

Clarkia speciosa subsp. *immaculata*
(Pismo Clarkia)

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



**U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, CA**

August xx, 2009

5-YEAR REVIEW

***Clarkia speciosa* subsp. *immaculata* (Pismo Clarkia)**

I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

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

Species Overview:

Clarkia speciosa subsp. *immaculata* is an annual herb, with branched stems, in the four o'clock family (Onagraceae). It is up to 50 centimeters (cm) (20 inches (in)) tall and has flowers 1.5 to 2.5 cm (0.5 to 1.0 in) wide that are white or cream colored at the base, streaking into pinkish or reddish-lavender at the tips. At the time of listing, the known distribution of *C. speciosa* subsp. *immaculata* ranged from San Luis Obispo south to the Nipomo Mesa area, in pockets of dry sandy soils within grassy openings in chaparral and oak woodlands.

Methodology Used to Complete This Review:

This review was prepared by the Ventura Fish and Wildlife Office (VFWO), following the Region 8 guidance issued in March 2008. We used information from the recovery plan, survey information from experts, and the California Natural Diversity Database (CNDDDB) maintained by the California Department of Fish and Game. The recovery plan and personal communications with experts were our primary sources of information used to update the species' status and threats. We received no information from the public in response to our Federal Register Notice initiating this 5-year review. This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing or since the last 5-year review. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor

analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

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Federal Register Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register (FR) on March 22, 2006 (71 FR 14538).

Listing History:

Original Listing

FR Notice: 59 FR 64613

Date of Final Listing Rule: December 15, 1994

Entity Listed: *Clarkia speciosa* subsp. *immaculata* (subspecies)

Classification: Endangered

Associated Rulemakings: None

Review History: This is the first in-depth status review that has been conducted for this species since its listing in 1994. A draft and a final recovery plan were prepared for *Clarkia speciosa* subsp. *immaculata* in 1997 and 1998 (Service 1997, 1998), respectively; however, a thorough analysis of the species' status and threats, including a five-factor analysis (see the Five Factor Analysis section below), was not conducted for these publications.

Species' Recovery Priority Number at Start of Review: The recovery priority number for *Clarkia speciosa* subsp. *immaculata* is 3C according to the Service's 2008 Recovery Data Call for the Ventura Fish and Wildlife Office, based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 FR 43098, September 21, 1983). This number indicates that the taxon is a subspecies that faces a high degree of threat and has a high potential for recovery. The "C" indicates conflict with construction or other development projects or other forms of economic activity, due to the large degree of development pressure in the areas where this taxon occurs.

Recovery Plan or Outline

Name of Plan: Recovery Plan for the Morro Shoulderband Snail and Four Plants from Western San Luis Obispo County, California.

Date Issued: September 26, 1998.

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 of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

Information on the Species and its Status

Description and Taxonomy

As noted previously, *Clarkia speciosa* subsp. *immaculata* is an annual herb, with branched stems, in the four o'clock family (Onagraceae). It is up to 50 cm (20 in) tall and has flowers 1.5 to 2.5 cm (0.5 to 1.0 in) wide that are white or cream colored at the base, streaking into pinkish or reddish-lavender at the tips.

Abundance and Population Trends

Below, we define various terms that are used for different assemblages of plants that we use in discussing the status of *Clarkia speciosa* subsp. *immaculata*. In this review, we use the term "occurrence" to be consistent with the definition used by the CNDDDB: a grouping of plants within 0.25 mile (mi) (0.4 kilometer (km)) of each other (CNDDDB 2007, unpaginated). There may be (and occasionally are) one or more discrete polygons of plants within a single "occurrence". We use the term "population" to refer to a group of interbreeding individuals, in the biological sense of the word. There may be (and usually are) one or more "occurrences" within a single population. Our use of the term "location" in the final listing rule for *C. speciosa* subsp. *immaculata* was interchangeable with "occurrence" and "population." In this 5-year review "location" refers only to a particular physical site or area, as in "at that location," with no relation to an assemblage of plants (e.g., polygon, occurrence, population).

At the time of listing in 1994, there were five known extant *Clarkia speciosa* subsp. *immaculata* populations (Element Occurrence (EO) 2, 3, 4, 5, and 6 in the CNDDDB), totaling less than 4,000 individuals across all occurrences, and two populations that had been extirpated (EO 7 and 9) by residential development. Currently, there are 14 populations listed within CNDDDB that are extant or presumed to be extant (EO 2, 3, 4, 5, 6, 8, 11, 12, 13, 14, 18, 19, 20, and 21) and five populations that have been extirpated or are presumed to have been extirpated (EO 7, 9, 10, 16, and 17) (CNPS 2006; L. Althouse, Biological consultant, pers. comm. 2006; CNDDDB 2009). One occurrence (EO 15) that was recorded after the time of listing has been combined with

another occurrence (EO 10), as they are considered to be a part of the same population (CNDDDB 2009).

There are three additional populations that are undocumented in CNDDDB and one additional polygon mapped for the Ormonde Road population (EO 2 in the CNDDDB). The first additional population is listed within the California Consortium of Herbaria (Consortium) (2009) and is located in the Irish Hills area of San Luis Obispo; the second population was documented by Nick Havlik, City Planner, and is located in the Indian Knob area of San Luis Obispo; and the third population was documented in a report by Bill Roalman, County Planner, regarding a violation that had occurred on private property and is located within Arroyo Grande in the Nipomo Mesa (Roalman 2000; J. Dart, Biological Consultant, pers. comm. 2006; L. Althouse pers. comm. 2006; N. Havlik, Planner City of San Luis Obispo, pers. comm. 2006; Consortium 2009). These additional populations are also noted in the table in Table 1 as Consortium UCR88342, CLSP 1, and CLSP 2 respectively. Precise information on the size and status of these three populations is not available to the Service at this time.

Since listing, data on many *Clarkia speciosa* subsp. *immaculata* occurrences have been collected and are available through the CNDDDB (2009). Surveys are being conducted in new/additional locations every year and new *C. speciosa* subsp. *immaculata* populations continue to be found as a result. This could either indicate that *C. speciosa* subsp. *immaculata* numbers are increasing or simply that people are looking in more places and observing more individuals within the known range of the species. However, annual fluctuations in number of individuals and the way data have been gathered make the available information insufficient to determine abundance, population or demographic trends. Nonetheless, more extant locations are known now than were known when *C. speciosa* subsp. *immaculata* was listed.

Genetics

No genetics studies have been conducted since the time of listing and there are no plans to analyze trends in genetic variation for *Clarkia speciosa* subsp. *immaculata*.

Taxonomic Classification or Changes in Nomenclature

No changes in taxonomic classification or nomenclature have been proposed for *Clarkia speciosa* subsp. *immaculata* (Lewis and Lewis 1955, Munz 1959, Lewis 1993).

Spatial Distribution and Trends in Spatial Distribution

At the time of listing, the known distribution of *Clarkia speciosa* subsp. *immaculata* ranged from San Luis Obispo south to the Nipomo Mesa area, an area approximately 20 kilometers (km) (13 miles (mi)) long by 10 km (7 mi) wide. It occurs in pockets of dry sandy soils within grassy openings in chaparral and oak woodlands (59 FR 61614). Due to the patchy distribution of these openings, *C. speciosa* subsp. *immaculata* populations (and polygons within each population) are fragmented by nature. At present, *C. speciosa* subsp. *immaculata* is known from a slightly larger range that is approximately 22 km (14 mi) long by 10 km (7 mi) wide. All of the recently discovered populations occur within this area.

Habitat or Ecosystem Conditions

The range of habitat and ecosystem conditions for *Clarkia speciosa* subsp. *immaculata* are essentially the same as when it was first listed. It has a limited distribution between the City of San Luis Obispo and Nipomo Mesa areas and is further restricted here to pockets of dry sandy soils within grassy openings in chaparral and oak woodlands (59 FR 64613). The amount of suitable habitat is decreasing continually due to the continued and increasing development in this area (CNDDDB 2005, 2009; AirPhotoUSA Inc. 2000, 2003; USDA National Agricultural Image Program 2005).

Five-Factor Analysis

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

Under Factor A in the final listing document, the present or threatened destruction, modification or curtailment of its habitat or range, we stated that threats to the continued existence of *Clarkia speciosa* subsp. *immaculata* consisted of cattle grazing, road grading, roadside traffic, roadside maintenance (including mowing and herbicide spraying), residential development, and other secondary impacts associated with urban development. Since the listing of this plant, the Service developed and finalized a multi-species recovery plan that includes this plant (Service 1998); however, the threats to this species have not diminished. While one of the threats (grazing) from the original listing document does not appear to be as detrimental as previously thought, none of the original threats to this species under Factor A have been controlled.

Development and secondary impacts from development. Residential development and other secondary impacts associated with urban development continue to be the greatest threat to the continued existence of *Clarkia speciosa* subsp. *immaculata*. Development has caused the loss of all or part of five known populations of this species since listing (EO 6, 7, 9, 16, 17, and CLSP 2). Development has affected or continues to threaten nine additional populations in part or in whole (EO 2, 3, 6, 11, 12, 13, 14, 19) (Roalman 2000, CNPS 2006, CNDDDB 2009). In addition to direct loss of plants and occupied sites, development eliminates adjacent suitable habitat that otherwise would allow for natural population expansion and movement as suitable microhabitats shift in the landscape. Furthermore, it may eliminate habitat that supports populations of pollinators and seed dispersal vectors and habitat that contains a seedbank, in cases where there is no germination in a given year when surveys are conducted.

Urban sprawl and development leads to habitat loss and increased fragmentation and is the number one cause of imperilment to listed species, including *Clarkia speciosa* subsp. *immaculata*, in California (Doyle et al. 2001). Likewise, urban sprawl and development are directly linked to introduction of and competition from non-native species and outdoor recreation, the second and third leading cause in the decline of listed species, including *C. speciosa* subsp. *immaculata* (Alberts et al. 1993, Doyle et al. 2001). The fragmentation of habitat and populations due to development projects may pose the greatest threat to the recovery of the species. Commercial and residential development is rapidly increasing within areas in close proximity to existing and potential *C. speciosa* subsp. *immaculata* habitat (Draeger 2002), leading to a substantial increase in fragmentation of populations since listing. A large increase in

the amount of development (e.g., residential, recreational, infrastructure) within this area has occurred between populations, which may have increased their isolation from each other (CNDDDB 2005; AirPhotoUSA Inc. 2000, 2003; USDA National Agricultural Image Program 2005; M. Elvin, Service Biologist, pers. obs. 2006). Additionally, numerous development projects have further fragmented individual populations by extirpating portions of them (CNDDDB 2005; AirPhotoUSA Inc. 2000, 2003; USDA National Agricultural Image Program 2005; L. Althouse, pers. comm. 2006). Like habitat loss, habitat fragmentation affects persistence of populations or species within habitat fragments (Wilcove et al. 1986, Noss et al. 1997). Fragmentation also may lead to a decrease in pollination and reduced reproductive success, due to decreased visitation from pollinators to small and/or isolated populations (Kearns and Inouye 1997). While fragmentation does not necessarily lead to extinction of a species within a habitat patch, small populations in small habitat patches have an increased likelihood of extinction and are increasingly affected by their surroundings (i.e., edge effects such as physical effects differing at the boundaries of a patch and the interior of a patch) (Noss and Cooperrider 1994). At what point in the fragmentation process biological integrity of this species declines dramatically is not known.

The CNDDDB indicates that many of the properties containing *Clarkia speciosa* subsp. *immaculata* populations have been proposed for development since listing (CNDDDB 2005), although many of these projects either have not occurred yet or have fallen through (L. Althouse pers. comm. 2009; Google Earth 2009). We know of two instances where the translocation of *C. speciosa* subsp. *immaculata* populations (soil and seedbank) was attempted in an effort to mitigate for impacts to portions of the original populations due to development (EO 16 and 17). Plants survived during the monitoring and management phases of these projects, but after the monitoring and management ended, the sites became so degraded and the vegetation/habitat was altered to the point that suitable habitat for *C. speciosa* subsp. *immaculata* no longer exists at any of the sites. Plants have not been seen at these locations since 1998 and all of these sites (original donor populations and the recipient translocated populations) are now presumed to be extirpated (J. Dart, pers. comm. 2006; L. Althouse, pers. comm. 2006; M. Elvin, pers. obs. 2006; CNDDDB 2009). Therefore, all of the known translocation efforts for *C. speciosa* subsp. *immaculata* have failed and the translocation of populations of this species may not be a sufficient mitigation or conservation strategy.

Other threats to this species associated with secondary and indirect effects due to development have arisen. *Cortaderia jubata* (pampas grass) and *Ehrharta calycina* (veldt grass) are nonnative plants adversely affecting many populations (CNDDDB 2005, 2009; L. Althouse pers. comm. 2009), and their invasions are most likely an indirect effect from nearby development and plants that escaped from landscaping.

Only two populations of *Clarkia speciosa* subsp. *immaculata* (EO 8 and 19) are receiving some protection in the form of an open space easement recorded with the city of Arroyo Grande (J. Dart, pers. comm., 2006). No other easements or protections are known for any *C. speciosa* subsp. *immaculata* populations and these are the only protected sites where the preservation of part of a population has been used as mitigation for impacts due to development. Demographic studies were not conducted prior to development and have not been conducted since, so we do not know the trend for the remaining portion of the population. Although surveys have not been

recently conducted for either of these populations, the population off James Way in Arroyo Grande (EO 8) was visited by Service biologists on August 12, 2008, and *Clarkia speciosa* subsp. *immaculata* plants were in bloom and prevalent. Although this population is protected from some threats, such as future development, this population is threatened by fire prevention maintenance activities (i.e. mowing, etc.) and competition from veldt grass (H. Abbey, Service Biologist, pers. obs. 2008). *Clarkia speciosa* subsp. *immaculata* at sites like this will likely require long-term, intensive management (for example, removal of nonnative species) to persist due to the small number of individuals within populations, constrained boundaries, edge effects, and adjacent development (Menges 1991, Alberts et al. 1993).

There was one documented occurrence of a landowner pulling *Clarkia speciosa* subsp. *immaculata* plants so that they would not affect his ability to obtain a building permit to locate a mobile home and erect a barn on the site where the plants were growing (Roalman 2000). This population is listed in the occurrence table in Table 1 as CLSP 2 and is not recorded in CNDDDB. This violation was pursued by the California Department of Fish and Game's law enforcement department. Some development occurred on this property after the said violation took place, but it is uncertain whether the development occurred in the area where the *C. speciosa* subsp. *immaculata* plants were known to occur (Google Earth 2009). We do not have access to information on the current status of this population at this time.

Roadside threats. Threats and adverse effects from road grading, roadside traffic, and roadside maintenance (including mowing and herbicide spraying) have not caused the extirpation of any entire occurrence, but they continue to threaten the species as a whole. At least three occurrences (EO 2, 4, and 5) are threatened by road maintenance activities (CNDDDB 2005, CNPS 2006, CNDDDB 2009).

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

Under Factor B in the final listing document, we stated that overutilization was not known to be a factor/threat to this species (Service 1994). There are no data to indicate that this is a threat now.

FACTOR C: Disease or Predation:

Under Factor C, disease or predation, in the final listing document, we stated that there were potential threats to the continued existence of *Clarkia speciosa* subsp. *immaculata* from grazing of livestock (Service 1994). We noted that two of the four known extant occurrences (at that time) had been subject to grazing by livestock (Service 1994), but that *C. speciosa* subsp. *immaculata* might be able to sustain a certain amount of grazing by livestock (Dunn 1987).

Although cattle grazing may adversely affect *Clarkia speciosa* subsp. *immaculata*, it may not necessarily be a threat to its survival under all conditions. If controlled and timed correctly, cattle grazing may provide some benefits to *C. speciosa* subsp. *immaculata* by reducing competition from other vegetation. Over-grazing, on the other hand, can be extremely detrimental to the species, particularly through trampling and alterations to the hydrology

(Service 1997, 1998).

While this plant may be able to withstand a small amount of grazing, grazing still appears to adversely affect it through the reduction of reproductive success due to loss of flowers and a correlated reduction in the production of seeds (Service 1998). Grazing has been reported as a potential threat at four occurrences (EO 5, 12, 18, and 19) (CNDDDB 2009). We note that further study is warranted in this area.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms:

Under Factor D, inadequacy of existing regulatory mechanisms, in the listing document, we noted that *Clarkia speciosa* subsp. *immaculata* received some protections because it was listed in 1978 as rare under the California Native Plant Protection Act (chapter 1.5 section 1900 et seq. of the Fish and Game Code) and the California Endangered Species Act (chapter 1.5 section 2050 et seq.). We also noted that even though both statutes prohibit “take”, there are exemptions. Also, after a landowner has been notified that a State-listed plant grows on his or her property, State law requires only that the landowner notify the agency “at least ten days in advance of changing the land use to allow salvage of such plant” (chapter 1.5 section 1913). The County of San Luis Obispo is aware of *C. speciosa* subsp. *immaculata* and its listed status. The County regulates/reviews project proposals in the southwestern portion of the county for potential impacts to the plant (J. Eliason, County of San Luis Obispo, pers. comm. 2006). However, at this time, the County is unable to track which and how many populations were, are, or may be impacted by development. Furthermore, the County has not assessed whether mitigations have been implemented by developers, and whether they were appropriate or successful. Therefore, although these regulatory mechanisms were in place before *C. speciosa* subsp. *immaculata* was listed under the Act, the potential threats due to their inadequacies remain.

Federal agencies are required to consult with the Service (under section 7(a)2 of the Federal Endangered Species Act) if any of their actions may affect a federally listed species. No formal consultations have been conducted on effects to *Clarkia speciosa* subsp. *immaculata* since it was listed in 1994.

Despite State and Federal laws and regulations, *Clarkia speciosa* subsp. *immaculata* populations continue to be adversely affected in whole or part (CNDDDB 2009). At least four populations are known or presumed to have been extirpated since the listing.

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

We determined in the final listing document that there were potential threats to the existence of *Clarkia speciosa* subsp. *immaculata* from: (1) stochastic (i.e., random) extirpation/extinction events due to the small size and isolation of the remaining populations, and (2) wide fluctuations in population numbers from year to year that may reduce viability of populations after a series of poor seed production years (59 FR 64613). We have no reason to believe these threats have lessened since the time of listing.

Clarkia speciosa subsp. *immaculata* may be threatened with stochastic extinction due to the small number of individuals within populations and isolation of the remaining populations (Airphoto USA Inc. 2000, 2003; CNDDDB 2009). The conservation biology literature commonly notes the vulnerability of taxa known from small populations (Shaffer 1981, 1987; Meffe and Carroll 1997, Primack 1998). It is generally accepted that small populations have higher probabilities of extinction than larger populations because their low numbers make them susceptible to inbreeding, loss of genetic variation, high variability in age and sex ratios, demographic stochasticity, and random naturally occurring events such as wildfires, floods, droughts, or disease epidemics (Soulé 1987, Shaffer 1981, 1987; Meffe and Carroll 1997, Primack 1998).

Another factor commonly understood to make populations vulnerable to stochastic events is isolation. Isolation often acts in concert with small population size to increase the probability of extinction. Isolated populations are more susceptible to long-term/permanent extirpation by accidental or natural catastrophes because the likelihood of recolonization following such events is negatively correlated with the extent of isolation (i.e., colonization is less likely as isolation increases) (Wilcox and Murphy 1985, Meffe and Carroll 1997).

In addition, wide fluctuations in numbers from year to year in annual plants, such as *Clarkia speciosa* subsp. *immaculata*, may reduce population viability if there is a series of poor seed production years (Menges 1991). The limited gene pool may depress reproductive vigor or a single human-caused or natural environmental disturbance (e.g., wildfire) could extirpate one or more populations of this species. Additionally, small populations are threatened by inbreeding depression and can have significantly lower germination rates than larger populations of the same species due to high levels of homozygosity (Menges 1991). The effects of competition with nonnative species are most prominent immediately adjacent to urban areas and in habitat that is isolated or fragmented by development (Alberts et al. 1993) and more exotic animals and plants will likely invade *C. speciosa* subsp. *immaculata* habitat areas as a result of increasing development. These factors may not be enough to threaten the survival of the species independently, but due to the limited range of the species, the cumulative effect of all of these threats could threaten the survival and recovery of *C. speciosa* subsp. *immaculata*.

Since the time of listing, we have identified climate change as a potential threat to the species. Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, Intergovernmental Panel on Climate Change 2007). However, predictions of climatic conditions for smaller sub-regions such as California remain uncertain. It is unknown at this time if climate change in California will result in a warmer trend with localized drying, higher precipitation events, or other effects. While we recognize that climate change is an important issue with potential effects to listed species and their habitats, we lack adequate information to make accurate predictions regarding its effects to particular species at this time.

Clarkia speciosa subsp. *immaculata* may be particularly threatened by climate change because its geographic distribution is so narrow and its current range is unlikely to overlap with regions that would be climatically suitable in the future (Levine et al. 2008). Because of this, Levine et

al. (2008) suggest that the persistence of many rare species depends on how populations respond to climate change in their current locations. Loarie et al. (2008) project that up to 66 percent of the flora of California will experience a greater than 88 percent reduction in range in the next century under a conservative climate change scenario. This rate is exacerbated for species, such as *C. speciosa* subsp. *immaculata*, that have limited ability to disperse from their current locations (Loarie et al. 2008).

III. RECOVERY CRITERIA

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

Although the recovery criteria in the recovery plan (Service 1998) were not explicitly based on threats, the criteria do address particular threats that were specifically identified in the listing rule. In addition, many of the recovery tasks in this plan address threats identified in the listing rule. The recovery plan includes the following criteria:

Clarkia speciosa subsp. *immaculata* can be considered for downlisting when:

1. eight populations are on lands secured from human-induced threats with adequate surrounding habitat to permit natural population expansion and movement as suitable microhabitats shift in the landscape (addresses Listing Factors A, C, D, and E). This criterion has not been met because almost all of the existing populations occur on private property that is not secure from new development threats. This criterion is relevant and up-to-date.
2. the eight protected populations represent the plant's entire range (addresses Listing Factors A, C, D, and E). This criterion has not been met because only one population is currently being protected; the remaining populations are not currently protected. This criterion is relevant and up-to-date.
3. these populations must be large, stable or increasing (a minimum of 10 years of monitoring is

needed because the population sizes fluctuate due to precipitation) (addresses Listing Factors A, C, D, and E). This criterion has not been met because there have not been adequate population demographic studies for the species over the last 10 years, and the few populations which have been adequately surveyed are relatively small and do not show a stable or increasing trend as a whole. This criterion is relevant and up-to-date.

4. management of these populations and associated lands in the future must be reasonably assured for the long term, and must be effective, as demonstrated by stable or increasing populations (addresses Listing Factors A, C, D, and E). This criterion has not been met because there are no programs or conservation easements in place to help secure the future viability of the majority of populations, most of which occur on private land. This criterion is relevant and up-to-date.

No delisting criteria were included in the recovery plan due to a lack of information. The recovery plan stated that delisting criteria will be developed as information on life history and response to management activities becomes available.

IV. SYNTHESIS

While more populations have been found in recent years, the overall status of this species is not improving. Development has adversely affected or threatens to adversely affect nine of the remaining 14 known populations and fragmentation due to development is a serious concern for the survival of the species as a whole. Existing regulatory mechanisms and regulations (including CEQA, the California Endangered Species Act, and the Federal Endangered Species Act) have not been able to preclude many of the continued impacts to this species, due to the large proportion of populations of *Clarkia speciosa* subsp. *immaculata* that exist on private land. There are only two populations that currently have any protections. These populations have an open space easement placed over them (J. Dart, pers. comm. 2006; Service 1998). However, these sites do not meet the “secured from human-induced threats” recovery criterion in the recovery plan. To meet this criterion, these populations need to be secured as having “...adequate surrounding habitat to permit natural population expansion and movement as suitable microhabitats shift in the landscape” (Service 1998). The available habitat at these sites is small and fragmented with no buffer between homes and the “open space” (H. Abbey, Service Biologist, pers. obs. 2008; Google Earth 2009). The main threat to this species is urban growth/development causing a loss of individuals, polygons, and populations, as well as a loss of suitable but currently unoccupied habitat. The status of this plant does not warrant downlisting at the current time as none of the recovery criteria have been met and the main threats identified at the time of the listing still persist.

V. RESULTS

Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist (indicate reasons for delisting per 50 CFR 424.11):

- Extinction
- Recovery
- Original data for classification in error
- No Change

New Recovery Priority Number 6C

We recommend that the recovery priority number be changed to 6C. There is still a high degree of threat to this subspecies. The recovery potential has changed from high to low based on the need for more intensive management at population sites. This is mainly due to the continued invasion of nonnative species and the increasing fragmentation within and among populations.

VI. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Work with local partners to secure occupied sites that meet recovery criteria.
2. Work with local partners (including the County of San Luis Obispo) to help development projects avoid impacts to *Clarkia speciosa* subsp. *immaculata*, considering the two attempted translocation projects for this species have failed, resulting in the presumed extirpation of both populations.
3. Work with the County of San Luis Obispo to develop an improved system to track projects that might adversely affect listed and other sensitive species.
4. Amend the recovery objectives and tasks to account for the increase in fragmentation and how it affects our ability to accomplish the recovery criteria.

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Table 1: Population Records for *Clarkia speciosa* subsp. *immaculata* (CNDDDB 2009, Consortium 2009)

Identification Number	Name	Current Trend per CNDDDB	Year Collected/ Observed	Population Size	Reference	Site Manager/ Owner
CNDDDB EO 2	Tiber Canyon, NW side Ormonde Rd	Presumed extant	1968 (Heckard)	2000+ (1987) 1000 (1990) 200 (1993)	CNDDDB 2006	Private
CNDDDB EO 3	Price Canyon, 3 mi S of Edna	Presumed extant	1928 (Hitchcock)	No population size data	CNDDDB 2006	Private
CNDDDB EO 4	Highway 227 at summit of Carpenter Canyon (type locality)	Presumed extant	1947 (Lewis)	50 (1983) 30 (1987)	CNDDDB 2006	CalTrans
CNDDDB EO 5	Price Canyon, 1 mi S of Edna	Presumed extant	1928 (Hitchcock)	1000 (1983) 2000+ (1987)	CNDDDB 2006	SLO County
CNDDDB EO 6	Grover City, E&W side of 12 th St at Margarita St.	Presumed extant/a portion extirpated	1916 (Reed)	100 (1987)	CNDDDB 2006	Private
CNDDDB EO 7	Arroyo Grande Cemetery	extirpated	1895 (King)	No population size data	CNDDDB 2006	Private
CNDDDB EO 8	Arroyo Grande, junction of James Way and La Canada (within Rancho Grande development)	Presumed extant	1996 (Morey)	12 (1997) 28,000 (2003)	CNDDDB 2006	Private
CNDDDB EO 9	Arroyo Grande, Oak Park School, junction of Oak Park Rd and Ormonde Rd	extirpated	1966 (Hoover)	No population size data	CNDDDB 2006	Private
CNDDDB EO 10	Nipomo Mesa, S of Black Lake Canyon, W of Pomeroy Rd (site of proposed sedimentation basin)	Presumed extant	1989 (McLeod)	615 (1992)	CNDDDB 2006	Private
CNDDDB EO 11	Between Ormonde Rd and Hwy 227, near Patchett Rd	Presumed extant	1992 (Keil)	>1000 (1992)	CNDDDB 2006	Private
CNDDDB EO 12	N of Grover City, 1.3 mi NW of Central Blvd and Noyes Rd	Presumed extant	1977 (Lewis)	20 (1997)	CNDDDB 2006	Private
CNDDDB EO 13	Gragg Canyon, northern slopes	Presumed extant	1993 (Biosystems Analysis)	Several 1000 (1993)	CNDDDB 2006	Private-Chevron
CNDDDB EO 14	NW of Arroyo Grande, W side of old Oak Park Rd	Presumed extant	1995 (Holland & Oyler)	3000 (1995)	CNDDDB 2006	City of Pismo Beach
CNDDDB EO 16	Nipomo Mesa, Black Lake Canyon Golf Course, 0.9 mi NW of Willow and Pomeroy Rd	Presumed extant (but possibly extirpated*)	Wier (1998)	No population size data	CNDDDB 2006 *Althouse, pers. comm.. 2009	Private (Black Lake Canyon Golf Course)
CNDDDB EO 17	Nipomo Mesa, Black Lake Canyon Golf Course, 0.8 mi NW of Willow and Pomeroy Rd (transplant site for portion of EO 16)	Transplant of 1995 did not persist after first 2 years	Hickson/Wier (1998)	No population size data	CNDDDB 2006	Private (Black Lake Canyon Golf Course)
CNDDDB EO 18	Corbit Canyon, E side; hillside opposite Deer Canyon	Presumed extant	2003 (Gilligly & Meek)	500 (2003)	CNDDDB 2006	Private

CNDDDB EO 19	E of Arroyo Grande Valley, 0.75 mi NNW of radio towers	Presumed extant	2001 (Bernstein)	2500-3000 (2001) many (2003)	CNDDDB 2006	Private (Middle Ranch)
CNDDDB EO 20	E of Corbit Canyon, 0.5 mi NE of Carpenter Creek's confluence w/ Corbit Creek	Presumed extant	2003 (McGovern)	600-700 (2003)	CNDDDB 2006	Private
CNDDDB EO 21	Nipomo Mesa, along Viego Rd, between Stanton Rd & Camino Perro	Presumed extant	2005 (Langford)	250-500 (2005)	CNDDDB 2006	Private (but w/ county road easement)
Consortium UCR88342	Central Coast Bear Creek Ranch, 6 mi SE of Los Osos on Clark Valley Rd	Unknown	1995 (Helmkamp)	No population size data	Consortium 2009	Private
CLSP 1	Approximately 2.3 mi E of State Hwy 1 and 2.3 mi W of Edna Rd	Unknown	2006(Havlik)	Several hundred	Havlik 2006	Private
CLSP 2	On the corner of Stanton Rd and Chesapeake Pl on the Nipomo Mesa	Unknown	2000 (Roalman)	No population size data	Roalman 2000	Private

CNDDDB identification # (EO) = occurrence number assigned by the California Natural Diversity Database (CNDDDB 2009).
Consortium identification number = accession ID assigned by the California Consortium of Herbaria (Consortium 2009)

Figure 1. Distribution Map for *Clarkia speciosa* subsp. *immaculata* (Pismo Clarkia).



**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW**

Clarkia speciosa subsp. *immaculata*
(Pismo Clarkia)

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

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

Review Conducted By: Mark A. Elvin and Heather Abbey

FIELD OFFICE APPROVAL:

Field Supervisor, U.S. Fish and Wildlife Service

Approve Dawn K. Wade Date 8/17/09