

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

California Endangered Species Act



Five-Year Species Review for Napa bluegrass (*Poa napensis*)

Report to the California Fish and Game Commission
October 2026



Cover banner alternative text: San Joaquin Valley habitat image overlaid by CDFW shield and text "California Department of Fish and Wildlife [line break] California Endangered Species Act"

Cover page photo by Jake Ruygt (Alternative text: A closeup photograph of a wispy grass. Along the main culm, the grass is branched opposite and alternating with multiple florets per spikelet that are purple with white-yellow tips.)

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List of Abbreviations, Acronyms, and Terms

ABAG – Association of Bay Area Governments
 CAL FIRE – California Department of Forestry and Fire Protection
 Cal-IPC – California Invasive Plant Council
 CCH2 – Consortium of California Herbaria
 CDC – California Department of Conservation
 CDFG – California Department of Fish and Game
 CDFW – California Department of Fish and Wildlife
 CEQA – California Environmental Quality Act
 CESA – California Endangered Species Act
 CNDDDB – California Natural Diversity Database
 CNPS – California Native Plant Society
 Commission – California Fish and Game Commission
 CRPR – California Rare Plant Rank
 Department – California Department of Fish and Wildlife
 EO – CNDDDB Element Occurrence
 ESA – Federal Endangered Species Act
 et al. – “and others”
 MTC – Metropolitan Transportation Commission
 NAHC – Native American Heritage Commission
 NOAA – National Oceanic and Atmospheric Administration
 PCA – Priority Conservation Area
 PUC – Pacific Union College
 sp. – one species
 spp. – more than one species
 ssp. – subspecies
 TEK – Traditional Ecological Knowledge
 USFWS – United States Fish and Wildlife Service
 var. – variety

Executive Summary

In 1979, the California Fish and Game Commission (Commission) listed Napa bluegrass (*Poa napensis*) as endangered under the Native Plant Protection Act (NPPA) and then as endangered under the California Endangered Species Act (CESA) in 1984. This five-year species review for Napa bluegrass was prepared by the California Department of Fish and Wildlife (Department) for the Commission pursuant to the requirements of CESA (Fish & G. Code, § 2077, subd. (a)). This five-year species review is based on the best scientific information currently available to the Department regarding each of the components listed under section 2072.3 of the Fish and Game Code, and Section 670.1, subdivisions (d) and (i)(1)(A), of Title 14 of the California Code of Regulations. The Department prepared this five-year species review to evaluate whether conditions that led to the original listing of Napa bluegrass are still present or have changed. In addition, this document includes the identification of habitat that may be essential to the continued existence of the species, and the Department's recommendations for management activities and for recovery of the species (Fish & G. Code, §§ 2072.3 & 2077, subd. (a)).

Napa bluegrass is a perennial grass species with two extremely small populations remaining. Both populations are located on private properties in Calistoga and together occupied about 100 sq m (1,100 sq ft) at the time of listing. The species grows in alkaline wetland habitat which is essential to its survival due to the habitat's distinct mineral-concentrated soils, formed from volcanic activity and fed by geothermal waters. At the time of listing under the NPPA and subsequent five-year species review for evaluation under CESA, the most immediate threats to the species were limited range and distribution, stochastic events due to small population size, changes in hydrology, and habitat modification and destruction from development, grazing, grass mowing, airport activities, and trampling. The species is currently in serious danger of extinction by these factors, in addition to competition and altered hydrology. The species has not been surveyed regularly nor has been monitored and there are no specific management efforts underway for the conservation of Napa bluegrass. The Department continues to coordinate with various partners and conduct outreach to landowners to find solutions for aiding in the species conservation and recovery.

While conditions that led to the listing of Napa bluegrass as endangered have changed, the Department has determined that there is sufficient scientific information to indicate that the presence of serious and immediate threats and the need for management activities and other actions to recover the species are still present, and put the species in danger of becoming extinct. For these reasons, the Department recommends no change to the endangered status of Napa bluegrass at this time.

1 Introduction

A. Five-Year Species Review Overview

The California Department of Fish and Wildlife (Department) prepares five-year species reviews to determine whether the conditions that led to the listing of a species as threatened or endangered under the California Endangered Species Act (CESA) are still present or have changed. A five-year species review serves as the basis for a recommendation to the California Fish and Game Commission (Commission) on whether a change to the status of a species listed under CESA is warranted (Fish and G. Code § 2077, subd. (a); Cal. Code Regs. tit. 14 § 670.2 & 670.5). A five-year species review is based upon the best scientific information available to the Department. It is not intended to be an exhaustive review of all published scientific literature on the species; rather, it is intended to summarize key points relevant to the status of the species and address regulatory report requirements (Fish & G. Code, §§ 2072.3, 2072.7, & 2077, subd. (a), (e); Cal. Code Regs. tit. 14, 670.1, subd. (d)).

A five-year species review must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information" (Fish & G. Code, §§ 2072.3, 2077). A five-year species review shall also include information regarding the habitat necessary for the continued existence of the species, a detailed distribution map, the Department's recommendations for management activities and other recommendations for recovery of the species, and any other factors that are deemed relevant (Fish & G. Code, §§ 2072.3 & 2077, subd. (a); Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). Additionally, a five-year species review addresses the following factors as they pertain to the species: "present or threatened modification or destruction of its habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities" (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A)). In some instances, the Department has grouped similar components together and renamed components, described where applicable, to create a more cohesive and readable report.

Receipt by the Commission of a five-year species review is to be placed on the agenda for the next available Commission meeting after delivery. At that time, the five-year species review will be available to the public for at least 30 days before the Department presents the results of the five-year species review and its recommendation at a Commission meeting. When the Department provides a recommendation in a five-year species review to the Commission to uplist (threatened to endangered), downlist

(endangered to threatened), or delist, the Department's five-year species fulfills the requirements of Fish and Game Code section 2077, and also serves as a petition to change the listing status of the species (Fish & G. Code, §§ 2072.7 & 2077, subd. (e)).

B. Listing and Review History

a. Native Plant Protection Act, California Endangered Species Act History

On May 25, 1979, the Commission listed Napa bluegrass as endangered (CDFG 1979a) under the Native Plant Protection Act (NPPA) of 1977 (Fish & G. Code, § 1900 et seq.). In 1984, plants listed as endangered under the NPPA were designated as endangered under CESA and added to the CESA list of endangered plants (Fish & G. Code, § 2062). In the 1980s, the Department wrote a five-year species review for Napa bluegrass and recommended no change in status from endangered (CDFG N.D.).

b. Federal Endangered Species Act History

The United States Department of the Interior, U.S. Fish and Wildlife Service (USFWS) listed Napa bluegrass as endangered in 1997 under the Federal Endangered Species Act (ESA). The USFWS completed five-year reviews in 2010 and 2023 and recommended no change in status (USFWS 2010, 2023).

C. Additional Species Status Designations

a. California Rare Plant Rank

The California Native Plant Society works in collaboration with botanical experts throughout the state, including Department biologists, to assign rare plants a California Rare Plant Rank (CRPR) reflective of their rarity status (CNDDDB and CNPS 2020). Napa bluegrass has been assigned a CRPR of 1B.1 (CNPS 2026). Plants with a CRPR of "1B" are considered rare, threatened, or endangered throughout their range with the majority endemic to California (CNDDDB and CNPS 2020). The threat code extension of ".1" indicates that the species is seriously threatened in California, with over 80 percent of occurrences threatened and a high degree and immediacy of threat (CNDDDB and CNPS 2020).

b. NatureServe Conservation Status Ranks

NatureServe's conservation status ranks consist of a global conservation status rank (global rank, G rank) describing the status of a given species over its entire distribution, and a subnational conservation status rank (subnational rank, S rank) describing the status of a given species over its state distribution (Master et al. 2012; NatureServe 2025).

Napa bluegrass has been assigned a global rank of G1 and a subnational rank of S1 (NatureServe Explorer 2026), both indicating that the species is critically imperiled and at very high risk of extinction due to a very restricted range, very few populations, very steep declines, severe threats, or other factors (CNDDDB 2020, 2025).

D. California Native American Tribes and Traditional Ecological Knowledge

Since time immemorial, California Native American tribes have lived alongside the fish, wildlife, and native plants of California, including Napa bluegrass and the geothermal waters the species relies on. California Native American tribes have collected a growing body of knowledge of the environment over thousands of years. This body of knowledge is often referred to as Traditional Ecological Knowledge (TEK) and encompasses the world view where ecology, spirituality, and human-animal relationships are all interconnected. TEK and related practices support a deep understanding of a species' life history and inform its management.

Through our tribal engagement process, the Department sought to understand how tribes would like to engage with the development of this five-year species review and how TEK and tribal practices of stewardship, restoration, and conservation relate to and affect Napa bluegrass and its habitat. The Department ensures permission is received from tribes before including any shared information in a five-year species review. While the Department did not receive any tribal comments or information to be included in this five-year species review, the Department recognizes how geothermal waters across North America, including in California, are known to be sacred, spiritual, communal spaces, and important cultural touchstones to Native Americans (Menefee 1873; Lund 1995; Miller 2013; Pascual et al. 2024; Native Land Digital 2025; NAHC 2025). Published sources indicate that geothermal waters may hold cultural significance in some contexts (Menefee 1873; Lund 1995; Milliken 2009; Grossinger and Askevold 2012; Pinoleville Pomo Nation 2020; Pascual et al. 2024; Native Land Digital 2025; Suscol Intertribal Council 2025), but such information cannot substitute for direct tribal input and should not be generalized. The Department invites and will continue to seek meaningful tribal engagement to promote collaborative management of California's natural resources and provide opportunities to participate in discussions of Napa bluegrass conservation that reflect tribal priorities.

E. Notifications and Information Received

Notifications were sent to USFWS to coordinate and exchange information in relation to this five-year species review (Fish & G. Code, § 2077, subd. (b)). Public notifications were distributed to affected and interested parties and sent to email distribution lists that are

maintained by the Department and the Commission. The Department received one comment in response to public notifications. See [Appendix A](#) for additional details.

Tribal notifications were mailed and emailed to a list of tribes provided by the Native American Heritage Commission (NAHC) as having cultural or traditional affiliation with the geographic area of Napa bluegrass. The Department received no comments in response to the tribal notifications. The tribal engagement summary for Napa bluegrass is described in [Appendix B](#).

2 Species Description and Taxonomy

A. Species Description

Napa bluegrass was first collected in 1903 by Joseph P. Tracy and later described in 1946 by Alan Ackerman Beetle (Peterson and Soreng 2007; CCH2 2025). Napa bluegrass is a perennial bunchgrass in the Poa family (Poaceae). Napa bluegrass stems, leaves, and flowers are generally hairless or rough (scabrous) (Figure 1). The species has short roots and grows in dense clumps (tufts) that are 30 to 100 cm (1 to 3 ft) wide with stems (culms) that reach 30 to 100 cm (1 to 3 ft) tall (Soreng 2024). The sheaths of the leaves are generally open before wrapping closely to the culm below a papery-thin outgrowth (ligule) that is interior to the sheath (Figure 1; Table 1). The ligule is 4-6 mm (0.1 to 0.2 in) long and shaped like a triangle with a pointed (acute) or rounded (obtuse) tip (Soreng 2024). Leaves can grow 15 to 20 cm (6 to 8 in) long (USFWS 2023). The species' cluster of flowers (inflorescence) stemming from each culm is generally 5 to 15 cm (2 to 6 in) long and is arranged in a panicle (many-branched inflorescence) with branches that are condensed together or loosely spreading. Panicles overall have 40-100+ spikelets (floral unit), and each smaller branch contains about 5-27 spikelets with 3-5 florets (flowers) per spikelet (Flora of North America 2026a). Fresh flowers are generally pale green to purple and contain one seed (grain) per flower. The base of a floret (callus) will usually be without hairs (glabrous) (Figure 2) and sometimes, but rarely, with a tiny crown of hairs to 0.1 mm (0.04 in) (Flora of North America 2026a). Glabrous calluses are an atypical feature of most *Poa* species since most *Poa* species have cobwebby hairs. Another distinct feature of Napa bluegrass is the white-margined glumes that subtend the florets at the base of an entire spikelet (Figure 2) (CNPS 1977; CDFG 1979a; Brane and Malloch 1985).

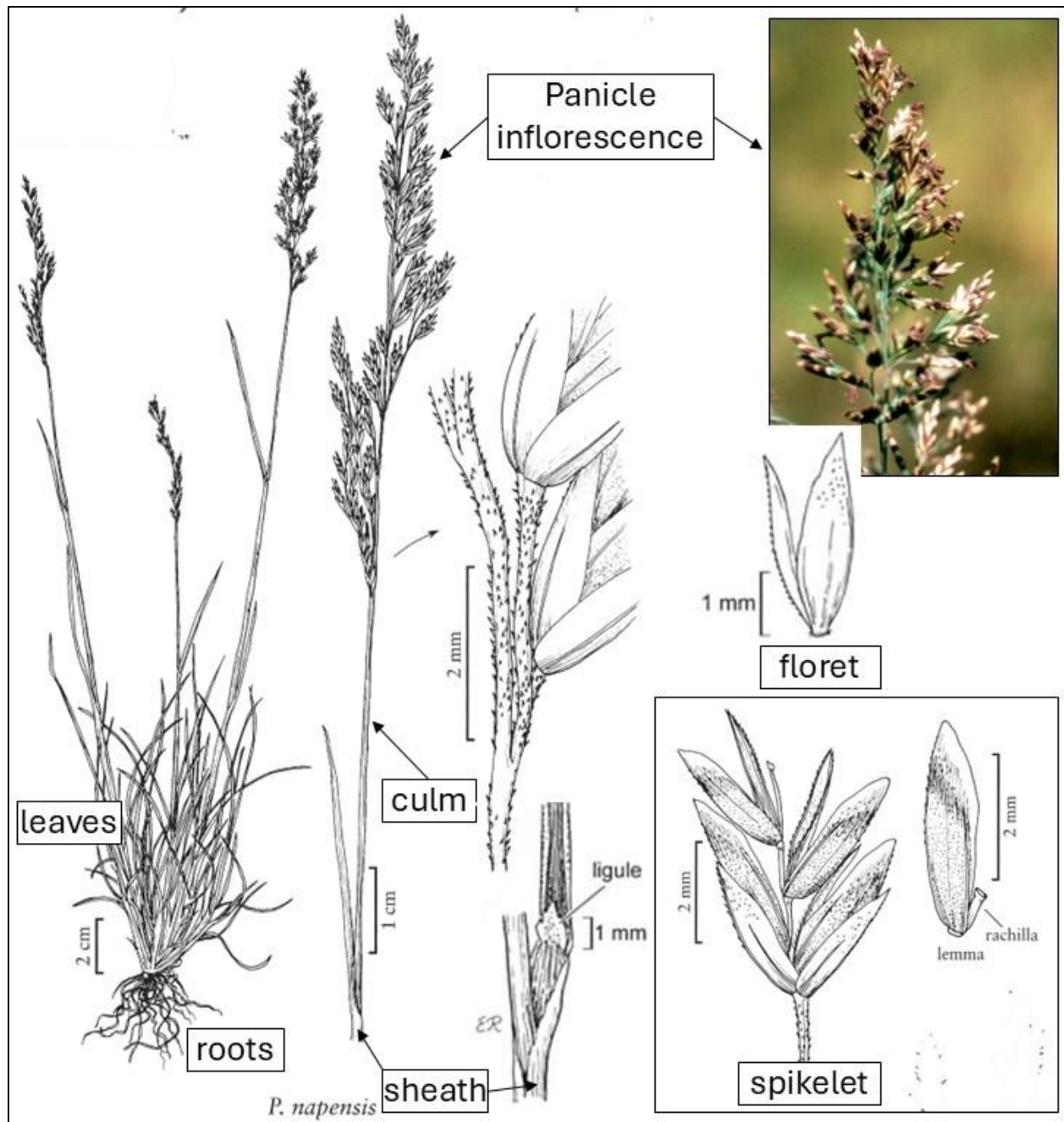


Figure 1. Napa bluegrass illustrations. Line illustrations by Sandy Long (Flora of North America 2026a) and UC Jepson Herbaria (Soreng 2024), Photo by Marianne McDermon (CDFW 2013).

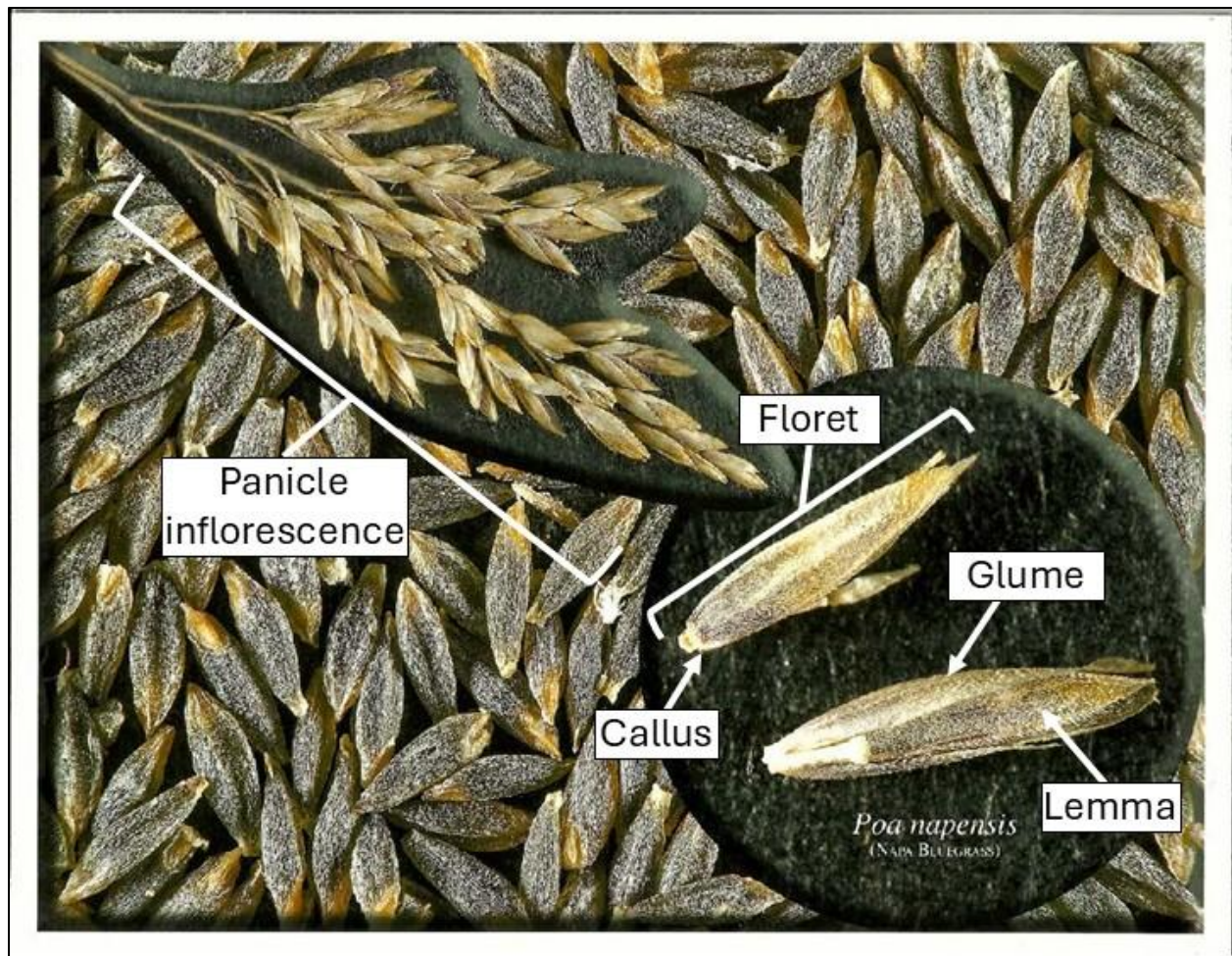
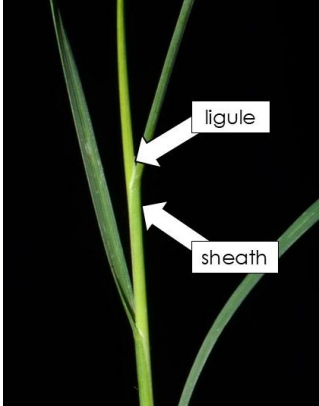


Figure 2. Close up of Napa bluegrass inflorescence and florets. Photos by John Macdonald (2012).

B. Species Taxonomy and Similar Taxa

Napa bluegrass is closely related to secund bluegrass (*Poa secunda*) (Peterson and Soreng 2007), which is a common widespread species; and a high salinity-adapted species called San Francisco bluegrass (*Poa unilateralis*). These species share similar morphological features that are not typical of most *Poa* species, but secund bluegrass is the only species that may be confused for Napa bluegrass since it is commonly found near where Napa bluegrass occurs (Table 1). The callus hairs of a floret, when observed in other *Poa* species are usually long and cobweb-like (Flora of North America 2026b). The rare occurrence of tiny hairs around the callus of a floret in Napa bluegrass is a shared feature with secund bluegrass and San Francisco bluegrass (Gillespie et al. 2018; Soreng and Gillespie 2018).

Table 1. Traits to distinguish Napa bluegrass from secund bluegrass. Defining features for Napa bluegrass are underlined. Photo sources: Sheaths (Greenberger 2021; Campbell 2023), Ligules (Carr 2014; Chasey 2025), Spikelets (Chasey 2026; Smith 2026).

Trait	Napa bluegrass	Secund bluegrass
Sheaths	<u>Generally open</u>, wrapped close around stem <u>far below ligule</u> 	Open 3/4 length, wrapped close around stem close to ligule and below 
Ligules	<u>Sides obtuse (wide) or acute (straight)</u> <u>tapering to rounded or jagged pointed tip</u>; 4 to 6 mm 	Sides gradually taper to a sharp pointed (acuminate) or truncate (flat) tip; 0.5 to 10 mm 
Spikelets and Florets	Spikelets generally laterally compressed (flattened) Lemma keeled (boat-like); 3 to 4 mm; glabrous (no hair), rarely hairs at callus (base) 	Spikelets generally terete (rounded); lemma weakly keeled; 3.5 to 6mm; glabrous, scabrous, or short-hairy at callus 

3 Life History and Ecology

This section considers the best available scientific information regarding the species' life history (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

Napa bluegrass is a perennial, which means it completes its life cycle in more than two years or growing seasons. Its roots and leaves survive through the winter in a dormant state and grow new leaves and flowers in spring. Unlike annual grasses that reproduce in the same growing season, a perennial grass may not reproduce each growing season, but instead conserve resources to reproduce during a growing season with more favorable conditions. Napa bluegrass can produce new, vertical shoots from its base (tillering) and reproduce by seed, which is typical of dense, clump-forming grasses. These seeds germinate during the winter in moist soils with high mineral (e.g., boron) concentrations, that are fed by alkaline springs and seasonal precipitation. Napa bluegrass typically blooms in May (Soreng 2024) but can also flower in April or June depending on weather and habitat conditions. Napa bluegrass is wind-pollinated, which is an adaptation of most grasses that allows them to reproduce without relying on insects for pollination.

4 Range and Distribution

This section considers the species' range and distribution and provides a detailed distribution map (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). A species' range for the purposes of CESA and a five-year species review is the species' California range (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal.App.4th 1535, 1551). Range describes the general geographical area in which a species occurs. Distribution describes the actual sites where individuals and populations of the species occur within the species' range.

Napa bluegrass is extremely limited in its range and distribution because the species is highly dependent on the high soil-mineral concentrations formed by the area's geothermal activity. The species' entire known range is within a 1.9 sq km (0.7 sq mi) area in and near the city of Calistoga, Napa County, California (Figure 3). There are two known Element Occurrences (EOs), which are mapped areas of species presence that are at least 0.4 km (0.25 mi) apart, in the Department's California Natural Diversity Database (CNDDDB). EO 1 (which includes the former EO 2) and EO 3 consist of one and three areas, respectively. Taken together, the two occurrences occupy about 100 sq m (1,100 sq ft) (USFWS 2010; USFWS 2023) and are discussed further below. Napa bluegrass was once known to occur in a third location near the "Old Faithful Geyser" (near EO 1) but was considered extirpated at this location before the species was listed in 1979 (CNPS 1977; CDFG 1979a) and never received an element occurrence number.

A. Tubbs-Myrtledale (EO 1)

The Tubbs-Myrtledale occurrence (EO 1) is in Napa County approximately 2.4 km (1.5 mi) northwest of the City of Calistoga. The species occupies small patches within the mapped occurrence boundary that overlaps eight private properties (with a combined 23 ha (56 ac)) on Tubbs Lane and Myrtledale Road.

EO 1 was first documented from a specimen collection in 1946 in an area on Myrtledale Road identified as Myrtledale Hot Springs (CCH2 2025). In 1980, the species was collected from a corner property on Tubbs Lane and Myrtledale Road (Tubbs Lane property). A 1983 survey documented more Napa bluegrass in a patch about 575 m (1,900 feet) northwest of the Tubbs Lane property (Callizzo 1983a, b) towards Bennett Lane. However, the Tubbs Lane property is currently the only property within EO 1 where Napa bluegrass is still known to exist. The seven other properties need to be surveyed to assess presence or absence of the species. On the Tubbs Lane property, there are patches of the species that occur across a 4 ha (10 ac) area on a 8 ha (20 ac) property that is bisected by an asphalt road (USFWS 2010; CNDDDB 2025). In 2008, the USFWS reported Napa bluegrass growing on the northern western edge of the property on both sides of the fence line (Symonds 2008; USFWS 2010). During a site visit in 2025, the species was observed in pools that were up to 4.5 m (15 ft) wide (Ruygt 2025). Overall, the distribution of Napa bluegrass at EO 1 appears to have contracted to an area on one property; however, there is not enough continuous distribution data from all areas to make any conclusions to whether there has been a change in distribution at this occurrence since listing.

B. Gliderport (EO 3)

The Gliderport occurrence (EO 3) is within the city of Calistoga at the now defunct Gliderport, with the Indian Springs Resort to the northwest and a mobile home park to the north. The occurrence is mapped into three main areas—one on the northcentral, another on the southcentral, and the third on the northeastern end of the airfield. Napa bluegrass is distributed patchily and occurs on both sides of the runway (Ruygt 1994), and was estimated to occupy a total area of 1 sq m (11 sq ft) (Cox 1983). In two small patches on the northeastern end of the airfield, the species overlaps in distribution with Calistoga popcornflower (*Plagiobothrys strictus*), a state threatened and federal endangered species (Glenn Lukos Associates 2009; Wyrick-Brownworth 2013). There is also a known water leak that feeds these patches, originating from geothermal pipes that run below the mobile home park (Wyrick-Brownworth 2013). In 2008, Napa bluegrass was observed in 26 spots from the central to the eastern end of the Gliderport, that ranged in size from less than 1 sq m (11 sq ft) up to 1,104 sq m (11,900 sq ft) (Glenn Lukos Associates 2009). In 2026, updates on the distribution of Napa bluegrass

indicate that the species appears to have contracted based on a mapping effort that showed the species covering about five, small spots on the northeastern end of the Gliderport (Monk & Associates Inc. 2026). A five-year monitoring period for the species will be conducted post-construction of the resort expansion of the Veranda at Indian Springs Project (Monk & Associates Inc. 2026), which may provide greater insight on how the distribution of Napa bluegrass has changed since listing and if the species still occurs in the two central areas of Gliderport that were previously reported in 2008 (Glenn Lukos Associates 2009). Overall, there is not enough data to draw any conclusions on whether the distribution of the species at EO 3 has changed. However, comparisons between the 2008 and 2025 mapped distributions indicate there has been a reduction in the species' extent at EO 3 (Glenn Lukos Associates 2009; Monk & Associates Inc. 2026), and additional monitoring may provide insights on any shifts in the species' distribution.

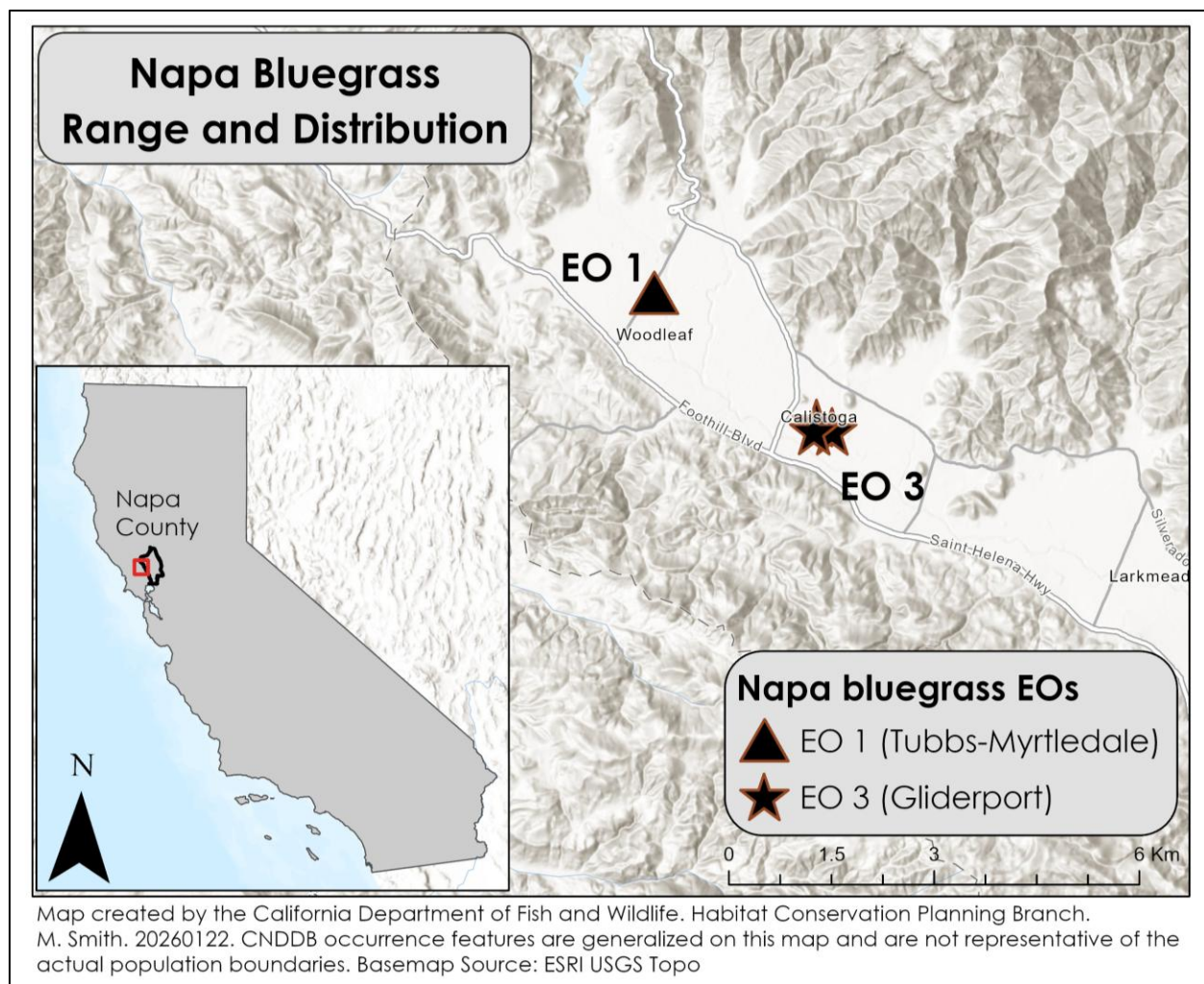


Figure 3. Range and distribution map of Napa bluegrass.

5 Abundance and Population Trend

This section considers the species' abundance and population trends (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

Since listing, estimates of the population size of Napa bluegrass from periodic surveys have not reached above 1,000 plants, which is low for a perennial plant species with only two occurrences left. The Tubbs-Myrtledale occurrence (EO 1) is known to persist on only one property (Tubbs Lane property), and it is unknown if the species is present on neighboring parcels where it was previously observed in the 1980s. The Gliderport occurrence (EO 3) has been observed during surveys for *Calistoga popcornflower*; however, there is not enough abundance data to evaluate a population trend.

A. Tubbs-Myrtledale (EO 1)

The population size at the Tubbs-Myrtledale occurrence (EO 1) has been generally approximated (a range between 1,000 and 10,000 plants) (Table 2). A 1983 survey was the most thorough search for Napa bluegrass with scattered individuals observed in three primary areas (Callizzo 1983a, b; Cox 1983). Of these areas in EO 1, the pools within the Tubbs Lane property have been surveyed the most (USFWS 2010; CNDDDB 2025). In spring 2025, members of the Napa Valley Chapter of CNPS were permitted access to the Tubbs Lane property to search for Napa bluegrass (J. Ruygt, personal communication, Aug 7, 2025) and estimated between 250 and 315 plants at the site (Ruygt 2025). Surveys for the species at this property are planned in Spring 2026 (J. Ruygt, personal communication, Jan 14, 2026). Overall, abundance and population size of Napa bluegrass at EO 1 appears to have declined since listing; however, there is not enough abundance data from any of the areas to infer a population trend at this occurrence.

Table 2. Observations and plant count for Napa bluegrass at the Tubbs-Myrtledale occurrence (EO 1) from 1946 to 2025.

Year	Plant Count	Notes on occurrence	Observation Type	Source
1946	NA	Myrtledale Hot Springs	pressed specimens	(CCH2 2025)
1955	NA	Myrtledale Hot Springs	pressed specimens	(CCH2 2025)
1962	NA	Myrtledale Hot Springs	pressed specimens	(CCH2 2025)
1965	NA	Myrtledale Hot Springs	pressed specimens	(CCH2 2025)
1980	NA	SE Tubbs Lane Patch	pressed specimens	(CCH2 2025)
1981	50+	Tubbs Lane property (scattered), Myrtledale Hot Springs (2 patches – 20; 2-5 plants)	Plant survey	(Rae and Harrison 1981)
1983	1,000-10,000	Myrtledale Hot Springs (few), Tubbs Lane near Bennet Lane (scattered),	Plant survey, census	(Callizzo 1983a, b; Cox 1983)

Year	Plant Count	Notes on occurrence	Observation Type	Source
		Tubbs Lane property near Myrtdale Road (many scattered)		
1984	NA	Tubbs Lane property	Plant survey	(Shaw 1984)
1985	1,000-10,000	Tubbs Lane property	Plant survey	(Callizzo 1985)
1986	1,000-10,000	Tubbs Lane property	Plant survey	(Doran 1986)
1987	1,000-10,000	Tubbs Lane property	Plant survey	(Doran 1987)
1988	NA	Tubbs Lane property (fewer plants, very dry)	Plant survey	(Doran 1988)
1989	1,000-10,000	Tubbs Lane property	Plant survey	(Callizzo 1989)
2007	6	Tubbs Lane property	Plant survey	(Ruygt 2007)
2010	NA	Tubbs Lane property	Seed collection	(RSABG 2012; California Plant Rescue 2019)
2011	NA	Tubbs Lane property	Seed collection, pressed plant specimens	(RSABG 2012; California Plant Rescue 2019; CCH2 2025)
2025	250-315	Tubbs Lane property	Plant survey, iNaturalist	(Ruygt 2025; S. Yarger, personal communication, Jul 29, 2025)

B. Gliderport (EO 3)

Although the species has been periodically collected at the Gliderport since 1903 (CCH2 2025), it was not until 1986 when Napa bluegrass was first counted (Soreng 1986) and then later mapped in 2008 (Glenn Lukos Associates 2009). About 520 plants were recorded in 2008; however, average densities were poor (0-8 plants/sq m (0-8 plants per 11 sq ft)) (Glenn Lukos Associates 2009). In 2025, 103 plants were mapped as part of a baseline assessment of the species, which will be followed up with five more years of surveys as part of post-construction required activities related to a resort expansion (Monk & Associates Inc. 2026). There are also observations recorded in iNaturalist (a global community science platform) where Department staff confirmed that the observations occurred at the Gliderport (Table 3). Additional continuous survey data at EO 3 is needed to determine possible population trends. In conclusion, the species remains critically vulnerable to extinction due to low abundance and small population extents. Since there is a possibility that the extent of the species has reduced from three areas to one main area on the northwest section of the Gliderport based on the mapped distributions for the species in 2008 and 2025 (Glenn Lukos Associates 2009; Monk & Associates Inc. 2026), the abundance and population size of Napa bluegrass at EO 3 appears to have declined since listing.

Table 3. Observations and estimated plant count for Napa bluegrass at the Gliderport occurrence (EO 3) from 1903 to 2025.

Year	Plant Count	Notes on occurrence	Observation Type	Source
1903	NA	In alkaline soil	Pressed specimens	(CCH2 2025)
1948	NA	Hot springs	Pressed specimens	(CCH2 2025)
1957	NA	Common, the smaller plants in drier ground	Pressed specimens	(CCH2 2025)
1986	500	Plants present where mowed less	Plant survey, pressed specimens	(Soreng 1986; CCH2 2025)
1994	150	Observed both sides of runway, mostly on eastern end	Plant survey	(Ruygt 1994)
1996	200-300	In	Pressed specimens	(CCH2 2025)
2008	520	1-100 plants at 26 locations	Census	(Glenn Lukos Associates 2009)
2009	NA	Observed species	Plant survey	(EcoSystems West Consulting Group 2009)
2018	NA	Observed in area that grows with Calistoga popcornflower	iNaturalist	(R. Elliot, personal communication, Jul 31, 2025; iNaturalist 2025; S. Yarger, personal communication, Jul 29, 2025)
2021	NA	Observed in area that grows with Calistoga popcornflower	iNaturalist	(R. Elliot, personal communication, Jul 31, 2025; iNaturalist 2025; S. Yarger, personal communication, Jul 29, 2025)
2024	many	Not abundant, scattered near scalds	iNaturalist	(iNaturalist 2025; T. Van Loon, personal communication, Aug 3, 2025)
2025	103	Scattered near scalds, some growing within dried pools, 30-50/pool	Census, iNaturalist	(iNaturalist 2025; J. Liu, personal communication, Aug 4, 2025; Monk & Associates Inc. 2026)

6 Habitat

This section considers the best available scientific information regarding the kind of habitat necessary for the species survival (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)), and a review of the identification of the habitat that may be essential to the continued existence of the species (Fish & G. Code, § 2077, subd. (a)).

Napa bluegrass occurs at 90-180 m (300-600 ft) in elevation. The species grows on conspicuous, bare alkaline crusts (Figure 4, Figure 5) with high concentrations of manganese, potassium, boron, sulfate, and sodium that at similar levels would be severely toxic to most agricultural crops (Northwest Biosurvey 2005; USFWS 2010; Wyrick-Brownworth et al. 2021). Napa bluegrass can be found with Calistoga popcornflower in damp depressions to more dry alkaline crusts (Cox 1983; Brane and Malloch 1985).

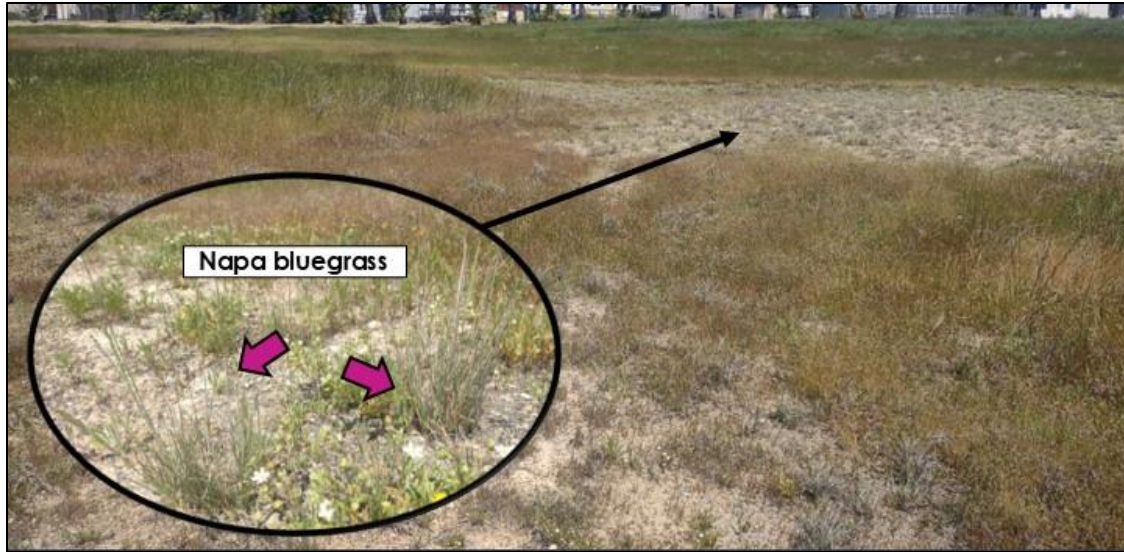


Figure 4. Napa bluegrass at the Gliderport occurrence (EO 3). The inset photo shows a close up of Napa bluegrass growing in bare interspaces as part of a larger dried vernal pool. Photo source: Liu (2025).



Figure 5. Napa bluegrass at the Tubbs Lane property of the Tubbs-Myrtledale occurrence (EO 1) in Spring 2025. (Left) Patches of the species in a dry alkaline pool

surrounding a dense patch of white flowering *Calistoga* popcornflower. (Top Right) Napa bluegrass growing through overgrown, dry plants (thatch). (Bottom Right) Napa bluegrass amongst other vegetation. Photos source: Ruygt (2025).

A. Vegetation Communities

The plant diversity where Napa bluegrass occurs is a mix of rare and native plant species (Table 4, [Appendix C](#)) and some invasive species. At both occurrences, Napa bluegrass is closely associated with the state-threatened *Calistoga* popcornflower, pink star-tulip (*Calochortus uniflorus*), pappose tarplant (*Centromadia parryi* ssp. *parryi*), and woolly-headed lessingia (*Lessingia hololeuca*). Napa bluegrass at the Tubbs-Myrtledale occurrence (EO 1) is also closely associated with Brewer's milkvetch (*Astragalus breweri*), salt grass (*Distichlis spicata*), beaked spikerush (*Eleocharis rostellata*), and California loosestrife (*Lythrum californicum*). Napa bluegrass at the Gliderport occurrence (EO 3) is also most closely associated with California goldfields (*Lasthenia californica*), and large-flowered sand-spurrey (*Spergularia macrotheca* var. *longistyla*).

Table 4. Rare and native plant species at the Tubbs-Myrtledale (EO 1) and Gliderport (EO 3) occurrences. Superscripts: ¹CESA-listed plant, ²CNPS rare rank 1B.1, 1B.2.

Common Name	Scientific Name	EO 1	EO 3	Source of Information
Small-leaf bent grass	<i>Agrostis microphylla</i>	X		(Cox 1983; Brane and Malloch 1985; CNPS 1987; Ruygt 2025)
Brewer's milkvetch	<i>Astragalus breweri</i>	X		(Callizzo 1983a; Cox 1983; CNPS 1987; G. Cooley, personal communication, Nov 10, 2005; CNDDDB 2025)
Pink star-tulip	<i>Calochortus uniflorus</i>		X	(G. Cooley, personal communication, Nov 10, 2005; Wyrick-Brownworth et al. 2021; CNDDDB 2025) Ruygt 2025, 1983 TNC; 1987 CNPS status report
Pappose tarplant ²	<i>Centromadia parryi</i> ssp. <i>parryi</i>	X	X	(Cox 1983; G. Cooley, personal communication, Nov 10, 2005; EcoSystems West Consulting Group 2009; CNDDDB 2025; Ruygt 2025)
Annual hairgrass	<i>Deschampsia danthonioides</i>	X	X	(EcoSystems West Consulting Group 2009; Ruygt 2025)
Salt grass	<i>Distichlis spicata</i>	X	X	(EcoSystems West Consulting Group 2009; CNDDDB 2025; Ruygt 2025)
Beaked spikerush	<i>Eleocharis rostellata</i>	X		(CNDDDB 2025; Ruygt 2025)
Button-celery	<i>Eryngium</i> sp.	X	X	(Brane and Malloch 1985; Ruygt 2025)
Seep monkeyflower	<i>Erythranthe guttata</i>	X	X	(Brane and Malloch 1985; Ruygt 2025)
Low barley	<i>Hordeum depressum</i>	X	X	(EcoSystems West Consulting Group 2009; Ruygt 2025)
Baltic rush	<i>Juncus balticus</i>	X		(Ruygt 2025)
Toad rush	<i>Juncus bufonius</i>		X	(CNDDDB 2025)
California goldfields	<i>Lasthenia californica</i> ssp. <i>californica</i>		X	(EcoSystems West Consulting Group 2009; Wyrick-Brownworth et al. 2021; CNDDDB 2025)
Woolly-headed lessingia	<i>Lessingia hololeuca</i>	X	X	(G. Cooley, personal communication, Nov 10, 2005; CNDDDB 2025; Ruygt 2025)
California loosestrife	<i>Lythrum californicum</i>	X		(Cox 1983; G. Cooley, personal communication, Nov 10, 2005; CNDDDB 2025; Ruygt 2025)
Common muilla	<i>Muilla maritima</i>	X	X	(Brane and Malloch 1985; EcoSystems West Consulting Group 2009; Ruygt 2025)

Common Name	Scientific Name	EO 1	EO 3	Source of Information
Napa bluegrass ¹	<i>Poa napensis</i>	X	X	(CNDDDB 2025)
Bluegrass	<i>Poa</i> spp.		X	(Cox 1983)
Annual semaphore grass	<i>Pleuropogon californicus</i>	X		(Ruygt 2025)
California alkaligrass ²	<i>Puccinellia simplex</i>	X		(Cox 1983; Brane and Malloch 1985; CNPS 1987; CCH2 2025)
Clustered goldenweed	<i>Pyrocoma racemosa</i> var. <i>racemosa</i>	X	X	(G. Cooley, personal communication, Nov 10, 2005)
Sticky sandspurry	<i>Spergularia macrotheca</i> var. <i>leucantha</i>	X		(Ruygt 2025)
Large-flowered sand-spurrey	<i>Spergularia macrotheca</i> var. <i>longistyla</i>		X	(EcoSystems West Consulting Group 2009; Wyrick-Brownworth et al. 2021; CNDDDB 2025)
Sun cup	<i>Taraxia ovata</i>		X	(Brane and Malloch 1985)
Saline clover ²	<i>Trifolium depauperatum</i> var. <i>hydrophilum</i>	X	X	(G. Cooley, personal communication, Nov 10, 2005)
Tomcat clover	<i>Trifolium willdenovii</i>		X	(Brane and Malloch 1985)
Triple lilies	<i>Triteleia</i> spp.		X	(Wyrick-Brownworth et al. 2021)
Southern cattail	<i>Typha domingensis</i>	X		(CNDDDB 2025; Ruygt 2025)

Non-native invasive plant species are also present at the sites of both occurrences with their abundance and distribution varying annually. Some species, such as tall fescue (*Festuca arundinacea*), have been observed spreading in areas adjacent to suitable Napa bluegrass habitat in the summer and fall. The following is a list of non-native species found at the sites (Callizzo 1983a; Symonds 2008; USFWS 2010; RSABG 2012; Wyrick-Brownworth et al. 2021; L. Pollastro, personal communication, Dec 11, 2025; Ruygt 2025):

- Wild oat (*Avena fatua*)
- Yellow star-thistle (*Centaurea solstitialis*)
- Common teasel (*Dipsacus fullonum*)
- Tall fescue (*Festuca arundinacea*)
- Italian ryegrass (*Festuca perennis*)
- Meadow fescue (*Festuca pratensis*)
- Mouse barley (*Hordeum murinum*)
- Prickly lettuce (*Lactuca serriola*)
- Perennial pepperweed (*Lepidium latifolium*)
- Tamarisk (*Tamarix ramosissima*)
- Spring vetch (*Vicia sativa*)
- Hairy vetch (*Vicia villosa*)

B. Climate and Hydrology

Napa bluegrass grows in wet depressions but persists in drier parts of barren, alkaline crusts (or scalds), indicative of alkaline vernal pool habitat that is highly dependent on belowground geothermal water activity and seasonal precipitation. These alkaline crusts are formed from geothermal hot springs (historic or active) that deposit high levels of water-soluble minerals that are not normally tolerated by plants (i.e., boron, manganese, sulphates). However, Napa bluegrass is adapted to these soils (CDFG 1979b; Wyrick-Brownworth et al. 2021; USFWS 2023). Over time, higher and higher concentrations of minerals and salts are left behind as water evaporates from the hot spring overflows (Northwest Biosurvey 2005; Grossinger and Askevold 2012). Any remaining alkaline crusts are usually indicators of where historic outflow of hot springs once surfaced (Northwest Biosurvey 2005; Grossinger and Askevold 2012), and are unique habitat features important to Napa bluegrass.

The Tubbs Lane property that contains the Tubbs-Myrtledale occurrence (EO 1) is less than 200 m (650 ft) east of Calistoga's "Old Faithful Geyser," which is a likely source of water for EO 1. At the Gliderport occurrence (EO 3), some of the patches where Napa bluegrass is observed are likely fed by seasonal precipitation and by a known water leak from geothermal pipes below the adjacent mobile home park (Wyrick-Brownworth 2013). Research is needed to better understand the species' hydrologic thresholds for reproduction and survival.

C. Geology and Soils

The geology and soils in and around Calistoga, as part of the Napa Valley, were formed about 3 million years ago from colliding tectonic plates that formed the surrounding mountains and volcanic activity (ash, lava, magma) that created the unique hydrothermal character of the lowland valley of the Calistoga area (Enderlin 1995; Grossinger and Askevold 2012). Historical evidence also suggests this unique geology allowed for volcanic sediments at higher elevations to dissipate into multiple branched streams and settle in layers, developing wetlands, and the valley's vernal pools (Grossinger and Askevold 2012). Napa bluegrass occurs in soils mapped as Bale loam or Bale clay loam (Soil Survey Staff 2025). Soils in the Bale series are very deep and poorly drained, and formed when flowing water deposited igneous rocks such as rhyolite and andesite (volcanic sediments rich in silica) (USDA-NRCS 1997; Soil Survey Staff 2025), which makes these soils desirable for growing grapes for wine due to the high silica content. Napa bluegrass's habitat contains poorly draining soils (gravelly loam with dark, adobe-like clay) that are also rich in minerals which would be toxic to most plants. The mineral composition of the soils at the Gliderport occurrence (EO 3) contain manganese, potassium, boron, sulfate, and sodium in extremely high

concentrations, while copper, iron, and phosphate are in low concentrations (Wyrick-Brownworth et al. 2021). The soils of the Tubbs Lane property with the Tubbs-Myrtledale occurrence (EO 1) have not been tested; however, they are likely similar to the soils at EO 3 due to the area's geologic and geothermal history where Napa bluegrass occurs.

7 Threats

This section considers the factors affecting the ability of the species to survive and reproduce, and the degree and immediacy of threat (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). In addition, this section addresses the six listing factors identified in title 14 of the California Code of Regulations section 670.1, subdivision (i)(1)(A):

- Present or threatened modification or destruction of habitat
- Overexploitation
- Predation
- Competition
- Disease
- Other natural occurrences or human-related activities

The sixth listing factor, "other natural occurrences or human-related activities", is addressed under the following subsections: small population size, and stochastic events. Compounding factors, such as climate change, likely amplify the intensity of the threats that are mentioned above. At the time of listing in 1979 and the Department's five-year species review in the 1980s, the threats to Napa bluegrass were predominately limited range and distribution, small population size, changes in hydrology, and habitat modification and destruction from development, grazing, grass mowing, airport activities, and trampling (CDFG 1979b, N.D.). Due to its small population size, the species was also highly vulnerable to stochastic (chance) events (CDFG 1979a; N.D.). The following sections outline how threats within each listing factor have changed.

A. Present or Threatened Modification or Destruction of Habitat

In the 1980s, modification or destruction of habitat was identified as one of the immediate threats to Napa bluegrass (CDFG N.D.). The two five-year reviews by USFWS (2010, 2023) also identified potential future development as a threat to the species. The Department indicated that urbanization significantly reduced the population size at the Tubbs-Myrtledale occurrence (EO 1) (CDFG N.D.). Additionally, neighboring viticulture (i.e., wine grape cultivation) was and still is a threat to the species from habitat destruction and the diversion of water. Viticulture is a major industry in Calistoga, and by 2012, about 3,500 acres were already under intensive agricultural cultivation in the

planning area for open spaces that are managed for resource production (e.g., ranching, farming, water extraction), including 268 acres within city limits (City of Calistoga 2012). Over the years, development centered around natural hot springs plus other human activities have further fragmented the species' distribution and reduced its population size. Present or threatened modification or destruction of habitat continues to put the species in danger of extinction and is described in more detail below.

a. Potential Housing Development

The Gliderport occurrence (EO 3) is located on private property that is sub-divided into 14 parcels under the same ownership. These parcels allow for commercial activities of existing, approved uses (e.g., airport) (LightBox 2025a), and any future development for other uses would require zoning re-classification (City of Calistoga 2020a). An estimated 62 properties under various ownership and zoning are neighboring or near the Gliderport property; however, none of the parcels are protected from future development. Most of the neighboring properties to the south and east of the Gliderport property are owned by the City of Calistoga.

In October 2023, the City of Calistoga re-zoned some areas to meet state mandates for affordable housing in the Housing Element of the City's General Plan (2023-2031) (City of Calistoga 2020a, 2023a). Two parcels (sites F and G; Figure 6) were included in the re-zoning and are across the road from the Gliderport property containing EO 3 (City of Calistoga 2023a). Sites F and G are owned by the City of Calistoga, and the re-zone allows for development of housing on both parcels (Figure 6). The Department provided comments expressing concern that re-zoning to allow potential development on these sites would jeopardize the existence of Napa bluegrass (CDFW, personal communication, Sep 15, 2022), since development would increase human activity and increase sources of potential pollution. The Department also requested to remove sites F and G from the re-zoning plan to fully ensure no future impacts to Napa bluegrass. The City of Calistoga's response indicated there were sufficient mitigation measures for any future proposed development to ensure the species' continued existence (City of Calistoga 2023b). The City also indicated they would notify the Department for additional recommendations to avoid or minimize impacts to the species if development on sites F and G were proposed (City of Calistoga 2023b).

The Tubbs Lane property containing the Tubbs-Myrtledale occurrence (EO 1) is designated as "vacant rural land" that permits uses such as agriculture, a communications tower, and single-unit housing and accessory structures (LightBox 2025b). This parcel once contained a house, a barn, and ancillary structures, but these were torn down in recent years. Prior to vacating the property, the former landowner

mentioned they were potentially selling the land to commercial developers (Callizzo 1985, 1989). An estimated 23 parcels are adjacent to or are near the Tubbs Lane property containing EO 1 and are all zoned with some form of development allowed (Figure 7), including mixed residential use, commercial, and agricultural (LightBox 2025b). Currently, a local land trust is pursuing the conservation of the Tubbs Lane property (L. Pollastro and J. Ruygt, personal communication, Jul 16, 2025 to Sep 8, 2025), which would prohibit any future development of the property.

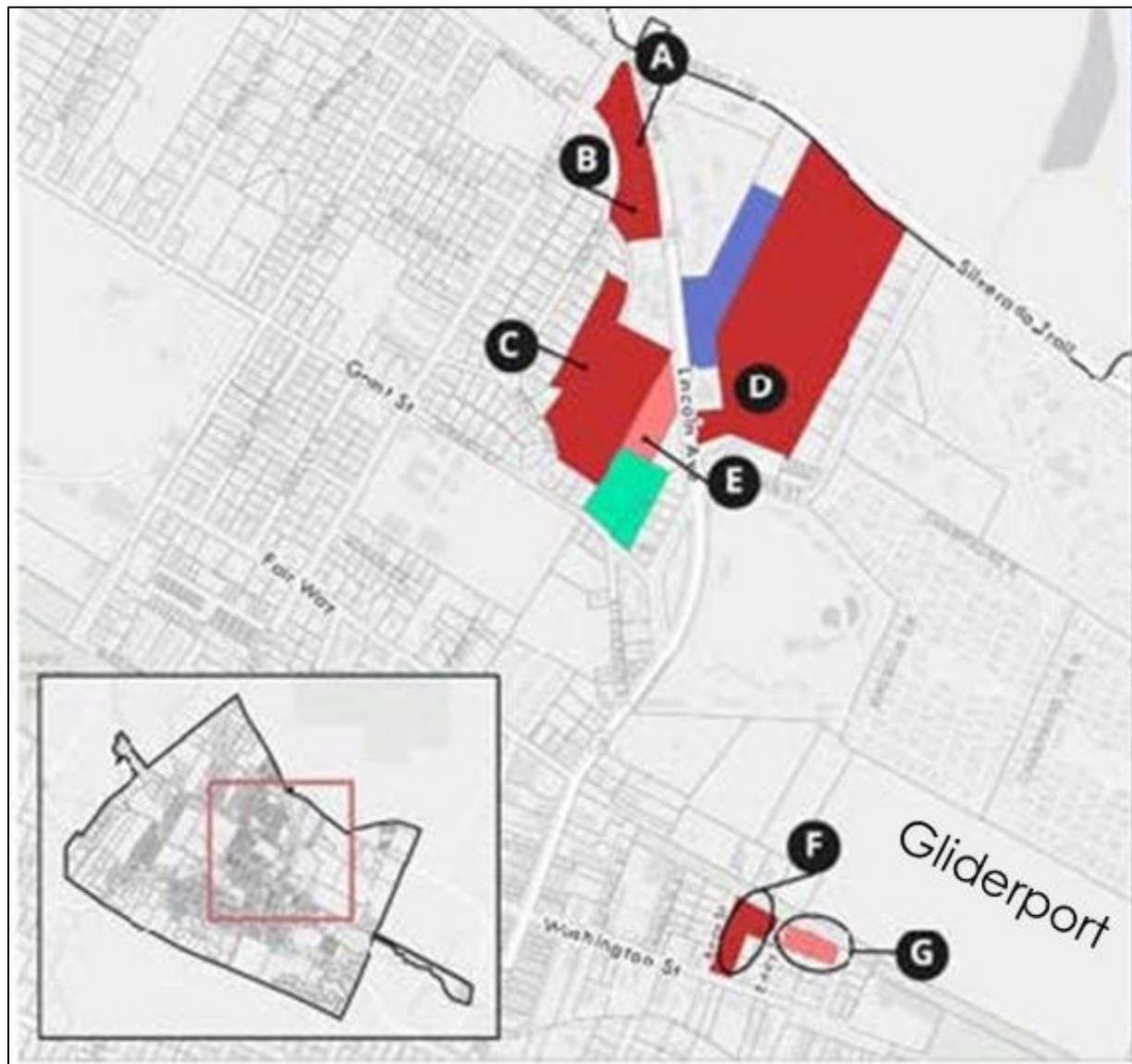


Figure 6. Sites re-zoned near the Gliderport occurrence (EO 3) to allow for the development of affordable housing. Map source: 2023 City of Calistoga Housing Element, p. 5-23 (City of Calistoga 2023a).

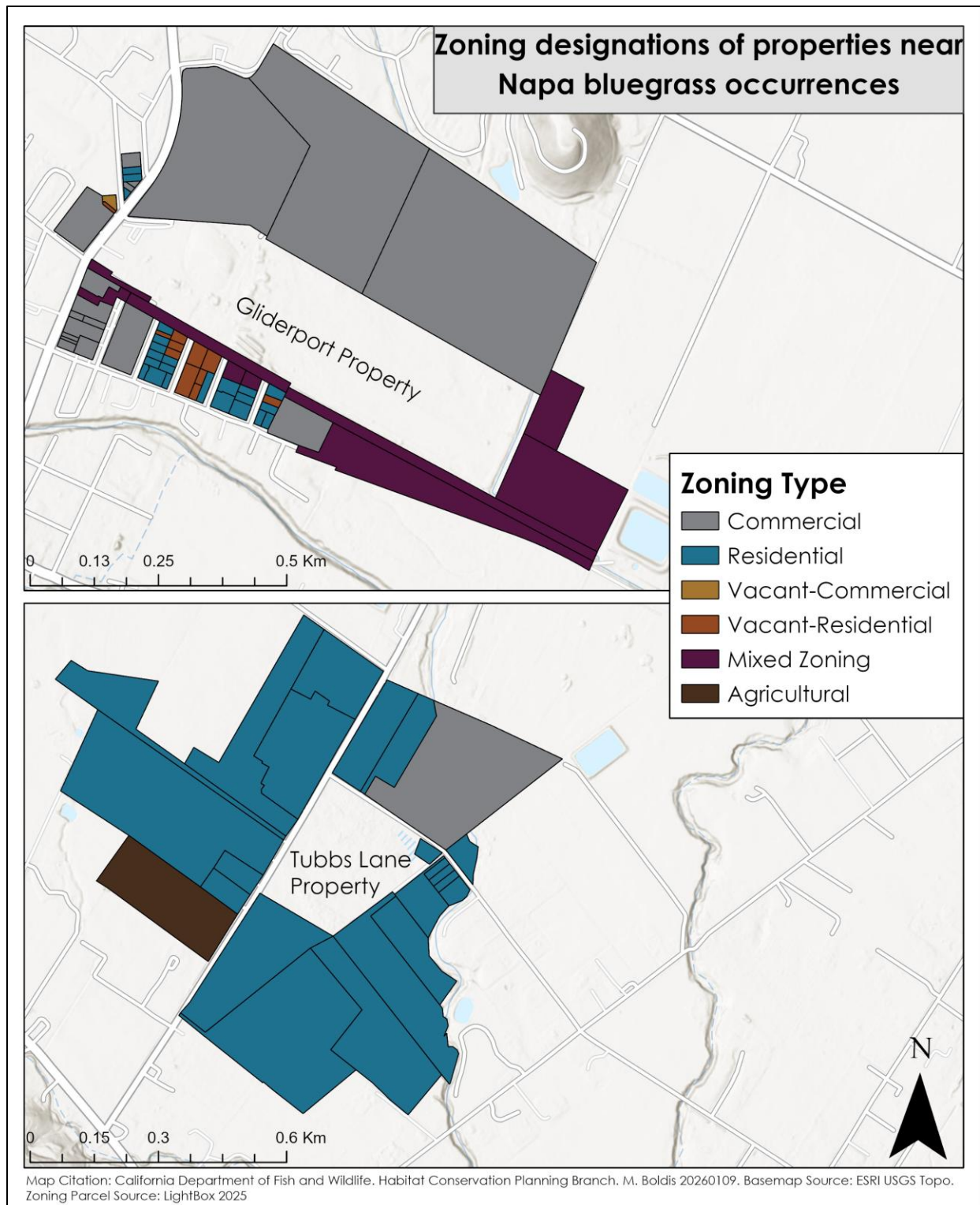


Figure 7. Zoning for properties near Napa bluegrass occurrences. The Gliderport property contains commercial and vacant-commercial zoning types, and the Tubbs Lane property is zoned as Agricultural.

b. Resort Expansion

Since the mid to late 2000s, development of the Gliderport to expand the existing Indian Springs Resort (originally built between 1912 and 1920) has been proposed several times (USFWS 2009; J. Bjerke, personal communication, Oct 22, 2013; Merchant N.D.). In January 2025, the City of Calistoga approved the Veranda at Indian Springs Project, a hotel expansion that includes a 2-story building with 96 hotel rooms and additional amenities (City of Calistoga 2020c; Z. Tusinger, personal communication, Aug 26, 2020 to Sep 17, 2020; G. Desmond, personal communication, Jul 17, 2025). This expansion is located at the western end of the Gliderport (Figure 8).



Figure 8. Outline of approved development to expand the Indian Springs Resort on the Gliderport property. Source: (G. Desmond, personal communication, Jul 17, 2025).

While Napa bluegrass occurs away from the expansion towards the central and eastern side of the Gliderport, the indirect effects of development reach beyond the project's immediate footprint. For example, Calistoga popcornflower once occurred in the area overlapping with the resort's project area (CNDDDB 2025); but Calistoga popcornflower hasn't been observed in the project area for years, likely due to regular disturbance and fragmentation. The resort expansion further alters hydrological flow and fragments into more of the undeveloped portion of the Gliderport, which reduces the buffer distance between Napa bluegrass habitat patches and the edges where the most disturbance and invasive plants occurs on the land (Monk & Associates Inc.

2026). Habitat fragmentation changes the microenvironment (e.g., higher temperatures, water availability) at the edges of remaining undeveloped land (Wiens 1976), which may indirectly impact Napa bluegrass population distribution and abundance in the long-term. This case study shows how the cumulative degradation of native plant habitat is driven by chronic human related disturbances that gradually alter habitat conditions rather than with a single event, where eventually native and rare plant communities become displaced, their populations decline, and ultimately lead to extirpation (Ruas et al. 2022).

c. Altered Geothermal Hydrology

Altered geothermal hydrology from drilling water wells, historical and ongoing water extraction, and water diversions have contributed to the decline of Napa bluegrass, resulting in just two extant and isolated occurrences left in the world. A decrease in ground water flow feeding lowland habitat from hot springs, water diversions from springs, complete drying of springs, or any other further change could lead to further population declines or complete extinction of Napa bluegrass.

The species' habitat was once more extensive before there were changes in land use and geothermal hydrology in Calistoga. Calistoga was characterized as a riverine wetland complex (bodies of water connected by various small and large streams) that was eventually channelized into the present day Napa River that runs through the city (Grossinger and Askevold 2012). Since the late 1860s, drilling wells and water extraction activities have been important for developing Calistoga's hot spring resorts, residential homes, and mineral water companies (Youngs and Higgins 1981; Digitale 2015; Napa County Historical Society 2015), especially in the valley (called "Springs Ground") (Figure 9). Between 1910 and 1920, the depth to water table in "Springs Ground" lowered more than 30 m (100 ft) due to excess water extraction (Allen and Day 1927). The shallowest areas completely dried by 1924 (Allen and Day 1927). Today, the Gliderport occurrence (EO 3) is located within the portion of old "Springs Ground" that remains intact from seasonal flooding from precipitation and from an underground water leak from the geothermal pipes that run below the mobile home park (Wyrick-Brownworth 2013).

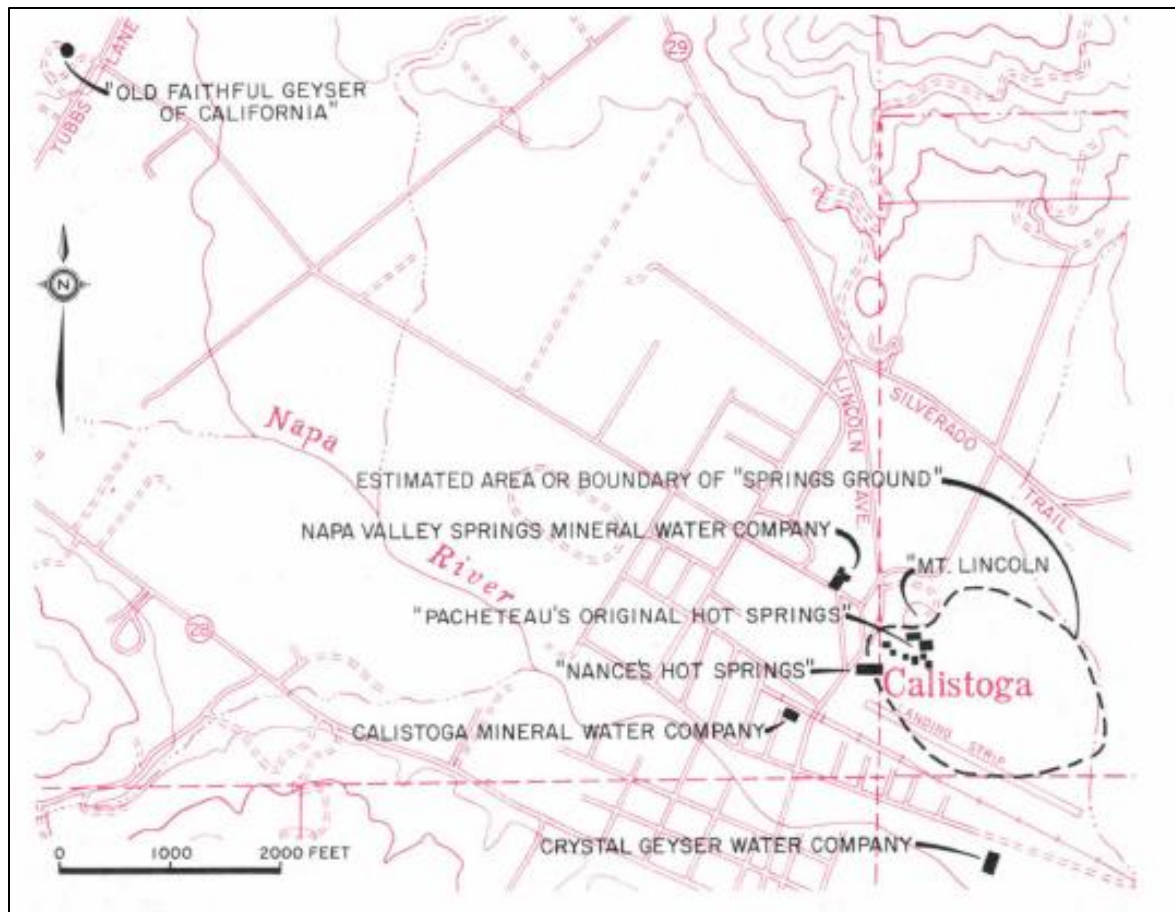


Figure 9. Map of Calistoga valley ("Springs Ground") in the 1860s. The "Pacheteau's original hot springs" is present-day Indian Springs Resort. Source: Allen and Day (1927).

In 1980 and 1981, the California Geological Survey (formerly the California Division of Mines and Geology), conducted a study to assess all the wells and geothermal activity in California for additional potential development opportunities, which included the evaluation of over 100 wells in Calistoga (Youngs et al. 1980; Taylor et al. 1981; Youngs and Higgins 1981). At present, about 136 wells are within 4 km (2.5 mi) of extant Napa bluegrass occurrences (CDC 2025). There are 102 wells currently permitted to be operating and supplying water (active) or remain operable but are not currently supplying water (idle), and the remaining 34 are closed and no longer supplying water (non-active) (Figure 10).

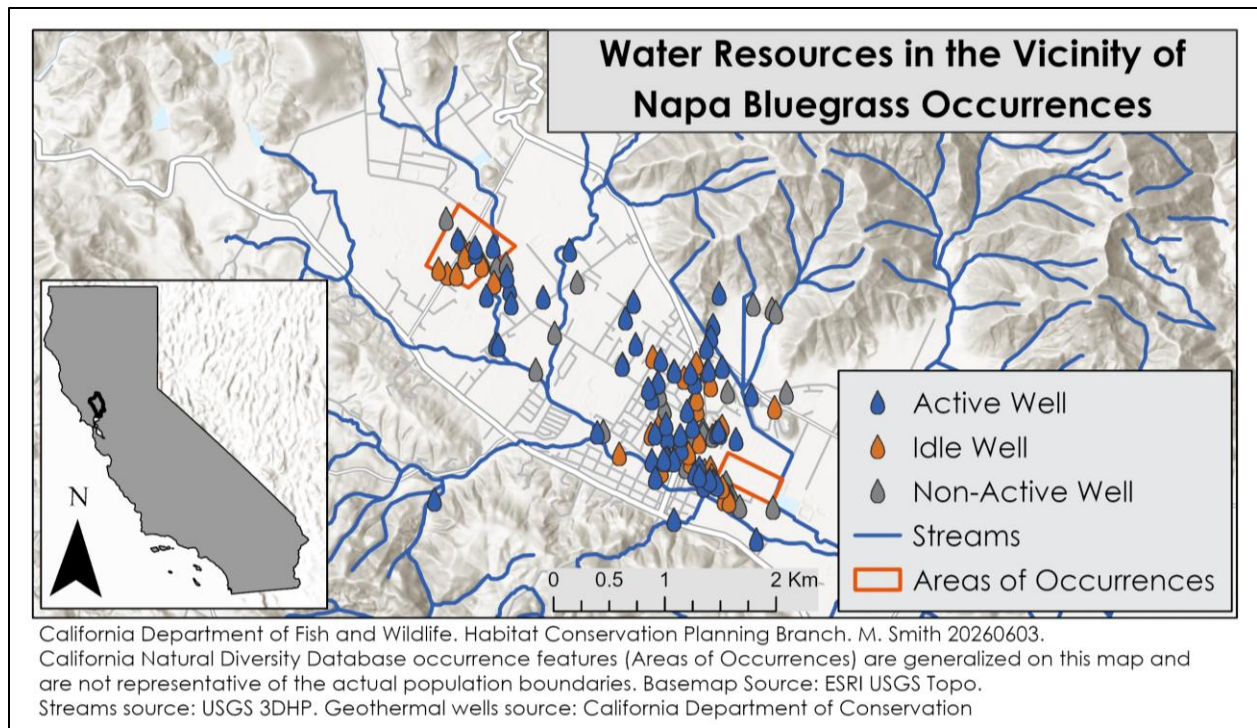
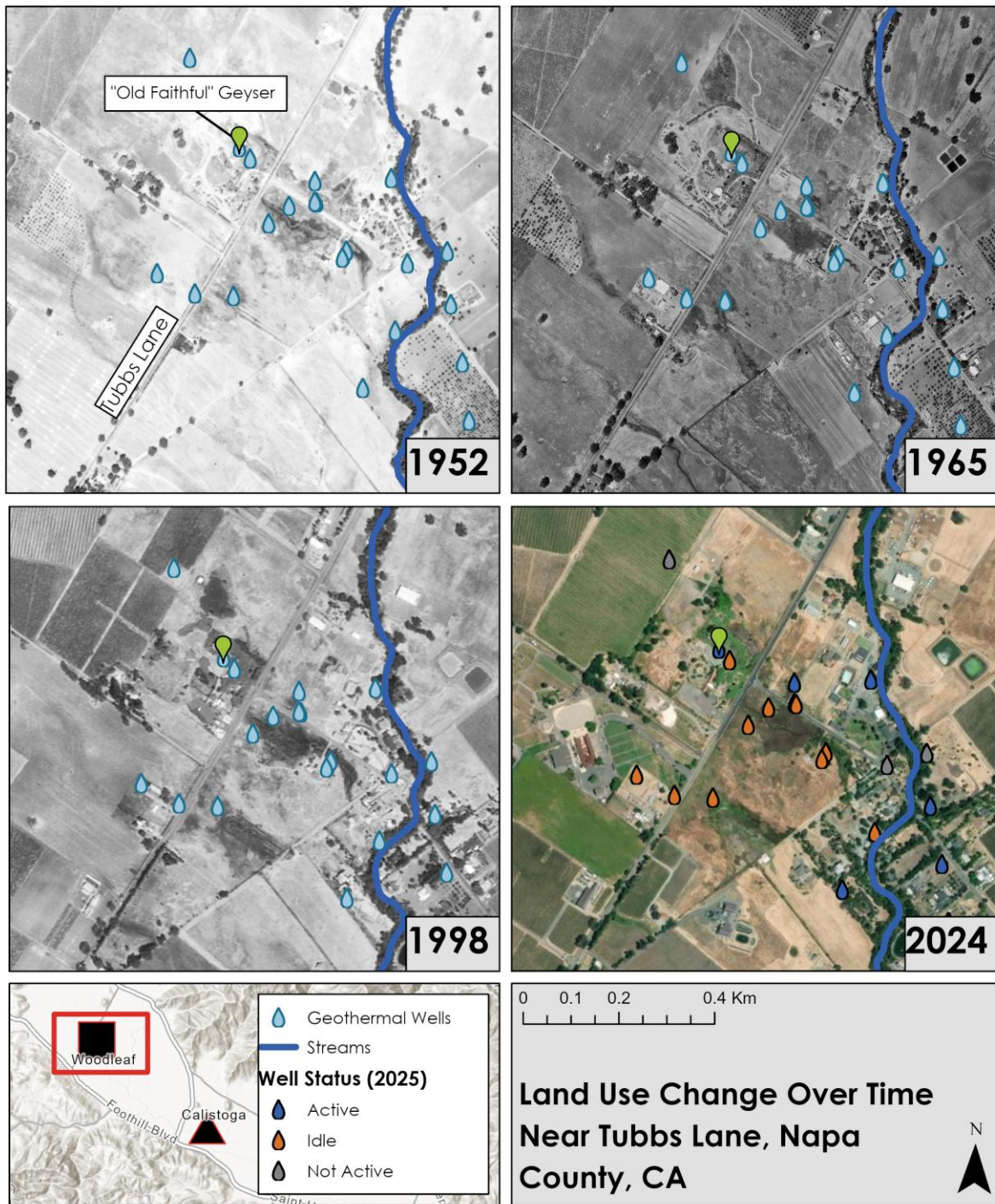


Figure 10. Geothermal well status and streams in the vicinity where Napa bluegrass occurrences are observed. 102 wells are active or idle.

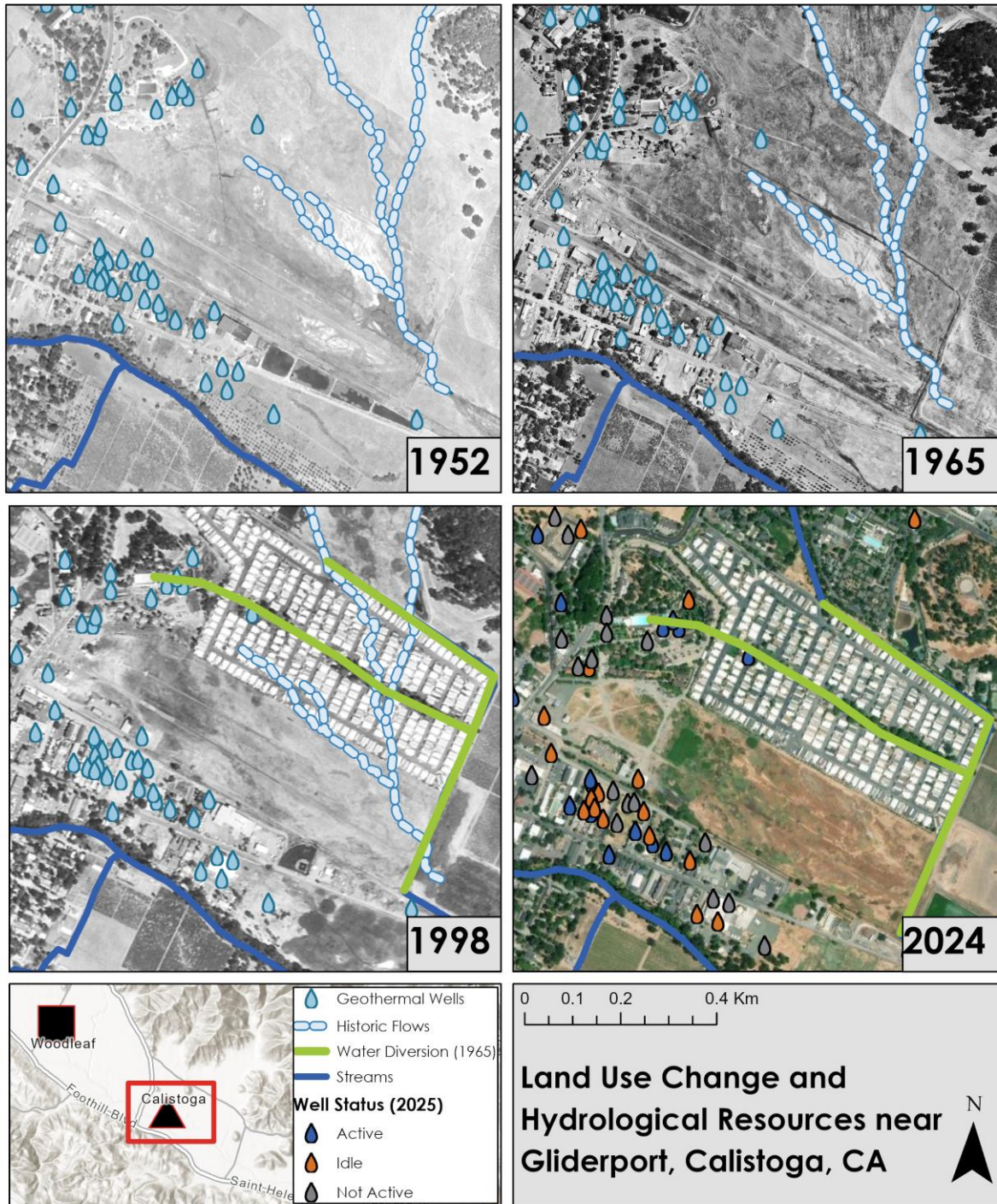
By 1912, 13 geyser wells within the vicinity of the Tubbs-Myrtledale occurrence (EO 1) were drilled for commercial or residential use (Allen and Day 1927). EO 1 may share a water source with the “Old Faithful” Geyser (drilled in 1915) due to their relative proximity to each other and historical well data (Youngs and Higgins 1981). Historical imagery from 1952, 1965, 1998, and 2024 at EO 1 shows how the land changed (Figure 11). It appears that the focus of land use shifted from water extraction for the geothermal properties to the development of vineyards, wineries, and residences nearby. This may be due to the slightly higher elevations (± 18 m (60 ft)) that make it more expensive to drill deeper wells for hot spring development and because the volcanic soils are also desirable for wine-grape growing (Youngs and Higgins 1981).

Historical imagery at the Gliderport occurrence (EO 3) from 1952, 1965, 1998, and 2024 shows where surface water flowed, before development (Figure 12). In 1965, hot spring water from Indian Springs Resort and surface waters directly north of EO 3, were diverted beneath and around a newly constructed mobile home park (Figure 12) and emptied into the Napa River. Prior to developing the mobile home park, patterns of dry and wet vegetation and alkaline crusts existed in this area (Figure 13).



Map created by California Department of Fish and Wildlife, Habitat Conservation Planning Branch, M. Smith 20251223.
 Basemap Sources: ESRI USGS Topo, UC Santa Barbara Frame Finder Library of Historical Aerial Photos. Streams Source: USGS 3DHP 2025.
 Wells Source: California Department of Conservation, CalGEM.

Figure 11. Hydrological resources and land use change over time near the Tubbs-Myrtledale occurrence (EO 1).



Map created by California Department of Fish and Wildlife, Habitat Conservation Planning Branch, M. Smith 20251223. Basemap Sources: ESRI USGS Topo, UC Santa Barbara Frame Finder Library of Historical Aerial Photos. Water Diversion (1965) Source: Glenn Lukos Associates 2009. Streams Source: USGS 3DHP 2025. Wells Source: California Department of Conservation, CalGEM.

Figure 12. Hydrology and land use change near the Gliderport occurrence (EO 3). Geothermal water from Indian Springs Resort and other water were channeled into pipes beneath the mobile home park in 1965 and flowed southeast into the Napa River.



Figure 13. Alkaline crusts (bare scalds) and meadows north of the Gliderport occurrence (EO 3) before 1965. Adjacent to the Indian Springs Resort (in foreground), an alkaline meadow interspersed with bare scalds once existed in the location where at present day a mobile home park stands. Bare scalds are considered locations of historical outflow of hot springs and are indicators for Napa bluegrass habitat. Image source (Grossinger and Askevoid 2012, p. 77, courtesy of the California Historical Society).

Since the early 2000s, various plans that would affect the Gliderport property were proposed, raising concerns over impacts to the hydrology of EO 3 (USFWS, personal communication, Dec 22, 2009; J. Bjerke, personal communication, Oct 22, 2013; City of Calistoga, personal communication, Dec 10, 2013; CDFW, personal communication, Aug 26, 2020; Merchant N.D.). In 2013, there was a proposal to discharge stormwater into Napa bluegrass habitat, but it was not implemented because it was unknown how Napa bluegrass would be affected by year-round inundation and potential pollutant discharge (City of Calistoga, personal communication, Dec 10, 2013; Cooley 2013; CDFW, personal communication, Feb 5, 2014). As part of the Veranda at Indian Springs Project proposed in subsequent years (City of Calistoga 2020b), stormwater discharge infrastructure was integrated into the design and was modified prior to final approval to ensure runoff would not be released east into the Gliderport (CDFW, personal communication, Aug 26, 2020; City of Calistoga 2020b, c; Z. Tusinger, personal

communication, Aug 26, 2020 to Sep 17, 2020). Instead, stormwater runoff will flow into an onsite 100-year rainfall-rated detention chamber located on the western edge of the emergency vehicle access road, and then be discharged via percolation through a rock layer below the chamber to filter pollutants (City of Calistoga 2020b, c). If the chamber fills beyond capacity and soils are fully saturated, the overflow would release immediately south of the proposed parking lot (City of Calistoga 2020b). Prior to final project approval, the Department suggested relocating the emergency vehicle access road (Figure 14) away from the Gliderport property, which as currently designed, would be approximately 200 m (700 ft) from the species' habitat (G. Allen and K. Weiss, personal communication, Sep 8, 2020).



Figure 14. Site Plan of the Veranda at Indian Springs Project. Source: City of Calistoga (2020c), Figure 5, p. 16.

However, the City of Calistoga indicated relocation would not be possible and provided a mitigated alternative where the road would be sloped to direct runoff to the west, away from the Gliderport (CDFW, personal communication, Aug 26, 2020; City of Calistoga 2020b). In January 2025, the City of Calistoga finalized the Veranda at Indian Springs Project which also requires preparing a final stormwater control plan (City

of Calistoga 2020b, 2025). Despite efforts to avoid all impacts to Napa bluegrass, the resort expansion will likely result in some indirect impacts to the species through altered hydrology and long-term introduction of pollutants from pesticides and herbicides applied to the resort's landscaping. Any modifications to the project and additional development into the Gliderport could impact what remains of Napa bluegrass at the Gliderport property.

d. Grazing and Mowing

At the time of listing and in the Department's previous five-year species review, trampling from grazing animals and grass mowing negatively impacted the species (CDFG 1979b; N.D.). At the Tubbs-Myrtledale occurrence (EO 1), mowing was noted near the area identified as Myrtledale Hot Springs on Myrtledale Road during a survey in 1983 (Callizzo 1983a, b; Cox 1983). However, it is unknown if and how mowing or any other disturbance over the years has impacted the species at this location due to a lack of access to the property and updated data. For decades, horses and goats grazed the Tubbs Lane property containing EO 1, but grazing was removed from the site sometime before 2011 and has not occurred since (Shaw 1984; Doran 1988; Callizzo 1989; RSABG et al. 2012).

The site of the Gliderport occurrence (EO 3) used to be a small airport originally known as the Calistoga Airfield; however, all flying operations ceased in 1999 (Freeman 2024). Sometime between 2000 and 2003, the current landowner removed the asphalt of the runway and piled the gravel at the north end of the runway (Freeman 2024). The outlines of the runways are still discernable and free of large debris (Figure 15). Grass mowing occurred frequently at EO 3 before and after the airport ceased operations (CDFG 1989). Mowing was a threat that lowered Napa bluegrass's reproductive potential (Ruygt 1994). Napa bluegrass was believed to be extirpated at EO 3 before being "rediscovered" in 1983 (Cox 1983). In areas that have been mowed less frequently, the species appeared to be more robust in size (Soreng 1986). Surveys and monitoring reports (2013-2021) for the co-occurring species, Calistoga popcornflower, suggest that mowing has been minimized in more recent years (Wyrick-Brownworth et al. 2021), likely due to the landowner being made aware of the status and impacts of mowing to both of these listed plant species (Wyrick-Brownworth et al. 2021). Notably, as mowing intensity has decreased, invasive vegetation has increased (Wyrick-Brownworth et al. 2021; Monk & Associates Inc. 2026) and the threat of competition from invasive species has become a greater threat to the species.



Figure 15. View looking north at the end of a formerly paved runway at the Gliderport (Calistoga Airfield) in 2003. Photo source: Jonathan Westerling (Freeman 2024).

In conclusion, present or threatened modification or destruction of habitat where the species occurs have increased since listing. The remaining habitat is on land that is not permanently protected from future development. Residential development and surface disturbance-related activities (e.g., access roads, mowing) where EO 1 occurs has likely reduced the extent of the population from occurring on multiple properties to becoming restricted to only the Tubbs Lane property. However, surveys for the species within the entire extent of the occurrences is still needed. The resort expansion at Gliderport where EO 3 occurs has reduced the size of the undeveloped portion of land and reduced the buffer distance between Napa bluegrass populations and the edge of where the most disturbance and invasive plants occur. This reduction in undeveloped land and buffer distance may increase the magnitude of how severe threat impacts are on the species. The altered geothermal hydrology (e.g., water diversions, well-water supply) continues to affect how much water is available for the species and its habitat. Any hydrological changes (e.g., decrease in water supply) can be detrimental to Napa bluegrass. Additionally, as the threats of mowing and grazing have decreased, the threat of competition from invasive vegetation has significantly increased, which contributes to the displacement of the species. Overall, the risk of

extinction from present or threatened modification or destruction of habitat to the species has continued, and in some cases increased, since the species was first listed.

B. Overexploitation

Overexploitation was not considered a threat at the time of listing, and there is no information to suggest that it has since become a threat.

C. Predation

Predation or herbivory on the species was not considered a threat at the time of listing, and there is no information to suggest that it has since become a threat.

D. Competition

At the time of listing and in the Department's previous five-year species review, competition was not identified as a threat to Napa bluegrass. Competition by vegetation encroaching into the species' habitat now appears to threaten Napa bluegrass. With an increase in urbanization and agricultural land conversion, the introduction of non-native plants that are invasive or may become invasive is a secondary threat. Non-native, invasive plants diminish native plant biodiversity by competing with native plants for resources, including blocking light to smaller perennials like Napa bluegrass, especially when the invasive plants become dry and overgrown (i.e., thatch).

At properties previously surveyed as part of the Tubbs-Myrtledale occurrence (EO 1), annual grasses (e.g., *Avena* spp.) were observed along property lines and fields that were regularly disturbed (Rae and Harrison 1981; Callizzo 1983a). On the Tubbs Lane property, tall fescue is known to be an encroaching and problematic species that appears to tolerate a lot of moisture (Ruygt and Wyrick-Brownworth pers. comm. 2013; Ruygt 2025). Tall fescue is rated as moderately invasive by the California Invasive Plant Council (Cal-IPC), which indicates that the species has a substantial and apparent ecological impact on habitat and plant and animal communities (Cal-IPC 2004b). Tamarisk is not a species currently encroaching into the Napa bluegrass population at the Tubbs Lane property; however, it is presently on the property and has the potential to indirectly displace Napa bluegrass by reducing the availability of water and increasing fire risk to habitat (Cal-IPC 2003b). Tamarisk is rated as highly invasive by Cal-IPC, which increases concern for spread due to its high rate of establishment and severe impacts to ecological processes, especially hydrology, which can shift the health and biodiversity of entire plant communities (Cal-IPC 2003b).

At the Gliderport property, the approved resort expansion (City of Calistoga 2025) may facilitate the unintentional introduction and spread of invasive plant species east of the expansion towards the Gliderport occurrence (EO 3) (CDFW, personal communication, Aug 26, 2020; City of Calistoga 2020b). Vegetation in the area where the emergency vehicle access road would be located (Figure 14) consists of Bermuda grass (*Cynodon dactylon*), large patches of Himalayan blackberry (*Rubus armeniacus*), field brome (*Bromus arvensis*), prickly lettuce, spring vetch, and hairy vetch, which have the potential to significantly impact Napa bluegrass nearby (City of Calistoga 2020b, c). Bermuda grass (moderately invasive) and Himalayan blackberry (highly invasive) are not species currently encroaching into Napa bluegrass habitat, likely because they may not survive as well in highly mineralized soils that are toxic to most plants. However, they both have the potential to indirectly displace Napa bluegrass by reducing water availability (Cal-IPC 2004a, d). To mitigate invasive plant impacts, the project added vehicle washing stations and associated mitigation measures for the duration of the construction period to minimize non-native plant introductions (City of Calistoga 2020b). The project also includes a mitigation measure that the landowner is required to develop a Habitat Protection and Management Plan that includes management of invasive plants in perpetuity (G. Allen, personal communication, Sep 8, 2020; City of Calistoga 2020b).

At both Napa bluegrass occurrences, wild oat, yellow star-thistle, Italian ryegrass, perennial pepperweed, meadow fescue, and common teasel have been commonly observed (Symonds 2008). Meadow fescue has no rating for invasiveness, but wild oat, Italian ryegrass, and common teasel are rated as moderately invasive by Cal-IPC, while yellow star-thistle and perennial pepperweed are rated as highly invasive by Cal-IPC. Yellow star-thistle and perennial pepperweed are known to encroach into both dry and wet habitats, but yellow star-thistle significantly depletes soil moisture and perennial pepperweed is known to deplete soil salinity (Cal-IPC 2003a, 2004c). The high mineral concentrations in soil are tolerated by Napa bluegrass which gives the species a competitive advantage since these conditions are not tolerated by most plants including non-native invasive species. However, these non-native invasive species grow in tall, dense patches near and adjacent to these mineral pools that may shade out areas of suitable habitat in the future if they are not managed for. Dense areas of non-native invasive species also likely use available soil-water resources that are upland from the pools, before being able to reach Napa bluegrass. In conclusion, competition by non-native plants encroaching habitat and growing in dense stands has become a new threat since listing.

E. Disease

Disease was not considered a threat at the time of listing, and there is no information to suggest that it has since become a threat.

F. Small Population Size

Plants with small population sizes that also occupy relatively small areas are inherently more vulnerable to extinction than plants with larger population sizes that also occupy larger areas. Napa bluegrass occupies an extremely small area, and its population sizes are extremely small, making it highly vulnerable to extinction. Since listing, no additional occurrences have been found, and the species' distribution and abundance within each occurrence have generally decreased. It's important to remember that Napa bluegrass is a perennial, and florets are required for positive identification of the species, which means it will persist multiple years in a row even if they don't reproduce via seed or by tillering (i.e., lateral offshoots from the base). Years when few plants are observed may suggest that environmental conditions were poor for the species to tiller or produce florets, which could cause underreported plant counts if plants cannot be positively identified. Even though Napa bluegrass can survive for more than one growing season without reproducing, consecutive years of not tillering or flowering and producing seeds lowers recruitment for long-term persistence of the species. Lower reproduction means the species has a reduced opportunity for recruitment of new plants, the soil seed bank may deplete, and overall be an indicator that the quality of the species' habitat is declining (Fenner and Thompson 2005; Jacquemyn et al. 2012; Ågren and Sletvold 2025). The Tubbs-Myrtledale (EO 1) and Gliderport (EO 3) occurrences have been subject to heavy disturbance over the years. The species low numbers (<1,000 individuals) indicate it can be easily extirpated from either site (Master et al. 2012). The planned resort expansion at the Gliderport in 2025 will result with indirect impact to the Napa bluegrass population (e.g., via pollutants, invasive species). When combined with other threats, Napa bluegrass's threshold for tolerating disturbance becomes extremely low, jeopardizing its existence. Overall, small population size continues to diminish the species' ability to recover from years where its reproductive capacity may already be low.

G. Stochastic Events

Stochastic events threaten Napa bluegrass due to the vulnerability of its small population size and its restricted distribution. Stochastic events are random or occur by chance (e.g., wildfire, flood). For example, mowing overgrown invasive vegetation before Napa bluegrass produces seed, especially when mowing multiple years in a row, can extirpate a population. The intensity of a stochastic event does not have to be

high to be existential when a species' population size is very small and/or its distribution is highly restricted. Invasive species (e.g., tall fescue) present in areas surrounding Napa bluegrass occurrences can pose an increased fire risk, especially in late summer when invasive vegetation is overgrown and dry, and wildfire risk is high. Napa bluegrass may be dormant in summer, but wildfire of high intensity can be catastrophic if the fire burns the roots and seed bank of the species. Historical and recent fire data (1950 – 2025) in the area (CAL FIRE 2025c) shows the expansive footprint of wildfire over the years near the two Napa bluegrass occurrences (Figure 16). In 2016, a local fire that started at the “Old Faithful Geyser” (Bay City News 2016) also burned part of the Tubbs-Myrtledale occurrence (EO 1), including the Tubbs Lane property where Napa bluegrass still occurs (Figure 17). Despite the fire, Napa bluegrass has been observed at EO 1 in subsequent years. However, it is unknown how fire, especially high intensity fire, impacts Napa bluegrass. In conclusion, stochastic events remain a threat to the species.

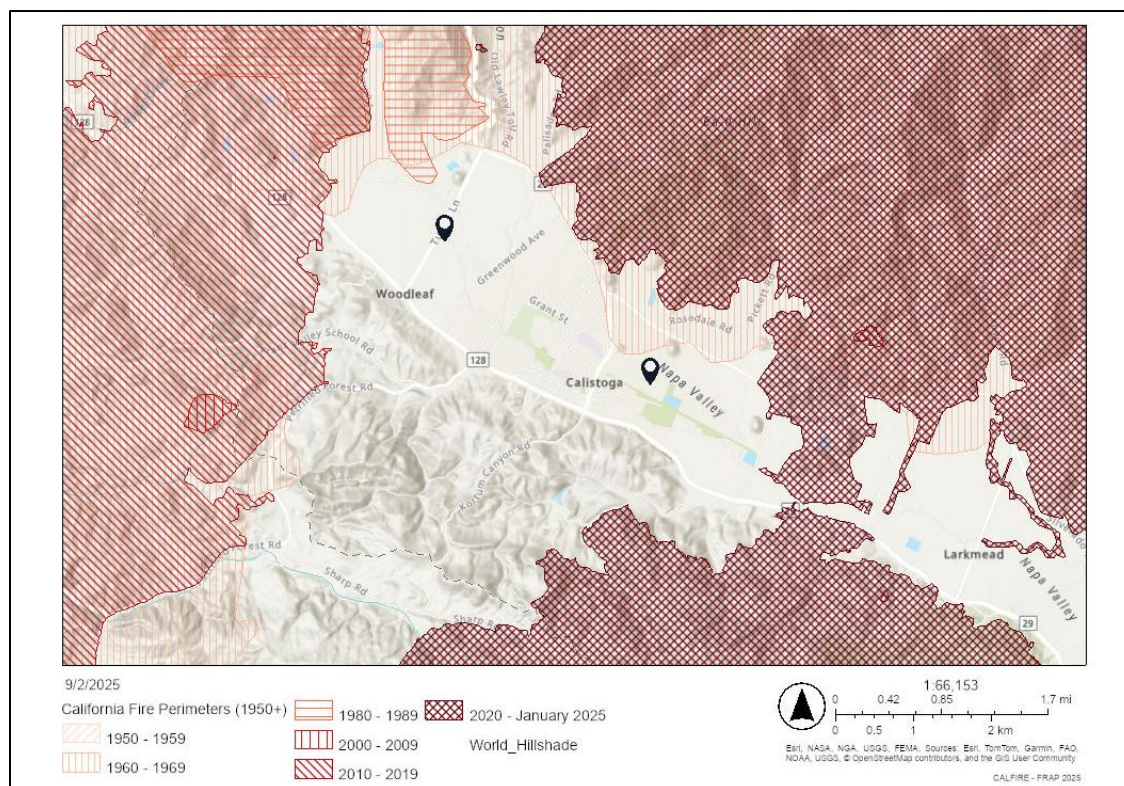


Figure 16. Fire Perimeters (1950-2025) surrounding the Calistoga area. The pins on the map show the approximate locations of the occurrences relative to the fire perimeters.



Figure 17. Burned areas from a 2016 fire that burned habitat where the Tubbs-Myrtledale occurrence (EO 1) is observed. Source: Napa Valley Register (2016).

8 Existing Management

This section considers the impact of existing management efforts on the species (Fish & G. Code, § 2072.3; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

Just as indicated in the previous five-year species review (CDFG N.D.), there are no existing or past management efforts for the direct conservation of Napa bluegrass. Both occurrences are located on private property, which can make implementing management more complex. Although there is no existing management, the following provides insight into existing efforts to minimize impacts on the species and seek solutions for conserving Napa bluegrass.

A. Habitat Mitigation and Monitoring Plan at the Gliderport

The resort expansion (Veranda at Indian Springs Project) was approved in January 2025 (City of Calistoga 2025). As part of the Veranda at Indian Springs Project, the landowner is required to prepare a Habitat Protection and Management Plan that is to be reviewed by the Department (City of Calistoga 2020b, c; Z. Tusinger, personal communication, Aug 26, 2020 to Sep 17, 2020). The Habitat Protection and Management Plan is required to include monitoring for Napa bluegrass, management for the species' benefit, management of invasive species in perpetuity, and recommendations for designating the remaining Gliderport property as a Natural Resource Preservation Area (G. Allen, personal communication, Sep 10, 2020; City of

Calistoga 2020a, b). It is important to note that this plan does not protect the remaining Gliderport habitat from future development and does not guarantee the protection and conservation of Napa bluegrass from possible extirpation.

B. Seed Storage and Research

Long-term seed banking of rare species is an important tool for conserving the genetic diversity and in reducing extinction risk in the face of threats such as habitat destruction, competition, and stochastic disasters (CPC 2019). USFWS staff collected a total of a little over 3,500 seeds in 2010 and 2011 from the Tubbs-Myrtledale occurrence (EO 1), which were later cultivated for seed bulking in 2017 and 2018 (California Plant Rescue 2019). The purpose of this collection and seed bulking was for conservation and long-term seed storage at the California Botanic Garden.

Current researchers at the University of Texas Austin are investigating whether threatened and endangered plant species, including Napa bluegrass, may be at risk of herbivory by an insect that is used to control the invasive Guinea grass (*Megathyrus maximus*) (L. Springer, personal communication, Jun 27, 2025). Results of this study may come out in late 2026 or 2027 and will inform whether Guinea grass in the U.S. could be managed by this insect without becoming a threat for listed plant species.

C. Local Jurisdictions

The importance of protecting critical habitat resources for Napa bluegrass is mentioned within the Open Space and Conservation Element of the General Plan for the City of Calistoga (City of Calistoga 2012, 2020a), and within the Managed Production of Resources in the Napa County General Plan (Napa County 2009). The General Plan for the City of Calistoga identifies wetland resources at the Gliderport property that should remain intact to protect Napa bluegrass, but it also suggests identifying a site within the Gliderport property itself for new park planning. Some of the goals and objectives recognize the value in protecting sensitive resources (e.g., Napa bluegrass) to the extent possible on the Gliderport property and outline objectives that encourage the city to explore designating parcels as Natural Resource Preservation Areas. The Napa County General Plan provides goals and objectives that focus on agricultural sustainability while balancing the need to protect important biological resources that include Napa bluegrass.

Both Napa bluegrass occurrences are located within Local Responsibility Areas, meaning the financial responsibility of wildfire prevention is with Napa County for the Tubbs-Myrtledale occurrence (EO 1) and with the City of Calistoga for the Gliderport occurrence (EO 3). Part of where EO 1 is observed falls within a moderate fire hazard severity zone (CAL FIRE 2025b). The Gliderport property is not currently within an

identified fire hazard severity zone, but the zone boundaries could change in the future (CAL FIRE 2025a).

EO 1 and EO 3 are also located within locally and regionally designated Priority Conservation Areas (MTC 2025a), which are separate from local land use zoning as designated by the City and County. Priority Conservation Areas are lands recognized by the Association of Bay Area Governments (ABAG) as being important for conservation, enhancement, restoration, or public access in the face of climate change (MTC 2025b). Each Priority Conservation Area is defined as one of five types of land designations. Each land designation has goals and objectives that identify the type of conservation actions needing to be implemented (MTC 2024b). All properties within EO 1 received a Working Lands designation (Napa County Agricultural Lands) in 2008, which offers both protection and enhancement opportunities within the definition. The Working Lands designation supports activities and projects that enhance or protect and preserve habitat, but the main objectives for these lands are to support the region's agricultural economy. EO 3 received a Recreation designation (Vine Trail) in 2025, which is not focused on protection like the other designation because it occurs within an urban setting (MTC 2024a). The Recreation designation provides opportunities for habitat enhancement, but not for protection and preservation (MTC 2024a). While a Priority Conservation Area does not change or affect local land use, zoning, or a landowner's ability to develop in the future, these designations streamline assessments and provide grant opportunities for projects that focus on conservation, enhancement, restoration, or public access (MTC 2025c).

D. Ongoing Communication

Over the last two decades, the landowners have periodically been given recommendations for conserving Napa bluegrass at the Gliderport occurrence (EO 3) (USFWS, personal communication, Dec 22, 2009; J. Bjerke, personal communication, Oct 22, 2013; Z. Tusinger, personal communication, Aug 26, 2020 to Sep 17, 2020; CDFW, personal communication, Sep 30, 2024). The Department has regularly communicated with interagency partners and individuals since 2024 to collaborate and exchange information on monitoring, research, and potential management for the species and its habitat (F. Bowman et. al., personal communication, Nov 22, 2024; CDFW, personal communication, Sep 30, 2024; M. Day, personal communication, Jul 10, 2025; USFWS and J. Ruygt, personal communication, Jul 31, 2025). As of publication of this five-year species review, a local land trust was pursuing the conservation of a property containing the Tubbs-Myrtledale occurrence (EO 1) with support from the Department and collaborating partners (CDFW and partners et. al., personal communication, Jul 16 to Oct 17, 2025).

9 Management Recommendations

This section considers suggestions and recommendations for future management activities and other recommendations for recovery of the species (Fish & G. Code, §§ 2072.3 & 2077; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). The following actions are not a detailed conservation strategy; however, they outline management actions which are likely to aid in recovery and prevent the extinction of the species. The Department recommends that the following actions be conducted in coordination with partners and interested parties, consistent with California's goals of preventing the extinction of rare, threatened, and endangered species. Protecting any remaining and extremely rare habitat is vital to prevent Napa bluegrass from going extinct.

A. Recommended Management Actions

Below is a table of recommended actions that may be used to aid in recovery and to prevent extinction of Napa bluegrass. Each action is accompanied by the threats it will address and how it may contribute to the species' recovery.

Table 5. Recommended actions to aid in the recovery of Napa bluegrass.

Actions	Threat(s) Addressed	Contributions to aid Recovery
1. Conserve remaining habitat permanently	Present or threatened modification or destruction of habitat	Conserves remaining population by removing the potential for habitat elimination or destruction due to development and associated activities
2. Facilitate multi-species coordination efforts to avoid negative impacts to listed plants that overlap in habitat through outreach and cooperation	Present or threatened modification or destruction of habitat; competition; small population size	Increases awareness of the species' imperiled status and enables potential coordination to manage for and protect the Calistoga popcornflower and Napa bluegrass from threats of extinction
3. Stabilize and expand populations	Small population size; stochastic (chance) events	Preserves existing genetic diversity important for species resiliency and supports the potential for reintroducing or outplanting the species to increase population size
4. Remove or minimize competition from invasive plants	Present or threatened modification or destruction of habitat; competition	Maintains critical habitat essential to the continued existence of the species

Actions	Threat(s) Addressed	Contributions to aid Recovery
5. Re-establish and/or protect existing hydrologic connectivity to geothermal springs	Present or threatened modification or destruction of habitat; small population size	Ensures remaining occurrence can rely on connectivity to geothermal resources that seasonally feed their habitat and improve species' survival
6. Establish research and long-term monitoring to build understanding of the species' needs, tolerances, and population trends	Present or threatened modification or destruction of habitat; small population size; stochastic (chance) events	Supports scientific understanding of the species' ecology and biology to create an informed conservation strategy for the species' recovery
7. Engage with tribes to raise awareness of the species' need for management and provide opportunities for tribes to express priorities	Present or threatened modification or destruction of habitat; competition; small population size	Supports transparency of the species' status, and enables opportunities for collaborative problem solving and integration of tribal priorities into decision making processes

B. Recommended Tasks to Implement Management Actions

To prevent extinction and facilitate recovery of Napa bluegrass, cooperation of partners and stakeholders in the species' area is needed. To aid in the recovery of the species, recommended tasks for each management action from Table 5 are provided below.

1. Conserve remaining habitat permanently.
 - a. Permanently protect (e.g. with a conservation easement) any land containing Napa bluegrass. All remaining areas containing habitat is considered essential. Support acquisition and/or management efforts by conservation-focused non-profits (e.g., land trusts) or tribes.
 - b. Update the Priority Conservation Area land designations maintained by the Association of Bay Area Governments (ABAG) for both occurrences to recognize the importance of protecting and preserving essential habitat. Re-designate the Tubbs-Myrtledale occurrence (EO 1) from Working Lands to Natural Lands, and the Gliderport occurrence (EO 3) from Recreation to Natural Lands (MTC 2024b). Working Lands designation supports projects that enhance or protect and preserve habitat, but the main priority is to support the agricultural economy. The Recreation designation supports activities for habitat enhancement, but does not offer activities for habitat protection and preservation (MTC 2024a). Natural Lands

designation support activities that protect, enhance, or maintain regional biodiversity and ecological function of terrestrial and aquatic ecosystems.

- c. Implement the goals and objectives for protecting significant biological resources outlined in the general plans for the City of Calistoga and for Napa County to protect Napa bluegrass and its habitat (Napa County 2009; City of Calistoga 2020a).
 - d. Request for a change to the local land use type at the Gliderport occurrence (EO 3) from "Airport Commercial" to "Open Space for the Preservation of Natural Resources" in a future amendment of the General Plan for the City of Calistoga. This change would aid in minimizing the possibility of developing the species' habitat in the future and would be consistent as a Priority Conservation Area that the land is designated as by the ABAG.
 - e. Promote acquisition projects in Priority Conservation Areas that focus on protecting Napa bluegrass for the benefit of the species and other rare plants. The Priority Conservation Area Grant Program may provide funding to support acquisition: <https://mtc.ca.gov/funding/funding-opportunities/priority-conservation-area-pca-grants>. Additional funding sources may include the Endangered Species Recovery Land Acquisition Grant Program (Non-traditional Section 6): <https://wildlife.ca.gov/Grants/Land-Acquisition>; the Land Acquisition Program: <https://wcb.ca.gov/Programs/Acquisitions>; and the Sustainable Agricultural Lands Conservation Program: <https://www.conservation.ca.gov/dlrp/grant-programs/SALCP/Pages/Program-Guidelines.aspx>.
2. Facilitate multi-species coordination efforts to avoid negative impacts to listed plants that overlap in habitat through outreach and cooperation.
- a. Provide landowners with information on the avoidance of impacts to Napa bluegrass and Calistoga popcornflower and encourage the establishment of coordinated multi-species management plans that aim to avoid impacts in the future. Landowners can explore partnering with USFWS's Partners for Fish and Wildlife Program to implement a shared-cost conservation project: <https://www.fws.gov/program/partners-fish-and-wildlife>.
 - b. Work with Napa County and the City of Calistoga to amend their General Plans' goals and objectives concerning Napa bluegrass and its shared

habitat with Calistoga popcornflower to ensure the protection and management of open spaces coincides with preventing extinction of the species.

- c. Conduct periodic partner meetings to discuss parallel conservation efforts of Napa bluegrass and Calistoga popcornflower for continued outreach and/or engagement with the landowners. Partners may include, but are not limited to, tribes, Department staff in region offices, USFWS, Napa County Flood Control and Water Conservation District, California Native Plant Society, Pacific Union College, and local land trusts.
 - d. Develop a formal management and recovery plan for the species and ensure shared recommendations for habitat overlapping with Calistoga popcornflower is agreed upon in collaboration with federal and state agency partners, local government, tribal partners, non-profit organizations, landowners, and other interested parties.
 - e. Protect Napa bluegrass from any future development by understanding how the surrounding infrastructure will continue to shape the remaining undeveloped areas, minimizing disturbance, and proactively managing disturbed areas near and adjacent to the species habitat for restoring ecological function (e.g., invasive plant removal).
 - f. Utilize laws and regulations (e.g., CESA, CEQA) through permitting pathways for projects near Napa bluegrass to protect the species and its essential habitat.
3. Stabilize and expand populations.
- a. Establish redundant seed collections that represent the genetic diversity of the species and store at accredited seed banking institutions for long-term conservation storage.
 - b. Test viability of seeds collected periodically to ensure reproductive capacity.
 - c. Develop propagation techniques for Napa bluegrass.
 - d. Collaborate with local partners to plan and implement an experimental propagation and outplanting project to expand the population at existing sites or to establish populations at new sites.
4. Remove or minimize competition from invasive plants.

- a. Implement an annual assessment of invasive species (e.g., tall fescue, yellow star-thistle, tamarisk) at both occurrences.
 - b. Develop and implement an invasive species management plan with the Department, USFWS, City of Calistoga, Napa County, CAL FIRE, tribes, landowners, and other interested parties to minimize habitat encroachment and mitigate fire risk.
- 5. Re-establish and/or protect existing hydrologic connectivity to geothermal springs.
 - a. Identify causes and coordinate any plans for remediation with the appropriate parties for the known water leak from the geothermal pipes below the adjacent mobile home park seeping into Napa bluegrass habitat at the Gliderport occurrence.
 - b. Measure groundwater recharge annually at both occurrences to monitor changes in hydrology.
 - c. Install a weather station in Calistoga to collect precise precipitation data for the localities and to provide redundancy for the collection of long-term weather data by the National Oceanic and Atmospheric Administration California Nevada River Forecast Center. Currently, the nearest weather station is Napa State Hospital 48 km (30 mi) away.
 - d. Identify ways to improve and stabilize hydrology to increase the amount of suitable habitat.
- 6. Establish research and long-term monitoring to build understanding of the species' needs, tolerances, and population trends.
 - a. Evaluate how factors such as soil nutrient concentrations, precipitation, soil water availability, and depth to water table relate to the species' thresholds for perennial persistence, reproductive output, and distribution.
 - b. Examine how the high mineral concentrations found in habitat patches relate to the species' uptake and storage of these minerals in plant tissue.
 - c. Evaluate how local hydrology (e.g., weather patterns, surface water, groundwater) influences the species' ecology, including abundance, distribution, reproductive output, size, longevity, and root length.

- d. Study the viability of Napa bluegrass at several growth stages under various moisture regimes and fire intensities to better understand survival tolerances in the face of climate change.
 - e. Conduct habitat modeling to identify areas of possible suitable habitat outside the urban areas of Calistoga that could be potential future outplanting sites.
 - f. Census both occurrences annually, and survey in areas where the species has previously been known to occur but requires updated data to confirm presence or absence.
7. Engage with tribes to raise awareness of the species' need for management and provide opportunities for tribes to express priorities.
- a. Share with tribes any new and relevant information the Department receives related to the species, including recommended management actions to support informed decision making by a tribe.
 - b. Ensure tribal interests are sought out when any future management or conservation efforts for the species are proposed by the Department.
 - c. Strive for collaborative strategic planning and integration of tribal priorities (e.g., stewardship, research, co-management) into recommended management actions 1 through 6 and any other efforts that enhance species' survival and its habitat. Assist with facilitating opportunities related to stewardship, conservation, and any other efforts that enhance the species' survival and habitat. Conservation efforts applied to the species' habitat would likely benefit from tribal involvement and/or co-management.

10 Recommendation to the Commission

For this five-year species review, the Department evaluated the components set forth in Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1) for sufficiency of information pursuant to Fish and Game Code section 2077. Based upon the information contained in this five-year species review, the Department determined there has been a decline or no change in the conditions of Napa bluegrass since the last five-year species review in the 1980s. As outlined in this document, the distribution of Napa bluegrass within its range has likely reduced or has not improved since the species was first listed due to present or continued modification and destruction of habitat. Additionally, the likely reduction in

overall extent of the species' occurrences may require a minimum population size that is greater than the count estimates for when the species was first listed, to ensure persistence. The most immediate threat to the species is modification or destruction of habitat, which has continued or increased since listing (except for grazing and mowing which have been minimized). Since listing, competition by non-native, invasive vegetation has become new threat factor. Small population size and stochastic events remain ongoing threats since listing, amplifying the species' vulnerability to extinction.

Based on the criteria described and the best scientific information available, the Department submits the following recommendation to the Commission:

No change in status from **endangered** – conditions **have** changed

While conditions that led to the listing of Napa bluegrass as endangered have changed, the Department has determined that there is sufficient scientific information to indicate that the presence of serious and immediate threats and the need for management activities and other actions to recover the species are still present, and put the species in danger of becoming extinct. For these reasons, the Department recommends no change to the endangered status of Napa bluegrass at this time.

Acknowledgements

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following up from a Dec 2009 meeting at the Gliderport property related to potential development and recommendations for avoiding direct and indirect effects to the species and their habitat; specifically, regarding *Calistoga popcornflower*, Napa bluegrass, the vernal pool fairy shrimp. (22 December 2009).

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Van Loon, T. 2025. Email exchange between T. Van Loon and M. Smith (Department) on 2024 iNaturalist observations for *Calistoga popcornflower* and Napa bluegrass to confirm coordinates for EO 3. (3 August 2025).

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Appendix A Notifications and Information Received

Napa bluegrass and Calistoga popcornflower, both listed under CESA, co-occur. Since multiple factors affect both species, the Department's outreach requested information for both species for their respective five-year species review. The following is a summary of notifications sent to inform public partners of the Department's initiation of a five-year species review of Napa bluegrass and a summary of information received in response to the notifications:

- February 1, 2024—The Department notified the Commission of a list of species that the Department expected to initiate or continue five-year species reviews on, including Napa bluegrass (Fish and G. Code, § 2077(a)). The Commission then notified people who have expressed interest in CESA actions of this information. The e-mail notification sent by the Commission to interested parties included a link to the Department's dedicated web page for five-year species reviews at <https://www.wildlife.ca.gov/Conservation/CESA/Five-Year-Reviews>.
- January 15, 2025—The Department contacted the USFWS to coordinate and exchange information for the Department's five-year species reviews of Napa bluegrass and Calistoga popcornflower (F. Bowman and L. Kong, personal communication, Jan 10, 2025) with their five-year review process last completed in 2023 for both species. Prior to this exchange, the Department and the USFWS coordinated updates on these species in 2023 and 2024 (F. Bowman et al., personal communication, Sep 4 2024 to Oct 21 2024). The Department and USFWS coordination for conservation, management, and recovery are ongoing. The Department included information provided by USFWS in this five-year species review.
- February 14, 2025—The Department sent an email bulletin through GovDelivery to subscribers in the CESA 5-year Species Reviews and CESA Plants groups (CDFW, personal communication, Feb 14, 2025). People may voluntarily opt-in to GovDelivery notifications at <https://public.govdelivery.com/accounts/CNRA/signup/35821>.
- February 18, 2025—The Department posted a call for data for Napa bluegrass and Calistoga popcornflower on the California Natural Diversity Database's Blog, available at <https://wildlife.ca.gov/Data/CNDDDB/News/calistoga-popcornflower-and-napa-bluegrass-species-reviews-how-you-can-help>.
- April 7, 2025—The Department mailed notifications of the initiation of this five-year species review to private landowners where Napa bluegrass and Calistoga popcornflower are both known to grow.

- May 6, 2025—The Commission forwarded the Department's bulletin dated February, 14, 2025, to the Commission's GovDelivery subscribers to CESA alerts (CFGF, personal communication, May 6, 2025).
- January 22, 2026—The Department mailed and emailed notifications to private landowners where Napa bluegrass has previously been known to grow, to request any updates or information on the species. The Department received one response. The landowner that responded did not respond again to two follow ups by the Department.
- The Department also individually contacted and coordinated efforts with the USFWS, Department Bay Delta Region staff, City of Calistoga, Napa County, Land Trust of Napa County, Pacific Union College, the Napa Valley Chapter of the California Native Plant Society, local botanists and naturalists, and others with relevant experience or expertise concerning Napa bluegrass.

Appendix B. Tribal Engagement Summary

The Department contacted tribes identified by the Native American Heritage Commission (NAHC) as having cultural or traditional affiliation with the geographic area of Napa bluegrass. Initial outreach was in the form of a Tribal Notification letter sent to tribes to notify them that the Department initiated a five-year species review for Napa bluegrass, and to describe the five-year species review process. Additionally, the Tribal Notification letter provided opportunities for engagement in the form of direct communication with Department staff and consultation. Additional details on the tribal outreach conducted for Napa bluegrass are listed below.

Tribal Outreach Efforts:

- February 11, 2025— The Department sent seven Tribal Notification letters (paper and electronic) to a list of tribes provided by NAHC that were identified as having cultural or traditional affiliation with the geographic area of Napa bluegrass and Calistoga popcornflower.
- April 11, 2025— The Department followed up via email and phone calls with the tribes that had not yet responded to the Tribal Notification letters. A second follow up was sent via email on May 9, 2025. The Department received no responses from the Tribes. No information related to Napa bluegrass was received from Tribes for this five-year species review.

Appendix C. Vascular Plants Observed on the Tubbs Lane Property Containing the Tubbs-Myrtledale Occurrence (EO 1)

List of plants observed on the Tubbs Lane property, which includes areas outside the EO 1 boundary. The table of species is unmodified from the original unpublished PDF (Ruygt N.D.). Common names marked with an asterisk were identified as non-native plants.

Scientific Name	Common Name	Status	Habitat
<i>Acemispum americanus</i> var. <i>americanus</i>	American Trefoil		
<i>Astragalus breweri</i>	Brewer's Milkvetch	CNPS List 4.2	
<i>Atriplex triangularis</i>	Fat hen		
<i>Avena barbata</i>	Wild Oats *		
<i>Briza minor</i>	Small Quaking Grass *		
<i>Brodiaea terrestris</i> subsp. <i>terrestris</i>	Dwarf Brodiaea	Napa Co. rare	
<i>Bromus diandrus</i>	Ripgut Grass *		
<i>Bromus hordeaceus</i>	Soft Chess *		
<i>Callitriche</i> sp.	Water Starwort		wetland
<i>Cardamine oligosperma</i>	Few-seeded Bitter Cress		
<i>Centromadia parryi</i> subsp. <i>parryi</i>	Pappose Spikeweed	CNPS List 1B.2	wetland
<i>Cerastium vulgare</i>	Mouse-eared Chickweed *		
<i>Daucus carota</i>	Queen Anne's Lace *		
<i>Deschampsia danthonioides</i>	Annual Hair Grass		wetland
<i>Dipsacus fullonum</i>	Wild Teasel *		
<i>Distichlis spicata</i>	Salt Grass		
<i>Eleocharis rostellata</i>	Beaked Spikerush	Napa Co. rare	wetland
<i>Epilobium ciliatum</i>	Northern Willow Herb		
<i>Eryngium jepsonii</i> ?	Coyote Thistle	(CNPS 1B)	
<i>Erythranthe guttata</i>	Seep-spring Monkeyflower		
<i>Festuca arundinacea</i>	Meadow Fescue *		
<i>Festuca perenne</i>	Italian Rye *		
<i>Galium aparine</i>	Cleavers		
<i>Geranium dissectum</i>	Cut-leaved Geranium *		
<i>Hainardia cylindrica</i>	Thin Tail *		
<i>Hordeum depressum</i>	Low Barley		wetland
<i>Hordeum marinum</i> subsp. <i>gussoneanum</i>	Mediterranean Barley *		wetland

Scientific Name	Common Name	Status	Habitat
<i>Iris</i> sp.	Iris *		
<i>Juncus balticus</i>	Baltic Rush		wetland
<i>Juncus bufonius</i>	Toad Rush		wetland
<i>Lasthenia californica</i> subsp. <i>californica</i>	California Goldfields		
<i>Lathyrus angulatus</i>	Angled Pea *		
<i>Lathyrus odoratus</i>	Common Sweet Pea *		
<i>Leontodon saxatilis</i> subsp. <i>longirostris</i>	Lesser Hawkbit *		
<i>Lepidium acutidens</i>	Alkali Peppergrass *	Napa Co. rare	wetland
<i>Lepidium latifolium</i>	Broad-leaved Peppergrass *		
<i>Lessingia hololeuca</i>	Woolly-headed Lessingia	CNPS List 3	
<i>Lotus corniculatus</i>	Bird's Foot Trefoil *		
<i>Lupinus bicolor</i>	Miniature Lupine		
<i>Lythrum californicum</i>	California Loosestrife	Napa Co. rare	wetland
<i>Lythrum hyssopifolia</i>	Hyssop Loosestrife *		wetland
<i>Muilla maritima</i>	Common Muilla	Napa Co. rare	wetland
(Palm)			
<i>Perideridia kelloggii</i>	Kellogg's Yampah		
<i>Plagiobothrys strictus</i>	Calistoga Popcornflower	FE	wetland
<i>Pleuropogon californicus</i>	Semaphore Grass		wetland
<i>Poa napensis</i>	Napa Bluegrass	FE	wetland
<i>Rumex acetosella</i>	Sheep Sorrel *		
<i>Rumex crispus</i>	Curly Dock *		wetland
<i>Shoenoplectus americanus</i>	Olney's Bulrush		
<i>Senecio vulgaris</i>	Common Grounzel *		
<i>Sisyrinchium bellum</i>	Blue Eyed Grass		
<i>Spergularia marcotheca</i> var. <i>leucophylla</i>	Long-styled Sand Spurry	CNPS List 1B.2	wetland
<i>Tamarix parviflora</i>	Small-flowered Tamarisk *		
<i>Triglochin scilloides</i>	Flowering Quillwort		wetland
<i>Trifolium depauperatum</i> var. <i>trunacatum</i>	Pale Sack Clover *		
<i>Trifolium hirtum</i>	Rose Clover *		
<i>Trifolium variegatum</i>	White-topped Clover		wetland
<i>Triphysaria versicolor</i> subsp. <i>faucibarbata</i>	Smooth Owl's Clover		
<i>Vicia sativa</i> subsp. <i>sativa</i>	Spring Vetch *		
<i>Vicia villosa</i> subsp. <i>varia</i>	Woolly-podded Vetch *		