

Allium munzii
(Munz's Onion)

**5-Year Review:
Summary and Evaluation**



Allium munzii (Munz's onion).

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**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California**

September 5, 2013

5-YEAR REVIEW

***Allium munzii* (Munz's Onion)**

I. GENERAL INFORMATION

Purpose of 5-year Review:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed. Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our listing of a species as endangered or threatened is based on an assessment of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act. We must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In a 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process as defined in section 4 of the Act which includes provisions for public review and comment.

Species Overview:

Allium munzii (Munz's onion) is a bulb-forming perennial herb, discontinuously distributed across the Riverside-Perris area in western Riverside County, California. It is generally found on more mesic (wet) clay soils within microhabitats of grassland and sage scrub habitats.

At the time of listing, *Allium munzii* was known from 13 occurrences in Riverside County (USFWS 1998, p. 54975). In our last 5-year review, we described 18 presumed extant occurrences within the same general geographical areas as that known at the time of listing. For this 5-year review, we have defined 6 geographic locations representing 15 presumed extant occurrences of *A. munzii* in western Riverside County. These locations and their occurrences are found within the geographical areas described in our previous 5-year review.

The threats to *Allium munzii* identified at the time of listing were those associated with urbanization and agricultural development, off-road vehicles, clay mining, and highway construction, as well as grazing and nonnative plants (grasses) (USFWS 1998, pp. 54982–54988). Current threats include localized effects related to urban development, recreational activities, and clay mining, as well as rangewide threats, including invasive nonnative plants and climate change.

Allium munzii was federally listed as endangered under the Act in 1998. In January 1990, *A. munzii* was listed as threatened by the State of California under the California Endangered Species Act.

Based on our assessment of the current threats to *Allium munzii*, we recommend no change in its listing status. However, we are recommending a change in the taxon's recovery priority number from 2C to 8C.

Methodology Used to Complete This Review:

This review was conducted by Betty Grizzle and staff at the Carlsbad Fish and Wildlife Office, following the Region 8 guidance issued in March 2008. We used information in the 1998 listing rule, the 2013 final critical habitat rule, available literature, reports and information in our files, and current information provided by experts familiar with the species and its habitat (Steven Boyd, Botanist (retired); Kirsten Winter, U.S. Forest Service (USFS), Cleveland National Forest (CNF)). We received one comment from the public in response to our notice in the **Federal Register** initiating this 5-year review and information relevant to *Allium munzii* is incorporated below (CDFW 2013, pers. comm.; USFWS 2013a, pp. 19510–19514). This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing. We focus on current threats to the species that are attributable to any of the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions recommended to be completed or initiated within the next 5 years.

Contact Information:

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Federal Register Notice Citation Announcing Initiation of This Review:

A notice announcing initiation of the 5-year review of this species and the opening of a 60-day period to receive information was published in the **Federal Register** on April 1, 2013 (USFWS 2013a, pp. 19510–19514). We received one response from the California Department of Fish and Wildlife (CDFW) (formerly California Department of Fish and Game or CDFG), which included a final report summarizing results of a population genetics study for *Allium munzii*.

Listing History:

Federal Listing

FR Notice: 63 FR 54975–54994 (USFWS 1998)

Date of Final Rule: October 13, 1998

Entity Listed: *Allium munzii* (Munz's onion), a plant species.

Classification: Endangered

Critical Habitat: 78 FR 22626–22658 (USFWS 2013b).

State Listing

Allium munzii (Munz’s onion) was listed by the State of California as threatened in 1990.

Associated Rulemakings:

Critical habitat for *Allium munzii* was designated on April 16, 2013 (USFWS 2013b) at Elsinore Peak Unit (98.4 acres (ac) (39.8 hectares (ha)), located within CNF and on adjacent State land in Riverside County, California (USFWS 2013b, p. 22633).

Review History:

The Service initiated a status review for *Allium munzii* on March 22, 2006 (USFWS 2006). We completed a 5-year review on June 17, 2009, and recommended no change in the listing status for this species (USFWS 2009, p. 23).

Species’ Recovery Priority Number at Start of this 5-year Review:

The recovery priority number (RPN) for *Allium munzii* is 2C according to the Service’s 2012 Data Recovery Call, based on a 1–18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (USFWS 1983a, pp. 43098–43105; USFWS 1983b, p. 51985). An RPN assignment of 2C indicates that the species faces a high degree of threat and a high potential for recovery, and is in conflict with construction or other development projects.

Recovery Plan or Recovery Outline:

A recovery outline or recovery plan has not been completed for *Allium munzii*.

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy:

The Act defines “species” as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition of species under the Act limits listing as distinct population segments to species of vertebrate fish or wildlife. Because the species under review is a plant, the DPS policy is not applicable, and the application of the DPS policy to the species’ listing is not addressed further in this review.

Information on the Species and its Status:

Species Description

Allium munzii is a bulb-forming perennial herb that annually produces a single cylindrical leaf prior to flowering and, depending on rainfall and age of the plant, a scapose inflorescence (a

leafless flower stalk that grows directly from the ground) 0.5 to 1.2 feet (ft) (15 to 35 centimeters (cm)) tall (McNeal 2012, p. 1294). The inflorescence is elliptic to ovate umbellate (each individual flower stalk radiates from the same point of attachment), and consists of 10 to 35 flowers (McNeal 2012, p. 1290). Each flower has six white or white with red midvein perianth segments (outer part of flower), 0.2 to 0.3 inch (in) (6 to 8 millimeters (mm)) long, which become red with age. The ovary is crested with fine, irregularly dentate (pointed) processes and the fruit is a capsule (McNeal 1992, p. 413; McNeal 2012, p. 1294).

Species Biology and Life History

Native *Allium* taxa typically require 3 to 5 years after seeds germinate for plants to reach maturity and produce flowers (Schmidt 1980, p. 164). *Allium* plants are adapted to survive unfavorable seasons underground, as are all bulb-forming and corm-forming plants (geophytes) (Pütz 1992, p. 1433). Seedlings achieve the appropriate depth in the soil by the action of specialized roots, which pulls the young plants down through the soil (Pütz 1992, p. 1433). *Allium munzii* plants are dormant from mid-summer through autumn. The flowering period varies from year to year, but is generally between March and May (California Native Plant Society (CNPS) 2013). After flowering and seed dispersal, the aboveground portions of *A. munzii* plants die back to the bulb. Following seed germination, at least 3 years are required for these bulb-forming plants to produce flowers (M. Wall, former Curator and Conservation Program Manager, Rancho Santa Ana Botanic Garden, 2012, pers. comm.).

Allium munzii is adapted to seasonal (summer and fall) drought and variable annual rainfall. McNeal (1992, p. 413) observed that flowering in the *A. fimbriatum* complex, which includes *A. munzii*, appears to be correlated with rains in the late fall and early winter. As a result, *A. munzii* may occur in various states during a given growing season, including: (1) As dormant underground bulbs, (2) as seedlings and other pre-reproductive plants that only produce one leaf, (3) as adults with only one leaf that do not produce an inflorescence that year, (4) as adults that produce one leaf and an inflorescence, and (5) as seeds in a soil seedbank. When rainfall is heavier, most plants flower successfully (McNeal 1992, p. 413). *Allium munzii* often does not flower in very dry years, though most plants will sprout leaves and sometimes produce flower buds (Boyd 1988, p. 3).

In addition to sexual reproduction through seed production, *Allium munzii* plants can reproduce asexually through vegetative division of the bulbs (Ellstrand 1999, p. 1; Ellstrand 1993, p. 5). The resulting “daughter” plants are genetically identical to the originating plant and are sometimes referred to as “clones.” Ellstrand (1999, p. 4) found that the percentage of clones varied among the *A. munzii* populations he sampled. For example, at one population, 30 to 40 percent of the sampled individuals were clones, whereas in a different population no more than 8 percent were clones; however, the total number of *A. munzii* individuals within clonal groups was small, ranging from 2 to 8 (Ellstrand 1999, p. 4). He also noted that *A. munzii* plants that were separated by greater than about an inch were “almost certain to be genetically distinct” (Ellstrand 1999, p. 4). He concluded that genetically identical individuals produced from dividing bulbs can be fairly common, but formation of large [groups of] clones, in either the numbers of plants or the geographical area, does not occur in this species (Ellstrand 1999, p. 4).

We have no definitive information regarding pollinators of *Allium munzii*, but it is likely that a number of insect species serve this function (S. Boyd, Botanist, 2007, pers. comm.). Small beetles of the family Anthicidae (ant-like flower beetles) were found on about one-third of the *A. munzii* inflorescences of a population in Temescal Canyon (The Environmental Trust 2002, p. 16); however, their role as pollinators was not confirmed. A photograph published in a 2011 *A. munzii* monitoring report depicts what appear to be March flies (*Bibio* sp.) (Bibionidae family) on flowering *A. munzii* (Dudek 2011, front cover). Adult species of *Bibio* are considered important pollinators (Fitzgerald 2005, p. 17) and are frequently found on flowers (Borror and DeLong 1971, p. 501).

Habitat or Ecosystem

Allium munzii is found along the southern edge of the Riverside-Perris area (Perris Basin physiogeographic range) in western Riverside County (Figure 1). Climate in this area is characterized by cool, moist winters and hot, dry summers (Boyd 1988, p. 4). *Allium munzii* is found on level or slightly sloping areas or on terrace escarpments (California Natural Diversity Database (CNDDB) 2013) and is strongly associated with mesic (wet) clay soils in western Riverside County (Boyd 1988, pp. 2, 4). *Allium munzii* occupy microhabitat sites created by the complex geology of the Perris Basin; these sites receive or retain more moisture than nearby or surrounding sites due to exposure, slope characteristics, hydrological characteristics, or topographic features (see the topography and geology discussion in Boyd 1983, pp. 10, 13–14, 18).

Many of the clay soil types where *Allium munzii* occurs typically support open native or nonnative grasslands. Known soil associations with *Allium munzii* include, but are not limited to: Altamont, Auld, Bosanko, and Porterville clays of sedimentary origin. These clay soils are scattered in a band several miles wide and extend south of Corona, California, through Temescal Canyon and along the Elsinore Fault zone to the southwestern foothills of the San Jacinto Mountains (Boyd 1988, p. 2). Some of these soils are small pockets of clay soil (e.g., Gavilan Hills) and are not identified on coarse-scale soil maps (Boyd 2011, pers. comm.). Wet clay soils facilitate the formation of soil channels for movement of young bulbs (Pütz 1992, p. 1433), which is necessary for establishment and persistence of *A. munzii* plants. *Allium munzii* is also known from rocky-sandy loam soil within rocky outcrops such as North Domenigoni Hills (CNDDB 2013, Element Occurrence (EO) 10). These soils may be of sedimentary or igneous origin with a clay subsoil (such as Cajalco, Las Posas, or Vallecitos) (Knecht 1971, pp. 2–3, 21, 42, 62–64).

Allium munzii is considered a component of a “clay soil flora” that includes perennial herbs and a variety of annuals (Boyd 1988, p. 4). Plants are most frequently found in areas that are minimally disturbed and in areas where there is little competition and overcrowding from nonnative plants. In contrast, areas that consistently experience ground disturbance activities (such as disking for dryland farming) or are heavily infested with invasive, nonnative plants (particularly annual grasses) generally result in a decline in habitat quality and subsequent reduction in *A. munzii* populations (F. Roberts, Botanist, 1998, pers. comm.; CNDDB 2013).

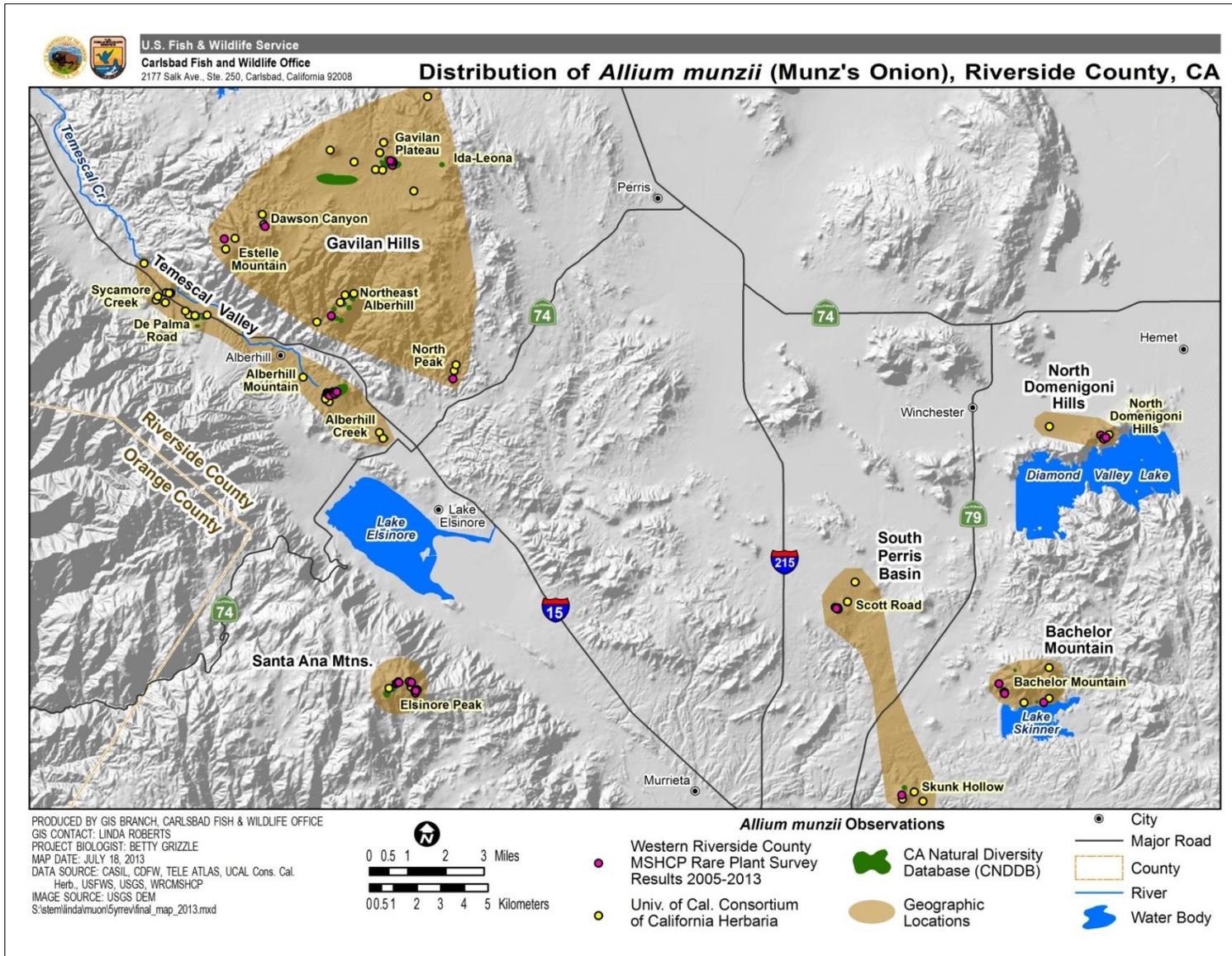


Figure 1: Distribution of *Allium munzii* (Munz's onion); prepared for 2013 5-year Review.

In western Riverside County, *Allium munzii* is found in southern needlegrass grassland, mixed grassland, open coastal sage scrub or Riversidean sage scrub, or occasionally cismontane juniper woodlands (CNPS 2013, p. 67). In some instances, the observed differences in plant communities that occupy clay versus nonclay soils can be very different as is the case for the terraces in Temescal Canyon (Boyd 1988, p. 4). At other locations, such as Alberhill Mountain and the Gavilan Hills region, the grasslands form a mosaic with the surrounding scrub-type vegetation and *A. munzii* is often observed in open areas within these grassland communities (Boyd 1988, p. 4). *Allium munzii* is also found with nonnative plants, primarily invasive annuals (CDFG 1989, p. 2).

Spatial Distribution and Abundance

Allium munzii is a narrow endemic plant discontinuously distributed along the southern edge of the Riverside-Perris area (Perris Basin physiogeographic range) and within a portion of the Santa Ana Mountains (Elsinore Peak) in western Riverside County, between the elevations of 1,200 to 3,500 ft (366 to 1,067 meters (m)) above mean sea level (Boyd 1988, p. 2; Boyd and Mistretta 1991, pp. 1–3; Roberts *et al.* 2004, pp. 10, 130). Its historical distribution may have been within clay soils scattered throughout the entire Perris basin in western Riverside County, which exhibits a complex physical geography characterized by several distinct geologic events and subsequent erosional processes that have produced numerous soil or sediment types on the remaining land forms (Dudley 1936, pp. 358–360, 376). *Allium munzii* shares its range and habitat with a portion of the range of the similar-appearing *A. haematochiton* (red-skinned onion). The two species can occur within several feet of each other, but they do not interbreed (CDFG 1989, p. 2).

In general, the distribution of plant taxa may be determined from a variety of sources including preserved herbarium specimens, survey reports, and various databases. Survey records typically contain information describing locations and numbers of plants, which can be called localities or groups of individual plants (up to several thousand in one location or only a few plants), or can be described as the actual number of individual plants. The precision of the location of survey sites varies from general area descriptions to road perimeters to more recent Global Positioning System (GPS) technology. The CNDDDB, maintained by CDFW is an ongoing effort to include herbarium records and survey reports for separate EOs of all of the taxa tracked by the database. To constitute a separate EO, the site must be at least one-quarter mile from any other such site. Sequential surveys are accumulated in the EO report for the site. Because contribution to the database is not mandatory, some herbarium specimens and survey reports are not yet included in the database. In this 5-year review, our use of the term occurrence may indicate an area that includes one or more point localities or EOs.

A number of terms have been used to define locations of *Allium munzii*, including populations, localities, occurrences, and CNDDDB's Element Occurrence. In our listing rule, we identified 13 extant populations of *Allium munzii* (USFWS 1998, p. 54975) that were primarily based on sites identified as CNDDDB EOs, including EOs 2, 4, 5, 7–16 (CNDDDB 1997, pp. 1–16). Since listing, six new EOs were included in the CNDDDB (CNDDDB 2013, EOs 17, 18, 20, 21, 22, and 23), and during the preparation of our 2009 5-year review, we located another record (from 1994) that was unknown at the time of listing and that is not yet described in the CNDDDB

(USFWS 2009, p. 38; *proposed* EO 24). At the time of our 2009 5-year review, we assessed the status of *A. munzii* based primarily on the CNDDDB EOs as follows: two CNDDDB-defined EOs (EOs 1 and 8) were likely extirpated (locally extinct), three (EOs 20, 21, and 22) were vague historical locations and of currently unknown condition, and one (EO 19) was likely based on a misidentified specimen and deleted by CNDDDB (USFWS 2009, p. 9). In addition, we noted in that review that the CNDDDB had combined EO 8 with EO 3 because of their close proximity (USFWS 2009, p. 9). We therefore concluded in our 2009 5-year review that there were 18 extant (still in existence) occurrences of *A. munzii* based on CNDDDB's EOs (EOs 2–7, 9–18, 23), and a *proposed* EO 24, all essentially within the same geographic range (i.e., Riverside-Perris area and Elsinore Peak) known at the time of listing. Because of the species' habitat requirements, we do not anticipate this geographic range will change significantly in the future, even if additional locations of plants are discovered.

In this 5-year review, we are using the occurrences described in our 2009 5-year review (USFWS 2009, p. 33–38) and descriptions of critical habitat units from our proposed and final critical habitat rules (USFWS 2012, pp. 23022–23026; USFWS 2013b, pp. 22633, 22636) to define the six current locations (Gavilan Hills, Temescal Valley, Santa Ana Mountains, South Perris Basin, Bachelor Mountain, and North Domenigoni Hills) where observations and collections of *Allium munzii* have been recorded. This description includes the records contained in CNDDDB (EOs), Consortium of California Herbaria (CCH) collections, and observations from other surveys. The geographical grouping of occurrences combines several CNDDDB EOs and CCH collections. Of the 18 occurrences described in the previous 5-year review, EOs 11, 12, 17, and 24 are now included within one occurrence (Bachelor Mountain). Therefore, while there were 18 occurrences discussed in the previous 5-year review, there are now 15 occurrences shown in Figure 1 and described in Appendix 1 that represent occurrence data for *A. munzii* within the six geographic locations.

The number of *individual* plants of *Allium munzii* detected in any one area differs from year to year and is not an accurate reflection of the actual number of individuals present. This is primarily due to the variety of life history phases represented in a given area (see Species Description section above). Some surveyors may only observe flowering individuals while others may be able to observe plants with only the vegetative single leaf present. Because of the difficulties of obtaining reliable survey results and the fact that the number of standing individuals is dependent upon rainfall, estimates of individuals at a given location can vary across years.

In the 1998 final listing rule, we estimated that there were 20,000 to 70,000 individuals of *Allium munzii*, though most occurrences contained fewer than 1,000 individual plants (USFWS 1998, p. 54975). The largest recorded location of plants at that time was at Harford Springs County Park and adjacent private lands (EO 2), with over 50,000 individuals observed in 1995 (Ellstrand 1996, p. 4). In our 2009 5-year review, we indicated that, prior to listing, 1,000 or more individuals were recorded in at least one year at 10 CNDDDB-defined EOs (USFWS 2009, Appendix 1, p. 33), while others appeared to support fewer individual plants (i.e., 500 or fewer plants observed).

Rare plant surveys completed under requirements of the Western Riverside County Multispecies Habitat Conservation Plan (MSHCP) by the Western Riverside County Regional Conservation Authority (RCA) are summarized in annual reports (e.g., Western Riverside County RCA 2012, entire). However, through 2011, these surveys are considered to be part of the “inventory phase” for the Western Riverside County MSHCP’s Biological Monitoring Program; they are not intended to be comprehensive surveys and are subject to the limitations described above for year-to-year differences in survey effort, site conditions, and timing of inflorescence. A review of surveys conducted by Western Riverside County RCA from 2005 through 2013 indicates that fewer than 100 individuals were observed at most surveyed occurrences, with the North (Steele) Peak (400 plants in 2008), Bachelor Mountain (200 plants in 2008), and the Diamond Valley Lake (600 plants in 2008) occurrences being the exceptions (A. Malisch, Western Riverside County RCA, 2013, pers. comm.). Survey results from the Western Riverside County RCA through April 2013 are incorporated into Figure 1.

Changes in Taxonomic Classification or Nomenclature

The name and description of *Allium munzii* have not changed since it was listed (USFWS 1998, p. 54975). However, at that time, all *Allium* taxa were placed in the family Liliaceae (Lily family). Although the name of the species remains the same, the genus *Allium* has been segregated from Liliaceae and is now placed in the family Alliaceae (Onion family) (McNeal 2012, pp. 1289–1297). In our final critical habitat rule, we amended part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations to reflect the transfer of *A. munzii* from Liliaceae to Alliaceae (USFWS 2013b, p. 22656).

Genetics

We are unaware of any completed or proposed studies focused exclusively on the genetics of *Allium munzii*.

Species-specific Research and/or Grant-supported Activities

A population genetics study of *Allium munzii* was conducted under a research permit with the CDFW to examine within and among population genetic diversity (Mashayekhi 2013, entire). While the total genomic DNA (i.e., 10 chloroplast non-coding regions and two nuclear markers, including attempts to amplify low copy nuclear markers) was extracted in the pilot study for *A. munzii*, only the *rpL32-trnL* IGS intergenic spacer region and *rpoC1* intron were used for the complete population screening because these data were found to be the most variable within the species. The study sampled leaf material collected at 11 occurrences: Estelle Mountain, Dawson Canyon, Gavilan Plateau, Sycamore Creek, De Palma Road, Alberhill Mountain, Alberhill Creek, Elsinore Peak, Scott Road, Bachelor Mountain, and North Domenigoni Hills occurrences (see Appendix 1). The majority of the total genetic diversity measured (approximately 87 percent) was attributed to the differences among these occurrences within seven defined geographical regions—Estelle Mountain, Temescal Canyon, Lake Elsinore, Elsinore Mountain, Paloma Valley, Bachelor Mountain, and North Domenigoni Hills (Mashayekhi 2013, p. 4, Table 1).

The study found a total of seven unique and five shared haplotypes (a group of alleles of different genes on a single chromosome that are closely enough linked to be inherited together) in the 11 occurrences (Mashayekhi 2013, p. 5; Figure 1). The Elsinore Peak occurrence (EO 13) had the most frequent haplotype and was assigned by the study authors as the putative ancestor (Mashayekhi 2013, p. 5). The Gavilan Plateau occurrence (EO 2) was found to be the most polymorphic, with five different haplotypes (Mashayekhi 2013, p. 5), a result consistent with a 1999 study in which a high level of genetic variation at this location was observed (Ellstrand 1999, p. 5). In addition, the study found that the North Domenigoni Hills and Bachelor Mountain occurrences (EOs 10 and 12, respectively) contained unique haplotypes not shared by any other occurrences; the researchers therefore concluded that these populations are reciprocally monophyletic (two groups for which all genes within the group are more closely related to each other than those outside the group) (Mashayekhi 2013, p. 6). A haplotype network was prepared to summarize the study findings, which illustrates the relationships between the observed haplotypes for the *Allium munzii* occurrences evaluated (Mashayekhi 2013, p. 14, Figure 2).

Vulnerability Factors

Rare species are generally considered more vulnerable to extinction than common species (Sodhi *et al.* 2009, p. 517). Three criteria of rarity can be used to evaluate a species vulnerability when applied to its entire geographic range or to its distribution and abundance in a species area: (1) narrow geographic range, (2) specific habitat requirements, and (3) small population size—although within a limited geographical range, a rare species may be locally abundant (Primack 2006, pp. 155–156). In general, species that have a narrow geographic range, specific habitat requirements, and are always found in small populations have a high conservation priority in order to maintain their limited populations (Primack 2006, p. 156). Related to the concept of rarity, endemism, or the natural restriction of a species to a single geographic area, is also a factor in a species' risk of extinction (Primack 2006, p. 157).

Consideration of elements of rarity and endemism along with life history traits can provide an extinction vulnerability profile for *Allium munzii*. This species exhibits two key attributes that might limit its distribution and population growth. These attributes include:

- 1) Restriction of the species to specific microhabitats (i.e., specialized niche) that have been significantly reduced in western Riverside County.
- 2) Dependence on undisturbed clay soils in these microhabitats that are easily and permanently altered by human activities.

These attributes represent significant vulnerabilities for *Allium munzii*, which may separately, or together, exacerbate any of the threats described below in our five-factor analysis.

Five-factor Analysis:

Our 1998 listing rule identified urban development (including highway construction), agriculture, and clay mining as the primary threats to *Allium munzii* (USFWS 1998, p. 54982). Off-road vehicles, trampling (from livestock grazing), and nonnative plants (grasses) were also listed as threats for this species (USFWS 1998, p. 54982). Since listing, the effects of climate

change have been identified as an additional threat to *A. munzii*. The current status of threats identified at the time of listing as well as the current status of newly identified threats is discussed below; threats attributed to each occurrence are identified in Appendix 1.

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Threats to *Allium munzii* attributable to **Factor A** at the time of listing included urbanization, agriculture, off-road vehicles, and clay mining, as described in our 1998 listing rule (USFWS 1998, pp. 54982–54985). We evaluate off-highway vehicle activity with other recreational activities as a habitat threat under **FACTOR A** in this 5-year review. Threats from invasive nonnative plants previously discussed under **Factor E** in the listing rule and our 2009 5-year review are now described in **FACTOR A**. The current threats evaluated under **FACTOR A** are organized under the following headings: Urban Development, Agricultural Activities, Clay Mining, Recreational Activities, Invasive Nonnative Plants, and Wildland Fire Management.

Urban Development

At the time of listing, urban development was described as a threat to *Allium munzii* under **Factor A** (USFWS 1998, p. 54982). Threats to *A. munzii* from development include direct effects (loss of habitat) and indirect effects (changes to native plant communities or disruption of hydrological patterns). Prior to listing, *A. munzii* habitat at EO 1 (Gavilan Plateau occurrence) was lost when the area was converted to citriculture (Boyd 1988, p. 2), and any remaining individuals were then lost after the area was converted to a housing and golf course development (CNDDDB 2013, p. 1). Since listing, urban development has continued in western Riverside County, including the Temescal Valley area where portions of available habitat were lost at the Sycamore Creek (EO 3) occurrence and proposed for development (Saddleback Estates) at the De Palma Road (EO 7) occurrence (Dudek 2011, p. 1; Helix Environmental Planning 2011, p. 1). However, salvage and transplant operations for *A. munzii* plants were successfully conducted at both of these project sites (see Helix Environmental Planning 2011; Dudek 2011). A 7-year maintenance and monitoring period for the De Palma Road occurrence was initiated in 2008, although construction of the proposed road and development has not been initiated (Dudek 2013, p. v).

With the implementation of the Western Riverside County MSHCP, 13 occurrences, or significant portions thereof, are now located on designated conservation lands (Public/Quasi Public lands) or within areas identified as Additional Reserve Lands, discussed below under **FACTOR D**. We therefore believe that threats from urban development have been significantly reduced since the time of listing, but are still a concern at two occurrences (Dawson Canyon and Alberhill Creek).

Agricultural Activities

As described in our 2009 5-year review, past agricultural activities affected areas known to be occupied by *Allium munzii* (USFWS 2009, p. 12, citing CDFG 1989, p. 4, and the CNDDDB EO report for *A. munzii* from 2008). We also noted that existing agricultural lands were transitioning

to urban land uses and stated that we had no new information to indicate that agricultural activities were a threat to habitat at extant occurrences of *A. munzii* (USFWS 2009, p. 12).

Under the Western Riverside County MSHCP, within the Criteria Area of the plan, both existing agricultural uses and conversion of natural lands to agricultural use as well as new conversions to agricultural use (up to an established threshold of 10,000 acres over the life of the plan) are considered covered activities (Dudek and Associates 2003, pp. 7–13). The general provisions and specific conservation measures for *Allium munzii* contained within the Western Riverside County MSHCP are discussed below under **FACTOR D**. We do not believe agricultural activities present a current threat to the species.

Clay Mining

Clay mining was described in our final listing rule as a threat to *Allium munzii* (USFWS 1998, p. 54982). Clay mining activities can result in several impacts to *A. munzii* habitat; it can remove native soils, heavy equipment use can compact remaining soil, and spoil material can burry habitat areas (e.g., Boyd 1988, p. 3), all of which can cause changes in landform and hydrological conditions. In our 2009 5-year review, we indicated that prior to listing, portions of EO 6 (Alberhill Mountain occurrence) were destroyed by clay mining activities (USFWS 2009, p. 12). At that time, we also stated that clay mining represented an ongoing activity within the range of *A. munzii*, which is still the case today.

Mining activities are covered under the Western Riverside County MSHCP (discussed below under **FACTOR D**) in cases where local jurisdictions within the plan area require land use permits. New mining operations proposed within lands covered by the Western Riverside County MSHCP are subject to review by Riverside County and, where appropriate, a local jurisdiction (e.g., City of Lake Elsinore) under the provisions outlined in the Western Riverside County MSHCP. However, clay mining entities who have *existing* mining permits are considered exempt from the plan's requirements; Riverside County determines the appropriate category for a mining operation (USFWS 2013b, p. 22652). Regardless, no active clay mines are located within the currently presumed extant occurrences of *Allium munzii* and mining is not anticipated to expand beyond current boundaries within the foreseeable future, given the long history of clay mining in the area (Industrial Economics, Incorporated 2012, pp. ES–7, 4–2). Therefore, with limited exceptions for existing mining permit holders, we do not believe that clay mining represents a threat to *A. munzii*.

Recreational Activities

Off-highway vehicle (OHV) activity has been previously identified as a threat to *Allium munzii* (CDFG 1989, p. 4; Winter 1992, p. 7). In our 2009 5-year review, we stated that OHV activity may modify or curtail *A. munzii* habitat by promoting erosion, compacting the soil (especially if OHV activity occurs on wet soils), and promoting invasion by nonnative plants (Kuss 1986, pp. 637–650). OHV activity can also crush or damage the above-ground portions of individual plants.

Dispersed recreation (e.g., camping, hiking, mountain bike activity) is an occasional, ongoing use within several *Allium munzii* occurrences. The use of existing trails or the creation of new trails within the Elsinore Peak occurrence located on CNF lands has been and continues to be a threat to *A. munzii* primarily from disturbance of habitat, although crushing or trampling of individual plants may also result from these activities. Restrictive barriers have been placed, both on and off USFS lands, to protect the habitat containing the Elsinore Peak occurrence (USFS 2012b, p. 30). The USFS Forest Plan Standards S11, S24, and S34 also provide measures to avoid or mitigate any recreational use threats for Federal activities or projects implemented within the occurrences found on USFS lands (USFS 2012b, pp. 40–41). The Service completed a formal consultation on CNF and concluded that while individual plants might be intermittently impacted by recreation and road use and maintenance, no permanent loss of habitat or appreciable reduction in the numbers, reproduction, or distribution of *A. munzii* on CNF is expected (USFWS 2013c, p. 19).

The Rancho Bella Vista Park, which includes the Skunk Hollow occurrence of *Allium munzii*, allows both active and passive uses of the Skunk Hollow area. The park (located within the Rancho Bella Vista Habitat Conservation Plan (HCP) area, discussed below under **FACTOR D**) includes a nature trail through portions of conserved habitats and an interpretive, educational display for the larger Skunk Hollow area. These features provide additional opportunities to educate the public about the location of, and efforts to conserve endangered plants such as *A. munzii*, within the Rancho Bella Vista HCP. However, recent reported activity in the park indicates that ongoing management (e.g., fencing) may be necessary to ensure that individual plants are protected from authorized and unauthorized recreational activities (K. Drennen, Western Riverside County MSHCP Biological Monitoring Program, 2013, pers. comm.).

In summary, impacts to *Allium munzii* associated with recreational activities represent a localized threat to at least two occurrences.

Invasive Nonnative Plants

In our listing rule, we identified the threat from nonnative grasses to *Allium munzii* related to crowding and competition for resources (**Factor E**) (USFWS 1998 pp. 54988–54989). Nonnative plants have been listed as a threat to several occurrences of *A. munzii* (CNDDDB 2013, EOs 5, 6, 7, 10, 12, and 16). Disking and grading activities related to agriculture and urban development can promote the spread of invasive weedy grasses (Boyd 1988, p. 3), and therefore reduce the available habitat for *A. munzii*. Therefore, impacts to the habitat from the threat of nonnative plants are discussed here under **FACTOR A**.

Invasive nonnative plants were identified by USFS as a threat to habitat quality for *Allium munzii* at the Elsinore Peak occurrence (USFS 2005e, Volume 1, p. 160). Roads and road construction from grading of fuel breaks facilitate the introduction and establishment of invasive nonnative plants (discussed above) by creating open, repeatedly disturbed habitat. Invasive nonnative plants can also be transported along these corridors by equipment and other vehicles, as well as recreational activity. They are more readily established on the exposed cut-and-fill slopes of roads than native plants (USFS 2005e, Volume 1, p. 114). Recent observations of invasive

nonnative plants also include the Bachelor Mountain, Estelle Mountain, and Scott Road occurrences (Malisch 2013, pers. comm.).

Activities associated with the removal of invasive plants may have short-term adverse effects to *Allium munzii*. However, these actions, if determined to be necessary, would likely provide long-term benefits to *A. munzii* when directed toward invasive nonnative plants, which have the potential to compete with this species for space and other life history requirements (USFS 2005a, p. 204). Within the CNF, short-term adverse effects from invasive plant species control activities would be mitigated by use of USFS Best Management Practices and Forest Plan Standards S6, S12, and S24 (USFS 2005a, p. 205). Manual thatch removal in *A. munzii* habitat is recommended as the preferred management strategy for the Elsinore Peak occurrence, since it would result in less soil disturbance and has been effective at reducing invasive nonnative grasses in the region (Boyd 2013, pers. comm.; Dudek 2013, p. v–vi).

Based on the best available information, we believe that invasive nonnative plants are currently a threat at most occurrences of *Allium munzii*.

Wildland Fire Management

Allium munzii habitat may be destroyed or modified during the creation and maintenance of fire breaks, a practice which often used for wildland fire management. Discing for fire control has been identified as a threat to *A. munzii* in the past (Boyd 1988, p. 1), and was mentioned as a **Factor A** threat in our 1998 listing rule, but was not described specifically for *A. munzii* (USFWS 1998, p. 54982). Fuel modification can also be conducted prior to wildland fire events.

The Western Riverside County MSHCP requires development projects to incorporate their own fuel breaks. Within established Western Riverside County MSHCP Reserves, land managers manage fuel and conduct fuel modification activities with as little impact as possible. The majority of land managers in Riverside County have prepared wildland fire management plans and managers provide guidance to fire personnel to minimize the effects to sensitive or federally listed species during wildland fire events, with consideration given to threats to life or property. In addition, Cal-Fire participates in the monthly Reserve Managers and Monitoring coordination meeting (K. Cleary-Rose, USFWS Palm Springs Fish and Wildlife Office, 2013, pers. comm.).

Fuel modification practices should not pose a threat for the majority of occurrences of *A. munzii*, since most are located on conservation lands where land managers are expected to implement fuel modification activities using methods appropriate to the location (Cleary-Rose 2013, pers. comm.). Regardless, fuel modification activities such as hand clearing or mowing would not likely represent a threat to *Allium munzii*.

Under the programmatic direction of the revised Land Management Plans for the four Southern California National Forests, future fuel treatments on CNF, which incorporates the Elsinore Peak occurrence, may have short-term impacts to *Allium munzii*, but these activities would be conducted to provide long-term benefits to the species (USFWS 2005, p. 122). The CNF could still propose vegetation management activities with long-term negative impacts to this species, but these activities would be subject to a Land Management Plan amendment. Regardless, all

proposed vegetation management activities that could impact *A. munzii* would still be subject to project-level section 7 consultation (see Endangered Species Act of 1973, as amended (Act) below) (USFWS 2005, p. 15).

As discussed in **FACTOR E** below, we expect the risk of wildland fire to increase in western Riverside County by 2020 due to climate change effects. We therefore anticipate the creation and maintenance of fire breaks will continue, though predicting the location of emergency-response fire breaks is not possible.

Summary of Factor A

Impacts to *Allium munzii* related to urban and agricultural development have been reduced since the time of listing. Although clay mining continues to be a threat, the magnitude of this threat is not as great as it was in the past and, through time, we anticipate that implementation of the Western Riverside County MSHCP will further reduce this threat. Recreational activities currently represent a localized, but important threat that is being managed at the Elsinore Peak occurrence. The survival and recovery of *A. munzii* is currently threatened from invasive nonnative plants, throughout much of its range. Wildland fire management may represent a threat to habitat of *A. munzii* given anticipated climate change impacts for the region; however, we believe that fuel modification practices and fire management plans are being implemented to reduce impacts to *A. munzii* habitat located on conservation lands (i.e., all or part of 13 of 15 occurrences).

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.

This factor was not known to be a threat at the time of listing and we do not consider it a current threat.

FACTOR C: Disease or Predation

Disease

Disease was not known to be a threat to *Allium munzii* at the time of listing (USFWS 1998, p. 54985) or at the time of our 2009 5-year review (USFWS 2009, p. 14). Based on current information, we do not believe that disease poses a threat to the species.

Predation

At the time of listing, predation was not described as a threat to *Allium munzii* (USFWS 1998, p. 549685), though livestock grazing was identified by some observers prior to listing (as noted on the 2013 EO report, CNDDDB 2013, pp. 5, 7–8, 15). We did not identify grazing as a significant threat to *A. munzii* at the time of our 2009 5-year review (USFWS 2009, p. 9).

Predation by small mammals (rabbits) was reported in 2004 at one (bulb) transplant area at the Sycamore Creek occurrence and the area was subsequently fenced (Helix Environmental

Planning 2011, p. 4). At another transplant site (DePalma Road), leaf and bulb herbivory was reported from 2008 to 2010 and control measures were implemented (Dudek 2011, p. 17). Additional rodent control measures were conducted in 2012, including trapping and removal of deer mice (*Peromyscus maniculatus*) within the translocated area, in conjunction with thatch removal and hand pulling of invasive weeds (Dudek 2013, p. vi).

Summary of Factor C

Based on the best available information, disease does not currently pose a threat to *Allium munzii*. Predation has been documented as a localized threat within at least two occurrences. However, we do not have any new information to conclude that this activity is so widespread to affect the survival and recovery of *A. munzii*.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, regulatory mechanisms considered to provide some protection for *Allium munzii* included: (1) State laws, including the Native Plant Protection Act (NPPA), California Endangered Species Act (CESA), California Environmental Quality Act (CEQA), and California Natural Community Conservation Planning (NCCP) Act, and (2) Federal laws and regulations, including the Act (USFWS 1998, pp. 54985–54988). Land acquisition and management by various Federal, State, or local government agencies, or by private conservation organizations was also evaluated in the listing rule (USFWS 1998, pp. 54987–54988).

In our 2009 5-year review, we evaluated the State protections provided under the NPPA, CESA, CEQA, and NCCP and Federal protections including National Environmental Policy Act (NEPA), the Act, and National Forest Management Act (NFMA). We concluded that, while State laws provided some protection of *Allium munzii* on private lands through permit requirements of CESA, the Act was an important regulatory mechanism in addressing threats to this species on Federal lands. We also stated that the Act provided a primary regulatory mechanism for working with private landowners and other partners for voluntary actions, including the Western Riverside County MSHCP in promoting the recovery of *A. munzii*. In this 5-year review, we evaluate each of these regulatory mechanisms as well as those provided under other Federal laws and regulations.

State Regulatory Mechanisms

California Endangered Species Act (CESA) and the Native Plant Protection Act (NPPA)

In 1990, the California Fish and Game Commission listed *Allium munzii* as threatened under the NPPA (Division 2, Chapter 10, section 1900–1913 of the California Fish and Game Code (CFG Code)) and CESA (Division 3, Chapter 1.5, section 2070–2090 of the CFG Code). Both the NPPA and CESA include prohibitions forbidding the take of *A. munzii* (Chapter 10, Section 1908, and Chapter 1.5, Section 2080–2085, CFG Code).

Under CESA, activities are subject to permit requirements and consultation with CDFW if they would result in an adverse effect to a State-listed species (Consultation “Take” Authorization,

section 2080.1 or 2081 of the CFG Code). Any take (defined in CESA as “to hunt, pursue, capture, or kill, or attempt to hunt, pursue catch, capture, or kill”) of a State-listed species requires authorization from CDFW. Sections 2081(b) and (c) of CESA allow CDFW to issue incidental take permits for State-listed threatened and endangered species if: (1) The take is incidental to an otherwise lawful activity; (2) the impacts of the authorized take are minimized and fully mitigated, (3) the measures required to minimize and fully mitigate the impacts of the authorized take are roughly proportional in extent to the impact of the authorized taking on the species; (4) the applicant ensures adequate funding is provided to implement the required minimization and mitigation measures and to monitor compliance with, and the effectiveness of, the measures; and (5) issuance of the permit will not jeopardize the continued existence of a State-listed species.

Because *Allium munzii* is both a federally and State-listed species, consultation under CESA requires that a project (or activity) proponent submit a letter to CDFW describing the project, the species potentially affected, proposed avoidance and minimization measures for the species, and request concurrence from CDFW that the project would not result in take of the State-listed species (California Code of Regulations § 783.2; Title 14, Subdivision 3, Chapter 6, Article 1 of the CFG Code). If CDFW determines that take will not occur, their letter of concurrence represents their CESA determination. If CDFW determines that take will occur, then a consistency determination (pursuant to Fish and Game Code 2080.1) or application for a take permit (pursuant to CFG Code 2081) is required. The CDFW can also permit take or possession of State threatened, endangered, or candidate species for scientific, educational, or management purposes.

The Natural Community Conservation Planning (NCCP) Act

The NCCP program is a cooperative effort between the State of California and numerous private and public partners with the goal of protecting habitats and species. An NCCP program identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land uses (<http://www.dfg.ca.gov/nccp/>). Regional NCCPs provide protection to federally listed species by conserving native habitats upon which the species depend. Many NCCPs are developed in conjunction with HCPs prepared pursuant to the Act. The Service issued a section 10(a)(1)(B) permit for the County of Riverside for the Western Riverside County MSHCP, which includes *Allium munzii* as a covered species. Regional NCCPs may provide protection to federally listed species by conserving native habitats upon which the species depend. On June 22, 2004, NCCP Approval and Take Authorization were issued by the CDFW for the Western Riverside County MSHCP. The specific measures under these plans that afford protection to *A. munzii* are discussed below under **Federal Regulatory Mechanisms**.

California Environmental Quality Act (CEQA)

CEQA (California Public Resources Code 21000–21177) is the principal statute mandating environmental assessment of projects in California. The purpose of CEQA is to evaluate whether a proposed project may have an adverse effect on the environment and, if so, to

determine whether that effect can be reduced or eliminated by pursuing an alternative course of action or through mitigation. CEQA applies to projects proposed to be undertaken or requiring approval by State and local public agencies and requires disclosure of potential environmental impacts and a determination of “significant” if a project has the potential to reduce the number or restrict the range of a rare or endangered plant. However, projects may move forward if there is a statement of overriding consideration. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (Public Resources Code 21000; CEQA Guidelines at California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000–15387).

Allium munzii is listed by CNPS as **1.B.1** or rare, threatened, or endangered in California and elsewhere, and seriously endangered in California (CNPS 2013). The CDFW works in collaboration with CNPS and with botanical experts throughout the State to maintain an *Inventory of Rare and Endangered Plants*, and the similar *Special Vascular Plants, Bryophytes, and Lichens List*. All CNPS List 1 and 2 and some List 3 and 4 plants (now known as California Rare Plant Ranks 1A, 1B, 2, 3, and 4) may fall under Section 15380 of CEQA (CDFG 2012, p. ii). In addition, the CDFW is the trustee agency for wildlife of California under CEQA (Section 15386), including plants, ecological communities, and habitat upon which they depend, and the agency provides expertise in reviewing and commenting on environmental documents during the CEQA process regarding potential negative impacts to these resources (CDFG 2012, p. vii).

We believe these State regulatory mechanisms provide some level of protection against current threats to *Allium munzii*, primarily through the consultation and take provisions of CESA/NPPA, and the NCCP Act and protections provided through implementation of management actions and conservation measures outlined in the Western Riverside County MSHCP (discussed below).

Federal Regulatory Mechanisms

National Environmental Policy Act (NEPA)

All Federal agencies are required to adhere to the NEPA of 1970 (42 U.S.C. 4321 *et seq.*) for projects they fund, authorize, or carry out. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. The Council on Environmental Quality’s (CEQ) regulations for implementing NEPA state that agencies shall include a discussion on the environmental impacts of the various project alternatives (including the proposed action), any adverse environmental effects that cannot be avoided, and any irreversible or irretrievable commitments of resources involved (40 CFR part 1502). Its public notice provisions provide an opportunity for the Service and others to review proposed actions and provide recommendations to the implementing agency. NEPA does not impose substantive environmental obligations on Federal agencies—it merely prohibits an uninformed agency action. However, if an Environmental Impact Statement is prepared for an agency action, the agency must take a “hard look” at the consequences of this action and must consider all potentially significant environmental impacts. Effects on threatened and endangered species is an important element for determining the significance of an impact of an agency action (40 CFR § 1508.27). Thus,

although NEPA does not itself regulate activities that might affect *Allium munzii*, it does require full evaluation and disclosure of information regarding the effects of contemplated Federal actions on sensitive species and their habitats. Federal agencies may also include mitigation measures in the final Environmental Impact Statement as a result of the NEPA process that help to conserve *A. munzii* and its habitat and these may include measures that are different than those required through the section 7 consultation process.

Organic Administration Act of 1897 and the Multiple-Use, Sustained-Yield Act of 1960

The USFS Organic Act of 1897 (16 U.S.C. § 475–482) established general guidelines for administration of timber on USFS lands, which was followed by the Multiple-Use, Sustained-Yield Act (MUSY) of 1960 (16 U.S.C. § 528–531), which broadened the management of USFS lands to include outdoor recreation, range, watershed, and wildlife and fish purposes. Under general provisions of the USFS Organic Act (16 U.S.C. § 472) and MUSY (16 U.S.C. § 551), the USFS can also designate Special Areas for protection based on their unique or outstanding physical features, environmental values or social significance (USFS 2005e, Volume 1, p. 13). Special Areas also include administrative designations, such as Research Natural Areas and Special Interest Areas (USFS 2005e, Volume 1, p. 13). Designated Research Natural Areas are permanently protected and maintained in natural conditions, for the purposes of conserving biological diversity, conducting non-manipulative research and monitoring, and fostering education (<http://www.fs.fed.us/rmrs/research-natural-areas/>) and fall under Forest Service Manual Directive 4063, Research Natural Areas, and Directive 4063.3, which provides direction regarding protection and management standards covering a broad range of activities. To date, no Special Areas have been designated at the Elsinore Peak occurrence of *Allium munzii* located within the CNF.

National Forest Management Act (NFMA)

The NFMA (16 U.S.C. § 1600 *et seq.*) requires USFS to develop a planning rule under the principles of the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. § 528–531). The NFMA outlines the process for the development and revision of the land management plans and their guidelines and standards (16 U.S.C. § 1604(g)).

A new National Forest System (NFS) land management planning rule (planning rule) was adopted by the USFS, effective May 9, 2012 (USFS 2012a). The new planning rule guides the development, amendment, and revision of land management plans for all units of the NFS to maintain and restore NFS land and water ecosystems while providing for ecosystem services and multiple uses (USFS 2012a, p. 21162). Land management plans (also called Forest Plans) are to be designed to: (1) provide for the sustainability of ecosystems and resources; (2) meet the need for forest restoration and conservation, watershed protection, and species diversity and conservation; and (3) assist USFS in providing a sustainable flow of benefits, services, and uses of NFS lands that provide jobs and contribute to the economic and social sustainability of communities (USFS 2012a, p. 21162). A land management plan does not authorize projects or activities, but projects and activities must be consistent with the plan (USFS 2012a, p. 21261). The plan must provide for the diversity of plant and animal communities including species-specific plan components in which a determination is made as to whether the plan provides the

ecological conditions necessary to contribute to the recovery of federally listed species (USFS 2012a, p. 21265). The decision of record for the final planning rule was prepared in accordance with the requirements of NEPA. In addition, the NFMA requires specific land management plans to be developed in accordance with the procedural requirements of NEPA, with a similar effect as zoning requirements or regulations as these plans control activities on the national forests and are judicially enforceable until properly revised (Coggins *et al.* 2002, p. 720). The most recent Land Management Plan for the CNF was prepared in 2005 in conjunction with a final Environmental Impact Statement for four Southern California National Forests (USFS 2005b–d; USFS 2005e).

Other Federal Regulations

The USFS Directive System codifies the agency's policies, practices, and procedures under the various Federal laws and regulations under which the USFS operates, including the Act. The Directive System is the primary basis for the internal management and control of all programs as well as the primary source of administrative direction to USFS employees. This system includes the USFS Manual and Handbooks that outline land and resource management planning and other conservation directives (http://www.fs/fed/us/im/directives/dughtml/serv_fsm.html).

As an example, potential effects from fuels management (prescribed fire) to *Allium munzii* habitat can be avoided or mitigated by Forest Plan Standards S6, S11, S12, S24, and S37 (USFS 2005a, p. 205). Implementation of Forest Plan Standard S38 can reduce the risk to occupied or suitable *A. munzii* habitat that might be affected by staging areas, helibases, base camps, firelines, or other areas of human concentration and equipment related to fuel or fire management practices (USFS 2005a, p. 205).

Endangered Species Act of 1973, as amended (Act)

Since listing, the Act is the primary Federal law providing protection for *Allium munzii*. The Service's responsibilities for administering the Act include sections 6, 7, 9, and 10. Section 7(a)(1) of the Act requires all Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species. Section 7(a)(2) of the Act requires Federal agencies, including the Service, to satisfy two standards in carrying out their program. Federal agencies must ensure that actions they fund, authorize, or carry out are not likely to (1) jeopardize the continued existence of any listed species or (2) result in the destruction or adverse modification of designated critical habitat. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 C.F.R. § 402.02). Critical habitat has been designated for this species (USFWS 2013b, pp. 22626–22658).

The section 7(a)(2) prohibition against jeopardy applies to plants as well as animals, but other protections of the Act are more limited for plant species. There is no prohibition against the taking of a protected plant under section 7(a)(2), thus no incidental take statement is prepared in the analysis of effects associated with a project. A non-jeopardy opinion for plants therefore would not include reasonable and prudent measures to minimize incidental take. However,

voluntary conservation recommendations may be included. These are discretionary actions the action agency can implement relevant to the proposed action and consistent with their section 7(a)(1) authority to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or develop information; however, they are not a precondition for a finding of no jeopardy (or adverse modification).

The Service has an extensive section 7(a)(2) consultation history with the USFS in southern California, including the Trabuco District of CNF where the Elsinore Peak occurrence of *Allium munzii* is found. Most recently, the Service completed a formal consultation for some recreation and road and trail use and maintenance on CNF (USFWS 2013c). This was prepared in response to the biological assessment completed by USFS in December 2012 prepared for the revised Land and Resource Management Plans for the Four Southern California Forests, including the CNF Land Management Plan (USFS 2005b–d). The biological assessment addressed activities related to forest roads, trails, developed recreation sites, dispersed recreation, and administrative infrastructure (USFS 2012b, p. 7). It also provided updated information on existing conditions and effects of USFS management within the CNF for *A. munzii* (USFS 2012b, pp. 29–32) and other federally listed plants and their critical habitat. Our consultation concluded that while individual plants might be intermittently impacted by recreation and road use and maintenance, no permanent loss of habitat or appreciable reduction in the numbers, reproduction, or distribution of *A. munzii* on the CNF or rangewide is expected (USFWS 2013c, p. 19).

Under the taking prohibitions of section 9(a)(2) of the Act, it is unlawful to remove and reduce to possession (i.e., collect) any endangered species of plant from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy such species. For areas outside Federal jurisdiction, there are no restrictions on killing, damaging, or removing plants or plant parts unless State law prohibits these acts and it can be shown that there was a knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law. The protection of section 9 afforded to endangered species is extended to threatened wildlife and plants by regulation. Additionally, federally listed plants may be incidentally protected if they co-occur with federally listed wildlife species.

Other protections for plants in the Act include restrictions against the import into or export from the United States any endangered plant and to deliver, receive, carry, transport, or ship or sell or offer for sale in interstate or foreign commerce any such species.

The Cooperative Endangered Species Conservation Fund (Conservation Fund), under section 6 of the Act, provides grants to States and Territories to participate in voluntary conservation projects for candidate, proposed, and listed species. The program provides funding to States and Territories for species and habitat conservation actions on non-Federal lands. Four grant programs are available through this the Conservation Fund: Conservation Grants, HCP Assistance Grants, HCP Land Acquisition Grants, and Recovery Land Acquisition Grants.

Section 10(a)(1)(A) of the Act includes provisions for collection of plants or plant parts for scientific purposes or to enhance the propagation and survival of the species. The occurrences of

Allium munzii in Riverside County would be covered under this provision and these activities would require consultation and coordination with the Service.

For projects without a Federal nexus that may result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). Issuance of a section 10(a)(1)(B) permit for an HCP is a Federal action subject to compliance under section 7(a)(2). The Western Riverside County MSHCP, discussed below, is a large-scale, multi-jurisdictional NCCP/HCP permitted under section 10(a)(1)(B) of the Act and is discussed below. The Rancho Bella Vista HCP, permitted under section 10(a)(1)(B) prior to the Western Riverside County MSHCP, is also described below.

Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The Western Riverside County MSHCP is a large-scale, multi-jurisdictional HCP that addresses 146 listed and unlisted “Covered Species” within a 1,260,000-acre Plan Area in western Riverside County (USFWS 2004, p. 17). The Western Riverside County MSHCP was designed to establish a multi-species conservation program that minimizes and mitigates the expected loss of habitat and the incidental take of Covered Species. Although “take” only applies to listed wildlife, *Allium munzii* is “covered” under a 75-year 10(a)(1)(B) permit issued for the Western Riverside County MSHCP in recognition of the conservation measures incorporated into the Plan for plant species.

Section 5.2 of the Western Riverside County MSHCP defines management activities to be implemented by reserve managers and a reserve management oversight committee (with priorities identified by those entities) to carry out species objectives and provide for biological values identified in section 3.2 of the plan (Dudek and Associates 2003, p. 5–3). Management actions are defined at two levels within the Western Riverside County MSHCP—habitat- or landscape-based management activities and species-specific management activities (Dudek and Associates 2003, p. 5–3). Species-specific management activities defined for *Allium munzii* state that reserve managers are to manage known and future occurrences of this species to reduce threats related to competition with nonnative plant species, clay mining, off-road vehicles, and discing activities (Dudek and Associates 2003, p. 5–31).

Species-specific conservation objectives are provided for *Allium munzii* in the Western Riverside County MSHCP, as followed: (1) conserve at least 21,260 ac (8,603 ha) of suitable habitat to include at least 2,070 ac (838 ha) of clay soils, (2) conserve at least 13 localities (populations within EOs as defined in the CNDDDB) within the Temescal Valley and the southwestern portion of the plan area, and (3) conduct Narrow Endemic Plant Species surveys, discussed below (Dudek and Associates 2003, pp. 9–126—9–127).

The Western Riverside County MSHCP Narrow Endemic Plant Survey Policy requires that, when a narrow endemic plant species is detected (including *Allium munzii*), impacts to 90 percent, the portions of the property that provides long-term conservation value for the narrow endemic species, be avoided until it is demonstrated that conservation objectives (discussed above) are met (Dudek and Associates 2003, p. 6–38). The information from these surveys is

used to prioritize areas for acquisition into the Western Riverside County MSHCP (USFWS 2004, p. 28).

Surveys conducted from 2005 through 2013 have confirmed 10 of 13 “occurrences” (defined as the unit of group of individuals that meet the criteria for one location in the Western Riverside County MSHCP species objective)¹ (Western Riverside County RCA 2012, pp. 6, 35). These 13 “occurrences” are the localities identified for conservation under management activities and species-specific conservation objectives (described above) within the Western Riverside County MSHCP (Dudek and Associates 2003, pp. 9–126—9–127). These 13 “occurrences” are defined as Estelle Mountain, the Domenigoni Hills, Lake Skinner, Scott Road, Alberhill, DePalma Road, Bachelor Mountain, CNDDDB EO 5, northeast of Alberhill, North Peak, Elsinore Peak, Harford Springs County Park, and 1 additional unique occurrence (Western Riverside County RCA 2012, p. 35).

In addition, the Western Riverside County MSHCP identified two CNDDDB-defined EOs partially within the Conservation Area (EOs 2 and 9) and two others, currently located outside the Conservation Area (EOs 5 and 16), that will be added to the Conservation Area. Finally, as noted above, the Western Riverside County MSHCP provides flexibility for criteria refinement, such that if an area is currently outside the reserve design defined by the Western Riverside County MSHCP, but is later determined to be important for conservation, then it could be added to the reserve as Additional Reserve Lands or Acquisition Lands.

In our biological opinion, our analysis of effects to *Allium munzii* for the Western Riverside County MSHCP indicated that: (1) 16 known localities (based on populations defined by the extant CNDDDB-defined EOs at that time) would be included in the Conservation Area; (2) we anticipated that occurrences determined to be important to the overall conservation of the species will be considered for inclusion in the Additional Reserve Lands; and (3) at least some of the avoided areas may be maintained as open space habitat (USFWS 2004, p. 327). The Service concluded that planned activities covered by the Western Riverside County MSHCP in combination with this conservation strategy would not jeopardize the continued existence of *A. munzii* (USFWS 2004, p. 327).

Because the Western Riverside County MSHCP focuses on lands identified as important for the long-term conservation of its covered species, and outlines management actions and conservation objectives, as described above and in its Implementing Agreement (Western Riverside County Regional Conservation Authority *et al.* 2003, p. 51), we believe the Western Riverside County MSHCP provides an important layer of regulatory protection to covered plants and animals, including *Allium munzii*.

¹ The species-specific objectives listed in the Western Riverside County MSHCP identifies a certain number of locations, occurrences, records, and/or localities for each species, all used interchangeably, and often identifies areas where the species have historically occurred (Western Riverside County RCA 2012, p. 6). The rare plant survey reports use the term “occurrence” as defined here. However, there may not be a one-to-one relationship between the number of occurrences and locations when evaluating species’ conservation objectives.

Rancho Bella Vista Habitat Conservation Plan

Most of the Skunk Hollow occurrence for *Allium munzii* is located within a smaller, individual HCP, the Rancho Bella Vista HCP, which was approved prior to the Western Riverside County MSHCP through a separate section 10(a)(1)(B) permit and authorized Pacific Bay Properties to develop the 798-ac (323-ha) site that included 102.3 ac (41.4 ha) of native habitat (USFWS 2004, p. 66). In our 2000 biological opinion, we determined that implementation of the Rancho Bella Vista HCP would not likely jeopardize the continued existence of *A. munzii* (USFWS 2000, p. 41). The remaining occupied area within the Skunk Hollow occurrence is found within the Western Riverside County MSHCP, as either Public/Quasi-Public or Additional Reserve Lands. Conservation objectives for *A. munzii* in those areas are addressed in the *Western Riverside County MSHCP* section above.

Long-term management of the Rancho Bella Vista HCP conservation lands includes the following activities: (1) control access and, where necessary, limit access by people, vehicles, and domestic pets to conserved habitats and preclude access to highly sensitive resources; (2) monitor target species, including *Allium munzii*, and provide species management of all covered species; (3) identify and rank, in order of priority, opportunities for habitat restoration and enhancement within the conserved habitats; (4) monitor conserved lands for the occurrence of nonnative invasive plants and animals and provide the prompt control of such species; (5) map the locations of nonnative plant species within and immediately adjacent to conserved habitats and schedule for removal, monitoring, or control as necessary; (6) develop a fire management program in consultation with the County of Riverside Fire Marshal and wildlife agencies to minimize impacts to conserved habitats from fire management programs and adjacent land uses; and (7) develop public information materials and programs including: (a) a brochure that describes the natural resources, areas of special interest, and prohibited activities within conserved habitats, (b) a landscape and fuel break planning brochure for homeowners and homeowner associations located adjacent to conserved habitats, and (c) nature trails along or through portions of conserved habitats (provided impacts are avoided or mitigated) (USFWS 2000, pp. 4–5).

In summary, the Act is the primary Federal law providing protection for *Allium munzii*, primarily through section 7 and section 10. Other Federal laws and regulations that confer protections including provisions under the USFS Organic Act, which allows for designation of Wilderness Areas or Special Areas for protection based on unique or outstanding physical features, environmental values or social significance, respectively. The NFMA requires the USFS to incorporate provisions to support and manage the plant and animal communities for diversity and long-term rangewide viability of native species into the CNF Land Management Plan.

Other Conservation Mechanisms

Southwestern Riverside County Multi-species Reserve

The Bachelor Mountain and North Domenigoni Hills occurrences of *Allium munzii* are found almost entirely within the Southwestern Riverside County Multi-species Reserve (Reserve), which was created in 1992, prior to the listing of *A. munzii*, as a mitigation measure for impacts

resulting from the Diamond Valley Lake Reservoir. The Reserve comprises about 13,000 ac (5,261 ha), approximately 9,400 ac (3,804 ha) of which are owned by the Metropolitan Water District, 2,500 ac (1,012 ha) by the Riverside County Habitat Conservation Agency, 360 ac (146 ha) by the Bureau of Land Management, and 600 ac (243 ha) by the Riverside County Parks and Open Space District (USFWS 2004, p. 61).

The Reserve is managed through a cooperative management agreement (Monroe *et al.* 1992, Appendix B). The Service is a party to this agreement and is a member of the five-member committee that makes management decisions (Monroe *et al.* 1992, Appendix B). Management strategies defined for the entire Reserve include: (1) protection of habitat from human disturbance through fencing, construction of fire breaks, and patrols to prevent unauthorized access; (2) activities to promote the recovery of native plant and animal communities by managing fire and controlling grazing; and (3) management for biodiversity, including maintaining a mosaic of different-aged habitats to meet the needs of many species (Monroe *et al.* 1992, pp. ES-5—ES-6). Specific enhancement and monitoring goals, objectives, and strategies for *A. munzii* are defined in the 2008 Southwestern Riverside County Multi-species Reserve Management Plan (Moen 2008, Appendix 10), developed in order to meet management goals for the Reserve. These include: (1) estimating the area occupied by *A. munzii* within the Reserve by mapping each occupied area annually, (2) estimating individual plants within the known populations, and (3) enhancing habitat suitability within occupied areas by annually removing thatch and biomass from nonnative vegetation and determining the efficacy of each treatment (Moen 2008, Appendix 10, pp. 1–2).

Summary of Factor D

Existing State regulatory mechanisms provide some level of protection to *Allium munzii* from current threats rangewide. These include the consultation requirements and take provisions under CESA as well as the NCCP Act and protections provided through implementation of the Western Riverside County MSHCP, which is also permitted through section 10(a)(1)(B) of the Act. Management activities and conservation measures for this species are identified in the Western Riverside County MSHCP and the plan provides a level of regulatory protection related to any proposed developments for 11 occurrences. Conservation measures identified in the Rancho Bella Vista HCP for *A. munzii* and its habitat provide significant conservation benefits to one occurrence of *A. munzii*. Additionally, the Southwestern Riverside County Multi-species Reserve Management Plan identifies specific conservation measures for *A. munzii* and its habitat at two occurrences.

Federal regulatory mechanisms have also reduced the overall loss and degradation of habitat of *Allium munzii* by virtue of its one occurrence on USFS lands. The NFMA in conjunction with the requirements of NEPA provides important guidance and policy for maintaining ecosystem and species-specific biodiversity via the development and implementation of land management plans (and environmental impact statements). This includes amendments or revisions to the CNF Management Plan (USFS 2005b–d). Additional important Federal regulatory mechanisms include protections provided under the USFS Organic Act and other USFS management policies, practices, and procedures that guide management within CNF.

We believe that the Act continues to remain the primary regulatory mechanism providing for the conservation of *Allium munzii*, through requirements of both section 7 and section 10(a)(1)(B). The inclusion of measures to protect listed plants and their habitats in the Western Riverside County MSHCP, Rancho Bella Vista HCP, and Southwestern Riverside County Multi-species Reserve Management Plan provide specific and comprehensive protections for *A. munzii*.

FACTOR E: Other natural or manmade factors affecting its continued existence.

At the time of listing, we identified crowding and competition from nonnative grasses as a **Factor E** threat impacting *Allium munzii*. In this review, habitat impacts from nonnatives were discussed above (see **FACTOR A**). Changing climatic conditions were mentioned briefly in the listing rule, though climate change was not clearly identified as a threat at that time. Impacts to *A. munzii* associated with climate change are evaluated here under **FACTOR E**.

Climate Change

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms “climate” and “climate change” are defined by the Intergovernmental Panel on Climate Change (IPCC). The term “climate” refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, p. 78). The term “climate change” thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, p. 78).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has been faster since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions. (For these and other examples, see IPCC 2007a, p. 30; and Solomon *et al.* 2007, pp. 35–54, 82–85). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate, and is “very likely” (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007a, pp. 5–6 and figures SPM.3 and SPM.4; Solomon *et al.* 2007, pp. 21–35). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global

surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al.* 2007, pp. 760–764 and 797–811; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529). (See IPCC 2007b, p. 8, for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation. Also see IPCC 2011(entire) for a summary of observations and projections of extreme climate events).

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007a, pp. 8–14, 18–19). Identifying likely effects often involves aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (IPCC 2007a, p. 89; see also Glick *et al.* 2011, pp. 19–22). There is no single method for conducting such analyses that applies to all situations (Glick *et al.* 2011, p. 3). We rely on our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Although many species listed as endangered or threatened may be particularly vulnerable to negative effects related to changes in climate, we recognize that, for some of these species, the likely effects may be positive or neutral. In any case, the identification of effective recovery strategies and actions for recovery plans, as well as assessment of their results in 5-year reviews, should include consideration of climate-related changes and interactions of climate and other variables. These analyses also may contribute to evaluating whether an endangered species can be reclassified as threatened, or whether a threatened species can be delisted.

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (e.g., IPCC 2007a, pp. 8–12). Therefore, we use “downscaled” projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al.* 2011, pp. 58–61, for a discussion of downscaling).

We reviewed predictions from Cal-Adapt, a web-based, climate adaptation planning tool that synthesizes existing downscaled climate change scenarios and climate impact research, and presents it in an interactive, graphical layout (<http://cal-adapt.org/>; California Energy Commission 2011). Projected changes in annual averages in temperature for the western Riverside County region using the Cal-Adapt Climate tool indicates an increase in temperature

ranging from 3.7–3.8 °F (approximately 2.0 °C) under the low emissions scenario (B1), and, under the high emissions scenario (A2), an increase ranging from 6.3–6.8 °F (3.5–3.7 °C) (Cal-Adapt 2013a). Both of these scenarios are comparisons between the baseline period (1961–1990) and the end of century period (2070–2090). Using the Cal-Adapt tool, wildfire impact projections for the region for 2020 (measured as potential amount of area burned) range from an increase of 5 percent (relative risk (RR)=1.05) under the low emissions scenario, to a 25 percent increase (RR=1.25) when compared to 2010 levels (Cal-Adapt 2013b). For 2050, wildfire risk projections for this region range from a *reduction* of 4 percent (RR=0.96) to an increase of 28 percent (RR=1.28) under the low emissions scenario, and range from a *reduction* of 6 percent (RR=0.94) to a 28 percent *increase* (RR=1.28) under the high emissions scenario, relative to 2010 levels (Cal-Adapt 2013b).

Summary of Factor E

Based on the best available information contained in model predictions for this general region of California, a change in temperature conditions resulting from climate change is considered a rangewide threat to *Allium munzii* due to predicted changes to its habitat. Climate model predications also indicate a moderate increase in fire risk to the geographical range of *A. munzii*, which, when combined with anthropogenic facilitation, can produce a shortening of the fire return interval and potentially increase wildland fire management practices as discussed under **FACTOR A**, such as the creation of fuel breaks, which can disturb native soils. However, while we recognize that climate change is an important issue with potential future effects to *A. munzii* and associated habitat, the currently available information does not allow us to develop accurate predictions regarding its effects at specific occurrences of *A. munzii* at this time.

III. RECOVERY CRITERIA

A recovery plan has not been completed for *Allium munzii*.

IV. SYNTHESIS

There are currently 15 occurrences of *Allium munzii* western Riverside County, in 6 geographically defined locations identified as: Gavilan Hills, Temescal Valley, Santa Ana Mountains, South Perris Basin, Bachelor Mountain, and North Domenigoni Hills. The distribution of *A. munzii* largely remains as identified at the time of listing. We have no current comprehensive abundance estimate of *A. munzii*; limited surveys at several occurrences have found up to 600 plants at some locations, but less than 100 individuals at many occurrences.

The primary threats to *Allium munzii* identified at the time of listing were those associated with urban and agricultural development and clay mining. Off-road vehicles, trampling (from livestock grazing), and nonnative plants (grasses) were also listed as threats for this species. Since listing, some occupied areas of *A. munzii* were lost due to urban and agricultural development. However, several protective regulatory mechanisms have been implemented since listing including the development of a comprehensive HCP (the Western Riverside County MSHCP). Two additional conservation mechanisms (Rancho Bella Vista HCP and the Southwestern Riverside County Multi-species Cooperative Agreement) are also being

implemented, which encompass three occurrences. *Allium munzii* is found on USFS lands (Elsinore Peak occurrence) and a revision of the USFS planning rule, the development of revised land and resource management plans, and designation of critical habitat all provide significant conservation protections for the Elsinore Peak occurrence. Collectively, these mechanisms provide a comprehensive level of conservation planning for all occurrences that has reduced threats related to urban and agricultural development.

Impacts related to recreational activities is a localized threat for at least two occurrences of *Allium munzii*. This threat is actively managed at the Elsinore Peak occurrence to prevent further habitat degradation from OHV activity.

Invasive nonnative plants represent an important rangewide threat to *Allium munzii* habitat due to competition for resources and space, and one that will likely require active management (removal of invasive grasses and thatch) at most of the current occurrences. The effects of climate change, particularly a projected increase in wildfire risks, is also a potential future threat to *A. munzii*. This threat may result in increased wildland fire management practices, which can cause soil disturbance to the clay soils occupied by this bulb-forming plant.

In recognition of the current threats, we recommend no change in the endangered status of *Allium munzii* at this time.

V. RESULTS

Recommended Listing Action:

- Downlist to Threatened
 Uplist to Endangered
 Delist (indicate reason for delisting according to 50 CFR 424.11):
 Extinction
 Recovery
 Original data for classification in error
 No Change

New Recovery Priority Number and Brief Rationale: Change from RPN 2C to 8C

The geographic range of *Allium munzii* is largely the same as that at the time of listing, and new localities have been located within this range since the plant was listed in 1998. The potential for recovery remains high since all 15 occurrences now receive some level of protection from management actions and conservation measures required under the Western Riverside County MSHCP, Rancho Bella Vista HCP, and Southwestern Riverside County Multi-species Reserve Management Plan, as well as management activities being implemented by the USFS. Specific monitoring and management actions for the conservation of *A. munzii* have been identified and surveys are being implemented to meet obligations under the Western Riverside County MSHCP. We therefore believe the degree of threat to this taxon is now moderate, with a high recovery potential. Therefore, we recommend a change in the recovery priority number from 2C to 8C for this species.

VI. RECOMMENDATIONS FOR FUTURE ACTIONS

The actions listed below are recommendations to be completed over the next 5 years. These will help guide recovery of *Allium munzii* by reducing future losses of habitat, minimizing degradation of chaparral ecosystems, and avoiding adverse changes to fire regime resulting from human activities.

Conservation of *Allium munzii* is dependent on continued cooperation with our partners (i.e., Federal, State, and local agencies). We will work with Service programs, such as the Service's Partners for Fish and Wildlife Program, to identify opportunities for conservation on private lands. Property easements or purchases of parcels could also be made through the Act's section 6 funding. We recognize that the conservation of *A. munzii* will require continued cooperation and coordination with partners to minimize impacts from current threats and aid future restoration.

- 1) Continue to work with CNF to ensure that USFS guidelines and directives are being implemented for activities that might directly or indirectly affect *Allium munzii* habitat. This should also include providing comment on biological assessments for proposed recreational and trail use and maintenance and proposed wildland fire management actions.
- 2) Survey current, presumed extant occurrences of *Allium munzii* to estimate the level and extent of nonnative invasive plants. Develop site-specific restoration measures such as thatch removal or prescribed fire.
- 3) Continue to conserve or preserve *Allium munzii* occurrences on private lands, especially within the Temescal Valley occurrences. Pursue opportunities to purchase parcels through the Act's section 6 funding and other conservation partnership programs (i.e., Western Riverside County MSHCP) with willing sellers.
- 4) Identify pollinators of *Allium munzii* by installing small trigger cameras to record and document pollinators at the occurrence at Elsinore Peak, Cleveland National Forest.

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Appendix 1. Occurrences of *Allium munzii* (Munz's onion): Current status, threats, and conservation. Prepared for the 2013 5-year Review.

GEOGRAPHICAL LOCATION	OCCURRENCE¹: incorporates EOs (CNDDDB 2013), survey points, herbarium collections (CCH 2013), and other surveys (Western Riverside County RCA)	STATUS AT LISTING²	CURRENT STATUS*	CURRENT THREATS³	CURRENT PRIMARY CONSERVATION MECHANISM
Gavilan Hills	Estelle Mountain EO 9; RSA#770513	Extant	Presumed extant	<u>A</u> : Invasive Nonnative Plants <u>E</u> : Climate Change	Western Riverside County MSHCP
	Dawson Canyon EO 5; RSA#770512	Extant	Presumed Extant	<u>A</u> : Invasive Nonnative Plants <u>E</u> : Climate Change	Western Riverside County MSHCP
	Gavilan Plateau (includes Harford Springs County Park) EOs 1 and 2; RSA#770515; OBI#43236	EO 1–Extirpated; EO 2–Extant	EO 2–Presumed Extant	<u>A</u> : Urban Development <u>E</u> : Climate Change	Western Riverside County MSHCP
	Ida-Leona EO 23	Unknown at listing	Presumed Extant	<u>A</u> : Urban Development <u>E</u> : Climate Change	Western Riverside County MSHCP
	Northeast Alberhill EO 16; RSA#747571; RSA#747569	Extant	Presumed Extant	<u>A</u> : Invasive Nonnative Plants <u>E</u> : Climate Change	Western Riverside County MSHCP
	North Peak EO15	Extant	Presumed Extant	<u>E</u> : Climate Change	Western Riverside County MSHCP

GEOGRAPHICAL LOCATION	OCCURRENCE ¹ : incorporates EOs (CNDDDB 2013), survey points, herbarium collections (CCH 2013), and other surveys (Western Riverside County RCA)	STATUS AT LISTING ²	CURRENT STATUS*	CURRENT THREATS ³	CURRENT PRIMARY CONSERVATION MECHANISM
Temescal Valley	Sycamore Creek EO 3; EO 8	EO 3– Presumed Extirpated; EO 8– Extant	Presumed Extant ⁴	<u>A</u> : Urban Development <u>E</u> : Climate Change	Western Riverside County MSHCP
	De Palma Road EO 7; RSA#785116	Extant	Presumed Extant	<u>A</u> : Urban Development; Invasive Nonnative Plants <u>E</u> : Climate Change	Western Riverside County MSHCP
	Alberhill Mountain EO 6; UCR#217516; UCR#230056; RSA#770514	Presumed extirpated	Presumed Extant	<u>A</u> : Urban Development; Invasive Nonnative Plants <u>E</u> : Climate Change	Western Riverside County MSHCP
	Alberhill Creek EO 18; RSA#770511	Unknown at listing	Presumed Extant	<u>A</u> : Urban Development <u>E</u> : Climate Change	Western Riverside County MSHCP
Santa Ana Mountains	Elsinore Peak EO 13; RSA#770516	Extant	Extant	<u>A</u> : Invasive nonnative plants; Recreational Activities <u>E</u> : Climate change	USFS – CNF Land and Resource Management Plan

GEOGRAPHICAL LOCATION	OCCURRENCE¹: incorporates EOs (CNDDDB 2013), survey points, herbarium collections (CCH 2013), and other surveys (Western Riverside County RCA)	STATUS AT LISTING²	CURRENT STATUS*	CURRENT THREATS³	CURRENT PRIMARY CONSERVATION MECHANISM
South Perris Basin	Scott Road EO 14	Extant	Presumed Extant	<u>A</u> : Invasive nonnative plants <u>E</u> : Climate Change	Western Riverside County MSHCP
	Skunk Hollow EO 4	Extant	Presumed Extant	<u>A</u> : Recreational Activities; Invasive nonnative plants <u>E</u> : Climate Change	Rancho Bella Vista HCP
Bachelor Mountain	Bachelor Mountain EOs 11, 12, 17, <i>Proposed 24</i>	EOs 11 and 12–Extant ⁵	Presumed Extant ⁶	<u>A</u> : Invasive Nonnative Plants <u>E</u> : Climate Change	SW Riverside County Multi-species Reserve, Cooperative Management Agreement; Western Riverside MSHCP
North Domenigoni Hills	North Domenigoni Hills EO 10;UCR#217543	Extant	Presumed Extant	<u>A</u> : Invasive Nonnative Plants <u>E</u> : Climate Change	SW Riverside County Multi-species Reserve, Cooperative Management Agreement; Western Riverside MSHCP

Abbreviations:

EO = CNDDDB Element Occurrence; CCH = Consortium of California Herbaria; RCA = Regional Conservation Authority MSHCP = Multispecies Habitat Conservation Plan; USFS = U.S. Forest Service; CNF = Cleveland National Forest; HCP = Habitat Conservation Plan.

Footnotes:

1. Occurrences based on USFWS critical habitat unit and subunits, CNDDDB named locations, and our 2009 5-year review, which indicated that EOs 20, 21, and 22 are based on vague historical locations with exact locations unknown and EO 19 was likely based on a misidentified specimen and was deleted by CNDDDB.

2. The final rule to list *Allium munzii* identified 13 “populations” (i.e., CNDDDB EOs 2, 4, 5, 7–16), all of which were presumed extant. Of the CNDDDB EOs described in 1997 (16 total), we considered EOs 1, 3, and 6 extirpated at the time of listing.

3. Current threats to the occurrence segregated by listing threat **Factor** (see analysis in text).

4. Former EO 8 now assigned EO 3.

5. EO 17 and *proposed* EO 24 were not known at time of listing.

6. EO 17 has not been relocated in several survey efforts.

*There have been no changes in status since the 2009 5-year review.

U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW

***Allium munzii* (Munz's Onion)**

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

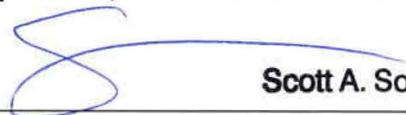
Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

Lead Field Supervisor, U.S. Fish and Wildlife Service

ACTING

Approve _____



Scott A. Sobiech

Date _____

SEP 05 2013