BIOLOGICAL MONITORING PROTOCOL

for

Toxostoma lecontei

(Le Conte's Thrashers)

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Prepared by

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&
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for the

Coachella Valley Conservation Commission

Background

Le Conte's Thrashers (*Toxostoma lecontei*) range across the deserts of southern Nevada and Utah through California and Arizona into northern Mexico. Le Conte's Thrashers prefer habitat consisting of sparsely vegetated desert flats, dunes, and alluvial fans with a high proportion of saltbush (*Atriplex* spp.), Desert Tea (*Ephedra* spp.) and/or cholla cactus (*Opuntia* spp.). They are rarely found in habitats with large proportions of rock, or deep silty clays, and commonly use small arroyos, and vegetated margins of large, rolling sand dunes (Sheppard 1970, 1973; Laudenslayer et al., 1992). This cryptic species can be difficult to detect as it typically forages on the ground beneath shrubs and trees (Sheppard, 1996). While Le Conte's Thrashers are readily detected on aeolian sand communities due to their distinctive tracks, elsewhere in the Coachella Valley tracks are much less evident, and these birds tend to blend well with dry vegetation and ground cover, making detection of presence difficult with passive surveys. Adding to the challenge of detecting this species is that in more densely occupied habitats in the Mojave and "San Joaquin Valley" Deserts these thrashers sing more frequently throughout the spring, while in the more sparsely occupied Colorado Desert they sing frequently during the pre-breeding period, but rarely throughout the rest of the year (Fletcher 2009, Hutchinson in Allen et al. 2005). Where they occur in higher densities, effective surveys have included ground searches without using call-broadcasts (Jongsomjit e al. 2012), however at low densities such methods have proved ineffective (Hutchinson in Allen et al. 2005, Blackman et al. 2012).

Previous studies have found call-broadcast surveys to be extremely effective with this genus (England and Laudenslayer, 1989; Sheppard, 1970). Call-broadcast surveys prompt Le Conte's Thrashers to move from the ground to the tops of bushes and stimulate these birds to respond vocally and behaviorally, and call-broadcast surveys were found to be three times more effective than passive surveys during the pre and post breeding periods (Blackman et al., 2012; Fletcher, 2009; Allen et al., 2005). Nesting begins in January and can extend into early June (Sheppard, 1970; Sheppard, 1996; Blackman et al, 2012), however, LeConte's Thrashers engage in pair bonding, including territorial defense from late November to February which defines their peak singing time (Jongsomit et al., 2012). During the rest of the breeding season males reduce their singing time to less than 10 minutes a day primarily during dawn and dusk (Jongsomit et al., 2012), therefore the period between December – February has been identified as the ideal time within which they are particularly responsive to the audio playbacks. Once breeding season is in full swing, responsiveness becomes much more sporadic and costly to the breeding pair (Allen et al., 2005). Call-broadcast surveys have been shown to be most effective when sustained winds are at no more than Beaufort Scale 4 (20-28 km/hr), and there is no rainfall. To maximize detection probability to 95%, each point should be visited three times during the sampling period (Conway & Simon, 2003).

Research Questions

At the time of this 2013 assessment a number of critical questions about the ecology of Le Conte's Thrasher's in the Low Desert remain unanswered, limiting our understanding of suitable habitat, local occupancy patterns and local species drivers and stressors. This survey work will help answer some of these questions and support the development of more focused research and monitoring activities for this species within Conservation Areas of the Coachella Valley Multiple Species Habitat Conservation Plan. Several critical questions are outlined below. These questions are aimed at beginning to develop and test hypotheses between perceived suitable habitat and this species' occupancy patterns.

1. What is the effect of habitat fragmentation on this species' occurrence? Do they avoid or ignore proximity to public roadways or suburban development?
2. To what extent are invasive plant species present within occupied and unoccupied habitat? To what extent are other invasive organisms present? Does the presence or abundance of any of the observed invasive species strongly correlate with the presence/absence of the target species?

Once habitat attributes and species distributions are established, future monitoring efforts may expand to population based questions such as:

3. Is there a "social" component to Le Conte's thrashers' occupancy patterns in the Low Desert? Are they more likely to occur in proximity to other Le Conte's thrashers; e.g. clustered or semi-colonial versus distributed evenly across particular landscapes?
4. What are the threshold levels in resources such as rainfall necessary to stimulate reproduction and population growth?
5. Do any invasive species observed within occupied (or previously occupied) habitat have a clear and measurable impact on the occupancy patterns of this species over time?

Objectives

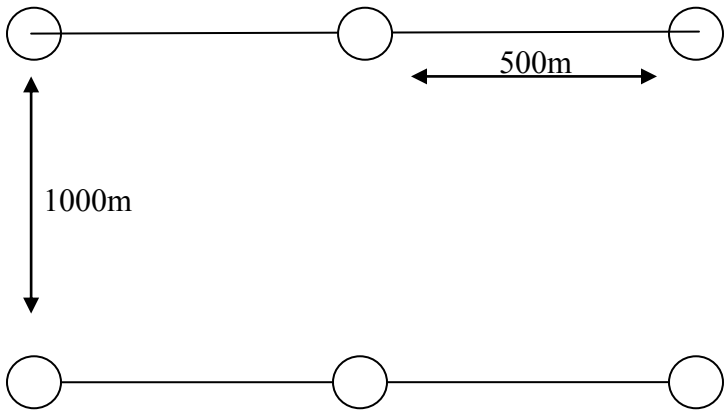
The CVMSHCP calls for a science-based biological monitoring program. With this baseline assessment effort, our primary objective is to assess the presence and distribution of LeConte's Thrasher within the Plan's Conservation Areas, and to collect information about potential habitat attributes that may determine habitat suitability in order to facilitate the development of hypotheses and models. We will employ CNPS and CDFG Combined Vegetation Rapid Assessment relevés in addition to species-focused methods to document habitat attributes such as slope and substrate, and measure the presence and extent of invasive plant species. Some variables that will be recorded include adjacent land uses (suburban, agriculture, natural open space) and degrees of anthropogenic alteration (as outlined in the CNPS/CDFW protocol, see addendum), which will assist with determining whether detectable patterns exist that can be tested with future work. The survey methodology will use a stratified selection of sample sites including multiple habitat types and proximity to roads and development specifically to help to answer research question #1 (above). Sampling will also document varying densities of invasive species, such as but not limited to Sahara mustard, and involve a Rapid Assessment relevé to be

performed during every site visit at all call-broadcast sites, to quantify presence of invasive plant species infestations, helping to answer research question #2. These data will be collected during this initial year of monitoring and shall be integrated into predictive species models and hypotheses relating distribution to habitat attributes. These predictive species models will require at least 40 independent observations and, once established, will help to facilitate the eventual expansion of survey efforts to begin addressing population level questions.

Methodology

Data Collection

During the period of December to early February, call-broadcast surveys will be implemented at 30 plots distributed across various sites within Conservation Areas of the CVMSHP (see Site Selection). At each plot two 1000m linear transects will be placed 1000 m apart, parallel to one another and oriented to best remain within potential suitable habitat. Call-broadcast surveys will be performed at 3 points along each transect. Points will be located at the beginning, middle and end of each transect and spaced 500m apart (Figure 1). Each plot will therefore have two transects and six call-broadcast points. Each plot will be visited three times during the sampling period to maximize detection probability and changes in vegetation.



A field recording of a singing male LeConte's Thrasher using a local dialect will be collected within the Coachella Valley and used for the callback surveys. The recording will be looped to create a 90 second sound file on an mp3 player, which can then be broadcast through an SME-AFS amplified field speaker at peak volume. Winds need to be no greater than 20 km/hr for the surveys to be considered valid, and they should not be done in periods of rain. At each broadcast point, two observers will begin with a passive detection period of two minutes where they scan vegetation at the point. Next the 90 second song recording will be looped and broadcast perpendicular to the transect, for a total of three minutes. After each three minute broadcast, a four minute detection period will follow when researchers will scan with binoculars and listen for a vocal response. If no response is detected, researchers will repeat the 3 minute playback / 4 minute detection period twice. If Le Conte's Thrashers are detected during the playbacks, the

playbacks will cease and data will be collected before moving on to the next point. Data collected will include the time, date, response time and direction, initial detections, distance, type/duration of vocals, GPS coordinates, and behaviors. Surveyors will also conduct CNPS and CDFG Combined Vegetation Rapid Assessment relevés at each broadcast point, during every visit to capture natural community data (see addendum for protocol).

Site Selection

Thirty plots were chosen for this effort using a stratified random sampling design. Strata were defined by previous LCTH detection locations, accessibility of sites within conservation areas, vegetation cover, and proximity to roads and development. Plots were chosen using ArcGIS software (v10.0, ESRI Inc. Redlands, California), overlaying existing vegetation, aerial imagery and conservation maps to identify survey locations within several habitat types and with differing proximity to roads and altered habitat. Only the San Jacinto and Santa Rosa Mountains Conservation Area, the Whitewater Canyon Conservation Area, and the Coachella Valley Stormwater Channel-Delta Conservation Area were found not to contain any of the vegetative alliances and associations previously noted for LeConte's Thrasher. Within the remaining twenty conservation areas, thirty plots were distributed based on the strata described above; with twelve plots identified in the west (Figure 2), eleven in the central valley (Figure 3), and seven in the southeast (Figure 4).

Plots 1 and 3were chosen in the Cabazon Conservation Area and the Snow Creek/Windy Point Conservation Area, both in areas of open desert scrub and wash with associations of *Ephedra* and *Atriplex* (Table 1). Plot 2was chosen in the Stubbe and Cottonwood Canyon Conservation Area and plot 4 in the Hwy 111/I-10 Conservation Area, both of which are characterized by open scrubby areas cleared in fires and possessing associations of *Ephedra*. In Upper Mission Creek/Big Morongo Canyon Conservation Area plots 5 and 6 were chosen as their habitat is similar to that in which previous sightings outside the conservation area occurred, with associations of *Ephedra* and *Opuntia.* Plots 7 and 8 were chosen in Morongo Wash Special Provisions Area, for similarity in habitat to previous sightings just west of these plots, outside the conservation area. 10 and 12 were chosen in the Willow Hole Conservation Area, both in areas dominated by *Atriplex* or *Prosopsis* with associations of *Ephedra.* Plot 9 was chosen in the Whitewater Floodplain Conservation Area in open scrub dominated by *Ambrosia*, *Lepidospartum* and *Psorothamnus*. Plot 11 was chosen at the mouth of the Long Canyon Conservation Area to sample the open scrub there with *Ephedra* associations. Plot 13 was chosen in the Edom Hill Conservation Area due to proximity and similarity in habitat to locations of previous sightings. Plot 14 was chosen on the border of the Deception Canyon, Indio Hills/Joshua Tree Linkage and Thousand Palms Conservation Area, in an area characterized by open scrub and washes dominated by *Encelia, Ambrosia* and *Psorothamnus.* Plots 15, 17, 18, and 19 were chosen in the Thousand Palms Conservation Area due to proximity and similarity of habitat to previous LCTH occurrence points, in areas dominated by *Ambrosia* and *Atriplex.* Plots 16 and 20 were chosen in the Indio Hills / Joshua Tree Conservation Area due to proximity and

similarity of habitat, in areas dominated by *Ambrosia* with *Psorothamnus* associations. Plot 21 was chosen on the border of east Indio Hills and Indio Palms Conservation Area and plots 22 and 23 in the east Indio Hills Conservation Area in lands dominated by *Atriplex* and *Prosopsis.* Plots 24 and 25 were chosen in the Mecca Hills Conservation Area in open scrub and wash areas with associations of *Ambrosia* and *Psorothamnus.* Plots 26, 27, and 29 were chosen in similar habitat within the Desert Tortoise Linkage Conservation Area along the opening of Box Canyon and the I-10 Freeway. Finally, plots 28 and 30 were chosen in the Dos Palmas Conservation Area in lands dominated by *Atriplex*.

Table 1. **Location and Habitat Classification of Survey Plots**

Plots	Conservation Area (CA)	No. of Plots	Habitat
1	Cabazon Conservation Area	1	Open desert scrub and wash with associations of Ephedra and Atriplex
3	Snow Creek / Windy Point Conservation Area	1	Open desert scrub and wash with associations of Ephedra and Atriplex
2	Stubbe & Cottonwood Canyon CA	1	Open scrub cleared by fire, with Ephedra associations
4	Hwy 111/I-10 CA	1	Open scrub cleared by fire, with Ephedra associations
5, 6	Upper Mission Creek/Big Morongo Canyon CA	2	Ephedra & Opuntia associations
7, 8	Morongo Wash Special Provisions Area CA	2	Ambrosia and Encelia dominated, with Ephedra associations
10, 12	Willow Hole CA	2	Atriplex or Prosopsis dominated; Ephedra associations
9	Whitewater Floodplain CA	1	Open areas with Ambrosia, Lepidospartum and Psorothamnus
11	Long Canyon CA	1	Open scrub with Ephedra associations
13	Edom Hill CA	1	Open scrub with Ambrosia associations
14	Border of Deception Canyon, Joshua Tree Linkage and Thousand Palms CA	1	Open scrub & washes, dominated by Encelia, or Ambrosia, and with Psorothamnus associations
15, 17, 18, 19	Thousand Palms CA	4	Areas dominated by Ambrosia and Atriplex
16, 20	Indio Hills/Joshua Tree CA	2	Areas dominated by Ambrosia with Psorothamnus associations
21	Border of East Indio Hills & Indian Palms CA	1	Areas dominated by Atriplex and Propsopsis
22, 23	East Indio Hills CA	2	Areas dominated by Atriplex and Propsopsis
24, 25	Mecca Hills CA	2	Ambrosia and Psorothamnus associations
26, 27, 29	Desert Tortoise Linkage CA	3	Open scrub with Ambrosia and Psorothamnus associations.
28, 30	Dos Palmas CA	2	Atriplex dominated

Map:

Figure 1: Distribution of LCTH plots for the Western Coachella Valley in relationship to Conservation Areas bounded by Cabazon Conservation Area in the west and Willow Hole Conservation Area in the east.

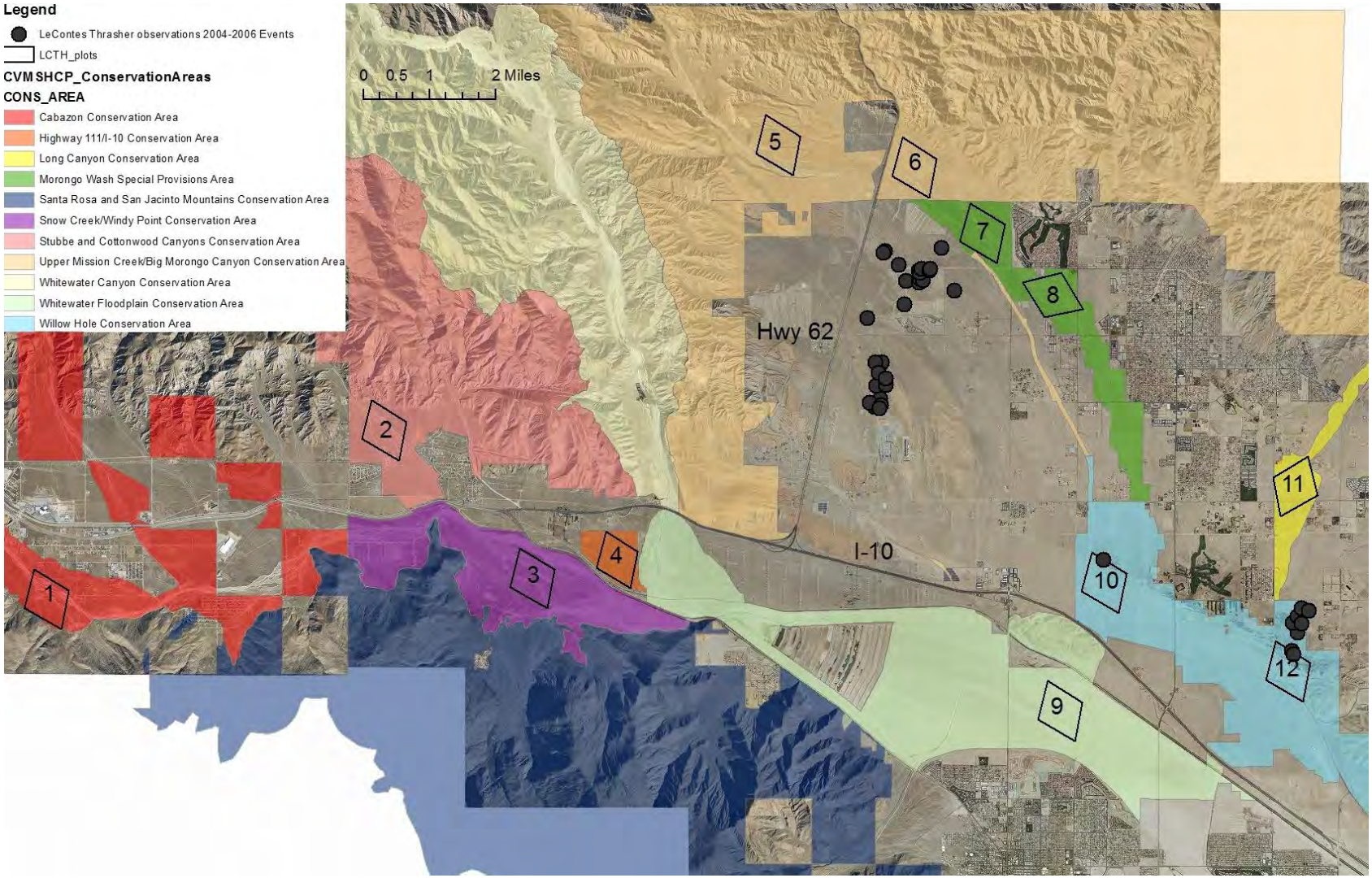


Figure 2: Distribution of LCTH plots for the central Coachella Valley in relationship to Conservation Areas bounded by Edom Hill Conservation Area in the west and East Indio Hills Conservation Area in the east.

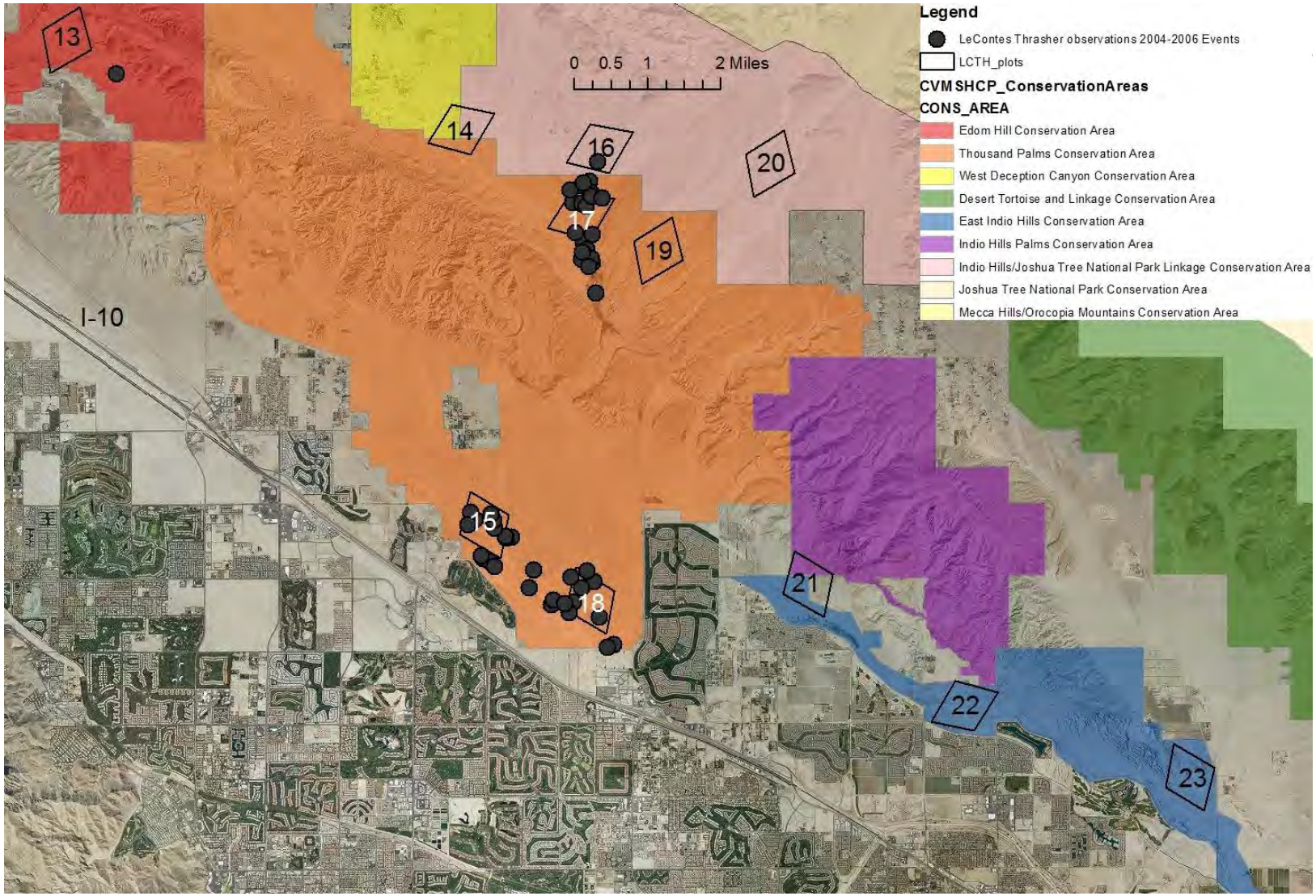
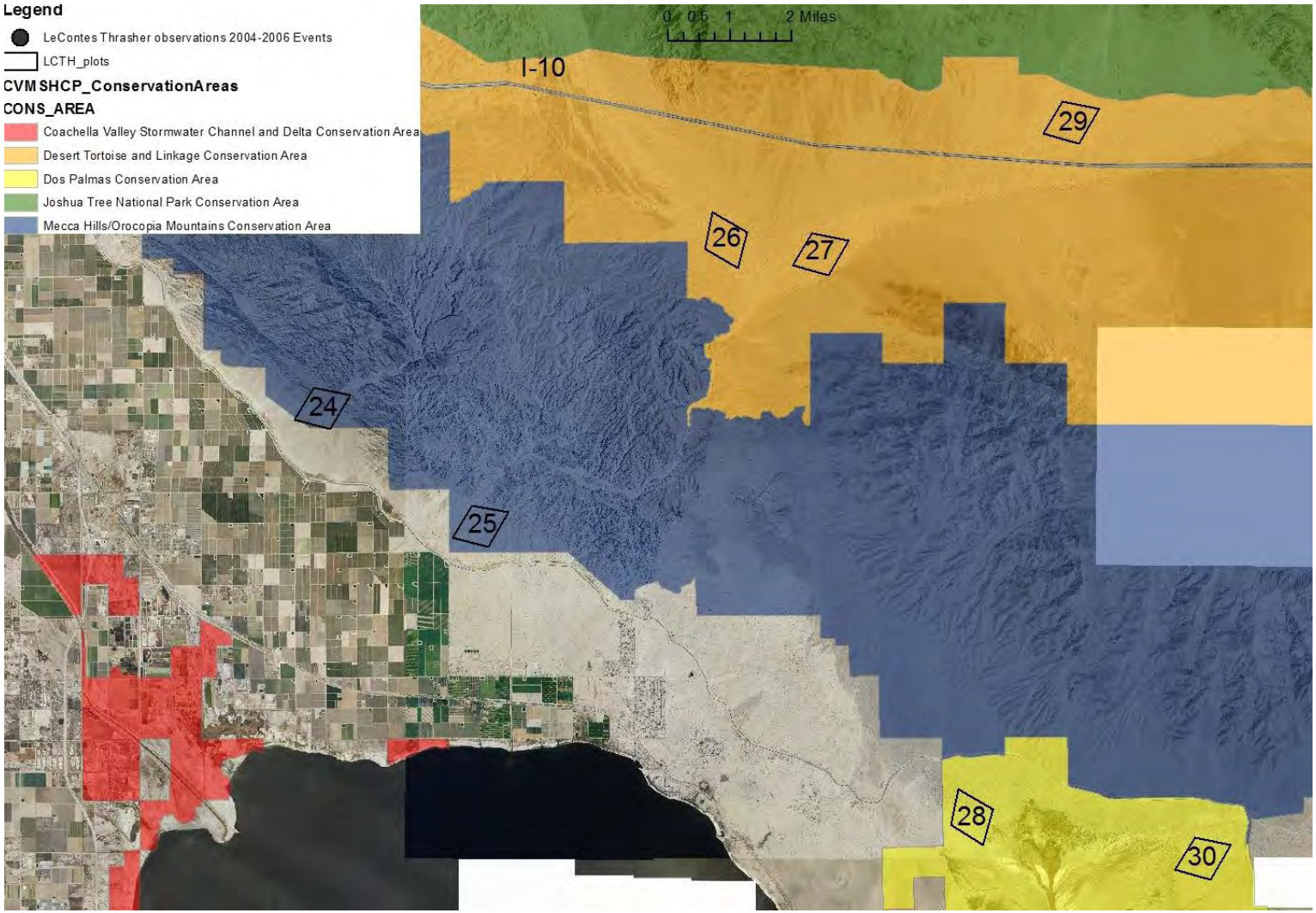


Figure 3: Distribution of LCTH plots for the central Coachella Valley in relationship to Conservation Areas bounded by Mecca Hills Conservation Area in the west and Dos Palmas Conservation Area in the southeast



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ADDENDUM

CALIFORNIA NATIVE PLANT SOCIETY –
VEGETATION RAPID ASSESSMENT PROTOCOL
CNPS VEGETATION COMMITTEE
(November 5, 2001, Revised September 20, 2004)

Introduction

The rapid assessment protocol is a reconnaissance-level method of vegetation and habitat sampling. It may be used to quickly assess and map the extent of all vegetation types in relatively large, ecologically defined regions. The California Native Plant Society (CNPS) has adopted this method to verify locations of known vegetation types, to gain information about new types, and to acquire general information about their composition, habitat, and site quality. Other agencies, such as California State Parks, the Department of Fish and Game, and the U.S. Forest Service, are also adopting this method for documenting vegetation patterns.

By using this method, biologists and resource managers can gain a broad ecological perspective, as the full range in ecological variation across broad landscapes can be reflected in the vegetation assessments. For example, changes in environmental elements (such as geology, aspect, topographic position) or physical processes (fire, flooding, erosion, and other natural or human-made disturbances) can influence the distribution of plants or patterning of vegetation, which are documented in the rapid assessments. In turn, these vegetation patterns can influence the distribution of animals across the landscape.

The quantitative vegetation data recorded in the rapid assessments can be described with standard classification techniques and descriptions, and they can be depicted in maps across any landscape. Additional information recorded in the assessments, such as disturbance history and anthropogenic impacts, can serve to define habitat quality and integrity for plant and animal distributions. Because this method provides an important means for representing the full array of biological diversity as well as habitat integrity in an area, it can also be an effective and efficient tool for conducting natural resource planning.

Purpose

The Vegetation Program has adopted the rapid assessment method to update the location, distribution, species composition, and disturbance information of vegetation types as identified in the first edition of *A Manual of California Vegetation* (MCV), a CNPS publication. The release of the MCV heralded a new statewide perspective on vegetation classification. The premise of the book – all vegetation can be quantified based on cover, constancy, and composition of plant species, yielding uniform defensible definitions of vegetation units – has proven to be very useful throughout California and the rest of the nation. The MCV has become the standard reference on California vegetation and has been adopted by many agencies such as California Department of Fish and Game, the National Park Service, California State Parks, and the U.S. Forest Service as the standard approach to classify vegetation statewide.

One of the most important purposes of rapid assessments is to verify the locations of each vegetation type because much about the geography of vegetation remains uncertain in this state.

To obtain a more accurate understanding of the location and distribution of the vegetation types, nothing short of systematic inventory will suffice. Using the rapid assessment method, CNPS Chapters and other organizations can work together in selected ecological regions to gather vegetation data over a short time period in a broad area. This geographic inventory of vegetation types can greatly advance the current distribution understanding of vegetation.

In addition, California is working with a new vegetation classification, and its parameters are largely untested. The rapid assessment method will be used to gather additional information on species composition, distribution, disturbance effects, and environmental influences of vegetation. Thus, this method will provide modifications to the existing vegetation classifications and information on new types.

This protocol can also be used in tandem with other resource assessment protocols such as wildlife assessments or aquatic/stream assessments. For example, the California Wildlife Habitat Relationships (CWHR) protocols have been used in conjunction with the vegetation assessment protocol to obtain detailed records on habitat quality and suitability for vertebrate animals in terrestrial habitats. The CWHR protocols can also help test the relationships between the vegetation type and habitat of various animals and thereby refine the understanding and predictability of the distribution of animals. A portion of the CWHR protocols is incorporated into the rapid assessment method to obtain suitability information for vertebrate species.

While people can quickly obtain information on the variety of vegetation types using this method, some of the vegetation types recorded in the rapid assessment process may be poorly defined in the current classification system. These poorly understood or unknown types will be identified and located and then will be prioritized for more detailed assessment using the CNPS relevé protocol. Thus, the rapid assessment method will be used in conjunction with the relevé method to provide large quantities of valuable data on the distribution and the definition of vegetation. These data will be entered into existing databases for summarizing and archiving, and they will be used to modify and improve statewide vegetation classification and conservation information.

<u>Why do we need to know about the composition and distribution of vegetation?</u>

- to have a more accurate understanding of the commonness and rarity of different forms of vegetation throughout the state
- to link the distribution of various rare and threatened plant species with the vegetation units
- to provide a clearer picture of relationships between vegetation types
- to help prioritize community-based land conservation goals based on the local representation of unique types, high diversity areas, etc.
- to do the same for regional vegetation throughout the state and the nation.
- to broaden the vegetation knowledge base for California
- to motivate people to do more to help identify, protect, and conserve vegetation in their area
- to link vegetation types with habitat for animals

Selecting stands to sample:

To start the rapid assessment method, stands of vegetation needs to be defined.
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 alpine meadow or tundra types, and some may be several square kilometers in size, such as desert or forest types. 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, a 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.

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

Depending on the project goals, you may want to select just one or a few representative stands of each homogeneous vegetation type for sampling (*e.g.* for developing a classification for a vegetation mapping project), or you may want to sample all of them (*e.g.* to define a rare vegetation type and/or compare site quality between the few remaining stands).

Definitions of fields in the protocol

LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #: Number assigned either in the field or in the office prior to sampling. It is usually denoted with an abbreviation of the sampling location and then a sequential number of that locale (*e.g.* CRRA-001 for Coyote Ridge rapid assessment number 1).

Air photo #: The number given to the aerial photo in a vegetation-mapping project, for which photo interpreters have already done photo interpretation and delineations of polygons. If the sample site has not been photo-interpreted, leave blank.

Date: Date of the sampling.

Name(s) of surveyors: The full names of each person assisting should be provided for the first rapid assessment. In successive assessments, initials of each person assisting can be recorded. Please note: The person recording the data on the form should circle their name/initials.

GPS waypoint #: The waypoint number assigned by a Global Positioning System (GPS) unit when marking and storing a waypoint for the stand location. These waypoints can be downloaded from the GPS into a computer Geographic Information System to depict sample points accurately on a map.

GPS name: The name personally assigned to each GPS unit (especially useful if more than one GPS unit is used to mark waypoints for the project).

GPS datum: (NAD 27) The map datum that is chosen for GPS unit to document location coordinates. The default datum for CNPS projects is NAD 27. However, other agencies and organizations may prefer another datum. Please circle NAD27 or write in the appropriate datum.

Is 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, or circle "No" to denoted the waypoint was taken at a distance from the stand (such as with a binocular view of the stand).

If No cite distance (note ft/m), bearing and view from point to stand: An estimate of the number of feet or meters (please circle appropriate), the compass bearing from the waypoint of GPS to the stand, and the method of view used to verify the plot (*e.g*. binoculars, aerial photo).

Error: ± The accuracy of the GPS location, when taking the UTM field reading. Please denote feet (ft) or meters (m). It is typical for all commercial GPS units to be accurate to within 5 m (or 16 ft.) of the actual location, because the military's intentional imprecision (known as "selective availability") has been "turned off" as of July 2000. Please become familiar with your GPS unit's method of determining error. Some of the lower cost models do not have this ability. If using one of those, insert N/A in this field.

UTM field reading: Easting (UTME) and northing (UTMN) location coordinates using the Universal Transverse Mercator (UTM) grid. Record using a GPS unit or USGS topographic map.

UTM zone: Universal Transverse Mercator zone. Zone 10S for California west of the 120th longitude; zone 11S for California east of 120th longitude.

Elevation: Recorded from the GPS unit or USGS topographic map. Please denote feet (ft) or meters (m), and note if reading is from GPS unit or map. (Please note: Readings taken from a GPS unit can be hundreds of feet off.)

Photograph #'s: Note the roll number, frame number, direction, and the name of the person whose camera is being used. Take at least two photographs from different directions, and describe the location and view direction from compass bearings for each frame. Additional photographs of the stand may also be helpful. (Also, if using a digital camera or scanning the image into a computer, positions relative to the polygon/stand number can be recorded digitally.)

Topography: Check two of the provided features, characterizing both the local relief and the broad topographic position of the area. First assess the minor topographic features or the lay of the area (*e.g.* surface is flat, concave, etc.). Then assess the broad topographic feature or general position of the area (*e.g.* stand is at the bottom, lower (1/3 of slope), middle (1/3 of slope), upper (1/3 of slope), or top).

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

Soil: Record soil texture or series that is characteristic of the site (*e.g.* sand, silt, clay, coarse loamy sand, sandy clay loam, saline, et.). *See soil texture key and code list for types.*

Rock: %Large (optional): Estimate the percent surface cover of large rocks (e.g. stones, boulders, bedrock) that are beyond 25 cm in size.

Rock:%Small (optional): Estimate the percent surface cover of small rocks (e.g. gravel, cobbles) that are greater than 2 mm and less than 25 cm in size.

%Bare/Fines (optional): Estimate the percent surface cover of bare ground and fine sediment (e.g. dirt) that is 2 mm or less in size.

%Litter (optional): Estimate the percent surface cover of litter, duff, or wood on the ground.

%BA Stems (optional): Estimate the percent surface cover of the plant basal area, i.e., the basal area of stems at the ground surface.

General slope exposure (circle one and enter actual º): Read degree aspect from a compass or clinometer (or estimate). Make sure to average the reading across entire stand. "Variable" may be selected if the same, homogenous stand of vegetation occurs across a varied range of slope exposures.

General slope steepness (circle one and enter actual º): Read degree slope from compass (or estimate), using degrees from true north (adjusting for declination). Average the reading over entire stand.

Upland or Wetland/Riparian (circle one): Indicate if the stand is in an upland or a wetland; note that a site need not be officially delineated as a wetland to qualify as such in this context (*e.g.* seasonally wet meadow).

Site history, stand age, and comments: Briefly describe the stand age/seral stage, disturbance history, nature and extent of land use, and other site environmental and vegetation factors. 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.

Type / level of disturbance (use codes): List codes for potential or existing impacts on the stability of the plant community. Characterize each impact each as L (=Light), M (=Moderate), or H (=Heavy). *See code list for impacts.*

VEGETATION DESCRIPTION

Basic alliance and stand description

Field-assessed vegetation alliance name: Name of alliance (series) or habitat following the CNPS classification system (Sawyer and Keeler-Wolf 1995). Please use binomial nomenclature, *e.g. Quercus agrifolia* forest. An alliance is based on the dominant (or diagnostic) species of the stand, and is usually of the uppermost and/or dominant height stratum. A dominant species covers the greatest area (and a diagnostic is consistently found in some vegetation types but not others).

Please note: The field-assessed alliance name may not exist in present classification, in which you can provide a new alliance name in this field. If this is the case, also make sure to denote and explain this in the "Cannot identify alliance based on MCV classification" of the "**Problems with Interpretation**" section below.

Field-assessed association name (optional): Name of the species in the alliance and additional dominant/diagnostic species from any strata, as according to CNPS classification. 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 agrifolia/Toxicodendron diversilobum*). Species in the same stratum are separated with a dash (*e.g. Quercus agrifolia-Quercus kelloggii).*

Please note: The field-assessed association name may not exist in present classification, in which you can provide a new association name in this field.

Size of stand: Estimate the size of the entire stand in which the rapid assessment is taken. As a measure, one acre is about 0.4 hectares or about 4000 square meters.

Adjacent Alliances: Identify other vegetation types that are directly adjacent to the stand being assessed. Specifically, list up to three alliances (or associations or mapping units) by noting the dominant species; also note the distance away in meters from the GPS waypoint and the direction in degrees aspect that the adjacent alliance is found
(e.g. Abies concolor-Pinus ponderosa 50m, 360°/N Arctostaphylos patula 100m, 110°).

Habitat classification per California Wildlife-Habitat Relationships (CWHR)
For CWHR, identify the size/height class of the stand using the following tree, shrub, and/or herbaceous categories. These categories are based on functional life forms.

Tree: Circle one of the tree size classes provided when the tree canopy closure exceeds 10 percent of the total cover (except in desert types), or if young tree density indicates imminent tree dominance. Size class is based on the average dbh (diameter of trunk at breast height). In choosing a size class, make sure to estimate the mean diameter of all trees over the entire stand. Circle the size class 6 multi-layered tree if there is a size class 5 of trees over a distinct layer of size class either 3 or 4 (*i.e.* distinct height class separation between different tree species) and the total tree canopy exceeds 60%.

If tree, list 1-3 dominant overstory species: If tree canopy cover exceeds 10 percent (except in desert types), please list the dominant species that occur in the overstory canopy.

Shrub: Circle one of the shrub size classes provided when shrub canopy closure exceeds 10 percent (except in desert types). 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 provided when herbaceous cover exceeds 2 percent. This height class is based on the average plant height at maturity.

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).

Overall cover of vegetation
Provide an ocular estimate of cover for the following categories (based on functional life forms). 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.

To come up with a specific number estimate for percent cover, first use to the following CWHR cover intervals as a reference aid to get a generalized cover estimate: <2%, 2-9%, 10-24%, 25-39%, 40-59%, 60-100%. While keeping these intervals in mind, you can then refine your estimate to a specific percentage for each category below.

%Overstory Conifer/Hardwood Tree cover: The total aerial cover (canopy closure) of all live tree species that are specifically in the overstory or are emerging, disregarding overlap of individual trees. Estimate conifer and hardwood covers separately. Please note: These cover values should not include the coverage of suppressed understory trees.

Shrub cover: The total aerial cover (canopy closure) of all live shrub species, disregarding overlap of individual shrubs.

Ground cover: The total aerial cover (canopy closure) of all herbaceous species, disregarding overlap of individual herbs.

Total Veg cover: The total aerial cover of all vegetation. This is an estimate of the absolute vegetation cover, disregarding overlap of the various tree, shrub, and/or herbaceous layers.

Modal height for conifer/hardwood tree, shrub, and herbaceous categories (optional)
If height values are important in your vegetation survey project, provide an ocular estimate of height for each category listed. Record an average height value, estimating the modal height for each group. Use the following height intervals and record a height class: 01=<1/2m, 02=1/2-1m, 03=1-2m, 04=2-5m, 05=5-10m, 06=10-15m, 07=15-20m, 08=20-35m, 09=35-50m, 10=>50m.

Species list and coverage
Species (List up to 12 major species), Stratum, and Approximate % cover: (Jepson Manual nomenclature please)
List the species that are dominant or that are characteristically consistent throughout the stand.

When different layers of vegetation occur in the stand, 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. Provide a stratum code for each species listed, based on height, where T (=Tall) is >5 m in height, M (=Medium) is between 0.5 and 5 m in height, and L (=Low) is <0.5 m in height.

Also, provide a numerical ocular estimate of aerial coverage for each species. When estimating, it is often helpful to think of coverage in terms of the cover intervals from the CNPS relevé form at first (*e.g.* <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%). Keeping these classes in mind, then refine your estimate to a specific percentage (*e.g* the cover of species "x" is somewhere between 25 and 50 percent, but I think it is actually around 30%). Please note: All estimates are to be reported as absolute cover (not relative cover), and all the species percent covers may total over 100% when added up because of overlap.

Major non-native species in stand (with % cover): All exotic species occurring in the stand should be listed in this space provided (or they can be recorded in the above Species list). Make sure to give each exotic species an absolute coverage estimate.

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

PROBLEMS WITH INTERPRETATION

Confidence in 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. 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.

Explain: Please elaborate if your "Confidence in Identification" is low or moderate. Similarly, if the field-assessed alliance name is not defined by CNPS's present Manual of California Vegetation (MCV) classification, note this in the space and describe why. In some instances for specific projects, there may be the benefit of more detailed classifications than what is presented in the first edition of the MCV. If this is the case, be sure to substitute the most appropriate and detailed classification.

Other identification problems (describe): Discuss any further problems with the identification of the assessment (*e.g.* stand is observed with an oblique view using binoculars, so the species list may be incomplete, or the cover percentages may be imperfect).

Polygon is more than one type (Yes, No) (Note: type with greatest coverage in polygon should be entered in above section) This is relevant to areas that have been delineated as polygons on aerial photographs for a vegetation-mapping project. In most cases the polygon delineated is intended to represent a single stand, however mapping conventions and the constraints and interpretability of remote images will alter the ability to map actual stands on the ground. "Yes" is noted when the polygon delineated contains the field-assessed alliance and other vegetation type(s), as based on species composition and structure. "No" is noted when the polygon is primarily representative of the field-assessed alliance.

Other types: If "Yes" above, then list the other subordinate vegetation alliances that are included within the polygon. List them in order of their amount of the polygon covered.

Has the vegetation changed since air photo taken? (Yes, No) If an aerial photograph is being used for reference, evaluate if the stand of the field-assessed alliance has changed as a result of disturbance or other historic change since the photograph was taken.

If Yes, how? What has changed (write N/A if so)**?** If the photographic signature of the vegetation has changed (*e.g.* in structure, density, or extent), please detail here.

Simplified Key to Soil Texture (Brewer and McCann, 1982)

Place about three teaspoons of soil in the palm of your hand. Take out any particles <2mm in size, and use the following key to figure out the soil texture (e.g. loamy sand). Then figure out the texture subclass by using the Code List attached (e.g. coarse loamy sand).

A1 Soil does not remain in a ball when squeezed.....sand

A2 Soil remains in a ball when squeezed..... B

B1 Add a small amount of water. Squeeze the ball between your thumb and forefinger, attempting to make a ribbon that you push up over your finger. Soil makes no ribbon.....loamy sand

B2 Soil makes a ribbon; may be very short.....C

C1 Ribbon extends less than 1 inch before breaking.....D

C2 Ribbon extends 1 inch or more before breaking.....E

D1 Add excess water to small amount of soil; soil feels very gritty or at least slightly gritty .....loam or sandy loam

D2 Soil feels smooth.....silt loam

E1 Soil makes a ribbon that breaks when 1–2 inches long; cracks if bent into a ring.....F

E2 Soil makes a ribbon 2+ inches long; does not crack when bent into a ring.....G

F1 Add excess water to small amount of soil; soil feels very gritty or at least slightly gritty.....sandy clay loam or clay loam

F2 Soil feels smooth.....silty clay loam or silt

G1 Add excess water to a small amount of soil; soil feels very gritty or at least slightly gritty.....sandy clay or clay

G2 Soil feels smooth.....silty clay

CALIFORNIA NATIVE PLANT SOCIETY RELEVÉ FIELD FORM CODE LIST

(revised 7/8/02)

IMPACTS

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

MACRO TOPOGRAPHY

00 Bench
01 Ridge top (interfluve)
02 Upper 1/3 of slope
03 Middle 1/3 of slope
04 Lower 1/3 of slope (lowslope)
05 Toeslope (alluvial fan/bajada)
06 Bottom/plain
07 Basin/wetland
08 Draw
09 Other
10 Terrace (former shoreline or floodplain)
11 Entire slope
12 Wash (channel bed)
13 Badland (complex of draws & interfluves)
14 Mesa/plateau
15 Dune/sandfield
16 Pediment
17 Backslope (cliff)

MICRO TOPOGRAPHY

01 Convex or rounded
02 Linear or even
03 Concave or depression
04 Undulating pattern
05 Hummock or Swale pattern
06 Mounded
07 Other

PARENT MATERIAL

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

SOIL TEXTURE

COSA	Coarse sand
MESN	Medium sand
FISN	Fine sand
COLS	Coarse, loamy sand
MELS	Medium to very fine, loamy sand
MCSL	Moderately coarse, sandy loam
MESA	Medium to very fine, sandy loam
MELO	Medium loam
MESL	Medium silt loam
MESI	Medium silt
MFCL	Moderately fine clay loam
MFSA	Moderately fine sandy clay loam
MFSL	Moderately fine silty clay loam
FISA	Fine sandy clay
FISC	Fine silty clay
FICL	Fine clay
SAND	Sand (class unknown)
LOAM	Loam (class unknown)
CLAY	Clay (class unknown)
UNKN	Unknown
PEAT	Peat
MUCK	Muck

DOMINANT VEGETATION GROUP

Trees:

TBSE	Temperate broad-leaved seasonal evergreen forest
TNLE	Temperate or subpolar needle-leafed evergreen forest
CDF	Cold-deciduous forest
MNDF	Mixed needle-leafed evergreen-cold deciduous. forest
TBEW	Temperate broad-leaved evergreen woodland
TNEW	Temperate or subpolar needle-leaved evergreen woodland
EXEW	Extremely xeromorphic evergreen woodland
CDW	Cold-deciduous woodland
EXDW	Extremely xeromorphic deciduous woodland
MBED	Mixed broad-leaved evergreen-cold deciduous woodland
MNDW	Mixed needle-leafed evergreen-cold deciduous woodland

Shrubs:

TBES	Temperate broad-leaved evergreen shrubland
NLES	Needle-leafed evergreen shrubland
MIES	Microphyllus evergreen shrubland
EXDS	Extremely xeromorphic deciduous shrubland
CDS	Cold-deciduous shrubland
MEDS	Mixed evergreen-deciduous shrubland
XMED	Extremely xeromorphic mixed evergreen-deciduous shrubland

Dwarf Shrubland:

NMED	Needle-leafed or microphyllous evergreen dwarf shrubland
XEDS	Extremely xeromorphic evergreen dwarf shrubland
DDDS	Drought-deciduous dwarf shrubland
MEDD	Mixed evergreen cold-deciduous dwarf shrubland

Herbaceous:

TSPG	Temperate or subpolar grassland
TGST	Temperate or subpolar grassland with sparse tree
TGSS	Temperate or subpolar grassland with sparse shrublayer
TGSD	Temperate or subpolar grassland with sparse dwarf shrub layer
TFV	Temperate or subpolar forb vegetation
THRV	Temperate or subpolar hydromorphic rooted vegetation
TAGF	Temperate or subpolar annual grassland or forb vegetation

***Sparse Vegetation*:**

SVSD	Sparsely vegetated sand dunes
SVCS	Sparsely vegetated consolidated substrates