# Andrena escondida IUCN Red List Pre-Assessment Draft Form with definitions

*Scientific name and taxonomic authority:* ***Andrena escondida,*** **Cockerell, 1938**

*Synonym/s (over the last 5 years or if widely used): This will be blank if no synonyms*

Common name(s):

Taxonomic notes (a. any taxonomic concerns about the validity of the species? b. any taxonomic revisions underway that would require a species reassessment**.**

## Distribution

*Andrena escondida* is known from 44 observations, from 1934 through 1975.

Range comment: It occurs in California, United States, and Baja California Norte, Mexico, from the San Francisco Bay Area, south on the west side of the Sierra Nevada mountains to Ensenada.
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Using all known records for the species, the extent of occurrence (EOO) is 73,239 $km^2$ (Chesshire et al. 2023). This species has not been observed anywhere in its range since 1975. Therefore, it is unclear if it is still extant throughout its entire range. Using all observations, the area of occupancy (AOO) is 44 $km^2$. Because there have been limited survey efforts for bees across the range of this species there is a high degree of uncertainty in the AOO.

Occurrence records for this and other bee species native to the U.S. were compiled by researchers using digitized bee data from 162 institutions or data repositories (Chesshire et al. 2023). The resulting database, which contains nearly 2 million records for 3,158 bee species, includes records from the Global Biodiversity Information Facility (GBIF) and the Symbiota Collection of Arthropod Network (SCAN). These records were systematically cleaned by removing duplicate records, and records where specimens were not identified to species level. Additionally, the database was examined by a geodata expert, who corrected inaccurate coordinates and removed records with vague or no geodata, and examined by bee taxonomy experts, who revised scientific names for specimens with synonymy issues, removed observations with invalid names, and removed implausible records and species outliers. This dataset is currently the most comprehensive and accurate bee occurrence dataset available for the U.S.

The accuracy of conservation status assessments for bees is limited by the quantity and quality of available data. Although there are over 2 million digitized bee records, there are an estimated 4.7 million bee specimens housed in U.S. museums that are undigitized (Chesshire et al. 2023). Error rates in data transcription from museum specimen to digitized records can be high. Limited funding for taxonomists means that keys used in identification have not been revised for many

decades, and that many recently collected specimens have not yet been identified. Additionally, few records are accompanied with search effort or sampling method data, limiting their utility (Rousseau et al. 2024). Lastly, there have been no systematic surveys for bees across much of the United States, contributing to limited understanding of even the most basic aspects of bee biology. The quality and accuracy of species status assessments will increase when funding is made available to digitize existing data and systematically survey the U.S. for bees, as well as to support taxonomists to identify the backlog of specimens collected in monitoring efforts, review specimens in collections, and revise identification keys. Overcoming these challenges with regard to bee data quality and quantity will take enormous time, effort, and funding. Conservation status assessments carried out in the meantime are done using the best available data, with limitations and assumptions clearly articulated, and many species assessments are likely to result in the category 'Data Deficient'.

EOO Range Extent: 73,239 $km^2$

EOO Justification:
The extent of occurrence was calculated using ArcGIS Pro. The minimum convex polygon was drawn around known occurrence records (Chesshire et al. 2023).

Country Occurrence: United States (California); Mexico (Baja California Norte).

AOO: 44 $km^2$

Elevation range CAG: 5 - 2466 m

Map notes: The map was created by generating a polygon around all records, generalizing it, and clipping it to the North American continent to remove areas of uninhabited habitat, such as the Pacific Ocean.

Severely Fragmented: NO

Number of Locations: N/A

"Population" Size

Population size comment:

There are many variables that factor into a given species's detectability, including survey period, sampling method, sampling location, and sampling effort. Data for some of these variables rarely accompany publicly available digitized specimen records, and make it difficult to determine the parameters of a survey that resulted in the detection of a given species. In order to determine if absence of recent records is due to limited search effort, we examined the search effort required to detect the species historically (before 2013), to assess if search effort in the recent time period (2013 and later) has been sufficient to detect it. To do this, we divided the total number of

historic *Andrena* records from the species EOO during the appropriate phenological window (XXX records) by the total number of historic *Genus species* records (XX records) to generate a relative abundance metric. For each *Genus species* detected within the EOO, XX *Andrena* of all species were sampled. In the recent time period, XX *Andrena* of all species were recorded in the EOO during the appropriate phenological window (the period of *Genus species* adult activity). This is approximately XX times the number of all bees detected relative to each *Genus species* prior to 2013. As such, we suggest that the absence of recent *Genus species* records from its EOO is not due to insufficient search effort. There may be some factor limiting the detectability of this species, including a possible absence of the species.

The population size and trend are not known for this species, as no studies have been conducted to examine population trends for this species.

Trend: Unknown

Number of Subpopulations: N/A

Extreme Fluctuation: N/A

Generation Length: 1 year

Habitats and Ecology

Food habits comment: *Andrena escondida* is a dietary specialist that collects pollen from the genus *Layia* (Asteraceae) to provision nests (Thorp and LaBerge 2006).

Habitat comment: This species has been recorded in grasslands and vernal pool systems (Spencer et al. 2006), between 5 and 2466 m.

Reproduction comment: This species likely nests underground like all other *Andrena* (Danforth et al. 2019), but nests from this species have not been described. Nest cells from other members of this genus are located at the ends of the lateral burrows, which are typically lined with a waxy Dufour's gland secretion (Cane 1981) that serves to both isolate the provision from pathogens in the surrounding soil and to regulate water uptake from the soil atmosphere (Cane and Love 2021). Females provision each cell with a ball of pollen moistened with nectar on which they lay a single egg (Michener 2007).

Phenology comment: Records of this species come from March through June (Chesshire et al. 2023). Adults are assumed to emerge annually (Danforth et al. 2019).

Habitat classification

**4. Grassland**

4.4. Grassland – Temperate

**5. Wetlands (inland)**

5.8. Wetlands (inland) – Seasonal/intermittent freshwater marshes/pools (under 8 ha)
5.17. Wetlands (inland) – Seasonal/intermittent saline, brackish or alkaline marshes/pools

## Use and Trade

This species is not known to be utilized commercially.

## Threats

### Threat comments:

Specific threats to this species have not been investigated. It may be impacted by drought and habitat loss, which have been documented in its range. Since 2000, the Southwest U.S. has seen the worst drought in 1200 years (Williams, Cook, and Smerdon 2022). Drought can reduce the abundance of flowering plants on a landscape scale, and also reduce pollen and nectar quality (Wilson Rankin, Barney, and Lozano 2020). Drought conditions have been shown to reduce the diversity and abundance of native bees (Minckley, Roulston, and Williams 2013; Hung et al. 2021).

This species may be threatened by the loss of vernal pool habitat where its host plants occur. These habitats are made up of discrete, ephemeral wetlands, and are characterized by their impervious substrate that collects winter precipitation that dries out over the course of the summer (Holland 2009). In California, the Central Valley vernal pool ecosystem has declined 95% from its historic extent (Dahl 1990). Much of the remaining vernal pool habitat occurs in areas with high pressure from urbanization and agricultural expansion, which is expected to continue. Vernal pool habitat is also threatened by alteration of hydrology, which can happen either through droughts, which are predicted to become more frequent and severe across the range of the species (Franklin and MacDonald 2024), or via increased irrigation with reclaimed water. In some sites, increased water in vernal pool sites has occurred via agricultural runoff. Increased water or irrigation at the wrong time of year can kill host plants, and can contain pollutants such as herbicide and excess nutrients, which can kill host plants and encourage invasion of exotic species (USFWS 2016).

Certain aspects of this species' biology may make it more vulnerable to some threats. *Andrena escondida* is a ground nesting species, and nests may be harmed by certain agricultural practices such as tilling, which can kill bees nesting close to the surface (Williams et al. 2010). This species is a dietary specialist, which has been linked to higher risk of extinction due to reduced host plant availability, especially under climate change scenarios (Roberts et al. 2011) and reduced effective population sizes (Packer et al. 2005). Additionally, *Andrena* have been reported

to have low reproductive output because of the short adult life span, and a low rate of brood cell provisioning (reviewed in Danforth et al. 2019). Other threats to bees generally include habitat loss or modification, climate change, pesticide use, exposure to pathogens from managed bee species, and competition with honey bees (Brown and Paxton 2009; Potts et al. 2010; Wojcik et al. 2018; Grab et al. 2019; Raven and Wagner 2021).

Threats Threats:

Threat: Timing: Scope: Severity: Impact Score:

1. Residential & commercial development -> 1.1. Housing & urban areas

Timing: Ongoing

Scope: Majority (50-90%)

Severity: Slow, significant declines

1. Residential & commercial development -> 1.2. Commercial & industrial areas

Timing: Ongoing

Scope: Majority (50-90%)

Severity: Slow, significant declines

8. Invasive and other problematic species, genes, and diseases -> 8.1 Invasive non-native/alien species/diseases -> 8.1.2. Named species

Timing: Ongoing

Scope: Minority (<50%)

Severity: Slow, significant declines

9. Pollution -> 9.3 Agricultural and forestry effluents -> 9.3.3 Herbicides and Pesticides

Timing: Ongoing

Scope: Minority (<50%)

Severity: Slow, significant declines

11. Climate change & severe weather -> 11.1. Habitat shifting & alteration

Timing: Ongoing

Scope: Majority (50-90%)

Severity: Slow, significant declines

11. Climate change & severe weather -> 11.2.Droughts

Timing: Ongoing

Scope: Minority (<50%)

Severity: Slow, significant declines

11. Climate change & severe weather -> 11.3.Temperature extremes

Timing: Ongoing

Scope: Minority (<50%)

Severity: Slow, significant declines

Conservation Actions

*Conservation needs*

No known conservation actions are in place for this species.

Protected/Managed area comment: Observations of this species are known from United States Forest Service land, but this does not confer any specific protections to the species.

Management comment: Specific conservation needs for this species have not been identified. Due to the importance of supporting wild bee populations for pollination services, general conservation practices are recommended including, restoring, creating, and preserving natural high-quality habitats to include suitable forage and nesting sites; limiting pesticide use on or near suitable habitat, particularly during the adult bee's flight period; promoting farming and urban practices that increase pollinator-friendly plants in margin space; minimizing exposure of wild

bees to diseases transferred from managed bees; and lastly, avoiding honey bee introduction to high-quality native bee habitat.

## Conservation Actions Needed

1. Land/water protection -> 1.2. Resource & habitat protection

2. Land/water management -> 2.3. Habitat & natural process restoration

4. Education & awareness -> 4.3. Awareness & communications

5. Law & policy -> 5.2. Policies and regulations

## *Research needs*

Research need comment:  More information is needed about the population status, population trend, existing threats, range limits, habitat, and ecology of this species. Surveys targeting this species are needed throughout its range to determine its persistence throughout its historic range.

## Research Needed

1. Research -> 1.2. Population size, distribution & trends

1.3. Life History and Ecology

1.5. Threats

1.6 Conservation actions

3. Monitoring -> 3.1. Population trends

3.4. Habitat trends

## Assessment

Date of assessment (month-day-year): 4-30-2025

Assessors names (use * to indicate primary assessor, typically the participant with most experience/knowledge of the species): Saff Killingsworth

Reviewer(s):

Contributors(s): For a full list of the 162 institutions that contributed to the Chesshire et al. dataset, please see Chesshire et al. 2023, S1.

Facilitator(s) and compiler(s): Paige R. Chesshire, Erica E. Fischer, Nicolas J. Dowdy, Terry L. Griswold, Alice C. Hughes, Michael C. Orr, John S. Ascher, Laura M. Guzman, Keng-Lou James Hung, Neil S. Cobb and Lindsie M. McCabe

Red List Category and Criteria: Near Threatened

Justification:

*Andrena escondida* is a solitary bee that occurs in California, United States, and Baja California Norte, Mexico. Using all records of the species, the extent of occurrence is 73,239 $km^2$. It is known from no more than 10 locations, if threats act on each locality separately. However, it has not been observed since 1975, and therefore, it is unclear if the species still persists throughout its known range. It is a dietary specialist, collecting pollen from the genus *Layia* (Asteraceae) to provision nests. It occurs in grasslands and vernal pools. California's vernal pools face threats from climate change and drought, major habitat loss and fragmentation, and invasion of exotic species. These threats may decrease the quality and quantity of host plants available to *Andrena escondida,* and limit the suitable habitat for the bee. Across the range of this species, impacts from exposure to pesticides have also been observed, and these threats may be acting on the species at local levels. More information is needed to determine if this species is still extant, and if so, to determine its population size, and the degree to which threats are acting on the population. Because this species is known from no more than 10 locations, is facing continuing decline inferred in its quality of habitat, and is known from a relatively small range, it is assessed as Near Threatened for now.

**Rank reasons**

This species is a solitary bee that occurs in California, United States, and Baja California Norte, Mexico. Using all verified records of the species, the range extent is 73,239 $km^2$. The species has not been observed since 1975. Therefore it is unclear if the species is still extant. It is a dietary specialist, collecting pollen from the genus *Layia* (Asteraceae) to provision nests. It occurs in grasslands and vernal pools. California's vernal pools face threats from climate change and drought, major habitat loss and fragmentation, and invasion of exotic species. These threats may decrease the quality and quantity of host plants available to the bee, and limit the suitable habitat for the bee. Across the range of this species, impacts from exposure to pesticides have also been observed, and these threats may be acting on the species at local levels. More information is needed to determine if this species is still extant, and if so, to determine its population size, and the degree to which threats are acting on the population. Because this species is known from no more than 10 localities, is facing continuing decline inferred in its quality of habitat, and is known from a relatively small range, it may be facing some extinction risk.

**NatureServe Specific Text (NOT OTHERWISE INCLUDED IN ABOVE TEXT):**

## For Rank Calculator:

1. Element occurrences (using separation distance of 5,000 m): 0
    A. Estimated Number of Element Occurrences Comments: Using all records from the last 30 years (since 1995), this species is known from zero occurrences using a 5 km separation distance.
2. Population size: Unknown
3. Viability/Ecological integrity (choose one)
    a. Number of occurrences with good viability/ecological integrity: Unknown
    b. Percent of area occupied (For Species with Known AOO): N/A
4. Environmental Specificity: B. Narrow. Specialist or community with key requirements common.
    A. Environmental specificity comments: This species is a dietary specialist, using pollen from the plant genus *Layia* (Asteraceae), which likely restricts its distribution and phenology.
5. Intrinsic Vulnerability: B. Moderately vulnerable
    a. Intrinsic vulnerability comments: *Andrena* have been reported to have low reproductive output because of the short adult life span, and a low rate of brood cell provisioning (reviewed in Danforth et al. 2019).
6. Trend
    a. Short Term Trend: Unknown
    b. Comments: Abundance estimates and population trends are not known for this species.
    c. Long Term Trend: Unknown
    d. Comments: Abundance estimates and population trends are not known for this species.

## For Biotics Global Element Characterization:

1. Habitat

Grassland/Herbaceous

2. Food Habits
    e. Adult: nectarivore
    f. Immature: nectarivore

Literature References:

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*Andrena escondida* Range

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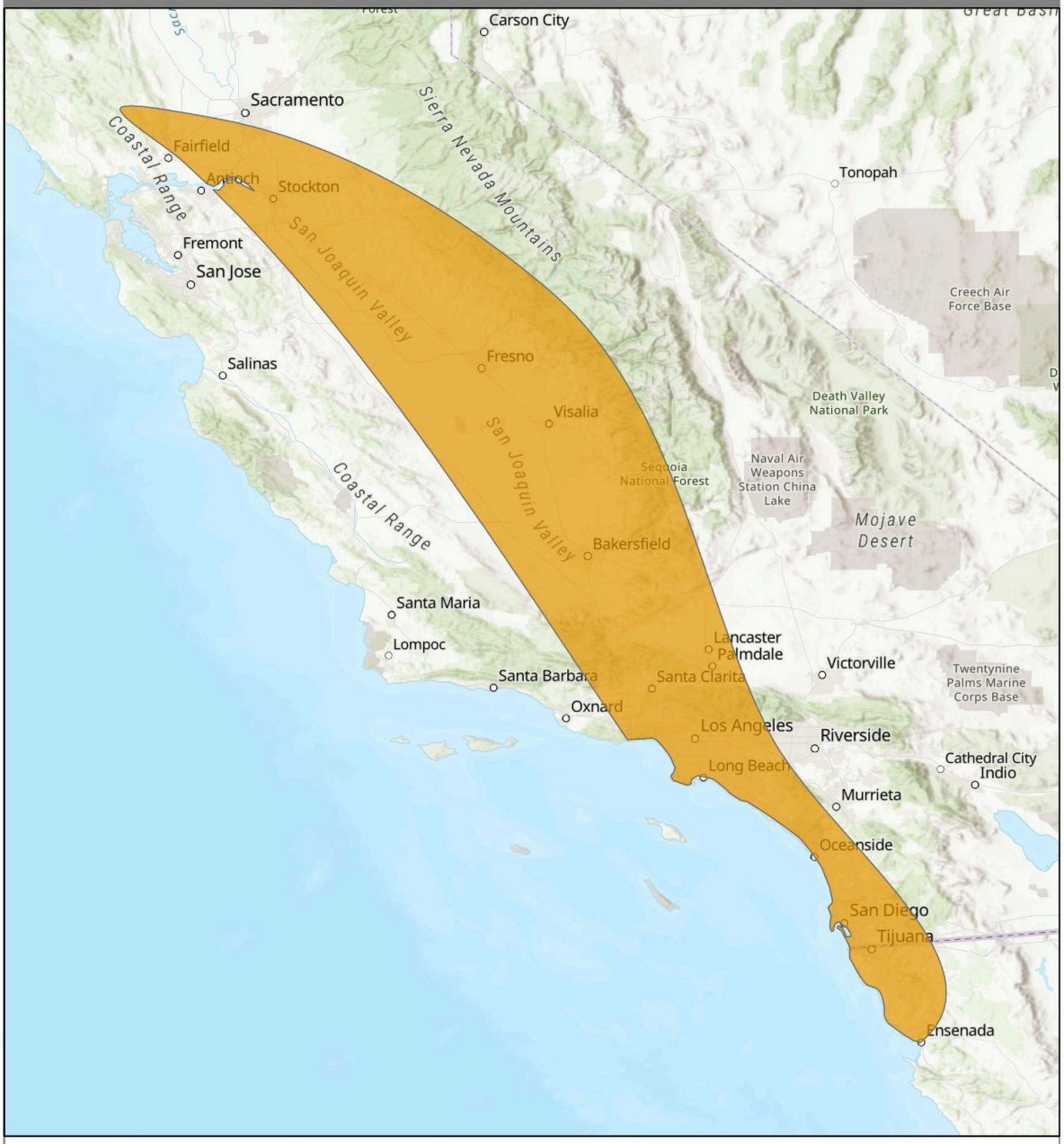


*Andrena escondida* Range

0 300 600 1,200 Kilometers

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Produced by The Xerces Society on 4/30/2025