

State of California
Department of Fish and Wildlife

Memorandum

Date: January 14, 2014

To: Sonke Mastrup
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director



Subject: Initial Evaluation of Petition to List the Livermore Tarplant (*Deinandra bacigalupii*) as Endangered under the California Endangered Species Act

The Department of Fish and Wildlife (Department) has completed its initial evaluation of the petition to list the Livermore tarplant as an endangered species (Petition) under the California Endangered Species Act (CESA) (Fish and Game Code, §2050 et seq.). The Fish and Game Commission (Commission) received the Petition from Mr. Heath Bartosh on August 26, 2014, accompanied by a letter of endorsement from the California Native Plant Society (CNPS) stating that CNPS should be considered a co-sponsor of the petition. Pursuant to Fish and Game Code section 2073, the Commission referred the Petition to the Department on August 28, 2014. In accordance with Fish and Game Code section 2073.5, subdivision (b), on November 24, 2014, the Department requested a 30-day extension to further analyze the Petition and complete its evaluation report.

The Department completed the attached Petition evaluation report as required by Fish and Game Code section 2073.5. (See also Cal Code Regs., title 14, §670.1, subd. (d).) The Department's evaluation report delineates the categories of information required in a petition, evaluates the sufficiency of the available scientific information regarding each of the petition components, and incorporates additional relevant information that the Department possessed or received during the review period. Based upon the information contained in the petition and other relevant information in the Department's possession, the Department has determined that there is sufficient scientific information available at this time to indicate that the petitioned action may be warranted. The Department recommends that the Petition be accepted.

If you have any questions or need additional information, please contact Sandra Morey, Deputy Director of Ecosystem Conservation Division at (916) 653-6956 or Helen Birss, Chief, Habitat Conservation Planning Branch at (916) 653-9834.

Attachment

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State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF THE PETITION
FROM MR. HEATH BARTOSH AND THE CALIFORNIA NATIVE PLANT SOCIETY TO LIST
LIVERMORE TARPLANT (*Deinandra bacigalupii*)
AS AN ENDANGERED SPECIES UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

December 2014



Deinandra bacigalupii, CDFW photo by Jeb Bjerke

Charlton H. Bonham, Director
Department of Fish and Wildlife



INTRODUCTION

The subject of this evaluation report is a petition to list Livermore tarplant (*Deinandra bacigalupii*) as an endangered species (Petition) under the California Endangered Species Act (CESA). (See Fish and Game Code, § 2050 et seq.) Mr. Heath Bartosh (Petitioner) submitted the Petition, dated August 29, 2014, to the Fish and Game Commission (Commission) on August 26, 2014. The Petition was accompanied by a letter of endorsement from the California Native Plant Society (CNPS) stating that CNPS should be considered a co-sponsor of the Petition.

The Commission referred the Petition to the California Department of Fish and Wildlife (Department) for an initial evaluation pursuant to Fish & Game Code section 2073.5. (Cal. Reg. Notice Register 2014, No. 37-Z, p. 1627.) In accordance with Fish and Game Code section 2073.5 and Section 670.1, subdivision (d)(1), of Title 14 of the California Code of Regulations, the Department has prepared this evaluation report for the Livermore tarplant Petition. The purpose of this report is to inform the Commission as to whether the Petition, when considered with this evaluation report, provides sufficient scientific information to indicate that the petitioned action may be warranted. In its advisory capacity to the Commission, the Department's charge and focus is scientific. Consistent with controlling law, the Department bases its recommendation to the Commission on the sufficiency of the scientific information.

PETITION PROCESS AND STANDARDS

CESA sets forth a two-step process for listing a species as threatened or endangered. First, the Commission determines whether a species is a candidate for listing by determining whether “the petition provides sufficient information to indicate that the petitioned action may be warranted.” (Fish & Game Code, § 2074.2, subd. (e)(2).) A petition to list a species under CESA 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. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and other factors the petitioner deems relevant.” (Fish & G. Code, § 2072.3.)

Within ten days of receipt of a petition, the Commission must refer the petition to the Department for evaluation (Fish & Game Code, § 2073.) The Commission must also publish notice of receipt of the petition in the California Regulatory Notice Register. (Fish & Game Code, § 2073.3.) Within 90 days of receipt of the petition, the Department must evaluate the petition on its face and in relation to other relevant scientific information and submit to the Commission a written evaluation report with one of the following recommendations:

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

(Fish & Game Code, § 2073.5, subd. (a)(1) and (2).)

The Department's recommendation to the Commission is based on an evaluation of whether or not the petition provides sufficient scientific information relevant to the petition components set forth in Section 2072.3 of the Fish and Game Code and controlling regulation. (See Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).) The geographic context for the Department's evaluation and recommendation is the species' range within California. (*California Forestry Association v. California Fish and Game Commission* (2007) 156 Cal. App. 4th 1535, 1551.)

If the Commission accepts the petition for consideration, the second step requires the Commission to determine, after a year-long "scientific-based review of the subject species," whether listing as endangered or threatened is or is not actually warranted. (Fish & Game Code, § 2075.5.)

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal. App. 4th 597, the California Court of Appeals addressed the parameters of the Commission's discretion in its application of the threshold candidacy advancement test. The court began its discussion by describing the candidacy advancement test previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104, 1114:

As we explained in *Natural Resources Defense Council* [citation], "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" [citation] "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity*, at pp. 609-10.)

The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (Id. at p. 611.) However, the court clarified:

[T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department[.]

(Ibid.)

SUMMARY OF KEY FINDINGS

Having reviewed and evaluated relevant information, including the material referenced in the Petition and other information in the Department's possession, the Department believes there is sufficient scientific information available at this time to indicate that the petitioned action may be warranted. In making this recommendation to the Commission, the Department emphasizes that limited information exists within the Petition and in the Department's possession relating to Livermore tarplant's population trends, abundance, life history, the kind of habitat necessary for

Livermore tarplant survival, and the impact of existing management efforts on Livermore tarplant. However, the Department believes there is sufficient scientific information at this time, particularly with respect to the most biologically critical factors (limited range, distribution, ongoing and potential habitat modification and destruction, and competition with non-native plant species) to indicate that the petitioned action may be warranted. (See Fish & G. Code, § 2073.5, subd. (a)(2); Cal. Code Regs. tit. 14, § 670.1, subd. (d)(1).)

BACKGROUND ON LIVERMORE TARPLANT

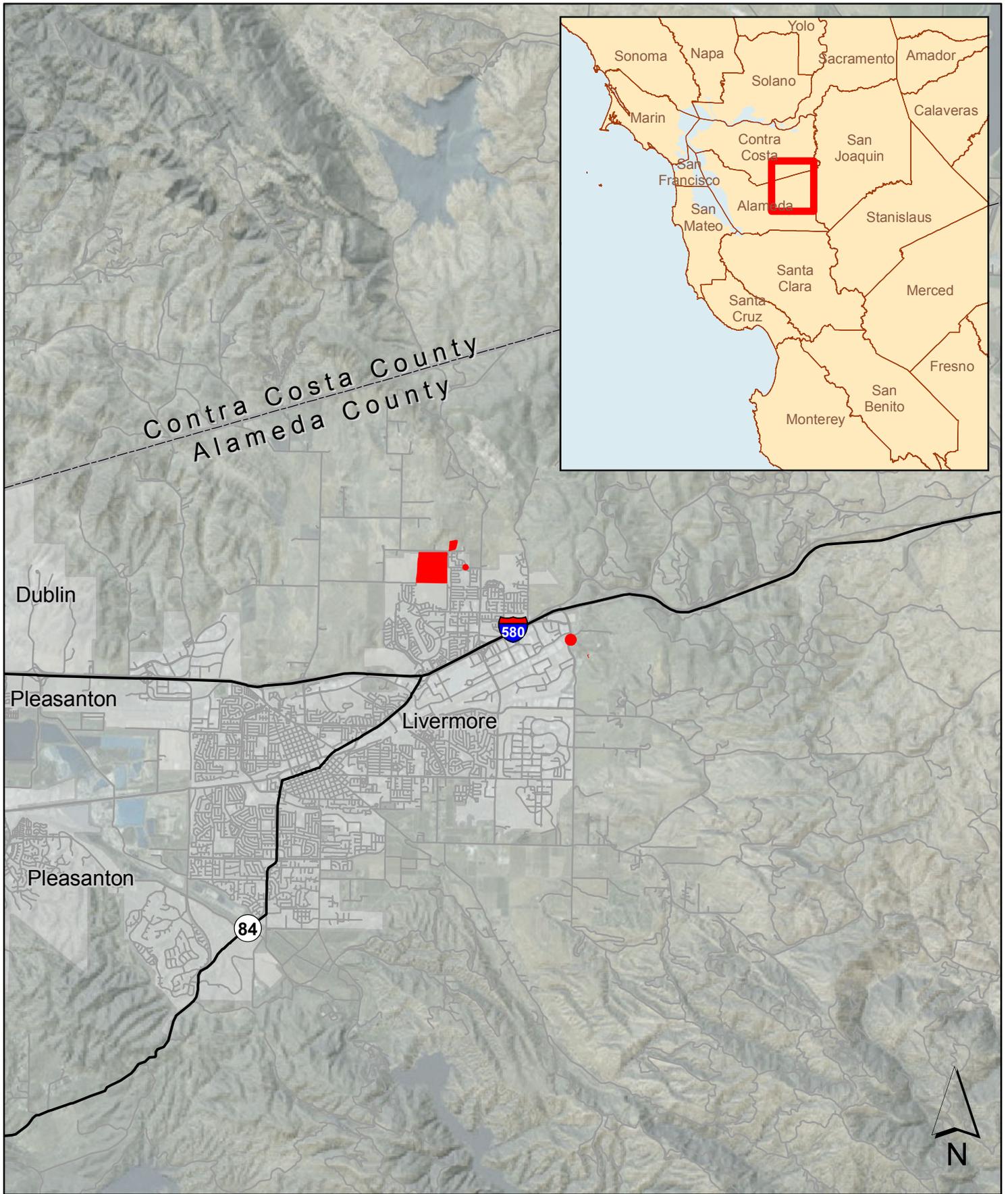
Livermore tarplant is a plant of the sunflower family (Asteraceae) first described to science in 1999 (Baldwin 1999). It is an annual plant, which means that it completes its life cycle within one year or growing season. Livermore tarplant grows to a height of 10 to 40 cm and produces yellow flower heads that can appear from approximately June to October. Livermore tarplant is only known to exist in a few areas of the Livermore Valley area of Alameda County in California (CNDDDB 2014)(Figure 1). The plant is only found growing in poorly-drained, seasonally dry alkaline meadows in the vicinity of barren alkali scalds, alkali vernal pools and playa-like pools.

Livermore tarplant is most commonly observed growing with the non-native grasses ripgut grass (*Bromus diandrus*) and soft chess (*Bromus hordeaceus*) along with the native herbs alkali heath (*Frankenia salina*) and narrow tarplant (*Holocarpha virgata*)(Bartosh 2010). Other plant species associated with Livermore tarplant include iodine bush (*Allenrolfea occidentalis*), brittlescale (*Atriplex depressa*) in adjacent alkali-scald habitat, spikeweed (*Centromadia pungens*), salt dodder (*Cuscuta salina*), annual hair grass (*Deschampsia danthonioides*), salt grass (*Distichlis spicata*), brome fescue (*Festuca bromoides*), rye grass (*Festuca microstachys*), rattail sixweeks grass (*Festuca myuros*), alkali barley (*Hordeum depressum*), Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum*), toad rush (*Juncus bufonius* var. *bufonius*), goldfields (*Lasthenia californica*), narrowflower flaxflower (*Leptosiphon liniflorus*), sickle grass (*Parapholis incurva*), sticky sand-spurrey (*Spergularia macrotheca* var. *longistyla*), and small-head clover (*Trifolium microcephalum*) (Baldwin 1999).

Known occurrences of plant taxa, animal taxa, and natural communities that are of conservation concern within California are documented within the Department’s California Natural Diversity Database (CNDDDB) and referred to as “elements.” An “element occurrence” (EO) is a location record for a site which contains an individual, population, nest site, den, or stand of a special status element. Populations, individuals, or colonies that are located within 1/4 mile of each other generally constitute a single EO, sometimes with multiple “parts” (Bittman 2001). There are currently three EOs for Livermore tarplant that are documented in the CNDDDB; however, among these three EOs there are a total of five separately-mapped parts that could each be considered a different colony or population. To make it easier to refer to these different parts of the same EO, separately-mapped parts of the same EO will be referred to as “populations” in this evaluation report, and have been named in Table 1, below. A map of the known populations of Livermore tarplant is presented in Figure 2.

Table 1. Livermore Tarplant Populations (approximate areas are from the Petition)

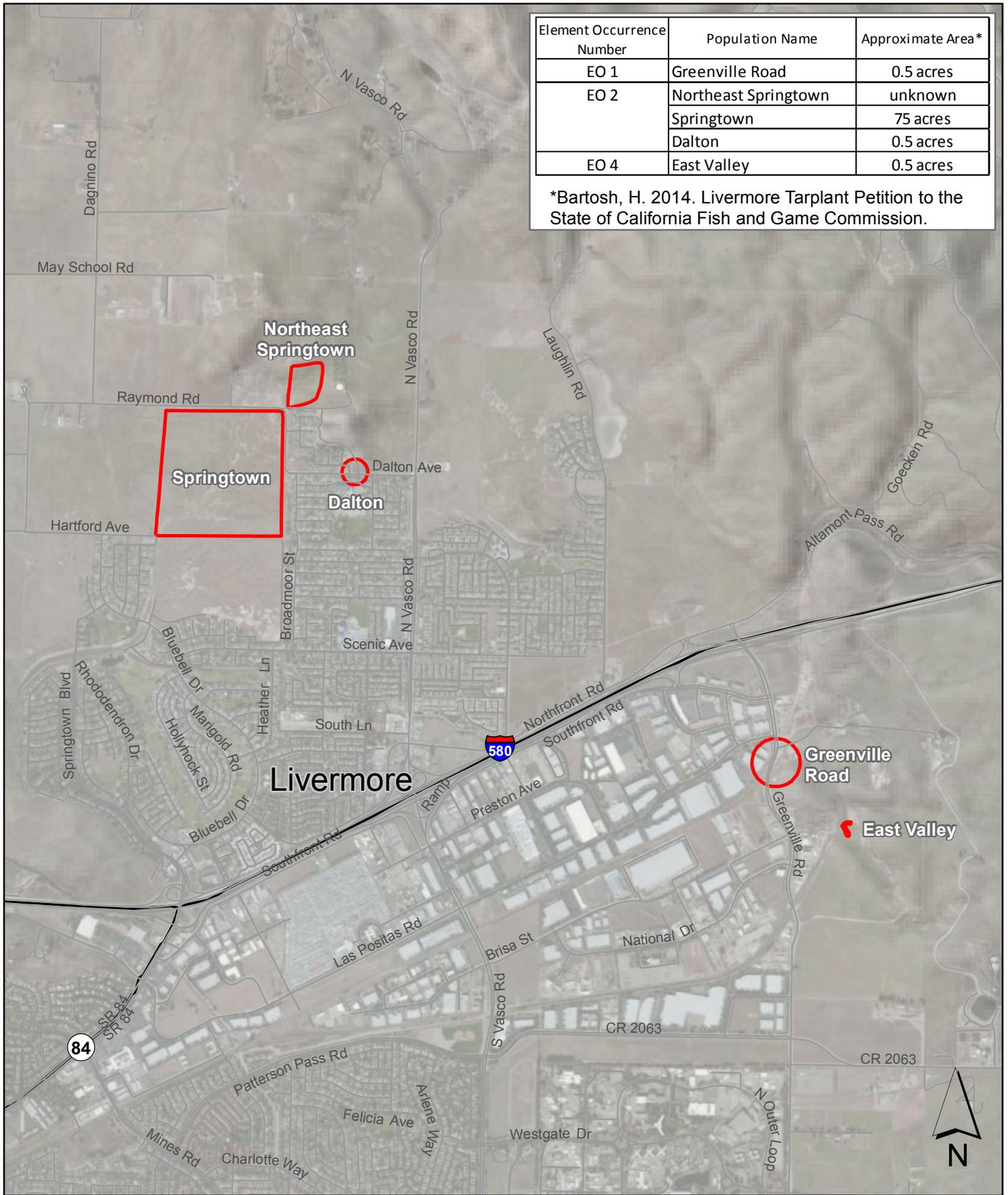
<i>Element Occurrence Number</i>	<i>Population Name</i>	<i>Approximate Area (Acres)</i>
EO 1	Greenville Road	0.5
EO 2	Northeast Springtown	not provided in the Petition
	Springtown	75
	Dalton	0.5
EO 4	East Valley	0.5



Species Occurrence Data Source: California Natural Diversity Database (October 2014)

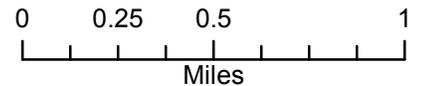
Figure 1. Vicinity of Livermore Tarplant





Species Occurrence Data Source: California Natural Diversity Database (October 2014)

Figure 2. Known Locations of Livermore Tarplant



EVALUATION OF THE PETITION

The discussion below presents the Department's topic area-specific evaluation of the Petition on its face and in relation to other relevant information in the Department's possession. (See generally Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).)

POPULATION TREND

The population trend of Livermore tarplant is discussed in the following sections of the Petition: Abundance on page 7, Trends on page 8, and Known Occurrences on pages 8 and 9.

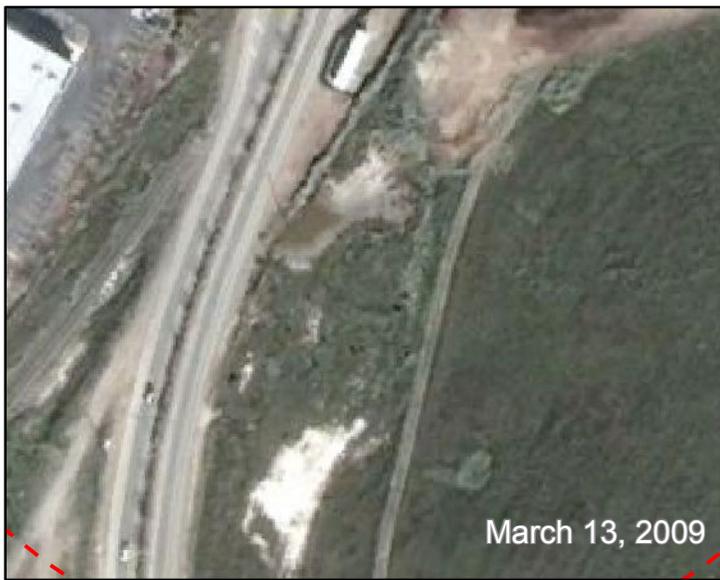
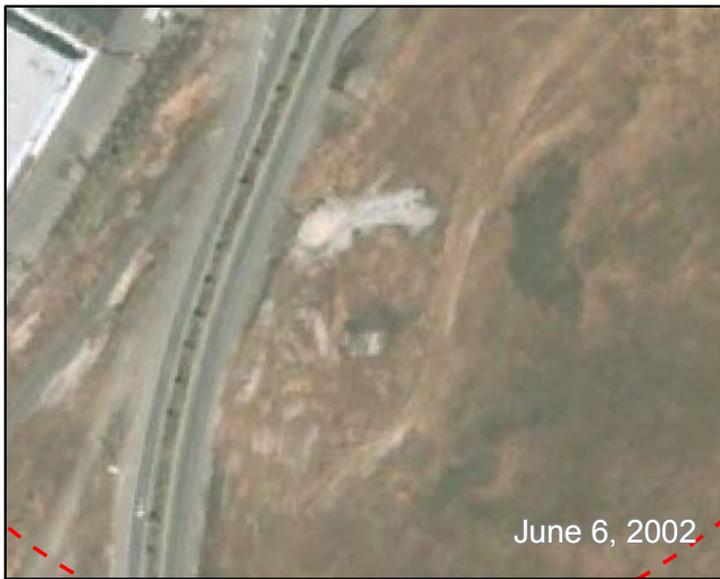
The Petition states that little is known about the long-term population trends of Livermore tarplant and explains that population numbers can fluctuate dramatically from year to year because Livermore tarplant is an annual plant. The Petition reports that the number of plants in the Springtown Population of EO 2 in 2009 was estimated based on sampling and statistical analysis (Bartosh 2009). The Petition also reports visual population estimations that have been made by the Petitioner and documented in the CNDDDB for other populations. However, these observations and data do not provide information on the population trend of Livermore tarplant.

Aerial photographs in the Petition show the progression of habitat destruction that has taken place at EO 1 from road construction and earthmoving and soil storage activities. The Petition reports that a population estimate of greater than 100 individuals was reported to the CNDDDB for the Northeast Springtown Population of EO 2 in 2000; however, the Petition indicates that the Northeast Springtown Population is no longer considered to be extant. The information provided in the Petition indicates that these populations have declined.

According to an evaluation noted by the Petitioner (Cal. Dept. of Conservation FMMP 2009, Bartosh et al. 2010), it is estimated that 28 percent of the same soil series that is known to support Livermore tarplant in the Springtown area has been lost. However, the Petition does not provide any direct scientific information of a decline in Livermore tarplant populations as a result of this loss of habitat.

The Department has also considered other relevant information related to the population trends of Livermore tarplant. As discussed below under "Factors Affecting the Ability to Survive and Reproduce," Department staff visited EO 1 with the Petitioner on September 19, 2014 and observed that the previously known population at EO 1 has been completely or almost completely buried by piles of dirt and/or trampled by heavy equipment (Figure 3 and Figure 4). Through evaluation of aerial photographs and direct observation of the site, the Department infers that a decline in the Livermore tarplant population has taken place at EO 1. The Department also received an e-mail response from the Petitioner clarifying that the Northeast Springtown Population of EO 2 is not considered extant because the site is grazed by horses and the Petitioner has not observed Livermore tarplant at the site after several years of observing the site from nearby (H. Bartosh pers. comm. 2014). Because Livermore tarplant is no longer considered present at the Northeast Springtown site by the Petitioner, the Department can reasonably conclude that a decline in the Northeast Springtown Population has taken place.

The Department recognizes that annual plant populations can have high annual variability depending upon environmental conditions and are thus very difficult to monitor directly to detect population trends. Annual and short-lived plant numbers can fluctuate wildly from year to year depending on the seed production in previous years, germination of seedlings and



Data Sources: California Natural Diversity Database (October 2014), Google Earth, Digital Globe.

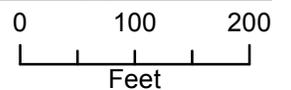


Figure 3. Aerial Photos of Livermore Tarplant Element Occurrence 1: Greenville Road



Photo 1. EO 1: Greenville Road on September 24, 2014, view direction North-northeast



Photo 2. EO 1: Greenville Road on September 24, 2014, view direction South-southeast

Figure 4. Photos of Livermore Tarplant Element Occurrence 1: Greenville Road on September 24, 2014

environmental conditions (e.g. timing and amount of rainfall) (Fischer and Matthies 1998; Harrison, Maron and Huxel 1999). Aerial extent of populations is sometimes used as a rough indicator of population size; however, it is often more effective to focus on a habitat factor or significant threat when trying to monitor or understand trends (Elzinga et al. 1998).

Scientific information on Livermore tarplant's population trends is limited. There is no scientifically-measured or statistical information available in the Petition or possessed by the Department regarding the population trends of Livermore tarplant. The Petition does not provide sufficient scientific information regarding Livermore tarplant's general population trend; however, it is reasonable to infer based on observations that EO 1 and the Northeast Springtown Population of EO 2 have declined.

RANGE

Range is considered the general geographical area in which a species is found. The range of Livermore tarplant is discussed in the following sections of the Petition: Executive Summary on page 3, Habitat on page 5, Distribution on page 6, Abundance on page 7, Trends on page 8, Known Occurrences on pages 8 and 9, and Attempts to Locate Additional Populations on pages 9 and 10.

The Petition relies on historical collections and information within the CNDDDB which indicate that all known populations of Livermore tarplant are restricted to the eastern portion of the Livermore Valley on both public and private land within the City of Livermore and unincorporated Alameda County, California. The Petition notes that some of the world's most renowned botanists have collected plant specimens in alkaline areas of eastern Alameda and Contra Costa counties since as early as the 1860s, and the available data indicates that Livermore tarplant has always been limited in distribution.

There is sufficient scientific information in the Petition regarding Livermore tarplant's current and historical geographic range.

DISTRIBUTION

Distribution is considered the spatial arrangement of populations or individuals within an area. The distribution of Livermore Tarplant is discussed in the following sections of the Petition: Executive Summary on page 3, Distribution on page 6, Abundance on page 7, Trends on page 8, Known Occurrences on pages 8 and 9, and Attempts to Locate Additional Populations on pages 9 and 10.

The Petition specifically discusses the distribution of the Livermore tarplant on page 6. The Petition relies on historical collections, surveys, and other information from the CNDDDB to describe the distribution of all known Livermore tarplant populations. This information in the Petition indicates that the distribution of Livermore tarplant is clustered in three EOs, located within a three mile radius of each other in the Altamont Creek watershed that feeds Las Positas Creek. The three Livermore tarplant EOs are listed in Table 1 of the Petition.

Based on the information in the Petition, the three Livermore tarplant EOs are described as follows:

EO 1: Greenville Road: This EO is located on private property (Assessor's Parcel Number 99B-5700-2-9) within unincorporated Alameda County, south of Interstate 580 and immediately east

of Greenville Road south of its intersection with Las Positas Road. This EO is approximately 0.5 acres in area, and occupies an alkaline swale/scald and the uplands surrounding it, including the shoulder of Greenville Road. The location of this EO is shown in Figure 3 of the Petition, and in Figure 2 of this evaluation report.

EO 2: Springtown: EO 2 is described as being located north of Interstate 580 between North Livermore Avenue and Vasco Road. The CNDDDB maps EO 2 as three populations; however, based on the most recent surveys the population located on private property north and east of Raymond Road (Northeast Springtown Population) is not considered to be extant, and therefore EO 2 only consists of two populations. The largest population of EO 2 occupies approximately 75 acres and is located south of Raymond Road and west of Ames Street on the Springtown Wetlands Preserve (Springtown Population). The Springtown Population is the largest known population of Livermore tarplant and it is owned by the City of Livermore. The Springtown Population is not permanently protected by a conservation easement, but it is zoned by the City of Livermore as a preserve. The other extant population of EO 2 is located immediately west of Vasco Road and north of Dalton Avenue (opposite Pasatiempo Street) and it comprises approximately 0.5-acre (Dalton Population). The Dalton Population is on private property (Assessor's Parcel Number 99B-5300-5-5) and is separated from the other portions of EO 2 by city streets and a residential subdivision. The Dalton Population may have been essentially continuous and part of one larger population prior to the residential development on the west side of Vasco Road. The locations of the three populations of EO 2 are shown in Figure 2 of the Petition, and in Figure 2 of this evaluation report.

EO 4: East Valley: This EO is described as being located approximately 0.35-mile southeast of EO 1 on the other side of a low prominence (717 feet in elevation). EO 4 is approximately 0.5-acre in size and located in a drainage swale that ultimately drains into EO 1. EO 4 is privately owned (Assessor's Parcel Number 99B-5600-4-24) as of 2011. The location of EO 4 is shown in Figure 3 of the Petition, and in Figure 2 of this evaluation report.

In addition to the distribution information provided in the Petition, the Department has more accurate and precise location information for EO 1 and the Dalton Population of EO 2 based on information submitted to the CNDDDB in 2013 and observations made by Department staff on September 19, 2014. The Department also received an e-mail response from the Petitioner clarifying that the Northeast Springtown Population of EO 2 is not considered extant because the site is grazed by horses and the Petitioner has not observed Livermore tarplant at the site after several years of observing the site from nearby (H. Bartosh pers. comm. 2014). This information has not yet been incorporated into the CNDDDB.

The Petition provides sufficient scientific information regarding Livermore tarplant's distribution.

ABUNDANCE

The abundance of Livermore tarplant is discussed in the following sections of the Petition: Executive Summary on page 3, Abundance on page 7, Trends on page 8, and Known Occurrences on pages 8 and 9.

The only scientific quantitative abundance data for Livermore tarplant provided in the Petition is a statistical population estimate for the Springtown Population of EO 2. The Petition explains that the Springtown Population was estimated to consist of between 237,690 and 365,552 individuals in 2009 with a 95 percent confidence interval, but the population is likely around 300,000 individuals (Bartosh 2010).

The Petition also states that visual population estimates for three other Livermore tarplant populations have been made. The Petition reports that the Northeast Springtown Population of EO 2 was reported to the CNDDDB to consist of greater than 100 individuals in 2000. However, based on the most recent surveys, the Petitioner does not consider this population to be extant. Based on visual observations, the Petitioner estimated that the Dalton Population of EO 2 consisted of approximately 500 individuals in 2009, and estimated that EO 1 consisted of approximately 1,600 individuals in 2009. The Petition does not provide any population estimates for EO 4.

The Petitioner speculates that Livermore tarplant may have been more abundant prior to the development of a residential subdivision, golf course, and former dump site north of Interstate 580 and east of North Livermore Avenue. As previously noted, the Petition also reports that according to an evaluation of U.S. Department of Agriculture soils and California's Farmland Mapping and Monitoring datasets (Cal. Dept. of Conservation FMMP 2009) it is estimated that 28 percent (648 acres) of habitat with the same soil series known to support Livermore tarplant have been lost in the Springtown area (Bartosh et al. 2010). The Petition states that commercial and industrial development along the Greenville Road corridor may have also replaced habitat occupied by Livermore tarplant.

The Department has also considered other relevant information related to abundance of Livermore tarplant. As discussed below under "Factors Affecting the Ability to Survive and Reproduce", Department staff visited EO 1 with the Petitioner on September 19, 2014 and observed that the previously known population at EO 1 has been completely or almost completely buried by dirt and/or trampled by heavy equipment (Figure 3 and Figure 4). The Department also received an e-mail response from the petitioner clarifying that the Northeast Springtown Population of EO 2 is not considered extant because the site is grazed by horses and the petitioner has not observed Livermore tarplant at the site after several years of observing the site from nearby (H. Bartosh pers. comm. 2014).

Scientific information on Livermore tarplant's abundance is limited. However the Petition, along with information possessed by the Department, provides sufficient scientific information regarding Livermore tarplant's abundance.

LIFE HISTORY

The life history of Livermore tarplant is discussed in the following sections of the Petition: Executive Summary on page 3, Description on page 4, Phenology on page 4, and Pollination on pages 5 and 6.

The Petition notes that Livermore tarplant is an annual plant that flowers from approximately June to October (Baldwin 1999, 2012; CNPS 2014), and seed production closely follows flowering during summer and fall months. The Petition states that no pollination studies have been performed on Livermore tarplant to date and no anecdotal observation data on pollinators is available, but in general plants of the Asteraceae (sunflower family) are considered to be pollinated by a wide diversity of insects, or more rarely birds or the wind. The Petition also indicates that based on observations of other *Deinandra* species and related taxa, Livermore tarplant is likely pollinated by flies (Diptera), wasps (Hymenoptera), moths and butterflies (Lepidoptera), true bugs (Hemiptera) and beetles (Coleoptera). The Department possesses information that indicates that Livermore tarplant is self-incompatible, meaning that it does not effectively self-pollinate (Baldwin and Strother 2006).

There is limited scientific information available that is specific to Livermore tarplant's life history. However, the Petition, along with information possessed by the Department, provides sufficient scientific information regarding Livermore tarplant's life history.

KIND OF HABITAT NECESSARY FOR SURVIVAL

The kind of habitat necessary for Livermore tarplant survival is discussed in the following sections of the Petition: Habitat on page 5, Known Occurrences on pages 8 and 9, and Preservation of Potential Habitat on page 16.

The Petition includes a discussion of currently occupied Livermore tarplant habitat on page 5 and potential Livermore tarplant habitat on pages 8 and 16. The Petition accurately describes the type of habitat for Livermore tarplant's survival. On page 5, the Petition explains that Livermore tarplant is supported by poorly drained, seasonally dry, highly alkaline Pescadero and Solano series soils (Baldwin 1999) of sedimentary parent material. The Petition describes Livermore tarplant as occurring in alkaline meadows and grasslands in the vicinity of barren alkali scalds, alkali vernal pools, and playa-like pools. The Petition states that alkali meadow/grassland and alkali sink habitats are considered sensitive natural communities. The Petition also reports that the average mean temperature of Livermore Valley is 14 degrees Celsius, and the average annual rainfall is between 33 to 46 centimeters (USDA 1966).

On page 16, the Petition notes that principles of conservation biology emphasize the need to preserve both occupied habitat and unoccupied potential habitat. The Petition states that this matrix of contiguous occupied and potential habitat allows species to expand their distribution and migrate in response to varying changes in climate and disturbance regimes, and to survive stochastic events that may destroy individual populations. On page 8, the Petition notes that Livermore tarplant occupies approximately 90 of the 2,313 acres of potentially suitable alkaline habitat in the Springtown watershed as identified by soil series (Bartosh et al. 2010). However, the Petition acknowledges that Livermore tarplant habitat requirements may be more specialized than currently understood, and there is currently no evidence that Livermore tarplant can survive outside of its current known distribution.

The Department has also considered other relevant information related to the kind of habitat necessary for Livermore tarplant survival. A 2010 report from Susan Bainbridge provides baseline mapping, habitat mapping and modeling for the state- and federally-endangered palmate salty bird's-beak (*Chloropyron palmatum*) at Springtown Alkali Sink. Although the report is not specific to Livermore tarplant, it does provide habitat information for the Springtown Population of Livermore tarplant, which could provide insight into the kind of habitat necessary for Livermore tarplant survival. The 2010 Bainbridge report provides a vegetation map for the Springtown Alkali Sink that was created using a generalized vegetation classification system based on observations rather than data. A report on the soils of Springtown Alkali Sink is also provided as Appendix 3 of the 2010 Bainbridge report.

Alkali meadow and scalds and alkali wetlands are natural communities associated with Livermore tarplant and are discussed in the East Alameda County Conservation Strategy, which could also provide insight into the kind of habitat necessary for Livermore tarplant survival (ICF International 2010).

There is limited scientific information available regarding the kind of habitat necessary for Livermore tarplant survival, particularly information on why Livermore tarplant does not occur in

other areas of potentially suitable alkaline habitat in the Springtown watershed. However, the Petition, along with information possessed by the Department, provides sufficient scientific information regarding the kind of habitat necessary for Livermore tarplant survival.

FACTORS AFFECTING THE ABILITY TO SURVIVE AND REPRODUCE

The factors affecting the ability of Livermore tarplant to survive and reproduce are discussed in the following sections of the Petition: Executive Summary on page 3, Abundance on page 7, Known Occurrences on pages 8 and 9, and Threats on pages 10 through 14. The Petition indicates that the primary factors affecting the ability of Livermore tarplant to survive and reproduce are (1) habitat modification and destruction through development and other human-related activities; and (2) competition with non-native plants. These two primary factors are discussed separately under the headings below.

Habitat Modification and Destruction:

The Petition includes a description of threats associated with habitat modification and destruction, as follows. The Petition indicates that all populations of Livermore tarplant are threatened by development, changes in land use, or other habitat modification or destruction that could destroy plants and/or occupied or unoccupied habitat. The Petition also indicates that indirect threats to Livermore tarplant may also result from development or changes in land use that cause changes in the hydrologic regime, changes in water quality, alteration of soil chemistry, introduction of non-native plant species, creation of conditions that are favorable for the spread of non-native plant species, or an increase in the use of habitat by humans and related soil disturbance and compaction.

The Petition notes that past disturbance to EO 1 has occurred from habitat loss and degradation resulting from soil deposition activities, excavation of the western portion of the property, and the construction of a roadway accompanied by grading and gravelling of natural habitat (Figures 4, 5, and 6 of the Petition).

Regarding the Springtown Population of EO 2, the Petition notes that it is owned by the City of Livermore and comprises approximately 75 acres. The Springtown Population of EO 2 is zoned as open space agriculture. The Petition states that the Open Space and Conservation Element of the City of Livermore's General Plan contains objectives related to the protection of Livermore tarplant (City of Livermore 2004, 2014a, 2014b); however, it has no permanent protection (such as a conservation easement) and does not have a management plan.

The Petition states that the City of Livermore is in the process of developing a conservation/mitigation bank that may include wetland construction within the Springtown Population. The Petition explains that wetland creation has the potential to directly impact Livermore tarplant and current and/or potential occupied habitat through construction, and that wetland creation near the Springtown Population site could also indirectly impact Livermore tarplant through alteration of surface hydrology, introduction of non-native plant species or creation of conditions that are favorable for the spread of non-native plant species. The Petition notes that the southern portion of the Springtown Population is routinely illegally used by off-road vehicles and bicycles. The Petition states that the "figure 8" shaped off-road vehicle track, shown in Figure 7 of the Petition, has been created by local residents and has directly impacted Livermore tarplant individuals.

Regarding the Dalton Population of EO 2, the Petition explains that Livermore tarplant is significantly threatened due to its location within unincorporated Alameda County where it is zoned as a rural property used for agriculture (10+ acres), which could allow the land to be used for various agriculture-related purposes, possibly without environmental review.

As previously noted, the Petitioner does not consider the Northeast Springtown Population of EO 2, also located within unincorporated Alameda County, to be extant and threats to this population are not discussed in the Petition.

The Petition explains that EO 4 is threatened by changes in agricultural land use, but it is zoned as “rural property in transition to a higher use;” therefore, there is the potential for EO 4 to be developed for industrial, commercial or residential purposes in the future or indirectly impacted from habitat alteration.

The Department has also considered other information related to the threats associated with habitat modification and destruction. As discussed under the Population Trend section of this evaluation report, EO 1 is under an imminent threat of becoming extinct from soil deposition activities and related surface disturbance and compaction. Department staff visited EO 1 with the Petitioner on September 19, 2014 and observed that the EO 1 population has now been completely encroached upon by soil deposition activities. A large volume of dirt/fill had been deposited directly upon the former known location of the population, and related operation of heavy equipment has compacted and disturbed remaining areas of EO 1 (Figure 4). From an analysis of aerial imagery, it is clear that these impacts occurred sometime between April and June of 2014 (Figure 3) (Google Earth 2014). From the vantage point of Department staff on the shoulder of Greenville Road, there was no evidence that any living Livermore tarplant plants remained at the site. These soil deposition activities may also cause indirect impacts such as establishing and expanding non-native plant populations, changing hydrologic conditions or changing soil chemistry from inadvertent or intentional application of herbicides, fertilizers or pesticides. It is likely that the functionality of the habitat at EO 1 is now permanently degraded or destroyed. Without restoration and protection the Department considers it likely that EO 1 will lose the ability to support Livermore tarplant.

The Department also considers the agricultural zoning at a Livermore tarplant population to be a factor affecting the ability of Livermore tarplant to survive and reproduce through habitat modification and destruction. Agricultural zoning could allow for cultivation and tillage of the soil; planting, growing, spraying of pesticides and/or fertilizers; harvesting of agricultural commodities such as wine grapes, vegetables, fruit and nut crops, nurseries, or animal products; practices performed by a farmer or on a farm as incidental to those farming operations, including preparation for market, delivery to storage or market, delivery to carriers for transportation to market; or use of the land for horse boarding, training, or breeding (Alameda County Community Development Agency 2005).

Threats to habitat associated with Livermore tarplant are also discussed in the East Alameda County Conservation Strategy (ICF International 2010).

Competition:

The Petition also includes a discussion of threats to Livermore tarplant associated with competition. Specifically, the Petition states that all Livermore tarplant habitat is threatened by invasion of non-native grasses and forbs from surrounding areas, and that disturbance of habitat may exacerbate these threats. Furthermore, the Petition states that the lack of an

appropriate disturbance regime such as grazing may also be a catalyst for competition that affects the ability of Livermore tarplant to survive and reproduce. The Petition notes that Ripgut grass and ryegrass (*Festuca perennis*) pose a threat to ungrazed areas of occupied Livermore tarplant habitat through thatch accumulation.

The Petition notes that non-native perennial pepperweed (*Lepidium latifolium*) and stinkwort (*Dittrichia graveolens*) are aggressive invaders and are the most immediate threat to all populations of Livermore tarplant. The Petition describes perennial pepperweed and stinkwort as both well adapted to alkaline habitat, which is the kind of habitat necessary for Livermore tarplant survival. The Petition describes perennial pepperweed as a perennial plant that spreads by rhizomes, which makes removal difficult, and that it can form a monoculture if left unabated. The Petition describes stinkwort as a prolific wind-dispersed seeder which allows its populations to spread easily.

The Petition reports that the Springtown Population of EO 2 is directly threatened by expansion of an existing stand of perennial pepperweed on the east side of Ames Street. The Petition also indicates that use of the off-road vehicle track in the southern portion of the Springtown Population may also serve as a vector for non-native plant invasions.

Department staff visited the Springtown Population at EO 2 with the Petitioner on September 19, 2014 and observed perennial pepperweed on the west side of Ames Street in the immediate vicinity of Livermore tarplant individuals, presumably spreading from the west side of Ames Street as reported in the Petition.

The Petition, along with information possessed by the Department, provides sufficient scientific information regarding the factors affecting the ability of Livermore tarplant to survive and reproduce.

DEGREE AND IMMEDIACY OF THREAT

The degree and immediacy of threat to Livermore tarplant are discussed in the following sections of the Petition: Executive Summary on page 3, Known Occurrences on pages 8 and 9 and Threats: Degree and Immediacy on pages 10 through 14. The discussion of the degree and immediacy of threats to Livermore tarplant populations in the Petition is primarily based on zoning designations, discussion with a representative from the City of Livermore, direct observation of destruction and degradation of habitat, and direct observation of invasive plant species populations. The information provided in the Petition demonstrates that Livermore tarplant is under an immediate threat from the factors described in the Petition.

In addition to the information presented in the Petition, Department staff have observed that EO 1, Greenville Road, is under an imminent threat of becoming extinct from being buried by dirt/fill and related surface disturbance and compaction as described under Habitat Modification and Destruction, above. Department staff also observed populations of perennial pepperweed on the west side of Ames Street in the immediate vicinity of Livermore tarplant at the Springtown Population of EO 2 on September 19, 2014.

The Department also recognizes the vulnerability of extinction for species with small numbers of populations and small population sizes, such as Livermore tarplant, due to stochastic (chance) demographic and environmental and/or genetic events (Shaffer 1981, 1987; Primack 2006; Groom et al. 2006). The Department also recognizes that such species may also be subject to increased genetic drift and inbreeding (Menges 1991; Ellstrand and Elam 1993).

The Petition, along with information possessed by the Department, provides sufficient scientific information regarding the degree and immediacy of threat to Livermore tarplant.

IMPACT OF EXISTING MANAGEMENT EFFORTS

The impact of existing management efforts on Livermore tarplant are discussed in the following sections of the Petition: Known Occurrences on pages 8 and 9, Threats: Degree and Immediacy on pages 10 through 14, and Current Management Activities on pages 14 and 15.

The Petition includes a discussion of the City of Livermore General Plan's Open Space and Conservation Element which contains objectives related to Livermore tarplant protection at the Springtown Population of EO 2. However, the Petition states that no active on the ground management activities for Livermore tarplant are taking place. The Petition explains that the City of Livermore Planning Department has convened a Springtown Alkali Sink Working group which does not work on Livermore tarplant protection specifically, but has objectives related to the protection of the alkali sink that supports Livermore tarplant. According to the Petition, the Springtown Alkali Sink Working Group's objectives are related to signage, fundraising, outreach, weed control, and additional fencing, as well as enhancing long-term protection and management.

The Petition states that the Springtown Population of EO 2 is partially grazed by cattle, and notes that EO 1 and EO 4 have no existing management. The Petition indicates that the absence of appropriate disturbance, such as grazing, may result in competition with other species that is detrimental to Livermore tarplant.

The Department has also considered other information related to the impact of existing management efforts. Department staff visited the Dalton Population of EO 2 with the Petitioner on September 19, 2014 and observed Livermore tarplant growing immediately beneath the barbed-wire fence that delineated the private property from the road right-of-way. The area adjacent to the road was denuded of vegetation, clearly a result of herbicide application, and several Livermore tarplant carcasses were found in the area that appeared to be killed by the herbicide treatment.

The East Alameda County Conservation Strategy designates Livermore tarplant as a focal species (ICF International 2010). Although the East Alameda County Conservation Strategy does not provide Livermore tarplant with any management or formal protection, it may provide some benefit for Livermore tarplant if agencies choose to follow it. The Department does not have a management plan for Livermore tarplant.

There is limited scientific information available regarding the impact of existing management efforts on Livermore tarplant. As discussed above, the Petition states that the Springtown Population of EO 2 is partially grazed by cattle. However, the Petition does not provide any other information on the grazing activities that occur on the site, such as timing, duration or intensity. Moreover, the Petition does not provide any information on other land management activities that may be taking place such as herbicide spraying or mowing. The data presented in the Petition does not describe the impact of existing management in a scientifically precise way, and does not provide sufficient scientific information regarding the impacts of existing management efforts on Livermore tarplant.

SUGGESTIONS FOR FUTURE MANAGEMENT

Suggestions for future management of Livermore tarplant are discussed in Potential Management Activities on pages 15 through 17 of the Petition. The Petition's discussion of potential management activities includes (1) listing the species under CESA, (2) adequate buffering, (3) preservation of potential habitat, (4) ecological management, (5) research and (6) monitoring. The Department considers these suggestions to be possible valid components for the future management of Livermore tarplant.

The Petition provides sufficient scientific information regarding suggestions for future Livermore tarplant management.

AVAILABILITY AND SOURCES OF INFORMATION

The Availability and Sources of Information section of the Petition is on pages 17 and 18. The sources of information for the Petition include published literature and other sources. The sources listed in the Petition were not included with the Petition when submitted to the Commission. One source of information that was cited in the Petition (DiTomaso and Healy 2007) was not listed in the Availability of Sources of Information of the Petition, but has been included below in the references section of this evaluation report. The Petitioner provided the Department with electronic copies of several Petition references on October 9, 2014.

Little information on Livermore tarplant exists in the literature, and the Department has little information that specifically addresses the concerns articulated in the Petition. However, the Petition provides sufficient scientific information on the availability and sources of information used in the Petition regarding the Livermore tarplant.

DISTRIBUTION MAP

As described in the Distribution section of this evaluation report, Figures 2 and 3 on page 7 of the Petition include two maps showing the distribution of all currently known Livermore tarplant populations. These distribution maps provide sufficient scientific information on the known distribution of Livermore tarplant.

RECOMMENDATION TO THE COMMISSION

Pursuant to Section 2073.5 of the Fish and Game Code, the Department has evaluated the Petition on its face and in relation to other relevant information the Department possesses or received. In completing its petition evaluation, the Department has determined there is sufficient scientific information to indicate that the petitioned action may be warranted, and recommends the Petition be accepted and considered.

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