California Natural Diversity Database (CNDDB)

Management Framework

California Department of Fish and Wildlife

Biogeographic Data Branch

California Natural Diversity Database

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Disclaimer:

This document describes the current status and management practices of the California Natural Diversity Database (CNDDB). It is up to the user to make sure CNDDB data and resources are properly understood and interpreted. Please contact CNDDB program staff for any questions.

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Introduction

The purpose of this document is to provide a general overview of the California Natural Diversity Database (CNDDB), its background, products, and proper use. CNDDB program staff should be contacted directly to answer any specific questions regarding the program or its data.

Mission Statement

The mission of the California Natural Diversity Database program is to advance conservation of California's natural heritage and at-risk ecological resources through collecting, synthesizing, and sharing biological information.

The CNDDB Program

The CNDDB program is a natural heritage program and is part of a nationwide network of similar programs overseen by NatureServe. There are currently 80+ natural heritage programs throughout the western hemisphere. The main objective of all natural heritage programs is to provide location, natural history, and rarity status information on special status plants, animals, and natural communities to the public, government agencies, and conservation organizations. The data help drive conservation decisions, aid in the environmental review of projects and land use changes, and provide baseline data helpful in recovering rare taxa and for use in research projects.

The CNDDB program is housed within the Biogeographic Data Branch of the California Department of Fish and Wildlife (the Department) in Sacramento. The CNDDB program distributes textual data to subscribers via the online application RareFind 5 and distributes spatial data via Geographic Information System (GIS) products. In addition,

users without GIS software can view CNDDB spatial data through the Department's online map viewer, BIOS.

Background

The CNDDB program was first established as California's natural heritage program by The Nature Conservancy in 1979 and transferred to the Department in 1981 via Fish and Game Code Chapter 12 Section 1932. This section of the Fish and Game Code established the Significant Natural Areas Program and designated the CNDDB as the database management system that the Department will use to maintain, expand, and keep current information on California's natural resources. In addition, Section 1932 of the Fish and Game Code mandates that all who use the CNDDB share in its cost and an appropriate schedule of compensation is to be paid by individuals using the CNDDB. For this reason, the CNDDB is a subscription database and users of the data are subject to the terms and conditions outlined in a formal license agreement.

When the CNDDB program was established in 1979, occurrences were mapped on paper USGS topographic maps (1:24,000 scale) using colored dots (see Figure 1). The paper maps were later "digitally processed" into a CAD (Computer Aided Design) system and the associated text information was entered into an early style database. Subscribers then received semi-transparent map overlays for the USGS 7.5' topographic quadrangle requested plus text printouts of the relevant occurrences.

Figure 1. Example of the original CNDDB mapping protocol using paper USGS topographic map with colored dots representing CNDDB occurrences and handwritten notes in margins.

In the late 1980s and early 1990s, GIS became more widely available and the CNDDB program became the first natural heritage program, and the first program in the Department, to move to a GIS-based database. In addition to using GIS for spatial data, the CNDDB program developed RareFind, a computer program which gave CNDDB subscribers easy access to the attribute information associated with the spatial data. When developed in the 1990s, RareFind was a PC application that was distributed each month to subscribers via compact disc. RareFind has undergone several iterations over

the years and moved to an online application available to subscribers through a user name and password system in 2009.

Special Status Taxa

The CNDDB includes data on "special status taxa," which is a broad term used to describe all plants, animals, and natural communities tracked by the CNDDB program, regardless of their legal protection status. The term "element" is often used when referring to what is tracked. This is because in addition to tracking the full California distribution of distinct taxa (i.e., species, subspecies, and varieties), the CNDDB program will also track distinct portions of a taxon's range (Evolutionarily Significant Unit (ESU) and Distinct Population Segment (DPS)[1]), as well as assemblages of species (legacy data on terrestrial and aquatic communities).

The CNDDB includes all taxa that are listed by the California Endangered Species Act (CESA), as well as most federally listed taxa that occur in California. Additionally, the CNDDB includes elements that are considered rare by experts, but that have not undergone the rigorous steps necessary to become officially listed through CESA. For plants, this includes all taxa assigned a California Rare Plant Rank (CRPR), and for animals this can include elements identified as CDFW Species of Special Concern (SSCs), Species of Greatest Conservation Need under the State Wildlife Action Plan, or those identified by other agencies or organizations as taxa of concern. NatureServe conservation status ranks also come into play when determining which elements are

[1] For more information on the definitions of an Evolutionarily Significant Unit (ESU) and Distinct Population Segment (DPS) under the US Endangered Species Act, see Federal Register 61:26 (Feb 7 1996).

included in the CNDDB (see the Conservation Status Ranks section of this document for additional information).

The process for deciding which elements should be included in the CNDDB varies across taxonomic groups. For plants, CNDDB program botanists work in collaboration with the California Native Plant Society (CNPS) to determine what should be tracked as a special status plant and assigned a CRPR[2]. Decisions for animal taxa are typically evaluated on a case-by-case basis by communication and coordination with experts.

The CNDDB program periodically updates the publicly available lists of plants and animals included in the CNDDB. These lists are posted on the CNDDB program website as the Special Vascular Plants, Bryophytes, and Lichens List and the Special Animals List.

Natural Communities

The CNDDB program has included sensitive natural communities in its database since its inception in 1979. These natural communities were based on Robert Holland's 1986 classification called "Preliminary Descriptions of the Terrestrial Natural Communities of California". In the mid-1990s, funding for the natural communities portion of the CNDDB program was halted and no new natural communities have been added or updated in the CNDDB since that time. The natural community information in the CNDDB is considered legacy data and has remained in the CNDDB for informational purposes but should not be used as the sole source of information on vegetation.

[2] For additional information on the CNDDB/CNPS rare plant status review process, see The California Natural Diversity Database (CNDDB) and California Native Plant Society (CNPS) Rare Plant Status Review Process.

The natural community classification system has since been replaced by the Survey of California Vegetation (SCV) as the state standard for vegetation classification. The Department's Vegetation Classification and Mapping Program (VegCAMP) has been working on classifying vegetation types using the state standard and should be contacted for any questions related to vegetation and natural communities.

CNDDB Data

As a natural heritage program, CNDDB program staff use methodology based on standards outlined by NatureServe for all natural heritage programs to follow. Primarily, CNDDB program staff utilize the NatureServe Element Occurrence Data Standard for defining, mapping, and assessing locations of conservation priority for individual taxa. Additionally, NatureServe's Conservation Status Assessments are used to evaluate and assign standardized ranks that measure the risk of extinction for a given element at the state, national, and global level. Conservation status assessments and ranks are discussed in more detail in the Conservation Status Ranks section of this document.

Below are descriptions of a few key terms important for understanding CNDDB data. A complete list of definitions for all CNDDB fields can be found in the CNDDB metadata.

Element Occurrences

The CNDDB includes special status species information in the form of element occurrences. An element is a plant, animal, or natural community that is tracked in the CNDDB. An element occurrence (also referenced as an EO or occurrence) is a specific location where an element has been known to occur, and that has practical conservation value. Rather than representing individual observations, CNDDB EOs represent a summary of all observation information for a documented location of an

element, which can potentially include several years of data summarized into a single record. EOs can change in size and shape over time as new information is received.

Since EOs are used by all NatureServe programs, they can be compared across jurisdictions to assess conservation value of an element throughout its range. By compiling individual observations into meaningful EOs, the individual data are transformed into a useful tool for conservationists, researchers, and land managers.

Element Occurrence Definitions

What an EO represents depends on the EO definition for the element; this will vary between plants and animals, and between animal taxa. In general, any observation of a plant will be turned into an EO since the location a plant is found is also where reproduction and important life history events take place. However, for animals, determining what to track as an EO can be more difficult since where an animal is observed is not necessarily an area that is of conservation importance. For example, a record of a bird flying over a site may not indicate that the site has any real importance for the conservation of the species. In general, animal occurrences represent breeding localities for birds and resident populations for other taxa, since these are the observations that are most essential to the conservation of the animal species. The EO definitions for individual animals can be found in the Special Animals List.

Element Occurrence Separation Distances

Determination for when observations should be grouped into a single EO or made into multiple EOs is made by CNDDB program biologists. In general, a default separation distance of one-quarter mile is used to determine when a population should be considered a single occurrence or multiple occurrences. In other words, if two populations are separated by a distance less than one-quarter mile, and there are no significant barriers between them, they are considered part of the same EO.

EO numbers are assigned sequentially as they are added to the database. EO numbers are not based on importance of the EO to conservation (i.e., EO #1 is not necessarily more important than EO #50). Once an EO number has been used, it is not reused later. Therefore, there may appear to be EO numbers missing for some elements if EOs have been deleted due to misidentification, merging of EOs, or other factors.

Element Occurrence Types and Rankings

There are many benefits to tracking EOs instead of simple observations. EOs are data-rich records that track the status of a particular element at a particular site through time, and can be used to determine the conservation value of a site. Each EO record can be assigned certain attributes or ranks to help in identifying the status of the EO. These attributes include:

- **Occurrence type**. In addition to native/natural populations, EOs that are transplants or introduced populations are also included in the CNDDB. For some zoology elements, refugium/artificial habitats are tracked as well. Separating out non-natural from native/natural occurrences can be an important distinction to make when looking at the status of EOs for conservation purposes. The options for the occurrence type category in the CNDDB are:
    - Native/natural occurrence
    - Transplant outside of native habitat/range
    - Introduced back into native habitat/range
    - Refugium; artificial habitat/occurrence
- **Presence type**. This category is used to identify which EOs are presumed extant (present) and which are extirpated or possibly extirpated. Generally, EOs are maintained as presumed extant unless there is sufficient documentation to support a change to extirpated or possibly extirpated. Such documentation includes aerial imagery showing extreme habitat modification, or survey results

that have determined the area does not contain the element. Since EOs are often rediscovered when the area is thoroughly surveyed, historical records are rarely designated as extirpated or possibly extirpated based on age of data alone. EOs that no longer contain the element (extirpated and possibly extirpated) are not removed from the CNDDB as they can be useful to help identify downward population trends for an element through time. The options for the presence type category in the CNDDB are:

  - Presumed Extant
  - Possibly Extirpated
  - Extirpated

- **Trend rank**. When there are multiple years of survey data for an EO, a trend rank can be assigned to indicate how that particular population is trending over time. The options for the trend rank category in the CNDDB are:
  - Increasing
  - Stable
  - Decreasing
  - Fluctuating
  - Unknown
- **EO rank** (sometimes referred to as overall site quality or occurrence viability). This rank is extremely important and helps in determining which occurrences are of higher conservation value. Below are brief descriptions of the EO ranks used in the CNDDB:
  - **Excellent (A rank)**: Population is large and healthy with positive signs of reproduction for the taxon AND habitat in excellent condition. Habitat may show some minor disturbances such as the presence of some invasive species, dirt roads, etc. Population is expected to be viable at this site for at least 20-30 years, assuming nothing changes.

- **Good (B rank)**: Population is in very good condition and fairly large with positive signs of reproduction for the taxon AND habitat in reasonably good condition. Some disturbances may exist including dirt roads, weed encroachment, nearby incompatible land uses, logging nearby, grazing, etc., but none so severe as to seriously impair species' ability to persist over at least the next 20-30 years.
- **Fair (C rank)**: Population is small and/or potentially not very viable OR habitat in disturbed, fragmented, or otherwise suboptimal condition. Disturbances are more severe and can include nearby development, heavy recreational use, ORV use and damage, heavy weed infestation, and more. Population is not expected to persist in the long term.
- **Poor (D rank)**: Population is very small and/or non-viable. Habitat may be in good condition, but usually it is not and shows multiple disturbances and features of degradation. Population is not expected to persist.
- **None (X rank)**: This is the rank assigned to occurrences that are extirpated or possibly extirpated.
- **Unknown (U rank)**: This is the default rank assigned to occurrences that have no site quality or occurrence viability information.

Sources

Every EO is based on one or more source records. CNDDB program staff rarely collect their own data. Instead, information is obtained from secondary sources such as biological consultants, CDFW and other agency biologists, academics, researchers, and conservation groups such as CNPS and others. In addition, the CNDDB includes source records from herbarium and museum collections as well as citizen science observations. The CNDDB has over 250,000 source records with hundreds of additional source records added every month. These source records are the backbone of the CNDDB and are

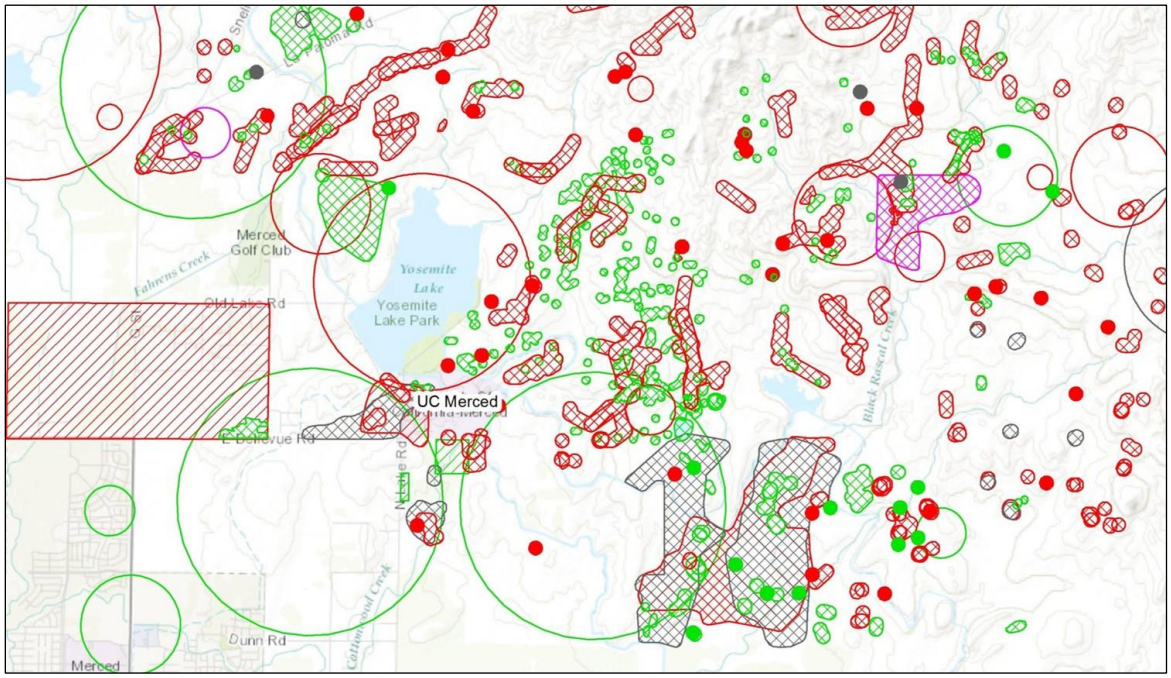
retained in program files to provide supporting documentation for every one of the 95,000+ EOs currently in CNDDB.

All CNDDB source records are given a 10-character code (called a source code) that is used to easily reference and track the source record within CNDDB program files. Source records can be provided to users if more detailed information is needed about a particular EO or if there is a question as to the validity of the EO. CNDDB program staff should be contacted if copies of the source records used to create an EO are needed by the user.

Graphic Accuracy Classes

Spatial data for CNDDB EOs are represented on maps by circles and polygons (see Figure 2). These features can be specific or non-specific, and the different sizes and patterns of the symbols indicate the level of location detail provided in the source document(s) (see Figure 3 for CNDDB official layer symbology). CNDDB EOs are also displayed in different colors: Features in green are plants, features in red are animals, features in purple are terrestrial communities, features in blue are aquatic communities, and features in gray have multiple elements known from the same site.

Figure 2. CNDDB EOs in the vicinity of UC Merced as an example of the varying colors, shapes, and sizes of CNDDB spatial data.



Specific features represent locations that have a high degree of precision and accuracy. There are two main categories of specific features in the CNDDB.

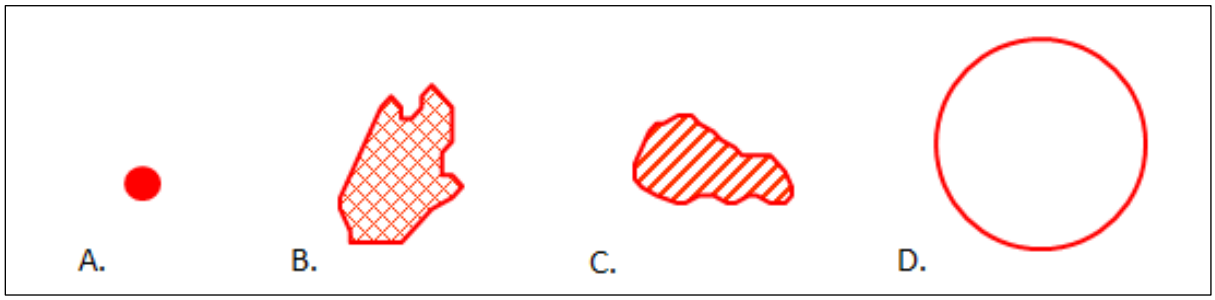
- **80-meter radius circles** are one of the smallest spatial features in the CNDDB. Specific polygons can be even smaller, down to 30-meter radius circles. Many plants are mapped as extremely small specific polygons while animals are very rarely mapped smaller than 80-meter radius circles. 80-meter radius circles are usually used to represent GPS points.
- **Specific polygons** indicate the locational data received was very precise and the submitter outlined where the element was observed. Specific polygons could represent a series of GPS points or a delineation of the population area occupied.

Non-specific features are more general and indicate that an observation was made somewhere within the bounded area, but there may not be enough detail provided to

know exactly where. There are two main categories of nonspecific features in the CNDDB.

- **Non-specific circles** range in size from 1/10, 1/5, 2/5, 3/5, 4/5, 1, and 5 mile radius. Non-specific circles are used to indicate data with varying levels of uncertainty. A vague specimen locality may reference the nearest town, a general area such as a meadow, or a distance from a known landmark (e.g., about 2 miles east of Big Prospector Meadow); these will often be mapped as a 1 mile radius circle around the center of the town (centered on the main post office) or the center of the named feature. It is important to remember that larger circles do not indicate more of the rare element occurring in a larger area; it means there is greater locational uncertainty, and the element likely occurred somewhere within the circle, but the exact location is unknown.
- **Non-specific polygons** are used to indicate an area where an element is known to occur, but the exact location of the observation within the mapped area is unknown. The data submitter may have provided a vague map, or indicated the element was found somewhere along a lakeshore, following a topographic feature such as a ridge, along a road, etc. Non-specific polygons may also represent project boundaries or Public Land Survey System (PLSS) sections when it is unknown where within that area the element was found.

Figure 3. CNDDB official layer symbology. A. Specific 80-meter radius circles are represented in the CNDDB by solid circles. B. Specific polygons are represented in the CNDDB by cross-hatched lines. C. Non-specific polygons are represented in the CNDDB by diagonal lines. D. Non-specific circles of varying radius are represented in the CNDDB by open circles.



Conservation Status Ranks

Conservation status ranks were developed by NatureServe to assess the conservation status of species and ecosystems across geographic scales using standard methods. The NatureServe methodology for determining conservation status ranks has been evolving since 1978 with significant improvements and refinements made in subsequent years.

One of the most important advancements in determining conservation status ranks was the development of the rank calculator which improves the transparency and repeatability of the assignment of ranks. The rank calculator groups core status rank factors into three categories: rarity, threats, and trends. These factors are scaled and weighted within the calculator according to their impact on risk. The factors are then scored for the element in question to generate a rank that is subsequently reviewed and adjusted (if appropriate) by a biologist before a final conservation status rank is assigned.

These conservation status ranks are used by all NatureServe programs and are a valuable resource to help determine which species and ecosystems are thriving and which are rare or declining and in need of conservation or action.

Overview of Conservation Status Ranks

NatureServe's conservation status ranks are assessed at a global, national, and subnational level. For the purposes of the CNDDB, a global rank (G rank) and a state rank (S rank) are assigned to all elements tracked in the database. Each element is assigned a global rank and a state rank consisting of a numerical value (1 to 5) with 1 representing a status of critically imperiled to 5 representing a status of secure. Uncertainty in the exact status of an element can be expressed as range ranks (e.g., G3G4 to express uncertainty as to whether an element is a G3 or G4) and modifiers can be added to some of the ranks to denote questionable taxonomy (e.g., G3Q) or inexact numeric ranks (e.g., S3? to indicate the element is most likely an S3 but there is a significant chance the element could be an S2 or S4). In rare instances where an element is only extant in cultivation or captivity, a "C" modifier can be added to denote that the element is extinct in the wild across its native range but present in cultivation or captivity (e.g., G1C).

Global Ranks

Global ranks (G ranks) reflect the status of a species throughout its worldwide range. Global ranks are assigned at the full species level. When assessing the status of a subspecies or variety, a trinomial rank (T rank) is also assigned indicating the status of the subspecies or variety throughout its worldwide range. Below are the main categories of global ranks:

- GX- Presumed extinct

- GH- Possibly extinct; known only from historical occurrences but there is still some hope of rediscovery.
- G1- Critically imperiled; at very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
- G2- Imperiled; at high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
- G3-Vulnerable; at moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
- G4-Apparently secure; at fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
- G5-Secure; at very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

State Ranks

State ranks (S ranks) reflect the status of a species, subspecies, or variety statewide. Below are the main categories of state ranks:

- SX- Presumed extirpated
- SH- Possibly extirpated; known only from historical occurrences but there is still some hope of rediscovery.
- S1- Critically imperiled; at very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

- S2- Imperiled; at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
- S3-Vulnerable; at moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
- S4-Apparently secure; at a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
- S5-Secure; at very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

Conservation Status Rank Example

Viviparous foxtail cactus (*Coryphantha vivipara* var. *rosea*; Figure 3) has a NatureServe conservation status rank of G5T3 S1.

- G5 represents the global rank for the full species *Coryphantha vivipara*. The full species (including all eight varieties) is common in western North America and occurs in a wide range of habitats and elevations. *Coryphantha vivipara* has a G rank of G5 as it is believed to be secure from extinction in its global range.

Figure 4. Photo of Coryphantha vivipara var. rosea, photo © 2012 Cindy Hopkins.

- T3 represents the global rank for the variety *Coryphantha vivipara* var. *rosea*. The variety is found on limestone slopes and gravelly areas in woodland or desert mountains between 5000 and 9000 feet in elevation. It is known from three states (California, Arizona, and Nevada) and is more common in Arizona and Nevada than in California. *Coryphantha vivipara* var. *rosea* has a T rank of T3 as it is believed to be vulnerable to extinction in its global range.
- S1 represents the state rank for the variety *Coryphantha vivipara* var. *rosea*. The variety is known from just 20 occurrences in California with half of those occurrences historic (not seen in the last 20 years). *Coryphantha vivipara* var. *rosea* has an S rank of S1 as it is considered critically imperiled within California.

Data Submission

The CNDDB is only as good as the data received, and the program relies almost entirely on stakeholders to submit their observations. The CNDDB program accepts data on rare species in several formats. The method of submission will likely depend on the amount of data that was collected, the format the data was collected in, and the type of project being carried out. For all data submissions, the more information that is provided on population size, site condition, threats, etc., the better CNDDB program staff can assign an accurate element occurrence rank to the site. The element occurrence rank is then taken into consideration when determining rarity status of the element and when prioritizing sites for conservation purposes.

Online Field Survey Form

For single species observations, the preferred submission method is via the CNDDB online field survey form (oFSF). Data submitted through the oFSF application are saved directly as GIS data for easier incorporation into CNDDB occurrences. In addition, the oFSF application allows the data submitter to save their oFSF submission as a PDF report and allows the data submitter to view all of their previous oFSF submissions. Another advantage of submitting data through the oFSF application is that oFSF submissions that are not currently mapped into CNDDB occurrences are available for viewing within the CNDDB layer in BIOS the following month.

Digital Data (GIS, Databases, Excel Files)

Digital data are accepted in several formats including GIS shapefiles, DBF files, Microsoft Access databases, or tabular formats (such as Excel tables). This type of data submission is especially useful for large amounts of data. See Guidelines for Submission of Spatial Data to the CNDDB for additional information. An Excel table data submission template

is also available for download from the CNDDB program webpage, under the Digital Data tab.

PDF Field Survey Form

While users are highly encouraged to use the online field survey form, a PDF version of the field survey form is available for those who prefer to not use the online version. These forms can be mailed to the CNDDB (P.O. Box 944209, Sacramento, CA 94244-2090) or submitted electronically by sending an email to CNDDB@wildlife.ca.gov.

Reports

The CNDDB program will accept reports as a form of data submission. Reports are best submitted in conjunction with field survey forms or digital data to provide context for the surveys performed. However, the CNDDB program will accept reports as the sole form of data submission as long as they contain location information on the rare element observed (maps or coordinates) and some additional information about those observations (such as date observed and population sizes).

Personal Communications

For brief updates about previously documented occurrences, or to notify the CNDDB program of misidentified occurrences, simply send an email to CNDDB@wildlife.ca.gov with the updated information.

Data Entry

The CNDDB includes over 900 rare animal taxa and 2,400 rare plant taxa. In addition, the CNDDB has over 95,000 element occurrence records for those rare taxa and CNDDB program staff add or update about 500 occurrences each month. Maintaining information on all of California's rare taxa is a huge undertaking with a limited number

of CNDDB program staff and resources. In addition, CNDDB program biologists spend a great deal of time researching the elements being mapped, gathering information, and synthesizing that information into data-rich element occurrence records; all CNDDB occurrence records are reviewed by at least two CNDDB program biologists before the data are made available to users. This attention to detail makes CNDDB data a value-added product that is very high quality, but it can also be a time intensive process. For this reason, not all data can be immediately mapped into the CNDDB and certain records or taxa are prioritized over others for data entry.

Data Prioritization

The CNDDB program prioritizes data entry and updates based on a variety of factors, such as: whether the species is currently undergoing review for state or federal listing; whether certain regions are working on Habitat Conservation Plans (HCPs) or Natural Community Conservation Plans (NCCPs); how much data is waiting to be entered; if a significant amount of new data for the species has been received; or if special funding has been provided to work on a particular species or area.

If a user has data that is a high priority to be entered into the CNDDB, the user can send an email to CNDDB@wildlife.ca.gov and staff will make every effort to accommodate the request. It is important that CNDDB data are useful and valuable to subscribers, so users are encouraged to contact the CNDDB program directly. CNDDB data is updated the first Tuesday of each month so please keep this in mind when making requests for data entry; requests made at the very beginning of the month may not be reflected in the CNDDB until the following month's data distribution (or possibly later) depending on how time intensive the request is.

Data Errors

The goal of the CNDDB program is to provide high quality data to users. If errors are encountered in CNDDB data, CNDDB program staff should be notified immediately by sending an email to CNDDB@wildlife.ca.gov. The email should explain the issue, providing supporting documentation if necessary, and staff will work to fix the error as soon as possible.

Data Access

CNDDB data are available in a variety of formats. As a subscription-based service, distribution of precise location data is limited to CDFW staff and subscription users only. These tools and resources are typically updated with new data on the first Tuesday of every month.

The CNDDB is comprised of two data components, text information and spatial information. Text information is available through RareFind 5 and provides essential information about special status species and occurrences. Spatial information is available through GIS downloads or can be viewed in the BIOS Viewer. Spatial information is important but MUST be used in conjunction with the text information in order to fully understand and appreciate the different aspects of the occurrence.

The CNDDB is constantly evolving with over 500 occurrences added or updated every month. Therefore, it is essential that users access the most current version of the CNDDB. While RareFind 5 is updated automatically every month, GIS data users should download a new copy of the CNDDB GIS data each month so that they are using the most up-to-date version of the CNDDB.

CNDDB Subscriptions

CNDDB data is distributed to users as either a government version or a commercial version. The only difference between the two versions is that the commercial version has a small percentage of the occurrences (~1%) generalized to the 7.5-minute USGS quadrangle level. This suppression of data is most commonly done for elements and/or occurrences that are highly vulnerable to collectors, but can also be done at the request of the data submitter due to private property restrictions or other reasons. When a commercial subscriber comes across a suppressed occurrence near their project site, CNDDB program staff should be contacted and a map or coordinates of the project site provided. CNDDB program staff will then provide the commercial subscriber with additional information about the suppressed record and how close it is to the subscriber's project site.

Generally, government CNDDB subscribers consist of state and federal agencies, conservation organizations, and researchers. Commercial subscribers consist mainly of environmental consultants and other private industries. For additional information about subscribing to the CNDDB or managing a CNDDB subscription, please visit the CNDDB program's subscription webpage.

For non-CNDDB subscribers, the CNDDB QuickView Tool is free and publicly available (see the CNDDB QuickView Tool section of this document for additional information) and PDF maps and text reports can be purchased on a quadrangle by quadrangle basis. See the CNDDB program's subscription webpage for additional information on purchasing reports for select USGS 7.5' topographic quadrangles.

GIS Data

GIS data files, which include both tabular and spatial data, are available for download in shapefile format via the CNDDB program website. The CNDDB program recommends

that the official layer symbology, included in the monthly GIS download, be used when viewing CNDDB data. This symbology conveys differences in the accuracy of the data used to map occurrences that is important for proper interpretation of the spatial data (see Figure 3). Metadata is included with the GIS files and should be referenced for clarification of the fields included in the CNDDB GIS data.

RareFind 5

RareFind 5 is a custom web-based application that allows for complex querying and reporting of the textual component of CNDDB data. RareFind 5 also allows users to easily view the spatial features of occurrence records queried by displaying that information in the BIOS Viewer. Metadata is included in the Help tab of RareFind 5 and should be referenced for clarification of fields. For additional information on RareFind 5, please see the RareFind 5 User Guide.

BIOS

BIOS is a custom web-based map viewer that houses many biological and environmental datasets, including the CNDDB. The BIOS Viewer allows users to view data spatially, add labels, and print maps without the need to have GIS software installed on the user's computer. The BIOS Viewer has some limited reporting and querying capabilities, but more complex spatial analyses and data manipulation will still require the use of a full GIS in conjunction with RareFind 5.

While BIOS and RareFind 5 are two separate entities, they are linked in several ways. Results from queries run in RareFind 5 can be viewed in BIOS which is especially helpful for those without GIS software. Conversely, when viewing CNDDB data in BIOS, occurrences can be selected in the map viewer and then RareFind 5 launched to see additional details about the selected occurrences and to access several report options.

Unprocessed Data from the CNDDB Online Field Survey Form

Unprocessed Data from the CNDDB Online Field Survey Form is available as a separate viewable layer in the BIOS Viewer (ds1002). The points shown in this layer have been submitted to the CNDDB program via the Online Field Survey Form but have not yet been quality controlled by CNDDB program staff for inclusion into the CNDDB. This layer is updated the first Tuesday of the month in conjunction with all other CNDDB data.

The CNDDB QuickView Tool

The CNDDB QuickView Tool is a free Internet application that provides users with a list of all tracked elements that have been documented in the CNDDB and the Spotted Owl Observations Database (SPOWDB) to occur in a selected USGS 7.5' topographic quadrangle or in a selected county. The CNDDB QuickView Tool generates a list with species names and rarity status information. It can also display a map for a selected element showing all quads where the CNDDB has a documented occurrence as well as all quads with unprocessed (unreviewed) records currently in the CNDDB program files. This can serve as a *de facto* range map for that element. No specific location information or other occurrence level details are provided in this free application.

Data Limitations

As with any large database, there are limitations to CNDDB data and how it should be used. Some of the more important limitations are discussed below.

Positive Sighting Database

The CNDDB is a positive sighting database. Information on negative sightings is only included when it pertains to previously documented occurrences. It is important to emphasize that absence of data is not proof of absence. There may be areas of the state that have not been surveyed or where data have not been submitted to the CNDDB

program. Just because a species has not been documented in the CNDDB at a given location does not necessarily mean the species does not occur there. The absence of data in the CNDDB is NOT proof of absence and does not constitute the basis for a negative declaration.

Polygons Versus Points

The CNDDB spatial data is composed of polygons, not points. Some polygon features can be fairly extensive, and the center point for that occurrence would not be representative of the entire occurrence. Displaying CNDDB point data should only occur when trying to visualize CNDDB data on a small-scale map (zoomed out to 1:500,000 or greater).

Acreage Estimates

CNDDB data should never be used for acreage estimates. Nearly all CNDDB data is buffered by a certain amount, depending on the specificity of the source data. For circular features, the larger the size of the circle, the less specific the data. Even the most precise spatial features often need buffering to ensure that the polygons are visible on a map. If these polygons are then used to calculate acreage, the result will likely be a gross over-estimate of the area an element occupies.

Modeling

Care should be taken when determining how to use CNDDB data for modeling purposes. Depending on the type of model being generated, the large non-specific circular features can sometimes result in over-estimates of area occupied, while specific multi-part polygons can cause a species to be under-represented if only using a central occurrence point.

Proper Use of CNDDB Data

CNDDB program staff work very hard to keep the database as current and up-to-date as possible. However, the CNDDB is not, nor should it be portrayed as, an exhaustive and comprehensive inventory of all rare taxa statewide. For this reason, field verification for the presence or absence of sensitive taxa will always be an important obligation of CNDDB users.

Using CNDDB for Pre-Project Surveys

When trying to determine what CNDDB-tracked elements occur in the vicinity of a project, the recommended approach is to perform a nine-quad search using the CNDDB QuickView Tool. This tool allows users to generate a baseline list of rare taxa that have been previously documented in the area. By looking at what has been documented on the quad of interest and on the eight surrounding quads, a preliminary list can be obtained of what taxa might be found in similar habitats within the area of interest.

This query should be performed using the CNDDB QuickView Tool in BIOS, rather than in RareFind 5, as the CNDDB QuickView Tool includes quad and county information for lower priority taxa as well as taxa with unprocessed data in our files. These data are not included in RareFind 5 queries; RareFind 5 only contains information for mapped occurrences. While having a list of rare taxa known from the area can be helpful, on-the-ground surveys should always be conducted in order to document what is actually present at a site.

CNDDB Data in Public Reports

The CNDDB includes data on sensitive resources, and if the data are made available to the general public, there are some who will use the information to harm the species or habitat. This is why there are restrictions on what information can be included in

publicly accessible reports or documents. Copies of EO records should never be included in reports available to the public. CNDDB data can be displayed on maps in reports available to the public only if it is done in such a way that the viewer cannot determine the exact location of the elements. Guidelines on this topic can be found in the CNDDB Data Use Guidelines document.

Unauthorized Distribution of CNDDB Data

Unauthorized distribution of CNDDB data, or login credentials used to access CNDDB data, is not allowed. Only the person or organization with a CNDDB account should be accessing CNDDB data. The data should not be shared with anyone else. Please see the license agreement for additional information.