Notice of Petition

For action pursuant to Section 670.1, Title 14, California Code of Regulations and Division 3, Chapter 1.5, Article 2 of the California Fish and Game Code (Sections 2070 et seq.) relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED

Abbott's bushmallow (*Malacothamnus abbottii*)

II. RECOMMENDED ACTION

Listing as endangered

This petition is to list the Abbott's bushmallow (*Malacothamnus abbottii*) as endangered pursuant to the California Endangered Species Act (California Fish and Game Code Sections 2050 et seq.: CESA). This petition demonstrates that the Abbott's bushmallow is eligible for and warrants listing under CESA based on the factors specified in the statute and its implementing regulations. A species is an "endangered species" when it is "in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (California Fish and Game Code Section 2062).

The attached information supporting this petition provides sufficient information to demonstrate that the listing of Abbott's bushmallow as an endangered species under CESA clearly may be warranted; i.e., the amount of information presented would lead a reasonable person to conclude that there is a substantial possibility that listing could occur.

I respectfully request the Department of Fish and Wildlife and the Fish and Game Commission make such recommendations and findings pursuant to their respective authorities (California Fish and Game Code Sections 2073.5 and 2074.2).

III. AUTHOR OF PETITION

John C. Hunter, Ph.D.

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature Date: August 29, 2025

Supporting Information for Abbott's Bushmallow (*Malacothamnus abbottii*) Petition to the California Fish and Game Commission

Prepared by John C. Hunter, Ph.D.
August 29, 2025

Executive Summary

This document provides the scientific information required by California Fish and Game Code Section 2072.3 to demonstrate that adding Abbott's bushmallow (*Malacothamnus abbottii*) to the list of endangered species under the California Endangered Species Act (CESA) may be warranted.

Population Trend. Abbott's bushmallow is believed to have declined substantially and to have a downward trend because of loss and degradation of occupied habitat.

Range. The range of Abbott's bushmallow encompasses approximately 101 square kilometers (39 square miles) at 135–490 meters (445–1,610 feet) in elevation in southern Monterey County.

Distribution. Abbott's bushmallow has 11 documented occurrences (occupied sites) in the California Natural Diversity Database (CNDDB).

Abundance. For seven occurrences, counts of plants or general observations of abundance have been recorded and range from one to "many" plants, with four of the seven sites having only one to several plants. The area of occupied habitat can also be a useful indicator of abundance and it is estimated to be less than 66 hectares (162 acres).[1]

Life History. Abbott's bushmallow is an insect-pollinated shrub in the Malvaceae (the mallow family) that has rhizomes (below-ground stems) and seed that may remain dormant in the soil until after a fire.

Kind of Habitat Necessary for Survival. Abbott's bushmallow grows in riparian scrub and coastal sage scrub.

Factors Affecting the Ability to Survive and Reproduce. Ten different threats to Abbott's bushmallow occurrences have been identified, and several are range-wide. The primary threats are from agricultural and developed land uses, spread of invasive plants, disruption of post-fire recovery, and climate change.

Degree and Immediacy of Threat. Without protective measures, there is a moderate to high likelihood that Abbott's bushmallow will become extinct because:

- Ongoing threats have already eliminated or substantially degraded more than 80 percent of its documented occurrences, and the severity of some threats is increasing.
- The species has been observed at only a small number of sites (11) and almost all of its remaining occurrences are small in area, fragmented, or contain few individuals, which increases its vulnerability to extirpation from random events and human actions.
- All sites occupied by Abbott's bushmallow are unprotected, which leaves the species highly vulnerable to extirpation at most sites.

Impact of Existing Management Efforts. To date, management of Abbott's bushmallow has been very limited. It has no legal protections that mandate contributions to its recovery or full mitigation of impacts, and none of its known occupied habitat is preserved.

Suggestions for Future Management. Suggestions for future management include listing Abbott's bushmallow as endangered under CESA and conserving its occurrences. Fifteen suggestions are provided for future management actions.

References and a **detailed distribution map** are also provided.

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[1] Estimate is for occurrences not likely to be extirpated and is the sum of (1) the acreage of specific occurrences and (2) the number of nonspecific occurrences multiplied by the average acreage of specific occurrences. This is an overestimate and includes some areas that are now in developed or agricultural land cover.

The scientific information in the following sections demonstrates that adding Abbott's bushmallow (*Malacothamnus abbottii*) to the list of endangered species under the California Endangered Species Act (CESA) may be warranted.

Based on much of the same information, NatureServe, in collaboration with the California Department of Fish and Wildlife (CDFW) and the California Native Plant Society (CNPS), has concluded that Abbott's bushmallow is critically imperiled. Similarly, CNPS, in collaboration with CDFW, has concluded that it is rare or endangered and seriously threatened (CNPS 2025; CDFW 2024a).

NatureServe defines "Critically Imperiled" (Global Conservation Status 1 [G1]) as being at a 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 (NatureServe 2012a). NatureServe designates species as G1 based on a score calculated from variables whose values are determined in collaboration with CDFW and CNPS (NatureServe 2012b).

CNPS and CDFW define the rank of "rare or endangered" (California Rare Plant Rank [CRPR] 1B) as plant species which are rare, threatened, or endangered in California and elsewhere (CNPS 2024, CDFW 2024a). These plant species are rare throughout their range, with the majority, like Abbott's bushmallow, also being endemic to California. Most of the plant species that are CRPR 1B have declined significantly over the last century. CNPS has concluded that a subset of CRPR 1B plant species (rank 1B.1) is "seriously threatened in California" (the highest level of threat) because over 80 percent of their occurrences are threatened or the species otherwise has a high degree and immediacy of threat (CNPS 2024). CNPS uses staff botanists and a committee of agency, academic, other professional, and amateur botanists to assign and periodically reevaluate these rankings in collaboration with CDFW. Please note that CDFW identifies all CRPR 1B species as taxa that may meet the requirements for CESA listing (CDFW 2024a).

To make their conclusions, CNPS and NatureServe use the best available scientific information regarding population trend, range, distribution, abundance, life history, habitat, threats, and management efforts, much of which CDFW has compiled in the California Natural Diversity Database (CNDDB) (CDFW 2024b).

To provide sufficient scientific information to support this petition, a summary of the relevant information compiled, maintained, and distributed by CDFW, CNPS, and NatureServe is provided below; this information is augmented by information from:

- Datasets developed and maintained by the California Consortium of Herbaria (CCH), California Invasive Plant Council (Cal-IPC), GreenInfo Network (GIN), and U.S. Geological Survey (USGS)
- Scientific and other technical literature

Information regarding each topic required by California Fish and Game Code Section 2072.3 is provided in a separate section below in the same order as in the code.

A. Population Trend

Information available from the CNDDB (CDFW 2024b) and land cover mapping (USGS 2021) indicates that Abbott's bushmallow has a decreasing population trend because of loss and degradation of occupied habitat at nine or more of the 11 sites where the species has been observed (occurrences or occupied sites). [2,3]

CNDDB records that indicate a decrease include:

- Eight occurrences where a decreasing population trend or poor or fair population viability has been noted (Occurrences 2–4 and 9–13) [4]

Land cover mapping that indicates a decrease includes:

- One occurrence where that species is likely extirpated—this occurrence is presumed extant in the CNDDB but its entire mapped area has been converted to agricultural and developed land cover (Occurrence 11). In the CNDDB, it is noted that this site has a decreasing population trend and poor viability.
- Eight sites with likely degradation or loss of habitat—these sites are precisely mapped sites (specific occurrences) presumed extant in the CNDDB that have a portion of their mapped area in agricultural or developed land cover (Occurrences 2–4, 7, 9, 10, 12, and 13). The portion of these occurrences in agricultural or developed land cover ranges from less than one percent to 98 percent, i.e., from negligible to near total direct loss of habitat. In the CNDDB, seven of these sites have a decreasing population trend or poor or only fair population viability noted.

In addition, degradation and loss of habitat at other sites may also contribute to the decreasing population trend. At these sites, degradation and loss of occupied habitat that is not documented in the CNDDB or by land cover mapping may be resulting from site-specific threats, range-wide threats (e.g., climate change), and nearby agricultural and developed land uses.

Furthermore, extensive, range-wide historical and ongoing human-caused changes to riparian and coastal sage scrub vegetation (which provides habitat for Abbott's bushmallow) suggest that Abbott's bushmallow has had additional, undocumented habitat losses, population reductions, or both. These human-caused changes not only include conversion of natural lands to agricultural and developed land and disturbance by a greatly increased human population, but also the introduction of livestock and invasive plant species, and the alteration of fire regimes and

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[2] An occurrence (also referred to as an element occurrence) is a specific location where a plant included in the CNDDB (a plant element) has been known to occur, and that has practical conservation value. In general, any location with an observation of the plant will be turned into an occurrence since the location a plant is found is also where reproduction and important life history events take place (CDFW 2020).

[3] USGS land cover mapping is more recent than most information in the CNDDB and is described further in Section G, "Factors Affecting the Ability to Survive and Reproduce (Threats)."

[4] Viability is as noted in the CNDDB's "Occurrence Rank" field (i.e., overall condition or viability). The occurrence rank fields are Unknown, Poor, Fair, Good, or Excellent, and are based on observed quality of habitat and condition of the population at that location.

hydrology (Burcham 1957, Vaghti and Greco 2007, Stephens and Sugihara 2006, Seabloom 2006, Minnich 2008). Most of these changes occurred before the distribution of Abbott's bushmallow was well documented and thus their impacts are undocumented.

B. Range

Abbott's bushmallow is a California endemic with a very limited range in the South Coast Ranges (Morse 2023a, b). Its range comprises approximately 101 square kilometers (39 square miles) in southern Monterey County at 135–490 meters (m) (445–1,610 feet [ft]) in elevation (CDFW 2024b, CNPS 2025).[5]

As calculated, this range is comparable to the "extent of occurrence" (EOO) that is used by the International Union for the Conservation of Nature (IUCN) as an indicator of extinction risk (IUCN 2024, Bachman et al. 2011).[6] The rationale for using EOO as an indicator of extinction risk is that many human-caused threats and natural events are more likely to cause similar effects at sites that are closer together than those further apart.

C. Distribution

Abbott's bushmallow is known from 11 sites along the Salinas River and in the Santa Lucia Range that were documented between 1930 and 2011 (CDFW 2024b). Of these sites, one is a "nonspecific" occurrence, whose location and boundaries are not precisely known. In addition to these 11 sites, the species was misidentified and unintentionally introduced in a revegetation project along Highway 166 in San Luis Obispo County outside of its known range (Morse 2023b).

A range-wide survey of potential habitat was conducted in 1996 that improved documentation of the species' distribution, and since then only one additional occurrence of Abbott's bushmallow has been documented (Elvin and Yadon 1996, CDFW 2024b). In addition, the species has a small range and is restricted to a heavily impacted habitat. Nonetheless, because the species' seeds germinate after fire and likely can remain dormant for decades, there may be undocumented sites where the species remains only as dormant seed in the soil. Any undocumented sites would likely be exposed to similar threats as documented sites because most riparian and coastal sage scrub vegetation that may provide habitat for Abbott's bushmallow is exposed to similar threats. Also, like documented sites, undocumented occurrences would likely be unprotected because most coastal sage scrub and riparian vegetation in the range of Abbott's bushmallow is unprotected.

The species' distribution is mapped in Section L, "Detailed Distribution Map."

[5] The extent of the species' range was calculated as the minimum convex polygon encompassing all occurrences documented in the CNDDB, including extirpated occurrences and occurrences with nonspecific locations.
[6] The IUCN consists of approximately 1,400 governmental and non-governmental organizations from more than 170 countries.

D. Abundance

The number of Abbott's bushmallow plants varies substantially among sites but less so among years because it is a perennial plant. In the 1990s, counts of plants or general observations of abundance were recorded for five of the 11 occurrences in the CNDDB (Occurrences 2, 3, 7, 8, and 11), and in 2011, general observations of abundance were recorded for two more occurrences (Occurrences 12 and 16) (CDFW 2024b). Most counts are of "colonies" that likely represent a single plant with multiple above-ground stems. At two occurrences (Occurrences 8 and 11), there was only a single plant (one colony), at three occurrences (Occurrences 2, 3, and 12) there were several plants, and at two occurrences (Occurrences 7 and 16), there were "numerous" or "many" plants. At one of these occurrences (Occurrence 3), counts were recorded for three consecutive years in the 1990s with five plants observed the first year, four the second year, and three in the third year.

Because recent, range-wide monitoring of Abbott's bushmallow has not been conducted, a rigorous estimate of the total number of plants cannot be made. In general, however, the size of perennial plant populations can be difficult to estimate because of challenges in distinguishing one individual from another and the frequently vast size differences among individuals.

In contrast, the area of occupied habitat (i.e., occurrence acreage) is less problematic to estimate, and can be a useful indicator of abundance. The mapped area of CNDDB occurrences represents the maximum extent of occupied habitat because (1) it encompasses all occupied habitat that has been documented, and (2) only a portion of it is occupied. [7] For Abbott's bushmallow, "specific" occurrences (which have precisely mapped locations) have an average size of approximately 6 hectares (15 acres) with a range of 2–18 hectares (5–43 acres) (CDFW 2024b).[8] Assuming that "nonspecific occurrences" (which have only imprecisely mapped locations) are of comparable size, the total extent of habitat occupied by Abbott's bushmallow would be less than 66 hectares (162 acres).[9,]

As calculated, area of occupied habitat is similar to "area of occupancy" (AOO) that is used by the IUCN as an indicator of extinction risk (IUCN 2024).[10] The rationale for using AOO as an indicator of extinction risk is that species occupying more or larger areas are less likely to have all occupied

[7] There are both ecological and methodological reasons why the species does not occupy the entire mapped area of an occurrence. Species only occupy areas to which their seed disperse and that are suitable for germination, growth, and survival, and for rare species such areas may account for only a small portion of an "occupied" site. Also, in the CNDDB, even specific occurrences include areas that are unsuitable as habitat. For example, many specific occurrences are point locations buffered by 80 m (262 ft), and the resulting 2-hectare (5-acre) area is usually much larger than the area occupied by the species. Furthermore, occupied sites documented in the CNDDB often have not been visited by a botanist for more than 10 or 20 years (or even longer), and during that time interval, habitat loss may have occurred.

[8] Occurrences 8–13 are approximately 2 hectares in size or smaller.

[9] Specifically, the combined area was estimated for occurrences not likely to be extirpated using the mapped area of specific occurrences and assuming that the area of each nonspecific occurrence was equal to the average area of specific occurrences (extant and extirpated).

[10] IUCN guidelines are to calculate AOO using presence in cells of a grid of 4 kilometer^2 (1.5 mile^2) cells, which is a coarser scale than used here (IUCN 2024).

areas affected by a specific threat than a species occupying fewer, smaller areas. Also, there is a generally positive relationship between AOO and population size.

E. Life History

This section provides the species' nomenclature, a description of its morphology, and a summary of available information on its reproduction and growth.

Nomenclature and Taxonomy

The Jepson eFlora currently recognizes *Malacothamnus abbottii* (Eastw.) Kearney as the scientific name of Abbott's bushmallow and *Malvastrum abbottii* Eastw. as a synonym for it (Jepson Flora Project 2024).

Species Description

Abbott's bushmallow is in the Malvaceae (the mallow family). Below is a description of its morphology based on the treatment of the taxa in the Jepson eFlora (Morse 2023a).

- Habit— Abbott's bushmallow is a shrub that grows up to 2 m (6.6 ft) in height. The plant spreads by rhizomes (underground stems), which allows it to form dense colonies.
- Stem—the stems are densely covered with stellate (star-shaped) hairs that are difficult to distinguish without magnification. Simple glandular hairs are also present.
- Leaf— the leaves are petioled (having a leaf stalk) with blades that are round or ovate (egg-shaped), often as wide as they are long. The leaves may be unlobed or have obscure to moderate 3- to 5-lobed margins. The lobes are rounded to acute at the tips, and the leaf bases are wedge-shaped to cordate (heart-shaped). The leaf surfaces are pale ashy-green to light green on the upper side (adaxial) and paler on the underside (abaxial). Both surfaces are densely covered with stellate hairs, and simple glandular hairs are also present.
- Inflorescence—the inflorescence is generally panicle-like (a branched type of inflorescence) but can occasionally be spike-like. The bracts that subtend the inflorescence internodes are lanceolate to triangular or ovate. Bractlets that subtend the calyx are oblong to awl-shaped, and 0.35 to 0.75 cm (0.14–0.30 inches) long.
- Flower—the calyx is 5-lobed and measures 0.85 to 1.2 cm (0.33–0.47 inches) in total length. The lobes are narrowly to moderately triangular or ovate, with tips that are acuminate (tapering to a point) to narrowly acute. The petals are 5 in number and exceed the calyx in length. They are unevenly obovate (broader at the tip) and can reach up to approximately 2 cm (0.79 inches) long. The corolla tends to dry in a closed position. The numerous stamens have filaments that are fused into a tube around the style. There is one pistil, and the ovary is superior, consisting of 7 to 14 carpels, each containing one ovule per cell.

- Fruit—the fruit is a loculicidal capsule (a capsule that splits open along the locules or chambers) and is disk-like in shape. It is fully dehiscent, with each fruit segment splitting into two separate halves.

Similar Species

Jones's bushmallow (*Malacothamnus Jonesii*) most closely resembles Abbott's bushmallow (Morse 2023a, b). However, the range of *Malacothamnus jonesii* does not overlap with the range of Abbott's bushmallow. Only *Malacothamnus jonesii* var. *jonesii* has a range near that of Abbott's bushmallow, and it blooms earlier (March–May) than Abbott's bushmallow (May–October). The two species can also be distinguished by the width of their calyx bract and length of their calyx trichomes.

Reproduction and Growth

As noted above, Abbott's bushmallow is a rhizomatous shrub. Abbott's bushmallow blooms during May–October (CNPS 2025). Bees appear to be the predominant pollinators of *Malacothamnus* species (Morse 2023b), and weevil predation of Abbott's bushmallow's developing seeds can be extensive (Elvin and Yadon 1996). In general, the seed of *Malacothamnus* species germinate in the winter-spring following a fire, and multiple *Malacothamnus* species (likely all) have long-lived seed that may persist in the soil for decades (Morse 2023b).

F. Kind of Habitat Necessary for Survival

Riparian scrub and coastal sage scrub provide habitat for Abbott's bushmallow (CNPS 2025, CDFW 2024b). At several sites, its habitat has been described as at an interface of scrub and grassland dominated by nonnative grasses. At these sites, associated species include representatives of both vegetation types, including California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), brome grasses (*Bromus* species), and wild oats (*Avena* species) (CCH 2024, CDFW 2024b). In riparian scrub, frequently noted associates include coyote brush (*Baccharis pilularis*) and blue elderberry (*Sambucus mexicana*).

G. Factors Affecting the Ability to Survive and Reproduce (Threats)

This section describes the factors (threats) resulting from human actions that have been, or likely will be, substantially reducing the survival and reproduction of Abbott's bushmallow, primarily by degrading or eliminating occupied habitat.[11] Prominent range-wide threats include conversion of habitat to agricultural or developed uses, climate change, the spread of invasive species, and disruption of post-fire recovery. Each of these threats is described in a separate section below. They are not, however, the only threats affecting Abbott's bushmallow. Botanists have also

[11] Numerous factors affect the ability of a plant to reproduce, grow, and survive, including interactions with pollinators, dispersal agents, seed predators, diseases, herbivores, and fungal symbiotes; availability of habitats with suitable conditions and sufficient resources; and events such as fires that can cause mortality but also provide opportunities for establishment and growth. This section focuses on those factors resulting from human actions that have been, or likely will be, substantially reducing reproduction and survival.

observed multiple other threats at specific sites (CDFW 2024b). The CNDDB reports seven different threats affecting occurrences:

- Agriculture—elimination of habitat or other adverse impacts due to agricultural development or agriculture-related activities (four occurrences)
- Development—construction of houses, businesses, and other developed land uses (three occurrences)
- Erosion/runoff—degradation of habitat by erosion or deposition of soil (five occurrences)
- Grazing—incompatible grazing by livestock (10 occurrences, one of which is likely extirpated)
- Mining—degradation of habitat by mining activities (three occurrences, one of which is likely extirpated)
- Road/trail construction/maintenance—construction or maintenance of roads or trails (six occurrences)
- Other—herbivory, seed predation, and disease (eight occurrences, one of which is likely extirpated)

Collectively, these threats affect most sites occupied by the species, with the CNDDB documenting one or more of these threats at all but one occurrence of Abbott's bushmallow (CDFW 2024b).

When considering these data, it is important to acknowledge that the CNDDB does not fully document the threats affecting occurrences. First, threat observations have not been provided for every documented occurrence; for example, the only documentation for some sites is the label of an herbarium specimen with little or no site information. Second, threat observations are not necessarily comprehensive and are not based on a systematic assessment. Third, many CNDDB records are not current: only 20 percent of Abbott's bushmallow occurrences have records with site information from the last 20 years.[12] Therefore, threats are likely underreported in the CNDDB records and may have changed at some occurrences, particularly unprotected ones, since they were last visited.

Agricultural and Developed Land Uses

Expansion of agricultural and developed land uses is a major threat to Abbott's bushmallow, not only because these land uses have been directly eliminating habitat, but also because they have been fragmenting and increasing threats to the remaining habitat. In fact, many types of threats listed in the CNDDB are caused primarily by nearby agricultural and developed land uses (e.g., biocides, erosion/runoff, vandalism/dumping). Occurrences fragmented by (and those near) agricultural and developed land uses are likely being impacted through any of several mechanisms (Collinge 2009, Honnay et al. 2005, Aquilar et al. 2019, Hansen et al. 2005, Ramalho et al. 2014).

[12] Based on the "Site Date" field of the CNDDB; excludes Occurrence 11, which has likely been extirpated.

Agricultural and developed land uses have had substantial impacts on Abbott's bushmallow that have not been fully reported in the CNDDB. First, extensive conversion of natural vegetation to agricultural and developed uses occurred before extensive documentation of the distribution of Abbott's bushmallow, and thus the impacts of that land cover conversion are undocumented. Second, land cover mapping that is more recent than CNDDB mapping documents developed land uses within the boundaries of nine of the 10 specific (precisely located) occurrences of Abbott's bushmallow (Table 1) (CDFW 2024b, USGS 2021). For two of these occurrences, developed land uses account for 98–100 percent of their mapped area (both are in oil fields). Furthermore, agricultural or developed land uses are within 100 m (328 ft) but outside the boundary of the other specific occurrence.

Table 1. Loss and Degradation of Habitat Occupied by Abbott's Bushmallow Caused by Agricultural and Developed Land Uses

	Agricultural-Developed Land[1]		
Occurrence Precision / CNDDB No.[2]	**Percentage of Occurrence Area (%)**[3, 4]	**Within 100 m of Occupied Habitat?**	**Notes**
Specific			
2	82	Y	Occurrence rank (viability) "poor"; population trend "decreasing"
3	98	Y	Located in oil field; occurrence rank (viability) "poor"; population trend "decreasing"
4	28	Y	Occurrence rank (viability) "fair"; development a threat in the CNDDB
7	<1	Y	—
8	—	Y	Development a threat in the CNDDB
9	1	Y	Occurrence rank (viability) "fair"; population trend "decreasing"; development a threat in the CNDDB
10	30	Y	Along road; occurrence rank (viability) "fair"
11	100	Y	Located in oil field; Occurrence rank (viability) "poor"; population trend "decreasing"; likely extirpated
12	18	Y	Along road; occurrence rank (viability) "fair"
13	24	Y	Along road; occurrence rank (viability) "fair"
Nonspecific			
16	24	Y	Along road

Sources: CDFW 2024b, USGS 2021

Key: CNDDB = California Natural Diversity Database, m = meters, No. = number, Y = yes

Notes:

[1] – Based on the 2021 National Land Cover Database (USGS 2021), which was developed from 2016 imagery.

[2] – CNDDB occurrence numbers are not necessarily sequential.

[3] – Most mapping of CNDDB occurrences pre-dates 2016, and thus, does not account for recent changes in land cover within occurrence boundaries. When mapped, specific occurrences contain little or no agricultural or developed land uses, the primary exception being roads. When mapped, nonspecific occurrences often include agricultural or developed land uses because nonspecific occurrences do not represent the precise location of occupied habitat, but rather a larger area within which the location of occupied habitat is only imprecisely known.

[4] – Because of the level of precision of occurrence and land cover mapping, errors in land cover classification, and more recent changes in land cover, the extent of land cover conversion may be over or underrepresented at individual occurrences.

In sum, agriculture and development have been causing loss and degradation of occupied habitat at all sites where habitat occupied by Abbott's bushmallow has been precisely located (specific occurrences). At the one site where the location of occupied habitat is only imprecisely known (a nonspecific occurrence), the species also is likely being impacted by agriculture and development because this occurrence is entirely within 100 m (328 ft) of agricultural or developed land uses.

Climate Change

Climate change directly and indirectly threatens Abbott's bushmallow by altering growing conditions, water availability, and frequency and intensity of disturbances, and by altering interactions of the plant with pollinators, dispersers, fungal symbionts, seed predators, herbivores, and competitors.[13] These consequences of climate change may also magnify the impacts of other threats.

The magnitude of climate change impacts on Abbott's bushmallow is uncertain but may be substantial, particularly because of the species' limited range, rarity, habitat specificity, and distribution in relatively small and isolated areas that will be exposed to dramatic changes. In an assessment of the vulnerability of 156 rare plant species, Anacker et al. (2013) classified Abbott's bushmallow as moderately vulnerable to climate change.[14] In a state-wide assessment of the vulnerability of vegetation to climate change, Thorne et al. (2016) concluded that the vegetation types providing habitat for Abbott's bushmallow have a moderate to high vulnerability to climate change.[15] Furthermore, in an analysis of California's endemic plants, Harrison et al. (2024) predicted that climate change will reduce the number of endemic plant species growing in what is currently the range of Abbott's bushmallow.

Invasive Species

In the CNDDB, invasive plant species have not been identified as a threat to occurrences of Abbott's bushmallow (CDFW 2024b). However, invasive species likely are a significant, range-wide threat to occurrences in riparian scrub. Highly invasive species that severely impact riparian scrub are spreading in the range of Abbott's bushmallow, including giant reed (*Arundo donax*), perennial pepperweed (*Lepidium latifolium*), Himalayan blackberry (*Rubus armeniacus*), and smallflower tamarisk (*Tamarix parviflora*) (Cal-IPC 2025).[16] Not only can infestations of these invasive species extirpate Abbott's bushmallow from sites by their direct effects on conditions or resources, but

[13] The CNDDB does not include climate change in its standardized list of types of threats, and therefore, in the CNDDB, climate change is not identified as a threat to any species.
[14] "Vulnerability" to climate change is a product of exposure and sensitivity to changes in climate.
[15] Habitat types recorded in the CNPS Rare Plant Inventory are categories in the Holland vegetation classification and were matched to the corresponding categories in Thorne et al. 2016 using Holland 1986 and Sawyer et al. 2009, Appendix 3, The National Vegetation Classification Hierarchy as Applied to California Vegetation. "Moderate-high" vulnerability is used as a synonym of "mid-high" vulnerability in Thorne et al. 2016.
[16] The Cal-IPC Invasive Plant Inventory (Cal-IPC 2025) was reviewed for invasive plants with a "high" impact rating in the same Jepson region(s) where Abbott's bushmallow occurs that affect general vegetation types that may provide habitat for Abbott's bushmallow.

also by reducing its population size and thus making Abbott's bushmallow more vulnerable to extirpation from other causes (Seabloom et al. 2006, Gilbert and Levine 2013).

Disruptions to Post-Fire Recovery

For its long-term persistence and its establishment at new sites, Abbott's bushmallow depends on post-fire recruitment of new individuals from seed stored in the soil (i.e., the soil seed bank). After a fire, the germination of seed depletes the soil seed bank, and it is not replenished until seedlings have established new individuals that have grown, reached maturity, and produced seed for multiple years. Competition from other plants, weather, herbivory, recurrent fire, and human activities could all impact this post-fire establishment and growth and replenishment of the soil seedbank. Invasive plants, particularly the invasive grasses that already co-occur with Abbott's bushmallow (CDFW 2024b), can reduce post-fire establishment from seed, and subsequent growth and reproduction. Because the landscapes containing most Abbott's bushmallow occurrences are mosaics of natural and developed-agricultural lands, their exposure to human activities, infestations of invasive plants, and human-caused fire ignitions, and other impacts of human activities are all much greater than in an entirely natural landscape.

H. Degree and Immediacy of Threat

Without additional management actions, there is a moderate to high likelihood that Abbott's bushmallow will be extirpated from much of its range or become extinct because:

- Ongoing threats have already been impacting all known occurrences, all known occurrences are threatened, and the severity of some threats is increasing.
- The species has been documented at only a small number of sites that are also small in area, which increases its vulnerability to extirpation or extinction from random events and human actions.
- All sites occupied by Abbott's bushmallow are unprotected and not managed for conservation of this species, which leaves all occurrences of Abbott's bushmallow highly vulnerable to extirpation.

Each of these three reasons is described further in a separate section below.

Ongoing and Increasing Threats

As described previously, multiple threats have been affecting Abbott's bushmallow and have already eliminated or degraded habitat at most occurrences:

- One occurrence is likely to be extirpated because its entire mapped area has been converted to agricultural or developed land cover (Occurrence 11) (CDFW 2024b, USGS 2021).
- Nine occurrences likely have been substantially degraded because they are specific occurrences whose mapped area is partly in developed or agricultural land cover indicating that occupied habitat has been lost, degraded, or both (Table 1) (CDFW 2024b, USGS

2021). The portion of these occurrences in agricultural or developed land cover ranges from less than one percent to 98 percent, i.e., from negligible to near total direct loss of habitat. All of these occurrences are noted in the CNDDB as having poor or only fair viability or a declining population trend.[17]

Also, the viability of the other two documented occurrences may have been reduced by the effects of nearby agricultural or developed land uses, other site-specific threats (e.g., grazing), invasive plants, and climate change.

In sum, more than 80 percent of known occurrences have already been eliminated or substantially degraded by the threats described in Section G, "Factors Affecting Ability to Survive and Reproduce (Threats)," and these threats are still impacting most or all occurrences of Abbott's bushmallow.[18] Furthermore, impacts from climate change and invasive species are likely to increase.

Small Number and Size of Occupied Sites

Species existing at small numbers of sites that are small in area and have few individuals are more vulnerable to extinction than species with more extensive distributions and larger population sizes. The smaller the number of occupied sites the greater the consequences for the species of site-specific random events or human actions. Also, occupied sites that are smaller in area and have fewer individuals are more vulnerable to extirpation by random events and human actions (e.g., Matthies et al. 2004, Vörös et al. 2025).

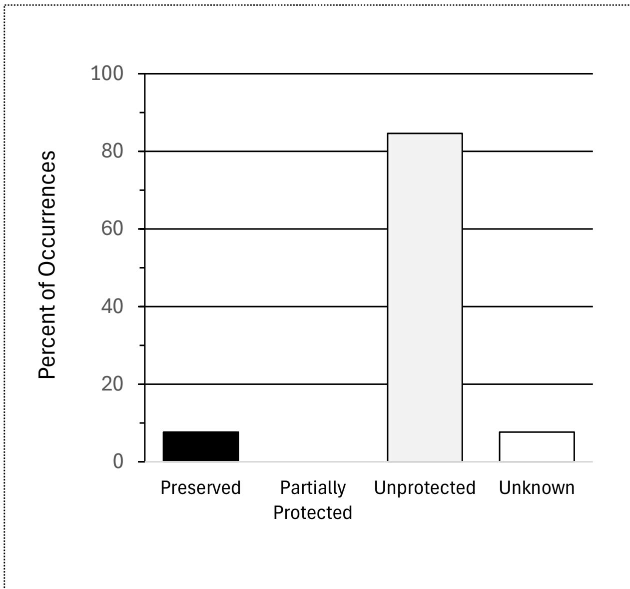
As described previously, Abbott's bushmallow has a restricted distribution of only 11 known occurrences (one of which is likely extirpated). Nine of the 10 remaining occurrences are small, fragmented, or contain only a few individuals. (See Table 1 and Section D, "Abundance.") Therefore, Abbott's bushmallow is highly vulnerable to extinction from site-specific random events (e.g., a short interval between fires) and human actions.

Lack of Protection and Management

Figure 1 displays the percentages of presumed extant occurrences that are preserved, partially protected (i.e., on public land that is managed for multiple uses), unprotected, and have unknown

[17] Viability as noted in the CNDDB's "Occurrence Rank" field (i.e., overall condition or viability), whose categories are Unknown, Poor, Fair, Good, or Excellent.
[18] Occurrences are considered substantially degraded if a specific occurrence and a portion of its mapped area is in agricultural or developed land cover.

status (CDFW 2024b, GIN 2024a, b).[19] All occurrences of Abbott's bushmallow are on unprotected land. At unprotected sites, ongoing threats are rarely addressed and management actions to conserve species are rarely implemented. Consequently, all occurrences of Abbott's bushmallow are highly vulnerable to extirpation, and thus, the species is highly vulnerable to extinction.



Source: CDFW 2024b, GIN 2024a, b

Figure 1. Protection of Occurrences Presumed Extant

I. Impact of Existing Management Efforts

To date, management of Abbott's bushmallow has been very limited, has not sufficiently addressed the threats described in Section G, "Factors Affecting the Ability to Survive and Reproduce (Threats)," and consequently has not resulted in significant conservation of the species. Below, this management is summarized by general type of action: legal protection, preservation and seed banking, management and monitoring, restoration, and surveys and research.

Legal Protection

Abbott's bushmallow has no legal protections that mandate avoidance or full mitigation of impacts, consultations with regulatory agencies, or contributions to the species' recovery. It is not listed under CESA or the federal Endangered Species Act. It also is not covered by any natural community conservation plans (NCCPs) or habitat conservation plans (HCPs).

However, because CDFW has designated Abbott's bushmallow a CRPR 1B.1 species, it should be treated as a special-status species during environmental review under the California Environmental Quality Act (CEQA) (i.e., as a species that may meet the requirements for CESA listing [CDFW 2024a]). Although CEQA requires lead agencies to adopt feasible avoidance, minimization, and mitigation measures to reduce impacts of nonexempt projects, it does not

[19] This is based on USGS Gap Analysis Project (GAP) codes for conservation status as mapped by GIN with "preserved" corresponding to GAP Codes 1 and 2 (areas permanently protected from conversion of natural land cover and managed for biodiversity), "partially protected" corresponding to GAP Code 3 (areas permanently protected from conversion of natural land cover but managed for multiple uses, which may include resource extraction), and "unprotected" corresponding to GAP Code 4 (GIN 2024a, b; USGS No Date). Specific occurrences mapped in two status categories were proportionally assigned to both categories. Nonspecific occurrences were considered to have unknown status unless their entire mapped area was in only one status category polygon was in one of the other status categories. Occurrences that are likely extirpated were not included.

require that impacts on special-status species be avoided, fully mitigated, or even reduced to a less-than-significant level (if impacts are considered significant and unavoidable).

Preservation and Seed Banking

No occurrences of Abbott's bushmallow have been preserved.

Seeds of Abbott's bushmallow have been collected and placed in long-term storage at University of California Santa Cruz (CNPS 2025).

Management and Monitoring

As described above, no occurrences of Abbott's bushmallow are on land that is managed for biodiversity. Also, no systematic, formal monitoring of Abbott's bushmallow has been conducted at any site.[20]

Restoration

No efforts have been made to restore or create habitat occupied by Abbott's bushmallow.[21]

Surveys and Research

In 1996, a range-wide survey of potential habitat was conducted to determine if Abbott's bushmallow occupied additional, undocumented sites (Elvin and Yadon 1996). Most documented sites have not been visited since 1996 (CDFW 2024b, CNPS 2025)

Research has not been conducted on the species' genetic diversity, pollination, dispersal, establishment, growth, mortality, interactions with other species, population dynamics, habitat requirements, or other aspects of its ecology. However, research on some of these topics has been conducted for its genus (*Malacothamnus*) (Morse 2023b). Consequently, understanding of the species' ecology is based primarily on understanding of the ecology of related and similar species and observations by botanists.

J. Suggestions for Future Management

Successful conservation of Abbott's bushmallow requires additional legal protection, preservation and seed banking, management and monitoring, restoration, and surveys and research. Suggestions for each of these general types of management actions are provided below.

Legal Protection

- List the species under CESA and prepare a recovery plan pursuant to California Fish and Game Code Section 2079.1.
- Include Abbott's bushmallow as a focal species in any regional conservation investment strategy (RCIS) and as a covered species in any NCCP developed within its range.

[20] Based on a review of publicly available information.
[21] Based on a review of publicly available information.

Preservation and Seed Banking

- Preserve occupied sites in perpetuity with an emphasis on sites with the largest, most intact areas of habitat containing and suitable habitat surrounding the largest populations of the species.

Management and Monitoring

- Develop and implement site-specific management plans for ensuring the long-term viability of Abbott's bushmallow populations. These plans should include practices for monitoring, criteria for evaluating management, and potential management actions.
- Manage extant populations to prevent the spread of invasive species and to eradicate existing infestations.
- Implement grazing practices that are compatible with or contribute to the persistence of Abbott's bushmallow.
- Implement fuel reduction treatments that are compatible with or contribute to the persistence of Abbott's bushmallow (e.g., controlled burns).
- Coordinate and share information among organizations working to conserve Abbott's bushmallow, including CDFW and CNPS.
- Coordinate with and support private landowners implementing conservation practices in occupied habitat (e.g., invasive plant removal).

Restoration

- Establish additional populations at sites with suitable habitat within or near the known range of Abbott's bushmallow that provide for long-term protection and targeted monitoring and management of the species.

Surveys and Research

- Conduct surveys to improve data on distribution and abundance, including surveys to confirm persistence of historical occurrences, more precisely map the location of the one nonspecific occurrence, and conduct post-fire searches of potentially suitable habitat for additional, undocumented populations of Abbott's bushmallow.
- Document genetic diversity in and among occupied sites to inform conservation.
- Investigate the species' population ecology to inform conservation and management (e.g., post-fire demography and accumulation of seed in the soil).
- Identify grazing practices that are compatible with or contribute to the persistence of Abbott's bushmallow.

- Investigate whether hybridization is a threat, especially with the nearby, and also rare, *Malacothamnus discombobulatus*, which blooms at the same time of year. Hybridization is a known threat for several other species in the genus (Morse 2023b).

K. Availability and Sources of Information

This document is based on available sources of information (i.e., publications and publicly distributed data) and communications with experts. This section provides a reference for each of these sources of information.

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L. Detailed Distribution Map

Figure 2 provides a detailed map of the distribution of Abbott's bushmallow that displays:

- Locations where the species has been documented, labelled with their CNDDB occurrence numbers
- Natural, agricultural, and developed land cover

Please note that the species may occur at unknown, undocumented sites that are not displayed on this map.

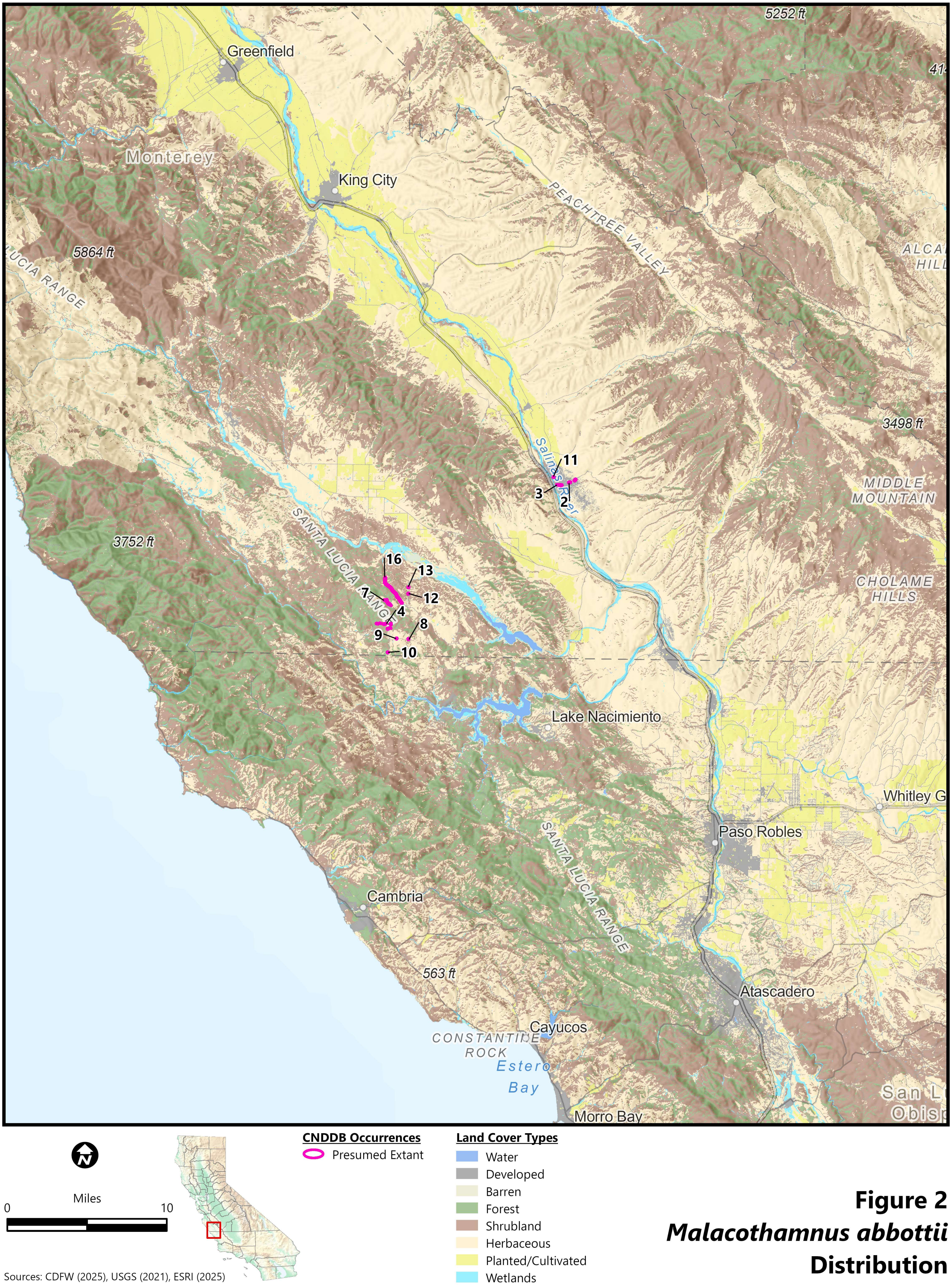

Figure 2
Malacothamnus abbottii
Distribution

Abbreviations and Acronyms

AOO	area of occupancy
Cal-IPC	California Invasive Plant Council
CCH	California Consortium of Herbaria
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cm	centimeters
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
EOO	extent of occurrence
ft	feet
G1	Global Conservation Status Rank 1, Critically Imperiled
GAP	Gap Analysis Project
GIN	GreenInfo Network
HCP	habitat conservation plan
IUCN	International Union for the Conservation of Nature
m	meters
NCCP	natural community conservation plan
RCIS	regional conservation investment strategy
USGS	U.S. Geological Survey