

Baccharis vanessae
(Encinitas baccharis)

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



Baccharis vanessae (Encinitas baccharis). Photograph credit: Andrew Borchert.

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

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5-YEAR REVIEW

***Baccharis vanessae* (Encinitas baccharis)**

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:

Baccharis vanessae (Encinitas baccharis) is a shrub of chaparral brushlands. This species is restricted to a patchy distribution along the coast and occasionally interior areas of San Diego County, California. At the time of listing, there were 19 known populations distributed across coastal northern San Diego County from Carlsbad east to Poway. Five occurrences in Encinitas, Carlsbad, and San Diego were known to have been eliminated by urban development prior to the species' listing. *Baccharis vanessae* is currently reported from 45 historical occurrences distributed within the same general range as that known at the time of listing, except for a southward extension of the range based on an occurrence detected in the Otay Mountain area. The species is now presumed extant at 30 occurrences. This increase is largely from our inclusion of data from the early 1990s that was prepared in support of the City of San Diego's Multiple Species Conservation Program (MSCP) but not included in the listing document. Few of these observations records have been subsequently verified, or vouchered with herbarium collections. The primary threats identified at the time of listing were associated with habitat loss, fragmentation, and degradation due to development; fuel modification and fire suppression activities; trampling; small population size; interruption of the natural fire cycle; and nonnative plants.

Baccharis vanessae was listed as endangered by the State under the California Endangered Species Act (CESA) in 1987 and federally listed as threatened under the Act in 1996.

Methodology Used to Complete This Review:

This review was conducted by James Thiede and staff at the Carlsbad Fish and Wildlife Office, following the Region 8 guidance issued in March 2008. We used information in the 1996 listing rule, available literature, reports and information in our files, and information provided by experts familiar with the species, its habitat, and the associated processes. 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:

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Federal Register Notice Citation Announcing Initiation of This Review:

A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information was published in the Federal Register on March 25, 2009 (USFWS 2009, pp. 12878-12883). No information relevant to *Baccharis vanessae* was received.

Listing History:

Federal Listing

FR Notice: 61 FR 52370-52384

Date of Listing Final Rule: October 7, 1996

Entity Listed: *Baccharis vanessae* (Encinitas baccharis), a plant species.

Classification: Threatened

Critical Habitat: Critical habitat has not been designated for this species.

State Listing

Baccharis vanessae (Encinitas baccharis) was listed as endangered by the State of California in 1987.

Associated Rulemakings: None.

Review History: No previous taxon-specific reviews of *Baccharis vanessae* have been conducted.

Species’ Recovery Priority Number at Start of this 5–Year Review:

The recovery priority number (RPN) for *Baccharis vanessae* is 5C according to the Service’s 2011 Data Recovery Call for the Carlsbad Fish and Wildlife Office, 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). This number indicates that the taxon is a species that faces a high degree of threat, has a low potential for recovery, and the continued existence of its remaining habitat is in conflict with construction or other development projects. The “C” indicates conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Recovery Outline:

A recovery outline or recovery plan has not been completed for this species.

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

Baccharis vanessae is a slender-stemmed, dioecious (separate male and female plants) shrub, 0.5 to 1.3 meters (m) (1.6 to 4.3 feet (ft)) tall, and is a member of the Asteraceae (sunflower family). This species can be distinguished from other members of the genus by its numerous, erect, glabrous stems; linear, entire leaves with only one principal vein; and its delicate, narrowly tapered phyllaries (bracts that form the inflorescence), which are reflexed at maturity. The dark green leaves are 0.1 to 4.5 centimeters (cm) (0.04 to 1.77 inches (in)) long, thread-like, narrower in width than the portion of the twig adjacent to the leaf (Sundberg 1993, p. 210). The flower heads (capitulae) are cylindrical receptacles each containing clusters of tiny, whitish, flowers; each flower head contains 15 to 22 flowers (Sundberg 1993, p. 210). The blooming period is between August and November (CNPS 2010; San Diego Plant Atlas 2010). *Baccharis vanessae* is unusual among the California species of *Baccharis* because it occurs mainly in chaparral rather than in riparian environments, washes, or otherwise disturbed lands.

Species Biology and Life History

Baccharis vanessae is dioecious, meaning separate plants of both sexes must be in close proximity for pollination and subsequent seed production to occur. Pollinated *Baccharis* flowers develop one-seeded dry fruits (achenes) that are each attached to a cluster of bristly hairs (a pappus), which facilitates wind dispersal (Steinberg 2002, p. 5). Some *Baccharis* taxa have fruits that germinate readily in response to light and moisture, and do not require fire-stimuli such as heat-shock or charate (ash) to break dormancy and germinate. They are believed to be short-lived, lasting a year or less in the soil, and less than 2 years in laboratory storage conditions; long-term storage in seed banks is not feasible because the plant oils decay rapidly (D. Wilken, Santa Barbara Botanic Garden, pers. comm., 2010).

Baccharis vanessae is probably pollinated by both wind and insects. Steffan (1997, pp. 52–54) collected native wasps, flies, beetles, and true bugs (from the order Hemiptera) from *Baccharis pilularis* (coyote bush), a related species that has flowers similar to *B. vanessae* and which also occurs in the same chaparral habitat. *Baccharis* species in San Diego County and central California are pollinated by sphecid, vespid, and ichneumonoid wasps, mordellid beetles, native bees in the genera *Dialictus* and *Hylaeus*, and muscoid flies (Moldenke 1976, p. 354). Pollinator abundance and seed set on *Baccharis* flowers were reported to be highly variable; however, native bees of the genera *Perdita* and *Bombus* were conspicuous by their absence from *Baccharis* (Moldenke 1976, p. 354). Griffin (1997, pp. 16–41, 46) demonstrated that wind pollination can occur in some *Baccharis* taxa, but that insect pollination significantly increases the quantity of *Baccharis* seeds that contain actual embryos. Her field study documented wide variations in the rate of pollination of individual *Baccharis* shrubs (4 to 65 percent) (Griffin 1997, pp. iii, 32–39, 46, 53–54). She found that insect pollination accounted for 50 to 90 percent of the *Baccharis* embryos produced (achenes filled), while wind pollination accounted for as little as 10 percent and a maximum of 50 percent (Griffin 1997, pp. 53–54). It is likely necessary to maintain adequate conditions for pollinating insects to sustain the full reproductive potential of the species at each of the occurrences.

Boldt (1989, p. 13) measured a 31 percent lower rate of achene production in 9-year old versus 4-year old plants of *Baccharis halimifolia*. The lowest rate of fruit production was from the oldest (and largest) plant; many of the flowers on this plant fail to produce fruits, and numerous other flowers fell away as buds (Griffin 1997, p. 47). Therefore, declining reproductive output could be due to senescence of the mature plants and in turn might pose a threat to small, isolated occurrences of *B. vanessae* if many or all of the remaining individuals have aged to the point of experiencing reduced fertility. It is possible that a lack of establishment of new plants could lead to and perpetuate lower reproductive output of any local occurrence of *B. vanessae*.

Observations suggest that *Baccharis vanessae* is not able to compete with taller, leafier shrubs such as *Arctostaphylos* spp. (manzanita) and *Ceanothus* spp., (ceanothus) or that it is a short-lived plant (KEA 1999, p. 15). Most *Baccharis* species appear to depend on disturbances—such as stream and gully erosion, landslides, or as in the case of *B. vanessae*, fires—for colonization and population recruitment opportunities; the exact kind of disturbance relied upon varies from species to species.

Baccharis vanessae appears to be a pioneer species that increases in numbers after disturbance, such as fire, that opens up the chaparral canopy (Messina 2001, pp. 2–3; CNDDDB 2011, EOs 17 and 18). The assumption is that the species' population expands via increased survival and establishment of seedlings after a fire, growing faster and flowering more profusely after having shade-casting competitors removed (K. Klutz, ICF International, pers. comm., 2010); no research has documented the actual mechanism of increase. The lack of fire or other habitat opening mechanism may pose a threat to the establishment and survival of *B. vanessae*.

Burning of *Baccharis vanessae* plant's crown can cause flowering to take place considerably earlier (as early as April) than in non-burn years (Klutz, pers. comm., 2010). This early flowering is presumably a by-product of the extremely fast stem growth (Wilken, pers. comm., 2010) that was observed on burned individuals near the Olivenhain Reservoir during the winter and spring following the 2007 Witch Creek Fire. No rangewide assessment of *B. vanessae*'s response to the regionally large fires has been conducted, although the species generally seems to survive and spread after some fire events.

Mediterranean-climate shrubs like *Baccharis vanessae* may survive brushfires by resprouting from dormant underground buds (Keeley and Zedler, 1978, pp. 142–144, 146; Pratt *et al.*, 2010, pp. 70–71). Most plants that burn in a fire may re-sprout (Messina 2001, p. 2; CNDDDB 2011, EO 17 and 18). Klutz (pers. comm., 2010) noted that individuals burned in the 2007 Witch Creek Fire re-sprouted vigorously with stems growing faster and longer, and plants flowering more profusely than undisturbed individuals. *Baccharis vanessae* will also resprout after the aboveground portion of the plant is mechanically removed (Beauchamp 1980, p. 217). Overall, *B. vanessae* appears to increase in numbers in burned areas following fire events. If a plant resprouts, but is destroyed by a subsequent fire before it has replenished its reserves, the plant will likely not persist (Carpenter and Recher, 1979, pp. 871–872; Zedler *et al.* 1983, p. 810; Bowen and Pate, 1993, pp. 7, 13–14). At this time, we do not know how long it takes an individual *B. vanessae* to replace the food reserves consumed by re-sprouting.

Habitat or Ecosystem

Baccharis vanessae occurs in several types of chaparral habitats distributed below 914 m (3,000 ft) where maritime climate prevails. Associated species characterize chaparral types that include, wart-stemmed ceanothus chaparral (southern maritime chaparral of other references, e.g., Hogan *et al.* 1996, pp. 3–7), Torrey pine stands (Torrey pine forest of other references), and Greenbark ceanothus chaparral (*Ceanothus spinosus* (coast greenbark lilac) chaparral of other references) (Sawyer *et al.* 2009, pp. 209, 459–460, 465). *Baccharis vanessae* nearly always occurs with *Ceanothus verrucosus* (wart-stemmed ceanothus) or *C. spinosus* (coast greenbark ceanothus), *C. cyaneus* (lakeside ceanothus), or *C. otayensis* (Otay ceanothus). Other commonly associated species include, but are not limited to: *Cneoridium dumosum* (bush rue), *Comarostaphylis diversifolia* subsp. *diversifolia* (San Diego summer holly), *Xylococcus bicolor* (mission manzanita), *Cercocarpus minutiflorus* (San Diego mountain mahogany), *Arctostaphylos glandulosa* subsp. *crassifolia* (Del Mar manzanita), *Dendromecon rigida* (bush poppy), *Ceanothus tomentosus* var. *olivaceous* (Ramona lilac), *Lessingia filaginifolia* (California aster), *Rhus integrifolia* (lemonade berry), *Salvia mellifera* (black sage), *Mimulus aurantiacus* (sticky

monkeyflower), *Quercus dumosa* (Nuttall's scrub oak), *Adenostoma fasciculatum* (chamise), and *Monardella hypoleuca* var. *lanata* (felt-leaf monardella) (CNDDDB 2011, EOs 1–32).

Baccharis vanessae was previously thought to be restricted to sandstone soils in southern maritime chaparral and southern mixed chaparral. A small population of *B. vanessae* was found on outcrops of andesite rock among *Dudleya viscida* (sticky dudleya) surrounded by a dense chaparral dominated by *Ceanothus spinosus*, *C. crassifolius* (hoaryleaf ceanothus), and *Adenostema fasciculatum* (chamise) in the San Mateo Canyon Wilderness in northern San Diego County (Boyd *et al.* 1992, p. 1). *Baccharis vanessae* was recently discovered in the Elfin Forest/Lake Hodges region of San Diego County growing on a wet site under a dense canopy of *Quercus berberidifolia* (scrub oak) and *Toxicodendron diversilobum* (poison oak) in a coast live oak woodland (Klutzy, pers. comm., 2010; CNDDDB 2011, EO 32). *Baccharis vanessae* has been observed to occur on the following soil types: Cieneba series, Corralitos loamy sand alluvial Huerhuero, San Miguel Exchequer, granitic, andesite rock outcrops, and soils derived from acid igneous rock (CNDDDB 2011).

Baccharis vanessae can be found on all slope aspects including both south-facing and north-facing slopes and just above riparian vegetation near streams (CNDDDB 2011; USFWS 2011 GIS data).

Spatial Distribution

The species range known at the time of listing was entirely in San Diego County extended from one outlying occurrence in the Cleveland National Forest at the northern County boundary southward along the coast into Encinitas and eastward to Alpine. The majority of occupied areas were between Carlsbad and Encinitas near the coast and Lake Hodges, Woodson Mountain, and Iron Mountain in interior San Diego County. We considered there to be 19 historical populations of *Baccharis vanessae*, 14 of which were extant at listing (USFWS 1996, p. 52372). However, four contained less than six individuals, and an additional location on Carmel Mountain consisted of a single plant (USFWS 1996, p. 52372).

Data assembled to document the distribution of the *Baccharis vanessae* at the time of the proposed rule to list the species did not include georeferenced data subsequently developed for the San Diego Multiple Species Conservation Plan (MSCP) from the City and County of San Diego or specific georeferenced herbarium specimens from the Consortium of California Herbaria (CCH 2010). The data from the City and County of San Diego is primarily based on observations of *B. vanessae* in the mid-1990s. Similarly older herbarium specimens in the CCH seldom had GPS accuracy levels and thus georeferencing was usually by inference. In this review we are including the MSCP data layer representing Regionally Sensitive Species (REGSS) points, identified in Appendix 1. The REGSS points and herbarium specimen collection sites that fall within existing California Natural Diversity Database (CNDDDB) polygons are identified as such and included in the row of the appropriate CNDDDB Element Occurrence (EO) in Appendix 1. The REGSS points and herbarium specimen collection sites that fall within a 400 m (quarter-mile) buffer around the CNDDDB polygons are likewise associated with the appropriate EO in Appendix 1. This distance corresponds to the distance used by the CNDDDB to identify separations between EOs and is considered suitable because of

the imprecision boundary limits of both the CNDDDB polygon boundaries and the REGSS points. In assessment of imagery, inference of association of REGSS points to CNDDDB EOs most often was supported by apparent continuity of suitable habitat as well. Isolated REGSS points or herbarium specimen references are included for reference and are intended for follow-up surveys to verify presence. Though these entries are not based on vouchered specimens, they are considered in determinations of the numbers of occurrences, conditions, threats, or distribution of *B. vanessae*.

The CNDDDB EOs, or portions thereof, as well as REGSS point sites and herbarium collection sites are depicted in USFWS GIS data layers. This allows us to indicate in the Appendix the conservation status of the lands on which they occur. At the time of listing we knew of 19 historical populations, 14 of which were extant. We now consider these 14 populations to represent 16 extant occurrences at listing, as identified in Appendix 1. Considering information not included in the listing rule, or available since listing the known historical distribution of *Baccharis vanessae* now includes 45 occurrences distributed from near the northern County boundary to the southern County boundary (see Appendix 1 and Figure 1). The majority of the occurrences newly identified and possibly extant are based on data collected prior to the final rule listing the species that have not been verified since that time. Of these, 30 are considered extant or presumed extant, while 15 are considered extirpated or possibly extirpated. Overall, the range of *B. vanessae* largely remains as it was at the time of listing; one occurrence has been detected on Otay Mountain (CNDDDB 2011, EO 30), 27 kilometers (15 miles) further southward, since it was listed. Other occurrences (EOs 27, 28, 31, and 32) discovered since the time of listing fall within the range known at the time of listing. Additional occurrences represented by herbarium collections and REGSS point data not included in the listing final rule have further increased the density of occurrences in the central portion of the endemic species' range.

Specimens of *Baccharis vanessae* are at the Santa Barbara Botanic Garden (SBBG), Rancho Santa Ana Botanic Garden (RSABG 2010), and the San Diego Botanic Garden. One accession of the species at RSABG consists of plants salvaged from Encinitas near Via Montoro and El Camino Real and vouchered by Tilforth #1682 (RSA 305660; SD 124211) (Appendix 1). These plants may prove useful for recovery of the species but will not be evaluated or discussed further in this review.

Baccharis vanessae has not yet been documented as occurring in Mexico; however, considering the species occurs just north of the United States-Mexico border and suitable habitat for the species apparently extends into Mexico, additional surveys should occur to determine if the southern range of the species extends into Mexico.

Abundance

At the time of listing, the rangewide population of *Baccharis vanessae* was estimated to be around 2,000 individuals (CNDDDB 1991). However, accurate plant counts for *B. vanessae* do not exist because no rangewide surveys have been conducted using a single monitoring protocol. Reference to the most recent surveys and plant counts are provided in Appendix 1. *Baccharis vanessae* is also difficult to locate in the field when not in flower. Plants may be confused with other co-occurring taxa (e.g. *Galium* spp. (bedstraw), *Helianthemum scoparium* (peak rush-

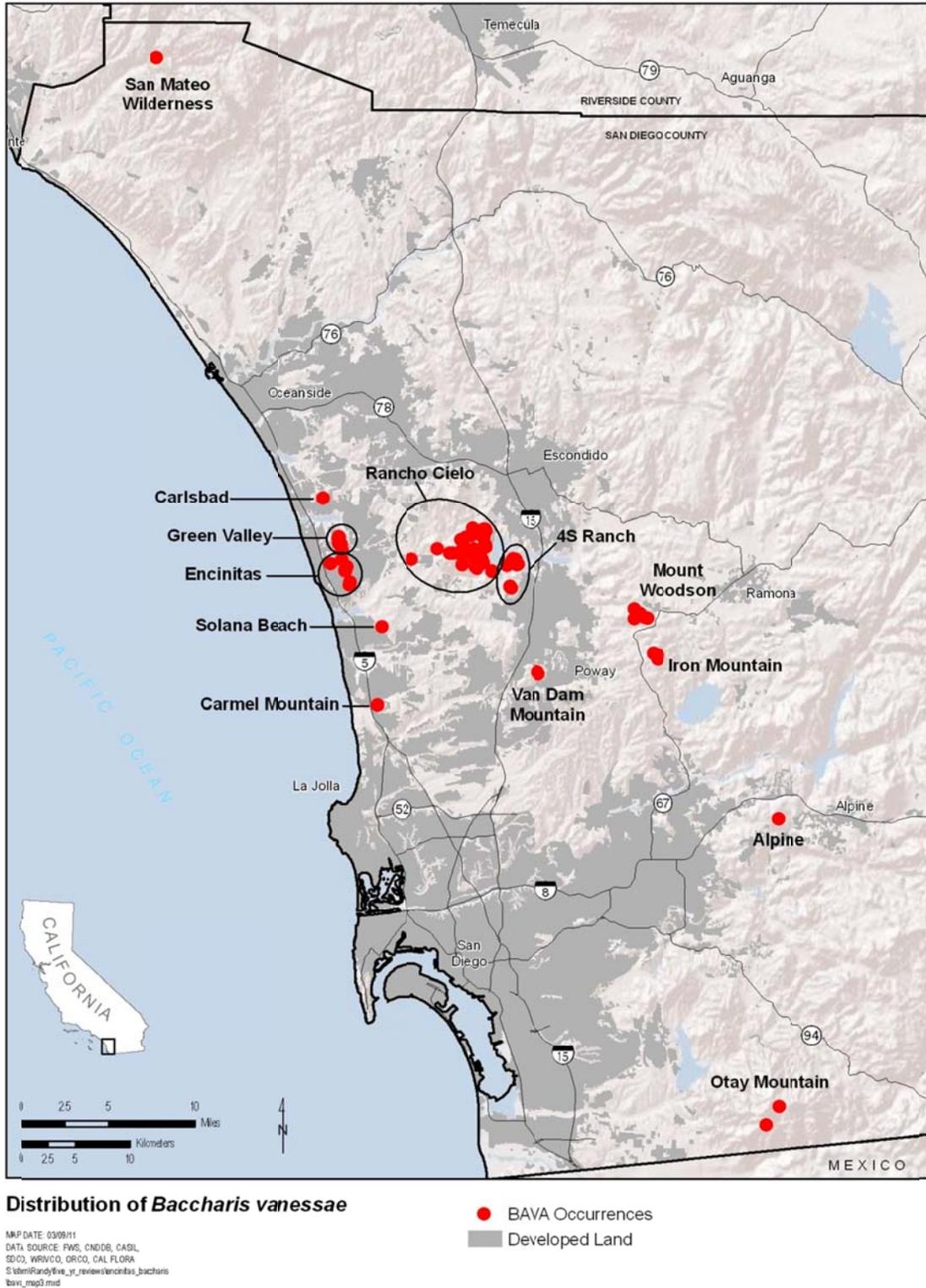


Figure 1: Distribution of *Baccharis vanessae* (*Encinitas baccharis*); prepared for 2011 5-Year Review.

rose), or *B. sarothroides* (broom baccharis)). For these reasons, it is possible that additional occurrences exist within the species' range, even in heavily urbanized areas. Surveys for *B vanessae* should be conducted during the months when the species is in flower to facilitate detection and accurate identification.

Although we currently have no reliable abundance estimate, it is likely that since 1996, the numbers of individuals may have declined at some occurrences as a result of approved urban development (EOs 7 and 16), road-widening (EO 21), and construction of water storage facilities (EOs 17, 18, and 19), respectively.

Changes in Taxonomic Classification or Nomenclature:

The taxonomic classification and nomenclature of *Baccharis vanessae* have not changed since the taxon was described in 1980.

Genetics:

No studies focused on the genetics of *Baccharis vanessae* have been conducted or proposed.

Species-Specific Research and/or Grant-Supported Activities:

None.

Vulnerability Factors:

Species may be vulnerable to threats for a variety of reasons. Primack (2006, p. 159) outlined five categories of species considered most vulnerable to extinction as:

- 1) Species with a very narrow geographical ranges;
- 2) species with only one or a few populations;
- 3) species in which population size is small (identified as one of the best predictors of species extinction rate);
- 4) species in which population size is declining; and
- 5) species that are hunted or harvested by people.

Consideration of these categories and its life history traits can provide a vulnerability profile for *Baccharis vanessae*. Fiedler and Ahouse (1992, p. 32) considered ecology, biotic competition, population dynamics, reproductive biology, and genetics among the factors affecting the rarity of a plant taxon that would be reflected in numbers 2 and 3 above (few and small populations).

Baccharis vanessae exhibits several attributes which might limit its distribution and population growth, including:

- 1) The species is restricted to a narrow belt of high-diversity chaparral having frost-free winters and summers moderated by cool, humid maritime air and an overcast stratus layer.

- 2) Establishment of seedlings may be a rare event limited to sites and occasions when a canopy gap is formed followed by an extended rainy season through late spring, or a few heavy rains during summer.
- 3) The plants are dioecious and both sexes must be represented in a population to produce seeds.

Life history traits and habitat specificity seem to comprise the most significant vulnerabilities of *Baccharis vanessae*. The most significant vulnerabilities of *B. vanessae* appear to be: (1) the small size of most of its remaining populations; (2) the need to have male and female plants present in the same location; and (3) an apparently low incidence of successful seedling establishment. These vulnerabilities may separately or in concert exacerbate any of the threats described below in the Five-Factor Analysis.

Five-Factor Analysis

The listing rule describes ongoing and threatened destruction and modification of habitat by urban and recreational development, inundation associated with a water storage facility, small population size, and interruption of natural fire cycle. Additional threats noted were trampling and alien plants (now termed nonnative), fuel modification activities, and fire suppression efforts (USFWS 1996, pp. 52377–52381). Since listing, additional threats to *Baccharis vanessae* have been identified, including potential impacts of parasitism, climate change, and small population size, including low recruitment and lack of adequate representation of both sexual forms at population occurrences. 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 is identified in Appendix 1.

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

Threats attributable to Factor A at the time of listing of *Baccharis vanessae* included urban and recreational development, recreational activities, trampling, and fuel modification. Impacts from trampling are combined with recreational activities and discussed under Factor E. Habitat fragmentation and isolation noted as a threat under Factor E in the listing rule are not known to pose significant quantifiable threats to *B. vanessae* at this time. The current threats attributable to Factor A are described below under the headings: Development and Altered Fire Regime.

Development

At the time of listing, 16 *Baccharis vanessae* occurrences were considered extant, half of which were threatened by urban or recreational development such as housing or golf courses (USFWS 1996, p. 52378). Following listing, occurrences continued to be impacted by development. A portion of one occurrence in Rancho Cielo (CNDDDB 2011 EO 7 that currently includes EOs 11, 13, and 14) was eliminated by urban development. However, conditions of approval to develop this area included conservation of over half of the CNDDDB polygon. Though similar approved development allowed for some loss of habitat and individuals, conservation also has been achieved through implementation of the County of San Diego and City of San Diego subarea

plans of the MSCP as well as the City of Carlsbad subarea plan of the Multiple Habitat Conservation Plan (MHCP).

The threat of destruction of *Baccharis vanessae* habitat by urban and recreational development has been reduced since listing by the protection or management of occurrences or portions thereof. This has been due primarily to implementation of regional Habitat Conservation Plans (HCPs) developed under the Act and described under Factor D below. The majority of extant occurrences (25 of 30) are conserved or at least partially conserved, thereby reducing direct impacts from development (e.g. habitat loss and degradation associated with development activities) (Appendix 1). Under provisions of the San Diego MSCP, 2.8 of the 3 major populations would be conserved (City of San Diego 1998, Table 3–5). The three major populations identified at that time were identified as 4–S Ranch-Lake Hodges (now comprising EOs 9 and 10 and nearby sites), Mt. Woodson and Van Dam Mountain (EOs 5 and 15), and Iron Mountain (REGSS 9962, 9977, and 10008) (USFWS and CDFG 1996, p. [12] [MSCP 1995 and 1996 species evaluations doc]). The MSCP database points REGSS 9962, 9977, and 10008 have no CNDDDB EO number assigned but form the basis for assessment of Iron Mountain as a major population on conserved lands (Appendix 1). The majority of the separate REGSS point locations not included within a CNDDDB polygon or within the quarter-mile buffer zone of a polygon, are also on conserved lands (Appendix 1). Various levels of protection have been afforded through regional conservation planning programs, such as the San Diego County MSCP and the northern San Diego County MHCP (City of San Diego 1998, Table 3–5; AMEC *et al.* 2003) and implementation of a habitat management plan for occurrences located on at the Elfin Forest Recreational Reserve (EO 17–19 and 32) (Messina 2001). Currently, 677 acres (ac) (274 hectares (ha)) of the 2,768 ac (1,120 ha) of CNDDDB polygons for *B. vanessae* are within conserved lands (USFWS 2011 GIS analysis). In addition, 86 of the 127 point localities (REGSS point and herbarium specimen localities) are within conserved lands (USFWS 2011 GIS analysis). However, development remains a threat to *B. vanessae* occurrences or portions of those occurrences as well as occurrences identified as REGSS points not encompassed by a CNDDDB polygons or the quarter-mile buffer zone around them. Of the 30 extant occurrences, 11 continue to be threatened by development associated impacts (EOs 1, 3, 5, 7, 8, 9, 24, 25, 27, 31, and SD 115244) (Appendix 1).

Altered Fire Regime

At the time of listing, fuel modification activities, fire suppression, and altered fire cycles were identified as threats to *Baccharis vanessae* under two separate listing factors (A and E). The following section discusses these in the larger context of impacts to habitat associated with altered fire regimes. Nearly the entire range of *Baccharis vanessae* lies in the coastal and otherwise urbanized portion of San Diego County. In southern California, populated areas in proximity to natural vegetation often are under some form of fuel modification requirements. Fuel modification generally includes the clearing or thinning of fire prone natural vegetation, which would include that occupied by *B. vanessae*. Fire suppression is a goal of fuel modification but may include other measures that result in changes to the natural fire cycle, referred to here as natural fire regime. A natural fire regime may include a balance of fire frequency, fire intensity, and fire expanse to which the native vegetation is generally well adapted.

Fire regimes are based on the temporal and spatial patterns of ignition sources, fuel, weather, and topography (Pyne *et al.* 1996, p. 48). It is also important to understand that fire severity, or the ecological impact of a fire and recovery of an ecosystem (Keeley and Fotheringham 2003, p. 231) can be different from fire intensity, or the energy released per length of fire front (Borchart and Odion 1995, p. 92). Additionally, impacts from spatially large fires are not always equivalent to those from high-intensity fires (Keeley and Fotheringham 2003, p. 231). This is particularly important when assessing effects of fire on chaparral communities. Fire often burns in a mosaic pattern at different intensities, thereby resulting in differing levels of impacts to particular species and habitats. Therefore, the inclusion of a specific mapped fire perimeter is not a reliable indicator of the level of plant mortality or habitat destruction.

Historically, natural fire regimes in southern California were likely characterized by many small lightning ignited fires in the summer and a few large fires in the fall of varying fire intensity (Keeley and Fotheringham (2003, pp. 242–243). These infrequent, large, high-intensity wildfires (“megafires”) (greater than 123,553 ac (50,000 ha) in size), burned the landscape long before Europeans settled the Pacific coast (Keeley and Zedler 2009, p. 90). The current fire regime in southern California results in numerous small fires that periodically escalate into megafires that are generally driven by extreme “Santa Ana” weather conditions of high temperatures, low humidity, and strong erratic winds (Keeley and Zedler 2009, p. 90). The primary difference between the current fire regime and historical fire regimes in southern California is that human-induced or anthropogenic ignitions have increased primarily due to an increase in human population density since 1960, resulting in human-triggered fire ignitions and in particular, megafires in many more localities (Keeley and Fotheringham 2003, p. 240), than were known historically. While this change may not have demonstrably affected *Baccharis vanessae* in San Diego County, especially within chaparral (Franklin *et al.* 2004, p. 701), frequent fires open up the landscape and make the habitat more vulnerable to invasive, nonnative plants (Keeley *et al.* 2005, p. 2117). However, the primary concern with frequent megafires is the plant mortality associated with these extensive and intense events (see Factor E discussion below) which may kill individual plants and thereby potentially precludes recolonization of burned areas by *B. vanessae*. Areas likely most vulnerable to the threat of wildfire include Otay Mountain region (EO 30 and CalFlora occurrence) and to a lesser extent, Van Dam Mountain (EO 5), Mount Woodson (EO 15), Alpine (EO 24), and 4–S Ranch (EOs 9 and 10). In light of the recent spate of drought-influenced wildfires in southern California, especially the 2003 and 2007 fires, a future megafire (or wildfire suppression activities associated with a megafire) affecting the *B. vanessae* populations in these areas is probable, thus continuing to pose a significant, albeit indirect threat, associated with development, to the habitat of this species.

Baccharis vanessae appears to respond positively to fire or other conditions that lead to periodically open areas in chaparral stands with increased flowering and seedling establishment. Consequently, lack of a natural fire regime or suitable substitute constitutes a nearly rangewide threat reflected as such in at least 13 of the 30 extant entries in Appendix 1. The lack of habitat clearing brushfires, of adequate frequency and intensity, may pose a threat to *B. vanessae* reproduction. This species appeared to increase in numbers after wildfires in Rancho Cielo (Messina 2001, pp. 2–3; CNDDDB 2011, EOs 17 and 18). *Baccharis vanessae* was unknown from Otay Mountain until it was detected in the years following the large 1996 fire. However, the exact mechanism by which this species might increase after fire has not been determined. It

is likely that following patchy low-intensity fires there is a likelihood that *B. vanessae* plants may resprout. The dispersal characteristics and early successional character of *B. vanessae* indicate that it is adapted to a disturbance regime resulting in open gaps in the chaparral canopy, as opposed to sites where entire landscapes are cleared by spatially large wildfires. If a subsequent fire occurs before postfire resprouting plants have flowered and set seed, the adult plants may perish due to lack of food stores replenishment and additional losses of seed in the soil are likely. Two scenarios associated with fire may affect the habitat of *B. vanessae*. The absence of an appropriate disturbance regime may limit opportunities for recruitment of *B. vanessae*; however, the specifics and magnitude of this threat cannot be quantified at this time. A megafire may destroy plants and the seed bank, resulting in habitat that is devoid of plants and isolated from other occupied sites to a degree that recolonization by dispersal events is unlikely. At the other extreme, fires that are too infrequent fail to maintain the natural turnover of local vegetation cover. This can alter the distribution and suitability of habitat for *B. vanessae*, which requires openings in the shrub canopy for growth and reproduction.

Information in our files indicates that the 2003 Otoy, Cedar, and Paradise fires along with the 2007 Harris, Poomacha, and Witch fires impacted some of the areas with documented *Baccharis vanessae* occurrences (EOs 7–10, 15–19, 22–24, 30–31, Calflora #ce286), and numerous Lake Hodges-area occurrences listed only in the REGSS database. The consequences for the local *B. vanessae* populations remain unknown due to a lack of monitoring. Large regional fires impacted the habitat supporting CNDDDB EOs 7, 9, and 10 in 2007 (USFWS 2011, CFWO GIS data). However, there has been no quantitative or qualitative assessment of the impact of large fires on the habitat quality or persistence and reproduction of *B. vanessae* across the spatial range of the fires.

Summary of Factor A

Habitat loss, a primary threat noted in the listing rule, has diminished considerably since *Baccharis vanessae* was listed and remains a threat at only 11 of 30 occurrences. Impacts from development have been reduced through development of HCPs, such that 25 of the 30 extant occurrences are conserved or at least partially conserved. Habitat for this plant is also threatened by altered fire regimes that consist of indirect impacts associated with development such as fuel reduction activities (e.g., brush removal and thinning), and activities associated with fire control. This species has a narrow geographical range in fire-adapted habitats, conditions recognizable as vulnerabilities under Vulnerability Factors above. The threat from lack of an appropriate fire regime is essentially rangewide but more in evidence at occurrences and sites in close proximity to urban developments (Appendix 1). This may result in limited suitable habitat for recruitment of new plants.

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

Overutilization for commercial purposes was not known to be a factor in the final listing rule (USFWS 1996, p. 52370). We do not think that overutilization for commercial, recreational, scientific, or educational purposes poses a threat to *Baccharis vanessae* at this time.

FACTOR C: Disease or PredationDisease

Disease was not known to be a threat to *Baccharis vanessae* at the time of listing, nor is it currently believed to pose a threat to the species (USFWS 1996, p. 52370).

Predation

At the time of listing, swollen galls on the stems of *Baccharis vanessae* reportedly indicated parasitism by a moth or butterfly (Beauchamp 1980, p. 217; USFWS 1996, p. 52379); however, the impact on the species is unknown. Insect predators can inflict heavy casualties on the flowers and seeds of plants, far more than is conventionally believed (Andersen 1988, p. 337). Louda (1982a) examined the effect of flower and seed-feeding insects on plant distribution and abundance using *Hazardia squarrosa* (coast goldenbush)—a distant relative of *B. vanessae*. Louda (1982a, p. 25; 1982b, p. 43) concluded that “predation by insects prior to release of seeds played a critical role in the population recruitment of *H. squarrosus*” and that this “...is the proximate factor limiting the recruitment and abundance of *H. squarrosus*.” It is plausible that recruitment of *B. vanessae* plants into a population could be limited by the same type of flower- and seed-feeding insects that afflict the more common *H. squarrosus* that occurs in the same general area. Predation is not currently considered a threat to the species, though research is necessary to evaluate the potential impacts from insect predators.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, regulatory mechanisms considered to potentially provide some protection for *Baccharis vanessae* included: (1) the California Endangered Species Act (CESA); (2) the California Environmental Quality Act (CEQA); (3) the California Natural Community Conservation Planning (NCCP) Program, which included the San Diego MSCP, MHCP, and Carlsbad Habitat Management Plan (Carlsbad HMP) under the MHCP; (4) the Act in those instances where it co-occurs with other listed taxa; (5) conservation provisions under the Clean Water Act (CWA); (6) land acquisition and management by Federal, State, or local government agencies, or by private conservation organizations; and (7) local laws and regulations. A brief discussion of the National Environmental Policy Act (NEPA) and Otay Mountain Wilderness Act are included. The regulatory mechanisms are reordered for clarity and discussed below under State and Federal Regulatory Mechanisms.

State Regulatory Mechanisms

State laws potentially providing protection to *Baccharis vanessae* include CESA, Native Plant Protection Act (NPPA), CEQA, and NCCP Act enacted in 1987.

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

Protections have been afforded to *Baccharis vanessae* since the species was listed as endangered by the State in 1987. Both the NPPA and CESA include prohibitions forbidding the “take” of

State-listed species (Chapter 10, Section 1908 and Chapter 1.5, Section 2080, CFG code). With regard to prohibitions of unauthorized take under NPPA, landowners are exempt from this prohibition for plants to be taken in the process of habitat modification. Where landowners are notified by the State that a rare or endangered plant is growing on their land, the landowners are required to notify the California Department of Fish and Game (CDFG) 10 days in advance of changing land use in order to allow salvage of listed plants. Sections 2081(b) and (c) of CESA allow CDFG to issue incidental take permits for State-listed threatened and endangered species if:

- 1) The authorized 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 taking of the species, maintain the applicant's objectives to the greatest extent possible, and are capable of successful implementation;
- 4) 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.

California Environmental Quality Act (CEQA)

CEQA 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 (http://www.ceres.ca.gov/topic/env_law/ceqa/summary.html). CEQA 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, including *Baccharis vanessae*; 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 (CEQA section 21002). Protection of listed species including *B. vanessae* through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

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 program began in 1991 under the State's NCCP Act (CFG Code 2800-2835). The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land uses (<http://www.dfg.ca.gov/nccp/>). Regional NCCPs provide protection to federally listed species by conserving native habitats upon which the species depend. Many

NCCPs are developed in conjunction with HCPs prepared pursuant to the Act. We issued section 10(a)(1)(B) permits for the County of San Diego Subarea Plan under the MSCP, the City of San Diego Subarea Plan under the MSCP, and the Carlsbad HMP under the MHCP, all of which include *Baccharis vanessae* as a covered species. Regional NCCPs may provide protection to federally listed species, such as *B. vanessae*, by conserving native habitats upon which the species depend. The specific measures under these plans that afford protection to *B. vanessae* are discussed below under the Act in the Federal Protections section.

State regulatory mechanisms affecting *Baccharis vanessae* are adequate although enforcement provisions may not be applied and the regulatory mechanisms may not be applicable to all occurrences of the species.

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. 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). NEPA is a disclosure law, and does not require subsequent minimization or mitigation measures by the Federal agency involved. Although Federal agencies may include conservation measures for *Baccharis vanessae* as a result of the NEPA process, any such measures are typically voluntary in nature and are not required by the statute. NEPA does not itself regulate activities that might affect *B. vanessae*, but it does require full evaluation and disclosure of information regarding the effects of contemplated Federal actions on sensitive species and their habitats.

Clean Water Act (CWA):

The potential for protections under the CWA was mentioned in the listing rule (USFWS 1996, p. 52380). Under section 404, the U.S. Army Corps of Engineers regulates the discharge of fill material into waters of the United States, which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. 1344). However, as stated in the final rule listing for *Baccharis vanessae*, since the majority of these taxa occur in upland habitat or in isolated fragmented parcels, it is unlikely that actions affecting *B. vanessae* will require section 404 permits. Any action with the potential to impact waters of the United States must be reviewed under the CWA, NEPA, and the Act. These reviews require consideration of impacts to listed species and their habitats, and recommendations for mitigation of significant impacts. Currently, it is unlikely that the CWA, an adequate regulatory mechanism, could provide protections to *B. vanessae* because the species is not likely to occur where CWA would normally apply.

Federal Land Policy and Management Act of 1976 (FLPMA):

The Federal Land Policy and Management Act (FLPMA) (Public Law 94–579, 43 U.S.C. 1701) was written “to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development and enhancement of the public lands; and for other purposes.” Section 102(f) of the FLPMA states that “the Secretary [of the Interior] shall allow an opportunity for public involvement and by regulation shall establish procedures... to give Federal, State, and local governments and the public, adequate notice and opportunity to comment upon and participate in the formulation of plans and programs relating to the management of the public lands.” Therefore, through management plans, the Bureau of Land Management is responsible for including input from Federal, State, and local governments and the public. Additionally, Section 102(c) of the FLPMA states that the Secretary shall “give priority to the designation and protection of areas of critical environmental concern” in the development of plans for public lands. Although the BLM has a multiple-use mandate under the FLPMA, which allows for grazing, mining, and off-road vehicle use, the BLM also has the ability under the FLPMA to establish and implement special management areas such as Area of Critical Environmental Concern, wilderness, research areas that can reduce or eliminate actions that adversely affect species of concern (including listed species). Though no actions have been taken so far, the FLPMA is an adequate regulatory mechanism that gives the BLM the ability to establish special management areas for the preservation of the *Baccharis vanessae* occurrence on Otay Mountain.

Otay Mountain Wilderness Act of 1999, P.L. 106–145, H.R. 15:

The Otay Mountain Wilderness Act (1999) (Pub. L. 106–145) and BLM management policies provide protection to *Baccharis vanessae* at EO 30. The Otay Mountain Wilderness Act directs that the Otay Mountain designated wilderness area (i.e., Otay Mountain Wilderness; 18,500 ac (7,486 ha)) be managed in accordance with the provisions of the Wilderness Act of 1964 (16 U.S.C. 1131 *et seq.*). The Wilderness Act of 1964 strictly limits use of wilderness areas, imposing restrictions on vehicle use, new developments, chainsaws, mountain bikes, leasing, and mining, in order to protect the natural habitats of the areas, maintain species diversity, and enhance biological values. Lands acquired by BLM within the Otay Mountain Wilderness boundaries become part of the designated wilderness area and are managed in accordance with all provisions of the Wilderness Act and applicable laws.

Baccharis vanessae is a BLM-designated special status plant (BLM 2010, p. 1). BLM-designated sensitive species are those species requiring special management consideration, including firefighting techniques, to promote their conservation. All federally listed and proposed species are automatically treated as special status species (BLM 2010, p. 1).

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

The Endangered Species Act of 1973, as amended (Act), is the primary Federal law that provides protection for *Baccharis vanessae*. The Service is responsible for administering the Act, including sections 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) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed species. Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the “take” of federally listed wildlife, however, plants are not protected against take. Instead, plants are protected from harm in two particular circumstances. Section 9 prohibits (1) the removal and reduction to possession (i.e., collection) of endangered plants from lands under Federal jurisdiction, and (2) the removal, cutting, digging, damage, or destruction of endangered plants on any other area in knowing violation of any State law or regulation or in the course of 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. Federally listed plants may be incidentally protected if they co-occur with federally listed wildlife species.

Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an incidental take statement. Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species because take of plants is not prohibited. However, limited protection of listed plants from take is provided to the extent that the Act and the implementing regulations prohibit the removal and reduction to possession of federally listed threatened or endangered plants or the malicious damage of endangered plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas when in violation of state law or regulation or in the course of any violation of a State criminal trespass law.

For projects without a Federal nexus that would likely 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). To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved Habitat Conservation Plan (HCP) that details measures to minimize and mitigate the project’s adverse impacts to the listed species. Therefore, HCPs provide an additional layer of regulatory protection to plants as well as animals. The San Diego County Subarea Plan and the City of San Diego Subarea Plan, both under the MSCP, and the Carlsbad HMP under the MHCP are large-scale, multi-jurisdictional NCCP/HCPs permitted under section 10(a)(1)(B) of the Act and are discussed below.

Multiple Species Conservation Program (MSCP)—County of San Diego Subarea Plan and City of San Diego Subarea Plan

The MSCP (City of San Diego 1998) is a comprehensive habitat conservation planning program for southwestern San Diego County. *Baccharis vanessae* is a covered species and is also identified as a Narrow Endemic Species under the MSCP (City of San Diego 1998, Table 3–5, p. 3–27; County of San Diego 1997b, Table 4–5, p. 4–15). Currently, the City of San Diego and the County of San Diego have approved subareas plans under the MSCP that address *B. vanessae*. The City and County of San Diego MSCP Subarea Plans emphasize avoidance of impacts to biologically sensitive resources, particularly narrow endemic species (USFWS 1997, p. 10; USFWS 1998, p. 12). Narrow endemic plants, including *Baccharis vanessae*, are conserved under the Biological Mitigation Ordinance using a process that: (1) requires avoidance to the maximum extent feasible; (2) allows for a maximum impact of 20 percent of a

population not already conserved if total avoidance is not feasible; and (3) requires in-kind mitigation at 1-to-1 to 3-to-1 ratios depending upon the sensitivity of the species and population size for impacts if avoidance and minimization of impacts would preclude reasonable use of the property (County of San Diego 1997b, p. 10; USFWS 1998, p. 12).

All three known extant occurrences of *Baccharis vanessae* within the City of San Diego MSCP Subarea Plan area are conserved (Appendix 1, EOs 26, 30, as is the CalFlora sighting occurrence). In addition, under the City Plan, impacts to narrow endemic plants, including *B. vanessae*, inside the Multi-Habitat Planning Area (MHPA) will be avoided, and outside the MHPA additional measures for its protection shall be required, including management, enhancement, restoration and/or transplantation to areas inside the preserve as deemed appropriate (USFWS 1997, p. 15).

Five of the 11 known extant occurrences of *Baccharis vanessae* located within the County of San Diego's Subarea Plan area are conserved (REGSS 8480 and 8775, EOs 7, 10 and 16), as are portions of 3 others (EOs 9, 18, and 31), while 3 (Wier in 1983, EOs 8 and 24) are not conserved (Appendix 1). Two of these (EOs 7 and 18) lie partly within the boundaries of the City of San Diego's North County subarea.

Conserved occurrences of *Baccharis vanessae* are generally protected from urban development under the MSCP through easements on private land (Appendix 1). The easements are significant in that they have saved these particular individuals and their habitat from urban development and recreation (golf course development) threats. However, the easement terms may leave management of the land up to the private landowner (the development company or sometimes a homeowners association, who has no obligation to manage the habitat or the *B. vanessae* population (other than to desist from clearing it, developing it, or landscaping it with nonnative plants). The proximity of several of the largest *B. vanessae* occurrences (Rancho Cielo area (including Mount Israel truck trail), Green Valley area (EOs 20 and 21), and Lux Canyon portion of the Encinitas area (EO 27) (Appendix 1)) to the adjacent housing developments leaves these occurrences vulnerable to invasion by nonnative plants. All such occurrences experience fire suppression activities to protect the adjacent residential communities. Thus, the protection afforded by these easements for *B. vanessae* is limited to preventing development. No species or habitat management is currently taking place within the easements. A site-specific monitoring plan, as originally intended, has yet to be developed.

Multiple Habitat Conservation Plan (MHCP)—Carlsbad Habitat Management Plan (Carlsbad HMP)

The MHCP is a comprehensive, multi-jurisdictional planning program designed to create, manage, and monitor an ecosystem preserve in northwestern San Diego County (AMEC 2003). The plan includes a Narrow Endemics Policy. Of the seven cities (Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Vista, and Solana Beach) evaluated under the MHCP, only Carlsbad, Encinitas, and Escondido have occurrences of *Baccharis vanessae* (AMEC 2003, p. 4–33). Carlsbad is the only city that currently has an approved subarea plan (see discussion below); however, some of lands in the jurisdictions of Encinitas and Escondido support occurrences of

B. vanessae and are conserved (Appendix 1). Encinitas and Escondido have draft subareas plans.

The MHCP Narrow Endemics Policy (AMEC 2003, pp. 12, D-1) will apply to any locations potentially threatened with development or to any new locations found in the future. For populations within the Focused Planning Areas (FPA), this policy requires maximum avoidance, minimization of impacts with no more than 5 percent gross cumulative loss for populations or occupied acreage, and mitigation for unavoidable impacts resulting in no net loss of narrow endemic populations, occupied acreage, or population viability. For populations outside the FPA, this policy requires avoidance, minimization of impacts with no more than 20 percent gross cumulative loss of locations, numbers or occupied acreage, and mitigation resulting in no net loss and designed to minimize adverse effects to the species viability and contribute to the species recovery.

There are two populations of *Baccharis vanessae* in the MHCP planning area identified as major populations. One population, considered to be a critical location, is in Encinitas and a small area of Carlsbad on the slopes of Green Valley (Appendix 1, EOs 20 and 21). Another smaller population, also considered critical is in Encinitas at Lux Canyon (Appendix 1, EO 27). Any location of *B. vanessae* identified as a critical location requires maximum avoidance (USFWS 2004, p. 12). If new locations are determined to be critical, then those locations must be maximally avoided which means “avoidance of impacts to the degree practicable without precluding reasonable use of the property” (AMEC 2003, pp. D-1—D-2).

In Escondido, a major population is found near Mount Israel (USFWS 2004, p. 280). Though this was not declared a critical population, this area is currently recognized as supporting several CNDDDB EOs (EOs 7, 8, 16, 17, 18, and 31) that are included in the MHCP Escondido subarea plan (not finalized), the MSCP North County subarea plan (not finalized), as well as the MSCP County subarea plan (finalized) (see Appendix 1 for designations). There are 9,292 acres of potential *Baccharis vanessae* habitat (southern maritime chaparral and southern mixed chaparral) in the MHCP planning area (USFWS 2004, p. 280).

The Carlsbad HMP is a subarea plan under the northwestern San Diego County MHCP. The MHCP is a comprehensive, multi-jurisdictional planning program designed to create, manage, and monitor an ecosystem preserve in northwestern San Diego County. The incidental take permit for the City of Carlsbad HMP was issued on November 9, 2004, and the City was the first of the seven participating cities to receive a permit on their subarea plan. *Baccharis vanessae*'s covered species status is contingent on funding for management of conserved areas consistent with the MHCP (USFWS 2004, pp. 3-4, and Table 3, p. 6). Once the City of Carlsbad has adequate funding and legal access to manage and monitor the plant consistent with the requirements of the MHCP, it will become a covered species. *Baccharis vanessae* is also listed in a Combined MHCP and HMP Narrow Endemic Species List (USFWS 2004, Table 10, p. 34).

There are three occurrences of *Baccharis vanessae* within the City of Carlsbad. Two of the occurrences (REGSS 7720 and EO 20) were evaluated in the HMP and it was determined that, overall, all of the occurrences would be conserved (AMEC 2003, pp. 4-35). Preservation of other occurrences (portions of EO 1) not evaluated in the HMP is required to be consistent with

the MHCP's narrow endemic policy. All conserved populations of *B. vanessae* will be incorporated into the preserve areas of the HMP. The HMP includes provisions to manage the populations within the preserve areas in order to provide for the long-term conservation of the species by minimizing edge effects, preventing disturbance, protecting against frequent fires, and possibly including prescribed fires (City of Carlsbad 2004, p. D-98).

Summary of Factor D

Loss of *Baccharis vanessae* habitat has continued to occur since listing, however, State and Federal regulatory mechanisms have reduced the likelihood of the outright destruction of the southern maritime chaparral and other habitat that supports *B. vanessae*. Protections afforded under regional HCPs have decreased major habitat alteration and loss and currently provide protection to 25 of the 30 known extant occurrences (including CNDDDB EOs, Herbarium specimen collection sites, or REGSS data points) under provisions of an HCP, or by virtue of occurring on Federal lands (BLM or United States Forest Service). At the present time, there are no monitoring and management actions in effect at the conserved occurrences to prevent populations in easements and preserves from declining further due to ecological processes. In absence of the Act, existing regulatory mechanisms remain insufficient to ameliorate impacts to *B. vanessae* from current threats rangewide.

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

At the time of listing, we identified the following Factor E threats to *Baccharis vanessae*: (1) fuel modification and fire suppression activities; (2) restricted distribution and small population size; (3) invasion of nonnative plant species; and (4) decline or loss of unidentified pollinators or seed dispersal agents. Habitat fragmentation and isolation, as well as the interruption of the natural fire cycle mentioned as threats in the listing rule are addressed under Factor A. Threats associated with recreation activities are related to trampling of *B. vanessae* plants and are discussed here rather than under Factor A, as they were in the final listing rule. Impacts associated with climate change, not identified as a threat at the time of listing, is also included here under Factor E.

Fuel Modification and Fire Suppression Activities

At the time of listing, fuel reduction activities were identified as one of the imminent threats to *Baccharis vanessae*. The thinning or removal of the crowns of *B. vanessae* shrubs as part of fuel reduction activities continues to threaten this species at 17 of the 30 known extant occurrences (Appendix 1). Local ordinances often require the creation of firebreaks around residential properties with varying levels of habitat impacts. The City of San Diego requires replacement of native brush within the first 11 m (35 ft) surrounding a home ("Zone 1") by an irrigated zone of low, fire-resistant nonnative vegetation, followed by thinning of chaparral and sage scrub in the outer 19.8 m (65 ft) ("Zone 2"). There is a requirement to cut down 50 percent of all plants over 0.6 m (2 ft) in height to a maximum height of 15.2 cm (6 in), while the remaining Zone 2 shrubs are to have their crowns thinned and their upper branches shortened. The City of San Diego allows coastal sage scrub plants in Zone 2 to be lowered to only 30.5 cm (12 in) in height (City of San Diego, Brush Management Guide, downloaded on 17 Feb 2010). The County of

San Diego requires fuel modification within 30 m (100 ft) of homes (County of San Diego, downloaded 17 Feb 2010). The City of Poway has a similar fuel reduction ordinance (Poway Municipal Code Section 8.76.30) and has requested modifications several times to its portion of the MSCP in order to implement fuel reduction actions.

Brush thinning or clearing associated with fuel modification removes or damages the crowns of individual *Baccharis vanessae* plants. This activity may result in the loss of plants, a decrease in reproductive output, and destruction of any residual soil seed bank that might be present. *Baccharis vanessae* occurs in habitat that is in close proximity to urban areas that require some level of fuel modification due to local ordinances and fire suppression measures. Areas likely susceptible to fire suppression actions were identified (see Appendix 1) using GIS analysis of proximity of developed sites, particularly homes and roads. Fuel modification and fire suppression measures continue to be a threat to plants in these areas.

Nonnative Plants

At the time of listing, competition from nonnative plant species was identified as a threat to *Baccharis vanessae*. Prevalence of nonnative plants is expected to increase with proximity to persistent sources such as residential development and highways. Nonnative plants may crowd out suitable establishment sites for *B. vanessae*, as may unchecked native plants, and they may alter the fire regime of the site. Consequently a generalized threat from nonnative plants could be expected at many *B. vanessae* occurrences including EOs 1, 7, 16, 20, 21, 25, 26, 27, 28, 31, and 32, and REGSS sighting 8775 (Appendix 1). Forty percent of the extant occurrences (12 of 30) are likely impacted by threats associated with nonnative plant taxa. Nonnative species of grasses and forbs are known to invade many plant communities often as an indirect result of habitat disturbance. *Carpobrotus edulis* (iceplant, Hottentot fig) has the ability to invade maritime chaparral after brushfires (Zedler and Scheid 1988, pp. 196–201). The thick mat of this nonnative plant can prevent seedlings of native plants from becoming established (D'Antonio and Mahall 1991, pp. 886–888).

Five occurrences of *Baccharis vanessae* (EOs 17–19, 23, and 32) occur at the water storage facility owned by the SDCWA and managed by the Olivenhain Metropolitan Water District. In a biological opinion, we required the SDCWA to develop a Habitat Management Plan for *B. vanessae* (USFWS 1999, p. 6). This plan was finalized in 2001 and called for conducting an experiment to see if reducing competition from taller species of chaparral shrubs would result in improved growth and reproduction in the *B. vanessae* plants (Messina 2001, pp. 2–3, 7–15). There was no significant increase in growth or reproduction among the *B. vanessae* where competing species were cut back (Klutz, pers. comm., 2010).

Another group of nonnative plants that have significantly expanded across the Mediterranean-climate regions of California are *Centaurea* species (star-thistles) (Keil and Turner 1993, pp. 222–223). *Centaurea* seeds are known to germinate much faster than those of some *Baccharis* species, grow rapidly during the winter and spring, and reduce the performance (biomass gain) of *Baccharis* seedlings (Gomez-Gonzalez *et al.* (2009, p. 81). Gomez-Gonzalez *et al.* (2009, p. 81) linked these findings with the discovery by Enloe *et al.* (2004, p. 933) that California soils dominated by *Centaurea solstitialis* (yellow star-thistle) are significantly drier than those

dominated by native grasses, suggesting that *C. solstitialis* could out-compete *Baccharis* seedlings through its ability to deplete moisture from the topsoil during spring before *Baccharis* seedling roots could penetrate the soil surface and reach the lower soils where some moisture persists throughout the dry season. Experiments also demonstrated that the high growth rate of *Centaurea* seedlings resulted in the shading of *Baccharis* seedlings, a factor that could have played a role in reducing their growth (Gomez-Gonzalez *et al.* 2009, pp. 73, 75, 80–81). *Centaurea* spp. may pose a significant threat to co-occurring *B. vanessae* seedlings due to *Centaurea*'s prolific seed production, high percentage of seed viability, and roots that are comparatively deep for an annual/biennial plant species. The magnitude of threat of this nonnative plant across the range of *B. vanessae* is unknown; however, Service biologists have observed thousands of *Centaurea* seedlings proliferating at one occurrence in Oakcrest Park (EO 1), which appear to be spreading through the trail system (Thiede, pers. obs., 2010).

Restricted Distribution and Small Population Size

As stated in the final listing rule, *Baccharis vanessae* is at risk of extinction from naturally occurring events because of its restricted distribution and small population size (USFWS 1996, p. 52381). The distribution of the species is relatively narrow and likely habitat limited. This situation may exacerbate any other threats that are rangewide in scope, such as wildfires or broad jurisdictional fire suppression efforts. Though the number of occurrences currently considered extant increased from 16 to 30 since listing, only one occurrence significantly extends the range of the species. The remaining occurrences are infillings in the previously known range. However, the threat of small population size has several identifiable components discussed below: a small number of standing plants present; there may be insufficient numbers of one sex plant over the other; there may be reduced genetic variability; and there may be low recruitment into the population due to low reproductive output in turn due to lack of pollinators or other seed limiting factors.

Abundance estimates have only been reported for a few sites since 2000. When numbers were reported, abundance at each occurrence was generally low (under 40 plants) and these counts did not distinguish whether the plants were male or female individuals (Appendix 1). *Baccharis vanessae* plants have not been observed at over 50 percent of occurrences since they were first reported and another 10 percent of occurrences were observed to support only a single plant. The small size of many *Baccharis vanessae* populations increases the probability that those populations will disappear or be otherwise compromised through random fluctuations in the environment (such as severe droughts or fires), failure to be cross-pollinated, or random human caused events (such as the clearing of a parcel of southern maritime chaparral in northern Lux Canyon in 2009) (S. Vurbeff, City of Encinitas, pers. comm., 2010).

Most alarming is the fact that, no *Baccharis vanessae* seedlings have been observed in the field since 1991 and we do not know what is limiting reproduction. In particular, no seedlings have been found in association with the 125 individuals monitored every November at Elfin Forest (Olivenhain Reservoir) from 2005 to 2009, not even in close proximity to the parent plants (Klutznick, pers. comm., 2010). Possible explanations include inadequate pollination of the female flowers, lack or diminished production of viable seeds, or subsequent low rate of establishment. An inadequate balance of male to female plants at a site may also contribute to low establishment

rates (Figure 2). However, there is no evidence to indicate any relationship between the numbers of either sexual morph and the production of viable seeds. The extreme manifestation of this threat is when a single plant occurs (e.g., EO 28) isolated from others, or sites where the occurrence is considered extant or possibly extant based on assessment of the habitat but where no plant counts are available (e.g., EO 3). These conditions exist at 17 of the 30 extant occurrences and could greatly diminish the opportunity for seed production (Appendix 1). Identification of the gender of each individual *B. vanessae* is needed in future surveys in order to quantify the potential extent of this problem. Up-to-date surveys are also needed to identify occurrences with significant or extreme unbalanced sex ratios.

Small populations are more susceptible to the expression of deleterious genes because of the low number of individuals in the population (Barret and Kohn 1991, pp. 7–8). We need to understand the genetic structure of *Baccharis vanessae*'s scattered populations and its breeding system to determine if this poses an actual threat to the species and the relative conservation value of the specimens at the various occurrences. This may also influence management decisions regarding *ex situ* conservation and population augmentation as conservation tools.



Figure 2: Contrasting Genders of *Baccharis vanessae*:

<p>Left photo: Staminate (male) flower heads Photo credit: Andrew Borchert</p>	<p>Right photo: Pistillate (female) flower heads Photo credit: Michael Charters (U.S. Forest Service)</p>
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The low numbers of individual *Baccharis vanessae* shrubs at most of the occurrences raises the question as to why more individuals are not being recruited into the population of established, mature shrubs. Seed production, seed mortality, and seedling establishment are components of this process.

Thirteen seed collections of *Baccharis vanessae* were collected from different plants at several sites around the Olivenhain Dam and reservoir site. None of the seed collections contained viable seeds (M. Wall, Rancho Santa Ana Botanic Garden, *in litt.*, 2000). Among the possible reasons are, something might be preventing pollination of the flowers, inbreeding depression is rendering the embryos inviable, there are too few individuals to achieve much wind pollination, plants are senescent and do not produce adequate amounts of seeds, heavy insect predation on

flowers and developing seeds, inadequate gender ratios limiting potential pollination, ineffective wind-pollination (Griffin 1997, pp. iii, 17–31, 53), or the decline or disappearance of key insect pollinators. It is also possible that embryo-containing fruits had already detached from the parent plant (Wall 2000, *in litt.*, 2010) before the seed sample was collected.

Climate Change

There is a broad consensus among scientists that the earth is in a warming trend caused by anthropogenic greenhouse gases such as carbon dioxide (IPCC 2007). Climate models are being generated to examine what will happen in localized regions such as southern California, and many scientists believe warmer, wetter winters and warmer, drier summers will occur within the next century as well as an increase in extreme temperature events (e.g., Field *et al.* 1999, pp. 2–3, 20; Christensen *et al.* 2007, p. 891). Climate-related changes in California have been documented (Croke *et al.* 1998, pp. 2128, 2130; Breashears *et al.* 2005, p. 15144; McMullen and Jabbour 2009, p. 41; Dominguez *et al.* 2010, p. 500). Predictions for California indicate prolonged drought and other climate-related changes will continue in the future (Field *et al.* 1999, pp. 8–10; Lenihan *et al.* 2003, p. 1667; Hayhoe *et al.* 2004, p. 12422; Breashears *et al.* 2005, p. 15144; Seager *et al.* 2007, p. 1181; IPCC 2007, p. 9). The impacts of predicted climate changes on individuals and habitat of *Baccharis vanessae* and similar species are unknown at this time.

Baccharis vanessae may already be suffering adverse effects from past climate changes resulting in a drier Holocene climate in present-day southern California. The observed lack of *B. vanessae* seedlings could possibly indicate that this species is unable to survive the length, severity, or the current timing of the annual dry season in San Diego County. Williams and Hobbs (1989, pp. 62, 64–66) discovered that *B. pilularis* seedlings tend to survive only during rainy springs (March to May) brought on by rare mega-El Niños like the one in 1982 to 1983 because the seedlings' root growth is negligible prior to March.

Trampling

Trampling and recreational impacts were listed as threats in the listing rule under Factor A, but are discussed here as threats to *Baccharis vanessae* at four occurrences. Currently, unauthorized camping occurs at Oak Crest Park in Encinitas (CNDDDB 2011, EO 1) even though the area is conserved (Thiede, pers. obs., 2010). Visitor foot traffic, as well as potential trail maintenance activities, also pose a threat to the *B. vanessae* populations at EOs 17 and 18, and rock climbers at Woodson Mountain likely impact plants at EO 15 (CNDDDB 2011). The threat of trampling is likely incidental, occasional, and localized.

Summary of Factor E

Fuel modification activities and fire suppression actions currently threaten *Baccharis vanessae* at 17 of the 30 extant occurrences. Impacts from nonnative plants are anticipated to increase with increasing development and have been reported to outcompete *B. vanessae* individuals. Nonnatives are currently a threat at 12 of the 30 occurrences. The relatively small population size of most *B. vanessae* occurrences increases their risk of becoming extirpated by random

environmental fluctuations or habitat modification such as brush clearing. Various aspects associated with small population size threaten 17 of the 30 known occurrences of *B. vanessae*. Six of these occurrences are possibly reduced to a single male or female plant thereby nearly precluding onsite reproduction. Of greatest concern is the rangewide absence of reproduction evidenced by the lack of documented establishment of seedlings. Climate change is a generalized rangewide threat to the species. Due to the impacts of fuel modification, nonnatives, and vulnerability of small population size, Factor E threats continue to threaten *B. vanessae* throughout its range.

III. RECOVERY CRITERIA

A recovery plan has not been completed for this species.

IV. SYNTHESIS

There are 30 known extant occurrences of *Baccharis vanessae*. Occurrences continue to be impacted by the major threat at listing: habitat loss. However, State and Federal regulations since that time have reduced the magnitude of this threat and regional HCPs implemented under the Act afford protection to the majority of extant occurrences. Only 11 of the 30 occurrences remain threatened by habitat loss through planned urban development or impacts associated with development. Impacts to *B. vanessae* occurrences by altered fire regimes have been observed at 13 occurrences and fuel modification actions threaten 17 of the 30 occurrences. Impacts from nonnatives are evident throughout the range at 12 occurrences and have been observed to outcompete *B. vanessae* individuals for water and space. Trampling is a localized threat with impacts noted at four occurrences. Threats associated with small population size threaten 17 of the 30 known extant occurrences. This is a primary concern, as new seedlings have not been observed since 1991, and the majority of occurrences are occupied by less than 20 individuals.

Most of the remaining occurrences of *Baccharis vanessae* are now in close proximity to housing developments and are threatened by a lack of canopy-opening disturbances, as well as brush thinning and removal for fuel reduction purposes, invasions of nonnative plants, and possibly by heavy insect predation on its flowers and seeds. Of greatest concern is the rangewide apparent lack of reproduction evidenced by the absence of seedlings. Several occurrences were last known to support a single (unisexual) plant, which will likely not persist at those sites. In recognition of the magnitude of the current threats, we recommend no change in the threatened status of *B. vanessae* 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: No Change

Baccharis vanessae is a species that faces severe threats, some of which are rangewide. However, its current potential for recovery is uncertain due to the lack of understanding of the biological and physical factors limiting its population growth and distribution. Research is needed in most areas of its ecology and life history, particularly on its reproductive ecology. Habitat loss, the major threat identified in the listing rule, has been reduced under conservation provisions of State and Federal laws, but often no habitat management is in place to prevent modification or degradation of conserved habitat by altered disturbance regimes, invasive plant species, and possible loss of pollinators. No species-level monitoring and management actions have been implemented to arrest the decline of *B. vanessae* on conserved lands (except at the Olivenhain Reservoir) and to promote population recovery. Threats associated with small population size and low recruitment of the taxon are rangewide. Documented threats from nonnative plants and trampling are more localized. The recovery priority number for *B. vanessae* is 5C. The degree of threat is considered high due to the lack of recruitment and the small size of most *B. vanessae* populations. The potential for recovery remains low due to the lack of understanding of the population recruitment dynamics and requirements, plant survival, and mortality factors driving *B. vanessae*'s decline. Although reduced since listing, the species continues to be threatened by construction projects (conversion of habitat to urban uses), so the suffix C is affixed, per the Service's published recovery priority criteria.

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 *Baccharis vanessae* by providing information to better understand the biological and physical factors limiting the population growth and distribution. Conservation of *B. vanessae* 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 *B. vanessae* will require extensive cooperation and coordination with partners to minimize impacts from current threats and aid future restoration.

- 1) Survey all historical and extant occurrences to determine the location, status, age-class representation, and sex composition of each population to establish a comprehensive baseline against which to measure future changes. Survey all areas that support "maritime-like" southern mixed chaparral for additional occurrences.
- 2) Manage *Baccharis vanessae* occurrences to maintain plants of both sexes. Outplantings could be considered at occurrences such as EO 28 where only one plant has been observed.
- 3) Investigate the possible causes of seed mortality and low reproductive success, and identify likely remedies.
- 4) Conserve or preserve *Baccharis vanessae* occurrences on private lands. Property easements or purchases of parcels could also be made through the Act's section 6 funding and other programs.
- 5) Determine the appropriate use or substitute for a natural fire regime to perpetuate suitable habitat for *Baccharis vanessae*.
- 6) Determine which areas are most susceptible, to reduce impacts to *Baccharis vanessae* from fuel modification and fire suppression activities (i.e. using GIS analysis).
- 7) Determine the distribution of genetic diversity in the species occurrences and identify the most appropriate means to preserve the diversity.

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- Wall, Michael. May 4 and 5, 2010. Manager, Conservation Seed Bank Program, Rancho Santa Ana Botanic Garden, Claremont, California. Notes from a telephone conversation with James Thiede, ecologist, Carlsbad Fish and Wildlife Office, Carlsbad, California, on May 4, 2010; e-mail with attached documents (letters) on May 5, 2010. Subject: *Baccharis vanessae* seeds collected at Olivenhain Reservoir and sent to RSABG to establish a long-term seed bank.
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Appendix 1. Occurrence records for *Baccharis vanessae* (Encinitas baccharis). Prepared for 2011 5-year review.

City or Area	Occurrence #		Owner	Status at Listing ²	Current Status	Survey Year (results)	Current Threats	Current Conservation		
	Included records ¹	Location name or identification								
Cleveland Nat. Forest	1	EO 22	San Mateo Canyon Wilderness	USFS, Cleveland National Forest	Extant	Extant	1992 (8-12 plants)	E: fuel mod	USFS, Cleveland National Forest	
San Marcos	2	Fuller et al Dec. 15, 1976 (UCR 15313)	N. Jct. San Marcos Blvd. and Rancho Santa Fe Rd.	Private	-	Extirpated	-	NA	MHCP, not in FPA, not conserved	
Carlsbad	3	REGSS 7720	NW jct Black Rail Rd & Aviara Pkwy.	Private	-	Possibly extirpated	1990 (no plants)	NA	MHCP Carlsbad subarea, FPA, Conserved	
Green Valley	4	EO 20	EO 20 incl REGSS 8412, 8425	Green Valley, (North)		Extant	Presumed extant	1992 (36 plants)	A: Altered fire regime E: fuel mod; nonnative plants	MHCP Carlsbad subarea, FPA, Conserved
			REGSS 8439, 8443, 8456	Green Valley (Central)		-	Presumed extant	12 plants (1)	A: Altered fire regime	MHCP Carlsbad subarea, FPA, Conserved
	5	REGSS 8358	Green Valley (Central)		-	Extirpated	-	NA	MHCP Carlsbad subarea, not in FPA, not conserved	

Green Valley	6	EO 21	EO 21 incl. REGSS 8532, 8534, 8540	Green Valley (South)		Extant	Presumed extant	1992 (13 plants total)	A: Altered fire regime E: fuel mod; nonnative plants	MHCP Encinitas subarea, FPA, Conserved
			REGSS 8491, 8545			-	Presumed extant	12 plants total (1)	A: Altered fire regime E: fuel mod; nonnative plants	MHCP Encinitas subarea, FPA, Conserved
			REGSS 8519, 8522			-	Extirpated	8 plants total (1)	NA	MHCP Encinitas subarea, Conserved
	7		REGSS 8659	Green Valley (South)		-	Possibly extirpated	1992 (no plants)	NA	MHCP Encinitas subarea, FPA, Conserved
Encinitas	8	EO 3	EO 3, incl.	N. Encinitas Blvd. along Via Cantebria	Private	Extirpated	Extirpated		NA	MHCP Encinitas subarea, FPA, not conserved
			REGSS 10409	REGSS 10409		-	Possibly extant	1989 (no plants)	A: Develop; altered fire regime E: fuel mod; small pop	MHCP Encinitas subarea, FPA, Conserved
			Reiser s.n. Aug 31 1989 (SD 134538)			-	Extirpated	-	NA	MHCP Encinitas subarea, not FPA, not conserved
			Tilforth et al. 1682 Aug 17, 1968 (RSA 30560, SD 124211)			-	Extirpated	-	NA	MHCP Encinitas subarea, not FPA, not conserved

Solano Beach	15	EO 29	San Dieguito Co. Park, SD Co.		Unknown	Translocation Possibly extirpated	-	NA	MSCP N. Co. Subarea, not in MHPA, conserved
	16	EO 25	SD Co.		Extant	Presumed extant	1990s (20-25 plants)	A: Develop; altered fire regime E: Fuel mod; nonnative plants.	MSCP N. Co. Subarea, not in MHPA, not conserved
	17	REGSS 9738	SD Co.		-	Possibly extirpated	1981 (0)	NA	San Diego MSCP, not in MHPA, not conserved
Rancho Cielo	18	REGSS 8863	SD Co.		-	Possibly extirpated	1992 (0)	NA	MSCP, N. Co. Subarea, not in MHPA, not conserved
	19	EO 18	Lake Hodges, Elfin Forest Recreational Reserve, SD Co.		Extant	Extant	-	A: Altered fire regime E: small population size; trampling	MSCP or MSCP N. Co. Subarea, conserved
			North polygon and REGSS 10605, 10606	SD Co.			Presumed extant	2001 (125 plants total) (1)	
		Central polygon, (incl. REGSS 10602, 10603, 10604), and REGSS 10607, 10608	SD Co.			Presumed extant	2002 (116 plants and 4 plants total) (1)		MSCP, County SD subarea & N. County subarea, in MHPA, conserved

Rancho Cielo		Central polygon, (incl. REGSS 10600, 10601, 10609, 10610, 10611, 10612, 10613, 10614)	SD Co.			Presumed extant	2002 (49 plants total) (1)		MSCP N. Co. Subarea, not in MHPA but conserved	
		South polygon, (incl. REGSS 8432, 8448)	SD Co.			Presumed extant	-		MSCP N. Co. Subarea, not in MHPA but conserved	
	20	EO 17	EO 17, incl. REGSS 8413	SD Co.	Lake Hodges-Elfin Forest Recreational Reserve	Extant	Extant	-	A: Altered fire regime E: trampling, small population size; trampling	MSCP N. Co. Subarea, not in MHPA but all conserved
			REGSS 8283	SD Co.		-	Possibly extirpated	1990 (no plants)		
			REGSS 8339	SD Co.		-		3 plants (1)		
	21	REGSS 8480		SD Co.		-	Presumed extant	1988 (no plants)		MSCP County SD subarea in MHPA, conserved
	22	EO 8	EO 8, incl. REGSS 8656	SD Co.		Extant	Presumed extant	1991 (0)	A: Develop E: fuel mod, small population size.	MSCP County SD subarea, not in MHPA, not conserved
			Reiser s.n. Nov 2, 1992 (SD 138939)	SD Co.		-	Presumed extant	-	E: fuel mod, small popul size.	
			Reiser s.n. Sept. 17, 1998 (SD 152642)	SD Co.		-	Presumed extant	-	E: fuel mod, small population size	
			REGSS 8614	SD Co.		-	-	-		

Rancho Cielo	23	EO 31	EO 31	SD Co.		Unknown	Presumed extant	1999 (1 plant)	A: Develop part E: Small population size	MSCP County SD subarea, n half in MHPA and conserved, s half not in MHPA and not conserved
			REGSS 8748	SD Co.	-	Possibly extirpated	1988 (no plants)	E: fuel mod; nonnative plants	MSCP County SD subarea, in MHPA and conserved	
	24	EO 16	EO 16 incl REGSS 8776	SD Co.		Extant	Presumed extant	1991 (413 plants)	A: Altered fire regime E: Fuel mod; nonnative plants	MSCP County SD subarea in MHPA, conserved
			REGSS 8769	SD Co.	-	-	1988 (no plants) (1)	A: Altered fire regime E: fuel mod; nonnative plants		
	25	REGSS 8775	SD Co.	-	Presumed extant	-	A: Altered fire regime E: Fuel mod; nonnative plants, small population size	MSCP County SD subarea, in MHPA, conserved		

Rancho Cielo	26	EO 32	SD Co.		Unknown	Extant	-	E: Fuel mod; nonnative plants, small pop size	MSCP N. Co. subarea, not in MHPA but conserved	
	27	EO 7 (incl. EOs 11, 13, 14)	EO 7 incl. REGSS 8860, 8875, 8877; Moran s.n. Dec. 5, 1988 (SD 126583)	SD Co.		Extant	Presumed extant	1986 and 1989 (no plants) (1)	A: Develop part; altered fire regime E: Fuel mod; nonnative plants	MSCP County SD subarea, not in MHPA, but over half polygon conserved
			REGSS 8820	SD Co.		-	Presumed extant	No plants (1)	A: Develop part; altered fire regime E: Fuel mod	MSCP N. Co. Subarea, not in MHPA or conserved
			REGSS 8824, 8923, 8930	SD Co.		-	Presumed extant	1992 (7 plants total)	A: Altered fire regime E: Fuel mod	MSCP County SD subarea, not in MHPA but conserved
			REGSS 8840	SD Co.		-		No plants (1)	A: Develop; altered fire regime E: Fuel mod	MSCP County SD subarea, in MHPA but not conserved
	28	REGSS 8959	SD Co.		-	Possibly extirpated	1988 (no plants) (1)	NA	MSCP County SD subarea, not in MHPA, not conserved	
	29	REGSS 8974	SD Co.		-	Possibly extirpated	1988 (no plants) (1)	NA	MSCP County SD subarea, in MHPA, not conserved	
	30	REGSS 8947	SD Co.		-	Possibly extirpated	1984 (no plants) (1)	NA	MSCP County SD subarea in MHPA, not conserved	
	31	REGSS 9001	City of SD		-	Possibly extirpated	1988 (no plants) (1)	NA	MSCP City SD subarea, in MHPA, not conserved	

4S Ranch	32	Wier s.n. May 1, 1983 (SD 115244)	SD Co.	-	Presumed extant	-	A: Develop E: Fuel mod; small population size	MSCP County SD subarea in MHPA, not conserved	
	33	EO 9	EO 9	SD Co.	-	Extant	Extant		
			EO 9 SE half incl. REGSS 8907, 8912, 8917, 8921, 8927, 8933, 8943, 8948	SD Co. 4S Ranch NE Ralph's Preserve	-	Presumed extant	1992 (no plants) (1) 2005 34 plants (18 male, 10 female, 6 unkn)		MSCP County subarea, in MHPA, conserved
			EO 9 NW half incl REGSS 8902, 8998	SD Co. 4S Ranch NE	-	Presumed extant	1992 (no plants) (1)	A: Develop	MSCP County SD subarea in MHPA not conserved
			EO 9 (NW half incl. REGSS 8886	SD Co. 4S Ranch NE	-	Presumed extant	1992 (no plants) (1)	A: Develop	MSCP County SD subarea not in MHPA, not conserved
			REGSS 8882	SD Co. 4S Ranch NE	-	Presumed extant	1981 (no plants) (1)	A: Develop	MSCP County SD subarea in MHPA not conserved
			Buegge 1338 Nov. 9, 2005 (SD 178827)	SD Co. 4S Ranch NE	-	Unknown	Presumed extant	-	A: Develop
	34	EO 10 includes REGSS 9223, 9255	SD Co. 4S Ranch south	-	Extant	Presumed extant	1983 (hundreds of plants)	MSCP County SD subarea, in MHPA conserved	

Mount Woodson	35	EO 15	EO 15	Woodson Mountain, S.D. Co.		Extant	Extant	1991 (12 plants)	E: Trampling.	MSCP N. Co. subarea not in MHPA but conserved
			Hirshberg 161 Dec 12, 1991 (SD 132751)			-	Presumed extant			
	36	REGSS 9766		Mt. Woodson, SD Co.		-	Presumed extant	-	E: Small population size.	MSCP, N. Co. Subarea, conserved
	37	Marshall 23 Dec. 17, 2005 (SD 174479)		SD Co.		Unknown	Presumed extant	No plants (1)	E: Small population size.	MSCP, N. Co. subarea, conserved
38	Marshall 21 Dec. 5, 2005 (SD 175312)				Unknown	Presumed extant	-	E: Small population size.	MSCP Poway subarea, in MHPA conserved	
Iron Mountain	39	REGSS 9962		Iron Mountain		-	Presumed extant	No plants (1)	E: Small population size.	MSCP Poway subarea, in MHPA conserved
		REGSS 9977				-	Presumed extant	No plants (1)	E: Small population size.	MSCP Poway subarea, in MHPA conserved
		REGSS 10008				-	Presumed extant	2002 1 plant (1)	E: Small population size.	MSCP Poway subarea, in MHPA conserved

Van Dam Mountain	40	EO 5 incl. REGSS 10169, 10187			Extant	Presumed extant	1981 (1 plant); 1990 (no plants) (1)	A: Develop part; altered fire regime E: Fuel mod, small population size	MSCP Poway subarea in MHPA about half EO conserved
	41	EO 6			Extirpated	Extirpated	-	NA	MSCP City SD subarea, not in MHPA not conserved
Carmel Mountain	42	EO 26	Carmel Mountain		Presumed extant	Presumed extant	-	E: Fuel mod; nonnative plants, small population size	MSCP City SD subarea, in MHPA conserved
Alpine	43	EO 24	Alpine, S.D. Co.		Presumed extant	Presumed extant	-	A: Develop	MSCP County SD subarea, not in MHPA not conserved
Otay Mountain	44	EO 30	SD Co		Unknown	Presumed extant	-	E: small population size	MSCP City SD subarea, in MHPA conserved
	45	CalFlora sighting				Presumed extant		E: small population size	MSCP City SD subarea, in MHPA conserved.

¹ Records used for the occurrence table include: included CNDDDB Element Occurrence (EO), Consortium of California Herbaria (CCH) online database, and REGSS (set of species-based GIS layers created by the San Diego Association of Governments). In some cases, there are multiple point locations/records for the same locality, and thus they are grouped together to represent one occurrence. All record numbers are ordered north to south.

² The final listing rule identified 19 known historical populations, 14 of which were extant. After analysis of all available information, these represent 16 extant occurrences.

U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW

***Baccharis vanessae* (Encinitas baccharis)**

Current Classification: Threatened

Recommendation Resulting from the 5-Year Review:

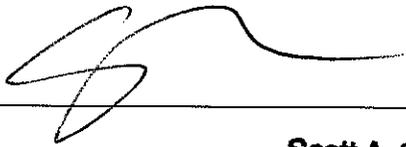
- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

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

Approve _____



Date _____

DEC 22 2011

Scott A. Sobiech

ACTING