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Forest Service

**Rangeland
Management
Staff**

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Threatened, Endangered And Sensitive Plants Element Occurrence

Field Guide

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Overview

Following is an overview and general description of the Forest Service's national protocol for collecting information about Threatened, Endangered and Sensitive plant occurrences.

General Description

The Threatened, Endangered and Sensitive (TES) Plant Protocol focuses on tracking the presence, location, extent, and abundance of ***TES plant occurrences***. Tracking of "watch" species, or species of concern at a Forest level, may also be accomplished using this protocol. The protocol also includes methods to record and track site information for each TES plant occurrence, such as site morphometry, plant community, associated species, soil characteristics, disturbances or threats. One method of monitoring TES plant occurrences consists of repeated observations over time, noting relative changes in location, extent, and density of the plant population, as well as changes in existing or potential threats and habitat conditions. This method of monitoring may also be accomplished using the protocol.

Standardized tracking of TES plant occurrences directly supports the policy and legal requirements to maintain the viability of such species on National Forest System lands (FSM 2670; National Forest Management Act; Endangered Species Act). Business needs of the national TES Plant Program that will be supported by this protocol include:

- Completion of Biological Assessments (BAs) and Biological Evaluations (BEs),
- Status summaries for TES plants,
- Completion of conservation assessments and conservation strategies for TES plants,
- Occurrence-level monitoring of TES plant populations over time (presence/absence, or abundance as measured by repeated censuses of the populations), and
- Establish plant-habitat relationships.

National Standards

Following a corporate approach for collection of TES plant occurrence data facilitates:

- Data sharing within the agency,
- Data sharing with partners,
- Data storage, tracking and reporting, and
- Program consistency and efficiencies.

The national TES Plant Program has developed agency data standards for collection and storage of TES plant data. Beginning in November 2001, a program working group, consisting of the Regional Botanists and a small number of botanists on the National Forests and Ranger Districts, provided the guidance for draft protocol development. In May 2004, the draft products were

further reviewed by a larger group of field botanists across the agency, representing the program user community. Additional protocol modifications were included in early 2005 as a result of feedback during prototype testing of the corporate database application for TES plants. Throughout the course of protocol development, reference was made to requirements in ***Biotics***, the NatureServe database application used nationally by the network of state Natural Heritage Programs. TES plant information gathered by Forest Service programs will be entered and stored in the Natural Resource Information System (NRIS), the corporate database and interface for stewarding TES plant data in the Forest Service. NRIS design will also facilitate a cooperative agreement with NatureServe to electronically submit new ***element occurrence*** data from NRIS to the Biotics databases at individual Natural Heritage Programs. This agreement and application design will also address the need to view element occurrence records from Biotics in conjunction with NRIS TES Plants.

An **element occurrence (EO)** is an area of land and/or water in which a TES plant species is, or was, present. TES plant occurrences that are entered in the NRIS application are synonymous with the element occurrences that are entered in Biotics by the Natural Heritage Programs. The terms “plant occurrence”, “element occurrence”, “EO” or “occurrence” as used in this document may be considered interchangeable.

A required set of core attributes must be collected during field work and electronically stored in the corporate NRIS application to meet the minimum business needs of this protocol. Required attributes are established to meet corporate expectations of reporting, monitoring or data sharing (e.g., with Biotics). All other fields are considered optional and can be used as needed or conditionally required at the Regional or local level to meet specific program objectives. All required and optional fields in this protocol are supported in the NRIS application. Table 1 lists the required attributes for TES plant occurrences. Some attributes are auto-generated and populated in the NRIS application from the spatial feature. Detailed attribute descriptions and collection standards follow later in this document.

Required Attributes
Plant Occurrence Point or Polygon *(spatial feature)*
FS Site ID
Date
NRCS Plant Code for EO species
Scientific Name for Plant Code
Record Source
Examiner(s)
Ownership
Area of occupancy *(Auto-generated in NRIS)*
Area Unit of Measure *(Auto-generated, acres)*
Survey ID *(if record source = field survey)*
State *(Auto-generated in NRIS)*
County *(Auto-generated in NRIS)*

Required Attributes
Region *(Auto-generated in NRIS)*
National Forest *(Auto-generated in NRIS)*
District *(Auto-generated in NRIS)*

Table 1: Fields required by the USDA Forest Service TES Plant Element Occurrence Protocol

Data can be recorded in the field using the standard field form for TES Plant Element Occurrences (Appendix C) and then entered into NRIS using the TES Plants application. The NRIS application uses ArcMap, an NRIS "Task Assistant" and Windows data entry forms to guide the user through a standard workflow to enter and edit the spatial representation of the plant occurrence site and the associated attribute data. The data entry screens mimic the workflow as presented on the paper field form. Block headings on the paper form generally correspond to tabs or buttons on the electronic forms. Future development work may also support field data entry on electronic portable data recorders (PDRs).

This TES Plant Element Occurrence Field Guide makes occasional references to the NRIS TES Plants computer application. However, the field guide is not meant to be a user guide for the NRIS application as a whole. User Guides, Administrative Guides, Stewardship Guides and other relevant information can be accessed via the NRIS FSWeb website (http://fsweb.nris.fs.fed.us/).

Mapping

This protocol requires spatially locating and delineating each element occurrence. TES plant occurrences can be mapped and stored as either points or polygons. Occurrences that could be mapped as "lines," such as those occurring along ridges or streams, will be stored as long, narrow polygons. Spatial representation can be created by a number of methods:

- Hand-drawing the perimeter of the occurrence or a representative point on maps or aerial photos, then redrawing the occurrence within the NRIS TES Plants application;
- Using a GPS (Global Positioning System) device to define smaller areas, converting them to a shapefile, and importing the file;
- Digitizing the occurrence with a computerized mapping system (Geographic Information System [GIS]) and importing it.

Regardless of the method used to delineate a TES plant occurrence in the field, the protocol requires that basic location information and the point or polygon be digitized and stored in ArcMap format. The point or polygon feature must be entered into NRIS before additional tabular attributes can be entered.

To ensure consistency, the scale for hand-drawn occurrences on maps should be 1:24,000. This is the scale of United States Geological Survey (USGS) 7.5-minute quadrangle (quad) maps. Note that maps with a variety of scales are utilized in Alaska. *(**Note:** the 1:24,000 scale is also the standard for invasive plant mapping as recommended by the International Mapping Standards for Invasive Plants).* Aerial photos, orthophoto quads and remote sensing approaches can also be useful formats for delineation.

There is no minimum size for a delineated polygon; however, occurrences less than .01 acre are generally mapped as points. The NRIS application will allow very small occurrences to be accurately depicted and located. It will also facilitate monitoring small changes in size.

A single TES plant occurrence may be comprised of more than one polygon (Figure 1). For example, a single occurrence may be defined by clumps of the same population in close proximity with intervening habitat. Recorded plant occurrence data, however, apply to the ***entire*** occurrence. Detailed data for each "subpopulation" of the survey is not specifically tracked in the TES plant occurrence data collection methods, field form, or NRIS application. Although each subpopulation can be individually drawn in the NRIS application, acres for all subpopulations comprising a particular occurrence are combined to calculate and auto-populate the occurrence area in the NRIS application. Text notes about specific subpopulations can be recorded and stored in the "EO comments" field.

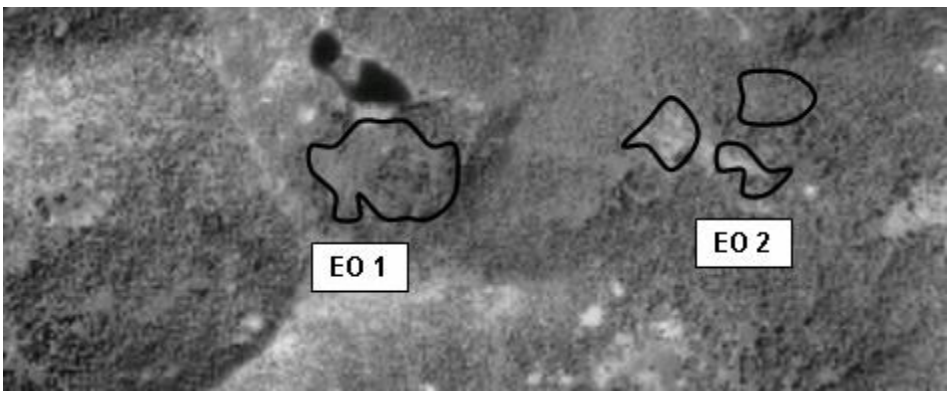

Figure 1: EO 1 is single element occurrence represented by one contiguous polygon. EO 2 is a single element occurrence represented by a multi-part polygon.

In addition to storing the spatial representation of the plant occurrence, the NRIS TES Plants application will automatically derive and populate required tabular geopolitical fields (State, County, Region, Forest and District) based on the location of the spatial feature in the NRIS application. Tabular location fields beyond those mentioned above are provided in the field form and the application, but are purely optional. These fields can be used to record a representative point or area for the plant occurrence when desired (available tabular location fields are outlined in the "Location Details Section").

Monitoring TES Plant Occurrences (Revisits)

An essential element of TES plant management is monitoring changes or stability in populations over time. Subsequent visits to a known site for remeasurement will be considered ***revisits***. Revisiting TES plant occurrences may also allow for detection of changes of threats to an occurrence. Each visit to a TES plant occurrence will require the completion of a new element occurrence form and the creation of a new record in the NRIS database to document that visit. Individual observations will be identified with the same *FS Site ID*, but differentiated by the visit date. Record "No" in the "New Occurrence" field for all revisit records. Some of the general site and location information from the previous visit can be automatically transferred to the new

record within the NRIS TES Plant application when appropriate. You can then update information about the plant occurrence based on the current site visit.

The *FS Site ID* and Element Occurrence number (if applicable) must remain constant for a particular occurrence through time (see data field descriptions later in this document). Changes in the occurrence data (i.e. size, shape, plant abundance, habitat or threats) can be traced over time through subsequent visits, differentiated by the *Visit Date*. The NRIS application will track these changes through time and record or display the history of any given site.

Extirpated Occurrences

All visual evidence of a formerly documented occurrence could be lacking during a revisit of the site. Though the plant may have disappeared above ground, there may be roots, rhizomes, or other plant parts that may recover and sprout. The relative time of visit compared to other years and/or yearly climate fluctuations may also affect the observation. Also, seeds of some species are stored in the soil and may remain viable for many years. For these reasons it is important to monitor some sites for many years, even after all evidence of the plant may have disappeared during an earlier visit.

For revisits that turn up no visual evidence of the TES plant, enter a new polygon or point representing the occurrence by copying the most recent spatial feature for that EO. Enter "No" for the "Plants Found" field and uncheck this flag in the application. Enter a canopy cover and plant count of zero (0). Enter appropriate comments in the "Population Comment" field and the "Revisit Justification" field. Other fields pertaining to habitat and threats (which may or may not be causal agents for change to the plant population) should be recorded. Recording a new revisit polygon/point and related data in the interim allows for monitoring of the site until there is adequate evidence that the occurrence has in fact disappeared.

Quality Control

The NRIS application for TES Plant Element Occurrences includes a quality control (Q/C) flag to indicate when the information for a particular EO is complete and has been reviewed and accepted by the appropriate data steward. At that point it is deemed ready for use in comprehensive analysis and for data sharing with partners *("no" is the default value until certified).* All required field work and data entry must be complete before a TES plant occurrence can be certified. The certification date and the person's name are auto-populated in the database form when the certification flag is switched to "yes." Only a person with the ***Data Steward Role*** can certify the plant occurrence within the NRIS application. Persons with the NRIS Data Entry Role can enter and edit data as appropriate. Once an occurrence is flagged certified by the data steward, it is locked and cannot be further edited.

Element Occurrence Field Form Instructions

Following is a list of data attributes (or data fields) and instructions for recording specific data about a TES plant occurrence. These attributes are supported by the methods of this protocol and by the NRIS TES Plants application.

Collecting information for a TES plant element occurrence that are not required by this protocol, such as soil characteristics, existing vegetation community type and/or associated species, potential vegetation types, aspect, slope and elevation is encouraged. This information will be useful in establishing habitat relationships and modeling to predict where one might find or search for a particular species, as well as inferring the potential for a particular species to occur in an area either at present or in the future. Additional information about dominant ecological processes, threats, and current or expected management activities aid in predicting stability of that particular occurrence.

Required data fields are indicated below and on the attached field form. Data attributes are grouped into general categories. Categories and field numbers correspond to the layout and naming conventions used on the attached TES Plant Element Occurrence field form. Fields that have a standard "List of Values" (LOV) associated with them are listed as well. The specific values for each LOV are listed in Appendix B. The field form layout may be used as is or modified to cater to your unit (e.g., drop fields never used on your Forest, pre-populate Region or Forest fields, etc.) However, please note:

- ***Only*** the attributes listed on the field form along with the documented coding conventions will be supported in the NRIS TES Plant application.
- The workflow within the NRIS application will mimic the grouping, flow and presentation of data fields as presented in the attached standard EO field form.

General Information

1) FS Site ID: *Required*.

Forest Service Site Identifier. Assign a ***unique*** identification to each element occurrence. The FS Site ID can be any combination of letters and numbers up to 30 characters in length. Regions are encouraged to adopt a standard coding convention to facilitate tracking. It is highly recommended that the combination of Region, Forest and District numbers and the letters, "EO" form the first eight digits of the FS Site ID (example: RRFFDDEO##### [060805EO00055]). This convention will facilitate consistent tracking and reporting within regional data centers. Since field sheets may get split up, it is a good idea to repeat the FS Site ID at the top of each page.

Each TES plant occurrence will be mapped separately so that each FS Site ID will document a single occurrence. Revisits to the same occurrence should continue to track using this ***same*** FS Site ID but with a different date. (Note: The Natural Heritage Program is responsible for assigning ***element occurrence (EO) numbers***. Thus, an EO number will not be available as a unique identifier for new occurrences, until they are entered in Biotics. Likewise, "watch" species or Forest "species of concern" that wouldn't be submitted to the state Natural Heritage Program will need a unique FS Site ID for tracking, but will not receive an actual EO number.

2) Date: *Required*.
Date when the field data for this element occurrence was collected (not the date the record was entered into the computer). Use date format of: MM/DD/YYYY. Date provides information about the time of year plants and habitats were observed and indicate the age of the occurrence information, which may help identify the need for revisits.

3) Site Name:
Informal descriptive name assigned to the EO site or area.

4) NRCS Plant Code: *Required:*
Required by the application, but not on the field form if scientific name is entered. Enter one code for the TES plant being documented in this particular EO. Codes for plant species must follow the USDA *PLANTS* database, plant symbols convention (USDA, NRCS 2002). Botanical nomenclature should follow a standard flora for the geographic area being sampled.

5) Scientific Name: *Required*.
The scientific name of the TES plant as needed, if the NRCS code is not known. It is a good habit, however, to write out the name or portion of the name on the field form to minimize misapplication of plant codes. The TES application will auto-populate the scientific name when codes are entered or will auto-populate the NRCS plant code when the scientific name is chosen from a standard list. Include the genus, species, and subspecies or variety as needed to properly identify the TES plant.

6) Record Source: *Required (LOV).*
Indicate the source of data for this EO, such as Field Survey or herbarium specimen.

7) Survey ID: *Conditionally Required.*
If the record source is "Field Survey," indicate the Survey ID Number. Refer to the Survey Protocol for Survey ID coding conventions.

8) Survey Name:
If the record source is "Field Survey," enter the name of the field survey (also include the project type here if desired, i.e. Black Butte Timber Sale, Yellow Springs Road Realignment, etc.).

9) Examiner(s): *Required.*
Provide the name(s) of the field surveyors. This will provide a point of contact for questions during data entry or for future reference.

10) Ownership: *Required.*
Record the land ownership where the occurrence is located. Where the occurrence exists on two or more ownerships or jurisdictions, enter all that apply.

11) E.O. #:
Element occurrence number, when available, as assigned by the State Natural Heritage Program/Conservation Data Center. This will be null for new occurrences that are not yet submitted for Heritage review and data entry.

12) New Occurrence:
May need to be completed after the field survey. A yes/no flag to indicate whether this is a new occurrence (Y) or, if it is an existing occurrence (N). Revisits to an existing EO, for example, are not new occurrences and should reuse the established FS Site ID and EO number (if one exists).

Geopolitical Units

It can be useful to record the political or administrative units on the field form. An occurrence may span two or more geopolitical units for any particular field. For example, a survey may extend across a state, county or National Forest boundary. In this case, record all that apply.

13) State: *Required.*
It is useful to enter this information on the field form; however, this will be auto-populated in the application when the spatial feature (EO polygon) is entered. Record the code for the state in which the site is located. These codes are the same as the postal state codes.

14) County Name: *Required.*
It is useful to enter this information on the field form; however, this will be auto-populated in the application when the spatial feature (EO polygon) is entered. Enter the county in which the EO is located. If the element occurrence crosses county lines, record appropriate counties.

15) Region: *Required.*
It is useful to enter this information on the field form; however, this will be auto-populated in the application when the spatial feature (EO polygon) is entered. Record the Region number where the occurrence is located, regardless of which Region is currently administering the site. This field is not required when ownership is on non-Forest Service lands.

16) National Forest/Grassland: *Required.*
It is useful to enter this information on the field form; however, this will be auto-populated in the application when the spatial feature (EO polygon) is entered. Record the National Forest or Grassland (or more than one) where the occurrence is located. This field is not required when ownership is on non-Forest Service lands.

17) District: *Required.*
It is useful to enter this information on the field form; however, this will be auto-populated in the application when the spatial feature (EO polygon) is entered. Record the Ranger District number(s) where the site is located. This field is not required when ownership is on non-Forest Service lands.

18) Entire Extent Mapped:
Indicates whether the entire area occupied by the element occurrence was mapped or not, or "uncertain" if that is not known. It is intended that the entire extent of any EO should be mapped whenever possible.

19) Area (Area of Occupancy):
Optional to collect in the field. The NRIS application will auto-populate the area in acres. Record the estimated size of the area occupied by this single TES plant occurrence as depicted in a mapped polygon or group of polygons on the field form if desired. The area will also be auto-populated in the application from the spatial feature or GPS information once the polygon(s) are entered. If subpopulations exist and are mapped, size will be calculated by adding the area from all related subpopulations to determine the total size of the EO. If the EO is a point, the NRIS application will indicate area as 0 acres in the data editing forms, but for output and reporting purposes points will be buffered and reported as having an area of 0.001 acres.

20) Area Unit of Measure*:*
Record the unit of measure if an area estimate is entered on the field form. Units can be acres, square meters, or hectares, but acres will be the default value in the NRIS application.

Element Occurrence Data

Canopy Cover
A measurement of canopy cover is encouraged for the EO species and optional for associated species and lifeform classes. Ocular estimates of canopy cover of live foliage for plant species or groups of plant species are an effective way to quickly collect abundance information about

plants. Cover is a meaningful attribute for nearly all plant life forms, which allows their abundances to be evaluated in comparable terms (Daubenmire 1968, Mueller-Dombois and Ellenberg 1974). ***Percent cover*** can be defined generically as "the vertical projection of the crown or shoot area to the ground surface expressed as … percent of the reference area" (Mueller-Dombois and Ellenberg 1974). ***Canopy cover*** is "the percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included" (SRM 1989, NRCS 1997). Canopy cover is synonymous with canopy closure (Helms 1998). For woody plants, canopy cover is synonymous with crown cover (NRCS 1997, Helms 1998).

Cover values are estimated and recorded for the EO polygon(s) or site as a whole (e.g., these values are ***not*** recorded using plot- or transect-based methods). The purpose for entering cover values is simply to provide relative estimates that might be used to compare the abundance of species at the EO site. As such, these cover values would ***not*** be appropriate for more rigorous quantitative analyses of vegetation data. If such rigorous data are desired, then the examiner(s) should use one of the appropriate vegetation protocols available such as ocular macroplot, cover-frequency, or line intercept (USDA Forest Service, 2003).

Estimating Canopy Cover

Project the outline of the plant's live foliage vertically to a horizontal plane to determine what percentage of the EO polygon area that it covers at the time of the survey. For canopy cover by lifeform or for associated species, contributing plants do not have to be rooted in the polygon to be counted for canopy cover (e.g., they can overhang the edges of the polygon in which cover is being estimated). The area of foliar cover included in the polygon, expressed as a percent of the total sampling area, represents the canopy cover for that individual species or plant group being estimated. Different lifeform groups or plants may overlap and, therefore, it is common for the canopy cover "sum" across lifeforms or across multiple plant species to be greater than 100% within a polygon. No single lifeform class or plant species, however, can total greater than 100%.

Canopy cover information can be collected using actual values or by using established canopy cover classes. If canopy cover classes are used to measure canopy cover, indicate the cover class set used.

21) Canopy Cover Method: *Conditionally Required (LOV)*.

If cover values are recorded for any of fields 22, 61, 62 or 69, then indicate the one method used for making any cover estimates at this site. Choices are Actual (0.1-100%), Daubenmire (modified) Cover Class Set, and National Range Cover Ten Class Set. If canopy cover sets are not used, draw a line or record N/A for "Not Applicable" in this space on the field sheet. See Appendix B for a list of canopy cover sets and the cover class codes for each set.

22) EO Canopy Cover:

The percent cover or cover class of the TES plant species within the EO polygon(s) or site. See Appendix B for a List of Values.

23) Lifeform: *(LOV).*

The lifeform of the rare plant. Lifeform is defined as the characteristic form or appearance of a species at maturity. See Appendix B for a List of Values.

24) Number of Subpopulations:
If the EO is not mapped as one contiguous polygon, map each subpopulation considered to be a component of this particular EO. Data stored in the NRIS application, however, will be relevant to the entire EO polygon only, and detailed data for each subpopulation is not tracked in the application. Text notes about subpopulations can be recorded and stored in the EO comment field. Although each "subpopulation" will be drawn into the NRIS application, acres for all subpopulations combined for a particular EO will be combined to calculate and auto-populate an accurate size in the application for the entire EO.

XX) Plant Found:
Indicate whether the EO plant species was observed during a revisit to the EO. This flag should be checked yes for all new occurrences (and is defaulted to yes in the database). If the plant is not observed during a revisit to the EO, record plants found as "no" and uncheck the "plant found" box in the application.

25) Plant Count:
Indicate the number of individual plants of the EO species.

26) Count Type: *(LOV).*
Indicate what was counted: Genets, Ramets, or Undetermined. Counts of genets represent the number of genetically independent individuals in an occurrence. Counts of ramets represent the number of vegetative units that are produced by the genets in an occurrence. For example, a plant occurrence that has five individual plants, each of which has produced five stems, consists of 5 genets and 25 ramets. See Appendix B for a List of Values.

27) Count (Actual or Estimate):
Indicate if the plant count was a precise count or an estimate.

28) Revisit Needed:
Yes or No flag to indicate need for a follow-up visit. Record *yes* if fieldwork is not completed and additional survey is needed or *yes* if a follow-up visit is anticipated or desired for monitoring purposes.

29) Revisit Date:
Record a desired date to re-visit the occurrence if that is identified. For example, enter a projected date if a particular study or set of circumstances require the EO to be re-examined two years from now or for monitoring purposes after project completion, or perhaps later in the same growing season. For visits over multiple years, it is generally best to compare sites at the same time each year.

30) Revisit Justification:
Give reason a revisit is desired. Examples include: post-project monitoring, successional monitoring, recovery or stability after protection, where revisits are part of a sampling method for a particular species protocol, etc.

31) Phenology by %:
Record the percentage of the occurrence that was in each stage at the time of visit: vegetative, flower/bud, fruit/dispersed, seedlings/juvenile. Values should total to 100%. See Appendix B for a List of Values.

32) Population Comments:
An open text field, to record observations regarding the status of the population, including distribution, vigor, density, phenology and dispersal.

33) Evidence of disease, competition, predation, collection, trampling, or herbivory:
Yes or No flag to indicate any evidence of these effects on the population.

34) Evidence Comments:
If Yes is checked for field above, give a brief explanation. If possible, record the cause of the effect(s).

35) Pollinator Observed:
Indicate whether pollinators were observed visiting flowers or reproductive structures of the TES plant (yes or no).

36) Pollinator Type(s): *(LOV).*
The organism(s) observed pollinating the TES plant. See Appendix B for a List of Values.

37) Pollinator Comments:
Text field, if needed, for further explanation of pollinator observations.

Site Morphometry

38) Percent Slope:
The average slope that is characteristic of the EO polygon or site, expressed as a percentage as measured in the field.

39) Slope position: *(LOV).*
Record the two-dimensional position of the occurrence on the landform as observed in the field. See Appendix B for the List of Values.

40) Aspect:
Record the predominant aspect as measured in the field that is characteristic of the EO polygon or site. Either azimuth in degrees (preferred) or cardinal direction can be used.

Azimuth:
(Range 0-360). The direction that the landscape predominantly faces at a defined position, such as the center point of the occurrence. Azimuth is recorded in degrees from north, in a clockwise manner. Use "360" for north. Use "0" when there is no slope.

Cardinal: *(LOV).*
The generalized cardinal direction that the landscape predominantly faces at a defined position, such as the center point of the occurrence. (Accuracy Standard: ± 11.25 degrees). See Appendix B for a List of Values.

41) Elevation:
For the spatial extent of the occurrence, record the average (or a "predominant") elevation of the area occupied by the species as measured either in feet or meters above sea level. Minimum and maximum elevation should be recorded only if it is determined that the elevation range is significant for that particular occurrence (e.g., an occurrence on a steep slope or a large occurrence on an undulating landscape).

42) Elevation Unit of Measure: *Conditionally Required (LOV)*.
Record the unit elevation was measured in; Feet or meters.

Soil Characteristics and Light Conditions

43) Substrate on which EO occurs: *(LOV).*
Record the predominant substrate that the rare plant species is rooted in. See Appendix B for a complete List of Values.

44) Parent Material: *(LOV).*
The unconsolidated material, mineral or organic, from which the substrate in the occurrence polygon developed. See Appendix B for List of Values.

45) Soil Moisture: *(LOV).*
Moisture state of the soil for the time period being described. See Appendix B for a List of Values.

46) Soil Texture: *(LOV).*
The code for the proportions of the various size groups of individual mineral soil grains less than two millimeters equivalent diameter in a mass of soil, expressed as a class, or names for other materials or physical state, measured at the surface horizon. See Appendix B for a List of Values.

47) Soil Type:
If desired, record the dominant soil map unit or soil series as indicated on a soils or ecological unit inventory map. Refer to locally stewarded soil maps or GIS layers to obtain this information. This information is not entered into the NRIS TES Plant Application. It would be obtained by intersecting appropriate spatial layers.

48) Light Exposure: *(LOV).*
Record the predominant light exposure throughout the occurrence polygon. Choose one of three values (full sun/ partial shade/ full shade). See also Appendix B for a List of Values and definitions.

Site Classifications

Record taxonomic units by type if published classifications exist for the area. Taxonomic classifications are not developed at the time of TES plant inventory. Use locally appropriate field keys and guides to describe the TES plant occurrence habitat within the terms of locally accepted and published classification systems. Contact your local or Regional ecologist for appropriate information available for use in your area. Available taxonomic classifications sanctioned for your area by regional and local stewards have been previously entered into NRIS and are used in the TES plants application as Lists of Values.

Taxonomic information about plant communities and site potential, along with other site morphometry measures and associated species, provide valuable information to model, track and predict the potential for TES plant species occurrences in time and space. Examples include focusing surveys on suspected habitats, predictive insight on the stability or successional status of the associated vegetation for a given population, and the ability to document and refine predictive models. Available taxonomic classifications and detail vary by Region within the USFS.

Existing Vegetation classifications provide context regarding the seral stage or current plant community in which the species occurs and should be recorded whenever possible. Existing vegetation classifications developed by the USFS, NatureServe or other partners may include hierarchical levels (i.e. classification levels) such as broad cover types, or alliances, or more detailed classifications at the association or community type level. Since most classification systems are hierarchical by design, record the most detailed classification level available (e.g., an association vs. an alliance).

Potential vegetation (or "Potential Natural Vegetation") or **Ecological Type classifications** provide context to determine areas that may now or in the future contain suitable habitat for a given species, and predictive insight on the stability of the population on that particular site in

time. For example, based on knowing the site capability where the EO occurs, the site may become more or less favorable through time for that particular TES plant species. Potential vegetation classifications include hierarchical levels (i.e. classification levels) with nomenclature such as series, plant association, habitat types, or phases of plant associations and habitat types. Ecological type information, which by design integrates soil, geology, geomorphology and potential vegetation, should be used at the landtype or landtype phase level when available.

49) Existing Veg:
Record the taxonomic classification name or code for the existing vegetation type that accurately describes the EO. In addition to code and name, the following fields are used in NRIS (as stewarded and stored regionally) to locate the correct record from a List of Values: Classification Level, Classification Code, Classification Short Name and Classification Set.

50) Potential Veg:
Record the taxonomic classification name or code for the potential natural vegetation type that accurately describes the EO. In addition to code and name, the following fields are used in NRIS (as stewarded and stored regionally) to locate the correct record from a List of Values: Classification Level, Classification Code, Classification Short Name and Classification Set.

51) Ecotype:
Record the taxonomic classification name or code for the ecological type classification that accurately describes the EO. In addition to code and name, the following fields are used in NRIS (as stewarded and stored regionally) to locate the correct record from a List of Values: Classification Level, Classification Code, Classification Short Name and Classification Set.

Habitat Quality and Management

The following fields are also contained in Biotics (Natural Heritage Program database).

52) Habitat Description:
Text field. A description or observations about the habitat that the EO occupies.

53) Dominant Process: (LOV).
Record a value indicating the dominant disturbance regime influencing the EO, if any. See Appendix B for a List of Values.

54) Process Comment:
Text field. Record any comments about the observed dominant disturbance.

55) Community Quality:
Enter a qualitative ranking for the overall quality of the habitat or plant community(-ies) with which the TES plant is associated. Choices: Low, Medium, High.

56) Landscape Integrity:
Enter a qualitative ranking for the overall quality of the landscape setting in which the TES plant is located. Choices: Low, Medium, High.

57) Disturbance/Threat (present or imminent): (LOV).
Record threats or potential threats, e.g., noxious weeds, OHV trails, or environmental problems that could affect the TES plant habitat. See Appendix B for a List of Values.

58) Disturbance/Threat Comment:
Record any comments about the extent or severity of the threat(s).

59) Non-native Species Comment:
Comments and observations concerning non-native species occurrences within or adjacent to the specific EO.

60) Current Land Use Comment:
Comments and observations about current land uses within or adjacent to the EO, including recommendations for modifications.

Lifeforms and Ground Cover

These lifeform canopy cover and ground cover estimates are approximate values. They are intended simply to give a general picture of the composition and relative abundance by lifeform category at the EO site during the visit. Use the same method for estimating covers as indicated in field 21, "Canopy Cover Method". See the Canopy Cover Section earlier for more detail regarding the use of cover data in this form.

61) Lifeform Canopy Cover (% Cover or Class): (LOV).
List the canopy cover for each lifeform represented in the EO, expressed as either percent cover values or canopy cover classes. Use the same method or class set for estimating cover for all cover estimates made for various lifeforms at this EO. See Appendix B for List of Cover Class Codes.

62) Ground Cover Type (% Cover or Class): (LOV).
The composition of the ground surface within the EO at the time of visit. Record each ground surface cover type present in the EO, expressed as a percent cover value or cover class code. This includes organic material, vegetation basal cover (live and standing dead), mosses, lichens, litter/duff, and inorganic material such as exposed mineral soil, gravel, rock, bedrock and any road surface. Ground surface for each type is estimated within only a two dimensional plane (unlike foliage cover); thus the total of all types should approximate 100%. See Appendix B for List of Cover Class Codes.

Associated Species

Associated species are those found in the same habitat and same location as the EO and should not include species that are not directly within or related to the EO polygon or site. Associated species help to establish habitat relationships and can help in habitat modeling. Associated species in the more general area surrounding the EO polygon can be listed in the associated TES plant field survey field form.

There is no limit to the number of species that may be entered. It is a good habit to write out the name or portion of the name on the field form to minimize misapplication of plant codes. The NRIS TES Plant application will auto-populate the entire scientific name when plant codes are entered, and can auto-populate the NRCS plant code when the scientific name is chosen from a standard list. Include the genus, species, and subspecies or variety as needed to properly identify the plant.

63) Completeness of Species List: *Conditionally required (LOV).*
It is helpful to know if the species list is a best attempt to document all associated species at the EO site (complete list) or if just certain species of interest were listed (selected or reduced by

some abundance level, or due to time constraints). Indicate how thorough the list of associated species is for an EO observation by selecting one of the standard choices listed in Appendix B (Complete, Reduced or Selected). This field is conditionally required if associated species are listed.

64) Species List Comment:

A text field to describe what guidelines were used for recording species or to give a text description of how complete or thorough the associated species list is. It is good practice to explain in this comment section what criteria were used to collect any partial plant list.

65) and 66) NRCS Plant Code and Scientific Name:

Record all associated plant species (plant code and/or scientific name) that are to be included in the EO site plant list. Codes for plant species must follow the USDA *PLANTS* database, plant symbols convention (USDA, NRCS, 2002). Botanical nomenclature should follow a standard flora for the geographic area being sampled.

67) Lifeform: *(LOV).*

Lifeform is defined as the characteristic form or appearance of a species at maturity. As desired, enter the lifeform code for each associated species listed for the EO. See Appendix B for a List of Values.

68) Dominant:

If desired, indicate whether the species is dominant at this site (Y = yes)

69) Percent Cover or Class: *(LOV).*

These cover estimates are approximate values, and are intended simply to give a general picture of the composition and relative abundance of each species at the EO site during this visit. Use the same method for estimating covers as indicated in field 21, "Canopy Cover Method". See the Canopy Cover Section earlier for more detail regarding the use of cover data in this form.

70) Non-Native:

Flag any species (y = yes) recorded on the list that are considered to be non-native plants. Refer to the USDA *PLANTS* database for this specification (USDA, NRCS 2002).

EO Specimen Documentation

Record appropriate documentation for EO voucher specimens collected for non-federally listed plants.

71) Reference for ID:

Record the appropriate flora or reference material used to identify the TES plant taxon.

72) Primary Collector: *Conditionally Required*.

Required if specimen collected. Record the primary collector of the specimen, who is responsible for assigning the collection number.

Other Collectors:

If additional collectors were involved in the collection.

73) Collection #:

Required if a specimen is collected. Record a unique number, assigned by the primary collector, for the specimen. If no collection number is assigned to the specimen, enter "s.n."

74) ID Confirmed: *Conditionally Required (LOV).*

Required if a specimen is collected. Indicate whether a positive identification has been confirmed for the specimen. See Appendix B for a List of Values.

75) Verification:
Name and institution or agency of the individual who provides authoritative verification of the specimen identification.

76) Specimen Repository: *Conditionally Required*.
Required if a specimen is collected. Text field to indicate the herbarium or location where the collected specimen is stored.

Image Information

77) Image ID:
Text field used to denote related photograph exposure numbers or computer file designations.

78) Image Description(s):
Text field used to describe the subject of any photograph or electronic image taken.

Location Information

This protocol requires spatially delineating each TES plant occurrence to document the location and extent of the occurrence (refer to *Mapping the Survey Area* on page 7). In addition to storing the spatial representation, the NRIS TES Plants application will automatically derive and populate required tabular geopolitical units in the application based on the location of the occurrence polygon or point (State, County, Region, Forest and District fields).

Alternative Location Methods

Tabular location fields beyond those mentioned above are provided in the field form and in the application, but are purely optional. These fields can be used to record a representative point or area for the location of the element occurrence, when desired. Tabular data can be recorded about quad maps or for any of the four location methods described below.

- Legal description
- Latitude and Longitude
- GPS UTM location
- Metes and Bounds

79) USGS Quad Number:
The number of the primary USGS quadrangle map containing the survey. These codes are stewarded nationally by the ALP application. *(Note: only one representative quad can be entered in the NRIS application. EOs may cross into more than one)*

80) USGS Quad Name:
The name of the primary USGS quadrangle map containing the survey. These codes are stewarded nationally by the ALP application. *(Note: currently only one representative quad can be entered in the NRIS application. EOs may cross into more than one)*

81) Forest Quad Number:
The locally stewarded number for the primary USGS quad map where the survey is located. *(Note: currently only one representative quad can be entered in the NRIS application. EOs may cross into more than one)*

82) Forest Quad Name:

The locally stewarded name for the primary USGS quad map where the survey is located. *(Note: currently only one representative quad can be entered in the NRIS application. EOs may cross into more than one)*

83) Legal Description (Public Land Survey System or "PLSS"):

For areas of the country where the Public Land Survey System is available, it is desirable and required to record this information to an appropriate level of detail **on the field form only**. Since legal descriptions will not be auto-populated in the NRIS application, this information must be manually entered into the NRIS TES Plants data entry form if it is desired to be electronically stored. (These fields can be used only to record a representative point or area for the EO, when desired.)

Meridian:

Record the code for the line of longitude from north to south that is the basis for local legal descriptions. These lines are also known as Principal Meridians and have distinct names. This information is available on the USGS Quadrangle map.

Township/Direction:

A Township is a unit of land containing 36 mile-square sections. Townships run in rows that parallel the local Base line. Each Township row is sequentially numbered relative to the row's order from, and whether it's north or south of, the local Base line; e.g., T2N (for the second township row north of the local Base line). To accommodate fractions of townships an additional code is required after the Township number, where 0 will equal no fraction; 1 equals ¼; 2 equals ½, and 3 equals a ¾ township (see table of examples below). This information is available on the USGS Quadrangle map.

Range/Direction:

The Range numbers run parallel to the local Principal Meridian. Range rows are sequentially numbered relative to the row's order from, and whether it's east or west of, the Principal Meridian; e.g. R2E (for the second Range row east of the Principal Meridian). This information is available on the USGS Quadrangle map.

Township/Dir & Range/Dir Example	Description
7 N 14 E	Township 7 North Range 14 East
7.1 N 16 E	Township 7 1/4 North Range 16 East
8.2 N 12.0 W	Township 8 1/2 North Range 12 West

Section:

Each 36 square-mile township is subdivided into smaller squares called Sections. Record the Section where the center of the EO is located. A Section is equal to one square mile, 2.59 square kilometers, 640 acres, or 1/36 of a township. This information is available on the USGS Quadrangle map. *(Note: Only one representative section can be entered in the application and surveys may commonly cross into more than one)*

Quarter Section:
The quarter-section subdivision where the center of the EO is located. For example: the NE quarter of section 4 (NE ¼).

Quarter, Quarter Section:
The quarter-quarter section subdivision where the center of the EO is located. For example: the NW quarter of the NE quarter of Section 4 (NW ¼ NE ¼).

Quarter, Quarter, Quarter Section:
The quarter-quarter-quarter section subdivision where the center of the EO is located. For example: the SE quarter of the NW quarter of the NE quarter of Section 4 (SE ¼ NW ¼ NE ¼).

Quarter, Quarter, Quarter, Quarter Section:
The quarter-quarter-quarter-quarter section subdivision where the center of the EO is located. For example: the SW quarter of the SE quarter of the NW quarter of the NE quarter of Section 4 (SW ¼ SE ¼ NW ¼ NE ¼).

84) Latitude and Longitude:
Arbitrary measurements used to describe any point on the Earth or similar globe. Borrowing from theories of ancient Babylonians, later expanded by the famous Greek thinker and geographer Ptolemy, a full circle is assigned 360 degrees. Latitude is the term for the distance from the middle of the circle, or, in the case of the Earth, the equator. The equator is designated 0 degrees, with each pole being 90 degrees. Longitude is the vertical measurement--current convention places the zero degree point at Greenwich, England (also known as the Prime Meridian), with 180 degrees being on the opposite point on the globe.

Geodetic Datum: *(LOV).*
Record the geodetic datum for the latitude and longitude coordinates. Latitude and longitude in degrees/minutes/seconds will be automatically converted to decimal degrees.

Examples of Commonly Used Datums	Description
NAD-27	North American Datum of 1927
NAD-83	North American Datum of 1983
WGS-84	World Geodetic System (1984)

Latitude:

Degrees:
(Range 0 to 90) The latitude degrees of the center of the EO as measured by GPS. (Default: North Latitude).

Minutes:
(Range 0 to 59) The latitude minutes of the center of the EO as measured by GPS. (Default: North Latitude).

Seconds:
(Range 0 to 59.99) The latitude seconds of the center of the EO as measured by GPS. (Default: North Latitude)

Longitude:

Degrees:
(Range 0 to 180) The longitude degrees of the center of the EO as measured by GPS. (Default: West Longitude).

Minutes:
(Range 0 to 59) The longitude minutes of the center of the EO as measured by GPS. (Default: West Longitude).

Seconds:
(Range 0 to 59.99) The longitude seconds of the center of the EO as measured by GPS. (Default: West Longitude).

GPS Datum:
Record the geodetic datum used by the GPS unit for the Latitude and Longitude coordinates. See table above for examples of commonly used datums.

Latitude Decimal Degree:
Latitude in a degree value. Consists of the latitude in degrees to at least 6 decimal places.

Code Example	Description
42.206088	Decimal degrees

Longitude Decimal Degree:
Longitude in a degree value. Consists of the longitude in degrees to at least 6 decimal places.

Code Example	Description
105.105206	Decimal degrees

85) UTM Location:
The Universal Transverse Mercator Map Projection. A special case of the Transverse Mercator project. Abbreviated as the UTM Grid it consists of 60 north-south zones, each 6 degrees wide in longitude.

UTM Datum:
Record the datum for the UTM projection.

Examples of Commonly Used Datums	Description
NAD-27	North American Datum of 1927
NAD-83	North American Datum of 1983
WGS-84	World Geodetic System (1984)

UTM Zone:
The zone for the UTM projection. This can be obtained from quad maps or from GPS devices. UTM zone coordinates measure in meters east and north from two perpendicular reference baselines. (Up to two alphanumeric characters.)

UTM Zone Example	Description
13	Ranges from 1 to 60

Easting:
The distance in meters, east or west, from the central meridian of the UTM Zone, which is designated at a value of 500,000 meters.

Code Example	Description
71204000.52	Recorded to the hundredth of a meter.

Northing:
The distance in meters north from the equator from the UTM Zone origin, which is designated as a value of zero meters. (This protocol addresses only north latitudes.)

Code Example	Description
1687534000.25	Recorded to the hundredth of a meter.

86) GPS Equipment Used:
The manufacturer and model number of the GPS unit used.

87) Metes and Bounds:
Metes and bounds is a system or method of describing property or real estate when it is surveyed. The system was used in England and, by custom, was applied in the original 13 colonies that became the United States. The system uses physical features of the geography along with directions and distances to define a piece of land. It is sometimes referred to as a *Boundary Survey*. The NRIS TES Plants application accommodates text up to 2000 characters in length.

Directions

88) Directions to the Site:
Text field. A narrative description of the EO location, with directions as needed for someone to follow in order to return to the site.

89) Sketch of Site or Area:
Make a general sketch, if desired, on the field form of the element occurrence to facilitate relocation or to point out any particular characteristics or features of the area. Include a general scale, with north at the top (unless otherwise indicated).

90) General Element Occurrence Comments:
Include any additional comments related to this EO that are not accounted for in other fields. Examples include details about subpopulations that may exist.

Appendix A – References

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Appendix B - List of Values (Standard Codes) for TES Plant Element Occurrence Field Form

Following are the standard codes or List of Values used for this protocol. Additional values should not be added to these lists without National approval because they will not be able to be entered into the NRIS TES Plants application.

6) Record Source List of Values:

Code	Name	Description
FS	Field Survey	A systematic search of a geographical area for a particular target species or group of species. Refer to the TES Plant Survey Protocol for conducting field surveys.
IN	Incidental	The EO was discovered informally while conducting other fieldwork (not part of a formal plant survey.
HS	Herbarium Specimen	The record source for the EO was obtained in the course of examining an herbarium specimen
EO	Existing Natural Heritage Program record	The record source for the EO is from an existing Natural Heritage Program record
RV	Revisit	This data record is a new visit to an existing plant occurrence for purposes of monitoring population stability, habitat change or threats to the occurrence. If the revisit occurs as part of another formal survey, use “Field Survey” as record source, and answer NO for the new occurrence field.

21) Canopy Cover Class Sets List of Values:

Code	Name	Description
DAUBEN	Modified Daubenmire	Daubenmire Canopy Cover Classes, modified to include trace.
NRMCOV	National Rangeland Methodologies - Cover Ten Codes	Cover Ten Codes - National Rangeland Methodologies Data Dictionary Canopy Cover Classes

22) Canopy Cover Class Values – Listed by Set

Modified Daubenmire Classes: Set Code = DAUBEN

Code	Cover Class	Mid Point
T	0 - 1.0%	0.5
1	1.1 - 5.0%	3.0
2	5.1 - 25.0%	15.0
3	25.1 - 50.0%	37.5
4	50.1 - 75.0%	62.5
5	75.1 - 95.0%	85.0
6	95.1 - 100%	97.5

National Range Management "Cover Ten Codes": Set Code = NRMCOV

Code	Cover Class	Mid Point
T	0.1 - 1%	0.50
0	1.1 - 5%	3.0
1	5.1 - 15%	10.0
2	15.1 - 25%	20.0
3	25.1 - 35%	30.0
4	35.1 - 45%	40.0
5	45.1 - 55%	50.0
6	55.1 - 65%	60.0
7	65.1 - 75%	70.0
8	75.1 - 85%	80.0
9	85.1 - 95%	90.0
A	95.1 - 99%	97.5
X	99.1 - 100%	99.5

23) and 66) Lifeform List of Values:

Code	Name	Description
FB	Forb/herb	Vascular plant without significant woody tissue above or at the ground. Forbs and herbs may be annual, biennial, or perennial but always lack significant thickening by secondary woody growth and have perennating buds borne at or below the ground surface. Federal Geographic Data Committee (FGDC) definition includes graminoids, forbs, and ferns; in PLANTS, graminoids are separated.
GR	Graminoid	Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-

Code	Name	Description
		grasses (Juncaginaceae), and quillworts (Isoetes). An herb in the FGDC classification.
LC	Lichen	Organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in symbiotic association. Often attached to solid objects such as rocks or living or dead wood rather than soil.
LI	Liana	Climbing plant found in forests with long, woody, rope-like stems of anomalous anatomical structure. A shrub in the FGDC classification.
NP	Nonvascular	Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts. Always herbaceous, and often attached to solid objects such as rocks or living or dead wood rather than soil.
SH	Shrub	Perennial, multi-stemmed woody plant that is usually less than 4 to 5 meters or 13 to 16 feet in height. Shrubs typically have several stems arising from or near the ground, but may be taller than 5 meters or single-stemmed under certain environmental conditions.
SS	Subshrub	Low-growing shrub usually under 0.5 m or 1.5 feet tall (never exceeding 1 meter or 3 feet tall) at maturity. A dwarf-shrub in the FGDC classification.
TR	Tree	Perennial, woody plant with a single stem (trunk), normally greater than 4 to 5 meters or 13 to 16 feet in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).
UN	Unknown	Lifeform is unknown.
VI	Vine	Twining/climbing plant with relatively long stems, which can be woody or herbaceous. FGDC classification considers woody vines to be shrubs and herbaceous vines to be herbs.
AL	Algae	A general name for the single-celled plant plankton, seaweeds, and their freshwater allies.
FU	Fungi	A non-flowering plant of the kingdom Fungi, lacking chlorophyll.

26) Plant Count Type List of Values:

Code	Name	Description
Genets	Genets	A plant that originates from seed, all parts of which thus share exactly the same genes. Counts of genets represent the number of genetically independent individuals in an occurrence. A genet may consist of numerous ramets.
Ramets	Ramets	Vegetative units that are initially physically attached to, and hence arise from, the same parent plant (genet). Examples include rosettes, stems or tillers (grasses), each of which have the potential for an independent existence if severed from the parent plant. Counts of ramets represent the number of vegetative units that are produced by the genets in an occurrence.
Undetermined	Undetermined	It is not clear whether the plant count is of genets, ramets, or a combination of both.

31) Phenology List of Values:

Code	Abbreviation	Meaning
VEG	Vegetative	Non-flowering or non-reproducing stems or individual plants.
FLB	Flower/Bud	Stems or individual plants that are in bud or flowering.
FRD	Fruit/Dispersed	Stems or individual plants that are fruiting, or have fruits that are dispersing, or have dispersed, seed.
SJ	Seedlings/Juvenile	Seedling or immature (pre-reproductive) stages.

36) Pollinator Type List of Values:

Code	Name
ANT	Ant
BAT	Bat
BIRD	Bird
BEE	Bee
BEET	Beetle
BUTTER	Butterfly
FLY	Fly
MOTH	Moth
OTUN	Other/Unknown

39) *Slope Position* List of Values:

Code	Name	Description
BS	Backslope	The steepest portion of the slope where material is generally in transit.
FS	Footslope	The lower portion of the slope where material is generally re-deposited.
SH	Shoulder	The upper slope where material generally moves through creep processes.
SU	Summit	The uppermost slope.
TS	Toeslope	The lowermost slope position where material moves generally through alluvial processes.

40) Aspect: Cardinal Direction List of Values:

Code	Name	Description
A	Includes all aspects	Where a population is on a conical depression or elevation and all aspects are represented
E	East	East
ENE	East northeast	East northeast
ESE	East southeast	East southeast
FL	Flat (no aspect)	Flat (no aspect)
N	North	North
NE	Northeast	Northeast
NNE	North northeast	North northeast
NNW	North northwest	North northwest
NW	Northwest	Northwest
S	South	South
SE	Southeast	Southeast
SSE	South southeast	South southeast
SSW	South southwest	South southwest
SW	Southwest	Southwest
W	West	West
WNW	West northwest	West northwest
WSW	West southwest	West southwest

43) Substrate on which EO Occurs List of Values:

Code	Name	Description
CL	Cliff	Any high, very steep to perpendicular or overhanging face of rock; a precipice.
DU	Duff	Leaf and needle litter, and duff not yet incorporated into the decomposed top humus layer. Non-continuous litter is not included
GR	Gravel	Rock fragments between 2 and 75 mm in diameter.
L	Log	An unhewn length of the trunk or large limb of a felled tree. The trunk or limbs of a felled tree or large fallen tree limbs.
M	Moss	Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts. Always herbaceous. This code does not apply to moss growing on bare soil in dry rangeland conditions.
O	Other	Other substrates not included in this list of values.
RS	Roadside	The disturbed area adjacent to a road surface.
R	Rock	Relatively hard, naturally formed mineral or petrified matter >1/8 inch in diameter appearing on soil surface, as small to large fragments, or as relatively large bodies, cliffs, outcrops or peaks.
S	Soil	Soil particles < 2 mm Bare soil, particles < 2 mm, not covered by rock, cryptogams, or organic material. Does not include any part of a road.
W	Water	Where the water table is above the ground surface during the growing season, such as streams, swamps, marshes, and ponds.

44) Parent Material List of Values:

Code	Name	Description
ALLU	Alluvium	A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi-sorted sediment in the bed of the stream or on its flood plain or delta, as a cone or fan at the base of a mountain slope
CIND	Cinders	A juvenile vitric vesicular pyroclastic fragment that falls to the ground in an essentially solid condition
COLL	Colluvium	A general term applied to any loose, heterogeneous, and incoherent mass of soil material and/or rock fragments deposited by rainwash, sheetwash, or slow continuous downslope creep, usually collecting at the base of gentle slopes or hillsides
EOLI	Eolian deposit	A sedimentary deposit accomplished by the wind.
GLAC	Glacial deposit	Materials produced by or derived from glaciers and ice

Code	Name	Description
		sheets.
HUCA	Human caused/constructed	Materials created by the acts of humans, such as crushed rock or screened gravel.
LACU	Lacustrine sediments	Pertaining to sedimentary deposits produced by, or formed in a lake or lakes.
LADE	Landslide deposits	Deposits related the mass movement, including topples, falls, slides and debris flows
LAHA	Lahar (volcanic mudflow)	Deposits from mudflows originating from volcanic activities, and commonly found along the flanks of volcanoes.
MIXE	Mixed parent material	Mixed parent material, such as where a landslide deposit has mixed with alluvium.
MUCK	Muck	Dark finely divided well decomposed organic material, intermixed with a high percentage of mineral matter, usually silt; it forms surface deposits in some poorly drained areas, e.g. areas of permafrost and lake bottoms
ORGA	Organic deposiits (undifferentiated)	A general term for organic deposits, including muck or peat
PEAT	Peat	An unconsolidated deposit of semicarbonized plant remains in a watersaturated environment, such as a bog or fen, and of persistently high moisture content (at least 75%).
RESI	Residuum	Deeply weathered in place bedrock.
TALU	Talus	Rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep, rocky slope. Also, the outward sloping and accumulated heap or mass of such loose broken rock, considered as a unit, and formed chiefly by gravitational falling, rolling, or sliding.
TEPH	Tephra	A general term for all pyroclastics of a volcano; particles that have been ejected through the air from volcanic activities, including ash, cinders and bombs
VOAS	Volcanic ash	Fine pyroclastic material under 2.0mm in diameter;

45) Soil Moisture List of Values:

Code	Abbreviation	Meaning
D	Dry	No moisture observed, at the wilting point (>15 bars of tension, realizing that various perennials, shrubs, trees and other native vegetation have wilting points up to 66 bars of tension).
M	Moist	Moisture state is between the wilting point and field capacity.
W	Wet	The moisture state is at field capacity or wetter.

46) Soil Texture List of Values:

Code	Name	Description
C	clay	A term used in the U.S. and by the International Society of Soil Science for a rock or mineral particle in the soil, having a diameter less than 0.002 mm (2 microns)
CL	clay loam	A soil containing 27-40% clay, 20-45% sand, and the remainder silt.
L	loam	A rich, permeable soil composed of a friable mixture of relatively equal and moderate proportions of clay, silt, and sand particles, and usually containing organic matter
S	sand	A term used in the U.S. for a rock or mineral particle in the soil, having a diameter in the range of 0.05-2 mm.
SI	silt	A rock or mineral particle in the soil, having a diameter in the range of 0.002-0.05 mm.
SIL	silt loam	A soil containing 50-88% silt, 0-27% clay, and 0-50% sand; e.g. one with at least 50% silt and 12-27% clay, or one with 50-88% silt and less than 12% clay.
SL	sandy loam	A soil containing 43-85% sand, 0-50% silt, and 0-20% clay, or containing at least 52% sand and no more than 20% clay and having the percentage of silt plus twice the percentage of clay exceeding 30, or containing 43-52% sand, less than 50% silt, and less than 7% clay.

48) Light Exposure List of Values:

Code	Name	Description
SUN	Full Sun	Full Sun characterizes the predominant light exposure condition across the EO.
PSH	Partial Shade	Partial Shade characterizes the predominant light exposure condition across the EO.
FSH	Full Shade	Full Shade characterizes the predominant light exposure condition across the EO.

53) Dominant Process List of Values:

Code	Name	Description
10	Insects (general)	Any of numerous usually small arthropod animals of the class Insecta, having an adult stage characterized by three pairs of legs and a body segmented into head, thorax, and abdomen and usually having two pairs of wings. Insects include the flies, crickets, mosquitoes, beetles, butterflies, and bees.
19	General diseases	A general category for a pathological condition of a part or system of an organism resulting from various causes, such as infection, genetic defect, or environmental stress, and characterized by an identifiable group of signs or symptoms. Included are biotic damage, root/butt diseases, stem decays/cankers/parasitic/epiphytic plants, decline complexes/diebacks/wilts, foliage diseases, stem rusts and broom rusts.
30	Fire	Disturbances related to natural or human caused fires.
41	Wild animals	Disturbances related to the activities of wild animals
42	Domestic animals	Disturbances related to domestic animals.
50	Abiotic damage	Disturbances related to a wide variety of abiotic events, including air pollution, chemicals, drought, flooding, lightning, snow/ice, avalanches and landslides.
51	Erosion	Disturbances related to the group of natural processes, including weathering, dissolution, abrasion, corrosion, and transportation, by which material is worn away from the earth's surface.
60	Competition	Disturbances related to the simultaneous demand by two or more organisms for limited environmental resources, such as nutrients, living space, or light.
70	Human activities	Disturbances related to human activities, including herbicides, imbedded objects, land clearing, logging damage, roads, vehicle damage and compaction.
90	Unknown	The mechanism creating the disturbance is unknown.

55) Community Quality List of Values

Code	Name	Description
L	Low	
M	Medium	
H	High	

56) Landscape Integrity List of Values

Code	Name	Description
L	Low	
M	Medium	
H	High	

57) Threats List of Values

Code	Name	Description
CO	Collecting	Collecting; includes scientific collecting, or gathering by gardeners or others with the intent of cultivation, or collecting for medicinal or wildcrafting use
EX	Exotic Plant Species	Threats related to the invasion of an invasive plants infestation.
FC	Change in fire regime	Successful fire suppression activities have lead to changes in the seral stage that may contribute to a greater threat of catastrophic fires.
FF	Fire suppression activities	Fire suppression activities, including hand lines, dozer lines, back burning, etc.
FI	Increased fire frequency	Changes in the vegetation community are contributing to an increased fire frequency.
FL	Federally Listed Species	Not currently known to occur on NFS lands in a given state, but currently included by USFWS on the species lists for the National Forests in that state; = listed species potentially occurring on NFS lands
FR	Fire (direct effects)	The effects of burning from a fire.
FS	Stand-replacing fires	The effects of intense fire that leads to mortality and stand replacement
GI	Grazing, Indirect Effects	Indirect effects of livestock grazing (e.g., changes in moisture regime)
GZ	Grazing, Direct effects	Direct effects of livestock grazing (e.g., browsing, trampling)
FX	Fire exclusion	Due to fire exclusion, the population is threatened.
HC	Hydrological regime	Changes; includes alterations to wetland habitats (e.g., peatlands, aquatic habitats) that might result indirectly from management activities elsewhere in the watershed

Code	Name	Description
MN	Mining	The direct and indirect effects of mining including removal of material, stockpiling or disposal of tailings and discharge of fluids.
NW	Not protected by existing wetland protections	Not adequately protected by existing wetland/SMZ/BMP guidelines (e.g., isolated wetlands < 1 acre, as not covered by PACFISH/INFISH)
OV	Off highway vehicles	Off-highway vehicles and motorized recreation
PA	Pathogens	Pathogens are affecting the population.
PL	Pipelines	Direct and indirect disturbances related to pipeline construction and maintenance
RC	Recreation	Recreation (hiking, stock use, mountain bike use, trail construction, etc.)
RD	Road construction	Direct and indirect disturbances related to road construction.
RE	Review	Review of status, threats, and ecological specialization needed by Forest specialists
RM	Road maintenance	Direct and indirect disturbances related to road maintenance.
RP	Riparian zone disturbances	Generic code for disturbances in riparian zones related to human activities
SU	Succession	The natural vegetation succession is creating habitat that is threatening the population
TH	Timber harvest	Timber harvest activities, including felling, yarding and disposal activities are threatening the population.
XX	Herbicide spray and drift	Direct application of herbicides and indirect effects of drift are affecting the population.

61) Ground Cover List of Values

Code	Name	Description
BARE	Bare soil (soil particles < 2 mm)	Bare soil, not covered by rock, cryptogams, or organic material. Does not include any part of a road (see definition for road).
BAVE	Basal vegetation	Basal vegetation, not differentiated by lifeform. For use when basal vegetation is not separated into more detailed codes.
BEDR	Bedrock Outcrop	A general term for the rock, usually solid, that outcrops at the surface
GRAV	Gravel	Rock fragments between 2 and 75 mm in diameter.
LICH	Lichen	an organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in a symbiotic association. For lichen growing on bare soil in dry rangeland conditions see cryptogrammic crusts (CRYP).

LITT	Litter and duff	Leaf and needle litter, and duff not yet incorporated into the decomposed top humus layer. Non-continuous litter is not included (for example, scattered needles over soil is classified as BARE).
MOSS	Moss	Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts. Always herbaceous. This code does not apply to moss growing on bare soil in dry rangeland conditions. For rangeland conditions, see cryptogrammic crusts (CRYP).
ROAD	Road	Improved roads, paved roads, gravel roads, improved dirt roads, and off-road vehicle trails regularly maintained or in long-term continuing use. Generally constructed using machinery. Includes cut banks and fills.
ROCK	Rock	Relatively hard, naturally formed mineral or petrified matter >1/8 inch in diameter appearing on soil surface, as small to large fragments, or as relatively large bodies, cliffs, outcrops or peaks. Includes bedrock. Generic term used by Inven.
WATE	Water	Where the water table is above the ground surface during the growing season, such as streams, swamps, marshes, and ponds.

63) Completeness of Species List List of Values:

Code	Name	Description
C	Complete	Represents an attempt to list all species found in association with the EO. The occurrence polygon or the survey area was surveyed intensively.
R	Reduced	Incomplete species list for some reason, e.g., partial search, only listed species above a certain cover value, etc. Indicate any specific criteria in a separate note.
S	Selected	Only listed species according to some selection criteria, such as only certain life forms, only species of specific interest, etc. Indicate any specific selection criteria in a separate note.

74) ID Confirmed **List of Values:**

Code	Name	Description
Y	Yes	Identification of the specimen has been confirmed
N	No	Identification of the specimen has not been confirmed, pending follow-up verification
Q	Questionable	Identification of the specimen can't currently be confirmed

Appendix C - TES Plant Element Occurrence Field Form

USDA FOREST SERVICE 2005

® = required field, ®* = conditionally required field

General Information

1) FS SITE ID: ®	**2) DATE: ®**	**3) SITE NAME:**
4) NRCS PLANT CODE: ®		
5) SCIENTIFIC NAME: ®		
6) RECORD SOURCE: ®	**7) SURVEY ID: ®***	**8) Survey Name:**
9) EXAMINER(S)- LAST: ®	**FIRST:**	**MIDDLE INITIAL:**
LAST:	**FIRST:**	**MIDDLE INITIAL:**
10) OWNERSHIP: ®		
11) E.O. #	**12) NEW OCCURRENCE – YES:** *OR* **NO:**	
13) STATE: ®*	**14) COUNTY: ®***	
15) REGION: ®*	**16) FOREST: ®***	**17) DISTRICT: ®***
18) Entire extent mapped: Yes: No: Uncertain:	**19) Area (Est):**	**20) Area UOM: ®***
21) Canopy Cover Method ®* (circle one): COVER PERCENT; DAUBEN; NRMCOV		

Element Occurrence Data

22) EO Canopy Cover: %Cov: ***or*** Cover Class Code:		**23) Lifeform:**
24) Number of subpopulations:	**XX) Plants Found: Yes or No**	
25) Plant Count:	**26)Count Type: *Genets/Ramets/Undetermined***	**27) Count: *Actual* or *Estimate***
28) Revisit needed - Yes *or* No	**29) Revisit Date:**	
30) Revisit Justification:		
31) Phenology by % *(Sum to 100%):* Vegetative . . . . . ___ Flower/Bud . . . ___ Fruit/Dispersed . ___ Seedlings/ Juvenile . . . . . ___	**32) Population Comments:** (e.g., distribution, vigor, density, phenology, dispersal)	
	33) Evidence of disease, competition, predation, collection, trampling, or herbivory: Yes___ *or* No ___ **34) Evidence Comments:**	
35) Pollinator observed – Yes *or* No **36) Pollinator type(s):**		
37) Pollinator comments:		

Site Morphometry

38) Percent Slope:	**39) Slope position:**
40) Aspect: azimuth: ***or*** cardinal:	
41) Elev.: Ave: Min: Max:	**42) Elev UOM: ®***

Soil Characteristics and Light Conditions

43) Substrate on which EO occurs:		
44) Parent Material:	**45) Soil Moisture:**	**46) Soil Texture:**
47) Soil Type:		**48) Light Exposure:**

FS SITE ID:

Site Classifications

Record taxonomic units of the given type(s) if published classifications exist for the area.			
CLASSIFICATION TYPE	**CLASS CODE**	**CLASSIFICATION SHORT NAME**	**CLASSIFICATION SET**
49) Existing Veg			
50) Potential Veg			
51) Ecotype			

Habitat Quality and Management Comments

52) Habitat Description:	
53) Dominant Process:	
54) Community Quality *(L, M, H):*	**55) Landscape Integrity *(L, M, H):***
56) Process Comment:	
57) Disturbance/Threats (present or imminent):	
58) Disturbance/Threats Comment:	
59) Non-Native Comment:	
60) Current Land Use Comment:	

Canopy Cover

Record % canopy cover by actual percent, ***or*** by cover class (*as indicated in General Information Block*).			
Lifeform Canopy Cover	**61) % Cov *or* Code**	**Ground Cover**	**62) % Cov *or* Code**
Tree		Bare	
Shrub		Gravel	
Forb		Rock	
Graminoid		Bedrock	
Non-vascular		Moss	
Lichen		Litter/Duff	
Algae		Basal Veg	
		Water	
		Road surface	
		Lichen	

FS SITE ID:

Associated Species

List species directly associated with the EO species on this site. Record the NRCS Plant Code, scientific name or both. If desired, indicate lifeform, dominant species, % cover for each species and flag non-native species.

63) Completeness of Species List: ®* C, R, OR S

64) Species List Comment:

65) NRCS Plant Code	66) Scientific Name	67) Life Form	68) Dom. (Y/N)	69) % Cov or Class	70) Non-native

EO Specimen Documentation

71) Reference for ID:

72) Primary Collector – Last Name: **First Name:** **M.I.**

Other Collectors – Last Name: **First Name:** **M.I.**

73) Collection #: ®* **74) ID Confirmed: ®*** Y: or N: or Questionable:

75) Verification:

76) Specimen Repository: ®*

Image Information

77) Image ID	78) Image Description

Location Information

(State, County, Region, Forest, District will be auto-populated by the database application when the spatial feature is entered)

79) USGS Quad Number:	80) USGS Quad Name:
81) Forest Quad Number:	82) Forest Quad Name:

83) Legal Description: Required where public land survey is available.

Meridian: **Township and Range:**

Section:__ **Q Sec:___** **QQ Sec: ____** **QQQ Sec: ____** **QQQQ Sec: ____**

84) Latitude and Longitude (either in degrees, minutes, seconds or in decimal degrees)

Geodetic Datum:

Latitude: **Degrees __ __ N** **Minutes** **Seconds __ __.__ __**

Longitude: **Degrees __ __ __ W** **Minutes** **Seconds __ __.__ __**

GPS Datum:

GPS Lat. Dec. Degrees: **GPS Long. Dec. Degrees:**

85) UTM

UTM Datum: **UTM Zone:**

Easting: __ __ __ __ __ __ **Northing: __ __ __ __ __ __**

86) GPS Equipment Used (Manufacturer and Model):

87) Metes and Bounds

FS SITE ID:

88) Directions to Site

89) Sketch of Site or Area

90) General EO Comments