

Atriplex coronata var. *notatior*
(San Jacinto Valley Crownscale)

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



Atriplex coronata var. *notatior* (San Jacinto Valley crownscale).
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**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California**

August 17, 2012

5-YEAR REVIEW
Atriplex coronata* var. *notatior
(San Jacinto Valley Crownscale)

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:

Atriplex coronata var. *notatior* (San Jacinto Valley crownscale) is an annual herbaceous plant associated with alkaline-saline soils. It is found in three floodplains of western Riverside County, California—San Jacinto River, including Mystic Lake; Upper Salt Creek; and Alberhill Creek. At the time of listing, approximately 11 population centers of *A. c.* var. *notatior* were reported in the San Jacinto River and Upper Salt Creek floodplains, and 1 additional small population was described for the Alberhill Creek area, northeast of Lake Elsinore.

A comprehensive rangewide survey for *Atriplex coronata* var. *notatior* in Riverside County has not been conducted. Observations from several independent surveys conducted since the early 1990s indicate that current occurrences of this taxon are within the same general geographical area as that known at the time of listing, and its current spatial distribution has not changed appreciably since listing. For this 5-year review, we have defined three geographic locations representing four occurrences of *A. c.* var. *notatior* in western Riverside County.

The primary threats identified at the time of listing were associated with habitat loss, fragmentation, modification, and degradation due to agriculture and urban development; indirect loss of habitat due to alteration of hydrology and floodplain dynamics (from water diversions, channelization, excessive flooding); and competition from nonnative plants. We believe these threats continue to impact *Atriplex coronata* var. *notatior*.

Atriplex coronata var. *notatior* was federally listed as endangered under the Act in 1998. It is not listed by the State of California under the California Endangered Species Act.

Methodology Used to Complete This Review:

This review was conducted by Betty Grizzle at the Carlsbad Fish and Wildlife Office, following the Region 8 guidance issued in March 2008. We used information in the 1998 listing rule, available literature, reports and information in our files, and information provided by experts (D. Bramlet, Consulting Biologist; F. Roberts, Botanist) familiar with the taxon, its habitat, and the associated processes. We received no information relevant to this taxon 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 taxon's 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 taxon 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 taxon 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 comment period to receive information was published in the Federal Register on May 25, 2011 (USFWS 2011, pp. 30377-30382). No information relevant to *Atriplex coronata* var. *notatior* was received during the comment period.

Listing History:

Federal Listing

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

Date of Listing Final Rule: October 13, 1998

Entity Listed: *Atriplex coronata* var. *notatior* (San Jacinto Valley crownscale), a plant variety.

Classification: Endangered

Critical Habitat: None designated (USFWS 2005, pp. 59952-59974)

State Listing

Atriplex coronata var. *notatior* (San Jacinto Valley crownscale) is not listed by the State of California as endangered or threatened.

Associated Rulemakings:

Critical habitat for *Atriplex coronata* var. *notatior* was first proposed for designation in the 1994 proposed listing rule (USFWS 1994, p. 64812). At the time of the final listing rule in 1998, the Service withdrew the proposed critical habitat designation (USFWS 1998, p. 54991). On October 6, 2004, we published a proposed rule to designate critical habitat for *A. c.* var. *notatior* and identified 15,232 acres (ac) (6,164 hectares (ha)) of habitat essential for the conservation of the taxon (USFWS 2004a, p. 59844). On October 13, 2005, we published a final critical habitat rule for *A. c.* var. *notatior* excluding all 15,232 ac (6,136 ha) from critical habitat under section 4(b)(2) of the Act (USFWS 2005, p. 59952). The final critical habitat rule was challenged and, as part of a settlement agreement, the Service published in the Federal Register a proposed rule to revise the designation of critical habitat for *A. c.* var. *notatior* (USFWS 2012, p. 23008). Three critical habitat units—San Jacinto River, Upper Salt Creek, and Alberhill Creek—were identified as proposed critical habitat, encompassing 8,020 ac (3,246 ha) in western Riverside County (USFWS 2012, p. 23027; Table 2). In the proposed revised rule, all three units are being considered for exclusion as critical habitat under section 4(b)(2) of the Act. The existing (2005) final critical habitat designation remains in effect until the final revised determination is completed.

Review History:

The Service initiated a status review for *Atriplex coronata* var. *notatior* on March 22, 2006 (USFWS 2006, p. 14539). The 5-year review was completed on March 8, 2008 and recommended no change in status (USFWS 2008, p. 17).

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

The recovery priority number (RPN) for *Atriplex coronata* var. *notatior* is 3 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 variety that faces a high degree of threat, but has a high potential for recovery.

Recovery Plan or Recovery Outline:

A recovery plan or recovery outline has not been completed for *Atriplex coronata* var. *notatior*.

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:

Under section 4 of the Act and in this 5-year review, taxon refers to a group of individuals recognized as a formal unit at any taxonomic rank; for example, a family, genus, species, subspecies, or variety. *Atriplex coronata* var. *notatior* is considered a variety.

Species Description

Atriplex coronata var. *notatior* is a bushy, erect annual plant that has unisexual flowers on each plant. It is a member of the Chenopodiaceae (goosefoot family) (Zacharias 2012, p. 629). Plants are from 4 to 12 inches (1 to 3 decimeters) high and generally appear gray and scaly during the growing season, becoming glabrous and straw-colored as they mature (Zacharias 2012, p. 633). The grayish leaves are sessile (stalkless and attached directly at the base), alternate, 0.3 to 0.8 inch (8 to 20 millimeters) long, and elliptic to ovate-triangular in outline (Zacharias 2012, p. 633). The flowers occur in mixed clusters (Munz 1974, p. 353; Zacharias 2012, p. 632). The female flowers are obscure and develop spherical bracts in the fruiting phase. These bracts have dense tubercles (projections) that are roughly equal in number to the marginal teeth on the bracts (Munz 1974, p. 353; Zacharias 2012, pp. 632, 637). *Atriplex coronata* var. *notatior* can be distinguished from the more northern *A. c.* var. *coronata* by its erect stature, the spherical shape of the bracts together in fruiting stage, and the more numerous tubercles and marginal teeth on the bracts (Zacharias 2012, p. 633); the ranges of the two taxa do not overlap. There are four other native *Atriplex* species generally associated with *A. c.* var. *notatior* (*A. argenta* ssp. *mohavensis*, *A. davidsonii*, *A. parishii*, and *A. serenana*) and two nonnative species, *A. suberecta* and *A. semibaccata* (D. Bramlet, Consulting Biologist, 2012, pers. comm.) *Atriplex coronata* var. *notatior* can be distinguished from these taxa by a combination of characteristics, including life history, shape of the leaf, and size and form of the bract (Munz 1974, pp. 354–355; Zacharias 2012, pp. 630–632).

Biology and Life History

Atriplex coronata var. *notatior* is monoecious (plants bear separate male and female flowers on the same plant) and is believed to be wind-pollinated. *Atriplex coronata* var. *notatior* is reported to be a prolific seed producer (Ogden Environmental and Energy Services Corporation [OEESC] 1993, p. 27). Seed viability is believed to be a minimum of 5 years, perhaps even decades (Bramlet 2004, pers. comm.; F. Roberts, Botanist, 2012, pers. comm.); however, the number of viable seeds lost to seed predators or through dispersal to unsuitable habitats is unknown.

Atriplex coronata var. *notatior* produces fruits capable of floating that may be dispersed during seasonal flooding (A. Sanders, (formerly) University of California, Riverside, 2004, pers. comm.), specifically by slow-moving water flows during winter and spring rainfall events. Seeds generally germinate in the spring as flows recede, flower in April and May, and set fruit by May or June (Bramlet 1992, pers. comm.). The flowering period may extend to August in years when the water recedes late in the spring season (Munz 1974, p. 355; California Native Plant Society [CNPS] 2001, p. 93).

Because it is an annual, the number of *Atriplex coronata* var. *notatior* plants in a population differs in response to rainfall, extent of winter flooding, and temperature (Roberts 1993, p. 3). These factors also influence the distribution of plants from one year to the next (Bramlet 1996, p. 3). Hydrology, flooding, and precipitation all play a role in the germination, flowering, fruiting, and seed dispersal of *A. c.* var. *notatior*.

Habitat or Ecosystem

Atriplex coronata var. *notatior* is reliant on fixed landscape features that include:

(1) Appropriate hydrology that allows for flooding and moist soil conditions during the winter and spring months, and (2) alkali soils that drain slowly following the winter and spring rains. The ponding of water (but not prolonged inundation) produced by these hydrologic conditions and underlying soils is necessary for the successful growth and reproduction of *A. c.* var. *notatior*.

Atriplex coronata var. *notatior* requires a hydrologic regime that includes seasonal and large-scale flooding in combination with alkaline soils that exhibit low permeability and low nutrient availability. The taxon is found in the San Jacinto River and Upper Salt Creek drainages and within the Alberhill Creek floodplain in soils where mineral nutrients are tightly bound to silt and clay particles (Roberts 2004, pers. comm.). Depending on the amount of precipitation, the duration and extent of flooding or inundation can be extremely variable year to year. Seasonal flooding (typically over the winter and early spring) is an important process that creates suitable alkali habitat for *A. c.* var. *notatior*, stimulates germination, prevents invasion from flood-intolerant plant species, restores disturbed areas, and helps disperse seed (Roberts 2004, pers. comm.). Additionally, large-scale flooding events, such as 10-, 50-, or 100-year floods, can restore or reset alkali habitat that has been colonized by upland species or disturbed by agricultural activities (Bramlet 1992, pers. comm.). The frequency, duration, and extent of seasonal ponding or flooding creates a dynamic matrix of habitat suitable for *A. c.* var. *notatior* depending on the level of disturbance and variations in annual rainfall. Irreversible actions, such as paving, redirection of sheet flow, or year-round flooding, that alter the hydrology of the seasonal wetlands and upland watersheds, or infringe upon the wetlands, may threaten the survival of *A. c.* var. *notatior*.

The watershed and the upland areas that provide water to the floodplains occupied by *Atriplex coronata* var. *notatior* are important for maintaining the flooding regime. While some runoff originates from undeveloped hillsides, much of the watershed where *A. c.* var. *notatior* occurs has been developed, and the flows traveling to the ponded habitats can include urban runoff (Regional Environmental Consultants (RECON) 1995, pp. 18, 21). Unless captured and routed

to storm water detention (desilting) basins, this runoff can transport a variety of pollutants that can be detrimental to native plant communities, particularly the unique soil and vegetation characteristics of vernal pool and alkali playa habitats and the species that occupy them (Clark *et al.* 1998, p. 251; Cahill *et al.* 2001, p. 820; Battaglin *et al.* 2009, p. 303). Therefore, a hydrologic regime that includes seasonal and large-scale flooding in combination with slow drainage in alkaline soils with low nutrient loads is a key habitat element for this taxon.

Atriplex coronata var. *notatior* is adapted to grow in slow-draining alkaline-saline clay soils, primarily the Willows soil series and, to a lesser extent, the Domino, Traver, Waukena, and Chino soils series (Knecht 1971, p. 23; Bramlet 1993, p. 4). These soils are typically found in floodplains or areas of seasonal ponding (Mitchell 1990, p. 1; Tierra Madre Consultants 1990, p. 2) and exhibit low permeability and low nutrient availability. In dry periods, these saline soils exhibit a white powdery surface (effloresce) of salts on their surface due to the evaporation of water (Mitchell 1990, p. 1). The alkaline-saline soils associated with the taxon are found in the greater Perris Valley and form a U-shaped band around the Lakeview Mountains within the basin and valley floors (Tierra Madre Consultants 1990, p. 3). Within these soil types, *A. c.* var. *notatior* occupies seasonal and ephemeral wetlands, including floodplains and vernal pools that are seasonally inundated, and within areas dominated by alkali playas, alkali scrub, and alkali grassland (Bramlet 1992, pers. comm.); plants are generally found at the upper margin or on mounds within these wetlands (Bramlet 2004, p. 4). These habitats are dependent upon adjacent transitional wetlands, marginal wetlands, and upland areas within the watershed (USFWS 1994, p. 64821).

Description of Habitat

Atriplex coronata var. *notatior* is found in herbaceous vegetation alliances and associations (Klein and Evens 2005, pp. 60–62; Sawyer *et al.* 2009, pp. 871–872, 939–940) and shrubland alliances (Klein and Evens 2005, p. 237) of western Riverside County. Alliances are considered generic units of vegetation based on a dominant or diagnostic species presence, whereas associations are subdivisions of alliances based on characteristic understory or associated taxa (Klein and Evens 2005, p. 9). There are various descriptors ascribed to the habitats associated with *A. c.* var. *notatior*; however, we rely on those provided in Sawyer *et al.* (2009) and more regional descriptions focused on western Riverside County from Klein and Evens (2005). These references are in general agreement in their treatment of vegetation descriptions, but have differing terminologies.

Atriplex coronata var. *notatior* is associated with herbaceous vegetation identified as: *Centromadia* (as *Hemizonia*) *pungens* subsp. *laevis* Unique Stands, *Hordeum depressum* Alliance, *Lasthenia californica* Alliance, *Plagiobothrys leptocladus* Unique Stands, and Vernal Alkali Plain, Vernal Alkali Playa, and Vernal Pool Habitats (Klein and Evens 2005, pp. 254, 256, 260, 267, 274). It is also associated with the shrubland alliance *Suaeda nigra* (as *moquinii*) Alliance (Klein and Evens 2005, p. 238). Sawyer *et al.* (2009) describes vegetation on a state-wide basis and, unlike Klein and Evens (2005), is not based directly on survey results. Sawyer *et al.* recognize some of these vegetation types as *Centromadia* (*pungens*) Herbaceous Alliance, *Deinandra fasciculata* Herbaceous Alliance, *Lasthenia californica*-*Plantago erecta*-*Festuca* (as *Vulpia*) *microstachys* Herbaceous Alliance (Sawyer *et al.* 2009, pp. 850, 871, 940). The two

references accommodate the known habitats associated with *A. c.* var. *notatior*, although the nomenclature for these habitats may differ among references.

The floodplain of the San Jacinto River, primarily the occurrence of *Atriplex coronata* var. *notatior* found in the Lower San Jacinto River, contains limited areas of undisturbed (not disked or plowed) native vegetative communities including alkali plain and vernal pool habitats. Plant species associated with these remaining habitats include *Suaeda nigra* (= *S. moquinii*) (bush seepweed), *Atriplex argentea* (silverscale), *Hordeum intercedens* (bobtail barley), *Lasthenia glabrata* subsp. *coulteri* (Coulter's goldfields), *Phacelia ciliata* (Great Valley phacelia), *Lepidium latipes* (dwarf peppergrass), *Lepidium dictyotum* (alkali peppergrass), *Brodiaea filifolia* (Glenn Lukos Associates, Inc. 2000, p. 16), and *Cressa truxillensis* (alkali weed) (Klein and Evens 2005, pp. 267, 274). In areas that have been disturbed, either through disking, plowing, or with the addition of soil amendments, associated species include nonnative species such as *Hordeum vulgare* (barley), *Salsola tragus* (Russian thistle), *Bassia hyssopifolia* (five-hook bassia), and *Hordeum jubatum* (foxtail barley) (Glenn Lukos Associates, Inc. 2000, p. 17).

The Upper Salt Creek occurrence of *Atriplex coronata* var. *notatior* is located within the natural flats west of Hemet within a tributary of the Upper Salt Creek. Habitats in this floodplain include alkaline vernal pools, alkaline grassland, and alkali plain or playa habitats with the gradient of community type defined by alkalinity of soils and the seasonality, duration, and depth of inundation (RECON 1995 pp.15–17; California Natural Diversity Data Base (CNDDDB) 2012). The predominant associations of plants with *A. c.* var. *notatior* at this occurrence include perennial plant species such as *Suaeda nigra*, *Arthrocnemum* (as *Salicornia*) *subterminalis* (Parish's pickleweed), *Frankenia salina* (alkali heath), and *Atriplex argentea* var. *mohavensis* (Mojave silverscale) (RECON 1995, p. 17; OEESC 1996, p. 3). Major flood control channels, local roads and road ditches, and agricultural drainage ditches currently disrupt historical drainage patterns in Upper Salt Creek, reducing the degree and duration of ponding during the wet season (RECON 1995, p. 18).

Atriplex coronata var. *notatior* has also been observed in the seasonal floodplain of Alberhill Creek, in western Riverside County. This geographical location contains alkali playa and alkali marsh habitat as well as nonnative grassland. Associated species recorded for this occurrence include *Spergularia marina* (saltmarsh sand-spurry), *Hordeum intercedens* (bobtail barley), *Suaeda nigra*, *Lepidium latipes*, and *Atriplex argentea* (CNDDDB 2012, Element Occurrence (EO) 16).

Spatial Distribution

At the time of listing, *Atriplex coronata* var. *notatior* was reported to be limited to the San Jacinto, Perris, Menifee, and Elsinore Valleys in western Riverside County. The listing rule identified 11 “population centers” of plants associated with the San Jacinto River and Upper Salt Creek tributary drainages and 1 additional small population found to the southwest near Lake Elsinore (Alberhill Creek) (USFWS 1998, p. 54976; CNDDDB 1997). The 2005 final critical habitat rule and our 2008 5-year review identified four general groupings of CNDDDB EOs, described as “occurrence complexes” (USFWS 2005, p. 59966; USFWS 2008, p. 5). These

areas were defined based on hydrologic processes (such as seasonal flooding) and alkali soil associations and include:

- 1) The floodplain of the San Jacinto River at the San Jacinto Wildlife Area, including Mystic Lake;
- 2) the floodplain of the San Jacinto River between the Ramona Expressway and Railroad Canyon Reservoir;
- 3) the Upper Salt Creek vernal pool complex in the west Hemet area; and
- 4) the floodplain of Alberhill Creek north of Lake Elsinore.

In our 2008 5-year review, using data from rangewide surveys of the taxon completed from 1996 to 2001, we determined that *Atriplex coronata* var. *notatior* occupied the same general geographical area described at the time of its listing in 1998 (USFWS 2008, p. 5).

In this 5-year review, we are using these previous spatial delineations to define the locations of observations of *Atriplex coronata* var. *notatior* using the CNDDDB dataset (CNDDDB 2012), survey reports, and herbarium collections (Consortium of California Herbaria (CCH) 2012). Specifically, we are defining as one geographical location the San Jacinto River floodplain, represented by two distinct occurrences: (a) Upper San Jacinto River, which includes the San Jacinto Wildlife Area and Mystic Lake, (b) Lower San Jacinto River from the Ramona Expressway to Railroad Canyon Reservoir (Appendix 1). The other two geographic locations are Upper Salt Creek in Hemet and Alberhill Creek. These locations are comparable to the three units identified in our 2012 proposed revised critical habitat rule—San Jacinto River Unit, Upper Salt Creek Unit, and Alberhill Creek Unit (USFWS 2012, pp. 23026–23029).

Documentation for many of the sites that support *Atriplex coronata* var. *notatior* is provided to CNDDDB and incorporated into individual EOs, each of which has a consecutive unique number related to the date of first recognition as an EO. In this review, we have adopted the use of the reference term “occurrence” for discussion of threats and protections afforded to this taxon. For analysis and organization, Appendix 1 provides a summary of the detections (EOs and point localities), including specimen collection sites, for each of the four occurrences among the three geographical locations defined by this taxon—San Jacinto River, Upper Salt Creek, and Alberhill Creek.

Comprehensive surveys have not been conducted rangewide for *Atriplex coronata* var. *notatior* other than the 2000 surveys along the lower San Jacinto River (Glenn Lukos Associates, Inc. 2000) and the 2005 to 2006 surveys in the Upper Salt Creek area (CH2M Hill 2010). *Atriplex coronata* var. *notatior* is a taxon subject to significant natural differences in numbers of observed individuals in any given year in response to annual rainfall, extent and distribution of winter flooding, and temperature (Roberts 1993, p. 3; Bramlet and White 2004, Table 2). Differences in survey methodologies and proportion of range surveyed may also contribute to differences in annual counts of individuals. In addition, a viable but unexpressed seed bank may exist in the soil at a site for several years (Bramlet 2004, pers. comm.) even if plants are removed or fail to germinate for a season, or if the site is disturbed (OEESC 1993, p. 27).

Alberhill Creek is part of the larger Temescal Wash region of western Riverside County, which drains the Gavilan Hills region and the northeast slope of the Santa Ana Mountains (Boyd 1983, p. 13). This floodplain is subject to periodic flooding, which produces ponding and, occasionally, scouring (as observed in aerial photos from 1980 and 2010), including seasonal overflow of water from Lake Elsinore. The alkali playa habitat at this location contains the Willows-Travers-Chino soil series and is dependent on the creek to maintain the supporting hydrology.

As of 2012, surveys conducted by the Western Riverside County Regional Conservation Authority (RCA) from 2006 to 2012 have confirmed *Atriplex coronata* var. *notatior* point localities within three of the occurrences used for this 5-year review—Upper Salt Creek, Upper San Jacinto River, and Lower San Jacinto River (A. Malisch, Western Riverside County RCA, 2010, pers. comm.; Western Riverside RCA 2011a, p. 32–33; A. Malisch 2012, pers. comm.).

Overall, based on known survey reports, the geographical area occupied by *Atriplex coronata* var. *notatior* largely remains as it was at the time of listing and correlates strongly with the alkaline soils found in western Riverside County, particularly the Willows soils series. However, new point localities (groups of individual plants) within the three geographical locations have been observed since listing, including an additional documentation within the Alberhill Creek floodplain (Provance 6594, collected May 17, 2005, UCR Accession Record 182507) (CCH 2012 AMEC Earth and Environmental Inc. 2006, p. 29). As discussed below, additional point localities reported in 2005–2006 survey data (CH2M Hill 2010), which were not included in the final listing rule, have resulted in an increase in the occurrences and abundance of individual plants observed in the Upper Salt Creek floodplain, but these do not represent a significant change in the distribution of *A. c.* var. *notatior* in this floodplain since the time of listing; rather, the results only provide more precise locations for this taxon and therefore an updated assessment of its distribution within the geographical area occupied at the time of listing.

Abundance

A status review and threat assessment for *Atriplex coronata* var. *notatior*, completed in October 1993 (prior to its listing in 1998), indicated that approximately 78,000 individuals were distributed throughout the “populations” defined by the CNDDDB EOs (Roberts 1993, p. 3). An additional review was conducted in 1997, which stated that approximately 27,000 *A. c.* var. *notatior* individuals occupied about 145 ac (59 ha) of habitat (Roberts and McMillan 1997, p. 1) and this population size was used in the final listing rule (USFWS 1998, p. 54975).

As noted earlier, the local abundance and distribution of *Atriplex coronata* var. *notatior* (an annual plant) differs from year to year in response to rainfall, winter flooding events, and temperature. At the time of listing, 11 “population centers” of *A. c.* var. *notatior* were considered extant encompassing EOs 2, 3, 5, 7–15, as defined by CNDDDB, plus 1 small population at Alberhill Creek (now EO 16). In our listing rule, we stated that, since 1993, the population had declined significantly due to recent flooding events and subsequent conversion or alteration of habitat; however, we also noted that new populations had been found near historical populations in the San Jacinto River and at a new location near Lake Elsinore (now EO 16) (USFWS 1998, p. 54976). The final listing rule noted that the apparent population decline

described in the rule was due in part to major flooding in the winter of 1992 to 1993 as well as habitat conversion or alteration of potential habitat, but also stated that new populations had been observed in the San Jacinto River floodplain and near Lake Elsinore (USFWS 1998, p. 54977).

In our 2008 5-year review, we indicated a rangewide population estimate of 106,000 individuals of *Atriplex coronata* var. *notatior* based on estimates from surveys conducted in the spring of 2000 (Glenn Lukos Associates, Inc. 2000, p. 15). Approximately 84,000 of these individuals were found on 236.5 ac (95.7 ha) in the Lower San Jacinto River occurrence (between the Ramona Expressway and the mouth of Railroad Canyon) for a total of 61 point localities (Glenn Lukos Associates, Inc. 2000, p. 16). This study found that approximately 58,000 of the estimated 83,741 individual plants (or 69 percent) were located within farmed or otherwise altered areas impacted by regular disking or, in some areas, by the additional soil amendments. This report also noted that approximately 7,470 individuals were observed within the San Jacinto Wildlife Area (Glenn Lukos Associates Inc. 2000, p. 15).

San Jacinto River

Surveys of point localities for *Atriplex coronata* var. *notatior* have been more limited in aerial extent within portions of both the Upper and Lower San Jacinto River occurrences (i.e., the middle and lower San Jacinto River floodplain and the Mystic Lake area) in 2005, 2008, and 2009 (Rancho Santa Ana Botanic Garden 2006, 2010; S. White, Consultant 2009, pers. comm.). Numbers of individual plants ranged from 21 to 220 per locality. The Western Riverside County RCA has also conducted surveys within the San Jacinto Wildlife Area (Upper San Jacinto River occurrence) since 2006 under the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) Rare Plant Survey program. These surveys are generally focused on known localities within conserved areas of the Western Riverside County MSHCP and are not intended to be widespread surveys across the geographical range of the taxon. Results from these surveys from 2006 through 2010 documented 100 individuals for 13 localities in the 2 San Jacinto River occurrences and Upper Salt Creek occurrence (Malisch 2010, pers. comm.). A total of 5 point localities (597 individual plants) were reported in 2011 in the Upper and Lower San Jacinto River occurrences, and 14 point localities (approximately 139 individual plants) were reported in the Upper and Lower San Jacinto River occurrences in 2012 (Malisch 2012, pers. comm.)

Although we currently have no comprehensive abundance estimate, we believe that since listing, the numbers of individuals have declined along the San Jacinto River floodplain as a result of agricultural operations, including continued irrigation farming and the addition of soil amendments such as sludge and manure, as well as disturbance from continued disking for fire and weed control, and alteration of hydrology with drainage structures. However, areas subject to farming activities that still contain native habitat, particularly underlying alkaline soils and seasonally flooding (Glenn Lukos Associates, Inc., 2000, p. 9) can still support *Atriplex coronata* var. *notatior*. In fact, *A. c.* var. *notatior* is described as one of a few alkaline-saline soil associated plants that can be found in areas in which almost all of the native habitat components have been removed (Glenn Lukos Associates, Inc., 2000, p. 9).

Upper Salt Creek

As for the Upper Salt Creek occurrence, a 1995 report of sensitive plant species within a large (1,400 ac (567 ha)) portion of the Salt Creek drainage system summarized existing records, aerial photography, and direct observations and described approximately 33 point localities of *Atriplex coronata* var. *notatior* ranging from less than 100 to approximately 9,000 individual plants for a total of approximately 31,400 plants (RECON 1995, p. 25, Figure 6). As an example of survey result variability, another report summarized more localized surveys within 45 ac (18.21 ha) of mitigation land (Metropolitan Water District of Southern California) within the Upper Salt Creek floodplain. This report described 16,500 individuals of *A. c.* var. *notatior* in 1996, and up to an estimated 136,948 individuals in 2001, with an aerial extent ranging from 9.7 ac (3.93 ha) to 12.66 ac (5.12 ha) during the same time period (AMEC Earth and Environmental Inc. 2001, p. 3). Lastly, a 2000 survey recorded approximately 15,000 individuals in Upper Salt Creek floodplain (Glenn Lukos Associates, Inc. 2000, p. 15).

Sensitive plant surveys for *Atriplex coronata* var. *notatior* were also conducted within the Upper Salt Creek occurrence in 2005 and 2006 (above average rainfall years) for a proposed highway realignment project (CH2M Hill 2010). These surveys documented over 100,000 plants within 555 point localities in alkali grassland, alkali playa, and vernal pool habitats (CH2M Hill 2010, p. 5-69, Appendix F (p. 5), and Figure 5.3-11). The largest number of locations of plants (90 percent) and the largest number of individual plants (over 100,000 plants) were all found in one general region of the Upper Salt Creek geographical location (north of the San Jacinto Branch Line, south of Devonshire Avenue, east of California Avenue, and west of Warren Road) (CH2M Hill 2010, p. 5-69). The Western Riverside County RCA rare plant surveys within the Upper Salt Creek occurrence have recorded approximately 246 individual plants at 4 point localities in May 2009 (Malisch 2010, pers. comm.) and 433 plants at 17 localities in 2012 (Malisch 2012, pers. comm.).

In general, we believe that the results of the recent surveys (2005 through 2009) within the floodplains of the San Jacinto River and Upper Salt Creek watersheds, including surveys that were conducted during a wet year, indicate a larger population of *Atriplex coronata* var. *notatior* within the Upper Salt Creek occurrence than was previously believed for this geographical location.

Alberhill Creek

Atriplex coronata var. *notatior* is also found in the Alberhill Creek floodplain. In 1997, 185 individual plants were observed on Willows soils in this floodplain within wetland habitat along Nichols Road, near the mouth of Walker Canyon (CNDDDB 2012, EO 16). A survey in 2005 recorded 10 individuals south of Nichols Road (approximately 1,320 feet (365 meters) from the 1997 location) in nonnative grassland and alkali marsh habitat (AMEC Earth and Environmental Inc. 2006, p. 29).

Changes in Taxonomic Classification or Nomenclature

There has been no change in the taxonomic classification or nomenclature of *Atriplex coronata* var. *notatior* since the time of listing in 1998.

Genetics

No studies focused on the genetics of *Atriplex coronata* var. *notatior* have been conducted or proposed.

Taxon-specific Research and/or Grant-supported Activities

None.

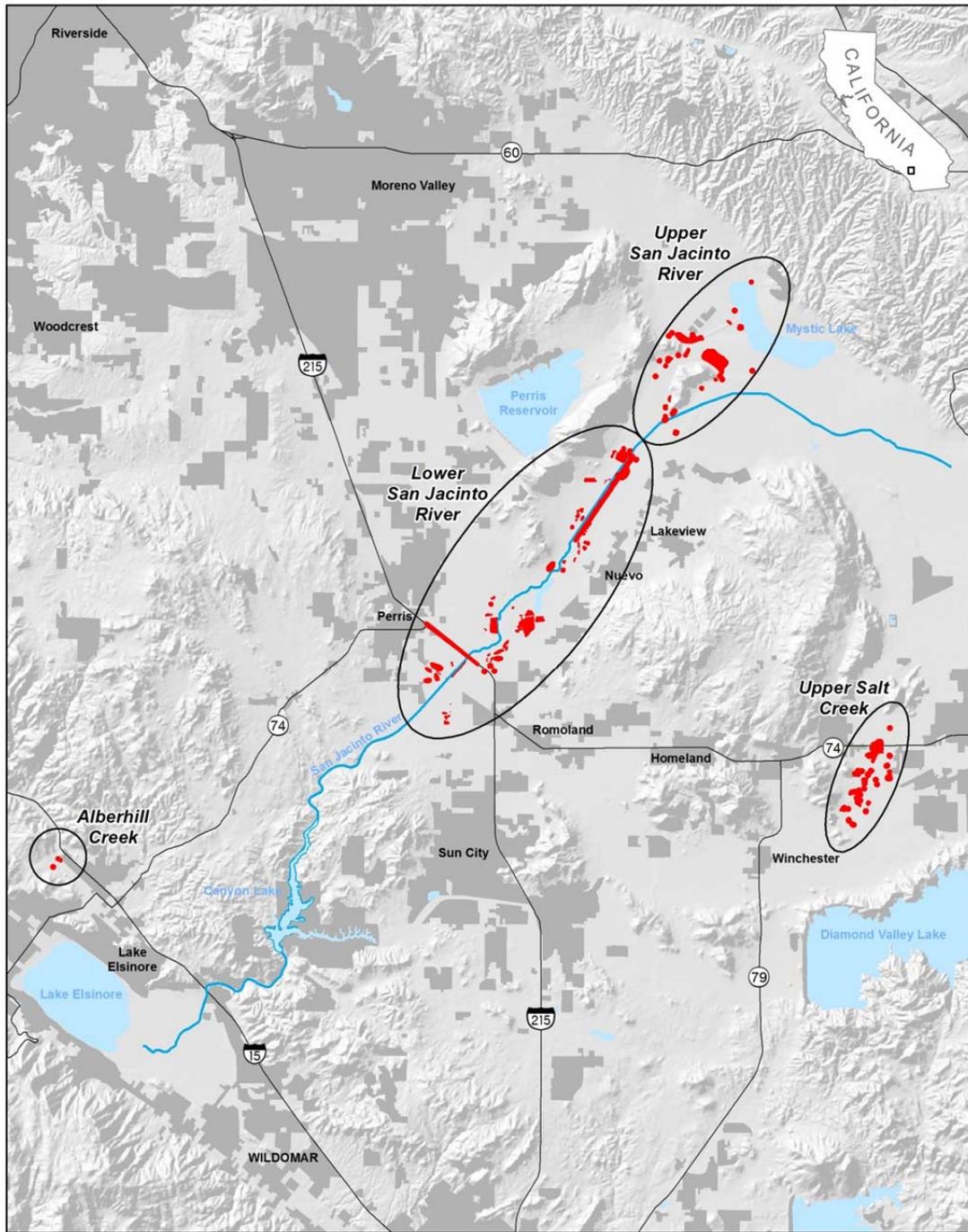
Vulnerability Factors

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

Consideration of elements of rarity and endemism along with life history traits can provide a extinction vulnerability profile for *Atriplex coronata* var. *notatior*. This taxon exhibits several attributes that might limit its distribution and population growth. These attributes include:

- 1) Restriction of the taxon to specific soil types (i.e., specialized niche) found within a narrow range in western Riverside County;
- 2) Dependence on seasonal hydrologic events and associated physical processes that are variable in nature and have been significantly altered within the geographical range occupied by the taxon; and
- 3) Populations that naturally fluctuate year-to-year, and are also subject to natural and human disturbance as well as stochastic events.

All of these attributes, but particularly habitat specificity and dependence on hydrologic processes, represent significant vulnerabilities for *Atriplex coronata* var. *notatior*. These vulnerabilities may separately or together exacerbate any of the threats described below in our **Five-factor Analysis**.



Distribution of *Atriplex coronata* var. *notatior*

MAP DATE: 02/21/12
DATA SOURCE: FWS, CNDDB, CASL, WRIVCO
S:\stem\Randy\five_yr_review\sjc\figure1.mxd

■ Occurrences
■ Developed Land

0 1 2 4 Miles
0 1 2 4 Kilometers
N

Figure 1: Distribution of *Atriplex coronata* var. *notatior* (San Jacinto Valley crownscale; prepared for 2012 5-year Review.

Five-factor Analysis

The listing rule summarized the following threats to *Atriplex coronata* var. *notatior*: ongoing and threatened destruction and modification of habitat by urbanization and agricultural activities, off-road vehicle use, alteration of hydrology, trampling or grazing, and alien (nonnative) species (USFWS 1998, p. 54982; Table 1).

These threats continued to impact *Atriplex coronata* var. *notatior* in 2008, when the previous 5-year review was completed. In our 2008 5-year review, we identified an increase in threats associated with dumping of manure and sludge (USFWS 2008, p.10). Subsequent to this 5-year review, the threat of climate change has been identified and is discussed in **FACTOR E** below. The 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 summarized in Appendix 1.

The majority of known populations of *Atriplex coronata* var. *notatior* are found on private lands, as shown in the proposed revised critical habitat units in Table 1 (USFWS 2012, p. 23027). These areas are not easily accessible for surveys; thus, the status of populations and extent of current threats is difficult to determine. Results of more recent surveys (Rancho Santa Ana Botanic Garden 2006, 2010; White 2009, pers. comm.; Drennen, Western Riverside County RCA, 2012, pers. comm.; Malisch 2010, 2012, pers. comm.) in western Riverside County have been limited and are not comprehensive across the geographical area occupied by the taxon.

Table 1. Land ownership (acres (hectares)) for the estimated, occupied geographical locations of *Atriplex coronata* var. *notatior* (see Appendix 1). (USFWS 2012).

Geographical Location	Ownership			Total Area
	State Land	Local Land	Private Land	
San Jacinto River	2,426 ac (982 ha)	517 ac (209 ha)	4,096 (1,658 ha)	7,039 ac (2,849 ha)
Upper Salt Creek	--	271 ac (110 ha)	603 ac (244 ha)	874 ac (354 ha)
Alberhill Creek	--	74 ac (30 ha)	33 ac (13 ha)	107 ac (43 ha)
Total	2,426 ac (982 ha)	862 ac (349 ha)	4,732 ac (1,915 ha)	8,020 ac (3,246 ha)

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

Threats attributable to **Factor A** at the time of listing to *Atriplex coronata* var. *notatior* included urbanization, isolation and degradation of remaining patches of habitat by agricultural practices, streambed channelization and other hydrological alterations, off-road vehicle use, weed abatement, fire suppression practices, and trampling or grazing (USFWS 1998, pp. 54982–54983). In our 2008 5-year review, we indicated that *A. c.* var. *notatior* continued to face the same threats attributable to this factor as it did at the time of listing and we described an increase

in the threat posed by the widespread dumping of manure and sludge (treated sewage biosolids) and the associated increase in threat from the establishment of nonnative plants in these areas (USFWS 2008, pp. 8–11). Impact from trampling through grazing activities is combined with off-road vehicle use and is now discussed under **FACTOR E**. The current threats attributable to **Factor A** are described below under the following headings: Urban and Agricultural Development, Alteration of Hydrology, Disking of Habitat (for fire suppression or weed abatement), and Invasive Nonnative Plants.

Urban and Agricultural Development

Urban Development

In our listing rule, we stated that, since 1993, the population had declined significantly due to recent flooding events and subsequent conversion or alteration of habitat. We noted that approximately 75 percent of historical plant communities known to support *Atriplex coronata* var. *notatior* had been impacted by a combination of intensive cultivation, urbanization, or watercourse channelization, or were otherwise highly disturbed (USFWS 1998, p. 54983). We stated that dryland or irrigated farming activities in the San Jacinto River and Upper Salt Creek floodplains had been occurring during the past 100 years, reducing potential or occupied habitat for *A. c.* var. *notatior*; however, at the time of listing, we also noted that a 5-year drought had significantly reduced these agricultural activities and had helped to maintain the existence of this taxon in the San Jacinto River floodplain (USFWS 1998, p. 54976). We also described major commercial and urban development and transportation projects (and associated infrastructure such as flood control) as potential threats to *Atriplex coronata* var. *notatior* (USFWS 1998, p. 54983). At that time, several pipeline projects had already impacted or destroyed 5 of 11 “populations” of *A. c.* var. *notatior* (R. Turner, Eastern Municipal Water District, 1992, 1993, pers. comm.; Tierra Madre Consultants 1992, pp. 4–5) and an additional pipeline project was identified as a threat to another population (Roberts and McMillan 1997, p. 3).

In our 2008 5-year review, we stated that, because additional development projects were expected, including potential projects from non-permittees of the Western Riverside County MSHCP, development continued to impact *Atriplex coronata* var. *notatior* in occupied or potentially occupied areas that were not identified as Public or Quasi-Public (conserved) lands within the Western Riverside County MSHCP (USFWS 2008, pp. 8–9). Since this time, the threat of loss of *Atriplex coronata* var. *notatior* habitat due to urban development (and related infrastructure) has been somewhat reduced since listing due to the partnerships created by the Western Riverside County MSHCP. As described in more detail in **FACTOR D** below, land acquisition of habitat for *A. c.* var. *notatior* within the Upper and Lower San Jacinto River occurrences totals 487 ac (197 ha) since 2004 (Western Riverside County RCA 2010, 2011b). These parcels are now part of the Western Riverside MSHCP Reserve lands. Some of these acquisitions were acquired with Habitat Conservation Plan Land Acquisition Grant Program funds authorized under section 6 of the Act (see **FACTOR D** below).

Within the Upper Salt Creek occurrence, there appear to be fewer threats from urban and agricultural development activities to *Atriplex coronata* var. *notatior* as compared to the Lower

San Jacinto River occurrence (Roberts 2010, pers. comm.), but, as noted earlier, comprehensive surveys at this geographical location have not been completed since 2005–2006.

The Alberhill Creek occurrence of *Atriplex coronata* var. *notatior* in the floodplain north of Lake Elsinore is located in an increasingly urbanized area that contains both local and private lands. An example of a recent development threat at this occurrence is a proposed subtransmission line (in association with a recently completed electrical power substation), as part of the Southern California Edison Valley-Ivyglen Subtransmission Line and Fogarty Substation Project (W. Worthey, Consultant, 2011, pers. comm.). The subtransmission line is being constructed by Southern California Edison, who will follow the provisions set forth in the Western Riverside County MSHCP if direct or indirect impacts to special-status plants cannot be avoided (State of California Public Utilities Commission 2010, p. 6-5). This project has also proposed an avoidance and minimization plan such as siting permanent project elements (i.e., roads and poles) away from known locations of special-status species and communities, identifying environmentally sensitive areas such as rare plant populations, monitoring of known locations of special-status plant populations prior to or during the construction period, to include monitoring during construction and for 1 year following construction to assess the effectiveness of protection measures, and limiting removal of native vegetation communities (State of California Public Utilities Commission 2010, pp. 6-2–6-4).

Efforts are in place to reduce threats to *Atriplex coronata* var. *notatior* from urban development and related infrastructure; however, comprehensive surveys have not been conducted for the Lower San Jacinto and Alberhill Creek occurrences. Therefore, we believe the threat for this factor is moderate at these two occurrences.

Agricultural Development

Subsequent to listing, in our previous 5-year review, we described an increase in the addition of manure and biosolids along the Lower San Jacinto River occurrence related to agricultural activities (USFWS 2008, p. 10). These soils amendments can permanently impact alkaline soil habitat where *Atriplex coronata* var. *notatior* is found as a result of: (1) disruption of essential physical or biological features due to continued ground disturbance and (2) alteration of soil chemistry, which causes permanent habitat conversion to a different plant community and expansion of nonnative plants that invade and may outcompete native taxa (Roberts 1999, pers. comm.).

We believe that these agricultural developments continue as important direct threats to *Atriplex coronata* var. *notatior* within the Lower San Jacinto River occurrence. However, based on the best available information, the magnitude of this threat is high for this occurrence because many of the point localities of *A. c.* var. *notatior* in portions of the Upper and Lower San Jacinto River occurrences are found on private land that continue to be tilled for dryland farming or negatively impacted by soil amendments.

Indirect impacts from agricultural activities also pose a threat to *Atriplex coronata* var. *notatior*. Within the Upper San Jacinto River occurrence, overland flows that cross over agricultural lands into Mystic Lake during major flood events (i.e., winter storms) can transport sediments

containing nutrients into the lake, which has increased in recent years as smaller flow events have caused failure of the Diversion Channel levees and flooding of agricultural lands in the San Jacinto Gap region (Tetra Tech and WRIME 2007, Appendix A, p. 1). During extreme rainfall events, the storage capacity of the lake can be exceeded, causing overflow back into the San Jacinto River and subsequent transport of nutrient-laden water into the floodplain of the river (Tetra Tech and WRIME 2007, p. 28). Proposed water quality projects in this portion of the San Jacinto River are being considered in an effort to convey water directly to Mystic Lake during certain storm events to help reduce the nutrient loading into the upper San Jacinto River and the surrounding floodplain containing the Upper San Jacinto River occurrence of *A. c.* var. *notatior* (Tetra Tech and WRIME 2007, p. F-97).

In summary, we believe the level of threat from agricultural activities, both direct and indirect (e.g., water quality), remains high for the Upper and Lower San Jacinto River occurrences.

Alteration of Hydrology

At the time of listing, we indicated that habitats that support *Atriplex coronata* var. *notatior* are vulnerable to alteration of the supporting watershed, including prolonged inundation from increases in urban run-off as well as drainage of wetlands from removal of water supply (USFWS 1998, pp. 54984–54985). These alterations of hydrological processes are often the result of agriculture or urban development activities adjacent to alkaline wetlands.

Downstream from Mystic Lake, the lower San Jacinto River occurrence of *Atriplex coronata* var. *notatior* is found within a wide fluvial floodplain. This floodplain is often dry due to groundwater infiltration enhanced by low groundwater levels from excessive pumping and limited recharge (Tetra Tech and WRIME 2007, p. 28), which alter the seasonal flooding cycle.

Within the Upper Salt Creek occurrence, rainfall and runoff collect within pools on slow-drainage alkaline soils, which contain remnants of an alkaline vernal floodplain complex and much of the area is still subject to flooding during modest flood events (RECON 1995, p. 34). However, the Upper Salt Creek occurrence is bisected north to south by the San Diego Aqueduct Canal and currently includes open fields and cow pastures within the remaining alkaline vernal pool, alkaline grassland, and alkali scrub habitats (RECON 1995, pp. 15, 17; CNDDDB 2012, EO 9). Additionally, historical drainage patterns in the Upper Salt Creek occurrence are disrupted by local roads, road ditches, and agricultural drainage ditches, which have reduced the degree and duration of ponding during the wet season (RECON 1995, p. 18).

In our 2008 5-year review of *Atriplex coronata* var. *notatior*, we stated that activities associated with the San Jacinto River Flood Control Project, including a proposed widening of the Ramona Expressway, was a threat due to its potential to alter the hydrological processes within this floodplain (USFWS 2008, p. 9). The preferred alternative for the State Route 79 realignment project (between Domenigoni Parkway and Gilman Springs Road) provides avoidance, minimization, or mitigation measures to prevent or avoid direct and indirect impacts to populations of *A. c.* var. *notatior* within the Upper Salt Creek geographical location.

Impacts from alteration of hydrology are evident at two of the four *Atriplex coronata* var. *notatior* occurrences (Upper Salt Creek and Lower San Jacinto River) and we believe that this remains a potentially significant threat to the continued survival and recovery of this taxon.

Disking of Habitat (for Fire Suppression or Weed Abatement)

In our listing rule, we noted that more than 500 ac (200 ha) of occupied or potential habitat for *Atriplex coronata* var. *notatior* had been disked for the purposes of fire suppression or weed abatement (USFWS 1998, p. 54984, citing Roberts 1993, p. 2). Disking (or tilling) is also used to prepare areas for farming activities, as noted above.

Disking is generally dependent on the anticipated use of the parcel for the year, particularly in the San Jacinto River Valley. However, regardless of land use, when used to maintain “clean parcels,” this activity changes the microtopography of the natural floodplains and the alkaline soils themselves, both of which are important features for establishment of this taxa and other native plants found in these seasonally flooded habitats (Bramlet 2009, pers. comm.). Disking for dryland farming has been an ongoing activity in the San Jacinto River floodplain for perhaps 100 years; however, this activity was, in the past, intermittent, allowing for recovery periods for *Atriplex coronata* var. *notatior* during fallow periods (Roberts 1999, pers. comm.).

In our 2008 5-year review, we indicated that systematic disking was reported in some areas in the Lower San Jacinto River occurrence, with a frequency of up to four times per year (USFWS 2008, p. 9). Although we have no current information on the extent of disking of *Atriplex coronata* var. *notatior* habitat, we believe this activity is still occurring, particularly for the Lower San Jacinto River occurrence, and remains a significant threat to the continued survival and recovery of this taxon.

Invasive Nonnative Plants

Displacement of *Atriplex coronata* var. *notatior* by nonnative plants was identified as a threat at the time of listing. In particular, the expansion of a nonnative grass, *Crypsis schoenoides* (swamp prickle grass), was described as an important threat as a result of its seeding as a food source for migratory waterfowl along the San Jacinto River (USFWS 1998, p. 54988).

The San Jacinto Wildlife Area (including Mystic Lake) is found within the Upper San Jacinto River occurrence of *Atriplex coronata* var. *notatior*. In our 2008 5-year review, we stated that *A. c.* var. *notatior* continued to be threatened by invasive nonnative plants, including weedy plant species introduced as food sources for waterfowl in the San Jacinto River/Mystic Lake area (i.e., part of the Upper San Jacinto River occurrence). We also noted the establishment of nonnative plants such as *Brassica nigra* (black mustard) and *Salsola traga* (Russian thistle) as a result of manure and sludge dumping along the Lower San Jacinto River floodplain (USFWS 2008, pp. 15–16).

At present, there is no final Management Plan for the San Jacinto Wildlife Area, which is managed by the California Department of Fish and Game (CDFG). The continued planting of cover crops such as *Festuca perennis* (rye grass) (as *Lolium multiflorum* (Italian rye grass)) or

Festuca (as *Lolium*) *rigidum* (Wimmera ryegrass; rigid Italian rye grass) for waterfowl, competes with existing alkali plant communities (Bramlet 2009, pers. comm.), displacing *Atriplex coronata* var. *notatior* and other native plants. Within other occurrences of *A. c.* var. *notatior*, nonnative plants can displace or out-compete for sites suitable for this taxon.

As described above (see Abundance section), comprehensive surveys within the geographical range occupied by the taxon are limited. Because of inconsistent or little active management, we believe that the prevalence of nonnative plants remains a threat to *Atriplex coronata* var. *notatior* due to continued disturbance of these areas and the proximity of *A. c.* var. *notatior* occurrences to consistent sources of nonnative species of grasses and forbs from nearby residential development and highways. Both localized and rangewide habitat threats from nonnative plants is therefore considered a current threat at all four occurrences of *A. c.* var. *notatior*.

Summary of Factor A

Habitat loss, a primary threat noted in the listing rule, remains a threat to *Atriplex coronata* var. *notatior* due to urban and agriculture development pressures at all known occurrences. Habitat alteration is also a threat at all occurrences, primarily from continued disking of areas that have historically contained alkaline-saline soils. Alteration of these essential hydrological processes related to development in western Riverside County remains a threat at both San Jacinto River occurrences, including a continued concern of impacts to water quality and groundwater reductions at sites that support *A. c.* var. *notatior*. The threat from nonnative plants also remains as a rangewide threat in all four occurrences, but particularly at the Lower San Jacinto River occurrence due to continued ground disturbance and land conversion to agriculture.

Federal mechanisms in effect since listing (see **FACTOR D**), such as implementation of the Western Riverside County MSHCP, have reduced impacts from urban development through acquisition of land within the San Jacinto River (Upper and Lower) occurrences and Upper Salt Creek occurrence. The Western Riverside County MSHCP provides landscape-level conservation as well as site-specific conservation measures for *Atriplex coronata* var. *notatior* and its habitat at all four occurrences.

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 1998, p. 54985). We do not believe that overutilization for commercial, recreational, scientific, or educational purposes poses a threat to *Atriplex coronata* var. *notatior* at this time.

FACTOR C: Disease or Predation

Disease

Disease was not known to be a threat to *Atriplex coronata* var. *notatior* at the time of listing (USFWS 1998, p. 54985), nor is it currently believed to pose a threat to the taxon.

Predation

At the time of listing, intensive sheep grazing was described for the San Jacinto River and Hemet floodplain areas occupied by *Atriplex coronata* var. *notatior* (USFWS 1998, p. 54985). At that time, *A. c.* var. *notatior* was not considered to be “regular forage” for sheep; threats were considered to be the result of animal trampling (discussed in **FACTOR E** below) rather than grazing. Sheep grazing in habitat occupied by *A. c.* var. *notatior* in the Upper Salt Creek occurrence was reported in 2005 (Roberts 2005, pers. comm.). We believe that predation from grazing is a localized, but recurring threat to the taxon at the Upper Salt Creek and the Lower San Jacinto River occurrences.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, we evaluated the following regulatory mechanisms for their potential to provide protection for *Atriplex coronata* var. *notatior*: (1) listing under the California Endangered Species Act (CESA); (2) mitigation measures required under the California Environmental Quality Act (CEQA); (3) implementation of conservation plans pursuant to the California Natural Community Conservation Planning (NCCP) program; (4) conservation provisions under section 404 of the Clean Water Act (CWA); (5) the Act in those instances where it co-occurs with other listed wildlife species; (6) land acquisition and management by Federal, State, or local government agencies, or by private land owners; and (7) local laws and regulations. These and other regulatory mechanisms are re-evaluated for this 5-year review, reordered for clarity, and discussed below under **State Regulatory Mechanisms** and **Federal Regulatory Mechanisms**.

State Regulatory Mechanisms

Atriplex coronata var. *notatior* is not listed by the State of California as rare, threatened, or endangered and therefore receives no protection under the CESA or the Native Plant Protection Act. However, the following State laws and regulations may provide some protective benefit to *A. c.* var. *notatior*.

The Natural Community Conservation Planning (NCCP) Act

The NCCP program is a cooperative effort between the State of California and numerous private and public partners with the goal of protecting habitats and species. An NCCP program identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. The primary objective of the NCCP program is to conserve natural communities at the ecosystem scale while accommodating compatible land uses (<http://www.dfg.ca.gov/nccp/>). Regional NCCPs provide protection to federally listed species by conserving native habitats upon which the species depend. Many NCCPs are developed in conjunction with habitat conservation plans (HCPs) prepared pursuant to the Act. We issued a section 10(a)(1)(B) permit for the County of Riverside for the Western Riverside County MSHCP, which includes *Atriplex coronata* var. *notatior* as a covered species. Regional NCCPs may provide protection to federally listed species, such as *A. c.* var. *notatior*, by conserving native habitats upon which the species depend.

On June 22, 2004, NCCP Approval and Take Authorization were issued by the CDFG for the Western Riverside County MSHCP. The specific measures under these plans that afford protection to *A. c.* var. *notatior* are discussed below under the Act in the **Federal Regulatory Mechanisms** section.

California Lake and Streambed Alteration Program

The Lake and Streambed Alteration Program (CDFG Code sections 1600–1616) provides protection of floodplains through its permitting process. CDFG Code (Section 1602) requires an entity to notify the CDFG of any proposed activity that may substantially modify a river, stream, or lake, to include: substantially diverting or obstructing the natural flow of any river, stream or lake; substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. If the CDFG determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement (Agreement) is prepared. The Agreement includes reasonable conditions necessary to protect those resources and must comply with CEQA. However, we currently have no information as to whether permits under this program has been required for projects within floodplains of the proposed San Jacinto River and Alberhill Creek Units occupied by *Atriplex coronata* var. *notatior*.

California Environmental Quality Act (CEQA)

The 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; 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 Guidelines Section 21002).

Atriplex coronata var. *notatior* is listed by the CNPS as **1.B.1** or rare, threatened, or endangered in California and elsewhere and seriously endangered in California (CNPS 2012). The CDFG recommend that plants on Lists 1A, 1B, and 2 of the CNPS Inventory be addressed in CEQA projects since they are considered plants that may qualify for listing (CEQA Guidelines Section 15380). However, a plant need not be in the CNPS Inventory to be considered a rare, threatened, or endangered species under CEQA. In addition, the CDFG recommends, and local governments may require, protection of plants that are regionally significant, such as locally rare species, disjunct populations of more common plants, or plants on the CNPS Lists 3 and 4. (CDFG 2012 http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/nat_plnt_consv.html).

State regulatory mechanisms are not considered adequate to reduce threats to *Atriplex coronata* var. *notatior* although mitigation provisions under CEQA and other protective programs (e.g., Streambed Alteration Program) have the potential for providing some level of protection to the taxon.

Federal Regulatory Mechanisms

National Environmental Policy Act

All Federal agencies are required to adhere to the National Environmental Policy Act (NEPA) of 1970 (42 U.S.C. 4321 *et seq.*) for projects they fund, authorize, or carry out. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. The Council on Environmental Quality's (CEQ) regulations for implementing NEPA state that agencies shall include a discussion on the environmental impacts of the various project alternatives (including the proposed action), any adverse environmental effects that cannot be avoided, and any irreversible or irretrievable commitments of resources involved (40 CFR part 1502). Its public notice provisions provide an opportunity for the Service and others to review proposed actions and provide recommendations to the implementing agency. The NEPA does not impose substantive environmental obligations on Federal agencies—it merely prohibits an unformed agency action. However, if an Environmental Impact Statement is prepared for an agency action, the agency must take a “hard look” at the consequences of this action and must consider all potentially significant environmental impacts. Effects on threatened and endangered species is an important element for determining the significance of an impact of an agency action (40 CFR § 1508.27). Thus, although NEPA does not itself regulate activities that might affect *Atriplex coronata* var. *notatior*, it does require full evaluation and disclosure of information regarding the effects of contemplated Federal actions on sensitive species and their habitats. Federal agencies may include mitigation measures in the final Environmental Impact Statement as a result of the NEPA process that help to conserve *A. c.* var. *notatior* and its habitat and these may include measures that are different than those required through the section 7 consultation process.

Clean Water Act (CWA)

Congress passed the Federal Water Pollution Control Act Amendments of 1972 and the CWA of 1977 to provide for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's lakes, streams, and coastal waters. Primary authority for the implementation and enforcement of the CWA rests with the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers (Corps). Section 404 of the CWA is the principal Federal program that regulates activities affecting the integrity of wetlands. Section 404 prohibits the discharge of dredged or fill material in jurisdictional waters of the United States, unless permitted by the Corps under § 404 (a) (individual permits), 404 (e) (general permits), or unless the discharge is exempt from regulation as designated in § 404 (f). The limits of jurisdictional waters of the United States are determined by: (1) In the absence of adjacent wetlands, jurisdiction extends to the ordinary high water mark; (2) when adjacent wetlands are present, jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands; or

(3) when the water of the United States consists only of wetlands, jurisdiction extends to the limit of the wetland. Currently, it is likely that the CWA, an adequate regulatory mechanism, can provide protections to *Atriplex coronata* var. *notatior* because the taxon is found within seasonal floodplain habitat. However, a site-specific jurisdictional delineation will be required to determine whether a section 404 CWA permit from the Corps would be required for those actions proposed for these areas.

In addition to the measures authorized before 1972, the CWA implements a variety of programs, including: Federal effluent limitations and State water quality standards, permits for the discharge of pollutants and dredged and fill materials into navigable waters, and enforcement mechanisms. These programs may provide additional protection of water quality within the floodplains and vernal pool habitats in which *Atriplex coronata* var. *notatior* occurs.

The Total Maximum Daily Load (TMDL) process, under section 303(d) of the CWA (ambient water quality standards), provides a mechanism for integrating the management of both the point and nonpoint source pollution sources that together may contribute to the impairment of a waterbody. The State and Regional Water Boards are required to develop a biennial water quality assessment under section 303(d) for California's waters to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. Within areas occupied by *Atriplex coronata* var. *notatior*, a portion of Alberhill Creek and Lake Elsinore, which drains into Temescal Creek (via a manmade canal) during wet years, has been identified as impaired (e.g., nutrients and oxygen levels for Lake Elsinore as nonpoint sources) on the State's 303(d) Listed Waters for 2010. A Nutrient TMDL program for Lake Elsinore was adopted by the Regional Water Quality Control Board in 2004 and approved by the U.S. Environmental Protection Agency in 2005. A monitoring program is in place to implement the Nutrient TMDL objective of water quality improvement in Lake Elsinore, and therefore the downstream floodplain occupied by *A. c.* var. *notatior*.

Endangered Species Act of 1973, as amended (Act)

Since listing, the Act is the primary Federal law providing protection for *Atriplex coronata* var. *notatior*. The Service's responsibilities for administering the Act include sections 6, 7, 9, and 10. Section 7(a)(1) of the Act requires all Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species. Section 7(a)(2) of the Act requires Federal agencies, including the Service, to satisfy two standards in carrying out their program. Federal agencies must ensure that actions they fund, authorize, or carry out are not likely to (1) jeopardize the continued existence of any listed species or (2) result in the destruction or adverse modification of designated critical habitat. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 C.F.R. § 402.02). Critical habitat was designated for this taxon in 2005 (USFWS 2005, pp. 59952–59974); however, this determination has been proposed for revision (USFWS 2012, pp. 23008–23057).

The section 7(a)(2) prohibition against jeopardy applies to plants as well as animals, but other protections of the Act are more limited for plants. There is no prohibition against the taking of a protected plant under section 7(a)(2), thus no incidental take statement is prepared in the analysis of effects associated with a project. A jeopardy opinion for plants therefore would not include reasonable and prudent alternatives to minimize incidental take. A non-jeopardy opinion could identify reasonable and prudent measures to minimize the impacts to individual plants or their habitats affected by the action, but they are not a substitute for a finding of jeopardy (or adverse modification). A jeopardy or a non-jeopardy opinion for plants may also include voluntary conservation recommendations, which are discretionary actions the action agency can implement relevant to the proposed action and consistent with their section 7(a)(1) authority to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or develop information; however, they are not a precondition for a finding of no jeopardy (or adverse modification).

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

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

The Cooperative Endangered Species Conservation Fund (Conservation Fund), under section 6 of the Act, provides grants to States and Territories to participate in voluntary conservation projects for candidate, proposed, and listed species. The program provides funding to States and Territories for species and habitat conservation actions on non-Federal lands. Four grant programs are available through this the Conservation Fund: Conservation Grants, HCP Assistance Grants, HCP Land Acquisition Grants, and Recovery Land Acquisition Grants. Within areas of western Riverside County occupied by *Atriplex coronata* var. *notatior*, two parcels were recently purchased within the Lower San Jacinto River and Upper Salt Creek occurrences with HCP Land Acquisition Grant Program funds (M.B. Woulfe, Biologist, Service, 2011a and 2011b, pers. comm.).

Section 10(a)(1)(A) of the Act includes provisions for collection of plants or plant parts for scientific purposes or to enhance the propagation and survival of the species. The occurrences of *Atriplex coronata* var. *notatior* in Riverside County would be covered under this provision and these activities would require consultation and coordination with the Service.

For projects without a Federal nexus that may result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). Issuance of a section 10(a)(1)(B) permit for an HCP is a Federal action subject to compliance under section 7(a)(2). The Western Riverside County MSHCP is a large-scale, multi-jurisdictional NCCP/HCP permitted under section 10(a)(1)(B) of the Act and is discussed below. The Implementing Agreement (IA) for the Western Riverside County MSHCP states that the plan provides a comprehensive, habitat-based approach to the protection of covered species, including *Atriplex coronata* var. *notator*, by focusing on lands essential for the long-term conservation of the covered species and appropriate management for those lands (Western Riverside County Regional Conservation Authority *et al.* 2003, p. 51). Therefore, the Western Riverside County MSHCP provides an additional layer of regulatory protection to covered plants and animals.

Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The Western Riverside County MSHCP addresses impacts to *Atriplex coronata* var. *notator* throughout its range. The Western Riverside County MSHCP is a large-scale, multi-jurisdictional HCP that addresses 146 listed and unlisted “Covered Species” within a 1,260,000-acre Plan Area in western Riverside County. The Western Riverside County MSHCP was designed to establish a multi-species conservation program that minimizes and mitigates the expected loss of habitat and the incidental take of Covered Species. Although “take” only applies to listed wildlife, *A. c.* var. *notator* is “covered” under a 75-year 10(a)(1)(B) permit issued for the Western Riverside County MSHCP in recognition of the conservation measures incorporated into the Plan for plant species. The Service concluded that planned activities covered by the Western Riverside County MSHCP in combination with this conservation strategy would not jeopardize the continued existence of *A. c.* var. *notator* (USFWS 2004b, p. 356).

Conservation objectives identified in the Western Riverside County MSHCP for *Atriplex coronata* var. *notator* include: (1) Conserve at least 6,900 ac (2,792 ha) of suitable habitat including grasslands, playas, and vernal pools (which includes those lands already conserved or Public/Quasi-Public Lands); (2) conserve the Alberhill Creek locality and three core areas located along the San Jacinto River and in the upper Salt Creek drainage; (3) conduct surveys (described below); (4) conserve the floodplain along the San Jacinto River consistent with objective 1, including maintaining floodplain processes; and (5) conserve the floodplain along Salt Creek, generally in its existing condition, including maintenance of floodplain processes (Dudek and Associates 2003, pp. 9-137–9-138). A total of 487 ac (197 ha) of land within the Upper and Lower San Jacinto River and Upper Salt Creek occurrences of *A. c.* var. *notator* have been added since 2004 to the existing conserved lands and have been incorporated into the Western Riverside County MSHCP Reserve (Western Riverside County RCA 2010, 2011b). Additionally, since 2004, no losses of lands have been reported within the Upper or Lower San Jacinto River geographical locations; approximately 10 ac (4 ha) have been lost in the Upper Salt Creek location (Western Riverside County RCA 2010, 2011b).

For *Atriplex coronata* var. *notator*, surveys are required within defined boundaries of the Criteria Area (Dudek and Associates 2003, Figure 6-2). As with Narrow Endemic Plant Species,

for locations with positive survey results, 90 percent of those portions of the property that provide for long-term conservation value for the identified species will be avoided until it is demonstrated that species-specific conservation objectives for these species are met. Within the Western Riverside County MSHCP conservation area, surveys for *A. c. var. notatior* are required every 8 years to verify occupancy for at least 75 percent of known localities; if a decline in distribution is observed below this threshold, management activities are triggered, as appropriate, to meet the species-specific objectives identified in the plan. In addition, if an area is identified as containing large numbers of individuals or is determined to be important to the conservation of *A. c. var. notatior*, but is currently outside the reserve design defined by the Western Riverside County MSHCP, there is flexibility for criteria refinement and these locations can be added as Additional Reserve Lands or Acquisition Lands.

Summary of Factor D

Some loss of *Atriplex coronata* var. *notatior* habitat has occurred since our last 5-year review. Monitoring and management actions under the Western Riverside County MSHCP only provides information on the current distribution of *A. c. var. notatior* within the Western Riverside County MSHCP conservation area. However, State and Federal regulatory mechanisms have reduced this threat, primarily as a result of conservation measures being implemented under the Western Riverside County MSHCP including acquisition and incorporation of lands containing localities of the taxa into the plan reserve. Survey requirements under the Western Riverside County MSHCP are providing some level of regulatory protection related to proposed developments on private lands in all locations. In absence of the Act, existing regulatory mechanisms remain insufficient to reduce or eliminate impacts to *A. c. var. notatior* 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 *Atriplex coronata* var. *notatior*: (1) invasion of nonnative plant species and (2) climatic conditions, specifically, a reduction in seasonal rainfall. Threats associated with nonnative plants are discussed above in **FACTOR A**. Threats associated with recreational activities are related to trampling of *A. c. var. notatior* plants and are discussed here rather than under **FACTOR C** above. Impacts associated with climate change is also included here under **FACTOR E**.

Trampling

Trampling and recreational impacts were listed as threats in the listing rule under **Factors A** and **C**, but are discussed here as threats to *Atriplex coronata* var. *notatior* at both the Lower San Jacinto River and Upper Salt Creek occurrences. Sheep grazing has been previously described as the primary impact related to trampling to individual stands of plants at both locations (Roberts 2005, pers. comm.).

Trampling resulting from off-road vehicle use was not evaluated as a threat in our 2008 5-year review, but is likely to be a localized, individual threat to some populations of *Atriplex coronata* var. *notatior* within the most southern portion of the Lower San Jacinto River occurrence based on visible off-road trails and land disturbance observed with aerial imagery (ESRI 2010).

At present, we believe that the threat of trampling is likely only occasional and localized, and is not a substantial threat to *Atriplex coronata* var. *notatior*.

Climate Change

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

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

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the

extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al.* 2007, pp. 760–764 and 797–811; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529). (See IPCC 2007b, p. 8, for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation. Also see IPCC 2011(entire) for a summary of observations and projections of extreme climate events.).

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

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

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

Projected effects of climate change in the southwestern California ecoregion occupied by *Atriplex coronata* var. *notatior* from regional climate models indicate a mean annual temperature increase of 1.7 to 2.2° Celsius (C) (3.06 to 3.96° Fahrenheit (F)) by 2070, and a general consensus of a 2° C (3.6° F) increase in most months over the next 100 years (Point Reyes Bird Observatory [PRBO] Conservation Science 2011, p. 40). Vegetation changes are also expected. In southwestern California, the area of chaparral or coastal scrub is projected to decrease by 38 to 44 percent by 2070, while grassland, which currently occupies 3 percent of this region, is projected to increase by 345 to 390 percent (PRBO Conservation Science 2011, p. 42). A recent study on the effects of climate change to grassland assemblages in California, as measured by trait differences between native and nonnative plant taxa, predicted an increase in dominance of nonnative taxa in grass assemblages with an increase in temperature (Sandel and Dangremond

2011, p. 11). One summary of projected annual precipitation totals across California indicates that, on average, there will be little change in total annual precipitation in California; however, several precipitation model projections do not show a consistent trend during the next century (<http://cal-adapt.org/precip/decadal/>). More specifically, the Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. One of the four climate models used in this statewide synthesis projects slightly wetter winters, while another projects slightly drier winters, with a 10 to 20 percent decrease in total annual precipitation (<http://cal-adapt.org/precip/decadal/>).

In our listing rule, we indicated that drier climatic conditions can stress native species and reduce germination and survival rates. We highlighted our concern that, when combined with other stressors, this changed condition can increase the threat to taxon such as *Atriplex coronata* var. *notatior* that rely on seasonal rainfall (USFWS 1998, p. 54989). Although there is currently uncertainty with current model projections of precipitation in southern California, we believe that predictions of warmer temperatures and increased variability in extreme rain or flood events are a threat to *A. c.* var. *notatior* through resultant changes in precipitation patterns that create conditions essential for maintaining habitat that supports plant populations.

Summary of Factor E

Based on the best available information, changes in temperature and hydrological conditions resulting from climate change are considered a moderate threat to *Atriplex coronata* var. *notatior* throughout its range. The threat from trampling from occasional grazing and off-road vehicle activities is considered low and is not significant threat to the conservation and recovery of *A. c.* var. *notatior*.

III. RECOVERY CRITERIA

A recovery plan has not been completed for this taxon.

IV. SYNTHESIS

There are four known extant occurrences of *Atriplex coronata* var. *notatior* within three geographical locations—San Jacinto River, Upper Salt Creek, and Alberhill Creek. Overall, based on survey reports, the geographical locations and occurrences (including EOs) of *A. c.* var. *notatior* largely remain as identified at the time of listing. We currently have no comprehensive abundance estimate of *A. c.* var. *notatior*; however, we believe that, since listing, the numbers of individuals has declined along the Lower San Jacinto River occurrence as a result of continued agricultural activities, but have increased at the Upper Salt Creek occurrence.

At the time of listing, threats to *Atriplex coronata* var. *notatior* included destruction and modification of habitat by urbanization and agricultural activities (including the addition of soil amendments), off-road vehicle use, alteration of hydrology, trampling or grazing, and nonnative plant species. Habitat loss, the major threat identified at listing, continues to be the primary threat

to *A. c.* var. *notatior*. The four known occurrences of *A. c.* var. *notatior* are in close proximity to agriculture and urban development and nearly 60 percent of the estimated geographical area occupied by this taxon is considered private lands. Protective mechanisms in effect since listing, such as implementation of the Western Riverside County MSHCP, have reduced the magnitude of this threat through acquisition of land within the San Jacinto River (Upper and Lower) occurrences and Upper Salt Creek occurrence. The majority of the recorded point localities of *A. c.* var. *notatior* are within the Western Riverside County MSHCP Conceptual Reserve criteria cells and approximately 487 ac (197 ha) of land within three occurrences of *A. c.* var. *notatior* have been acquired and placed into the Western Riverside County MSHCP Reserve.

We believe that all four occurrences are moderately threatened by habitat loss through urban development and related infrastructure and two occurrences remain highly threatened by agricultural activities as some loss of habitat has occurred since the Western Riverside County MSHCP was permitted. Impacts from nonnative plants are evident throughout the range of *Atriplex coronata* var. *notatior* and have displaced individuals in all floodplains where the taxon is found. The effects of climate change, particularly an increase in temperature and altered precipitation patterns, is a rangewide threat to the taxon. Trampling is a localized, but recurring threat within both the Lower San Jacinto River (off-road vehicles and grazing) and the Upper Salt Creek (grazing) occurrences. Fire suppression and weed abatement practices represent threats in three of the four occurrences; alteration of hydrology is an important threat at all four occurrences, but particularly for the Lower San Jacinto River occurrence. In recognition of the magnitude of the current threats, we recommend no change in the threatened status of *A. c.* var. *notatior* at this time.

V. RESULTS

Recommended Listing Action:

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

New Recovery Priority Number and Brief Rationale: Change from RPN 3 to 9C

Atriplex coronata var. *notatior* is a taxon that faces several threats, many of which are rangewide, but has a high recovery potential. Habitat loss, the major threat identified in the listing rule, has been reduced under conservation provisions of Federal laws. Documented threats from trampling and off-road vehicle activities are more localized, compared to listing. Monitoring and management actions for the conservation of *A. c.* var. *notatior* are being implemented to meet obligations under the Western Riverside County MSHCP, which encompass all four occurrences. However, surveys for this taxon are not comprehensive and

land zoning (primarily agricultural uses) has not changed for the three geographical locations that encompass the four occurrences. Both of these factors create some uncertainty as to current and future status of some point localities of *A. c.* var. *notatior*. Therefore, we believe the threat from urban development and related infrastructure is moderate at two occurrences. In addition, we believe the threat from agricultural development, a significant economic activity in Riverside County, remains high at two occurrences. Additionally, threats associated with nonnative plants remain within all occurrences of this taxon. However, we believe that the degree of threat for this taxon is now moderate, in large part, due to implementing measures of the Western Riverside County MSHCP. The potential for recovery remains high due to the expected continued land acquisition within the geographical locations occupied by *A. c.* var. *notatior* and the other conservation measures being implemented through the Western Riverside County MSHCP. Therefore we recommend a change in the recovery priority number from 3 to 9C for this taxon.

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 *Atriplex coronata* var. *notatior* by providing information to better understand the biological and physical factors limiting the population growth and distribution. We recognize that the conservation of *A. c.* var. *notatior* will require extensive cooperation and coordination with partners, including Federal, State, and local agencies, to minimize impacts from current threats and aid future restoration. 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. We will continue to assist in securing property easements or purchases of parcels of land with conservation value to *A. c.* var. *notatior* through the Act's section 6 funding.

- 1) Survey all historical and extant occurrences to determine the location, status, and acreage of occupied and suitable habitat of each population to establish a comprehensive baseline against which to measure future changes. Surveys should be concentrated on the remaining Willows soil series within the basin and valley floors that form the U-shaped region surrounding the Lakeview Mountains, encompassing the San Jacinto River and Upper Salt Creek 100-year floodplains. Additionally, a more focused survey for *Atriplex coronata* var. *notatior* should be conducted within the Alberhill Creek floodplain during a year with above average rainfall.
- 2) Conserve or preserve *Atriplex coronata* var. *notatior* occurrences on private lands. Continue to identify key property easements or parcels in the San Jacinto and Upper Salt Creek floodplains for Partners for Fish and Wildlife programs or purchase through the Act's section 6 funding program.
- 3) Manage *Atriplex coronata* var. *notatior* occurrences to prevent potential impacts from recreational activities, dumping, or other human-related activities. This may include fencing or posting to prevent access to managed areas and evaluation of appropriate use of disking practices for fire suppression and weed abatement.

- 4) Engage in the State of California's TMDL program to ensure that water quality (as discussed in **FACTOR A** and **FACTOR D**) within habitat occupied by sensitive taxon, such as *Atriplex coronata* var. *notatior*, is evaluated in determining "beneficial uses" within the Temescal Creek (and its tributaries) and Lake Elsinore TMDL process.
- 5) Develop a Population Viability Analysis model such as a metapopulation occupancy model for *Atriplex coronata* var. *notatior* to determine the key features for survival. Conduct a sensitivity analysis to identify those elements that represent the most important threats to maintaining minimum population size.
- 6) Conduct research to evaluate reproductive life history characteristics such as seed germination requirements, mechanism of seed dispersal, and seed viability. This will assist in identifying reasons for the persistence of certain occurrences and actions needed to help conserve others.

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Appendix 1. Occurrences* of *Atriplex notatior* var. *coronata* (San Jacinto Valley crownscale): Current status, threats, and conservation. Prepared for the 2012 5-year Review.

GEOGRAPHICAL LOCATION¹	OCCURRENCE (includes EOs, survey points, and herbarium collections (summary from CCH 2012))	STATUS AT LISTING²	CURRENT STATUS	NUMBER OF INDIVIDUAL PLANTS (Year Surveyed; Citation)³	CURRENT THREATS⁴	CURRENT PRIMARY CONSERVATION MECHANISM
San Jacinto River	<p>Upper San Jacinto River⁵ (EOs 5, 12–15, and Population A)</p>	Presumed extant	Presumed extant	<p>7,470 (2000; Glenn Lukos, 2000)</p>	<p><u>A</u>: Artificial flooding of habitat (as an indirect impact of urban and agricultural development); Invasive nonnative plants <u>E</u>: Climate change</p>	CDFG San Jacinto Wildlife Area
	<p>Lower San Jacinto River⁶ (EOs 2, 3, 7, 8, 11, 18)</p>	Presumed extant	Presumed extant	<p>83,741 (2000; Glenn Lukos, 2000)</p>	<p><u>A</u>: Urban and agricultural development (particularly the spreading of manure and other soil amendments, dryland farming, proposed residential development); Alteration of hydrology; Disking for fire and weed abatement; Invasive nonnative plants <u>E</u>: Climate change</p>	Western Riverside County MSHCP

GEOGRAPHICAL LOCATION¹	OCCURRENCE (includes EOs, survey points, and herbarium collections (summary from CCH 2012))	STATUS AT LISTING²	CURRENT STATUS	NUMBER OF INDIVIDUAL PLANTS (Year Surveyed; Citation)³	CURRENT THREATS⁴	CURRENT PRIMARY CONSERVATION MECHANISM
Upper Salt Creek	Upper Salt Creek (EOs 9,10)	Presumed extant	Presumed extant	100,000 (2005–2006; CH2M Hill 2010); 246 (2009; Malisch 2010, pers. comm.)	<u>A:</u> Agricultural development; Alteration of hydrology; Disking for fire and weed abatement; Invasive nonnative plants <u>E:</u> Climate change	Western Riverside County MSHCP
Alberhill Creek	Alberhill Creek (EO 16)	Presumed extant	Presumed extant	185 (1997; USFWS 1998); 10 (2005, AMEC Earth and Environmental, Inc. 2006)	<u>A:</u> Urban development; Invasive nonnative plants <u>E:</u> Climate change	Western Riverside County MSHCP

Abbreviations: EO = CNDDDB Element Occurrence; CDFG = California Department of Fish and Game; MSHCP = Multiple Species Habitat Conservation Plan; CCH = Consortium of California Herbaria (see references cited)
*Identifications are based on CNDDDB names, previous USFWS determinations, location information, and floodplain boundaries.
1. Name of geographical location in western Riverside County.
2. The final listing rule identified 12 “population centers” and one smaller population of <i>Atriplex coronata</i> var. <i>notatior</i> within the groupings found in this Table, all of which were presumed extant.
3. These estimates are from surveys conducted in (1) 2000 by Glenn Lukos Associates, Inc. (2 years after listing); (2) 2005–2006 by CH2M Hill; and (3) 2005 by AMEC Earth and Environmental, Inc.
4. Current threats to the occurrence segregated by listing threat Factor (see analysis in text).
5. Defined from San Jacinto Wildlife Area/Mystic Lake along the San Jacinto River floodplain to Ramona Expressway
6. Defined as along the San Jacinto River floodplain from Ramona Expressway to Railroad Canyon Reservoir

