

# CDFW-CNPS Protocol for the Combined Vegetation Rapid Assessment and Relevé Field Form

(April 28, 2016)

## Introduction

This protocol describes the methodology for both the Relevé and Rapid Assessment (RA) vegetation sampling techniques as recorded in the Combined Vegetation Rapid Assessment and Relevé Field Form. The same environmental data are collected for both techniques. However, the relevé sample is a plot demarcated with a measuring tape, and each species in the plot is recorded along with its cover. The rapid assessment sample is not based on a taped plot, but is based on a visually estimated, usually circular area within a representative portion of the entire stand, with up to 20 of the dominant or characteristic species and their cover values recorded.

In general, collect rapid assessments in woody vegetation and relevés in herbaceous vegetation. When working in an area that has not been sampled before, RAs in woody vegetation may list more than 20 species.

## Defining a Stand

A stand is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small, such as a portion of a vernal pool, and some may be several square kilometers in size, such as a forest type. All samples should be in stands that meet the minimum mapping unit of 1 acre for upland and 0.5 acre for special stands such as small wetlands, riparian and serpentine barrens.

A stand is defined by two main unifying characteristics:

- 1) It has compositional integrity. Throughout the site, the combination of species is similar. The stand is differentiated from adjacent stands by a discernable boundary that may be abrupt or indistinct.
- 2) It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes but not the lower, would be divided into two stands. Likewise, sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The structural and compositional features of a stand are often combined into a term called homogeneity. For an area of vegetated ground to meet the requirements of a stand, it must be homogeneous (uniform in structure and composition throughout).

## Selecting a bounded plot (Relevé) or representative area (Rapid Assessment) to sample within a stand

Stands to be sampled may be selected by evaluation prior to a site visit (e.g., from aerial photos) or they may be selected on site during reconnaissance to determine extent and boundaries, location of other similar stands, etc.

Because many stands are large, it may be difficult to summarize the species composition, cover, and structure of an entire stand. We are usually trying to capture the most information as efficiently as possible. Thus, we are typically forced to select a representative portion to sample.

When sampling a stand of vegetation, the main point is to select a sample that, in as many ways possible, is representative of that stand. This means that you are not randomly selecting a plot; on the contrary, you are actively using your own best judgment to find a representative example of the stand.

Selecting a relevé plot or RA area requires that you see enough of the stand you are sampling to feel comfortable in choosing a representative plot location. Take a brief walk through the stand and look for variations in species composition and in stand structure. In hilly or mountainous terrain, look for a vantage point from which you can get a representative view of the whole stand.

Variations in vegetation that are repeated throughout the stand should be included in your plot. Once you assess the variation within the stand, attempt to find an area that captures the stand's common species composition and structural condition to sample.

### **Tracking sampled vegetation types**

For large projects, the number of samples should be tracked daily or weekly by field-assessed Alliance type so that samples are spread as evenly as possible over types and time is not wasted collecting excessive numbers of samples of certain types. When multiple teams are in the field in the same week, daily communication between teams about Alliances sampled can ensure even sampling. *Prior to selecting a stand to sample, determine if what you are going to sample is needed based on this Alliance tracking.*

### **Selecting plots to avoid spatial autocorrelation**

When possible, do not sample adjacent stands. Do not take more than one sample of the same vegetation type within a sub-watershed. Exceptions can be made due to limited access to private lands. For example, samples from different formations, subclasses or classes (e.g., wetlands vs. uplands, lithomorphic vs. mesomorphic) may be sampled in the same sub-watershed, however, avoid sampling a grassland adjacent to an open woodland, even though they are technically different formations.

### **Plot Size**

All relevés of the same type of vegetation need to be the same size if they are to be analyzed together. Plot shape and size are somewhat dependent on the type of vegetation under study. Therefore, general guidelines for plot sizes of tree, shrub, and herbaceous communities have been established. Sufficient work has been done in temperate vegetation to be confident the following conventions will capture species richness:

Herbaceous communities: 100 m<sup>2</sup> plot

Special herbaceous communities, such as vernal pools, fens: 10 m<sup>2</sup> plot

Shrublands and riparian forest/woodlands: 400 m<sup>2</sup> plot

Open desert and other shrublands with widely dispersed but regularly occurring woody species: 1000 m<sup>2</sup> plot

Upland Forest and woodland communities: 1000 m<sup>2</sup> plot

### **Plot Shape**

A relevé has no fixed shape, though plot shape should reflect the character of the stand and is either a square or a rectangle. Adjust the orientation and dimensions of the plot to incorporate the best approximation of stand homogeneity. If the stand is about the same size as a Relevé, the plot boundaries may be similar to that of the entire stand. If we are sampling streamside riparian or other linear communities, our plot dimensions should not go beyond the community's natural ecological boundaries. Thus, a relatively long, narrow plot capturing the vegetation within the stand, but not outside it, would be appropriate. Species present along the edges of the plot that are clearly part of the adjacent stand should be excluded from the plot.

### **Location of GPS Points**

For Relevés, one corner will be considered the plot Identifier (ID point) and should be in the SW corner, if possible. If it is taken in another corner, this should be noted in the Site History section.

## **Definitions of fields in the Field Form**

### **I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION**

**Relevé or RA:** Circle the appropriate survey type.

**Database #:** This is the unique ID number for Relevés and Rapid Assessments, in the form of PPPPxxxx, where PPPP is the 4-character project code and xxxx is a unique 4-digit number (e.g. CARR0001 for Carrizo sample #1). If this is a long term plot, a character from A to Z can be added to the unique ID for each re-sampling survey; so the first re-sample for CARR0001 would be CARR0001A.

**Date:** Date of the sampling.

**Name of recorder:** The full name of the recorder should be provided for the first field form for the day. On successive forms, initials can be recorded.

**Other Surveyors:** The full names of each person assisting should be provided for the first field form for the day. On successive forms, initials of each person assisting can be recorded.

**Location Name:** The name of the property or park, or the location within large holdings (like USFS or BLM properties).

**GPS name:** The name/number assigned to each GPS unit. This can be the serial number if another number is not assigned.

**Bearing°, left axis at ID point of Long / Short side:** Fill this in for Relevés only. For square or rectangular plots: from the ID Point, looking towards the plot, record the bearing of the axis to your left. If the plot is a rectangle, indicate whether the left side of the plot is the long or short side of the rectangle by circling “long” or “short” side (no need to circle anything for square plots). If there are no stand constraints, set up the plot with boundaries running in the cardinal directions and place the ID Point in the SW corner.

**UTM coordinates:** Easting (**UTME**) and northing (**UTMN**) location coordinates using the Universal Transverse Mercator (UTM) grid. Record the information from your GPS unit. These coordinates are always the base point of the survey. Soil samples and photos are taken from this point, and exposure, steepness, topography, etc. are measured here. If the GPS is not within the stand (i.e., the point is projected), these are the UTMs of the base point.

*For Relevé plots, take the waypoint in the southwest corner of the plot whenever possible or in the center of a circular plot.*

**Zone:** Universal Transverse Mercator zone. Zone 10 is for California west of the 120<sup>th</sup> longitude; zone 11 is for California east of 120<sup>th</sup> longitude (the straight portion of California’s eastern boundary).

**NAD83:** This is the default GPS datum. If you use a different one, cross this out and write in the correct datum.

**GPS error: ft./ m./ PDOP:** Circle the appropriate unit of measure and record the error reading from the GPS unit.

**Decimal degrees:** *Use this only if your GPS unit will not record UTM coordinates.* Latitude–Longitude reading in decimal degrees. Record the information from your GPS unit. These coordinates are always the base point of the survey. Soil samples and photos are taken from this point, and exposure, steepness, topography, etc. are measured here.  
*For Relevé plots, take the waypoint in the southwest corner of the plot whenever possible or in the center of a circular plot.*

**GPS within stand? Yes / No:** Circle “Yes” to denote that the GPS waypoint was taken directly within or at the edge of the stand being assessed for a Rapid Assessment, or circle “No” if the waypoint was taken at a distance from the stand (such as with a binocular view of the stand). If the point is taken at the edge of the stand, note the direction to the stand.

**If No, cite from GPS to stand: distance (m), bearing°, inclination°:** From the base GPS point, measure the distance to the projected point using a range finder. Record the compass bearing

from the base point to the projected point; record the inclination if the base and projected points are not at the same elevation.

**and record Base point ID:** This is the waypoint # of the base GPS point, where the surveyors were standing to record the distance survey.

**and Projected UTM:** These are the coordinates of the projected point, the point being surveyed. They are generated in the field if the GPS units have the ability to calculate projected points. If the GPS unit does not have this capability, make a note to that effect and leave these fields blank.

**Camera Name:** Write the camera name.

**Cardinal photos at ID point:** Take four photos in the main cardinal directions (N, E, S, W) clockwise from the north, from the ID Point, and record the jpeg numbers here. Try to include the horizon in at least some of these photos. If this is a distance survey to a projected point, take the four cardinal photos at the base point and at least one photo of the stand.

**Other photos:** This may include cardinal photos at additional corners or other relevant photos. Notes regarding photo locations or subjects can go here.

**Stand Size:** Estimate the size of the entire stand in which the sample is taken. As a measure, one acre is about 4,000 square meters (approximately 64 x 64 m), or 208 feet by 208 feet. One acre is similar in size to a football field.

**Plot Size:** If this is a Relevé, circle "100" for a 100m<sup>2</sup> plot, or record the plot size.

**Plot Shape:** Record the length and width of the Relevé plot in meters.

**RA Radius:** Enter the radius in meters of the visually estimated sample area for Rapid Assessments (should be a 20-meter radius at minimum). For a large stand, this limits the area covered by the RA. If you can see and assess the entire stand, the length and width should be recorded. If it is a long, narrow stand, note the width of the stand at your location. If your point is on the edge of the stand, record the radius into the stand, but note your location and the direction to which the RA Radius applies in the Site History section.

**Exposure:** (Enter Actual ° and circle general category): While facing in the general downhill direction, read degrees of the compass for the aspect or the direction you are standing, using degrees from north, adjusted for declination. Average the reading over the entire stand, even if you are sampling a Relevé plot, since your plot is representative of the stand. If estimating the exposure, write "N/A" for the actual degrees, and circle the general category chosen. "Variable" may be selected if the same, homogenous stand of vegetation occurs across a varied range of slope exposures.

**Steepness:** (Enter Actual ° and circle general category): Read degree slope from your compass. If estimating, write "N/A" for the actual degrees, and circle the general category chosen. Make sure to average the reading across the entire stand even if you are sampling in a Relevé plot.

**Topography:** First assess the broad (**Macro**) topographic feature or general position of the stand in the surrounding watershed, that is, the stand is at the top, upper (1/3 of slope), middle (1/3 of slope), lower (1/3 of slope), or bottom. **Circle all of the positions that apply for macrotopography.**

Then assess the local (**Micro**) topographic features or the lay of the area (e.g., surface is flat or concave). **Circle only one of the microtopographic descriptors.**

**Geology code:** Geological parent material of stand. If exact type is unknown, use a more general category (e.g., igneous, metamorphic, sedimentary). *See code list for types.*

**Soil Texture code:** Record soil texture that is characteristic of the plot (e.g., coarse loamy sand, sandy clay loam). *See soil texture key for types.*

**Upland or Wetland/Riparian:** Indicate if the stand is in upland or wetland/riparian setting. (Wetland and riparian are one category.) Note that a site need not be officially delineated as a wetland to qualify as such in this context (e.g., seasonally wet meadow).

**% Surface cover:** The abiotic substrates of the plot. The total should sum to 100%. It is helpful to imagine "mowing off" all of the live vegetation at the base of the plants and removing it – you will

be estimating what is left covering the surface. Note that non-vascular cover (lichens, mosses, cryptobiotic crusts) is not estimated in this section.

<b>H<sub>2</sub>O:</b>	Percent surface cover of running or standing water, ignoring the substrate below the water.
<b>BA Stems:</b>	Percent surface cover of the basal area of stems at the ground surface. For most vegetation types, BA is 1-3% cover.
<b>Litter:</b>	Percent surface cover of litter, duff, or wood on the ground.
<b>Bedrock:</b>	Percent surface cover of bedrock, including outcrops.
<b>Boulder:</b>	Percent surface cover of rocks >60 cm in the longest dimension.
<b>Stone:</b>	Percent surface cover of rocks >25–60 cm in the longest dimension.
<b>Cobble:</b>	Percent surface cover of rocks >7.5–25 cm in the longest dimension.
<b>Gravel:</b>	Percent surface cover of rocks 2 mm–7.5 cm in the longest dimension.
<b>Fines:</b>	Percent surface cover of bare ground and fine sediment <2 mm in the longest dimension (e.g., dirt, sand).

**% Current year bioturbation:** Estimate the percent of the plot exhibiting soil disturbance by any organism that lives underground. Do not include disturbance by ungulates. Note that this is a separate estimation from surface cover.

**Past bioturbation present?** Circle Yes if there is evidence of bioturbation from previous years in the plot.

**% Hoof punch:** Note the percent of the plot surface that has been punched down by hooves (cattle or native grazers) in wet soil. Depressions must be >2 cm deep.

**Fire Evidence:** Circle Yes if there is visible evidence of fire within the stand, and note the type of evidence in the “Site history, stand age, comments section,” for example, “charred dead stems of *Quercus berberidifolia* extending 2 feet above resprouting shrubs.” If you are certain of the year of the fire, put this in the Site history section.

**Site history, stand age, comments:** Briefly describe the stand age/seral stage, disturbance history, nature and extent of land use, and other site environmental and vegetation factors, such as distribution of species. Examples of disturbance history: fire, landslides, avalanching, drought, flood, animal burrowing, or pest outbreak. Also, try to estimate year or frequency of disturbance. Examples of land use: grazing, timber harvest, or mining. Examples of other site factors: exposed rocks, soil with fine-textured sediments, high litter/duff build-up, multi-storied vegetation structure, or other stand dynamics.

**Disturbance code / Intensity (L,M,H):** List codes for potential or existing impacts on the stability of the plant community. See code list for impacts and definitions of levels of disturbance. Characterize each impact each as **L** (=Light), **M** (=Moderate), or **H** (=Heavy). Disturbance is evaluated on a stand basis.

## II. HABITAT AND VEGETATION DESCRIPTION

### **California Wildlife Habitat Relationships (CWHR)**

For CWHR, identify the size/height class of the plot using the following tree, shrub, and/or herbaceous categories. These categories are based on functional life forms.

**Tree DBH:** Circle one of the tree size classes provided when the tree canopy closure exceeds 10% of the total cover, or if young tree density indicates imminent tree dominance. Size class is based on the average diameter at breast height (dbh) of each trunk (standard breast height is 4.5ft or 137cm). When marking the main size class, make sure to estimate the mean diameter of all trees over the entire stand, and weight the mean toward the larger tree dbh's. The “**T6 multi-layered**” dbh size class signifies a multi-layered tree canopy (with a size class T3 and/or T4 layer growing under a T5 layer and a distinct height separation between the classes) exceeding 60% total cover. Stands in the T6 class need also to contain at least 10% cover of size class 5 (>24” dbh) trees growing over a distinct layer with at least 10% combined cover of trees in size classes 3 (>6-11” dbh) or 4 (>11-24” dbh).

**Shrub:** Circle one of the shrub size classes provided when shrub canopy closure exceeds 10% (except in desert types) by recording which class is predominant in the survey. Shrub size class is based on the average amount of crown decadence (dead standing vegetation on live shrubs when looking across the crowns of the shrubs).

**Herbaceous:** Circle one of the herb height classes when herbaceous cover exceeds 2% by recording the predominant class in the survey. Note: *This height class is based on the average plant height at maturity, not necessarily at the time of observation.*

**Desert Palm/Joshua Tree:** Circle one of the palm or Joshua tree size classes by averaging all the stem-base diameters (i.e., mean diameter of all stem-base sizes). Diameter is measured at the plant's base above the bulge near the ground.

**Desert Riparian Tree/Shrub:** Circle one of the size classes by measuring mean stem height (whether tree and/or shrub stand).

### III. INTERPRETATION OF STAND

**Field-assessed vegetation Alliance name:** Enter the name of the Alliance following the Manual of California Vegetation, 2<sup>nd</sup> Edition (Sawyer, Keeler-Wolf and Evens 2009). Please use scientific nomenclature, e.g., *Quercus agrifolia* forest. An Alliance is based on the dominant or diagnostic species of the stand, and usually reflects the uppermost and/or dominant height stratum. A dominant species covers the greatest area. A diagnostic species is consistently found in some vegetation types but not others.

The field-assessed Alliance name may not exist in the present classification, in which case you can provide a new Alliance name in this field. If this is the case, also make sure to state that it is not in the MCV under "Explain" below.

**Field-assessed Association name** (optional): Enter the name of the species in the Alliance and additional dominant/diagnostic species from any strata. In following naming conventions, species in differing strata are separated with a slash, and species in the uppermost stratum are listed first (e.g., *Quercus douglasii* / *Toxicodendron diversilobum*). Species in the same stratum are separated with a dash (e.g., *Quercus lobata* – *Quercus douglasii*).

The field-assessed Association name may not exist in the present classification, in which you can provide a new Association name in this field.

**Adjacent Alliances/direction:** Identify other vegetation types that are directly adjacent to the stand being assessed by noting the dominant species (or known type). Also note the distance in meters from the GPS waypoint and the direction in degrees that the adjacent alliance is found (e.g., *Amsinckia tessellata* / 50m, 360° N or *Eriogonum fasciculatum* / 100m, 110°).

**Confidence in Alliance identification: (L, M, H)** With respect to the "Field-assessed Alliance name," note whether you have L (=Low), M (=Moderate), or H (=High) confidence in the interpretation of this Alliance name.

**Explain:** Please elaborate if your "Confidence in Alliance identification" is low or moderate. Low confidence can occur from such things as a poor view of the stand, an unusual mix of species that does not meet the criteria of any described Alliance, or a low confidence in your ability to identify species that are significant members of the stand.

**Phenology:** Indicate early (E), peak (P), or late (L) phenology for each of the strata. For herbs, this generally indicates if species are in flower and/or fruit and are therefore identifiable. For shrubs and trees, this attribute generally refers to cover, e.g., a tree that is fully leafed out will be considered peak (P) even if it is not in flower. Phenology is useful for cover estimation and species identification issues, and should be elaborated upon in the next field.

**Other identification or mapping information:** Discuss any further problems with the identification of the assessment or issues that may be of interest to mappers. Note if this sample represents a type that is likely too small to map.

## IV. VEGETATION DESCRIPTION

**Database #:** Copy the database # from Page 1.

### ***Overall Cover of Vegetation***

Provide an estimate of cover for the life-form categories below. Record a specific number for the total aerial cover or “bird’s-eye view” looking from above for each category, estimating cover for the living plants only. Litter/duff should not be included in these estimates.

The *porosity* of the vegetation should be taken into consideration when estimating percent foliar cover for all categories below: consider how much of the sky you can see when you are standing under the canopy of a tree, or how much light passes through the canopy of the shrub layer to help you estimate foliar cover.

**% NonVasc cover:** The total cover of all lichens, bryophytes (mosses, liverworts, hornworts), and cryptogamic crust on substrate surfaces including downed logs, rocks and soil, but not on standing or inclined trees or vertical rock surfaces.

**Total % Vasc Veg cover:** The total cover of all vascular vegetation taking into consideration the porosity, or the holes, in the vegetation, and disregarding overlap<sup>1</sup> of the various tree, shrub, and/or herbaceous layers and species.

### ***% Cover by Layer***

**Conifer Tree /Hardwood Tree:** The total foliar cover (considering porosity) of all live tree species, disregarding overlap<sup>1</sup> of individual trees. Estimate conifer and hardwood covers separately. **Please note:** These cover values should not include the coverage of regenerating tree species (i.e., tree seedlings and saplings).

**Regenerating Tree:** The total foliar cover of seedlings and saplings, disregarding overlap<sup>1</sup> of individual recruits. See seedling and sapling definitions below.

**Shrub:** The total foliar cover (considering porosity) of all live shrub species disregarding overlap<sup>1</sup> of individual shrubs.

**Herbaceous:** The total cover (considering porosity) of all herbaceous species, disregarding overlap<sup>1</sup> of individual herbs.

### ***Height Class by Layer***

Modal height for conifer tree / hardwood tree, regenerating tree, shrub, and herbaceous categories. Record an average height value for each category by estimating the mean height for each group. Please use the following height intervals to record a height class: 1 = <1/2 m, 2 = 1/2-1 m, 3 = 1-2 m, 4 = 2-5 m, 5 = 5-10 m, 6 = 10-15 m, 7 = 15-20 m, 8 = 20-35 m, 9 = 35-50 m, 10 => 50 m.

*Note: For the herbaceous layer height, this height class is based on the average plant height at the time of observation, as opposed to how this is recorded in the CWHR section (at maturity).*

### ***Species List and Coverage***

**For Rapid Assessments:** List up to 20 species that are dominant or that are characteristically consistent within the assessment area. These species may or may not be abundant, but they should be constant representatives in the survey. When different layers of vegetation occur, make sure to list species from each stratum. As a general guide, make sure to list at least 1-2 of the most abundant species per stratum. There is a heavy line on the form under the 20<sup>th</sup> line to limit the RA section of the species list.

*Note: If constant, diagnostic, or interesting species occur outside the assessment area but in the stand, list the species and estimated stand cover in the Site History section.*

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<sup>1</sup> Porosity reduces the total cover of the canopy. Overlapping strata should not be included in the total cover percent; for instance, if a shrub is growing under a tree, only the cover of the tree will be added into the total; the cover of the shrub will be disregarded, except for the amount by which it fills in the porosity of the tree canopy.

**For Relevés:** list all species present in the plot, using a second species list page if necessary.

\*\* If using a second species list page, note "Continued" on the bottom of the first page and be sure to note the Database # on the second page.

**For both sample types,** provide the stratum:

**T = Tree.** A woody perennial plant that has a single trunk.

**A = Sapling.** 1" - <6" dbh and young in age, OR small trees that are <1" dbh, are clearly of appreciable age, and are kept short by repeated browsing, burning, or other disturbance. Includes trees that are re-sprouting from roots or stumps following fire, logging or other disturbance. These re-sprouts may exhibit a shrubby form, with multiple small trunks, but are species that are generally considered trees. If a majority of the trunks are >6" dbh, then the re-sprouts would be recorded under the "Tree" stratum.

**E = SEedling.** A tree species clearly of a very young age that is <1" dbh or has not reached breast height. Applies only to trees propagating from seed; resprouts are not recorded here even if they meet the size requirements.

**S = Shrub.** A perennial, woody plant, that is multi-branched and doesn't die back to the ground every year.

**H = Herb.** An annual or perennial that dies down to ground level every year.

**N = Non-vascular.** Includes moss, lichen, liverworts, hornworts, cryptogamic crust, and algae.

Be consistent and don't break up a single species into two separate strata. The only time it would be appropriate to do so is when one or more tree species are regenerating, in which case the SEedling and/or SApling strata should be recorded for that species. These may be noted on the same line, e.g.:

Strata	Species	%Cover	C
T/A/E	Quercus douglasii	40/<1/<1	

In some cases, the stratum of a particular species might not be obvious. Some examples are *Juniperus californica*, which has the size and growth habit of a shrub, but it is considered a tree, and mistletoe, which is considered a shrub. It is useful to have a list of species with ambiguous strata for each project. Consult the MCV or contact VegCAMP if you are unsure.

**C.** If a species collection is made, it should be indicated in the collection column with a "C" (for collected). If the species is later keyed out, cross out the species name or description and write the keyed species name in pen on the data sheet. Do not erase what was written in the field, because this information can be used if specimens get mixed up later. If the specimen is then thrown out, add a "T" to the "C" in the collection column (CT = thrown out after confirmation) or cross out the "C". If the specimen is kept but is still not confidently identified, add a "U" to the "C" in the collection column (CU = collected and unconfirmed). In this case the unconfirmed species epithet should be put in parentheses [e.g., *Hordeum (murinum)*]. If the specimen is kept and is confidently identified, add a "C" to the existing "C" in the collection column (CC = collected and confirmed). If the specimen is later deposited in an herbarium, add a "D" to the existing "C" in the collection column (CD = collected and deposited) and note the receiving herbarium.

Use Jepson Manual nomenclature. Write out the genus and species of the plant. Do not abbreviate except for dominant species that do not have ambiguous codes. If you aren't sure there aren't duplicate codes, don't use a code. When uncertain of an identification (which you intend to confirm later) use parentheses to indicate what part of the determination needs to be confirmed. For example, you could write out *Brassica (nigra)* if you are sure it is a *Brassica* but you need further clarification on the specific epithet.

Provide the % absolute foliar cover for each species listed, considering porosity. When estimating, it is often helpful to think of coverage in terms of the following cover intervals at first:

<1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%.

Keeping these classes in mind, refine your estimate to a specific percentage. All species percent covers may total over 100% because of overlap.

Include the percent cover of snags (standing dead) of trees and shrubs. Use the code "SNAG." Note their species, if known, in the "Species" column (i.e. SNAG – *Quercus wislizeni*).

For Rapid Assessments, make sure that the major non-native species occurring in the stand also are listed in the space provided in the species list with their strata and % cover.

For Relevés, all non-native species should be included in the species list.

Also for Relevés, record the <1% cover in one of two categories: "r" for trace (i.e., rare in plot, or solitary individuals) and "+" for <1% but not rare or solitary individuals.

**Unusual species:** List species that are locally or regionally rare, endangered, or atypical (e.g., range extension or range limit) within the stand. This field will be useful to the Program for obtaining data on regionally or locally significant populations of plants.

**Note:** Field forms are generally filled out in pencil, so that changes may be made easily while working in the plot or stand. Once out of the stand, however, entries on the field form should not be erased, but should be crossed out and corrected in a different-colored ink.

## CODE LIST

### GEOLOGY CODE

<b>IGTU</b>	<b>Igneous (type unknown)</b>
MIIG	Mixed igneous
ULTU	Ultramafic (type unknown)
VOLC	General volcanic extrusives
ANDE	Andesite
ASHT	Ash (of any origin)
BASA	Basalt
DIAB	Diabase
OBSI	Obsidian
PUMI	Pumice
PYFL	Pyroclastic flow
RHYO	Rhyolite
VOFL	Volcanic flow
VOMU	Volcanic mud
INTR	General igneous intrusives
DIOR	Diorite
GABB	Gabbro
GRAN	Granitic (generic)
MONZ	Monzonite
PERI	Peridotite
QUDI	Quartz diorite
<b>METU</b>	<b>Metamorphic (type unknown)</b>
MIME	Mixed metamorphic
GREE	Greenstone
BLUE	Blue schist
FRME	Franciscan melange
GNBG	Gneiss/biotite gneiss
HORN	Hornfels
MARB	Marble
PHYL	Phyllite
SCHI	Schist
SESC	Semi-schist
SLAT	Slate
ULTU	Ultramafic (type unknown)
SERP	Serpentine
<b>SETU</b>	<b>Sedimentary (type unknown)</b>
BREC	Breccia (non-volcanic)
CACO	Calcareous conglomerate
CALU	Calcareous (origin unknown)
CASA	Calcareous sandstone
CASH	Calcareous shale
CASI	Calcareous siltstone
CHER	Chert
CONG	Conglomerate
DOLO	Dolomite
FANG	Fanglomerate
LIME	Limestone
MISE	Mixed sedimentary
SAND	Sandstone
SHAL	Shale
SILT	Siltstone
CLAL	Clayey alluvium
DUNE	Sand dunes
GLTI	Glacial till, mixed origin, moraine
GRAL	Gravelly alluvium
LALA	Large landslide (unconsolidated)

### GEOLOGY CODE, continued

LOSS	Loess
MIAL	Mixed alluvium
SAAL	Sandy alluvium
SIAL	Silty alluvium
MIRT	Mix of two or more rock types
OTHE	Other than on list

### ROCK SIZE, measurement of longest dimension

Boulder	> 60 cm
Stone	25 cm to 60 cm
Cobble	7.5 cm to 25 cm
Gravel	2 mm to 7.5 cm
Fines	< 2 mm

### DISTURBANCE CODES

01	Development
02	ORV activity
03	Agriculture
04	Grazing
05	Competition from exotics
06	Logging
07	Insufficient population/stand size
08	Altered flood/tidal regime
09	Mining
10	Hybridization
11	Groundwater pumping
12	Dam/inundation
13	Other
14	Surface water diversion
15	Road/trail construction/maint.
16	Biocides
17	Pollution
18	Unknown
19	Vandalism/dumping/litter
20	Foot traffic/trampling
21	Improper burning regime
22	Over collecting/poaching
23	Erosion/runoff
24	Altered thermal regime
25	Landfill
26	Degrading water quality
27	Wood cutting
28	Military operations
29	Recreational use (non ORV)
30	Nest parasitism
31	Non-native predators
32	Rip-rap, bank protection
33	Channelization (human caused)
34	Feral pigs
35	Burros
36	Rills
37	Phytogenic mounding
38	Sudden Oak Death

## Descriptions of Common Disturbance Codes (Site Impacts)

Site impacts include any anthropogenic disturbance having an effect on vegetation. These are the standard codes for plant, animal, and natural community surveys, used by the Natural Diversity Database of the California Natural Heritage Program. Descriptions are provided for impacts that are common and for which additional clarification seems warranted. Impacts are evaluated as Light, Moderate, or Heavy. Unless otherwise stated, definitions of these values are:

- Light:** less than 33% of the stand is impacted
- Moderate:** between 33% and 66% of the stand is impacted
- Heavy:** more than 66% of the stand is impacted

**01 Development:** Used to describe any construction or human modifications to the environment that are not otherwise specifically included on the Disturbance Codes list. These can include fencing, informal campsite construction, building sites, etc. (e.g., houses, oil rigging pads, pumping stations, power transmission towers, walls, etc.)

- Light:** less than 2% of the stand is impacted
- Moderate:** between 2% and 5% of the stand is impacted
- Heavy:** more than 5% of the stand is impacted

**02 ORV activity:** "Informal" roads and trails created by off-highway vehicle activity. See 15 Roads/trails for examples

**04 Grazing:** Refers to the grazing of domesticated animals, and not necessarily to the grazing activities of native wildlife. Exceptions can be made in cases where management practices have resulted in the overpopulation of native herbivores and destruction of native vegetation (may include browsing on woody vegetation as well as herbaceous vegetation). Levels are determined by density of recent livestock droppings, level of distinction of browse lines on shrubs (attributable to livestock), density and extent of livestock trails, cover of livestock hoof-punch, and associated removal of vegetation cover from recent seasons.

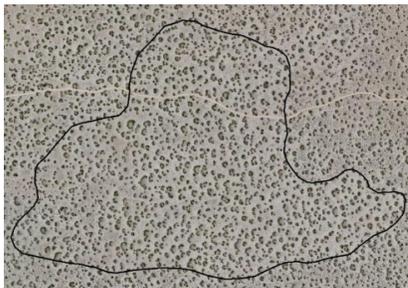
**05 Competition from exotics:** Refers to implied competition for resources between native and introduced non-native plant species. The level of impact is determined by the proportion of the total cover occupied by exotic species compared to total cover of all species. Estimate total vegetation cover and total non-native cover then divide the latter by the former.

- Light:** less than 33% of total cover is non-native
- Moderate:** between 33% and 66% of total cover is non-native
- Heavy:** more than 66% of total cover is non-native

**06 Logging:** Refers to the large scale removal of tree biomass, usually in commercial operations. This impact should not be used to describe the localized felling of one or a few trees.

**15 Road/trail construction/maint.:** Includes all established roads and trails (dirt, gravel, paved) and their impact on any part of the sampled vegetation stand.

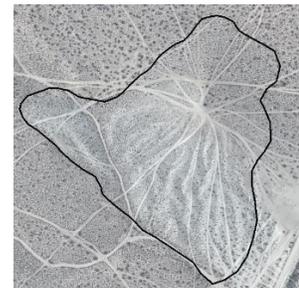
- Light:** less than 33% of the vegetation polygon area is affected by any type of road
- Moderate:** between 33% and 66% of the vegetation polygon is intersected by any type of road
- Heavy:** more than 66% of the vegetation polygon is affected by roads of any kind



Light



Moderate



Heavy

## Descriptions of Common Disturbance Codes (Site Impacts)

**19 Vandalism/dumping/litter:** Includes temporary degradable as well as more persistent trash and junk (for example, concrete or cement fragments not used as rip-rap, see below)

**21 Improper burning regime:** Should be used only in cases where repeated burning has caused significant changes to the vegetation OR in cases where the fire interval has been much longer than natural (causing shifts in vegetation or senescence). It does not necessarily apply to a recently burned stand, even if the fire was human-caused.

**27 Wood cutting:** Refers to the small scale cutting of firewood, or to the limited cutting of wood for other purposes, and not to large-scale commercial logging operations.

**32 Rip-rap, bank protection:** The treatment of slopes of dikes, banks of streams, lakes and other water bodies by placement of riprap (an engineered layer of graded broken rock pieces) to prevent erosion by surface runoff, stream flows and/or wave action.

**36 Rills:** Small, intermittent water courses with steep sides usually only a few centimeters deep. They occur most often on recently cultivated soils or on denuded surfaces.

**37 Phytogenic mounding:** Refers to the build-up of soil and debris at the base of shrubs or trees (normally seen in semi-arid environments), with a concomitant loss of surface material between the shrubs or trees.

**38 Sudden Oak Death:** A disease of oaks and other woody perennials caused by the plant pathogen *Phytophthora ramorum*. The most useful diagnostic symptom for *P. ramorum* is the development of cankers on the trunk. Cankers have red-brown to black discoloration and seep dark black to red or amber sap. They usually develop 1 to 2 m off of the ground, although they can be at soil level, or as high as 4 m or greater.

**Simplified Key to Soil Texture**  
(Adapted from Brewer and McCann 1982)

Place about three teaspoons of soil in the palm of your hand. Take out any particles  $\geq 3$  mm in size.

**A. Does soil remain in ball when squeezed in your hand palm?**

Yes, soil does remain in a ball when squeezed..... **B**

No, soil does not remain in a ball when squeezed..... **sand**

	SAND Sand (class unknown)
Very coarse texture.....	COSA Coarse sand
Moderately coarse texture.....	MESN Medium sand
Moderately fine texture.....	FISN Fine sand

**B. Add a small amount of water until the soil feels like putty. Squeeze the ball between your thumb and forefinger, attempting to make a ribbon that you push up over your finger. Does soil make a ribbon?**

Yes, soil makes a ribbon; though it may be very short..... **C**

No, soil does not make a ribbon..... **loamy sand**

Very gritty with coarse particles.....	COLS Coarse, loamy sand
Moderately to slightly gritty with medium to fine particles.....	MELS Medium to very fine, loamy sand

**C. Does ribbon extend more than one inch?**

Yes, soil extends > 1 inch..... **D**

No, soil does not extend > 1 inch.....Add excess water

Soil feels gritty or not smooth..... **sandy loam or loam**

	LOAM Loam (class unknown)
Very gritty with coarse particles.....	MCSL Moderately coarse, sandy loam
Moderately gritty with medium to fine particles.....	MESA Medium to very fine, sandy loam
Slightly gritty .....	MELO Medium loam

Soil feels very smooth..... **silt loam**

MESIL medium silt loam

**D. Does ribbon extend more than 2 inches?**

Yes, ribbon extends more than 2 inches, and does not crack if bent into a ring..... **E**

No, soil breaks when 1–2 inches long; cracks if bent into a ring.....Add excess water

Soil feels gritty or not smooth..... **sandy clay loam or clay loam**

Moderately to very gritty.....	MFSA Moderately fine sandy clay loam
Slightly gritty or not smooth.....	MFCL Moderately fine clay loam

Soil feels very smooth..... **silty clay loam or silt**

Moderately fine texture.....	MFSL Moderately fine silty clay loam
Very fine texture.....	MESI Medium silt

**E. Soil makes a ribbon 2+ inches long; does not crack when bent into a ring.....Add excess water**

Soil feels gritty or not smooth..... **sandy clay or clay**

Moderately to very gritty.....	FISA Fine sandy clay
Slightly gritty or not smooth.....	FICL Fine clay
	CLAY Clay (class unknown)

Soil feels very smooth..... **silty clay**

FISC Fine silty clay

UNKN = UNKNOWN

PEAT = PEAT

MUCK = MUCK