Santa Clara Valley Habitat Plan

CLARIFICATION AND INTERPRETATION

<table>
<thead>
<tr>
<th>Subject</th>
<th>Definition of a Covered Plant Occurrence and Tracking Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarification Number</td>
<td>2017-002b</td>
</tr>
<tr>
<td>Approved</td>
<td>Edmund Sullivan, Executive Officer</td>
</tr>
<tr>
<td>Draft Date</td>
<td>May 30, 2017</td>
</tr>
<tr>
<td>Revision Date</td>
<td>September 29, 2017</td>
</tr>
<tr>
<td>(if applicable)</td>
<td></td>
</tr>
</tbody>
</table>

Category

Covered Plants

There are three related clarification and interpretation memos on covered plants. The first memo, *Covered Plant Survey Timing* (Clarification Number 2017-002a), explores the potential for variances in the appropriate survey window. This memo, *Definition of a Covered Plant Occurrence and Tracking Occurrences* (Clarification Number 2017-002b), evaluates the occurrence definition as described in the Habitat Plan and outlines an adaptive approach to track those occurrences. The third memo, *Assessing Impacts on Covered Plant Occurrences* (Clarification Number 2017-002c), presents the Habitat Plan's guidance on how to assess impacts to covered plant occurrences by covered activities. Collectively the three memos are intended to clarify the requirements of the Habitat Plan's conservation strategy regarding covered plants and provide a detailed implementation strategy based on those requirements.

Topic

Covered Plant Occurrence Definition and Tracking
Definition of a Covered Plant Occurrence and Tracking Occurrences
May 30, 2017, Revised September 29, 2017
Clarification Number: 2017-002b

Issue/Question/Problem Statement

1. How is a plant occurrence defined in the Habitat Plan and how should occurrences be tracked?

2. Specifically, how are occurrences of Santa Clara Valley dudleya (dudleya abramsii ssp. setchellii) defined?

3. How are separate individuals of Santa Clara Valley dudleya identified and counted?

Habitat Plan Guidance

The following text is comprised of Habitat Plan references that address covered plant occurrences. There are references to covered plant occurrence definitions in Chapter 5 Conservation Strategy and Chapter 7 Monitoring and Adaptive Management of the Habitat Plan. Page numbers are provided after each excerpt for reference.

General Guidance

Generally, in the Habitat Plan, a plant occurrence is defined as a group of individuals that are separated by at least 0.25 mile from other groups of individuals of the same species or subspecies. This definition was used to be consistent with how plants are tracked by the California Natural Diversity Database (CNDDB), and to facilitate compliance monitoring by the Habitat Plan (see Chapter 7). (Page 5-45)

In some cases, an occurrence may be equivalent to a population; in other cases, multiple occurrences may form a single population. A biological population may be defined differently for each of the covered plants and is often unknown due to a lack of population data, pollination mechanisms, dispersal, and/or genetic analysis. Therefore, an occurrence provides a single standard by which to measure impacts and conservation for all covered plants. During implementation, the Implementing Entity may conduct monitoring or management actions based on populations, which is a more biologically meaningful unit, especially when reinforced by genetic data. (Page 5-45)

Species-Specific Plan Guidance: Santa Clara Valley Dudleya

One key question that will be addressed early in monitoring implementation is the maximum spacing distance for individuals within the same occurrence. For example, Santa Clara Valley dudleya individuals are patchily distributed, clustering on discrete serpentine rock outcrops. It is likely that plant interactions decrease with increasing distance from rock-outcrop patches. Occurrences are not likely to be discrete entities but rather a continuum of sub-occurrences. However, an operational “boundary” needs to be defined to delineate occurrences for monitoring and management purposes. (Page 7-67)

To successfully manage existing occurrences of Santa Clara Valley dudleya, targeted studies will be conducted to determine the biological definition of a population and the relationship between known occurrences and genetically defined populations. (Page 5-185)
Targeted studies will be used to inform the target occurrence size for management occurrences. For this species [Santa Clara Valley dudleya], the relationship between population and recorded occurrence is unclear. It is possible that multiple occurrences comprise a single population. A preliminary goal of 2,000 individuals per population will be implemented as recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area*, if approved by the Wildlife Agencies, this number will be adjusted as necessary pending research carried out during Habitat Plan implementation to assure viable occurrences of this species. (Page 5-186)

**Background**

There are inconsistencies both in the way the Habitat Plan defines a covered plant occurrence and in the way that covered plant occurrences were counted (Habitat Plan Table 5-16). These inconsistencies evolved as the Plan was developed over multiple years, using multiple types of data collected by different entities and individuals.

During Habitat Plan development, it was important to unify occurrence data derived from a number of different sources to determine the baseline number of occurrences of each covered plant in the Habitat Plan study area. Although the methodology used to develop covered plant occurrences in the Habitat Plan attempted to process the non-CNDDB data in a clear way, the dataset was very large and data collection methodologies differed. To determine the number of occurrences, private (non-CNDDB) plant occurrence data were combined with data from the CNDDB and evaluated against the CNDDB definition of an element occurrence.

Only some of the non-CNDDB data were immediately equivalent to the element occurrence data within the CNDDB (i.e., only some data were consistent with CNDDB without "processing"). In addition, point data—rather than polygon data—were used to document Habitat Plan occurrences. In some cases, the number of data points were equivalent to the number of element occurrences in CNDDB and no further action was needed. For other species, non-CNDDB data were processed to meet CNDDB occurrence criteria (i.e., similar occurrence numbers for the Habitat Plan were assigned to those occurrences that were within 0.25 mile of one another); in effect, lumping multiple point locations into fewer occurrences. If there was no existing CNDDB occurrence, then one occurrence was chosen to act as the Habitat Plan occurrence and any plants identified in the non-CNDDB data within 0.25 mile were included as part of that occurrence. Where an existing CNDDB occurrence was present, non-CNDDB data within 0.25 mile was assumed to be part of that data point.

However, this approach was applied inconsistently; as a small number of Habitat Plan occurrences are not quite 0.25 mile apart and some are more than 0.25 mile apart. The life history of each

---

1 CNDDB 2001. Element/Element Occurrence: Plant taxa in the CNDDB are referred to as "elements." A single "element occurrence" (EO) is a location record for a site which contains an individuals or populations of special status plant species within 0.25 mile of each other and not separated by significant habitat discontinuities. A single occurrence, can have multiple "parts."

2 The number of Habitat Plan data points is equivalent to the number of CNDDB element occurrences for the following species: Tiburon Indian paintbrush, Mt. Hamilton thistle, fragrant fritillary, and Metcalf Canyon jewelflower.
species further confounds these inconsistencies. Some species are found in discrete locations (e.g., Tiburon Indian paintbrush \( \textit{castilleja affinis} \text{ spp. neglecta} \)) while others are found across larger landscapes mosaics (e.g., Santa Clara Valley dudleya).

The Habitat Plan conservation strategy for covered plants is generally built upon the definition of an occurrence as determined by CNDDDB, which are individuals separated by 0.25 mile or less\(^3\). This definition was also meant to facilitate compliance monitoring. Unfortunately, 0.25 mile may not be an accurate metric when considering the life history of some species, and cannot always accurately depict the relationship between occurrences or potential factors affecting the distribution of plants across the landscape. This is why occurrences for some species are equivalent to populations while others are not.

**Analysis**

For the purposes of the Habitat Plan and the analysis, occurrences are equivalent to populations for all species except for Santa Clara Valley dudleya (Table 5-16) and Mt. Hamilton thistle (\( \textit{cirsium fontinale} \text{ var. campylon} \), page 5-183). An occurrence provides a single standard by which to measure impacts and conservation for all covered plants. This definition was used to be consistent with how plants are tracked by the CNDDDB, and to facilitate compliance monitoring by the Habitat Plan. Identifying the boundary for one occurrence to the next may be a challenge as individuals may be widely distributed across suitable habitat (e.g., smooth lessinga \( \textit{lessingia micradenia} \text{ var. glabrate} \)), Metcalf Canyon jewelweed \( \textit{streptanthus albidos} \text{ ssp. albidos} \), most beautiful jewelweed \( \textit{streptanthus albidos} \text{ ssp. peramoenos} \), Santa Clara Valley dudleya). The section \textit{Occurrence Surveys and Tracking} provides guidance for assessing the occurrence extent.

For Tiburon Indian paintbrush, Coyote ceanothus (\( \textit{ceanothus ferrisiae} \)), fragrant fritillary (\( \textit{fritillaria liliacea} \)), Loma Prieta hoita (\( \textit{hoita strobilina} \)), smooth lessinga, Metcalf Canyon jewelweed, most beautiful jewelweed an occurrence is equivalent to a population. For these plants, a plant occurrence is defined as a group of individuals “within 0.25 miles and not separated by significant habitat discontinuities”\(^4\), consistent with the definition of a CNDDDB element occurrence.

For Santa Clara Valley dudleya and Mt. Hamilton thistle, multiple occurrences may form a single population; however, the unit of occurrence is still used to measure impacts and conservation. The following paragraphs provide guidance on the definition of an occurrence for these species. This definition is to be used for determining an occurrence.

For Mt. Hamilton Thistle, the definition of an occurrence for this species depends on the location. An occurrence on the east side of Coyote Valley is defined as all occurrences in a discrete drainage. Series of interconnected drainages are likely linked by gene flow and thus multiple points are considered one occurrence. On the west side of Coyote Valley is defined as a specific occurrence point because the western occurrences are more likely to occur at isolated points rather than in a network of drainages. Here, Mt. Hamilton thistle occurs more as discrete occurrences in pond or

---

\(^3\) This definition was used for all species except for Santa Clara Valley dudleya, which is defined as rock outcrop.

seep environments, not multiple occurrences along a long drainage (J. Hillman pers. comm.) (page 5-183).

For Santa Clara Valley dudleya, the unusual nature of its distribution and/or dispersal makes it difficult to determine if an occurrence is equivalent to a population and this will likely remain unresolved until comprehensive genetic and demographic studies are undertaken. In the meantime, in order to clarify and track impacts and preservation ratios for the purposes of Habitat Plan implementation for this species, the following definitions of occurrence and/or individual are provided as guidance.

For Santa Clara Valley dudleya, a distinct occurrence is defined ecologically as a group of individuals on a rock outcrop or on clusters of rock outcrops which are separated by less than 0.25 mile. A different definition of an occurrence was used for this species because of its unique clumped distribution on rock outcrops. (Page 5-45).

It can be difficult to count individual dudleya plants as they can often appear clumped together on rocky outcroppings. Multiple individuals may have seeded next to each other, having the appearance of one plant, or a single individual plant may have multiple rosettes (Figure 1, 2, and 3). Multiple rosettes in Santa Clara Valley dudleya appear to be common, and may result from herbivory or other damage to the apex (stem). To provide guidance on how to count an approximate number of individuals in an occurrence, the following method was developed in consultation with Stephen McCabe, the author of *Dudleya* in The Jepson Manual, 2nd Edition (Baldwin et al. 2012; see also Stephen McCabe, personal communication to Janell Hillman, January and May 2017). In Santa Clara Valley dudleya specifically, the plants can commonly branch if the apex (stem) is damaged (such as by moth larvae or by herbivory from rodents). Therefore, counting every rosette can be time consuming, will result in an artificially high number of individuals counted and will not be an accurate census of an occurrence. A more accurate method is to count as one individual either one rosette or a cluster of rosettes, that have no visible separation from other rosettes. If there is visible separation between plants, they would be counted as separate individuals (Figure 4).

In addition, plant occurrences (those counted in the Habitat Plan as well as new occurrences discovered during Habitat Plan implementation) will also be defined and tracked based on the CNDBDB approach for defining element occurrences. This approach is described below in *Occurrence Surveys and Tracking*.

**Determination**

**Occurrence Surveys and Tracking**

Surveys for covered plants will be conducted per Habitat Plan requirements.

1. Surveys for covered plants will be conducted by qualified botanists and will occur either prior to impact or when an occurrence is evaluated as part of the Reserve System monitoring and assessment.
2. If occurrences are found during plant surveys, data will be collected consistent with Habitat Plan requirements. Occurrence boundaries may be redrawn, consistent with the methodology described under Implementation and Adaptive Management below.

3. The full occurrence extent, size, distribution, and quality must be assessed as part of surveys. In some cases, plant occurrences may extend beyond the boundaries of the subject property. A qualified botanist shall look at locations of known occurrences, soils map, and plant survey area to assess if there is a likelihood for the plant occurrence to extend beyond the property.
   - If the landowner agrees, the qualified botanist will obtain access to the adjacent sites on which the rest of the plant occurrence is located, and surveys will include the entire occurrence.
   - If access to adjacent site(s) is not possible, or if for some other reasons it is not feasible to survey the entire occurrence, then an alternative will be developed to estimate the extent and condition of the adjacent portion of the occurrence. This can include the use of binoculars or a spotting scope to estimate total occurrence size and condition, or subsamples of representative density using a quadrat or other method to extrapolate total occurrence size.
   - If only a small portion of the occurrence is on adjacent properties (estimated using the above methods), then only the portion of the occurrence on the subject site will be monitored and assessed for viability, but the total occurrence size will still be estimated if feasible.

If impacts to the occurrence are being assessed, refer to Assessing Impacts on Covered Plant Occurrences (Clarification Number 2017-002c).

4. Each occurrence will be given a unique ID, the number of individual plants within that occurrence will be counted, the location will be recorded with a GPS and a photo will be taken.

5. The data collected during the surveys will be compared to the existing Habitat Plan data to determine which are known occurrences and which are new occurrences.

6. The qualified botanist may make an initial determination on the boundary of the occurrence (i.e., if it is a new occurrence or an expansion/reduction of an existing occurrence) based on the field data collected and Habitat Plan data.

Any justifications for occurrence modifications will be based on the parameters described in NatureServe's Population/Occurrence Delineation and Viability Criteria (NatureServe 2015), which identifies populations/occurrences “based on barriers, distances, or factors that separate one occurrence from another,” and on professional judgement of the biologist conducting the survey(s). Ideally modifications will be based on the collection and analysis of comprehensive genetic and demographic data.

Santa Clara Valley Dudleya

The analysis above clarifies the Santa Clara Valley dudleya occurrence definition and size estimation methods. A distinct occurrence is defined ecologically as a group of individuals on a rock outcrop or
Definition of a Covered Plant Occurrence and Tracking Occurrences
May 30, 2017, Revised September 29, 2017
Clarification Number: 2017-002b

on clusters of rock outcrops which are separated by less than 0.25 mile. To estimate occurrence size, an individual plant may have either one or many rosettes, and is counted as a separate individual when there is visible distance between rosettes. This will provide a fairly accurate total number of individuals in an occurrence. While no method of distinguishing separate individuals is completely accurate in this taxon, the comparison year-to-year or between occurrences will be proportionately accurate as long as the same method is used (Stephen McCabe, personal communication to Janell Hillman, January 2017).

Implementation and Adaptive Management

Consistent with the conservation strategy requirement, monitoring results of covered plant occurrences, in conjunction with genetic data from special studies, will be used to evaluate if the 0.25 mile definition for a plant occurrence requires modification. Qualified botanists may record the occurrence based on distance, but will also note the characteristics of areas between occurrences. Barriers that might limit genetic interaction between two occurrences will be identified (e.g., land cover types, major roadways, water bodies, urbanization, agricultural lands) as a way to better understand the potential population dynamics between occurrences. Landscape photos of land cover types and habitat features will be included as part of monitoring. Data collection on each occurrence will allow the Habitat Agency to better understand the nature of occurrences and populations within the permit area. This methodology will also help to resolve the inconsistencies in the occurrence definition between different species of covered plants by providing a systematic way to evaluate and track all occurrences encountered during covered activity implementation or protected in the Habitat Plan Reserve System.
Definition of a Covered Plant Occurrence and Tracking Occurrences
May 30, 2017, Revised September 29, 2017
Clarification Number: 2017-002b

Figure 1. Santa Clara Valley dudleya with herbivory. Three rosettes with no separation between them means this would be counted as one individual.

Figure 2. Same plant as Figure 1, showing a single stem supporting the three rosettes.

Figure 3. Santa Clara Valley dudleya, showing twelve rosettes with no separation between them. This would be counted as a single individual.

Figure 4. Five individuals of Santa Clara Valley dudleya.