20. LASSICS LUPINE (CONSENT)

Today's Item **Information** ☐ **Action** ☒

Receive DFW's 90-day evaluation report on the petition to list Lassics lupine (*Lupinus constancei*) as an endangered species under the California Endangered Species Act (CESA).

Summary of Previous/Future Actions

▪ Received petition	Jul 19, 2016
▪ FGC transmits petition to DFW	Jul 29, 2016
▪ Publish notice of receipt of petition	Aug 12, 2016
▪ Approved DFW request for 30-day extension	Oct 19-20, 2016; Eureka
▪ **Today receive DFW evaluation of petition**	**Dec 7-8, 2016; San Diego**
▪ Determine if listing may be warranted	Feb 8-9, 2017; Santa Rosa

Background

A petition to list Lassics lupine as endangered under CESA was submitted by Dave Imper and Cynthia Elkins on Jul 19, 2016. Fish and Game Code Section 2073.5 requires that, within 90 days of receiving a petition, DFW shall evaluate the petition and submit to FGC a written evaluation with a recommendation. DFW requested an extension of up to 30 days to complete the evaluation, which was granted by FGC at the Oct 2016 meeting in Eureka.

Based upon the information contained in the petition and other relevant information, DFW has determined that there is sufficient scientific information available at this time to indicate that the petitioned action may be warranted. DFW recommends that the petition be accepted and considered. If FGC accepts DFW's recommendation, that determination results in the species being considered as a candidate species under CESA and mandating further review.

Significant Public Comments

This meeting is not intended for FGC discussion as the law requires the public to have 30 days to review the petition and public release of the evaluation report; however, under Bagley-Keene, FGC must allow public comment on this item if requested.

Recommendation

FGC staff: Under a motion to adopt the consent calendar, receive DFW's evaluation of the petition to allow future determination as to whether listing may be warranted.

DFW: Receive the evaluation of the petition and at a future meeting determine that listing may be warranted.

Exhibits

1. DFW memo, received Nov 3, 2016
2. DFW's evaluation of the petition, dated Nov 2016

Motion/Direction

Moved by _____ and seconded by _____that the Commission adopts the consent calendar, items 20-23.

State of California
Department of Fish and Wildlife

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Memorandum

Date: November 2, 2016

To: Valerie Termini
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: **Initial Evaluation of the Petition to List Lassics Lupine (*Lupinus constancei*) as Endangered under the California Endangered Species Act**

The California Department of Fish and Wildlife (Department) has completed its initial evaluation of the Petition to list Lassics lupine as an endangered species under the California Endangered Species Act, Fish and Game Code section 2050 et seq. The Fish and Game Commission (Commission) received the Petition from Mr. David Imper and Ms. Cynthia Elkins on July 19, 2016. Pursuant to Fish and Game Code section 2073, the Commission referred the Petition to the Department on July 29, 2016. In accordance with Fish and Game Code section 2073.5, subdivision (b), on September 14, 2016, the Department requested a 30-day extension to further analyze the Petition and complete its evaluation report. The Commission on October 20, 2016, granted the Department's request for a 30-day extension.

The Department completed the attached Petition evaluation report as required by Fish and Game Code section 2073.5. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).). 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 and considered.

If you have any questions or need additional information, please contact Ms. Sandra Morey, Deputy Director, Ecosystem Conservation Division at (916) 653-6956 or at Sandra.Morey@Wildlife.ca.gov. You can also contact Mr. Richard Macedo, Branch Chief, Habitat Conservation Planning Branch at (916) 653-3861 or at richard.macedo@wildlife.ca.gov.

Attachment

ec: **California Department of Fish and Wildlife**

Sandra Morey, Deputy Director
Ecosystem Conservation Division
sandra.morey@wildlife.ca.gov

Stafford Lehr, Deputy Director
Wildlife and Fisheries Division
stafford.lehr@wildlife.ca.gov

Wendy Bogdan, General Counsel
Office of the General Counsel
wendy.bogdan@wildlife.ca.gov

Nathan Voegeli, Attorney
Office of the General Counsel
nathan.voegeli@wildlife.ca.gov

Richard Macedo, Branch Chief
Habitat Conservation Planning Branch
richard.macedo@wildlife.ca.gov

Craig Martz
Environmental Program Manager
Regulations Unit
craig.martz@wildlife.ca.gov

State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF THE PETITION FROM MR. DAVID IMPER AND MS. CYNTHIA ELKINS TO LIST LASSICS LUPINE (*Lupinus constancei*) AS AN ENDANGERED SPECIES UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

November 2016

Lupinus constancei, CDFW photo by Jeb Bjerke

Charlton H. Bonham, Director
Department of Fish and Wildlife

INTRODUCTION

The subject of this evaluation report is a petition (Petition) to the California Fish and Game Commission (Commission) to list Lassics lupine (*Lupinus constancei*) as an endangered species under the California Endangered Species Act (Fish and Game Code, § 2050 et seq.; hereafter CESA). Ms. Cynthia Elkins from the Center for Biological Diversity and Mr. David Imper (Petitioners) submitted the Petition, dated July 14, 2016, to the Commission on July 19, 2016.

The Commission referred the Petition to the California Department of Fish and Wildlife (Department) pursuant to Fish and Game Code section 2073 for the initial evaluation required by Fish and Game Code 2073.5 (Cal. Reg. Notice Register 2016, No. 33-Z, p. 1463). 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 Petition evaluation report. 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 and to recommend to the Commission whether the Petition should be accepted and considered. In its advisory capacity to the Commission, the Department's charge and focus is scientifically based. 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 to designate a species as a candidate for listing by determining whether a petition provides "sufficient information to indicate that the petitioned action may be warranted." (Fish & G. Code, § 2074.2, subd. (e)(2).) Second, if the Commission accepts a petition for consideration, the Commission is required to determine whether or not the petitioned action to list the species as endangered or threatened is warranted. (Fish & G. Code, § 2075.5, subd. (e).)

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; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d).) The range of a species for the Department's petition evaluation and recommendation is the species' California range. (*Cal. Forestry Assn. v. Cal. Fish and Game Com*. (2007) 156 Cal. App. 4th 1535, 1551.)

Within ten days of receipt of a petition, the Commission must refer the petition to the Department for evaluation. (Fish & G. Code, § 2073.) The Commission must also publish notice that it received the petition in the California Regulatory Notice Register. (Fish & G. 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;
- 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 & G. 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 Fish and Game Code section 2072.3 and section 670.1, subdivision (d)(1), of Title 14 of the California Code of Regulations.

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 determination of whether a petitioned action should be accepted for consideration pursuant to Fish and Game Code section 2074.2, subdivision (e), resulting in the species being listed as a candidate species. The Court began its discussion by describing the standard for accepting a petition for consideration previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal. App.4th 1104.

> 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*, *supra*, 166 Cal. App. 4th 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." (*Center for Biological Diversity*, *supra*, 166 Cal. App. 4th 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 under [Fish and Game Code] section 2074.6.

(*Ibid*.)

If the Commission accepts the petition for consideration, the second step requires the Department to produce within 12 months of the Commission's acceptance of the petition a peer-reviewed report based upon the best scientific information available that indicates whether the

petitioned action is warranted. (Fish & G. Code, § 2074.6.) The Commission, based on that report and other information in the administrative record, then determines whether listing the species as endangered or threatened is or is not warranted. (Fish & G. Code, § 2075.5.)

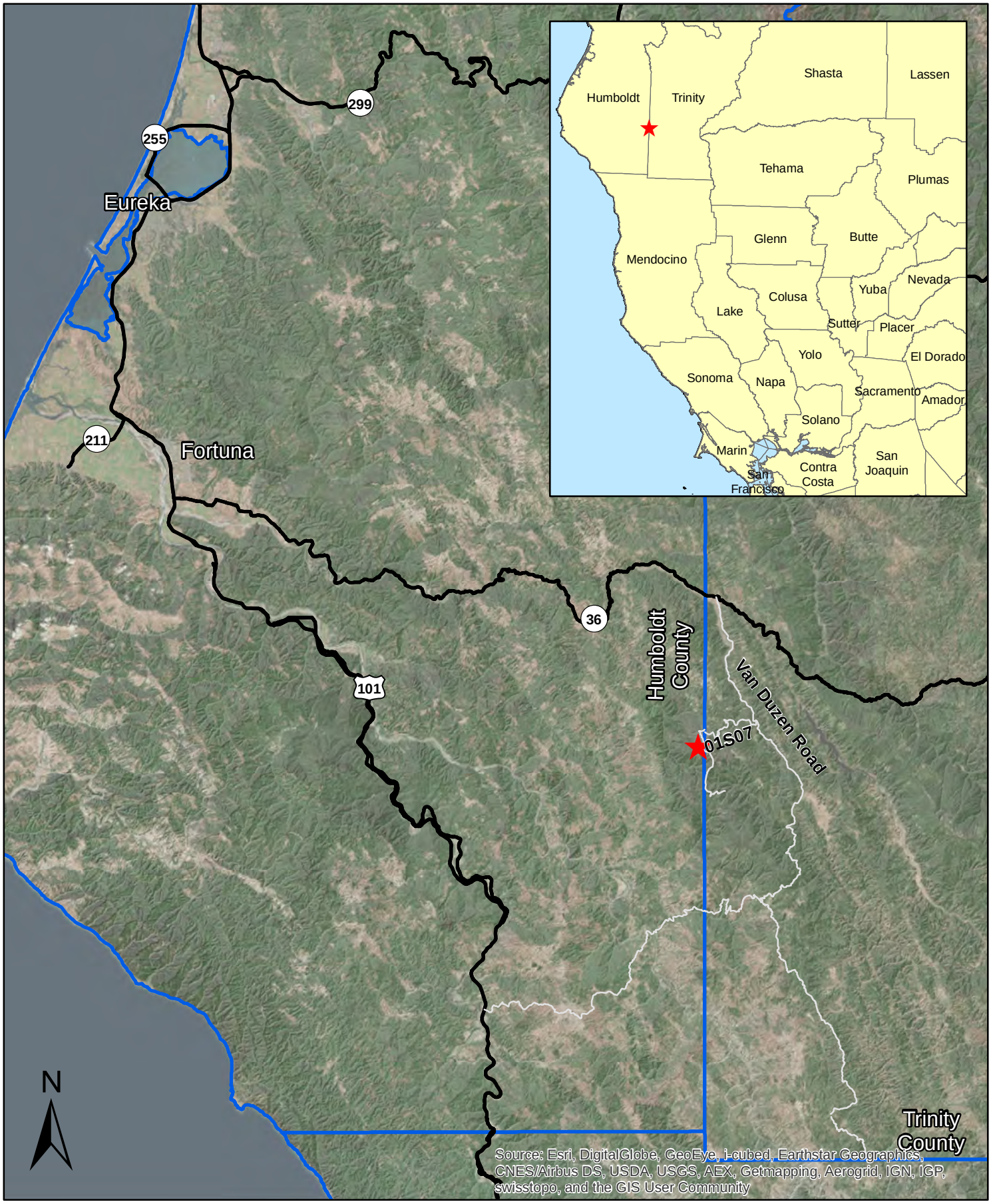
SUMMARY OF KEY FINDINGS

The Department has reviewed and evaluated the Petition on its face and in relation to other relevant information, including the material referenced in the Petition and other information possessed or received by the Department. Based on the Department's review and evaluation, the Department recommends that there is sufficient scientific information available at this time, particularly with respect to the most biologically critical factors (i.e. limited range, distribution and abundance; habitat requirements; range contraction; forest encroachment; seed predation; and climate change) to indicate that the petitioned action may be warranted and the Petition should be accepted and considered. (See Fish & G. Code, § 2073.5, subd. (a)(2); Cal. Code Regs. tit. 14, § 670.1, subd. (d)(1).)

BACKGROUND ON LASSICS LUPINE

Lassics lupine is a plant of the pea family (Fabaceae) first described to science in 1983 (Nelson and Nelson 1983). It is a perennial plant, which means that it can live for more than one year. Individual Lassics lupine plants have been observed to live up to 12 years, but they are typically shorter-lived (Imper and Elkins 2016). Lassics lupine is less than 15 centimeters (6 inches) tall and it is cespitose, which means it grows close to the ground (Nelson and Nelson 1983, Sholars 2012). Lassics lupine produces dense clusters of pink and rose-colored, pea-like flowers that bloom in July (CNPS 2016). Stems and silvery-green leaves are covered with silky hairs and the plant produces a tap-root. Mature plants growing under the best conditions may produce up to 20 or more clusters of flowers, but they typically produce fewer. Each cluster of flowers may produce up to 10 or more fruits, each with one to four seeds.

There are two populations of Lassics lupine, both in the Lassics area of Humboldt and Trinity counties at elevations between 1,590 and 1,740 meters (5,200 and 5,700 feet) above mean sea level (Figure 1). One of the populations is on Mount Lassic (Mt. Lassic Population), and the other, smaller population is approximately 0.8 kilometer (0.5 mile) to the southeast, near Red Lassic (Red Lassic Population) (Figure 2). In 2014, Lassics lupine was reported to occupy a total area of less than 1.6 hectares (4 acres) (Imper and Elkins 2016). The plant only grows in and near serpentine soils of the Lassics area, generally in soils with a pH ranging from 5.7 to 9.8 and sand content ranging from 81 to 91 percent (Alexander 2008, Imper 2012). Lassics lupine grows in several different ecological settings within the two known populations, including: (1) barren areas with flat to moderate slopes that are shaded by nearby topography; (2) steep, barren north-facing slopes; (3) north-facing slopes at the edge of or within Jeffrey pine (*Pinus jeffreyi*)/incense cedar (*Calocedrus decurrens*) forest; and (4) the crest of a southwest-facing slope with an overstory of Jeffrey pine (Figure 3).



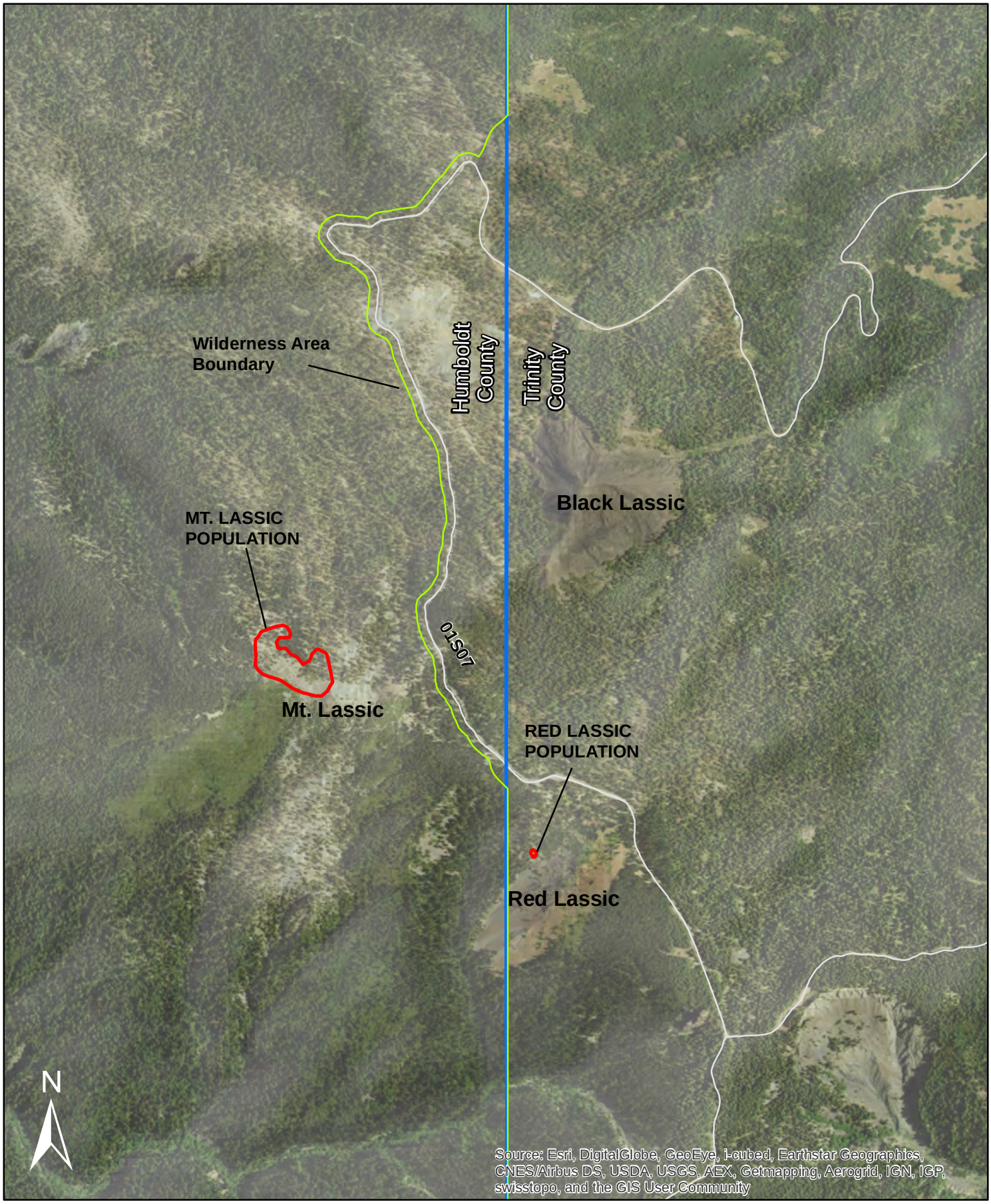
Species Occurrence Data Source: California Natural Diversity Database October 2016

0 5 10 20
Miles

Figure 1. Vicinity of Lassics Lupine

★ = Lassics Lupine Populations

California Department of Fish and Wildlife
Evaluation of the Petition to list Lassics lupine (*Lupinus constancei*) under the California Endangered Species Act



Species Occurrence Data Source: California Natural Diversity Database October 2016

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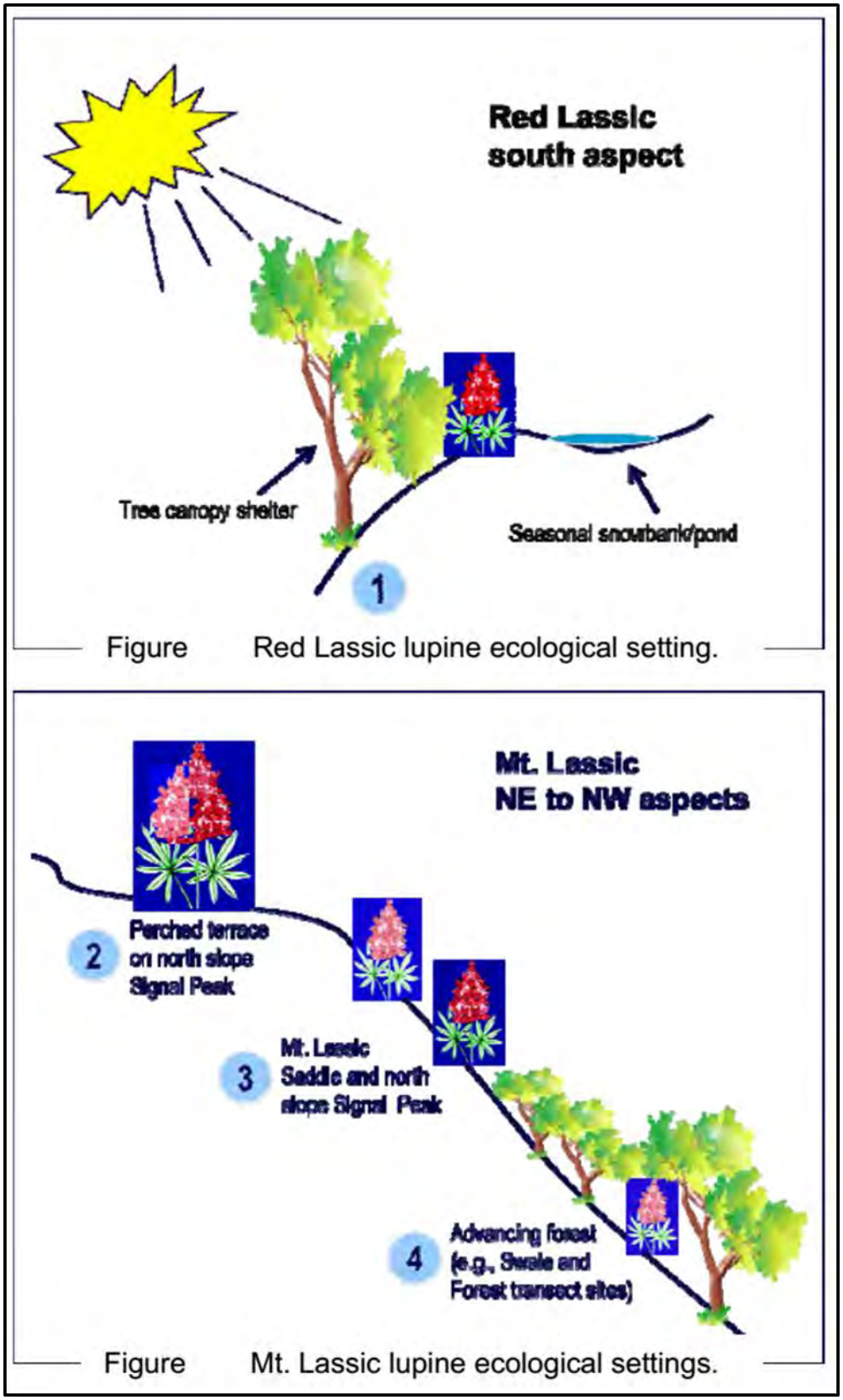
Figure 2. Lassics Lupine Populations

= Lassics Lupine Populations

California Department of Fish and Wildlife
Evaluation of the Petition to list Lassics lupine (*Lupinus constancei*) under the California Endangered Species Act



Source: Imper 2012

Figure 3. Lassics Lupine Ecological Settings

EVALUATION OF THE PETITION

The discussion below presents the Department's component-specific evaluation of the Petition on its face and in relation to other relevant information received or possessed by the Department. (See Fish & G. Code, §§ 2072.3, 2073.5; Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).)

POPULATION TREND

The population trends of Lassics lupine are discussed in the "Conservation Status and Management Efforts" section of the Petition on pages 6 and 7, and the "Population Trends and Abundance" section of the Petition on pages 7 through 9. References providing information on the population trends of Lassics lupine were also submitted with the Petition.

The Petition provides information on demographic monitoring of Lassics lupine that has taken place since 2003. One monitoring transect was established at the Mt. Lassic Population and one monitoring transect was established at the Red Lassic Population. An additional monitoring transect was established at the Mt. Lassic Population in 2005. Population data from the demographic monitoring are presented in Figure 1 of the Petition.

End-of-season counts of Lassics lupine plants in the monitoring transects demonstrate a general increase in the number of plants from 2005 to 2013, with a significant decline in the total number of Lassics lupine plants observed in September 2015, after two years of very low snowpack and a wildfire in the Lassics area. End-of-season monitoring results for 2016 are not yet available.

A population viability analysis for Lassics lupine was conducted in 2012 (Kurkjian 2012a) and is discussed in the Petition. The population viability analysis estimated that, without protecting any reproductive plants from seed predation, the probability of quasi-extinction of the species (defined as 10 or less adult plants remaining) in the next 50 years is between 68.4 and 100 percent. If approximately 30 percent of reproductive plants are protected from seed predation by caging, the probability of quasi-extinction is reduced to between 0.7 and 31.5 percent. If all reproductive plants are caged, the probability of quasi-extinction is reduced to between 0 and 1.8 percent. The population viability analysis did not, however, consider the impacts of reduced snowpack and wildfire, which would not be offset by caging adult plants. Warm winters in 2014 and 2015 combined with a severe wildfire in late July and August of 2015 resulted in a significant number of Lassics lupine fatalities in 2015. All adult plants at the Red Lassic Population were killed by the fire.

The Department has considered other relevant information related to the population trends of Lassics lupine. Department staff visited the Lassics lupine populations on August 4 and 5, 2016, and counted 72 seedlings and no adult plants at the Red Lassic Population. Department staff observed, but did not count, Lassics lupine plants at the Mt. Lassic Population. The Department also received an e-mail response from the Petitioner reporting a population size of 709 Lassics lupine plants (68 reproductive, 62 vegetative, 579 seedlings) at both population sites in July 2016, which predates the expected late-season mortality (Carothers pers comm. 2016). The Department does not know how many of these plants were in the different monitoring transects and therefore cannot compare this population size with other monitoring information provided by the Petitioner.

The Department concludes that the Petition includes sufficient scientific information regarding the population trends of Lassics lupine, and the information provided contributes to the Department's recommendation that the petitioned action may be warranted.

RANGE

Range is considered the general geographical area in which a species is found. For purposes of this Petition evaluation, the range is the species' California range. (*Cal. Forestry Assn. v. Cal. Fish and Game Com., supra*, 156 Cal. App. 4th at p. 1551.) The range of Lassics lupine is discussed in the "Range and Distribution" section of the Petition on pages 3 and 4. References providing information on the range of Lassics lupine were also submitted with the Petition.

The Petition provides information on the known range of Lassics lupine, which is situated near the boundary of Humboldt and Trinity counties, approximately 130 kilometers (80 miles) southeast of Eureka. Lassics lupine occurs in the Lassics area at elevations between 1,590 and 1,740 meters (5,200 and 5,700 feet) above sea level.

The Department concludes that the Petition provides sufficient scientific information to describe Lassics lupine's known geographic range, and the information provided contributes to the Department's recommendation that the petitioned action may be warranted.

DISTRIBUTION

Distribution is considered the spatial arrangement of populations or individuals within an area. The distribution of Lassics lupine is discussed in the "Range and Distribution" section of the Petition on pages 3 and 4, and in the "Factors Affecting the Lupine's Ability to Survive and Reproduce" section of the Petition on pages 16 through 20. A figure illustrating the distribution of Lassics lupine is provided on page 3 of the Petition. References providing information on the distribution of Lassics lupine were also submitted with the Petition.

There are two known populations of the species (Figure 2):

Red Lassic Population: A small population, occupying less than 250 square-meters (2,500 square-feet), is located on the west slope of Red Lassic, approximately 915 meters (3,000 feet) southeast of the Mt. Lassic Population, which is described below. This population is located in Trinity County within Six Rivers National Forest, to the west of Forest Road 1S07.

Mt. Lassic Population: The largest population is located near the top of the westernmost of the three peaks comprising Mt. Lassic and on the adjacent saddle (i.e., the lower west-facing slope of the second peak of the three peaks). This population is located in Humboldt County, within the Mount Lassic Wilderness of Six Rivers National Forest. The population is located to the west of Forest Road 1S07. The Mt. Lassic Population includes plants in three ecological settings: upper terrace, saddle/north slope, and forest/swale. The density of Lassics lupine plants varies in the different ecological settings. The ecological settings are described in more detail in the "Kind of Habitat Necessary for Survival" section of this report.

The Department concludes that the Petition provides sufficient scientific information to describe Lassics lupine's distribution, and the information provided contributes to the Department's recommendation that the petitioned action may be warranted.

ABUNDANCE

The abundance of Lassics lupine is discussed in the “Conservation Status and Management Efforts” section of the Petition on pages 6 through 7, and the “Population Trends and Abundance” section of the Petition on pages 7 through 9. References providing information on the abundance of Lassics lupine were also submitted with the Petition.

The Petition indicates that the plants within the three demographic monitoring transects for Lassics lupine represent roughly one-half of the total number of Lassics lupine plants. The Petition states that the total number of Lassics lupine plants has been variously estimated to be between 500 and 1,000 plants during the past 12 years. Many Lassics lupine plants died in 2015 as a result of the Lassics Fire and other causes, and only 30 plants were counted in the three monitoring transects in September 2015. If these 30 plants represent roughly one-half of the total number of Lassics lupine plants, the end-of-season population estimate for 2015 could be considered close to 60 plants, which is the lowest population estimate since demographic monitoring began.

The Department also considered other relevant information related to the abundance of Lassics lupine. Department staff visited the Lassics lupine populations on August 4 and 5, 2016. Department staff counted 72 seedlings and no adult plants at the Red Lassic Population. Department staff observed but did not count Lassics lupine plants at the Mt. Lassic Population. The Department also received an e-mail response from the Petitioner reporting that the total population of Lassics lupine at the Mt. Lassic Population was 709 plants (68 reproductive, 62 vegetative, 579 seedlings) in early July 2016 (Carothers pers comm. 2016). A final monitoring report for 2016 has not yet been prepared.

The Department concludes that the Petition provides sufficient scientific information to describe Lassics lupine’s abundance, and the information provided contributes to the Department’s recommendation that the petitioned action may be warranted.

LIFE HISTORY

The life history of Lassics lupine is discussed in the “Population Trends and Abundance” section of the Petition on pages 7 through 9, and in the “Life History” section of the Petition on pages 9 through 15. References providing information on the life history of Lassics lupine were also submitted with the Petition.

The Petition describes Lassics lupine as a short-lived perennial plant that produces a tap-root and dense clusters of pink and rose-colored, pea-like flowers that bloom in July. Mature plants growing under the best conditions may produce up to 20 or more clusters of flowers, but typically less. Lassics lupine is predominantly pollinated by two widespread bumblebee species, *Bombus vosnesenskii*, and *Bombus melanopygus*, which are large enough to trigger the mechanism that releases pollen and presents the stigma.

The Petition reports that each cluster of Lassics lupine flowers may produce up to 10 or more fruits, each with one to four seeds. At maturity, the fruits split along sutures, and seeds can be projected distances of 1.2 or more meters (4 or more feet). Seeds of Lassics lupine are thick-coated and relatively large. Maintaining a reserve of dormant seed in the soil appears to be an important life history strategy for the species. An experiment conducted between 2008 and 2013 showed approximately 50 percent of seed buried in the soil remained intact and viable after one

year, 25 percent after two years, and an average of 22 percent for each of the succeeding three years of the study (Carothers 2013a, 2013b).

A greenhouse propagation study by Guerrant (2007) resulted in 98 percent germination of Lassics lupine seed when it was intentionally scarified (i.e. scratched or weakened). Without seed scarification, the germination of Lassics lupine was 5 percent in the greenhouse study. Seed germination experiments in the wild using mostly unscarified seed showed a low rate of germination and early survival, with a maximum germination rate of 20 percent after seven years, and as high as 8 percent survival after six years for seeds that did germinate.

The Department concludes that the Petition provides sufficient scientific information to describe the life history of Lassics lupine.

KIND OF HABITAT NECESSARY FOR SURVIVAL

The kind of habitat necessary for Lassics lupine survival is discussed in the “Executive Summary” section of the Petition on page 1, the “Range and Distribution” section of the Petition on pages 3 and 4, and in the “Life History” section of the Petition on pages 9 through 15. References providing information on the kind of habitat necessary for Lassics lupine survival were also submitted with the Petition.

Geology and Soils

The Petition cites and describes a detailed soil report on the serpentine and related soils in the Lassics area (Alexander 2008). Lassics lupine populations occur on several soil units related to serpentinite and/or clastic rock that are described in detail in the 2008 Alexander report. The majority of Lassics lupine habitat at the Mt. Lassic Population is mapped in Entisols/clastic metasedimentary rock colluvium over serpentine (CS), and approximately 20 percent is mapped in Entisols/clastic sedimentary rocks (CM) soil, with the population appearing to extend to lesser degrees into, Entisols, Inceptisols and Mollisols/serpentinite (ST), Hyampom variant and Hungry family complex/serpentinite (SD) and nonserpentine (N) soils. The Red Lassic Population is within an area mapped as Hungry family/serpentinite colluvium (SL) soil.

Additional analysis by Imper (2012) revealed that soils supporting Lassics lupine generally have similar sand content (ranging from 81 to 91 percent), and generally similar concentrations of phosphorus, potassium, calcium, copper, iron, zinc, total carbon, total nitrogen and extractable aluminum when compared with other habitats nearby.

Climate and Solar Radiation

The Petition explains that climate factors play an important role in the distribution and life history of Lassics lupine. The Lassics area can be covered in snow for up to eight months a year and is also subject to hot, dry summers. The Petition cites extensive monitoring of various climate factors at Lassics lupine populations and nearby weather stations. The Petition indicates that an early snowmelt date, lack of summer precipitation, and high summer temperatures are all associated with Lassics lupine mortality.

Solar radiation, soil temperatures, and soil moisture in Lassics lupine habitat have also been investigated (Imper 2012). The amount of solar radiation received in habitats occupied by Lassics lupine has been positively correlated with soil temperatures, meaning that areas receiving more solar radiation generally have higher soil temperatures. Information cited in the

Petition suggests that Lassics lupine cannot survive if soil temperatures become too high, particularly in late summer after soils have dried out. Shading from trees and topography are therefore important factors in the kind of habitat necessary for Lassics lupine survival. Lassics lupine appears to be generally restricted to habitats where tree canopy or topography reduces late summer stress from high soil temperature and low soil moisture. The degree to which stresses from high soil temperature and low soil moisture are reduced may explain observed differences in plant density and reproductive vigor at Lassics lupine populations.

Ecological Settings

The Petition describes Lassics lupine as growing in the following ecological settings (Figure 3):

Red Lassic Population:

1. **Southwest-facing Forest Crest**: The Red Lassic Population is on the crest of a southwest-facing slope with an overstory of Jeffrey pine that protects the population from excessive solar radiation. A depression adjacent to the crest retains snow and moisture into the early summer.

Mt. Lassic Population:

2. **Upper Terrace**: Optimum habitat for Lassics lupine appears to be the areas with flat to moderate slopes that have no tree overstory, but are more heavily shaded by nearby topography. In this habitat, snow tends to melt later and soils tend to retain moisture later compared to other Lassics lupine habitats. Lassics lupine populations in these areas grow more densely, and plants tend to be more robust with respect to size and reproductive vigor.
3. **Saddle/North Slope**: Although the habitat is less optimal than Upper Terrace, the majority of Lassics lupine plants grow in areas of moderate to steep north- or west-facing slopes with bare soil that has a large proportion of gravel or cobble at the surface. These areas have no tree overstory and receive high direct sunlight compared to other Lassics lupine habitats. In this habitat, snow tends to melt earlier and soil tends to dry out earlier. The Lassics lupine population grows less densely in this habitat, and plants tend to have moderate growth and reproductive vigor compared to plants in other habitats.
4. **Forest/Swale**: Lassics lupine also grows at lower elevations than the habitats described above, at the edges of and within Jeffrey pine (*Pinus jeffreyi*)/incense cedar (*Calocedrus decurrens*) forest. These areas receive less direct sunlight, have lower soil temperatures and retain moisture to a moderate level in comparison to other Lassics lupine habitats. Forest edges are the least favorable habitat for Lassics lupine from the standpoint of reproductive vigor and growth rate.

The Department concludes that the Petition provides sufficient scientific information on the kind of habitat necessary for Lassics lupine survival.

FACTORS AFFECTING THE ABILITY TO SURVIVE AND REPRODUCE

The factors affecting the ability of Lassics lupine to survive and reproduce are discussed in the “Life History” section of the Petition on pages 9 through 15, and in the “Factors Affecting The Lupine’s Ability to Survive and Reproduce” section of the Petition on pages 16 through 20. References providing information on the factors affecting the ability of Lassics lupine to survive and reproduce were also submitted with the Petition.

The Petition indicates that the primary factors affecting the ability of Lassics lupine to survive and reproduce are: (1) range contraction at the Mt. Lassic Population, (2) forest encroachment, (3) the 2015 Lassics Fire, (4) impacts of forest management, (5) seed predation, (6) climate change, and (7) small population size.

Range Contraction at the Mt. Lassic Population

The Petition reports that the area occupied by Lassics lupine in the saddle area of the Mt. Lassic Population has been significantly reduced since monitoring of the area began in 2002. This range contraction is illustrated in Figure 6 of the Petition. The Petition speculates that this may be a result of relatively high levels of solar radiation in the area, with the effect exacerbated by virtually snow-free winters in 2014 and 2015, and the Petition references the possible connection of these observations to climate change. The effects of solar radiation, soil temperatures, and soil moisture on Lassics lupine are discussed in more detail in the “Climate and Solar Radiation” section of this report.

Forest Encroachment

The Petition provides information on the rapid advancement of forest over the past 50-60 years into Lassics lupine populations on the north face of Mt. Lassic and in other nearby areas (Carothers 2008). Forest canopy cover and related accumulation of leaf litter are reported to result in lower Lassics lupine plant density, reduced plant size, reduced reproductive vigor, and reduced seedling germination. Furthermore, encroachment of forest and other vegetation may provide cover for small mammals that consume Lassics lupine seed.

2015 Lassics Fire

The Petition discusses the fire that burned in the Lassics in July and August of 2015. The fire was reported to have killed most of the Lassics lupine individuals from the Red Lassic Population and some of the individuals in the northern part of the Mt. Lassic Population. The fire did not kill a significant number of trees at the predominately north-facing Mt. Lassic Population, and therefore did not improve the forest habitat for Lassics lupine at that location. In contrast, the fire killed a number of trees at the southwest-facing Red Lassic Population, which will likely result in more solar radiation which could increase plant mortality or reduce the suitability of the habitat at that location.

Impacts of Past Forest Management

The Petition suggests that historical fire suppression has contributed to the encroachment of chaparral and forest vegetation, which has likely reduced the distribution of Lassics lupine and increased small mammal seed predation. The Petition indicates that protection of Lassics lupine has been made a low priority by the U.S. Forest Service and that the Lassics Wilderness designation in 2005 has made efforts to reduce seed predation with cages more difficult due to possible conflicts with wilderness values.

Seed Predation

The Petition states that predation is a primary threat to Lassics lupine. Predation of Lassics lupine seeds by small mammals has been severe in most years since 2003, when almost the entire seed crop was eliminated. Seeds are eaten by small mammals prior to dispersal, when

fruits are still on the plants. The increase in seed predation is possibly a consequence of encroaching forest and chaparral vegetation which provides cover for small mammals. A Lassics lupine population viability analysis conducted by Kurkjian (2012a) showed that, without proper protection, seed predation is likely to result in the extinction of Lassics lupine within the next 50 years. The Petition states caging of Lassics lupine plants has been found to be effective at reducing seed predation; however, it is expensive and labor-intensive and requires coordination with the U.S. Forest Service to implement.

Lassics lupine foliage is also reported to be frequently eaten by deer and/or rabbits which may result in loss of reproductive capability or death of the plant.

Climate Change

The Petition describes the sensitivity of Lassics lupine to climate extremes and states that generally warmer winter temperatures, diminished snowpack, and drier summer and autumn seasons are expected as a result of climate change. The Petition also cites the enhanced risk of extinction for mountaintop species (Cochran 2011) and states that climate change is a primary threat to Lassics lupine.

Small Population Size

The Petition describes the small sizes of Lassics lupine populations as a threat to the species due to the vulnerability of the species to loss of genetic diversity and random environmental events.

The Department concludes that the Petition provides sufficient scientific information on the factors affecting the ability of Lassics lupine to survive and reproduce, and the information provided contributes to the Department's recommendation that the petitioned action may be warranted.

DEGREE AND IMMEDIACY OF THREAT

The degree and immediacy of threat to Lassics lupine is discussed in the "Population Trends and Abundance" section of the Petition on pages 7 through 9, and in the "Degree and Immediacy of Threat" section of the Petition on pages 21 and 22. References providing information on the degree and immediacy of threat were also submitted with the Petition.

The Petition's discussion of the degree and immediacy of the threat to Lassics lupine primarily relies on the population viability analysis for Lassics lupine that was conducted in 2012 (Kurkjian 2012a) and is discussed under the "Population Trends" section of this report. The population viability analysis shows that, without efforts to protect plants from seed predation with caging, the population has a high chance of extinction in the next 50 years. However, continuation of the current caging practices would reduce the risk of extinction, and an increase in the caging effort would significantly reduce the risk of extinction. The Petition also states that the population viability analysis did not account for impacts of the 2015 Lassics fire, recent years of extreme warm temperatures, declining snowpack, and the low numbers of Lassics lupine plants at the end of 2015. The Petition states that there is an immediate need to prioritize Lassics lupine conservation and implement management actions to reduce threats and increase populations.

The Department concludes that the Petition provides sufficient scientific information on the degree and immediacy of threat to Lassics lupine, and the information provided contributes to the Department's recommendation that the petitioned action may be warranted.

IMPACT OF EXISTING MANAGEMENT EFFORTS

The impact of existing management efforts on Lassics lupine is discussed in the following sections of the Petition: "Land Ownership and Management Direction" on pages 4 and 5, "Chronology of Past Investigation" on page 5, and "Conservation Status and Management Efforts" on pages 6 and 7. References providing information on the impacts of existing management efforts were also submitted with the Petition.

Lassics lupine only occurs on land managed by the U.S. Forest Service. Lassics lupine is listed as "sensitive" by the U.S. Forest Service, and the Mt. Lassic Population is within an area that was designated as Mt. Lassic Wilderness in 2006. The Petition cites U.S. Forest Service policy regarding management of wilderness for the protection of threatened and endangered species, and claims that the U.S. Forest Service has not implemented habitat restoration or aggressive recovery actions.

Boulders were placed near Forest Road 1S07 to block vehicle access to Lassics lupine populations in 2003. Off-highway vehicle use was precluded at both populations in 2004, and the area containing the Mt. Lassic Population was designated as wilderness in 2006. These efforts appear to have eliminated impacts to Lassics lupine from off-highway vehicle use. Trails were relocated in 2004 to reduce pedestrian impacts to Lassics lupine.

In 2003, seasonal caging of Lassics lupine plants was initiated at the Red Lassic Population to protect plants from browsing. The plant cage design was modified to prevent seed predation, and cages were installed at the Mt. Lassic Population in 2004. Caging of Lassics lupine plants was up to 100 percent effective at reducing seed predation; however, the Petition indicates that a forest supervisor ordered the removal of cages in 2012 to maintain wilderness values. A draft conservation strategy was developed for Lassics lupine by the U.S. Fish and Wildlife Service and U.S. Forest Service in 2012 that called for seasonal caging of plants as an interim measure. Caging of Lassics lupine plants has continued into 2016. Lassics lupine seed was stored at a seed bank for long-term conservation storage in 2005.

The Petition provides information on previous efforts to introduce populations of Lassics lupine. Lassics lupine seeds were planted at four sites in 2005, but the only site that retained plants into 2007 was on the north side of the easternmost peak of Mt. Lassic (ML Peak#1). More research into introduction sites was conducted and additional seeds were planted at five locations in 2012 and two locations in 2014. With the exception ML Peak#1, plant survival for more than one year was negligible at all sites. Only two juvenile plants remained at the ML Peak#1 site in June of 2015 following the warm and largely snow-free winter of 2014-2015.

The draft conservation strategy developed for Lassics lupine in 2012 called for reintroducing disturbance to counteract conifer succession and increasing chaparral cover on Mt. Lassic. The 2015 Lassics fire may have provided some reduction in chaparral cover near the Mt. Lassic Population; however, conifer succession at Mt. Lassic was not significantly affected.

The Department concludes that the Petition provides sufficient scientific information on the impact of existing management efforts on Lassics lupine, and the information provided contributes to the Department's recommendation that the petitioned action may be warranted.

SUGGESTIONS FOR FUTURE MANAGEMENT

Suggestions for future management of Lassics lupine are discussed in the "Recommended Management and Recovery Actions" section of the Petition on pages 22 through 25. References providing suggestions for future management were also submitted with the Petition.

The Petition identifies five tasks needed to avoid imminent species extinction and eight tasks needed to maintain a viable population.

Tasks needed to avoid imminent species extinction:

1. Implement habitat restoration at a portion of the Mt. Lassic Population through partial removal of tree canopy and litter layer,
2. Expand caging efforts to include protection of all adult plants and as many seedlings as possible,
3. Collect seed each year and either bury it to augment the seed bank or plant it in optimal habitat,
4. Continue investigations to locate suitable habitat for Lassics lupine, and outplant to those areas when seed is available, and
5. Expand *in situ* and *ex situ* propagation of Lassics lupine to provide planting stock and augment existing colonies.

Tasks needed to maintain a viable population

6. Reduce the extent of chaparral vegetation surrounding and within Lassics lupine habitat on Mt. Lassic,
7. Continue research into the effects of chaparral vegetation on seed predation of Lassics lupine,
8. Continue small mammal trapping efforts to inform research into the effects of chaparral vegetation on seed predation of Lassics lupine,
9. Continue monitoring snowpack duration and melt date, monitor climate data from weather stations, and explore relationships with results from small mammal trapping efforts,
10. Continue seed predation monitoring and research,
11. Continue demographic-based monitoring of Lassics lupine at the three existing monitoring sites,
12. Add to the offsite conservation seed bank, and
13. Update and maintain the Lassics lupine database which has been established but not updated since 2011.

The Department concludes that the Petition provides sufficient scientific suggestions for future management of Lassics lupine.

AVAILABILITY AND SOURCES OF INFORMATION

The "Information Sources" section of the Petition is on pages 26 through 29. Information sources cited in the Petition include published literature and other sources, including

unpublished notes and reports. The Petitioner submitted 24 digital files of reference documents to the Commission with the Petition; however, 10 of the references cited in the Petition were not available to CDFW during preparation of this report.

The Department concludes that the Petition provides sufficient scientific information on the availability and sources of information used in the Petition.

DISTRIBUTION MAP

Page 3 of the Petition includes a map showing the distribution of all known Lassics lupine populations. The Department concludes that the Petition contains a detailed distribution map with a sufficient depiction of Lassics lupine's distribution.

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 finds there is sufficient scientific information to indicate that the petitioned action may be warranted, and recommends the Commission accept and consider the Petition.

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Personal Communication

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