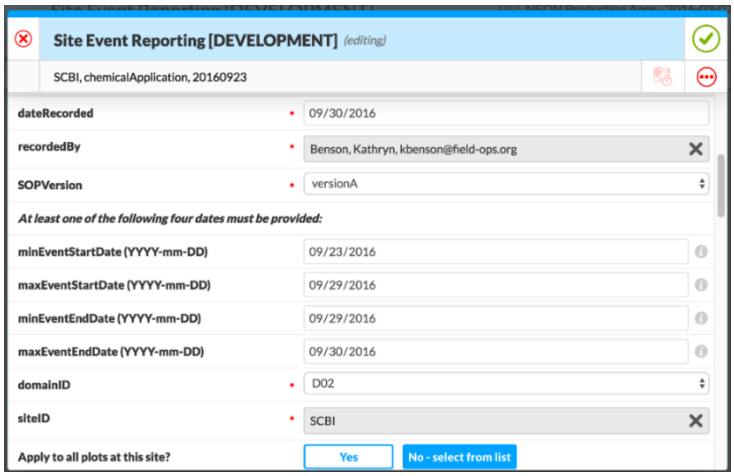
SOP C DATA ENTRY AND VERIFICATION

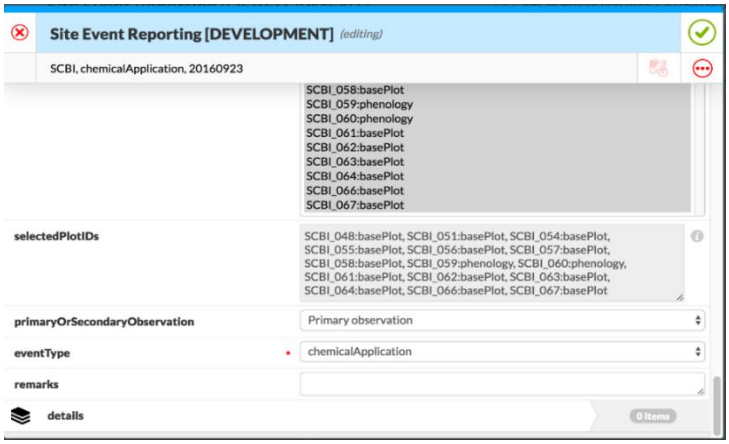
The importance of thorough, accurate data entry cannot be overstated; the value field efforts are only manifested once the data are properly entered for delivery to NEON's end users.

Mobile applications are the preferred mechanism for data entry. Data should be entered into the protocol-specific application as they are being collected, whenever possible, to minimize data transcription errors and improve data quality. Mobile devices should be synced at the end of each field day, where possible; alternatively, devices should be synced immediately upon return to the Domain Support Facility.

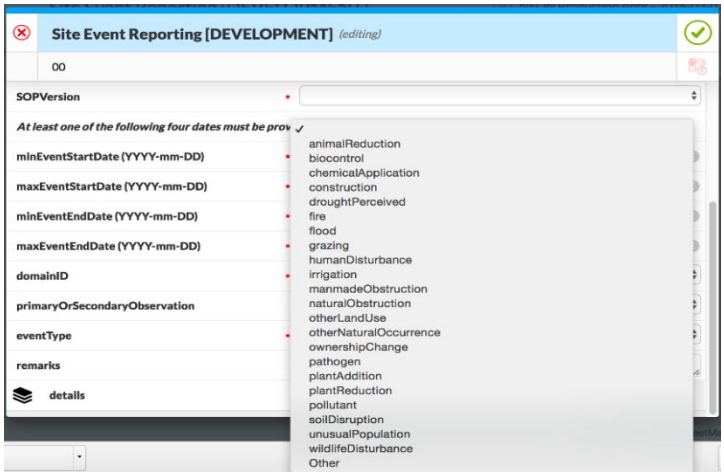
Report on activity using the mobile application, as specified in **Table 2** and **Table 4**.
See **Figure 1** for a schematic depicting the workflow for adding information via the application. Step-by-step instructions and screenshots follow.

1. Complete metadata

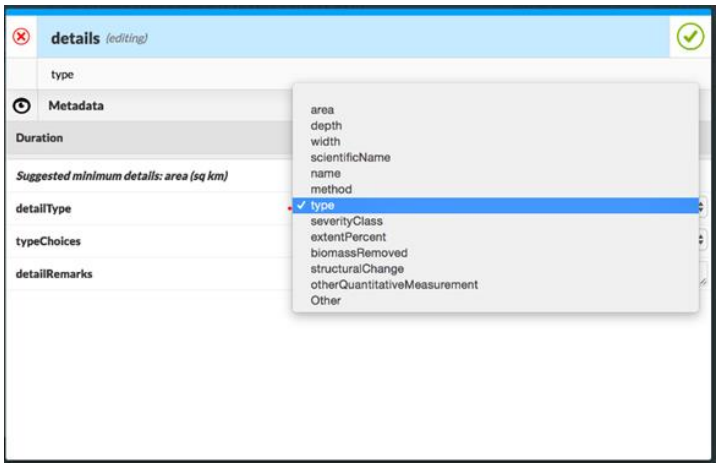




2. Select event type



3. Complete specification regarding the activity with as much detail as possible; exclude if information is not available.



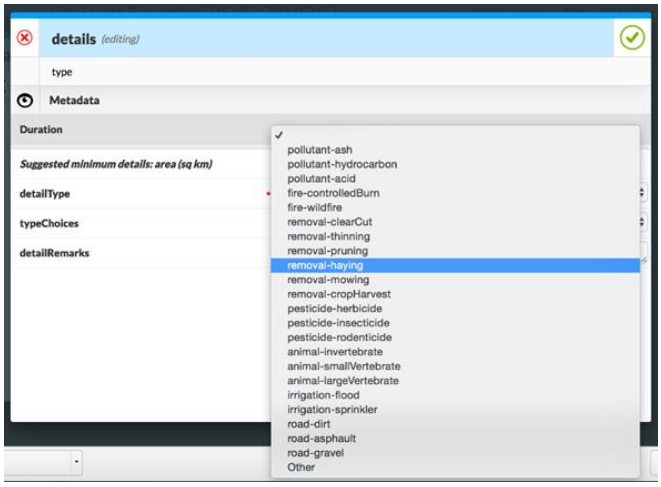
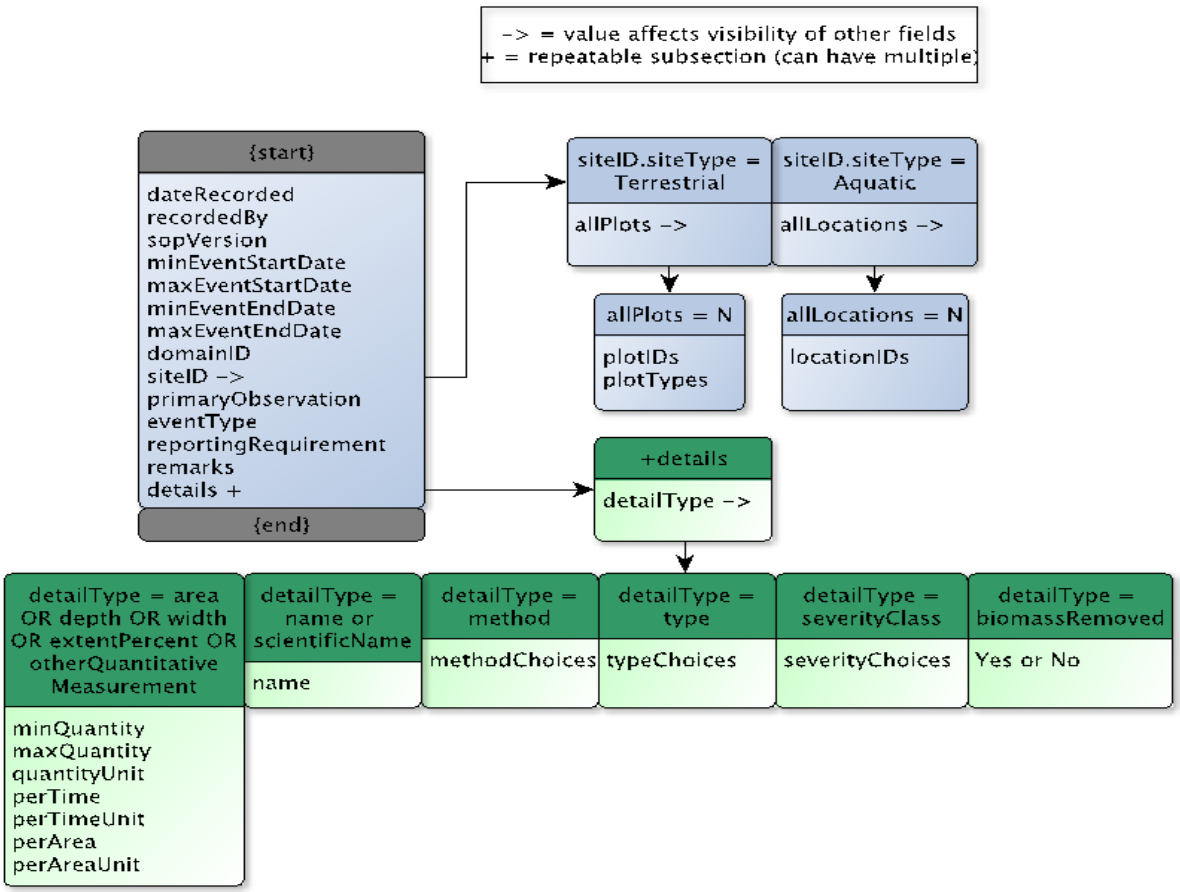


Figure 1. Schematic of mobile application workflow.



7 REFERENCES

Parson, Annette; Robichaud, Peter R.; Lewis, Sarah A.; Napper, Carolyn; Clark, Jess T. 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.

Appendix A DATASHEETS

There are no datasheets associated with this protocol. See quick reference section of this protocol for a list of helpful notes to take in the field.

Appendix B QUICK REFERENCES

If Fulcrum is unavailable to record data while at the site, the following can be noted in a field book for addition to the Fulcrum app once available.

1. Site event where event was observed (e.g. Great Smoky National Park)
2. Date and time event observed
3. Type of event observed (e.g., wildfire)
4. Specific location of event (e.g., plot type and number or extent of multiple plots)
5. Severity description (e.g., tree tops burned off, all remaining vegetation is black, understory completely burned, scorched soil, ash present to 3 inches deep)
6. Additional Remarks (e.g., looks like uncontrolled wildfire, not controlled burn, impacts at least ½ of site, possibly more, uniform disturbance)
7. Take pictures with any camera available- iPhones are appropriate to use here!

Appendix C FIRE SEVERITY CLASSIFICATION

Soil Burn Severity is assessed following Parson et al. 2010. **Table 5** can be used as a quick reference, with subsequent tables providing more detailed information and photographs. Please choose the category '**Low**', '**Medium**' or '**High**' that best describes the soil burn severity in the area you are assessing.

Table 5. Summary of characteristics of burn severity classifications, from Parson et al. 2010.

Factor Considered	**Severity Class: Low**	**Severity Class: Medium**	**Severity Class: High**
Aerial view of canopy	Tree canopy largely unaltered. Shrub canopy intact and patches of scorched leaves not dominant. Ash is spotty.	Tree canopy is scorched over 50% of area. Shrubs mostly charred but difficult to assess fuels from air. Black ash is visually dominant. Gray or white ash may be spotty.	Tree canopy is largely consumed over > 50% of area. Shrubs completely charred but difficult to assess fuels from air. Gray and white ash is visually dominant.
Trees	Nearly all of crown remains "green." Some scorching in understory trees.	High scorch height. Generally, > 50% of crown is scorched. Mostly "brown" crowns with intact needles.	No needles or leaves remaining. Some or many branches may be consumed. Mostly "black" remaining vegetation.
Shrubs	Scorching in canopy but leaves remain mostly green. Limited fire runs with higher scorch. 5 to 30% charred canopy.	30 to 100% charred canopy. Smaller branches < 0.5 inch (1 cm) remain. Shrub density was moderate or high.	90 to 100% charred canopy. Most branches consumed, including fuels < 1 inch (2.5 cm). Skeletons or root crowns remain. Shrub density was moderate or high. Often old growth in character.
Fine fuels (Grassland)	Scorched or partially consumed.	Mostly consumed. Appears black from the air. Small roots and seed bank remain intact and viable	
Ground cover	Generally, > 50% litter cover remains under trees—less under shrub community or where pre- fire cover is sparse.	Generally, 20 to 50% cover remains or will be contributed by scorched leaf fall from trees. Shrub litter will be mostly consumed.	0 to 20% cover remains as burned litter and woody debris under trees. Shrub litter is consumed.
Water repellency	Soils may be naturally water repellent under unburned chaparral. Other soils will infiltrate water drops in less than 10 sec; greater than 8 mL min–1 with the MDI.	The surface of the mineral soil below the ash layer may be moderately water repellent but water will infiltrate within 10 to 40 sec; 3 to 8 mL min–1 with the MDI.	Strongly water repellent soils (repels water drops for > 40 seconds; less than 3 mL min–1 with the MDI) may be present at surface or deeper.

Factor Considered	Severity Class: Low	Severity Class: Medium	Severity Class: High
Soil	Original soil structure— fine roots and pores are unaltered.	Original soil structure—roots and pores slightly altered or unaltered. Soil color darkened or charred at surface or just below surface only.	Soil structure to 1 inch is degraded to powdery, single-grained, or loose. Fine roots are charred. Pores are destroyed. Black charred soil color common below thick ash layer. Compare with unburned.

Appendix D SOIL CONDITIONS PHOTO SERIES

D.1 Ground Cover: Amount and Condition

	Low soil burn severity Little or no change from pre-fire status. Less than 50% consumption of litter and some char. Needles and leaves mostly intact.
	Moderate soil burn severity Up to 80% consumption of litter and duff, but generally incomplete. Recognizable leaves and needles remain. If more complete consumption occurred, a mitigating factor may be potential for leaf- or needle-cast from scorched canopy to provide ground cover.
	High soil burn severity Little to no effective ground cover remaining after fire (less than 20%) All or most litter and duff has been consumed, only ask or bare soil (ash blown away) remain. Little to no potential for lead or needle-cast.

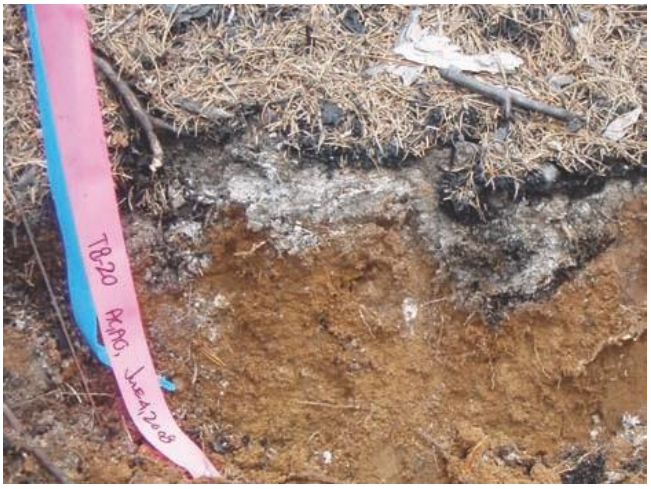
D.2 Ash Color and Depth

	Low soil burn severity Ground surface may be black with recognizable fine fuels (needles, grass, and leaves) remaining on surface.
	Moderate soil burn severity Thin layer of black to gray ash with recognizable litter beneath it. Ash layer may be patchy as it is highly moveable by wind and water. Soil heating may have been significant; residence time usually brief. If thicker ash layer is observed, a mitigating factor may be leaf or needle-cast potential from scorched canopy.
	High soil burn severity Thick, 1 to 3 inch (3 to 6 cm or more) layer of powdery gray or white ash covers the ground. Greater than 90% surface organics consumed; significant soil heating has occurred; residence time long. No potential for leaf or needle cast to provide ground cover. Localized red (oxidized soil may underlie a thick, powdery layer of gray and white ash- generally found near a burned out stump or log; indicates extreme heating.

D.3 Soil Structure

	Low soil burn severity Structure unchanged. Granular aggregates are not weakened by consumption of organic matter.
	Moderate soil burn severity Structure slightly or not altered. Some consumption of organic matter in the top 0.5 inch (1 cm) of the soil profile.
	High soil burn severity Structural aggregate stability reduced or destroyed. Loose and single-grained soil dominates and is exposed or under ask (up to 5 inches or 10 cm of ash.) Consumption of organic matter in the top 2 inches (5 cm) of the soil profile.

D.4 Roots

	Low soil burn severity Fine roots (~0.1 inches or 0.25 cm diameter) intact and unchanged
	Moderate soil burn severity Fine roots near surface maybe charred or scorched; large roots intact (~0.25 inches or 0.5 cm diameter).
	**High soil burn severity** Many or most fine roots near surface consumed or charred. Some charring may occur on very large roots (~3 inches or 8 cm diameter).

D.5 Soil Water Repellency

	Low soil burn severity No fire induced water repellency. Water infiltrates immediately; however, some soils exhibit water repellency when unburned.
	Moderate soil burn severity Weak to medium water repellency found at or just below soil surface. Water infiltrates slowly.
	High soil burn severity Strong water repellency found at surface or deeper. Water does not infiltrate. In case of extreme soil heating, soil water repellency may be destroyed or may exist at very deep soil depths (6 inches or 15 cm).

Appendix E SITE-SPECIFIC INFORMATION

D01 Domain 1

D01 – HOPB – Lower Hop Brook

Domain: 1

Site: HOPB

subsystem: AOS, AIS

	eventType – frequency	remarks
ownershipChange	MA Department of Conservation and Recreation	
fire	Wildfire- rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	hunting-rare	
Biocontrol	N/A	
populationSpike	rare	
obstruction	rare	Large beaver dam just upstream of reach.
irrigation	N/A	
otherNaturalDisturbance	common	Severe storms happen annually.
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	rare	
pollutant	rare	

D01 – HARV – Harvard Forest

Domain: 1

Site: HARV

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Harvard Forest and MA Department of Conservation and Recreation	
fire	Wildfire- rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	hunting-rare	
Biocontrol	N/A	
populationSpike	rare	Various invasive species present (EAB, wooly adelgid, Asian longhorned beetle, etc.). Could impact transport of samples.
obstruction	rare	
irrigation	N/A	
otherNaturalDisturbance	common	Severe storms happen annually.
wildlifeDisturbance	common	Bear damage to small mammal traps.
Other	N/A	
humanDisturbance	rare	
pollutant	rare	

D01 – BART – Bartlett Experimental Forest

Domain: 1

Site: BART

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	US Forest Service	
fire	Wildfire- rare	
grazing	N/A	

Domain: 1

Site: BART

subsystem: TOS

	eventType – frequency	remarks
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	Timber cutting- common	
animalReduction	hunting-rare	
Biocontrol	N/A	
populationSpike	common	Various invasive species present (EAB, wooly adelgid, Asian longhorned beetle, etc.). Could impact transport of samples.
obstruction	rare	
irrigation	N/A	
otherNaturalDisturbance	common	Severe storms happen annually.
wildlifeDisturbance	common	Bear damage to small mammal traps.
Other	N/A	
humanDisturbance	rare	
pollutant	rare	

D02 Domain 2

D02 – POSE – Posey Creek

Domain: 2

Site: POSE

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Smithsonian Institution	
fire	rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	hunting-rare	
Biocontrol	N/A	

Domain: 2

Site: POSE

subsystem: AOS

	eventType – frequency	**remarks**
populationSpike	common	EAB
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	tree damage, flooding
wildlifeDisturbance	common	bear damage
Other	N/A	
humanDisturbance	rare	
pollutant	rare	

D02 – LEWI – Lewis Run

Domain: 2

Site: LEWI

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Casey Trees	
fire	rare	
grazing	*Bos taurus*-rare not planned	rare occurrence when cattle are moved from one field to another or when they escape fenced areas
plantAddition	planting-common	they will add trees to riparian buffer over time
chemicalApplication	common	site receives ag runoff and effluent from a small municipal water treatment facility
plantReduction	mowing- common	mowing riparian area
animalReduction	hunting-common	deer management
Biocontrol	N/A	
populationSpike	common	EAB
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	tree damage, flooding, trampling
wildlifeDisturbance	common	bear, cattle, horse damage

Domain: 2

Site: LEWI

subsystem: AOS

	eventType – frequency	remarks
Other	N/A	
humanDisturbance	rare	
pollutant	rare	effluent from treatment plant mentioned in earlier category

D02 – SCBI – Smithsonian Conservation Biology Institute

Domain: 2

Site: SCBI

subsystem: TOS

	eventType – frequency	**remarks**
ownershipChange	Smithsonian Institution	
fire	Prescribed burn-frequent	some distributed plots are burned as part of management plan
grazing	*Bos taurus*-rare not planned	
plantAddition	planting-rare	some field plots may be seeded
chemicalApplication	fertilizer, herbicide, pesticide-common	treatment of invasives, use of fertilizer, spreading of dung
plantReduction	mowing-common	mowing, brush hogging, manual removal of invasives, herbicide treatment. Usually not directly in plots.
animalReduction	hunting-common	deer management
Biocontrol	N/A	
populationSpike	common	EAB
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	tree damage
wildlifeDisturbance	common	bear damage
Other	N/A	
humanDisturbance	rare	
pollutant	rare	

D02 – SERC – Smithsonian Environmental Research Center

Domain: 2

Site: SERC

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Smithsonian Institution	
fire	rare	not currently for management, but could be used in future
grazing	N/A	
plantAddition	planting-common	agricultural distributed plots - grains, corn and soybean
chemicalApplication	fertilizer, herbicide, pesticide-common	soil amendments, herbicide, pesticide
plantReduction	cropHarves-common	
animalReduction	hunting-common	deer management
Biocontrol	N/A	
populationSpike	common	EAB
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	tree damage
wildlifeDisturbance	common	bear damage
Other	N/A	
humanDisturbance	rare	rare
pollutant	N/A	

D02 – BLAN – Blandy Experimental Farm

Domain: 2

Site: BLAN

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	University of Virginia and Casey Trees (distributed plots)	
fire	rare	not currently for management, but could be used in future
grazing	N/A	

Domain: 2

Site: BLAN

subsystem: TOS

	eventType – frequency	remarks
plantAddition	planting-common	agricultural plots in Tower and Distributed plots - corn and grain. Perennial grass in Distributed plots may switch over time.
chemicalApplication	fertilizer, herbicide, pesticide-common	soil amendments, herbicide, pesticide
plantReduction	cropHarves, mowing-common	crop harvest at BLAN - Casey Trees has 1 or 2 cuttings for hay
animalReduction	hunting-common	deer management at Casey Trees distributed plots.
Biocontrol	N/A	
populationSpike	common	EAB
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	tree damage
wildlifeDisturbance	common	bear damage
Other	N/A	
humanDisturbance	common	Blandy is public space while Casey Tree is fenced and private.
pollutant	N/A	

D03 Domain 3

D03 – BARC – Barco Lake at Ordway-Swisher Biological Station

Domain: 3

Site: BARC

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	University of Florida	Unlikely to change, The Nature Conservancy has easement
fire	Prescribed fire - Frequent	

Domain: 3

Site: BARC

subsystem: AOS

	eventType – frequency	remarks
grazing	N/A	
plantAddition	N/A	
chemicalApplication	Herbicide-common	Access at ramp
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	rare	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	drought and long term lowering of water table. Also potential for exotic/invasive species
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	N/A	
pollutant	rare	

D03 – SUGG – Suggs Lake at Ordway-Swisher Biological Station

Domain: 3

Site: SUGG

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	University of Florida	Unlikely to change, The Nature Conservancy has easement
fire	Prescribed fire - Frequent	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	

Domain: 3

Site: SUGG

subsystem: AOS

	eventType – frequency	remarks
populationSpike	rare	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	drought and long term lowering of water table. Also potential for exotic/invasive species
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	N/A	
pollutant	rare	

D03 – FLIN – Flint River at Jones Ecological Center

Domain: 3

Site: FLNT

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	State of Georgia	This is a navigable waterway so it is public access. The shoreline where we will be conducting sampling belongs to the Woodruff Foundation and is unlikely to change
fire	prescribed-frequent	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	frequent	this is a navigable waterway, so it is likely some chemical application takes place at some point
plantReduction	N/A	Not along the JERC shoreline
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N	

Domain: 3

Site: FLNT

subsystem: AOS

	eventType – frequency	remarks
obstruction	rare	
irrigation	rare	Not along the JERC shoreline, but I'm sure it occurs somewhere in the area
otherNaturalDisturbance	common	Land use along the shores of the Flint has made the shoreline less resilient. After rains, the river can become "flashy"
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	common	See row 16
pollutant	common	Agriculture along shoreline

D03 – OSBS – Ordway-Swisher Biological Station

Domain: 3

Site: OSBS

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	University of Florida	
fire	prescribed- frequent	Frequent Prescribed fire every 2 to 4 years. Low to moderate intensity
grazing	N/A	
plantAddition	planting-frequent	Pine tree planting and some restoration of the herbaceous layer
chemicalApplication	herbicide-frequent	Herbicide for invasive plant control
plantReduction	mowing-frequent	No harvesting but some plant reduction for habitat restoration
animalReduction	common	Feral hogs
Biocontrol	N/A	Possibly for invasive plants in future
populationSpike	N/A	
obstruction	N/A	

Domain: 3

Site: OSBS

subsystem: TOS

	eventType – frequency	remarks
irrigation	N/A	Drinking water wells on the property
otherNaturalDisturbance	common	Treefall and other damage from weather events
wildlifeDisturbance	common	Occasional trap damage by larger vertebrates
Other		
humanDisturbance	common	Infrastructure and roads
pollutant	N/A	

D03 – DSNY – Disney Wilderness Preserve

Domain: 3

Site: DSNY

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	The Nature Conservancy	
fire	prescribed- frequent	Frequent Prescribed fire every 2 to 4 years. Low to moderate intensity
grazing	*Bos taurus*- frequent	Grazing is a management tool on some pasture land on the property.
plantAddition	planting-frequent	Pine tree planting and some restoration of the herbaceous layer
chemicalApplication	herbicide-frequent	Herbicide for invasive plant control
plantReduction	mowing-frequent	No harvesting but some plant reduction for habitat restoration
animalReduction	common	Feral hogs
Biocontrol	N/A	Possibly for invasive plants in future
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	Drinking water wells on the property

Domain: 3

Site: DSNY

subsystem: TOS

	eventType – frequency	remarks
otherNaturalDisturbance	common	Treefall and other damage from weather events
wildlifeDisturbance	common	Occasional trap damage by larger vertebrates
Other		
humanDisturbance	common	Infrastructure and roads
pollutant	N/A	

D03 – JERC – Jones Ecological Research Center

Domain: 3

Site: JERC

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	The Jones Ecological Research Center	
fire	prescribed- frequent	Frequent Prescribed fire every 2 to 4 years. Low to moderate intensity
grazing	N/A	
plantAddition	planting-frequent	Pine tree planting and some restoration of the herbaceous layer
chemicalApplication	herbicide-frequent	Herbicide for invasive plant control
plantReduction	mowing-frequent	No harvesting but some plant reduction for habitat restoration. Roller chopping to reduce hardwoods
animalReduction	hunting-frequent	Hunting is part of the management plan at JERC. They hunt all major seasons.
Biocontrol	N/A	Possibly for invasive plants in future
populationSpike	N/A	
obstruction	N/A	

Domain: 3

Site: JERC

subsystem: TOS

	eventType – frequency	remarks
irrigation	N/A	Drinking water wells on the property
otherNaturalDisturbance	common	Treefall and other damage from weather events
wildlifeDisturbance	common	Occasional trap damage by larger vertebrates
Other		
humanDisturbance	common	Infrastructure and roads
pollutant	N/A	

D04 Domain 4

D04 – CUPE – Rio Cupeyes

Domain: 4

Site: CUPE

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Puerto Rico Department of Natural and Environmental Recourses (DNER).	Access point through private land. Sampling area are in the state forest of Maricao and belongs to the Puerto Rico Department of Natural and Environmental Recourses (DNER).
fire	N/A	
grazing	*Bos taurus*- frequent	Access point: farm dedicated to cattle
plantAddition	N/A	Natural forest
chemicalApplication	fertilizer-frequent	Access point: application of fertilizers
plantReduction	mowingclearCut-frequent	Access point: land clearing for pastures
animalReduction	common	Access point: cattle rotation

Domain: 4

Site: CUPE

subsystem: AOS

	eventType – frequency	remarks
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	seasonal high flow
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	rare	Occasional / recreational fishing
pollutant	N/A	

D04 – GUIL - Rio Guilarte

Domain: 4

Site: GUIL

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Adjuntas Agricultural Experimental Station of the University of Puerto Rico – Mayaguez campus. Rest of the access and sampling areas in public land.	Combined access and sampling areas. Majority of the sampling area are in the Adjuntas Agricultural Experimental Station of the University of Puerto Rico – Mayaguez campus. Rest of the access and sampling areas in public land (what department owns this as public land? DNER?)
fire	N/A	
grazing	N/A	
plantAddition	planting-frequent	Agricultural Experiment Station dedicated to Coffee plantation and Citric plantation. Tendency to crop rotation.
chemicalApplication	fertilizer, pesticide- frequent	Agrichemicals (Fertilizers and Pesticides)

Domain: 4

Site: GUIL

subsystem: AOS

	eventType – frequency	**remarks**
plantReduction	cropHarvest-frequent	Tendency to crop rotation
animalReduction	N/A	
Biocontrol	rare	insect control
populationSpike	N/A	
obstruction	N/A	
irrigation	frequent	
otherNaturalDisturbance	common	seasonal high flow
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	frequent	Agricultural activities and recreational activities
pollutant	rare	Posible agrichimicals (Fertilizers and Pesticides)

D04 – GUAN – Guanica Forest

Domain: 4

Site: GUAN

subsystem: TOS

	eventType – frequency	**remarks**
ownershipChange	Puerto Rico Department of Natural and Environmental Recourses (DNER).	
fire	common	seasonal
grazing	N/A	
plantAddition	N/A	Natural forest
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	rare	Possibly for invasive plants in future
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	

Domain: 4

Site: GUAN

subsystem: TOS

	eventType – frequency	remarks
otherNaturalDisturbance	common	seasonal drought
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	frequent	Tourist
pollutant	N/A	

D04 – LAJA – Lajas Experimental Station

Domain: 4

Site: LAJA

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Lajas Agricultural Experimental Station of the University of Puerto Rico – Mayaguez campus and private farm	Combined access and sampling areas. Sampling area are in the Lajas Agricultural Experimental Station of the University of Puerto Rico – Mayaguez campus and privet farm dedicated to managed pastures and sorghum.
fire	N/A	
grazing	*Bos taurus*- frequent	Dairy cows – section of the Agricultural Experimental Station
plantAddition	planting-frequent	Tendency to crop rotation.
chemicalApplication	fertilizer, pesticide- frequent	Agrichemicals (Feretilizers and Pestisides) and manure as a organic fertilizer
plantReduction	cropHarvest-frequent	Tendency to crop rotation
animalReduction	common	Cow rotation
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	frequent	Irrigation channels - Lajas valley irrigation system

Domain: 4

Site: LAJA

subsystem: TOS

	eventType – frequency	remarks
otherNaturalDisturbance	common	seasonal high precipitation
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	frequent	Intensive farming activities
pollutant	rare	Posible agrichimicals (Feretilizers and Pestisides)

D05 Domain 5

D05 – CRAM – Crampton Lake

Domain: 5

Site: CRAM

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	The University of Notre Dame	CRAM is on the UNDERC property.
fire	Wildfire -- rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	rare	When required to maintain access roads, plant reduction may occur; however, not near NEON plots or infrastructure.
animalReduction	trapping-rare	Beaver trapping occurs at UNDERC property when damming of culverts causes flooding to occur on roads.
Biocontrol	rare	Some discussion of using Galarucella beetles to combat purple loosestrife at other UNDE lakes. Do not believe it is present at CRAM

Domain: 5

Site: CRAM

subsystem: AOS

	eventType – frequency	remarks
populationSpike	common	Emerald ash borer, soon, could impact shoreline. Uncertain about aquatic invasives. Chinese mystery snail reputedly in waters, although no signs of spiking populations are seen.
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	Windstorms blow a lot of trees down . Could damage on-shore infrastructure
wildlifeDisturbance	Rare	Uncertain. Something with wells? Birds on buoy?
Other		
humanDisturbance		
pollutant	Unlikely	

D05 – LIRO – Little Rock Lake

Domain: 5

Site: LIRO

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Wisconsin DNR property.	
fire	Wildfire -- rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	timber harvest- rare	Surrounding land is state forest. Possible logging.

Domain: 5

Site: LIRO

subsystem: AOS

	eventType – frequency	remarks
animalReduction	fishing-rare	Recreation fishing may occur on this property, and recreational hunting in surrounding areas
Biocontrol	rare	Not sure about purple loosestrife situation at site (DNR website does not document invasives for this site). Some WI lakeshores have programs to apply Galarucella beetles to combat
populationSpike	common	Emerald ash borer, soon, could impact shoreline. Uncertain about aquatic invasives.
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	Windstorms blow a lot of trees down . Could damage on-shore infrastructure
wildlifeDisturbance	Rare	Uncertain. Something with wells? Birds on buoy?
Other		
humanDisturbance	common	Vandalism?
pollutant	N/A	

D05 – UNDE – University of Notre Dame Ecological Research Center

Domain: 5

Site: UNDE

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	University of Notre Dame.	
fire	Wildfire -- rare	
grazing	N/A	
plantAddition	N/A	

Domain: 5

Site: UNDE

subsystem: TOS

	eventType – frequency	remarks
chemicalApplication	herbicide- rare	Roadside application of herbicide to invasive species is possible; activities like this would not likely occur near NEON plots or infrastructure unless NEON initiated (e.g., tower maintenance plan)
plantReduction	rare	When required to maintain access roads, plant reduction may occur; however, not near NEON plots or infrastructure.
animalReduction	trapping-rare	Beaver trapping occurs at UNDERC property when damming of culverts causes flooding to occur on roads.
Biocontrol	rare	Some discussion of using Galarucella beetles to combat purple loosestrife; likely not in any TOS areas
populationSpike	common	Emerald ash borer, soon. Various invasive plants present, but not spiking (yet?)
obstruction	rare	e.g., another researcher starts some research on a NEON plot. We work with Notre Dame to avoid, hopefully
irrigation	N/A	
otherNaturalDisturbance	common	Windstorms blow a lot of trees down . Could damage infrastructure. Has already occurred at UNDE
wildlifeDisturbance	Rare	Bear damage to ground instruments? Birds on tower. Bees on tower
Other		
humanDisturbance	common	Human traffic through plots?
pollutant	N/A	

D05 – STEI – Steigerwaldt Land Services

Domain: 5

Site: STEI

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Tower plots: Ed Steigerwaldt; Distributed plots: USFS-Chequamegon Nicolet National Forest	Tower plot area belongs to private landowner. Chequamegon National Forest areas may have logging rights sold.
fire	Wildfire -- rare	
grazing	N/A	
plantAddition	rare	Not sure if active planting is part of any logging/reforestation effort
chemicalApplication	rare	Not sure if herbicides or fertilizers are used in logging/re-forestation efforts. Not unheard of.
plantReduction	timber harvest- common	Tower site and distributed sites are managed. Some logging will occur.
animalReduction	rare	Recreational hunting occurs, but not likely to create impact through reduction of animal population
Biocontrol	rare	
populationSpike	common	Emerald ash borer, soon. Various invasive plants present, but not spiking (yet?)
obstruction	common	Hunters use the Chequamegon National Forest area to bait bear. We could end up with a bait pile in a plot
irrigation	N/A	
otherNaturalDisturbance	common	Windstorms blow a lot of trees down . Could damage infrastructure. Has already occurred at UNDE
wildlifeDisturbance	Rare	Bear damage to ground instruments? Birds on tower. Bees on tower
Other		
humanDisturbance	common	Human traffic through plots? Vandalism

Domain: 5

Site: STEI

subsystem: TOS

	eventType – frequency	remarks
pollutant	N/A	

D05 – TREE – Treehaven

Domain: 5

Site: TREE

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	University of Wisconson, Stevens Point and Ed Steigerwaldt.	
fire	prescribed, wildfire- rare to common	TREE is the focus of some controlled burn research. Some of our plots experience burns periodically.
grazing	N/A	
plantAddition	rare	Not sure if active planting is part of any logging/reforestation effort
chemicalApplication	rare	Not sure if herbicides or fertilizers are used in logging/re-forestation efforts. Not unheard of.
plantReduction	timber harvest- common	Tower site and distributed sites are managed. Some logging will occur.
animalReduction	rare	Minimal recreational hunting occurs. Nothing likely to create large impact via animal reduction
Biocontrol	rare	
populationSpike	common	Emerald ash borer, soon. Various invasive plants present, but not spiking (yet?)
obstruction	rare	
irrigation	N/A	
otherNaturalDisturbance	common	Windstorms blow a lot of trees down . Could damage

Domain: 5

Site: TREE

subsystem: TOS

	eventType – frequency	remarks
		infrastructure. Has already occurred at UNDE
wildlifeDisturbance	Rare	Bear damage to ground instruments? Birds on tower. Bees on tower
Other		
humanDisturbance	common	Human traffic through plots? Vandalism
pollutant	N/A	

D06 Domain 6

D06- KING – Kings Creek

Domain: 6

Site: KING

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	The Nature Conservancy	Managed by Kansas State University. Site host contact is Konza Prairie Biological Station Director John Briggs.
fire	prescribed-frequent	Kings Creek sits in an annually burned watershed. Burning occurs in the spring between March 1-May 1. The area directly around the creek does not burn with as high intensity as the surrounding prairies due to less vegetation from overstory trees and limestone inhibiting growth.
grazing	N/A	
plantAddition	N/A	

Domain: 6

Site: KING

subsystem: AOS

	eventType – frequency	remarks
chemicalApplication	herbicide, pesticide- frequent	Chemical application to control invasive species is widespread throughout the site and likely in the Kings Creek watershed.
plantReduction	N/A	Set in a matrix of native prairie.
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	rare	
obstruction	N/A	
irrigation	N/A	The site is not irrigated
otherNaturalDisturbance	common	Flooding following rain events happen often. Significant flood events happen on average 2-3x/year.
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	rare	
pollutant	N/A	

D06 – MCDI – McDiffett Creek

Domain: 6

Site: MCDI

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Kansas State University Endowment Foundation	Current leasee is Greg McDiffett who farms and runs cattle on the land. He also owns/farms adjacent lands.
fire	wildfire-rare	All areas in Kansas are eventually burned, though no specified burning frequency is established at the site.

Domain: 6

Site: MCDI

subsystem: AOS

	eventType – frequency	remarks
grazing	*Bos taurus*- frequent	Annual fall grazing happens following harvest of crops.
plantAddition	planting-frequent	2016 - corn
chemicalApplication	rare	
plantReduction	cropHarvest-frequent	early October - corn
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	rare	
obstruction	N/A	
irrigation	N/A	site is not irrigated
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	rare	
pollutant	N/A	

D06 – KONZ – Konza Prairie Biological Station

Domain: 6

Site: KONZ

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	The Nature Conservancy	Managed by Kansas State University. Site host contact is Konza Prairie Biological Station Director John Briggs.
fire	prescribed-common	Watersheds are burned on differing frequencies (annually to 20 years).
grazing	*Bos taurus*- frequent	Watersheds are grazed by cattle or bison. Some are left ungrazed.
plantAddition	N/A	

Domain: 6

Site: KONZ

subsystem: TOS

	eventType – frequency	remarks
chemicalApplication	herbicide, pesticide- frequent	Chemical application to control invasive species is widespread throughout the site.
plantReduction	mowing-frequent	Roadsides and fireguards (native prairie) are mowed throughout the season.
animalReduction	frequent	Cattle graze the site between 4/1 - 10/31. Bison culling happens late October.
Biocontrol	rare	I believe biocontrol have been previously introduced onto the site, though would need to confirm with site host for species and dates.
populationSpike	rare	
obstruction	N/A	
irrigation	N/A	None of the site is irrigated.
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	rare	
pollutant	N/A	

D06 – UKFS – The University of Kansas Field Station

Domain: 6

Site: UKFS

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	University of Kansas Endowment	Managed by the Kansas Biological Survey.
fire	prescribed- rare	Prairie areas are burned with differing and non-predictive frequencies.

Domain: 6

Site: UKFS

subsystem: TOS

	eventType – frequency	remarks
grazing	N/A	
plantAddition	N/A	
chemicalApplication	herbicide, pesticide- frequent	Chemical application to control invasive species is widespread throughout the site.
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	rare	I believe biocontrol have been previously introduced onto the site, though would need to confirm with site host for species and dates.
populationSpike	hunting-common	Whitetailed deer populations are currently experiencing a boom at the site. Researchers are working to estimate population numbers.
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	N/A	
humanDisturbance	rare	
pollutant	N/A	

D06 – KONA – Konza Prairie Biological Station

Domain: 6

Site: KONA

subsystem: TOS

	eventType – frequency	remarks
ownershipChange		
fire		
grazing		
plantAddition		

Domain: 6

Site: KONA

subsystem: TOS

	eventType – frequency	remarks
chemicalApplication		
plantReduction		
animalReduction		
Biocontrol		
populationSpike		
obstruction		
irrigation		
otherNaturalDisturbance		
wildlifeDisturbance		
Other		
humanDisturbance		
pollutant		

D07 Domain 7

D07 – LECO – LeConte Creek

Domain: 7

Site: LECO

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	GRSM NPS	
fire	Wildfire-rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	Flood	

Domain: 7

Site: LECO

subsystem: AOS

	eventType – frequency	remarks
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	Possible	
pollutant	N/A	

D07- WALK – Walker Branch

Domain: 7

Site: WALK

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	UT-Battelle	
fire	Wildfire-rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	Flood	
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	N/A	
pollutant	N/A	

D07 – ORNL – Oak Ridge National Laboratory

Domain: 7

Site: ORNL

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Oak Ridge National Laboratory	
fire	prescribed burn- common, wildfire-rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	frequent	pasture plots only
plantReduction	frequent	pasture plots only
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	N/A	
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	frequent	pasture plots only
pollutant	N/A	

D07 – MLBS – Mountain Lake Biological Station

Domain: 7

Site: MLBS

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Mountain Lakes Biological Station	
fire	prescribed burn- common, wildfire-rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	timber harvest- rare	

Domain: 7

Site: MLBS

subsystem: TOS

	eventType – frequency	remarks
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	N/A	
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	common	
pollutant	N/A	

D07 – GRSM – Great Smoky Mountains National Park

Domain: 7

Site: GRSM

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Great Smokey Mountains National Park	
fire	Wildfire-rare	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	herbicide- common	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	common	high wind
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	rare	

Domain: 7

Site: GRSM

subsystem: TOS

	eventType – frequency	remarks
pollutant	N/A	

D08 Domain 8

D08 – Black Warrior River near Dead Lake

Domain: 8

Site: BLWA

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USACE	Permit from USACE - LEe Chip Dixon is contact, Private Land owner for AIS portion (Gauge installation, portal, power line, device boxes) - Red Barton
fire	N/A	
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	windDamage - rare	Tornadoes in area
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	Dredging - frequent	Navigable commercial river - by USACE barges regularly in channel
pollutant	common	Upstream of site pollutant - wastewater

D08 - MAYF – Mayfield Creek

Domain: 8

Site: MAYF

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USFS	Cindy Ragland, District Ranger is contact
fire	Prescribed burn- common	USFS long leaf restoration?- Prescribed burns usually do not reach into MAYF area since it is a wetland, 3 year cycle
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	windDamage - rare	Tornadoes in area
wildlifeDisturbance	Sus scrofa- common	Feral pigs rooting in riparian area
Other	N/A	
humanDisturbance	N/A	
pollutant	N/A	

D08 – TOMB – Lower Tombigbee River at Choctaw Refuge

Domain: 8

Site: TOMB

subsystem: AOS

	eventType – frequency	**remarks**
ownershipChange	USACE, Portal and groundwater wells on University of South Alabama land	Lee Chip Dixon is contact, unsure about contact person for USA (ask permitting - Dan Jackson)
fire	N/A	

Domain: 8

Site: TOMB

subsystem: AOS

	eventType – frequency	remarks
grazing	N/A	
plantAddition	N/A	
chemicalApplication	N/A	
plantReduction	N/A	
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	N/A	
irrigation	N/A	
otherNaturalDisturbance	windDamage - rare	Tornadoes in area
wildlifeDisturbance	N/A	
Other	N/A	
humanDisturbance	Dredging - frequent	Navigable commercial river - by USACE barges regularly in channel
pollutant	common	Upstream of site pollutant - wastewater

D08 – TALL – Talladega National Forest

Domain: 8

Site: TALL

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USFS	Cindy Ragland, District Ranger is contact
fire	Prescribed burn- common	USFS long leaf restoration- Prescribed burns usually , 3 year cycle
grazing	N/A	
plantAddition	planting- *Triticum aestivum*	Planting wheat for deer
chemicalApplication	Herbicide - frequent	Area near R_005 was treated with herbicide to reduce understory

Domain: 8

Site: TALL

subsystem: TOS

	eventType – frequency	remarks
		woody vegetation; small oaks, and vaccinium. Once a year/as needed
plantReduction	removal-clearCut, removal - thinning	Understory thinning for Red Cockaded woodpecker restoration work-Near TALL tower plots
animalReduction	trapping Sus scrofa- frequent	Feral pig trapping
Biocontrol	N/A	
populationSpike	N/A	
obstruction	rare	occasional building material detritus from tornado
irrigation	N/A	
otherNaturalDisturbance	windDamage - occasional	Tornadoes in area
wildlifeDisturbance	Sus scrofa	Feral pigs rooting in plot
Other	N/A	
humanDisturbance	road - dirt	roads built throughout for timber access
pollutant	N/A	

D08 – DELA – Dead Lake

Domain: 8

Site: DELS

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USACE - Sate of Alabama (AL DCNR) does work there	Lee Chip Dixon is contact, Folks on ground are DCNR - Josh
fire	Prescribed burn- common	USFS long leaf restoration-, 3 year cycle
grazing	N/A	
plantAddition	planting-*Pennisetum glaucum*	Rice and Millet planted for ducks in feed plots
chemicalApplication	N/A	
plantReduction	N/A	

Domain: 8

Site: DELS

subsystem: TOS

	eventType – frequency	remarks
animalReduction	N/A	
Biocontrol	N/A	
populationSpike	N/A	
obstruction	rare	Annual flooding disperses trash throughout plots
irrigation	N/A	
otherNaturalDisturbance	Flood - annual	100 year flood 2015 covered area in 122 cm of water, December rains until May
wildlifeDisturbance	Sus scrofa	Feral pigs rooting in plot
Other	N/A	
humanDisturbance	N/A	
pollutant	N/A	

D08 – LENO – Lenoir Landing

Domain: 8

Site: LENO

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USFWS manages (leased to them by USACE)	Steve Reagan (USFWS) is contact for middle swamp, Randy Bumpers works for Steve and is groundskeeper in middle Swamp. Tower is USACE - Lee Chip Dixon is contact
fire	N/A	
grazing	N/A	
plantAddition	*Pennisetum glaucum*	Rice and Millet planted for ducks in feed plots
chemicalApplication	N/A	
plantReduction	N/A	

Domain: 8

Site: LENO

subsystem: TOS

	eventType – frequency	remarks
animalReduction	Sus scrofa	Feral pigs throughout distributed plots
Biocontrol	N/A	
populationSpike	N/A	
obstruction	Obstruction	Annual flooding disperses trash throughout plots, mostly in Tower plots
irrigation	N/A	
otherNaturalDisturbance	Flood - annual	December rains until June, Distributed plots covered with 243-274 cm ft of water, tower plots are minimal
wildlifeDisturbance	Sus scrofa	Feral pigs rooting in plot
Other	N/A	
humanDisturbance	N/A	
pollutant	N/A	

D09 Domain 9

D09 – PRLA – Prairie Lake at Dakota Coteau Field School

Domain: 9

Site: PRLA

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	North Dakota State Lands Trust	
fire	wildfire - rare	
grazing	Bos taurus - constant	
plantAddition	NA	
chemicalApplication	fertilizer/herbicide/insecticide - frequent	adjacent crop land; assessed by color of water
plantReduction	haying - frequent	
animalReduction	NA	

Domain: 9

Site: PRLA

subsystem: AOS

	eventType – frequency	remarks
Biocontrol	Aphthona spp. - rare	flea beetle to control noxious weeds
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D09 – PRPO – Prairie Pothole

Domain: 9

Site: PRPO

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	US Fish and Wildlife Service	Chase Lake National Wildlife Refuge
fire	Prescribed burn- rare	
grazing	*Bos taurus*- frequent	
plantAddition	NA	
chemicalApplication	herbicide, weed control- rare	
plantReduction	haying- frequent	
animalReduction	NA	
Biocontrol	Aphthona spp. - rare	flea beetle to control noxious weeds
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	

Domain: 9

Site: PRPO

subsystem: AOS

	eventType – frequency	remarks
humanDisturbance	rare	
pollutant	rare	

D09 – WOOD- Woodworth

Domain: 9

Site: WOOD

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	US Fish and Wildlife Service	Chase Lake National Wildlife Refuge
fire	Prescribed burn- rare	
grazing	*Bos taurus*- frequent	
plantAddition	NA	
chemicalApplication	herbicide, weed control- rare	
plantReduction	haying- frequent	
animalReduction	NA	
Biocontrol	Aphthona spp. - rare	flea beetle to control noxious weeds
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D09 – DCFS – Dakota Chateau Field School

Domain: 9

Site: DCFS

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	North Dakota State Lands Trust	
fire	wildfire - rare	
grazing	*Bos taurus* - constant	Management tool
plantAddition	NA	
chemicalApplication	fertilizer/herbicide/insecticide - frequent	adjacent crop land; assessed by color of water
plantReduction	haying - frequent	
animalReduction	NA	
Biocontrol	Aphthona spp. - rare	flea beetle to control noxious weeds
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D09 – NOGP – Northern Great Plains Research Laboratory

Domain: 9

Site: NOGP

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USDA ARS- Northern Great Plains Research Laboratory	
fire	wildfire - rare	
grazing	*Bos taurus* - constant	Management/Research
plantAddition	rare	agricultural research
chemicalApplication	fertilizer/herbicide/insecticide - frequent	

Domain: 9

Site: NOGP

subsystem: TOS

	eventType – frequency	remarks
plantReduction	haying - frequent	
animalReduction	NA	
Biocontrol	Aphthona spp. - rare	flea beetle to control noxious weeds
populationSpike	rare	
obstruction	rare	
irrigation	rare	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D10 Domain 10

D10 – ARIK – Arikaree River

Domain: 10

Site: ARIK

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	The Nature Conservancy (TNC)	Nathan Andrews runs cattle on the property.
fire	rare	
grazing	*Bos taurus* - constant	Management
plantAddition	NA	
chemicalApplication	frequent	
plantReduction		
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	rare	
otherNaturalDisturbance	rare	

Domain: 10

Site: ARIK

subsystem: AOS

	eventType – frequency	remarks
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D10 – CPER – Central Plains Experimental Range

Domain: 10

Site: CPER

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USDA-ARS	
fire	prescribed- frequent	management
grazing	*Bos taurus* - usually 5/1-10/1	management, research
plantAddition	NA	
chemicalApplication	frequent	
plantReduction	no	
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	rare	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D10 – STER – Sterling

Domain: 10

Site: STER

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Gilbert Lindstrom	Andrew Lindstrom (grandson) also farms the lands
fire	rare	
grazing	*Bos taurus* - constant	
plantAddition	common	agriculture
chemicalApplication	common	
plantReduction	cropHarvest-common	harvest of crops, haying
animalReduction	rare	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	rare	
otherNaturalDisturbance	rare	
wildlifeDisturbance	*Bos taurus* can damage site	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D10 – RMNP – Rocky Mountain National Park

Domain: 10

Site: RMNP

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	National Park Service	
fire	wildfire-rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	

Domain: 10

Site: RMNP

subsystem: TOS

	eventType – frequency	remarks
Biocontrol	NA	
populationSpike	NA	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D11 Domain 11

D11 – PRIN – Pringle Creek

Domain: 11

Site: PRIN

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Managed by US Forest Service	
fire	NA	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	rare	Flash floods, creek will likely be inaccessible during high rain events

Domain: 11

Site: PRIN

subsystem: AOS

	eventType – frequency	remarks
wildlifeDisturbance	NA	
Other	NA	
humanDisturbance	common	USFS land open for recreational use year round, Hunting, camping. horse trails- year round
pollutant	NA	

D11 – BLUE – Blue River

Domain: 11

Site: BLUE

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Managed by TNC	
fire	NA	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	rare	Flash flooding during high rains
wildlifeDisturbance	NA	
Other	NA	
humanDisturbance	common	Infrequent visits by other scientists, college groups
pollutant	NA	

D11 – CJBJ – LBJ National Grassland

Domain: 11

Site: CJBJ

subsystem: TOS

	eventType – frequency	**remarks**
ownershipChange	US Forest Service	
fire	Prescribed- rare	In tower site, and other parcels where NEON plots are location. On an approx. 3-yr rotation cycle
grazing	*Bos taurus*- rare	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	rare	Rains could wash out two-track fire line main path leading to tower/ins hut.
wildlifeDisturbance	rare	hog packs likely visit nearby areas infrequently.
Other	NA	
humanDisturbance	Hunting, camping. horse trails- yearround	USFS land open for recreational use year round
pollutant	NA	

D11 – OAES- Klemme Range Research Station

Domain: 11

Site: OAES

subsystem: TOS

	eventType – frequency	**remarks**
ownershipChange	Managed by Oklahoma State University	

Domain: 11

Site: OAES

subsystem: TOS

	eventType – frequency	remarks
fire	NA	
grazing	*Bos taurus*- frequent	Grazing is a planned activity. NEON is notified prior to cattle being moved into related pastures.
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance		
wildlifeDisturbance	NA	
Other		
humanDisturbance	NA	
pollutant	NA	

D12 Domain 12

D12 – BLDE - Blacktail Deer Creek

Domain: 12

Site: BLDE

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	National Park Service	
fire	wildfire- rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	

Domain: 12

Site: BLDE

subsystem: AOS

	eventType – frequency	remarks
animalReduction	chemical- planned fish eradication (rotenone) in coming years	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	rare	possible-earthquake, volcanic eruption
wildlifeDisturbance	frequent	bears, bison, other large carnivores
Other	NA	
humanDisturbance	frequent	fishing
pollutant	NA	

D12 – YELL – Yellowstone Northern Range

Domain: 12

Site: YELL

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	National Park Service	
fire	wildfire- rare	
grazing	frequent	bison, elk, deer. No cattle grazing
plantAddition	NA	
chemicalApplication	rare	
plantReduction	NA	
animalReduction	rare	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	rare	possible-earthquake, volcanic eruption
wildlifeDisturbance	common	

Domain: 12

Site: YELL

subsystem: TOS

	eventType – frequency	remarks
Other	NA	
humanDisturbance	common	
pollutant	NA	

D13 Domain 13

D13 – COMO – Como Creek at Niwot Ridge

Domain: 13

Site: COMO

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USFS	Mountain Research Station (MRS) are our point of contact, though they are not the site host.
fire	wildfire- rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	hunting-rare	
Biocontrol	NA	
populationSpike	rare	
obstruction	common	trees often fall and block the road, roads not maintained in the winter causing lack of access
irrigation	NA	
otherNaturalDisturbance	rare	windstorms
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D13 – WSTL – West Saint Louis Creek

Domain: 13

Site: WSTL

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USFS	Banning Starr is our POC on the ground
fire	wildfire- rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	common	fishing
pollutant	rare	

D13 – NIWO – Niwot Ridge Mountain Research Station

Domain: 13

Site: NIWO

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USFS	Mountain Research Station (MRS) are our point of contact, though they are not the site host.
fire	wildfire- rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	

Domain: 13

Site: NIWO

subsystem: TOS

	eventType – frequency	remarks
plantReduction	NA	
animalReduction	hunting-rare	
Biocontrol	NA	
populationSpike	rare	
obstruction	common	trees often fall and block the road, roads not maintained in the winter causing lack of access
irrigation	NA	
otherNaturalDisturbance	rare	windstorms
wildlifeDisturbance	rare	bears have disturbed beetle traps in the past
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D14 Domain 14

D14 – MOAB – Moab

Domain: 14

Site: MOAB

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Bureau Land Management	
fire	wildfire- rare	
grazing	*Bos taurus*- frequent	cattle grazing
plantAddition	NA	
chemicalApplication	NA	
plantReduction	rare	
animalReduction	NA	
Biocontrol	rare	
populationSpike	NA	

Domain: 14

Site: MOAB

subsystem: TOS

	eventType – frequency	remarks
obstruction	common	"road" access could be obstructed due to weather-"roads" unmaintained
irrigation	N	
otherNaturalDisturbance	common	flood
wildlifeDisturbance	rare	
Other	NA	
humanDisturbance	common	public access hunting, OHV recreation-plots located on OHV trail system on eastern side of TOS boundary
pollutant	NA	

D14 – SYCA – Sycamore Creek

Domain: 14

Site: SYCA

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Tonto National Forest	
fire	wildfire- rare	
grazing	*Bos taurus*- frequent	Reach located in Sunflower Allotment (currently for sale, no grazing since 2000)
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	N	
obstruction	common	Various man-made and natural debris following flash floods
irrigation	N	

Domain: 14

Site: SYCA

subsystem: AOS

	eventType – frequency	remarks
otherNaturalDisturbance	common	Flash floods
wildlifeDisturbance	NA	
Other	NA	
humanDisturbance	common	Heavy UTV recreational use downstream of permitted reach. Potential encroachment.
pollutant	NA	

D14 – SRER – Santa Rita Experimental Range

Domain: 14

Site: SRER

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Arizona State Land Department	
fire	wildfire- rare	
grazing	*Bos taurus*- frequent	Cattle rotated through pastures at various desities and durations. Subject to change during yearly SRER Grazing Plan issued by University of Arizona
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	common	Flash floods
wildlifeDisturbance	rare	Rare; javalina, rodents eating plot markers
Other	NA	

Domain: 14

Site: SRER

subsystem: TOS

	eventType – frequency	remarks
humanDisturbance	common	Recreation: hunting, target practice, UTVs
pollutant	NA	

D14 - JORN – Jornada Long Term Ecological Research

Domain: 14

Site: JORN

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USDA-ARS	
fire	wildfire- rare	
grazing	*Bos taurus*- frequent	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	Y	Rare; oryx, rodents eating plot markers
Other	NA	
humanDisturbance	NA	
pollutant	NA	

D15 Domain 15

D15 – REDB – Red Butte Creek

Domain: 15

Site: REDB

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USFS owns canyon/creek; Salt Lake City manages Red Butte Reservoir and access	
fire	wildfire- rare	unmanaged system-lots of woody debris
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	common	lots of woody debris in stream-unmanaged system
irrigation	NA	
otherNaturalDisturbance	common	flood
wildlifeDisturbance	rare	
Other	NA	
humanDisturbance	NA	closed to public access-but other researchers in canyon
pollutant	possible	oil spill occurred in 2010

D15 – ONAQ – Onaqui- Ault

Domain: 15

Site: ONAQ

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Bureau of Land Management	

Domain: 15

Site: ONAQ

subsystem: TOS

	eventType – frequency	**remarks**
fire	wildfire	two near site since 2014
grazing	*Bos taurus*- frequent	managed grazing lease with BLM 11/1-6/15 annually. Actual evidence of cows however typically through April annually.
plantAddition	rare	
chemicalApplication	rare	
plantReduction	mastication-frequent	juniper mastication event occurred on some of the site in 2015. possible this will occur again. We are in touch with BLM management regarding these activities.
animalReduction	NA	
Biocontrol	rare	
populationSpike	NA	
obstruction	common	heavy rains/snow melt make roads impassable
irrigation	NA	
otherNaturalDisturbance	common	flood
wildlifeDisturbance	rare	wild horses present
Other	NA	
humanDisturbance	common	public access-used for hunting and recreation
pollutant	NA	

D16 Domain 16

D16 – MCRA – McRae Creek

Domain: 16

Site: MCRA

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Willamette National Forest	H.J. Andrews Experimental Forest
fire	wildfire - rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D16 – MART – Martha Creek

Domain: 16

Site: MART

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	Gifford Pinchot National Forest	Wind River Experimental Forest
fire	wildfire - rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	

Domain: 16

Site: MART

subsystem: AOS

	eventType – frequency	remarks
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D16 – WREF – Wind River Experimental Forest

Domain: 16

Site: WREF

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Gifford Pinchot National Forest	Wind River Experimental Forest
fire	wildfire or prescribed burn - rare	
grazing	NA	
plantAddition	tree planting - rare	primarily Pseudotsuga menziesii
chemicalApplication	herbicide	possible but frequency unknown
plantReduction	clearcut - rare	
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	rare	
pollutant	rare	

D16 – ABBY – Abby Road

Domain: 16

Site: ABBY

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	Washington State Department of Natural Resources	Yacolt Burn State Forest
fire	wildfire or prescribed burn - rare	
grazing	NA	
plantAddition	tree planting - frequent	primarily Pseudotsuga menziesii
chemicalApplication	herbicide - rare	more common along roadsides
plantReduction	clearcut - frequent	
animalReduction	NA	
Biocontrol	NA	
populationSpike	rare	
obstruction	rare	
irrigation	NA	
otherNaturalDisturbance	rare	
wildlifeDisturbance	rare	
Other	rare	
humanDisturbance	vandalism; damage from motorcycles/ATVs; damage from recreational shooting; construction of logging roads - rare	mountain bike and motorcycle trails run through some TOS plots
pollutant	rare	

D17 Domain 17

D17 – TECR – Teakettle II Creek

Domain: 17

Site: TECR

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USDA Forest Service - rare	Pacific Southwest Research Station
fire	wild and prescribed-infrequent	

Domain: 17

Site: TECR

subsystem: AOS

	eventType – frequency	remarks
grazing	*Bos taurus*- infrequent	Bos taurus, in an active grazing allotment
plantAddition	NA	
chemicalApplication	fire retardant, other research - rare	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	rare	possible during spring melt
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	infrequent	Ursus americanus
Other	NA	
humanDisturbance	frequent	other research
pollutant	NA	

D17 – BIGC – Upper Big Creek

Domain: 17

Site: BIGC

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	USDA Forest Service - rare	Sierra National Forest
fire	wild and prescribed-infrequent	
grazing	*Bos taurus*- infrequent	Bos taurus, in an active grazing allotment
plantAddition	NA	
chemicalApplication	fire retardant - rare	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	

Domain: 17

Site: BIGC

subsystem: AOS

	eventType – frequency	remarks
obstruction	rare	possible during spring melt
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	infrequent	Ursus americanus
Other	NA	
humanDisturbance	frequent	near a dispersed campsite
pollutant	NA	

D17 – SJER – San Joaquin Experimental Range

Domain: 17

Site: SJER

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USDA Forest Service - rare	Pacific Southwest Research Station
fire	wild and prescribed-infrequent	
grazing	*Bos taurus*- frequent	Bos taurus, site is managed as a grazing research facility
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	infrequent	APHIS traps out here sometimes (coyotes, feral hogs)
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	frequent	Sus scrofa
Other	NA	
humanDisturbance	frequent	other research
pollutant	NA	

D17 – SOAP – Soaproot Saddle

Domain: 17

Site: SOAP

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USDA Forest Service - rare	Sierra National Forest
fire	wild and prescribed-infrequent	
grazing	*Bos taurus*- infrequent	Bos taurus, in an active grazing allotment
plantAddition	rare	after timber sales
chemicalApplication	fire retardant - rare	
plantReduction	timber cutting-infrequent	
animalReduction	NA	
Biocontrol	NA	
populationSpike	pine beetles-common	
obstruction	frequent	lots of dead trees ready to fall
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	frequent	Ursus americanus
Other	NA	
humanDisturbance	NA	
pollutant	NA	

D17 – TEAK – Lower Teakettle at Teakettle Experimental Forest

Domain: 17

Site: TEAK

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	USDA Forest Service - rare	Sierra National Forest
fire	wild and prescribed-infrequent	
grazing	*Bos taurus*- frequent	Bos taurus, in an active grazing allotment, mostly in meadows, along streams
plantAddition	rare	after timber sales
chemicalApplication	NA	

Domain: 17

Site: TEAK

subsystem: TOS

	eventType – frequency	remarks
plantReduction	timber cutting-infrequent	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	infrequent	Ursus americanus
Other	NA	
humanDisturbance	frequent	dispersed camping area near tower
pollutant	NA	

D18 Domain 18

D18 – OKSR – Oksrukuyik Creek

Domain: 18

Site: OKSR

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	BLM	
fire	rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	rare	geoblock trail will fail
irrigation	NA	
otherNaturalDisturbance	NA	

Domain: 18

Site: OKSR

subsystem: AOS

	eventType – frequency	remarks
wildlifeDisturbance	rare	Caribou, Bear, fox
Other	NA	
humanDisturbance	rare	Hunters, truckers, pipeline workers (from main road)
pollutant	rare	Alaska pipeline nearby

D18 – TOOK – Toolik Lake at Toolik Lake Field Station

Domain: 18

Site: TOOK

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	BLM/Toolik Field Station	
fire	rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	rare	geoblock trail will fail
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	NA	
Other	NA	
humanDisturbance	frequent	Other exisiting research on lake - frequent
pollutant	rare	Alaska pipeline nearby

D18 – TOOL – Toolik Lake Field Station

Domain: 18

Site: TOOL

subsystem: TOS

	eventType – frequency	remarks
ownershipChange		
fire		
grazing		
plantAddition		
chemicalApplication		
plantReduction		
animalReduction		
Biocontrol		
populationSpike		
obstruction		
irrigation		
otherNaturalDisturbance		
wildlifeDisturbance		
Other		
humanDisturbance		
pollutant		

D18 – BARR – Barrow Environmental Observatory

Domain: 18

Site: BARR

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	North Slope Borough	
fire	rare	
grazing	NA	
plantAddition	UNK	
chemicalApplication	UNK	
plantReduction	UNK	
animalReduction	occasional culling of wildlife by USFWS	
Biocontrol	NA	

Domain: 18

Site: BARR

subsystem: TOS

	eventType – frequency	remarks
populationSpike	lemmings/owls/yagers - occasional	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	Polar Bears, fox, caribou	
Other	NA	
humanDisturbance	Hunters & other existing research - frequent	
pollutant	Oil and Gas development	

D19 Domain19

D19 – CARI – Caribou Creek at Poker Flats

Domain: 19

Site: CARI

subsystem: AOS

	eventType – frequency	remarks
ownershipChange	DNR/UAF	
fire	wildlife - rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	NA	
wildlifeDisturbance	occational	Moose, grizzly bear - occasional
Other	NA	

Domain: 19

Site: CARI

subsystem: AOS

	eventType – frequency	remarks
humanDisturbance	frequent	Hunters & other existing research - frequent
pollutant	NA	

D19 – BONA – Caribou Creek at Poker Flats Watershed

Domain: 19

Site: BONA

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	DNR/UAF	
fire	wildlife - rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	occational	Trees near tower - occasional
wildlifeDisturbance	occational	Moose, grizzly bear - occasional
Other	NA	
humanDisturbance	frequent	Hunters & other existing research
pollutant	NA	

D19 – DEJU – Delta Junction

Domain: 19

Site: DEJU

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	BLM	
fire	wildlife - rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	rare	Trees near tower
wildlifeDisturbance	rare	Moose, grizzly bear
Other	NA	
humanDisturbance	frequent	Hunters & other existing research
pollutant	NA	

D19 – HEAL - Healy

Domain: 19

Site: HEAL

subsystem: TOS

	eventType – frequency	remarks
ownershipChange	DNR	
fire	wildfire - rare	
grazing	NA	
plantAddition	NA	
chemicalApplication	NA	
plantReduction	NA	
animalReduction	NA	
Biocontrol	NA	

Domain: 19

Site: HEAL

subsystem: TOS

	eventType – frequency	remarks
populationSpike	NA	
obstruction	NA	
irrigation	NA	
otherNaturalDisturbance	frequent	shifting permafrost
wildlifeDisturbance	occational	grizzly bear - occasional
Other	NA	
humanDisturbance	frequent	berry pickers and tourists use tower boardwalk - frequent
pollutant	NA	

D20 Domain 20

D20 – PUUM – Pu'u Maka'ala Natural Area Reserve

Domain: 20

Site: PUUM

subsystem: TOS

	eventType – frequency	remarks
ownershipChange		
fire		
grazing		
plantAddition		
chemicalApplication		
plantReduction		
animalReduction		
Biocontrol		
populationSpike		
obstruction		
irrigation		
otherNaturalDisturbance		
wildlifeDisturbance		
Other		

Domain: 20

Site: PUUM

subsystem: TOS

	eventType – frequency	remarks
humanDisturbance		
pollutant		

Appendix F MAPPING OF NEON MOBILE APPLICATION RECORDS TO AMERIFLUX BADM

Reporting of site management and disturbance events at NEON sites parallels a similar reporting effort at Ameriflux sites. Given the compatibility of some NEON data products with Ameriflux measurements, and the possibility that NEON sites may attain membership in the Ameriflux network in the future, the following table maps NEON site events reported with the mobile application to the Biological, Ancillary, Disturbance and Metadata (BADM) spreadsheet used to collect similar information at Ameriflux sites.

NEON Site Management and Disturbance Application *Fulcrum App inputs must match all entries specified for each Event type*							Ameriflux Disturbance and Management BADM *See functions below for mappings that are the same for all event types*		
Event type	detailType (1)	Entry (1)	detailType (2)	Entry (2)	detailType (3)	Entry (3)	Variable	dataValue	DM_COMMENT
ownershipChange	name	[any input value]					DM_GENERAL	Undisturbed	"ownership change"; Fulcrum:details:name; Fulcrum:remarks
fire	severityClass	[any input value]	methodOrType	fire-controlledBurn			DM_FIRE	Prescribed human induced underburn	Fulcrum:details:severitychoices;Fulcrum:remarks
fire	severityClass	[any input value]	methodOrType	fire-wildFire			DM_FIRE	Nature induced burn	Fulcrum:details:severitychoices;Fulcrum:remarks
grazing	scientificName	[any input value]					DM_GRAZE	Other	Fulcrum:details:name; Fulcrum:remarks
plantAddition	scientificName	[any input value]	methodOrType	addition-livePlants			DM_PLANTING	Planting other live plants	Fulcrum:remarks
plantAddition	scientificName	[any input value]	methodOrType	addition-seeds			DM_PLANTING	Sowing other seeds	Fulcrum:details:name; Fulcrum:remarks
chemicalApplication	methodOrType	fertilizer-organic	name	[any input value]	Other	[any input value]	DM_FERT_O	Other	Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
chemicalApplication	methodOrType	fertilizer-inorganic	name	[any input value]	other	[any input value]	DM_FERT_M	Other	Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks

NEON Site Management and Disturbance Application *Fulcrum App inputs must match all entries specified for each Event type*							Ameriflux Disturbance and Management BADM *See functions below for mappings that are the same for all event types*		
Event type	detailType (1)	Entry (1)	detailType (2)	Entry (2)	detailType (3)	Entry (3)	Variable	dataValue	DM_COMMENT
chemicalApplication	methodOrType	fertilizer-unknown	name	[any input value]	other	[any input value]	DM_FERT_M	Other	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
chemicalApplication	methodOrType	fireRetardant	name	[any input value]	other	[any input value]	DM_GENERAL	Other	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
chemicalApplication	methodOrType	pesticide-fungicide	name	[any input value]	other	[any input value]	DM_PESTICIDE	Fungicide	Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
chemicalApplication	methodOrType	pesticide-herbicide	name	[any input value]	other	[any input value]	DM_PESTICIDE	Herbicide	Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
chemicalApplication	methodOrType	pesticide-insecticide	name	[any input value]	other	[any input value]	DM_PESTICIDE	Insecticide	Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
chemicalApplication	methodOrType	pesticide-rodenticide	name	[any input value]	other	[any input value]	DM_PESTICIDE	Other	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:other; Fulcrum:remarks
plantReduction	methodOrType	removal-clearCut	scientificName	[any input value]	biomassRemoval	[any input value]	DM_FORESTRY	Clearcutting	Fulcrum:details:name; "biomass removal: " Fulcrum:details:yesorno; Fulcrum:remarks
plantReduction	methodOrType	removal-cropHarvest	scientificName	[any input value]			DM_AGRICULTURE	Harvest	Fulcrum:details:name; Fulcrum:remarks
plantReduction	methodOrType	removal-mowing	scientificName	[any input value]	biomassRemoval	[any input value]	DM_AGRICULTURE	Other	"mowing"; Fulcrum:details:name; "biomass removal: " Fulcrum:details:yesorno; Fulcrum:remarks

NEON Site Management and Disturbance Application *Fulcrum App inputs must match all entries specified for each Event type*							Ameriflux Disturbance and Management BADM *See functions below for mappings that are the same for all event types*		
Event type	detailType (1)	Entry (1)	detailType (2)	Entry (2)	detailType (3)	Entry (3)	Variable	dataValue	DM_COMMENT
plantReduction	methodOrType	removal-pruning	scientificName	[any input value]	biomassRemoval	[any input value]	DM_FORESTRY	Thinning/pruning	Fulcrum:details:name; "biomass removal: " Fulcrum:details:yesorno; Fulcrum:remarks
plantReduction	methodOrType	removal-thinning	scientificName	[any input value]	biomassRemoval	[any input value]	DM_FORESTRY	Thinning/pruning	Fulcrum:details:name; "biomass removal: " Fulcrum:details:yesorno; Fulcrum:remarks
animalReduction	scientificName	[any input value]	methodOrType	[any input value]			DM_GENERAL	Other	Fulcrum:details:methodchoices; Fulcrum:details:name; Fulcrum:remarks
biocontrol	scientificName	[any input value]					DM_GENERAL	Other	Fulcrum:eventtype_parent; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
irrigation	methodOrType	irrigation-flood					DM_WATER	Human induced flooding	Fulcrum:remarks
irrigation	methodOrType	irrigation-sprinkler					DM_WATER	Irrigation	Fulcrum:remarks
irrigation	methodOrType	irrigation-drainage					DM_WATER	Drainage	Fulcrum:remarks
tillage	methodOrType	tillage-conservation					DM_TILL	Conservation	Fulcrum:remarks
tillage	methodOrType	tillage-conventional					DM_TILL	Conventional	Fulcrum:remarks
tillage	methodOrType	tillage-other					DM_TILL	Other	Fulcrum:details:detailremarks; Fulcrum:remarks
humanDisturbance	methodOrType	soilDisruption					DM_GENERAL	Other	Fulcrum:details:typechoices; Fulcrum:details:detailremarks; Fulcrum:remarks

NEON Site Management and Disturbance Application *Fulcrum App inputs must match all entries specified for each Event type*							Ameriflux Disturbance and Management BADM *See functions below for mappings that are the same for all event types*		
Event type	detailType (1)	Entry (1)	detailType (2)	Entry (2)	detailType (3)	Entry (3)	Variable	dataValue	DM_COMMENT
humanDisturbance	methodOrType	vandalism					DM_GENERAL	Other	Fulcrum:details:typechoices; Fulcrum:details:detailremarks; Fulcrum:remarks
humanDisturbance	methodOrType	construction-structure					DM_ENCROACH	Urban encroachment	Fulcrum:details:typechoices; Fulcrum:details:detailremarks; Fulcrum:remarks
humanDisturbance	methodOrType	construction-road-dirt					DM_ENCROACH	Urban encroachment	Fulcrum:details:typechoices; Fulcrum:details:detailremarks; Fulcrum:remarks
humanDisturbance	methodOrType	construction-road-asphalt					DM_ENCROACH	Urban encroachment	Fulcrum:details:typechoices; Fulcrum:details:detailremarks; Fulcrum:remarks
humanDisturbance	methodOrType	Other					DM_GENERAL	Other	Fulcrum:details:typechoices; Fulcrum:details:detailremarks; Fulcrum:remarks
populationSpike	methodOrType	animal-invertebrate	scientificName	[any input value]			DM_INS_PATH	Insect	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
populationSpike	methodOrType	animal-smallVertebrate	scientificName	[any input value]			DM_ENCROACH	Invasive species	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
populationSpike	methodOrType	animal-largeVertebrate	scientificName	[any input value]			DM_ENCROACH	Invasive species	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
populationSpike	methodOrType	plant	scientificName	[any input value]			DM_ENCROACH	Invasive species	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks

NEON Site Management and Disturbance Application *Fulcrum App inputs must match all entries specified for each Event type*							Ameriflux Disturbance and Management BADM *See functions below for mappings that are the same for all event types*		
Event type	detailType (1)	Entry (1)	detailType (2)	Entry (2)	detailType (3)	Entry (3)	Variable	dataValue	DM_COMMENT
populationSpike	methodOrType	fungus	scientificName	[any input value]			DM_INS_PATH	Pathogen	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
populationSpike	methodOrType	pathogen	scientificName	[any input value]			DM_INS_PATH	Pathogen	Fulcrum:details:typechoices; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
populationSpike	methodOrType	Other	scientificName	[any input value]			DM_GENERAL	Other	Fulcrum:eventtype_parent; Fulcrum:details:name; Fulcrum:details:detailremarks; Fulcrum:remarks
obstruction							DM_GENERAL	Other	Fulcrum:eventtype_parent; Fulcrum:remarks
otherNaturalDisturbance	methodOrType	methodOrType	iceDamage				DM_EXT_WEATHER	Freeze	Fulcrum:typechoices; Fulcrum:details:minquantity "(min)" Fulcrum:details:maxquantity "(max)" Fulcrum:details:quantityunit; Fulcrum:remarks
otherNaturalDisturbance	methodOrType	methodOrType	frostDamage				DM_EXT_WEATHER	Freeze	Fulcrum:details:minquantity "(min)" Fulcrum:details:maxquantity "(max)" Fulcrum:details:quantityunit; Fulcrum:remarks
otherNaturalDisturbance	methodOrType	methodOrType	windDamage				DM_EXT_WEATHER	Storm	Fulcrum:typechoices; Fulcrum:details:minquantity "(min)" Fulcrum:details:maxquantity "(max)" Fulcrum:details:quantityunit; Fulcrum:remarks
otherNaturalDisturbance	methodOrType	methodOrType	flood				DM_EXT_WEATHER	Flood	Fulcrum:details:minquantity "(min)" Fulcrum:details:maxquantity "(max)"

NEON Site Management and Disturbance Application *Fulcrum App inputs must match all entries specified for each Event type*							Ameriflux Disturbance and Management BADM *See functions below for mappings that are the same for all event types*		
Event type	detailType (1)	Entry (1)	detailType (2)	Entry (2)	detailType (3)	Entry (3)	Variable	dataValue	DM_COMMENT
									Fulcrum:details:quantityunit; Fulcrum:remarks
otherNaturalDisturbance	methodOrType	methodOrType	earthquakes				DM_EXT_WEATHER	Other	Fulcrum:typechoices; Fulcrum:details:minquantity "(min)" Fulcrum:details:maxquantity "(max)" Fulcrum:details:quantityunit; Fulcrum:remarks
wildlifeDisturbance	scientificName	[any input value]					DM_GENERAL	Other	Fulcrum:eventtype_parent; Fulcrum:details:name; Fulcrum:remarks
pollutant							DM_GENERAL	Other	Fulcrum:eventtype_parent; Fulcrum:details: methodchoices; Fulcrum:details:typechoices; Fulcrum:details:minquantity "(min)" Fulcrum:details:maxquantity "(max)" Fulcrum:details:quantityunit; Fulcrum:remarks
droughtPerceived							DM_EXT_WEATHER	Drought	Fulcrum:remarks

* "Fulcrum:" designates a field in the Fulcrum mobile application used to report site management and disturbance events observed at NEON sites. Further entries after the ":" designate the key path to the field in which the referenced information is stored.

Programmatic functions for mappings from Fulcrum fields to BADM inputs that do not vary with event type

ADM Field	Function
DM_SURF	if(Fulcrum:selectedlocids == Fulcrum:siteid_parent){100%} else {length(Fulcrum:selectedLocIDs)/length(Fulcrum:locids_choice)}
DM_DATE	Fulcrum:firstdateprovided_string
DM_DATE_START	average(Fulcrum:mineventstartdate,Fulcrum:maxeventstartdate)
DM_DATE_END	average(Fulcrum:mineventenddate,Fulcrum:maxeventenddate)
DM_DATE_UNC	diff(Fulcrum:mineventenddate,Fulcrum:maxeventenddate)/2