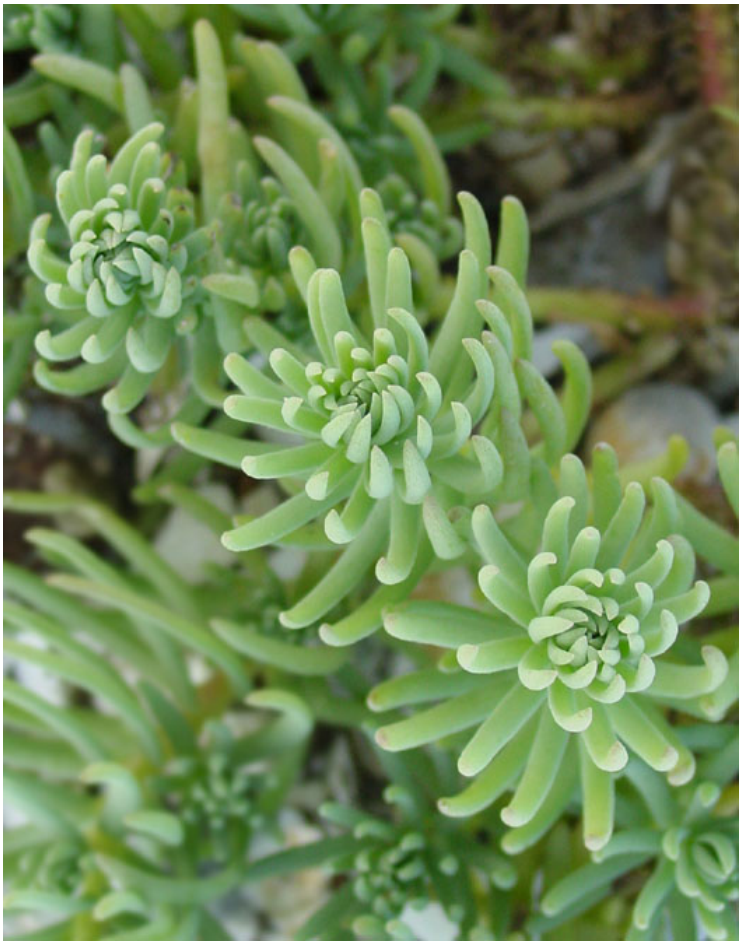
Suaeda californica
(California sea-blite)

5-Year Review:
Summary and Evaluation



California Sea-blite *(Suaeda californica)* Photo: Margo Bors 2003

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California

February 2010

5-YEAR REVIEW

Suaeda californica (California sea-blite) S. Watson

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 (or since the most recent 5-year review). 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 original listing of a species as endangered or threatened is based on the existence of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 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 defined in the Act that includes public review and comment.

Species Overview:

Suaeda californica (California sea-blite) is a succulent-leaved perennial shrub of the goosefoot family (Chenopodiaceae) endemic to the coastal zone of California. This species was federally listed as endangered throughout its range on December 15, 1994 (Service 1994). Once also found in tidally influenced salt marsh and estuarine habitat in and around San Francisco Bay, the current extant naturally-occurring distribution of *S. californica* is restricted to the upper tidal salt marshes of Morro Bay and estuarine creek mouths near Cayucos, California (Walgren 2006). Its distribution in Morro Bay is typically patchy, occurring predominantly along a narrow band of habitat adjacent to the communities of Los Osos and Baywood Park and the length of the sand spit, a narrow peninsula of dunes that comprise the western edge of Morro Bay. Four occurrences of the species have been re-introduced in the San Francisco Bay area in recent years (V. Bloom, Service biologist, *in litt.* 2009a).

Methodology Used to Complete the Review:

This 5-year review for *Suaeda californica* was prepared by the Ventura Fish and Wildlife Office (VFWO), following the Region 8 guidance issued in March 2008. We compiled and summarized information from the 1994 listing rule, an administrative draft of the recovery plan, the re-introduction plan developed for the San Francisco Bay (Baye 2006), published and unpublished survey and observational information from species experts, and element occurrence data housed in the California Natural Diversity Database (CNDDB 2009) maintained by the California Department of Fish and Game (CDFG). The administrative draft recovery plan and

information from species experts constitute the primary sources of information used to update the species' status and threats. No information was received from the public in response to our March 25, 2009, notice that initiated this 5-year review (Service 2009). The review contains updated information on the species' distribution and threats and an assessment of that information currently available compared to that known at the time of listing. This is the first status review prepared for *S. californica* and in it we focus on current threats to the species attributable to the Act's five listing factors. The review reflects a synthesis of information used to evaluate the listing status of the species and provides an indication of its progress towards recovery. Based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated in the next 5 years.

Contact Information:

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Lead Field Office: Ventura Fish and Wildlife Office: Julie M. Vanderwier, Fish and Wildlife Biologist, (805) 644-1766, extension 222; and Constance Rutherford, Listing and Recovery Program Coordinator for Plants, (805) 644-1766, extension 306.

Cooperating Field Office(s): Valary Bloom, Fish and Wildlife Biologist, Sacramento Fish and Wildlife Office; (916) 414-6600.

Federal Register Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this species and 57 other taxa as well as the opening of a 60-day period to receive information from the public was published in the Federal Register (FR) on March 25, 2009 (74 FR 12878; Service 2009).

Listing History:

Original Listing
FR Notice: 59 FR 64613
Date of Final Listing Rule: December 15, 1994
Entity Listed: *Suaeda californica*; species
Classification: Endangered

Associated Rulemakings: N/A

Review History: N/A

Species' Recovery Priority Number at Start of 5-Year Review: According to the Service's 2009 Recovery Data Call for the Ventura Fish and Wildlife Office, the recovery priority number for *Suaeda californica* is 8. This is based upon a 1-18 ranking system with 1 being the highest-ranked recovery priority and 18 the lowest (48 FR 43098; Service 1983). A ranking of 8

indicates that *S. californica* is a species facing a moderate degree of threat and has a high potential for recovery.

Recovery Plan or Outline

> **Name of Plan or Outline:** Draft Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (administrative draft, Sacramento Fish and Wildlife Office (SFWO))
>
> **Date Issued:** Cleared for publication in the FR; December 2, 2009.

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

Description.
Suaeda californica is a halophytic (salt-tolerant) member of the Chenopodiaceae family and is endemic to the coastal areas of California. Its growth form is a spreading, mounding, or decumbent subshrub, typically 60 centimeters (approximately 2 feet) in height and 2 meters (approximately 6 to 7 feet) in diameter. The colonial habit exhibited by plants makes an accurate count of individuals difficult to determine. While prostrate portions of the dense branches may become covered by detritus or sediment, they do not propagate vegetatively and, as such, individuals are not believed to form clonal assemblages.

The leaves are pale to glaucous green, densely crowded and overlapping, subsessile, linear to lance-linear, and up to 3.5 centimeters (approximately 1.5 inches) in length. Plants flower from May to October, but predominantly in the late summer. Flowers occur in scattered axillary clusters at the base of leaves and only on new growth. They are radial, 2 to 3 millimeters (approximately 0.1 inch) in diameter, and either perfect (both pollen- and ovule-bearing) or carpellate (ovule-bearing only). The calyx lobes are glabrous and rounded or hooded (Ferren 1993).

Taxonomy.
Suaeda californica was first described by Sereno Watson in 1874 based on type material collected in San Francisco Bay salt marshes. Amos Heller published the name *Dondia californica* in 1898, recognizing the genus name used by Michel Adanson in 1763; however, the name *Suaeda* was used first and so has been retained.

Taxonomic ambiguity within the genus in California resulted in confusion regarding the true extent of the geographic distribution of *Suaeda californica* along the California coast (Schenk and Ferren 2001). *Suaeda taxifolia* (Standley) Standley (woolly sea-blite), found along the southern California coast, had been treated by some authors as varieties of *S. californica* (vars. *pubescens* Jeps. and *taxifolia* (Standl.) Munz). In addition to its morphological differences, *S. taxifolia* typically colonizes coastal bluffs in addition to salt marshes. In contrast, most collections of *S. californica* are from the edges of salt marshes or estuarine beaches and only rarely reported from bluffs or elevations much above mean sea level.

Suaeda californica was distinguished taxonomically from *S. esteroa* Ferren and Whitmore in 1983 (Ferren 1993). *Suaeda esteroa* is ecologically similar to *S. californica*, being restricted to estuaries; however, it is found only south of Point Conception (Santa Barbara County, California) and into Baja California, Mexico. Many reports of *S. californica* from southern California are, in fact, misidentifications with *S. esteroa* (Ferren and Whitmore 1983). Key morphological traits of *S. esteroa* that distinguish it from *S. californica* include terminal clusters of flowers in well-defined inflorescences; calyx lobes that are keeled (not rounded) and usually unequal in size; rounded to spindle-shaped ovaries (not cone-shaped); and seeds that are never vertical in the ovary.

Species Distribution and Habitat.

Although described as a salt marsh species (Ferren 1993), *Suaeda californica* is most commonly found in the narrow ecotone between salt marsh and stable dune scrub communities occurring at the edge of the salt marsh.

There are two historic centers of distribution for this federally endangered plant species: the San Francisco Bay area and Morro Bay/Cayucos along the central coast (Figure 1). Currently, there are at least eight recorded occurrences that range from Morro Bay north to Cayucos, although more extant occurrences of *Suaeda californica* exist than are indicated by these records (e.g., a number exist along the eastern length of the Morro Bay sand spit as opposed to the two that are recorded for this area). No known occurrences have been extirpated since the time of listing. No new occurrences outside of the historic distribution of the species have been discovered since the time of listing; however, attempts to re-establish a number of occurrences in San Francisco Bay area have been initiated and occurrences along the central coast have been augmented since this time.

Before the reintroduction efforts in the San Francisco Bay area (discussed below), there had been no valid reports or collections of *Suaeda californica* since 1960 even though extensive surveys were conducted within its historic range in the 1990s (P. Baye, *in litt*. 2009). The last confirmed occurrence was from a 1958 collection made in San Leandro in Alameda County (Consortium of California Herbaria 2009). Given the scarcity of suitable habitat within its historic San Francisco Bay range, and negative survey results for decades, prior to the reintroductions, experts presumed that the species was extirpated in this area (Bloom, *in litt*. 2009a). Habitat descriptions from historic (extirpated) locations for *S. californica* in San Francisco Bay include estuarine sand beaches within general salt marsh habitats (Baye 2006); these habitats are very scarce today. Other than the small existing reintroduction sites, the

only remnant historic sandy salt marsh in the San Francisco estuary is found at Whittell Marsh, Point Pinole, in Contra Costa County.

The current, naturally-occurring distribution of *Suaeda californica* is restricted to the tidal edges of Morro Bay in San Luis Obispo County; with the exception of three occurrences at Old, San Geronimo, and Villa Creeks in the Cayucos area just north of Morro Bay (Walgren 2006). The majority of *S. californica* occurrences are found on lands owned and managed by the California Department of Parks and Recreation (CDPR), although several plants occur within Sweet Springs Nature Preserve, owned and managed by the Morro Coast Audubon Society.

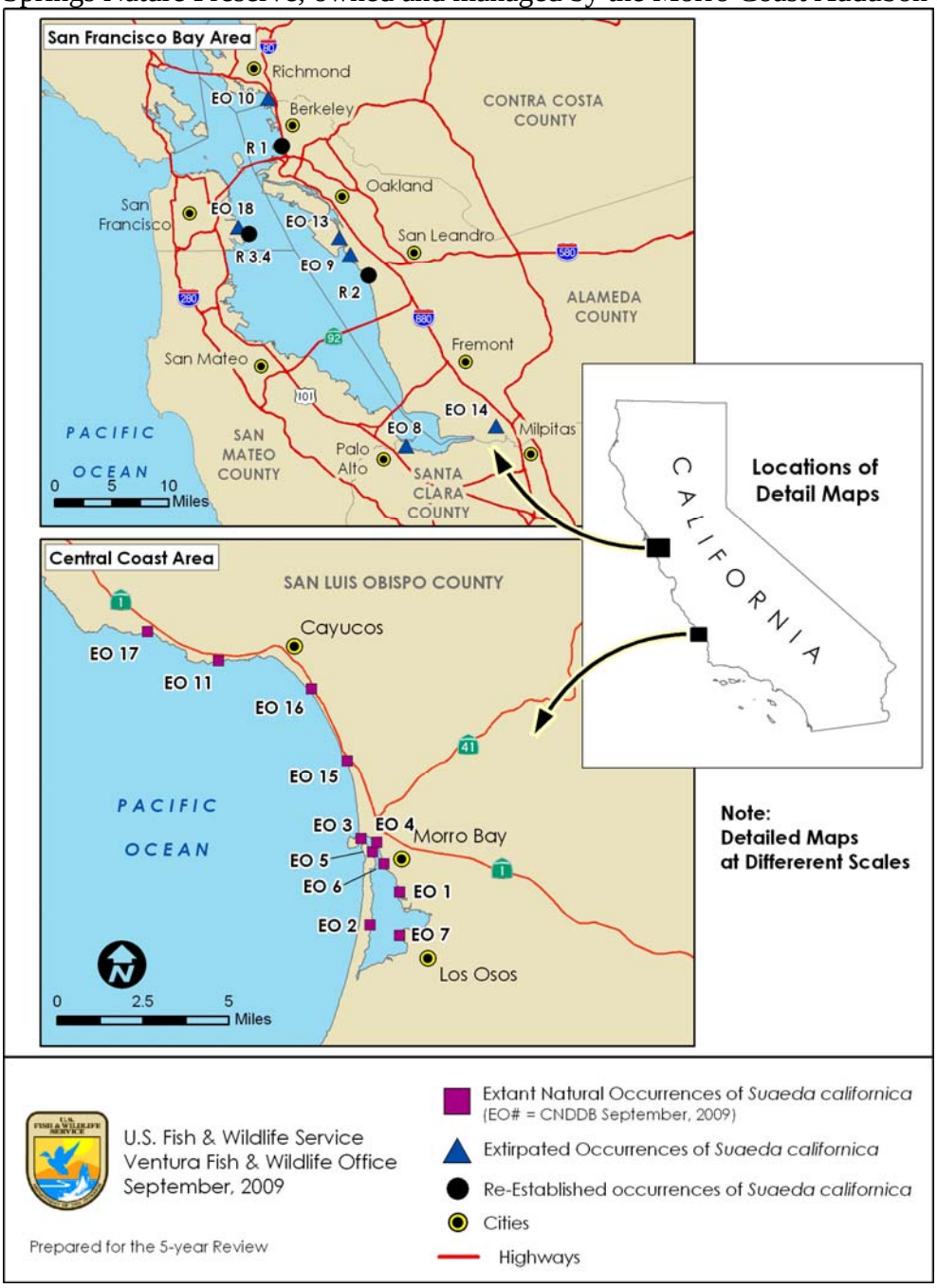

Figure 1

In Morro Bay, habitat typically consists of a narrow salt marsh-dune scrub ecotone. Here, *Suaeda californica* occurs with *Distichlis spicata* (salt grass), *Atriplex* spp. (saltbush), *Salicornia virginica* (pickleweed), *Frankenia salina* (alkali-heath), and *Jaumea carnosa* (fleshy jaumea). *Isocoma veneta* ssp. *vernonioides* (coast goldenbush) and *Ericameria ericoides* (mock-heather) are also typically present (P. Baye, Service biologist, pers. obs. 1998). In the southeastern portion of Morro Bay, *S. californica* occurs adjacent to colonies of the federally endangered *Cordylanthus maritimus* ssp. *maritimus* (salt marsh bird's beak). In estuarine beach habitat, *S. californica* co-occurs with many of the same species and also *Cakile maritima* (sea rocket), *Ambrosia chamissonis* (beach-bur), *Heliotropium curassavicum* (beach heliotrope), and *Abronia* spp. (sand verbena) (J. Vanderwier, Service biologist, pers. obs. 2009).

Occurrence information is provided in Table 1. While there is no comprehensive field census estimate for the total number of *Suaeda californica* individuals along the central coast prior to 1999, the total number of *S. californica* individuals was estimated to be between 200 and 300 individuals in 1999 (P. Baye, Service biologist, unpubl. data 1991-1999). As part of a survey of the occurrences in Morro Bay, those "scattered colonies" described by Hillaker (1992) along the Embarcadero were not re-surveyed in 1999; however, two of these were observed to be extant in 2009 (Vanderwier, pers. obs. 2009).

Table 1: Occurrences of *Suaeda californica*

Location	Last Observed	Element Occurrence (EO) Number*/Notes
San Francisco Bay Area		
Palo Alto	1906	EO 08; likely extirpated**
San Leandro; Bay Farm Island	1943	EO 09; likely extirpated**
Richmond; Fleming Point	1911	EO 10; likely extirpated**
San Leandro; west end of Williams Street	1958	EO 13; likely extirpated**
Milpitas; north of Mud Slough, east of Southern Pacific tracks	1912	EO 14; likely extirpated**
Hunter's Point; Heron's Head Park/Pier 98	2003	EO 18; established in 1999withat least 20extant, reproducing individuals**
Pier 94	2008	extant individuals with seedling recruitment**
Emeryville Crescent	2008	at least 8 reproducing, colonies**
Roberts Landing	2008	a few individuals surviving**
Central Coast (Morro Bay-Cayucos) Area		
Morro Bay State Park; Fairbank Point south to White Point and east beyond the campground	2009	EO 01; occurs along the whole bight with the exception of the dirt parking lot***
South and west shores of Morro Bay	2007	EO 02
North shore of Morro Bay near the mouth, just east of Morro Rock	1993	EO 03; not observed. Construction of boardwalk likely resulted in bluff disturbance***
Morro Bay, near the "T" Pier	2009	EO 04; one small individual in rip-rap at the base of ornamental *Echium****
Morro Bay Sand Spit; west shore on small peninsula at the northeast end	1992	EO 05; habitat present and species presumed extant
Morro Bay; east shore, south of boat ramp	2009	EO 06; several individuals along slope above rip-rap; iceplant encroaching***
Morro Bay; southeast shore along the peninsula of, Baywood Park	2009	EO 07; patchy distribution on south side of trail**
Cayucos; mouth of San Geronimo Creek	2009	EO 11; several individuals on the north side of creek mouth ***
Morro Bay; south of 24th Street	2002	EO 15; not observed **
Cayucos; mouth of Old Creek	2009	EO 16; individuals patchily distributed south of creek mouth***
Cayucos, mouth of Villa Creek	2005	EO 17; individuals lost to storm surge (Walgren 2006)

* = California Natural Diversity Data Base 2009
** = V. Bloom, *in litt.* 2009a,b,c
*** = personal observations by J. Vanderwier (July 17, 2009)

Reproduction.
Very little information is available on the reproductive system of the species other than the presence of mixed bisexual and carpellate flowers within inflorescences. The ability of isolated plants in cultivation to produce seed (Baye, pers. obs. 1998) suggests that at least some individuals possess some degree of self-compatibility. Seeds of *Suaeda californica* are somewhat hard-coated, and are enclosed in fleshy calyces that become spongy and buoyant upon drying, and which remain attached to the fruits after dehiscence and dispersal. Ripe seed occur within calyces that are green and succulent. Ripe and partially ripe fruit may be found attached to the plant into the following spring (Baye, pers. obs. 1991-1999; Baye, *in litt.* 2009). *Suaeda californica* produces seeds throughout its lifespan with reproduction appearing to be entirely sexual (by seed). As previously stated, there are no known reports of natural vegetative reproduction. The spread of individual plants can be extensive but represent colonial assemblages rather than actual clonal populations.

Seedlings have been observed to establish in sandy drift-lines or vegetation gaps along the high tide line in Morro Bay (Baye, pers. obs. 1991-1999; Baye, *in litt.* 2009). Abundant seedling establishment at Morro Bay appears to be episodic, corresponding to storm events. Individual plants of *Suaeda californica* marked as seedlings from the previous year were observed flowering in the spring of 1998 at the northern end of the Morro Bay sand spit indicating that reproductive maturity may be reached in as little as 1 year. The life span of individuals is unknown, but large woody plants in stable substrate (e.g., rip-rap slopes of the Morro Bay State Park Marina population (EO 01 in Table 1)) appear to have survived for over 10 years (P. Baye, Service biologist, unpubl. data 1997-1999).

Conservation Efforts.
Efforts have been undertaken to re-establish and augment occurrences in the San Francisco Bay area and along the central coast. These efforts are summarized below.

San Francisco Bay: *Suaeda californica* has recently been re-introduced to the San Francisco Bay area (see Figure 1) by the Service and several partner agencies in an attempt to establish persistent, self-sustaining occurrences. The principal species recovery goal for this San Francisco effort is to conserve two independent, geographically discrete estuarine occurrences (i.e., San Francisco Bay and Morro Bay), thereby offsetting the species' overall risk of extinction. These reestablished occurrences are not considered to be experimental pursuant to section 10(j) of the Act (Bloom, *in litt*. 2009b).

Two pilot projects for re-introduction of *Suaeda californica* to San Francisco Bay were implemented in San Francisco in 1999 at newly constructed urban tidal marsh restoration sites: Crissy Field (National Park Service, Presidio of San Francisco) and Pier 98 (Port of San Francisco, Heron's Head Marsh). These pilot re-introductions used propagated stock from Morro Bay provided by the Service to the National Park Service, Golden Gate National Recreation Area. The Crissy Field population failed because of impaired tidal hydrology, and the original Pier 98 population declined because of unsuitable substrate. The Pier 98 re-introduction, however, resulted in several years of seed reproduction and the natural recruitment of a small population of highly vigorous *S. californica* on an adjacent small estuarine beach (Bloom, *in litt*. 2009c).

In 2006, The Port of San Francisco and Golden Gate Audubon Society, in cooperation with the Service, initiated a full-scale local re-introduction of *Suaeda californica* to a reconstructed sand beach ecotone along a small urban salt marsh at Pier 94, San Francisco. The founder population was grown from seed collected at Pier 98 and planted along the high tide line in March 2006. In May 2006, all transplants had survived and were growing rapidly. Continued success was demonstrated in 2007 as individuals of *S. californica* continued to survive and seedling recruitment was observed (Golden Gate Audubon Society 2007). Additional seedlings were recruited in 2008 (Bloom, *in litt.* 2009c; P. Baye, private consultant, *in litt*. 2008).

In March 2007, 14 transplants were introduced along the high tide line of the East Bay Regional Park District's Eastshore State Park, Alameda County. A monitoring visit in April 2007 revealed the mortality of four transplants, presumably from moisture deficit, as excavation revealed roots had not grown sufficiently into the surrounding substrate. The remaining 10 plants thrived. Later that year, eight patches were producing seed (Golden Gate Audubon Society 2007). Currently, these patches are growing vigorously and continue to produce seed. Two patches are at least 2 meters (approximately 7 feet) in diameter (Bloom, *in litt.* 2009c; Baye, *in litt*. 2008).

The most recent re-introduction site is along the Robert's Landing, Alameda County sand spit, owned and managed by the City of San Leandro. Despite winter-spring drought and mid-spring storm erosion events in 2008, three of seven 1-gallon container stock of *Suaeda californica* that were planted on March 7, 2008 survived through October 2008. The three survivors regenerated in summer after complete burial by sand. A monitoring visit in September 2009 revealed two remaining plants measuring 1.5 meters (4.9 feet) each with seed in development (Bloom, *in litt*. 2009c).

Central Coast: During the spring of 2002, the CDPR initiated a project to restore, enhance, and augment occurrences of *Suaeda californica* (e.g., removal of non-native species), including the translocation of individuals to six sites within State Park units in this region. The six translocation sites include Villa Creek, Old Creek, Morro Strand State Beach, and three sites in Morro Bay (Walgren 2006). Except for the effort where individuals were planted in compacted soil in Morro Bay, all are considered to be successful as individuals were extant at five of the sites in 2005. A survey of *S. californica* by CDPR staff in and around Morro Bay in 2005 revealed a total of 28 to 30 plants surviving at the mouths of Old Creek and Villa Creek and several at San Geronimo Creek (Walgren 2006). Although the location at Villa Creek was not visited, individuals were observed at Old and San Geronimo Creeks in May 2009 (Vanderwier, pers. obs. 2009).

Five-Factor Analysis

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act.

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

In the listing rule, we identified threats to the species in the Morro Bay area only. These threats included recreational activity on tidal flats; erosion from changing hydrologic conditions in the intertidal zone (i.e., storm surge); sedimentation of Morro Bay, resulting from alteration within the watersheds for Los Osos and Chorro Creeks; and proposed dredging activities in the marina at Morro Bay State Park (Service 1994).

Potential threats from recreational activities still exist. Trampling has been an ongoing concern for *Suaeda californica* as it is typically concentrated along the upper marsh edge where seedlings regenerate and trampling results from activities such as kayak lay downs and hiking (Baye, *in litt*. 2009). Although these activities still occur, substantial negative effects have not been observed in recent times (Baye, in litt. 2009). Predation by deer along the edge of the bay and Morro Bay sand spit was also a concern in the past based upon field observations; however, this does not appear to constitute the threat it was once perceived to be (Baye, in litt. 2009). As recreational pressure in this area increases commensurate with the local population and increased visitor park use at Montaña de Oro, Morro Bay State Park, and Morro Strand State Beach, the frequency of adverse effects to *S. californica* from recreational activities is still something that should be monitored, particularly impacts during the seedling stage, to ensure that populations are not substantially adversely affected.

We do not have specific information on the scale of the threat that storm surge poses to *Suaeda californica*. However, concern over the direct and indirect effects of rising sea levels associated with climate change (see Factor E discussion below) exists, as the loss of individuals of *S. californica* due to storm surge events has been documented (Walgren 2006).

The City of Morro Bay Harbor Department is currently proposing a renovation and enhancement project for the marina in Morro Bay State Park. Construction is anticipated to commence in the summer of 2010 and will take approximately 12 months to complete. Impacts to *Suaeda californica* are being considered as part of the environmental review being conducted for this project (Padre Associates 2007).

Threats identified at the time of listing still exist; however, none appear to have resulted in substantial declines in the known occurrences since 1994.

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

Overutilization for commercial, recreational, scientific, or educational purposes was not identified as a factor in the listing rule and is still not considered to be one.

FACTOR C: Disease or Predation

Disease or predation was not identified as a factor within the listing rule and disease is still not considered to be one.

Since the time of listing, predation by deer has been observed; however, the magnitude of this threat remains unknown.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

The inadequacy of existing regulatory mechanisms was not discussed for *Suaeda californica* in the listing rule (Service 1994). The following paragraphs provide a discussion of those regulatory mechanisms that do exist and have the potential to protect *S. californica*.

State of California Protections

California Endangered Species Act: The California Endangered Species Act (CESA; California Fish and Game Code, section 2080 *et seq*.) and Native Plant Protection Act (NPPA; Division 2, Chapter 10, section 1908) prohibit the unauthorized take of State-listed threatened or endangered species. Pursuant to CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. The CESA requires an incidental take permit for activities that would result in take of a State-listed species. The State may authorize permits for scientific, educational, or management purposes, and to allow take that is incidental to otherwise lawful activities. Among other requirements for a State incidental take permit, a project proponent must demonstrate that any such take will be fully mitigated. While *Suaeda californica* is not State-listed, it can co-occur with other State-listed species (e.g., *Cordylanthus maritimus* ssp. *maritimus*) and, therefore, may receive indirect protection under CESA.

California Environmental Quality Act: While *Suaeda californica* is not a State listed or candidate species, its status as a federally listed species results in consideration of the species under the California Environmental Quality Act (CEQA). Pursuant to CEQA, government agencies are required to consider and disclose the environmental impacts of proposed projects. CEQA Guidelines §15065 lists certain conditions where mandatory findings of significance must be made (i.e., the lead agency must find that a project may have a significant effect on the environment and thereby require the preparation of an environmental impact report). One such condition that automatically triggers a higher level of review found as part of an environmental impact report (EIR) is if the "project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause population to drop below self sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of an endangered, rare, or threatened species… (§15065(a))."

Even if a species is not a State-listed it still may be considered endangered, rare or threatened if it can be shown to meet the criteria in §15380. *Suaeda californica* is considered to be a species that is rare, threatened, or endangered in California and elsewhere (List 1B) by the California Native Plant Society (California Native Plant Society 2001). As such, it meets the definitions of Section 1901, Chapter 10 (NPPA) or Sections 2062 and 2067 (CESA) of the California Department of Fish and Game Code as it is considered to meet the criteria for State listing. Such species are typically considered during preparation of environmental documents prepared

pursuant to CEQA.

The County of San Luis Obispo does consider *Suaeda californica* when reviewing discretionary projects as part of its compliance with its CEQA Guidelines and General Plan consistency determinations (County of San Luis Obispo 1988). Known occurrences and the habitat in which they occur are typically avoided and buffered from development (e.g., County of San Luis Obispo 2009). Re-introduced populations in the San Francisco Bay area have been located in conserved areas where development that could adversely affect the species is unlikely to occur.

The California Coastal Act: The California Coastal Commission considers the presence of listed species in determining environmentally sensitive habitat areas (ESHA) subject to section 30240 of the California Coastal Act of 1976. The County of San Luis Obispo has a Local Coastal Program that was approved by the Coastal Commission in 1988. Within this document, Morro Bay and Los Osos are found within the Estero Area Plan (County of San Luis Obispo 1988). This plan establishes zoning for all properties within the plan area; planning area standards; policies for dealing with environmentally sensitive habitat, flood hazards, and historic sites; circulation plans, including roads, bikeways, and public transportation; and general policies for parks, recreation, libraries, and other public services. Areas where *Suaeda californica* occurs along the central coast in San Luis Obispo County are considered to be ESHA in this Area Plan. As such, impacts to *S. californica* would be evaluated by the County of San Luis Obispo as part of the Coastal Development Permit process required for any proposed discretionary actions.

Federal Protections

National Environmental Policy Act: In general, the National Environmental Policy Act (NEPA) can provide some protection for *Suaeda californica*. For activities undertaken, authorized, or funded by Federal agencies (i.e., projects with a Federal nexus), NEPA requires the project be analyzed for potential impacts to the human environment prior to implementation (42 U.S.C. 4371 et seq.). For instances where that analysis reveals significant environmental effects, the Federal agency must identify appropriate mitigation to offset those effects (40 CFR 1502.16). It should be noted; however, that NEPA is a procedural statute and, while it requires disclosure and analysis of significant impacts and mitigation alternatives, does not require that such impacts be mitigated. Actions taken by private landowners that lack a Federal nexus are not required to comply with this law.

Federal Endangered Species Act: While the Act and its implementing regulations do not expressly prohibit the take of listed plant species on private lands, it is illegal to remove and reduce to possession any such species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any state or in the course of any violation of a state criminal trespass law (§9(a)(2)(B)).

Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402.

As *Suaeda californica* is found in the upper tidal zone, the U.S. Army Corps of Engineers would likely become involved in any project that would have the potential to affect this species through its permitting authority pursuant to section 404 of the Clean Water Act. By regulation, nationwide or individual permits cannot be issued where a federally listed endangered or threatened species would be affected by a proposed project without first completing formal consultation pursuant to section 7 of the Act.

In summary, regarding Factor D, we consider that current regulatory mechanisms are sufficient such that this factor does not present a major threat to *Suaeda californica*.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

Other natural or manmade factors affecting the continued existence of *Suaeda californica* were not specifically discussed for this species in the listing rule. There is one reference to the potential for *S. californica* to be subject to stochastic extinction due to the low number or individuals and restricted range; however, no discussion of other effects that would be attributable to this factor is provided. The following paragraphs identify the extent of current threats to the species.

Invasive Non-native Species: Non-native invasive species, primarily *Carpobrotus edulis* (iceplant), *C. chilensis* (sea-fig), *Eucalyptus globulus* (blue gum), *E. camaldulensis* (red gum), *Myoporum laetum* (myoporum), and *Cupressus macrocarpa* (Monterey cypress; non-native at this locale) have negative effects on *Suaeda californica* (Walgren 2006). *Carpobrotus* taxa establish clonal colonies in adjacent uplands above saline influence and aggressively encroach upon high marsh habitat (P. Baye, *in litt*. 2009; Vanderwier, pers. obs. 2009). Such impacts are particularly detrimental to seedling regeneration along the back barrier shore of Morro Bay sand spit by reducing or eliminating the open habitat needed for germination of *S. californica* seeds. The presence of leaf litter (and its allelopathic effects) and shade from *E. globulus* and *E. camaldulensis*, as well as shading from non-native stands of *C. macrocarpa*, may be detrimental to *S. californica* seed germination and seedling survival.

Recruitment Failure: Trampling of seedlings may contribute to the failure of *Suaeda californica* to re-establish following shoreline erosion caused by major storms. Trampling is concentrated along the upper marsh edge where seedlings establish, and is caused by recreational activities (e.g., hiking, kayak laydown) (Baye, *in litt*. 2009). As recreational pressure on the Morro Bay shoreline increases with local residential population and increased visitor park use at Montaña de Oro and Morro Bay State Parks, this impact is likely to become more severe.

Climate Change: Levine et al. (2008) suggest that the persistence of many rare species depends on how occurrences respond to climate change in their current locations. It is projected that up to 66 percent of California's flora will experience a greater than 88 percent reduction in range in the next century using even conservative climate change predictions (Loarie et al. 2008). Mean sea level rise on the California coast is predicted to rise 3.3 to 4.6 feet (1.0 to 1.4 meters) by the

year 2100 (California Climate Change Center 2009). The extent to which such events are caused by climate change and the extent to which it could affect *Suaeda californica* are unknown at this time. However, it could present a significant threat to the species and its habitat as it is found as part of littoral habitat at the edge of intertidal bays and estuaries. The loss of individuals of *S. californica* due to storm surge events (which could increase in frequency with an increase in sea level) has already been documented (Walgren 2006).

Oil Spills and Clean Up: Oil spills and oil spill clean-up operations along the central coast, especially within Morro Bay, could have significant adverse effects on *Suaeda californica*, particularly for seedlings. Spilled oil tends to accumulate near the high tide line, the narrow marsh zone to which S. *calfornica* is largely restricted. Oil would very likely result in high mortality of *S. californica* seedlings and juvenile plants during years of seedling regeneration. Oil clean-up operations involving mechanical removal (e.g., raking, excavation) of oiled sand could also cause substantial disturbance of habitat occupied by *S. californica*. The direct effects of oil on mature *S. californica* individuals are uncertain but could likely be less than those associated with its clean-up.

Other: Additional threats to *Suaeda californica* pertain to those that could preclude species recovery in areas outside of the central coast. Urbanization, the main cause of the species' extirpation from the San Francisco Bay, is irreversible; however, the maintenance of levees that have been constructed along portions of San Francisco Bay precludes the re-establishment of wave-deposited berms or sand beach ridges and spits that could provide re-establishment or re-introduction areas for *S. californica*. Continuing to maintain the historic San Francisco Bay levee designs and use of traditional methods for levee repair and maintenance could impede habitat restoration activities that otherwise could assist in species recovery in the only other historic habitat within its natural distribution.

III. RECOVERY CRITERIA

Recovery plans provide guidance to the Service, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species is robust enough, to downlist or delist the species. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of the species' status in this 5-year review on progress that has been made toward recovery since the species was listed (or since the most recent 5-year review) by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated.

The SFWO is currently preparing a draft recovery plan that addresses tidal marsh ecosystems in northern and central California. This recovery plan includes a discussion of natural and restored occurrences of *Suaeda californica* in the Morro and San Francisco Bay areas, respectively. It outlines a number of recovery tasks, as well as provides down- and delisting criteria, for the species. The notice of availability for the draft plan is expected to publish in the Federal Register by early 2010 (Bloom, pers. comm. 2009). In the interim, the SFWO is currently implementing tasks identified in the California Sea-blite (*Suaeda californica*) Re-introduction Plan, San Francisco Bay, California (Baye 2006).

IV. SYNTHESIS

Historically found in tidally influenced salt marsh and estuarine habitat in and around San Francisco and Morro Bays, the natural distribution of *Suaeda californica* is now restricted to the upper tidal salt marsh zone in Morro Bay and estuarine creek mouths near Cayucos, California. Taxonomic ambiguity with the genus resulted in confusion regarding the true extent of the geographic distribution of *S. californica* along the California coast; however, it is now known that this species occurs only north of Point Conception, with *S. esteroa* occupying the same ecological niche to the south. All sites with natural occurrences of *S. californica* extant at the time of listing still support the species today. Since listing, *S. californica* has been reintroduced at four locations in San Francisco Bay; however, it is too soon to tell if these populations will be self-sustaining in the long-term. Natural occurrences at three sites near Cayucos have also been augmented with additional plantings since this time.

At the time of listing, threats to the species were identified for those occurrences in Morro Bay only. These threats included adverse effects from recreational activities on tidal flats, erosion from changing hydrologic conditions in the intertidal zone, sedimentation of Morro Bay, and proposed dredging activities. All are still considered to exist; however, none appear to have resulted in substantial declines to the considered occurrences. Since the time of listing, several new threats have been identified: competition from non-native species, recruitment failure, oil spills and resultant clean-up, and the effects of increased storm surge anticipated to result from increased sea level rise associated with climate change. As threats known at the time of listing have not been eliminated and several new, potentially significant, threats have been identified, the risk of extinction from a stochastic event remains. As such, the classification of endangered is still appropriate for *S. californica*.

V. RESULTS

Recommended Listing Action:

_____ Downlist to Threatened
_____ Uplist to Endangered
_____ Delist (indicate reasons for delisting per 50 CFR 424.11):
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ No Change

New Recovery Priority Number and Brief Rationale: No change

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

1. Any person collecting information on *Suaeda californica* as part of field surveys or research should be encouraged to submit occurrence information to the CNDDB to provide a more comprehensive picture of this species distribution and status throughout its range.

2. Potential re-introduction sites for *Suaeda californica* within the San Francisco Bay area and other sites within its historic range should continue to be evaluated by the Service.

3. Land managers and the Service should work cooperatively to begin population surveys in all potentially suitable and legally-accessible habitat along the central coast to determine if there are yet undiscovered occurrences of *Suaeda californica* and to update the status of known occurrences.

4. The CDPR and the Service should continue monitoring of existing outplanting efforts and seek to identify additional sites for outplanting of *Suaeda californica* on Federal, State, or otherwise conserved lands along the coastline in San Luis Obispo County.

5. Establish site-specific and species monitoring protocols to identify potential impacts of sea-level rise and storm surge associated with climate change. This will assist in determining the effects of projected sea level rise and increased storm surge events on *Suaeda californica* and its habitat.

6. The CDPR and Morro Coast Audubon Society should develop and implement active non-native invasive species eradication programs for those occurrences of *Suaeda californica* under their management authority. Post-eradication, sites should be evaluated for their potential to re-establish occurrences of *S. californica*.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Suaeda californica* (California sea-blite)

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__X__ No change needed

Review Conducted By: Julie M. Vanderwier

FIELD OFFICE APPROVAL:

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

Approve Diane K Noda Date 2/9/10

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

Approve [signature] Date 5 February 2010