

*Ceanothus ophiochilus*  
(Vail Lake Ceanothus)

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



*Ceanothus ophiochilus* (Vail Lake ceanothus).  
Photo credit: U.S. Fish and Wildlife Service.

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

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## **5-YEAR REVIEW**

### ***Ceanothus ophiochilus* (Vail Lake Ceanothus)**

#### **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:**

*Ceanothus ophiochilus* (Vail Lake ceanothus) is a perennial evergreen shrub restricted to southwestern Riverside County, California. It is generally found within chamise chaparral habitats on ridge tops and north- to northeast-facing slopes.

At the time of listing, *Ceanothus ophiochilus* was known from three locations in southwestern Riverside County that included an area west of Vail Lake and two areas within the Agua Tibia Mountains (primarily the Agua Tibia Wilderness Area in the Cleveland National Forest (CNF)). In our last 5-year review, we described three occurrences within this geographic range. The current occurrences of *C. ophiochilus* are in the same general geographical area as that known at the time of listing, and its current known spatial distribution has not changed. *Ceanothus ophiochilus* is currently presumed to be extant in the three occurrences previously described within southwestern Riverside County identified here as Vail Lake, Agua Tibia Wilderness–North, and Agua Tibia Wilderness–South.

The primary threats to *Ceanothus ophiochilus* identified at the time of listing were associated with urbanization and off-road vehicle use, grading of habitat for fire breaks, vandalism, and altered fire regimes (USFWS 1998, pp. 54961–54962, 59464). Hybridization and introgression were also identified as potential threats within habitats occupied by *C. ophiochilus* (USFWS 1998, p. 54964). Current threats include effects related to urban development on private lands, invasive nonnative plants, wildland fire and fire management actions, and climate change.

*Ceanothus ophiochilus* was federally listed as threatened under the Act in 1998. In January 1994, *C. ophiochilus* was listed as endangered by the State of California under the California Endangered Species Act.

Based on our assessment of the current threats to *Ceanothus ophiochilus*, we recommend no change in its listing status. However, we are recommending a change in the recovery priority number from 2 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 2007 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 (Kirsten Winter, U.S. Forest Service (USFS), CNF). We received no information from the public in response to our notice in the Federal Register initiating this 5-year review. 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:**

**Lead Regional Office:** Larry Rabin, Deputy Division Chief for Listing, Recovery, and Environmental Contaminants and Lisa Ellis, Fish and Wildlife Biologist, Region 8; 916-414-6464.

**Lead Field Office:** Betty Grizzle and Bradd Baskerville-Bridges, Carlsbad Fish and Wildlife Office, Region 8; 760-431-9440.

### **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 27, 2012 (USFWS 2012a, pp. 25112-25116). No information relevant to *Ceanothus ophiochilus* was received.

### **Listing History:**

#### **Federal Listing**

**FR Notice:** 63 FR 54956-54971 (USFWS 1998)

**Date of Final Rule:** October 13, 1998

**Entity Listed:** *Ceanothus ophiochilus* (Vail Lake ceanothus), a plant species.

**Classification:** Threatened

**Critical Habitat:** 72 FR 54984–55010 (USFWS 2007b).

**State Listing**

*Ceanothus ophiochilus* (Vail Lake ceanothus) was listed by the State of California as endangered in 1994.

**Associated Rulemakings:**

Critical habitat was designated on September 27, 2007, for *Ceanothus ophiochilus*, along with *Fremontodendron mexicanum* (Mexican flannelbush) (USFWS 2007b). For *C. ophiochilus*, 203 acres (ac) (82 hectares (ha)) within one unit (Agua Tibia Mountains Subunit), was designated as final critical habitat, located entirely within the Cleveland National Forest in Riverside County, California (USFWS 2007b, p. 54995).

**Review History:**

The Service initiated a status review for *Ceanothus ophiochilus* on February 14, 2007 (USFWS 2007a). We completed a 5-year review on July 21, 2008, and recommended no change in status for this species (USFWS 2008, p. 20).

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

The recovery priority number (RPN) for *Ceanothus ophiochilus* is 2 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 2 indicates that the species faces a high degree of threat and a high potential for recovery.

**Recovery Plan or Recovery Outline:**

Neither a recovery outline nor a recovery plan have been completed for *Ceanothus ophiochilus*.

**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

*Ceanothus ophiochilus* is a 4 to 5 foot (ft) (1.2 to 1.5 meters (m)) tall, erect shrub and is a member of the buckthorn family (Rhamnaceae). As described by Wilken (2012, p. 1158), the inflorescence (flower stalk) has umbel-like aggregations of (few) flower clusters that are pale blue, or occasionally pink. The flat, dull green leaves are opposite, with knob-like stipules, narrowly oblanceolate (broadest above the middle and tapering toward the base) to obovate (egg-shaped) in shape, glabrous (smooth), with obscure veins and blades 3 to 7 millimeters (mm) (0.12 to 0.027 inch (in)) long and 1 to 3 mm (0.04 to 0.12 in) wide; fruits are 3 to 3.5 mm (0.12 to 0.14 in) wide, and without horns (Wilken 2012, p. 1158). It flowers from February through March (California Native Plant Society (CNPS) 2012). *Ceanothus ophiochilus* is distinguished from other taxa in the subgenus *Cerastes*, referred to as a section by Boyd *et al.* (1991, p. 28), of *Ceanothus* found within southern California by its blue to pinkish-lavender flowers, and small, narrow leaves that have a gibbous (swollen) abaxial (lower) surface (Boyd *et al.* 1991, p. 32).

### Species Biology and Life History

As with many chaparral plant species, *Ceanothus ophiochilus* is adapted to periodic disturbance (Shaffer 1993, p. 1; USFWS 2008, p. 4) and fire ecology is an important aspect of its life history. Soil moisture is a strong determinant of chaparral communities (Keeley and Davis 2007, p. 345) and a mosaic of different fuels and post-fire ecologies in southern California is created from the distribution of arid (usually south-facing slopes and ridges) and mesic chaparral sites (north-facing exposures) (Keeley 2006, p. 366). Plants that recruit seedlings after fire (obligate seeders) generally occupy the more arid sites, or low elevation and south-facing exposures (Keeley 1986, pp. 101–102; Keeley 2006, p. 366). *Ceanothus ophiochilus* is an obligate seeder and therefore does not resprout following fire, but instead recovers through the germination of seeds stored in the soil (Boyd and Banks 1995, p. 28; Keeley 2006, p. 367). *Ceanothus crassifolius*, another obligate seeder found in close association with *C. ophiochilus* has been shown to recruit heavily in the first post-fire year from dormant seed banks with very little recruitment until the next fire (Keeley *et al.* 2006, pp. 248 and Appendix A).

Fire frequency and fire intensity are also important factors in defining the mosaic chaparral plant communities found in southern California. *Ceanothus ophiochilus* generally requires a fire-return interval between 10 to 20 years to adequately replenish the seed bank (Keeley and Davis 2007, p. 350). Plants in the subgenus *Cerastes* including *C. ophiochilus*, also require high intensity fires with long intervals between fires for maintaining population viability (Shaffer 1993, p. 6). If more frequent fires occur, immature plants of *C. ophiochilus* may be destroyed before they can reproduce, whereas with low-intensity fires, seeds may not germinate at all (Zedler *et al.* 1983, p. 815; Keeley 1991, p. 89; Keeley and Davis 2007, p. 350). Therefore, alteration of the fire regime may result in the gradual elimination of *Ceanothus* species from the chaparral community (Keeley 1986, p. 101). *Ceanothus oliganthus*, also an obligate seeder, was nearly eliminated from chaparral habitat in San Diego County, a location that burned twice within 2 years (Zedler *et al.* 1983, pp. 812–813).

We found one fire ecology study specific to *Ceanothus ophiochilus*, which reported two years of monitoring data (2001 and 2002) after the 2000 Pechanga Wildfire in the Agua Tibia Wilderness Area on the CNF (within portions of both the North and South occurrences) (USFS 2003). A portion of the area was also burned in the 1989 Vail Wildfire (USFS 2003, p. 1). Fewer seedlings were found in the plots in the Agua Tibia Wilderness–South occurrence that burned in both fires (USFS 2003, p. 2). However, due to the low sampling numbers, the percent regeneration rates were not statistically different from those sites only burned once (USFS 2003, p. 2). An extended drought was offered as one explanation for the lower regeneration at the twice-burned site since two other monitored sites were also found to have poor flower and seed production at the time of monitoring (USFS 2003, pp. 2–3). Additional research on both basic and fire ecology of *C. ophiochilus* has been recommended (Sclafani 2012, no page number).

There is very limited information available regarding seed dispersal, seed production, and germination specific to *Ceanothus ophiochilus*. Many plant species with refractory seeds (i.e., seeds that need a fire-related stimulus, alone or in conjunction with other conditions; Keeley 1991, p. 87) have propagules that are not specialized for widespread dispersal and therefore have a relatively short dispersal distance (Keeley 1991, p. 105). *Ceanothus* plants have capsules that eject seeds and studies on two Sierra Nevada *Ceanothus* species, *C. cuneatus* and *C. leucodermis*, found that most seeds fall beneath the canopy vegetation (Evans *et al.* 1987, p. 288); even on open sites, few seeds (less than 2 percent) reached a distance of 29.5 ft (9 m) (Evans *et al.*, 1987, pp. 288–289). A post-fire reproductive study of *C. crassifolius* in the San Gabriel Mountains (Los Angeles County) found seed dispersal distance was approximately twice the mean diameter of mature plants (6.86 ft (2.09 m)) (Davey 1982, pp. iv, 20), or a dispersal distance of about (13.71 ft (4.18 m)). This study also documented harvesting of *C. crassifolius* seeds on the ground and in soils by several granivores (i.e., birds and ants) (Davey 1982, pp. 27–29), but concluded that a sufficient number of seeds remained year-round in the soil to insure stand replacement even after fire events (Davey 1982, p. 35).

In our final critical habitat rule and previous 5-year review, we described how soil type influences the distribution of *Ceanothus ophiochilus* and its hybridization with *C. crassifolius* (USFWS 2007b, pp. 54991–54992; USFWS 2008, pp. 4, 14). Hybridization is common among *Ceanothus* species (Wilken 2012, p. 1153; Fross and Wilken 2006, pp. 132–133). This is attributed, in part, to the lack of barriers to gene flow resulting from pollination by widely foraging insects and close proximity of *Ceanothus* species, which can be increased by both natural and artificial disturbances along the boundaries of plant communities (Fross and Wilken 2006, p. 133).

Introgression, or the backcrossing between hybrids and parents, can result in the loss of some parental characteristics if such backcrossing occurs repeatedly and produces offspring that are better suited because of new genetic combinations to the environment than those found in the parent; thus, favoring the natural selection of the offspring (Stern 1991, p. 235). Genetic assimilation from hybridization and introgression in rare plants can produce several effects including dilution of unique, characteristic alleles, loss of genetically discrete and ecologically specialized plants, and severe outbreeding depression (i.e., a reduction in fitness) (Rieseberg 1991, p. 181).

There appear to be fewer hybrid individuals between *Ceanothus ophiochilus* and *C. crassifolius* at the Vail Lake occurrence and hybridized individuals were described as limited to the margins of this occurrence (Boyd *et al.* 1991, p. 38). At the Vail Lake occurrence, *C. crassifolius* was found to be separated from *C. ophiochilus* by at least 0.2 miles (mi) (0.32 kilometer (km)) and individuals of *C. ophiochilus* were also found exclusively on an pyroxenite-rich outcrop (termed “ophiochilite”) (Boyd and Banks 1995, p. 15). However, at the two Agua Tibia Wilderness Area occurrences, *C. ophiochilus* plants have been described as surrounded by and interlocked with *C. crassifolius*, and considerable numbers of hybrid individuals between the two species have been observed (Boyd and Banks 1995, p. 15). In addition, the Agua Tibia Wilderness occurrences, with the exception of the most southeastern population of plants, have been described as located on gabbro and sedimentary deposits that contain a mixture of gabbro, “ophiochilite,” and granodiorite (Boyd and Banks 1995, p. 15). A 1993 report of soil characteristics reported a higher pH and shallower soil depth for the Vail Lake occurrence when compared with the Agua Tibia Wilderness–South occurrence, where the soil was more clayey and moderate in depth (USFWS 1993, p. 1).

Boyd and Banks (1995, p. 16) indicated that hybridization may be a lesser concern for the management of *Ceanothus ophiochilus* when compared to potential anthropogenic threats. They identified the original grading and additional grading for fire breaks along old Woodchuck Road as example of practices to be reduced to avoid future losses of *C. ophiochilus* within these two occurrences (Boyd and Banks 1995, p. 16).

#### Habitat or Ecosystem

*Ceanothus ophiochilus* is found in chaparral communities west of Vail Lake and in the Agua Tibia Wilderness Area of CNF in southwestern Riverside County at elevations between 1,900 to 3,500 ft (579 to 1,067 m) (Boyd and Banks 1995, p. 14; CNDDDB 2012, pp. 1–6).

This region contains Agua Tibia Mountain, which lies at the north end of a northwest-trending ridge that merges southeastward into Palomar Mountain within the southern California peninsular range (Irwin *et al.* 1970, pp. A2, A5). Deep V-shaped canyons are found on the southwest side of this ridge system with impenetrable vegetation and boulder outcrops covering most slopes, making access to the area difficult (Irwin *et al.* 1970, pp. A2–A3; Boyd and Banks 1995, p. 2).

*Ceanothus ophiochilus* is restricted to isolated patches of gabbro and pyroxenite-rich outcrops (Vail Lake), or within a mix of gabbro and sedimentary deposits (Agua Tibia Wilderness) (Boyd and Banks 1995, p. 15). The xeromorphic (adaptation to drought) features of *C. ophiochilus* including its small leaf size, small stature, and its pubescence are considered similar to the morphological features found in other plant taxa in response to serpentine substrates (Boyd *et al.* 1991, p. 37). In general, serpentine soils are very thin and are derived from ultramafic rocks or rocks rich in minerals (e.g., iron, magnesium, silicates), but poor in plant nutrients such as calcium and phosphorous (Kruckeberg 1984, pp. 18–19, 21; Boyd *et al.* 1991, p. 31, citing Tullock *et al.* 1989, pers. comm.). Although the outcrop of the Vail Lake occurrence is not serpentine, the substrate and soil type is serpentine-like in its physical and chemical composition (Boyd *et al.* 1991, p. 37).

In southwestern Riverside County, *Ceanothus ophiochilus* is found in vegetation identified as *Ceanothus crassifolius*–*Adenostoma fasciculatum* Alliance and *Ceanothus crassifolius* Alliance (Klein and Evens 2005, pp. 118–119, 151–152). Alliances are generic units of vegetation based on a dominant or diagnostic species presence, whereas associations are subdivisions of alliances based on characteristic understory or associated taxa (Klein and Evens 2005, p. 9). Sawyer *et al.* identified these vegetation types as the *Adenostoma fasciculatum* Shrubland Alliance or chamise chaparral and *Ceanothus crassifolius* Shrubland Alliance or hoary leaf ceanothus chaparral (Sawyer *et al.* 2009, pp. 317–320, 438–440). As described in our 2007 critical habitat rule, associated species for *Ceanothus ophiochilus* include: *Adenostoma fasciculatum* (chamise), *A. sparsifolium* (red shank), *Quercus berberidifolia* (scrub oak), *C. crassifolius* (hoary leaf ceanothus), *Arctostaphylos* spp. (manzanita), *Salvia clevelandii* (fragrant sage), and *Eriodictyon crassifolium* (yerba santa) (USFWS 2007b, p. 54992, citing Boyd and Banks 1995, p. 15).

The habitat for the Vail Lake occurrence of *Ceanothus ophiochilus* was described in Boyd *et al.* (1989). Chamise chaparral vegetation was described as the dominant vegetation type for this occurrence, located in the hills west of Vail Lake (Boyd *et al.* 1989, pp. 6–7). The populations of *C. ophiochilus* were found within low-statured (4–6 ft (1.2–1.8 m) tall), chamise chaparral communities with very little understory and within open ridge-top stands (Boyd *et al.* 1989, p. 7). *Ceanothus ophiochilus* was described as a co-dominant with *Adenostoma fasciculatum* and *Salvia mellifera* (black sage) (Boyd *et al.* 1989, p. 7).

The two Agua Tibia Wilderness Area occurrences of *Ceanothus ophiochilus* are also found within native chaparral vegetation. The Agua Tibia Wilderness Area–North occurrence lies within chamise chaparral habitat on ridge tops, with the following, relatively commonly associated species: *Ceanothus crassifolius*, *Eriodictyon crassifolium*, *Quercus berberidifolia*, *Salvia clevelandii*, and *Adenostoma sparsifolium* (Boyd and Banks 1995, p. 15; CNDDDB 2012, EO 2). The Agua Tibia Wilderness Area–South occurrence is located on a narrow band of gabbro outcrops, or on local colluvial deposits of these rock formations resting over granodiorite (Boyd and Banks 1995, p. 15). Associated species found at this southern occurrence include similar chamise chaparral-associated plant species such as *Adenostoma fasciculatum*, *Adenostoma sparsifolium*, *Ceanothus crassifolius*, *Arctostaphylos glauca* (big berry manzanita), *Salvia mellifera* (black sage), and *Mimulus aurantiacus* (sticky monkey flower) (CNDDDB 2012, EO 3).

Fire management practices can have important consequences for *Ceanothus ophiochilus* habitat, although they may not necessarily conflict with habitat management goals for this species if implemented under long fire return interval guidelines (USFS 2005a, p. 262). The original grading of old Woodchuck Road within the CNF may have resulted in direct losses of individual plants within both Agua Tibia Wilderness occurrences, which was made worse by grading activities for fire (fuel) breaks along the road, including for the 1989 Vail Wildfire (Boyd and Banks 1995, p. 16). The 2000 Pechanga Fire burned over a large portion of occupied *C. ophiochilus* habitat and surrounding vegetation in the Agua Tibia Wilderness; however, the potential of these areas burning again in the near future is likely to be relatively low and therefore these areas are not likely to be affected by future fuel suppression activities (USFS 2005a, p. 262). During a recent site visit to the Agua Tibia Wilderness–North occurrence in Spring 2013, a USFS biologist familiar with this burned area noted that the recovery of



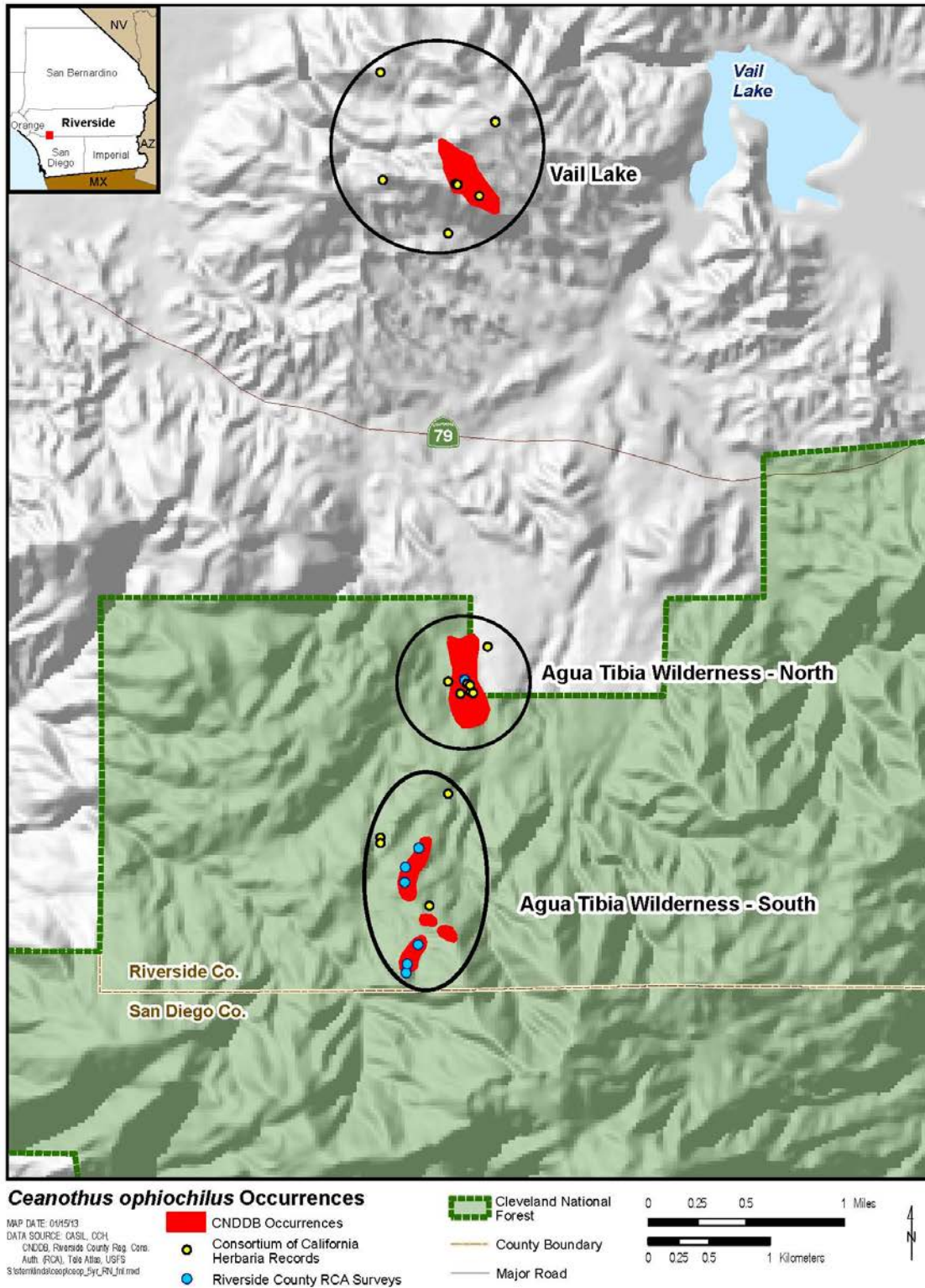
*C. ophiochilus* populations at this site was at least 80 percent recovered to conditions preceding the two fires (USFWS 2013). A brief survey at that time noted over 33 individuals of *C. ophiochilus* (not plants considered to be hybrids) at this occurrence (USFWS 2013).

### Spatial Distribution and Abundance

*Ceanothus ophiochilus* is a narrow, edaphic endemic plant found only within a narrow geographic range of southwestern Riverside County, California. The known range spans a narrow corridor approximately 4.6 mi (7.4 km) long and about 0.6 mi (0.97 km) wide covering approximately 108 ac (44 ha), based on CNDDDB distribution data (CNDDDB 2012, EO 1–3) and Consortium of California Herbaria (CCH) records (CCH 2012) (see Figure 1). Besides *C. ophiochilus*, several other California *Ceanothus* species have very restrictive geographical ranges, which are often associated with specific geological formations and substrates, and with topography defined by varying slopes and erosional features (Fross and Wilken 2006, pp. 135, 140). These elements have been created from a diverse mosaic of climate, topography, and geologic processes that define regional and local landscapes in western North America, including the California Floristic Province (Fross and Wilken 2006, p. 135).

Floristic surveys were conducted in the 1989 at Vail Lake, the type locality for *Ceanothus ophiochilus* (Boyd *et al.* 1989), and in the early 1990s in the CNF Agua Tibia Wilderness Area (Boyd and Banks 1995). At the time of listing, *Ceanothus ophiochilus* was distributed in three occurrences, one west of Vail Lake and two in the Agua Tibia Wilderness Area (USFWS 1998, p. 54957). In our proposed critical habitat rule, we defined one unit (Western Riverside County), with two subunits (Subunit 1A–Vail Lake, Subunit 1B–Agua Tibia Mountains), as essential to the conservation of *C. ophiochilus* (USFWS 2006, p. 58349). These two subunits include the three known occurrences described in the final listing rule (USFWS 1998, p. 54957). Subunit 1B–Agua Tibia Mountains contained two of the three CNDDDB Element Occurrences (USFWS 2006, p. 58349). Private lands within proposed Subunit 1A–Vail Lake and the remainder of Subunit 1B were excluded from designation (USFWS 2007b, p. 54995). We determined in our analysis that the benefits of exclusion outweighed the benefits of inclusion due to the partnerships that we have developed with local jurisdictions and project proponents in the development of the Western Riverside County MSHCP and the fostering of additional partnerships for the benefit of species on non-Federal lands (USFWS 2007b, p. 55001). Therefore, our final critical habitat designation in 2007 included only one portion of Subunit 1B–Agua Tibia Mountains (USFWS 2007b, p. 54995). In this 5-year review, we are using the previous occurrences described in our 2008 5-year review to define the locations of observations and collections of *C. ophiochilus* using the CNDDDB dataset (EOs 1–3) (CNDDDB 2012, pp. 1–6), survey reports (Western Riverside County Regional Conservation Authority (RCA) 2009, p. 26), and herbarium collections (CCH 2012). Specifically, we are defining three occurrences to represent the current geographical range of *C. ophiochilus*: (1) Vail Lake, (2) Agua Tibia Wilderness Area–North, and (3) Agua Tibia Wilderness Area–South (see Figure 1).

Using polygon boundaries defined by the CNDDDB occurrences (CNDDDB 2012; GIS datalayer), we estimated that approximately 60 percent (64.3 ac (26 ha)) of the chamise chaparral habitat where *Ceanothus ophiochilus* has been observed is found on lands owned and managed by the



**Figure 1: Distribution of *Ceanothus ophiophilus* (Vail Lake ceanothus); prepared for 2013 5-year Review.**

USFS as part of CNF (USFWS 2012b, GIS analysis). This includes the entire Agua Tibia Wilderness Area–South occurrence, and a portion of the Agua Tibia Wilderness Area–North occurrence. The remaining populations are on private lands found: (1) within the Vail Lake occurrence (approximately 33.4 ac (13.5 ha)), (2) within a portion of the Agua Tibia Wilderness Area–North occurrence outside of CNF (approximately 6.2 ac (2.5 ha)), or (3) within a portion of the Agua Tibia Wilderness Area–North occurrence located on inholdings within CNF (approximately 3.4 ac (1.4 ha)) (USFWS 2012b).

Comprehensive surveys of *Ceanothus ophiochilus* within the three occurrences have not been conducted since 1995 (Boyd and Banks, 1995). However, a few additional specimens of *C. ophiochilus* plants have been collected within the Vail Lake and Agua Tibia Wilderness–North occurrences (see CNDDDB 2012, EOs 1–3; CCH 2012, e.g., Burge 798c (RSA#779957)). Therefore, we believe that the geographical range of *C. ophiochilus* is largely the same as the time of listing.

An estimated 3,000 to 5,000 *Ceanothus ophiochilus* individuals were reported for the Vail Lake occurrence in 1993 (Shaffer 1993, p. 4). In 1995, Boyd and Banks provided population estimates of “*C. ophiochilus*-like” plants of 2,000 to 4,000 individuals for the Agua Tibia Wilderness–North occurrence, and approximately 6,000 to 12,000 individuals for the Agua Tibia Wilderness–South occurrence (Boyd and Banks 1995, p. 16). Shaffer reported an estimate of 500 *C. ophiochilus* plants for the Agua Tibia Wilderness–North occurrence, and 4,600 individuals for Agua Tibia Wilderness–South occurrence (Shaffer 1993, p. 4; CNDDDB 2012, pp. 3, 5). Rare plant surveys completed in April 2008 under requirements of the Western Riverside County Multispecies Habitat Conservation Plan (MSHCP) by the Western Riverside County RCA recorded seven locations of *C. ophiochilus* in the Agua Tibia Wilderness–North and Agua Tibia Wilderness–South occurrences (Western Riverside County RCA 2009, p. 26). The estimates of the numbers of individuals within the 7 locations ranged from 3 to 150 plants (A. Malisch, Western Riverside County RCA, 2013, pers. comm.).

#### Changes in Taxonomic Classification or Nomenclature

No papers have been published nor has new information become available since the listing of *Ceanothus ophiochilus* to change the name, taxonomic status, or systematic position of the species.

#### Genetics

We are unaware of any completed or proposed studies focused exclusively on the genetics of *Ceanothus ophiochilus*. As noted above, hybridization is a common phenomenon for *Ceanothus* species (Fross and Wilken 2006, p. 133) and *C. ophiochilus* is known to hybridize with *C. crassifolius* at all three occurrences. Genetic assimilation of *C. ophiochilus* resulting from hybridization and introgression is discussed in more detail below under **FACTOR E** threats.

### Species-specific Research and/or Grant-supported Activities

None known.

### 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 specific 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 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 *Ceanothus ophiochilus*. This species exhibits several attributes that might limit its distribution and population growth. These attributes include:

- 1) Restriction of the species to specific habitats (i.e., specialized niche) found within a narrow range in southwestern Riverside County.
- 2) Dependence on a wildland fire regime with a fire return interval of approximately 10 to 20 years, with high intensity, which has been altered by human activities.
- 3) Susceptibility to hybridization and introgression with co-existing *Ceanothus* species that can be enhanced by human disturbances of its habitat.

All of these attributes, but particularly habitat specificity, represent significant vulnerabilities for *Ceanothus ophiochilus*. These vulnerabilities may separately, or together, exacerbate any of the threats described below in our five-factor analysis.

### **Five-factor Analysis:**

The listing rule for *Ceanothus ophiochilus* described ongoing and threatened destruction and modification of habitat by urban and recreational development and grading of fire breaks (USFWS 1998, p. 54961). Additional threats described at the time of listing included vandalism, fire management, and hybridization and introgression (USFWS 1998, pp. 54962–54965).

Since listing, the effects of climate change has been identified as an additional threat to *Ceanothus ophiochilus*. 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 *Ceanothus ophiochilus* attributable to **Factor A** at the time of listing were urbanization, off-road vehicle use, and fire management practices, resulting in habitat modification, destruction, degradation, and fragmentation (USFWS 1998, p. 54961). We evaluate off-road vehicle use and other recreational uses as a habitat threat under **FACTOR A** in this 5-year review. Threats related to changes in fire regimes and related fire management practices previously described in the listing final rule under **Factors A** and **E** are now summarized in one heading (Wildland Fire and Fire Management) under **FACTOR A**. The current threats attributable to **FACTOR A** are therefore described below under the following headings: Urban Development, Recreational Activities, Invasive Nonnative Plants, and Wildland Fire and Fire Management.

### Urban Development

At the time of listing, we indicated that much of southwestern Riverside County was expected to become more urbanized based on development trends and planned developments on private lands in the Vail Lake area (USFWS 1998, p. 54961). In our 2008 5-year review, we re-evaluated the proposed developments for this area and stated that the most recently proposed, large-scale development (Specific Plan No. 324) for this area had not been acted upon and the project was inactive (USFWS 2008, p. 8). However, we concluded that urban development in the Vail Lake area remained a significant threat to the Vail Lake occurrence of *Ceanothus ophiochilus* since no assurances of the conservation of this species have been made (USFWS 2008, p. 8).

At present, the only Specific Plan on file with Riverside County Planning Department within the Vail Lake occurrence is Specific Plan No. 324. This proposed project is currently “on hold,” and there has been no activity recorded since 2004 (A. Rush, Principal Planner, Riverside County, 2013, pers. comm.). Therefore, at this time, we believe that urbanization remains a potential, though uncertain, threat to *Ceanothus ophiochilus* within the Vail Lake occurrence.

The Agua Tibia Wilderness–North occurrence also includes some private lands. Approximately 9.6 ac (3.9 ha) of private lands (or 22 percent) are included in this occurrence, as defined within the CNDDDB-defined polygon (43.3 ac (17.5 ha)) for this occurrence. This includes lands both inside (inholding) (3.4 ac (1.4 ha)) and outside (6.2 ac (2.5 ha)) the CNF (USFWS 2012b). Threats to *Ceanothus ophiochilus* from these residential developments are primarily indirect effects from activities such as fire suppression practices and from an increase threat of fire due to closer proximity to anthropogenic activities, which can increase the historical fire return frequency.

In summary, we believe that urban development represents a potential threat to *Ceanothus ophiochilus* at two of the three occurrences. Though this is not an imminent threat, it potentially impacts those populations of *C. ophiochilus* found on private lands within the Vail Lake occurrence, which represent approximately 31 percent of the total mapped localities for this species and has exhibited the lowest incidence of apparent hybrid individuals. Indirect effects of

urbanization on adjacent private lands remain a lesser threat within the Agua Tibia Wilderness–North occurrence on CNF lands.

### Recreational Activities

Dispersed recreation (e.g., camping, hiking, mountain bike activity) is an occasional, ongoing use at the Agua Tibia Wilderness occurrences (USFS 2012b, p.41). The use of exiting trails or the creation of new trails within the Agua Tibia Wilderness occurrences located on CNF lands represents a potential threat to *Ceanothus ophiochilus* primarily from soil compaction of habitat, although trampling of individual plants may also result from these activities. However, no designated USFS trails currently intersect with habitat occupied by *C. ophiochilus* (USFS 2012b, p. 41) and the recreational use, although allowed in or near the two Agua Tibia Wilderness occurrences within CNF by the public, is limited because access is controlled by adjacent private lands (USFS 2012b, pp. 40–41). A previously constructed fuel break along Old Woodchuck Road has been described as an “unofficial” trail in the Agua Tibia Wilderness; however, access to this trail requires traversing private lands, which limits its use by the public (USFS 2012b, p. 40). The northern portion of this “trail” is also well vegetated, making hiking somewhat difficult to the locations of *C. ophiochilus*. 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). We have no new information on recreational use at the Vail Lake occurrence, which is also relatively inaccessible.

In summary, impacts to *Ceanothus ophiochilus* associated with recreational activities do not represent a threat at this time given the remote location of all three occurrences and their limited access.

### Invasive Nonnative Plants

In our listing rule, we mentioned the threat of invasive plants related to potential urban development (**FACTOR A**) at the Vail Lake occurrence (USFWS 1998, p. 54961) and potentially resulting from the construction of fire breaks (**FACTOR E**). We did not discuss this threat in detail in our previous 5-year review. Threats related to fire breaks are discussed in more detail below under Wildland Fire and Fire Management.

Invasive nonnative plants have been identified by the USFS as a threat to habitat quality for *Ceanothus ophiochilus*, particularly in those areas within the Agua Tibia Wilderness occurrences where recent wildland fire has exposed bare soils and created unclassified trails as a result of fire suppression activities (USFS 2005a, p. 259). Roads and road construction from grading of fuel breaks facilitate the introduction and establishment of invasive nonnative plants (discussed above) by creating open, continually disturbed habitat. Invasive nonnative plants can also be transported along these corridors by equipment and other vehicles, as well as recreational uses, and can become more readily established on exposed cut-and-fill slopes of roads than native plants (USFS 2005e, Volume 1, p. 114).

The control of invasive nonnative species within the Agua Tibia Wilderness occurrences within CNF could also affect its habitat. Activities conducted by the USFS associated with the removal of invasive plants may have short-term adverse effects to *Ceanothus ophiochilus*. However, actions to control invasive nonnative species, if determined to be necessary, would likely provide long-term benefits to *C. ophiochilus* when directed toward invasive nonnative plants that might impact its habitat or which have the potential to compete with this species for space and other life history requirements (USFS 2005a, p. 259). Short-term adverse effects from these activities to control invasive plant species would be mitigated by use of USFS Best Management Practices and Forest Plan Standards S6, S12, and S24 (USFS 2005a, p. 259). A recent site visit to the Agua Tibia Wilderness–North occurrence revealed relatively very few invasive plants, particularly in areas further away from the graded area of Woodchuck Road (USFWS 2013). We have no current information as to whether invasive nonnative plants pose a threat to *C. ophiochilus* at the Vail Lake occurrence; however, we believe the low level of disturbance to the occurrence due to its limited access, which reduces the potential for the introduction or establishment of invasive nonnative plants from human activities.

In general, based on the best available information, we believe that invasive nonnative plants is not currently a significant threat to *Ceanothus ophiochilus*. However, adverse changes in fire frequency within its geographical range (as discussed below) may alter habitat conditions that could increase the level of this threat to impact conservation of the species in the future.

#### Wildland Fire and Fire Management

In our listing rule, we identified the change in fire cycle regimes (or fire frequency) as a threat to *Ceanothus ophiochilus* and other plants adapted to specific fire frequencies (USFWS 1998, p. 54964). Changes occurred from increased incidence of local accidental fires and less frequent natural fires resulting from human activity in fire prone areas (e.g., Vail Lake occurrence). We also highlighted fire management practices including grading of *C. ophiochilus* habitat for fire or implementation of fuel breaks as an important threat to this species for all three occurrences (Boyd 1991, pp. 2, 8; Boyd and Banks 1995, p. 16; USFWS 1998, p. 54961).

In our 2008 5-year review, we indicated that efforts were implemented to reduce the impacts to *Ceanothus ophiochilus* habitat from grading of fuel breaks within the Agua Tibia Wilderness Area (USFWS 2008, p. 8). However, we also noted the potential for continued use of the Old Woodchuck Road as a fuel break, in part, to protect adjacent private homes located within the Agua Tibia Wilderness–North occurrence (USFWS 2008, p. 8). Therefore, we concluded that the impact of fuel breaks on occurrences of *C. ophiochilus* remained a threat within the CNF (USFWS 2008, p. 9). The threat of altered fire regimes was also discussed in our previous 5-year review (under Factor E) due to drought, invasive plants, and increased human presence (USFWS 2008, p. 15). We concluded that the increased fire frequency was a threat to all three occurrences of *C. ophiochilus* (USFWS 2008, p. 15).

Fire management and suppression activities including fire line construction, fire retardant and water drops, establishment of temporary fire camps, staging areas, parking sites, safety zones, helipads, and post-fire rehabilitation can affect *Ceanothus ophiochilus* habitat (USFWS 2005, p. 27). As an example, safety zone and fire line construction can involve the use of bulldozers to

clear vegetation and parking areas and fire camps, resulting in heavy trampling and soil compaction from equipment and vehicles. Fire lines can be cut through habitat and alter hydrological patterns as well as destroy individual plants or encourage the establishment of nonnative species (USFWS 2005, p. 27).

The USFS stated in their 2005 Environmental Impact Statement for the Southern California National Forest Management Plans that the primary threat to the two *Ceanothus ophiochilus* occurrences found within the Agua Tibia Wilderness of CNF was the short-interval reburns of its populations, noting that all of these locations had burned in the 2000 Pechanga Fire (USFS 2005e, Volume 1, p. 121). The USFS has also noted that the fires within this section of the Agua Tibia Wilderness are generally started in areas outside USFS lands and therefore wildland fire prevention efforts for the two Agua Tibia Wilderness occurrences of *C. ophiochilus* often do not fall under the control of USFS (USFS 2005e, Volume 1, p. 121).

Under the programmatic direction of the revised Land Management Plans for the Four Southern California National forests, future fuel treatments on the CNF may have short-term impacts to *Ceanothus ophiochilus*, but these activities would be conducted to provide long-term benefits to the species (USFWS 2005, p. 131). 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 *C. ophiochilus* would still be subject to project-level section 7 consultation (USFWS 2005, p. 15).

The potential for impacts from fire suppression on USFS lands is also reduced by implementation of USFS Forest Plan Standard 38, which avoids establishment of staging areas, helibases, base camps, fuel breaks, or other areas of human concentration and equipment use within listed, proposed, and candidate species habitats, where practicable (USFWS 2005, p. 27). Biologists at the CNF worked with fire planners in 2012 to identify locations of threatened or endangered species and their habitats (USFWS 2013).

### **Summary of Factor A**

Urban development within the Vail Lake occurrence could impact 31 percent of the mapped habitat and therefore remains a direct, but is not currently an imminent threat to *Ceanothus ophiochilus*. Indirect activities from adjacent residences at the Agua Tibia Wilderness–North occurrence represent a much lesser urban development threat. Recreational use is not considered a current threat at any of the *C. ophiochilus* occurrences, in large part, due to their inaccessibility from adjacent private lands, which limits access to both the Vail Lake and Agua Tibia Wilderness–North occurrences. The survival and recovery of *C. ophiochilus* is not currently threatened from invasive nonnative plants, but the level of this threat could change should fire frequencies be altered within the species geographical range. Fire and fire fuels management activities represent the primary habitat threat to *C. ophiochilus* at all three of its occurrences; however, we believe this threat has been reduced since the time of listing due to the implementation of protective measures by the USFS within the two Agua Tibia Wilderness occurrences.



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

In our listing rule, we stated that no evidence exists to indicate that overutilization is a factor in the decline of *Ceanothus ophiochilus*, but we indicated that the species was vulnerable to both collection and vandalism (USFWS 1998, p. 54962). The threat of vandalism is discussed below under **FACTOR E**. In our 2008 5-year review, we stated that this species had been cultivated at the Rancho Santa Ana Botanic Garden from seeds and cuttings collected from all three occurrences prior to its listing (USFWS 2008, p. 9, citing S. Boyd 2007, pers. comm.). We indicated that no new requests for permits for collection of *C. ophiochilus* on USFS lands had been received since the time of listing (USFWS 2008, p. 9) and, relatedly, noted the limited access to private lands and the difficulty in accessing locations where this species is found (USFWS 2008, p. 9, citing L. Young, USFS, 2007, pers. comm.). We therefore concluded that no evidence exists for utilization, and this factor is not a threat to the conservation and recovery of *C. ophiochilus* (USFWS 2008, p. 9). We have no new information to support this potential threat, and do not believe that overutilization for commercial, recreational, scientific, or educational purposes poses a threat to *C. ophiochilus* at this time.

## **FACTOR C: Disease or Predation**

### Disease

Disease was not known to be a threat to *Ceanothus ophiochilus* at the time of listing (USFWS 1998, p. 54962) or at the time of our 2008 5-year review (USFWS 2008, p. 9). 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 *Ceanothus ophiochilus* (USFWS 1998, p. 54962) or at the time of our 2008 5-year review (USFWS 2008, p. 9). We have no new information indicating that predation is a current threat to the species.

### **Summary of Factor C**

Based on the best available information, neither disease nor predation currently poses a threat to *Ceanothus ophiochilus*.

## **FACTOR D: Inadequacy of Existing Regulatory Mechanisms**

At the time of listing, regulatory mechanisms considered to provide some protection for *Ceanothus ophiochilus* 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; (2) Federal laws and regulations including the National Environmental Policy Act (NEPA), Endangered Species Act (the Act), and section 404 of the Clean Water Act; and (3) local land use processes and ordinances (USFWS 1998, p. 54962). Land acquisition and management by various Federal,

State, or local government agencies, or by private conservation organizations was also evaluated in the listing rule.

In our 2008 5-year review, we evaluated the State protections provided under the NPPA, CESA, CEQA, and NCCP and Federal protections including NEPA and the Act. We concluded that, while State laws provided some protection of *Ceanothus ophiochilus* 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 *C. ophiochilus*. 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 1994, the California Fish and Game Commission listed *Ceanothus ophiochilus* as endangered 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 *C. ophiochilus* (Chapter 10, Section 1908, and Chapter 1.5, Section 2080–2085, CFG Code).

Under CESA, activities are subject to permit requirements and consultation with California Department of Fish and Wildlife (CDFW) (formerly California Department of Fish Game) if they would result in an adverse effect to a State-listed species (Consultation “Take” Authorization, Section 2080.1 or 2081 of the California Fish and Game 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 *Ceanothus ophiochilus* 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 Fish and Game 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 habitat conservation plans (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 *Ceanothus ophiochilus* 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 *C. ophiochilus* are discussed below under the Act in the **Federal Regulatory Mechanisms** section.

#### 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).

*Ceanothus ophiochilus* is listed by the California Native Plant Society (CNPS) as **1.B.1** or rare, threatened, or endangered in California and elsewhere, and seriously endangered in California (CNPS 2012). 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 1, 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 the wildlife of California under CEQA (Section 15386), including the plants, ecological communities and the 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 provides some level of protection against current threats to *Ceanothus ophiochilus*, 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 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 *Ceanothus ophiochilus*, 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 *C. ophiochilus* 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 RNAs 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/>). These areas fall under Forest Service Manual Directive 4063, Research Natural Areas, and these areas are subject to use only for research and development, study, observation, monitoring, and educational activities that maintain unmodified conditions. In addition, Directive 4063.3 provides direction regarding protection and management standards for RNAs that covers a broad range of activities including the following: No roads, trails, fences, or signs are permitted on an established RNA unless they contribute to the objectives or to the protection of the area (USFS 2005d, Appendix A, p. 19). Under the Organic Act, the Agua Tibia Research Natural Area (RNA) (517 ac (209 ha)), located within the Agua Tibia Wilderness, was established for the study of *Pseudotsuga macrocarpa* (bigcone Douglas fir trees) (USFS 2005c, pp. 35–36). The Agua Tibia Wilderness–South occurrence is located within this RNA. This designation provides an additional protection to this occurrence.

#### National Forest Management Act (NFMA)

The NFMA (16 U.S.C. § 1600 *et seq.*) requires the 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 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 the 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.* 2001, 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

Under the authority of the Wilderness Act (16 U.S.C. 1131 *et seq.*), Congress designated the Agua Tibia Wilderness, which now totals 17,924 ac (7,254 ha) (see PL 93–632, 88 Stat. 2154, 16 U.S.C. 1132 note; and PL 111–11, 123 Stat. 1062), and includes lands managed by both USFS and Bureau of Land Management. This Wilderness Act encompasses all of Agua Tibia Wilderness Area–South occurrence, and most, but not all, of the CNF lands found within the mapped Agua Tibia Wilderness–North occurrence of *Ceanothus ophiochilus* (USFWS 2012b). The Wilderness designation provides protection of *C. ophiochilus* found within the two Agua Tibia Wilderness occurrences through agency mandates that require preservation of its wilderness character (USFS 2005d, Appendix A p. 41).

The USFS Directive System codifies the agency’s policies, practice, 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](http://www/fs/fed/us/im/directives/dughtml/serv_fsm.html)). As an example, potential effects from fuels management (prescribed fire) to *Ceanothus ophiochilus* habitat can be avoided or mitigated by Forest Plan Standards S6, S11, S12, S24, and S37 (USFS 2005a, p. 262). Implementation of Forest Plan Standard S38 and CNF S7 can reduce the risk to occupied or suitable *C. ophiochilus* 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. 262).

### Endangered Species Act of 1973, as amended (Act):

Since listing, the Act is the primary Federal law providing protection for *Ceanothus ophiochilus*. 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 2007b, pp. 54984–55010).

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, which 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 USFS in southern California, including the Trabuco District of CNF where the two Agua Tibia Wilderness occurrences of *Ceanothus ophiochilus* are found. As an example, the USFS submitted a biological assessment to review the effects of ongoing management activities of CNF (USFS 2012b) and to meet consultation requirements for the Service's programmatic biological opinion (USFWS 2005) 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 addresses activities related to forest roads, trails, developed recreation sites, dispersed recreation, and administrative infrastructure (USFS 2012b, p. 7). It also provides updated information on existing conditions and effects of USFS management within CNF for *C. ophiochilus* and other federally listed plants and their critical habitat (USFS 2012b, pp. 40–41).

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 Conservation Fund: (1) Conservation Grants, (2) HCP Assistance Grants, (3) HCP Land Acquisition Grants, and (4) 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 *Ceanothus ophiochilus* 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 is a large-scale, multi-jurisdictional NCCP/HCP permitted under section 10(a)(1)(B) of the Act and is discussed 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-ac 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, *C. ophiochilus* 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. 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 *C. ophiochilus* (USFWS 2004, p. 391).

Management actions defined for *Ceanothus ophiochilus* within the Western Riverside County MSHCP include: (1) A general management measure to maintain and manage wetland habitat, to the extent feasible, in a condition similar to or better than the habitat’s condition at the time the lands were conveyed to the Western Riverside County MSHCP Conservation Area; and (2) a species-specific management activity wherein which reserve managers are required to manage the known and future occurrences of *C. ophiochilus* for competition with nonnative species, flood control activities, and alteration of the natural fire regime (Dudek and Associates 2003, pp. 5–5, 5–34).

In addition, conservation objectives identified in the Western Riverside County MSHCP for *Ceanothus ophiochilus* include the following: (1) Include within the Western Riverside County MSHCP Conservation Area at least 13,290 ac (5,378 ha) of suitable habitat (i.e., chaparral in the vicinity of Vail Lake and the Agua Tibia Wilderness), (2) include within the Western Riverside County MSHCP Conservation Area at least three core locations in the vicinity of Vail Lake and the Agua Tibia Wilderness area, and (3) conduct surveys as part of the project review process for public and private projects within the Western Riverside County MSHCP Criteria Area where suitable habitat is present, described in detail below (Dudek and Associates 2003, p. 9–144).

For *Ceanothus ophiochilus*, surveys are required within defined boundaries of the Criteria Area (Dudek and Associates 2003, Figure 6–2). For locations with positive survey results, 90 percent of those portions of the property that provide for long-term conservation value for the identified species will be avoided until it is demonstrated that species-specific conservation objectives for these species are met. Within the Western Riverside County MSHCP conservation area, surveys for *C. ophiochilus* are required every 8 years to verify occupancy for at least 75 percent of known localities; if a decline in distribution is observed below this threshold, management activities are triggered, as appropriate, to meet the species-specific objectives identified in the



plan. In addition, if an area is identified as containing large numbers of individuals or is determined to be important to the conservation of *C. ophiochilus*, but is currently outside the reserve design defined by the Western Riverside County MSHCP, there is flexibility for criteria refinement and these locations can be added as Additional Reserve Lands or Acquisition Lands. Approximately 14 ac (5.7 ha) of the Vail Lake occurrence are currently identified as Acquisition Lands, using the CNDDDB-defined polygon of *C. ophiochilus* Element Occurrences (USFWS 2012b).

The Western Riverside County MSHCP provides a comprehensive, habitat-based approach to the protection of covered species, including *Ceanothus ophiochilus*, by focusing on lands identified as important for the long-term conservation of its covered species and through the implementation of management actions for conserving those lands. These protections are outlined in the management actions and conservation objectives described above (Western Riverside County RCA *et al.* 2003, p. 51). We believe the Western Riverside County MSHCP therefore provides an additional layer of regulatory protection to covered plants and animals, including *C. ophiochilus*.

In summary, the Act is the primary Federal law providing protection for *Ceanothus ophiochilus*, primarily through section 7 and section 10. Other Federal laws and regulations that confer protections including provisions under the Wilderness Act and 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 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.

### **Summary of Factor D**

Existing State regulatory mechanisms provide some level of protection to *Ceanothus ophiochilus* 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 defined within the Western Riverside County MSHCP and the plan provides a level of regulatory protection related to any proposed developments on private lands within the Vail Lake occurrence. The Western Riverside County MSHCP indicates that all of the *known* locations of *C. ophiochilus* will be conserved (Dudek and Associates 2003, p. 9–145).

Federal regulatory mechanisms have also reduced the overall loss and degradation of habitat of *Ceanothus ophiochilus* by virtue of its 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 for the Agua Tibia Wilderness occurrences provided

under the Wilderness Act, 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 *Ceanothus ophiochilus*, 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 provides a comprehensive, landscape-level protection for plants such as *C. ophiochilus* that are limited geographic distribution and require specialized habitat and management requirements.

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

At the time of listing, we identified the following **Factor E** threats to *Ceanothus ophiochilus*: (1) changes in fire regime as a result of human activities and fire management practices and (2) hybridization and introgression (USFWS 1998, pp. 54964–54965). Threats associated with fire and fire management practices are now addressed under **FACTOR A Wildland Fire and Fire Management**. Threats related to vandalism (discussed in the listing rule and our 2008 5-year review under **FACTOR B**), and hybridization or introgression are included here under **FACTOR E**. Impacts to *C. ophiochilus* associated with climate change were not identified as threats at the time of listing, but are also evaluated here under **FACTOR E**.

Vandalism

In our final listing rule, we stated that vandalism was a threat to *Ceanothus ophiochilus* for those occurrences found on private lands (USFWS 1998, p. 54962). However, in our 2008 5-year review, we indicated that we had not identified or documented vandalism events since the time of listing, but stated that vandalism was a general threat to *C. ophiochilus* within the Vail Lake occurrence (private lands) (USFWS 2008, p. 9). The Vail Lake occurrence has not been surveyed by the Western Riverside County RCA as part of its Biological Monitoring Program established under the Western Riverside County MSHCP (Western Riverside RCA 2009, p. 26). The most recent reported observation of *C. ophiochilus* within this occurrence was in 2009 (CNDDDB 2012, pp. 1–2) in which the observed populations were described as “locally abundant” (CCH 2012; Burge #DOB1065). The USFS indicated that this threat does not exist for the two Agua Tibia Wilderness occurrences, in large part to the difficulty in accessing these areas (Winter 2013, pers. comm., cited in USFWS 2013).

We have no information as to indicate that vandalism is an ongoing threat at the Vail Lake occurrence and do not believe this threat currently exists for the two Agua Tibia Wilderness Area occurrences.

Hybridization and Introgression

Our listing rule discussed hybridization and introgression for *Ceanothus ophiochilus* as they relate to genetic variability (and viability) of small plant populations with limited distribution (USFWS 1998, pp. 54964–54965). In that rule, we acknowledged that apparently hybrid individuals between *C. ophiochilus* and *C. crassifolius* were found in all occurrences, but we

indicated that they were much less prevalent within the Vail Lake occurrence (USFWS 1998, p. 54964). We identified hybridization and genetic introgression with *C. crassifolius* as a major threat to *C. ophiochilus* where the two species co-occur in our 2008 5-year review (USFWS 2008, p. 14).

As discussed above in Species Biology and Life History, the plants found within the Vail Lake occurrence of *Ceanothus ophiochilus* have a greater physical separation from *C. crassifolius* populations than the two Agua Tibia Wilderness occurrences. The Agua Tibia Wilderness occurrences have also experienced more natural and artificial disturbances, which may facilitate the persistence of the hybrids.

We are not aware of any field or lab studies conducted to assess the long-term loss of genetic variability and viability of *Ceanothus ophiochilus* from hybridization or introgression. As noted above, the last assessment of the hybridization for all three occurrences was in 1995 and focused primarily on anthropogenic facilitation of the natural process of hybridization rather than the genetic assimilation threat to *C. ophiochilus* that may result from continued hybridization and introgression (Boyd and Banks 1995, p. 16). Without genetic evaluations and comprehensive surveys within the three occurrences, it is difficult to assess the nature and extent of hybrid individuals; thus, it is unclear if hybridization or introgression represents a current threat to *C. ophiochilus* at this time. Continued monitoring of disturbance to all three occurrences is needed in conjunction with additional genetic viability studies to better evaluate these two related threats to *C. ophiochilus*.

### Climate Change

Our analyses under the Endangered Species 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). Wildfire impact projections from Cal-Adapt's Climate Tools indicate a slight increase in fire risk (measured as potential amount of area burned) for 2085 relative to 2010 levels; specifically, an increase of 10 percent (relative risk=1.1) under low emissions and an increase of 5 percent (relative risk=1.05) under high emissions scenario. A 3 percent increase in fire risk is projected under both scenarios for 2050 when compared to 2010 levels. Projected changes in annual average in temperature for this region using the Cal-Adapt tool indicates, under the B1 scenario, a 3.8°F (2.1°C) increase in temperature, and a 6.6°F (3.7°C) increase under the A2 scenario, between the baseline period (1961–1990) and the end of century period (2070–2090). Vegetation changes are also expected. In southwestern California, areas of chaparral/coastal scrub are projected to decrease by 38 to 44 percent by 2070, while grassland, which currently occupies 3 percent of this region, is projected to increase by 345 to 390 percent (PRBO Conservation Science 2011, p. 42).

The projected decrease in chaparral habitat and considerable increase in grassland habitats noted above for southwestern California has the potential to negatively affect *Ceanothus ophiochilus* through the loss of its habitat. The projected increase in grassland communities may also increase the fire frequency in adjacent chamise chaparral communities, affecting the sustainability of the species. Additionally, component species in these plant communities may respond differently to changing environmental conditions induced or made worse by climate change effects. All of these factors may also affect the physical distance or ecological barriers that currently separate the two *Ceanothus* species and thus may change the nature and extent of threat of hybridization and introgression.

### **Summary of Factor E**

For the Vail Lake occurrence, the threat of vandalism to *Ceanothus ophiochilus* remains an unknown, but is unlikely to be a threat at this time given the difficulty in accessing this area. We do not believe vandalism is a threat to *C. ophiochilus* at the two Agua Tibia Wilderness occurrences, which are located primarily on public lands within CNF with limited access.

Loss of genetic identity and viability of *Ceanothus ophiochilus* through hybridization and introgression with *C. crassifolius* is believed to be a continued threat at this time at all occurrences, though the level cannot be determined without additional studies in the field or with controlled experiments.

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 *Ceanothus ophiochilus* due to predicted changes to its habitat. Climate model predications also indicate a slight increase in fire risk to the geographical range of

*C. ophiochilus*, which, when combined with anthropogenic facilitation, can produce a shortening of the fire return interval and affect its ability to recover and maintain its viability in the chaparral ecosystem.

### III. RECOVERY CRITERIA

A recovery plan has not been completed for *Ceanothus ophiochilus*.

### IV. SYNTHESIS

There are currently three occurrences of *Ceanothus ophiochilus* in southwestern Riverside County, identified as: (1) Vail Lake, (2) Agua Tibia Wilderness–North, and (3) Agua Tibia Wilderness–South. The distribution of *C. ophiochilus* largely remains as identified at the time of listing. We currently have no comprehensive abundance estimate of *C. ophiochilus*; however, we believe that, since listing, the numbers of individuals has remained largely the same in most areas, with a small decline in numbers from two wildfires within the Agua Tibia Wilderness occurrences.

The primary threats identified at the time of listing were those associated with urbanization and off-road vehicle use, grading of habitat for fire breaks, vandalism, and altered fire regimes. Hybridization and introgression were also identified as potential threats within habitats occupied by *Ceanothus ophiochilus*. Impacts from recreational use and invasive nonnative plants are not considered significant threats to any of the occurrences due to the lack of disturbance and their limited access and location within rugged terrain. Vandalism is also not considered to be a current threat.

The effects of fire and fire management practices and urban development represent the most important threats to *Ceanothus ophiochilus*. The USFS is implementing design features, best management practices, and other protective measures to minimize the direct and indirect effects of fire and fire management within the two Agua Tibia Wilderness occurrences. Though the Vail Lake occurrence is located entirely on private lands, it does not appear to be immediately threatened by proposed development. However, residential development located near portions of the Agua Tibia Wilderness–North occurrence represents a source of indirect threats for this occurrence.

Hybridization and introgression also continue to be a threat to *Ceanothus ophiochilus*, although the extent and degree of this threat at each occurrence is difficult to assess without additional studies. The effects of climate change, particularly an increase in temperature and altered precipitation patterns, are likely an important rangewide threat to *C. ophiochilus* and its habitat.

Protective regulatory mechanisms that have changed since listing include a revision of the USFS planning rule, the development of revised land and resource management plans, and the designation of critical habitat. These mechanisms provide a more comprehensive level of conservation planning that is reducing the magnitude of threat within occurrences of *Ceanothus ophiochilus* located on USFS lands, which encompass approximately 60 percent of the mapped habitat based on CNDDDB-defined Element Occurrences (CNDDDB 2012).

In recognition of the magnitude and immediacy of the current threats, we recommend no change in the threatened status of *Ceanothus ophiophilus* 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 TO 8C**

*Ceanothus ophiophilus* is a species that still faces relatively few threats, and has a high recovery potential. Fire and fire management practices remains an important primary threat to the species, as identified in the listing rule, but this has been reduced due to implementation of protective measures within USFS lands, which encompass the majority of one and all of another occurrence. Documented threats from vandalism have not been reported since the time of listing. Monitoring and management actions for the conservation of *C. ophiophilus* have been identified and surveys are being implemented to meet obligations under the Western Riverside County MSHCP. However, surveys for this species are not comprehensive and land zoning has not changed for the Vail Lake occurrence. Both of these factors create some uncertainty as to the current and future status of some point localities of *C. ophiophilus*. Therefore, we believe urban development is still a potential direct threat for the Vail Lake occurrence and an indirect threat for the Agua Tibia Wilderness–North occurrence. The potential for recovery remains high due to the restrictive and difficulty in accessing all three *C. ophiophilus* occurrences and from management actions and conservation measures required under the Western Riverside County MSHCP as well as management activities being implemented by the USFS. Therefore, we recommend a change in the recovery priority number from 2 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 *Ceanothus ophiophilus* by reducing future losses of habitat, minimizing degradation of chaparral ecosystems, and avoiding adverse changes to fire regime resulting from human activities.

Conservation of *Ceanothus ophiophilus* 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 *C. ophiophilus* will require continued

cooperation and coordination with partners to minimize impacts from current threats and aid future restoration.

- 1) Continue to work with the CNF to ensure that USFS guidelines and directives are being implemented for activities that might directly or indirectly impact *Ceanothus ophiochilus* habitat. This should include providing comment on biological assessments for proposed fire suppression activities and assistance in designing fuel breaks to protect populations of *C. ophiochilus*.
- 2) Conserve or preserve *Ceanothus ophiochilus* occurrences on private lands, especially at Vail Lake. 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.
- 3) Develop outreach or educational activities with the primary landowner adjacent to the Agua Tibia Wilderness–North occurrence to enlist their assistance in ensuring the survival and recovery of *Ceanothus ophiochilus*.
- 4) Develop a monitoring plan for populations of *Ceanothus ophiochilus*, the quality of chamise chaparral habitats, and threats at the three *C. ophiochilus* occurrences. This monitoring plan should include surveys to detect abundance, habitat conditions, and potential threats to the taxon, particularly those related to the effects of fire and fire management activities.
- 5) To generate interest for research opportunities for this taxon, post the following research need on the Carlsbad Fish and Wildlife Office website (<http://www.fws.gov/carlsbad>):
  - Determine the current level and pattern, extent, and impact of introgression of *Ceanothus ophiochilus* with *C. crassifolius* at all three occurrences.



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**Appendix 1. Occurrences of *Ceanothus ophiochilus* (Vail Lake ceanothus): Current status, threats, and conservation.**  
**Prepared for the 2013 5-year Review.**

| OCCURRENCE *   | OCCURRENCES:<br>includes EOs (CNDDDB 2012),<br>survey points, herbarium<br>collections <sup>1</sup> (CCH 2012), and<br>RCA surveys (Western<br>Riverside County RCA 2009) | STATUS AT<br>LISTING <sup>2</sup> | CURRENT<br>STATUS  | CURRENT THREATS <sup>3</sup>  | CURRENT<br>PRIMARY<br>CONSERVATION<br>MECHANISM                        |
|--|---|-----------------------------------|--------------------|---|--|
| Vail Lake  | EO 1  | Extant                            | Presumed<br>extant | <u>A</u> : Urban Development;<br>Wildland Fire and Fire<br>Management<br><br><u>E</u> : Hybridization and<br>Introgression; Climate Change            | Western Riverside<br>County MSHCP                                      |
| Agua Tibia<br>Wilderness–North   | EO 2;<br>Burge 798c   | Extant                            | Extant             | <u>A</u> : Urban Development<br>(indirect); Wildland Fire and<br>Fire Management<br><br><u>E</u> : Hybridization and<br>Introgression; Climate Change | Western Riverside<br>County MSHCP;<br>USFS-CNF Land<br>Management Plan |
| Agua Tibia<br>Wilderness–South   | EO 3  | Extant                            | Presumed<br>Extant | <u>A</u> : Wildland Fire and Fire<br>Management<br><br><u>E</u> : Hybridization and<br>Introgression; Climate Change                                  | USFS-CNF Land<br>Management Plan                                       |
| <b>Abbreviations:</b><br>EO = CNDDDB Element Occurrence; MSHCP = Multispecies Habitat Conservation Plan; USFS = U.S. Forest Service; CNF = Cleveland National Forest; CCH = Consortium of California Herbaria; RCA = Western Riverside County Regional Conservation Authority. |   |                                   |                    |   |  |
| *Identifications are based on USFS descriptions and location information, USFWS critical habitat unit determinations, and other locations.   |   |                                   |                    |   |  |
| <b>Footnotes:</b>  |   |                                   |                    |   |  |
| 1. Accession records listed in this table are <i>only</i> those not included in the 2012 CNDDDB database summary of Element Occurrences.   |   |                                   |                    |   |  |
| 2. The final rule to list <i>Ceanothus ophiochilus</i> identified 4 “localities” within three occurrences listed in this table, all of which were presumed extant. All three occurrences were presumed extant in the 2008 5-year review.                                       |   |                                   |                    |   |  |
| 3. Current threats to the occurrence segregated by listing threat <b>Factor</b> (see analysis in text).  |   |                                   |                    |   |  |



**U.S. FISH AND WILDLIFE SERVICE**

**5-YEAR REVIEW**

***Ceanothus ophiophilus* (Vail Lake Ceanothus)**

**Current Classification:** Threatened

**Recommendation Resulting from the 5-Year Review:**

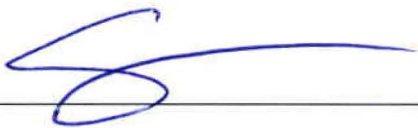
- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

**Review Conducted By:** Carlsbad Fish and Wildlife Office

**FIELD OFFICE APPROVAL:**

**ACTING**

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

Approve \_\_\_\_\_  \_\_\_\_\_ Date **JUN 17 2013**

**Scott A. Sobiech**