

Lupinus tidestromii
(Clover lupine)

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



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**U.S. Fish and Wildlife Service
Sacramento Fish & Wildlife Office
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5-YEAR REVIEW
Lupinus tidestromii (Clover lupine)

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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:

Species information for *Lupinus tidedromii* (clover lupine) is provided from the Recovery Plan for Seven Coastal Plants and the Myrtle's Silverspot Butterfly (Service 1998) and unpublished research data by Dr. Tiffany Knight (T. Knight, Washington University, St. Louis, Missouri, in litt. 2009). *Lupinus tidedromii*, a member of the pea family (Fabaceae) is a creeping perennial herb, 10-30 centimeters (cm) (4-12 inches) (in.) tall. The prostrate habit, number of leaflets (typically 3-5), small leaflet size (1.3 -2.0 cm long) (0.5-0.8 in.), and dense hairs on the foliage distinguish *L. tidedromii* from other lupines in the area. It is found in two disjunct areas: throughout the northern portion of the Monterey Peninsula in Monterey County and from the northwest portion of Marin County at Point Reyes National Seashore (PORE) to the Russian River, Sonoma County. It occurs in the mild maritime climate of the central California coast on partially stabilized dune communities. It is often associated with *Erysimum menziesii* (Menzies' wallflower), *Aliciella leptomeria* (sand gilia), *Oenothera drummondii* (beach evening-primrose), *Franseria chamissonis* (beach-bur), *Artemisia pycnocephala* (beach sagewort), *Abronia umbellata* (sand verbena), and *Ericameria ericoides* (mock heather). The life history of *L. tidedromii* is that of a short-lived perennial with a long-lived seed bank. Flowering occurs from May through June and flowers are primarily pollinated by bees, in particular *Bombus vosnesenskii*. Within populations, plants exhibit highly clumped distribution. Seeds are large and usually found littered around the plant base. Seeds are generally long lived and probably form a persistent dormant seed bank. Very slow microbial decomposition or long term erosion of the seed coat from sand scarification is the likely route for germination. This species has a very low burial tolerance and does not survive in accreting foredune formations. In addition, Dr. Knight believes that historically, large storms moved extensive areas of sand and brought deeply buried seeds to the surface where they could germinate. Currently, sand dunes are not as dynamic as they used to be, due to development in Coastal California and due to the introduction of stabilizing grasses such as the invasive *Ammophila arenaria* (European beach grass).

Methodology Used to Complete This Review:

This review was prepared by the Sacramento Fish and Wildlife Office (SFWO), following the Region 8 guidance issued in March 2008. We used information from the Recovery Plan, survey information from experts who have been monitoring various localities of this species, and the California Natural Diversity Database (CNDDDB) maintained by the California Department of Fish and Game. The Recovery Plan and personal communications with species experts were our primary sources of information used to update the species' status and threats. Published literature with regards to scientific analysis for the species is esoteric or unavailable. We received very little information from the public in response to our Federal Notice initiating this 5-year review. This included a written response from Jean Ferreira of Botanical Consulting Services regarding the City of Carmel North Dunes population and written response from the Attorney General of California regarding global warming impacts for listed species. The Attorney General's letter listed the Clover Lupine in its analysis, but did not specifically address affects to the plant. This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing. We focus on current threats to the species that are attributable to 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.

Contact Information:

Lead Regional Office: Diane Elam, Deputy Division Chief for Listing, Recovery and Habitat Conservation Planning, Region 8, Pacific Southwest; (916) 414-6464.

Lead Field Office: Kirsten Tarp, Recovery Branch, Sacramento, (916) 414-6600.

Cooperating Field Office: Christopher Diel, Biologist, (805) 644 1766, extension 305 and Connie Rutherford, Listing and Recovery Program Coordinator – Plants, (805) 644-1766, extension 306, Ventura Fish and Wildlife Office.

Federal Register (FR) 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 73 FR 11945 11950 on March 5, 2008.

Listing History:

Original Listing

FR Notice: 57 FR 27848-27859

Date of Final Listing Rule: June 22, 1992

Entity Listed: *Lupinus tidestromii*, a plant species

Classification: Endangered

State Listing: *Lupinus tidestromii* (Tidestrom's lupine) was listed by the State of California as endangered in January 1987.

Review History: No formal status reviews have been conducted since listing in 1992.

Species' Recovery Priority Number at Start of 5-Year Review: The recovery priority number for *Lupinus tidestromii* (Tidestrom's lupine) is 5 according to the Service's 2008 Recovery Data Call for the Sacramento FWO, 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 species that faces a high degree of threat and has a low potential for recovery.

Recovery Plan or Outline

Name of Plan or Outline: Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan

Date Issued: September 29, 1998

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy

The Endangered Species Act defines "species" as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition of species under the Act limits listing as distinct population segments to species of vertebrate fish or wildlife. Because the species under review is a plant, the DPS policy is not applicable, and the application of the DPS policy to the species' listing is not addressed further in this review.

Information on the Species and its Status:

Species Biology and Life History: Refer to Species Overview in General Information section I.

Spatial Distribution: This species is found in clustered colonies at 3 sites along the California coastal dunes: the southern most populations are found at various sites from Carmel Beach to Asilomar State Beach (ASB) on the northern tip of the Monterey Peninsula, the central populations are found in their highest numbers and concentration on Point Reyes National Seashore around Abbott's lagoon, and the northern most populations are found at Goat Rock Beach on the Sonoma Coast State Beach (SCSB).

Abundance: At the time of listing there were 3 geographically separate populations as described above with possible 4th and 5th populations occurring at Dillon Beach and Bodega Head in Sonoma County. The population at Dillon Beach in Marin County has since been extirpated (S. Lynch, Monk & Assoc., pers. comm. 2008). The CNDDDB occurrence # 26 at Bodega Head was most likely extirpated before listing and recent surveys have not found any evidence of the plants (D. Smith, Marin Chapter, California Native Plant Society (CNPS), in litt..

2008). According to the final rule, the putative collection of *Lupinus tidestromii* from Bodega Head in Sonoma County in 1925 may have been misidentified because of the limited dune habitat from this general area and the vegetative condition of the specimen (Service 1992). The current populations at PORE are stable or declining in population size. The largest population, located near Abbott's Lagoon is estimated to have over 100,000 individuals, and this number has persisted since 2001. A 2007 census estimates 115,062 individuals based on 69 100-meter (m) (3 feet (ft)) by 1 m transects (Knight 2009). The dunes near Abbott's Lagoon have received a great deal of restoration attention from 2002-2006 (European beachgrass removal). The second largest population at PORE, located on the dunes west of the Mendoza Ranch buildings has greatly declined likely due to encroachment of the invasive *Ammophila arenaria* (European beachgrass) on the dunes. A 2003 census estimated 32,528 individuals whereas 2007 census estimated 11,668 individuals (Knight, in litt. 2009). The third largest population at PORE, located on the dunes near the Davis residence declined from 982 individuals in 2003 to 159 individuals in 2007, likely due to encroachment of iceplant. Removal of *Carpobrotus* sp. (iceplant) surrounding this population was conducted in July 2008 (Knight, in litt. 2009). The populations at SCSB in Sonoma Co. are increasing in number relative to conservation and dune restoration efforts which include *Carpobrotus* sp. and *Ammophila arenaria* removal at those locations. Sonoma Coast State Beach has a strong healthy population of about 300 individuals and is expected to increase (B. O'Neil, SCSB, pers. comm. 2008). Current population counts at ASB in Monterey Co. and the conference grounds are estimated to be around 1,250 individuals (L. Madison, ASB, pers. comm. 2008). Additional records of *L. tidestromii* are known to occur on private lands on the Monterey Peninsula; however, a census of plants on private lands on the Monterey Peninsula has not been conducted and no estimates are available at the time of this review. Population numbers do appear to be stable throughout the Monterey Peninsula although number of individuals within populations has declined in recent years due to changes in weather patterns and hybridization. These populations on the Monterey Peninsula are highly threatened by hybridization with Chamisso bush lupine (*Lupinus chamissonis*). There are still genetically pure individuals on the Monterey Peninsula verified through gene sequencing and efforts are being made to remove *L. chamissonis* and its hybrids to prevent further hybridization (Madison, pers. comm. 2008). A small pocket population at City of Carmel North Dunes was documented at 280 plants in 1995 at four locations within close proximity (Jones and Stokes Associates, Inc. 1995). A 2008 census documented 340 plants at 2 remaining locations (J. Ferreira, Botanical Consulting Services, in litt. 2009). Although individual counts increased, two locations were extirpated since the 1995 census. The future of the City of Carmel North Dune population is uncertain, but is at high risk to human and domestic animal trampling, hybridization, and invasive plants. Currently no physical protections are provided for the plants at this location; however, the City of Carmel is developing a plan for long-term management of the dune and with regards to the listed plant coupled with public use and education.

Habitat or Ecosystem: *Lupinus tidestromii* lives in the coastal dune communities of California and thrives in areas of moderate disturbance and shifting dune dynamics. New research conducted by Dr. Tiffany Knight, has suggested that this is a secondary succession species and new seedlings are found in new dune formations created by the shifting of sands through tides and wind (Knight, in litt. 2009). Stabilization of the dunes by European beach grass and iceplant has reduced reproductive expansion of the species within its current locations. Restoration efforts at PORE, SCSB and sites on the Monterey Peninsula have involved removal of

beachgrass and iceplant which has shown to dramatically improve the reproductive success of Tidestrom's lupine. In particular, the mechanical removal of European beachgrass by digging 3 m (9 ft) into the ground and overturning this invasive grass, brings old *L. tidestromii* seeds to the surface and seedlings recruit into restored habitat within a year. These observations suggest a very long-lived seedbank for *L. tidestromii* (Knight, in litt. 2009).

Changes in Taxonomic Classification or Nomenclature: There are no current changes in taxonomic classification or nomenclature

Genetics: Several studies at Washington University in St. Louis by Dr. Knight and colleagues are in progress to determine the genetic variation within and among populations of this species. Hybridization of the southern populations throughout the Monterey Peninsula has been confirmed by allozyme genetic markers and is of concern. Estimating the frequency of pure and hybrid individuals in the Monterey Peninsula populations using genetic markers is currently underway. Madison and Knight classify plants as pure or hybrid based on morphological criteria; research is underway to determine how well this morphological identification matches the genetic data (Madison, pers. comm. 2008). Current surveys of the Monterey Peninsula populations, based on morphological classifications, have shown a large number of hybrid individuals and a decreasing number of genetically pure individuals. Genetic markers will be used to distinguish whether populations at PORE have been hybridized and may be masked by back-crosses. Genetic testing of the SCSB populations is also underway, but *Lupinus chamissonis* does not occur at the SCSB locations and therefore the individuals there are likely to be genetically pure.

Species-specific Research and/or Grant-supported Activities: In 2005, Dr. Tiffany Knight applied for a research permit to work at Point Reyes National Seashore to conduct a population viability analysis of Tidestrom's Lupine. Her work is conducted under permits PORE-2005-SCI-0027 and USFWS TE018180-2. Dr. Knight and her research team are part of a restoration effort supported by PORE that includes, but is not limited to: seed collection, beach grass removal, reintroduction, and genetic sampling. Asilomar State Beach is also funded through concessionary means for dune restoration and conservation. Conservation of populations on Pebble Beach and Spanish Bay golf courses are funded through mitigation agreements by the private land owners.

Five-Factor Analysis:

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

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

Habitat loss from commercial and residential development was considered to be a factor in the 1992 final listing rule (57 FR 27848-27859). Trampling from hikers, equestrians, and livestock was also considered to be a threat. Habitat loss for Tidestrom's lupine continues to be the primary threat due to development of coastal communities. Monterey Peninsula populations are

the highest at risk. Golf courses and residential developments have already eliminated several acres of the limited habitat in that area. Invasive species like European beach grass and iceplant have stabilized dune communities in the 3 sites effectively removing habitat for the lupine. Land management practices on protected lands have significantly reduced the risk of effects from hikers, equestrians, or livestock; however, these factors are still a considerable threat on unprotected private lands. The two sites at PORE and SCSB are located on Federal and State public lands that are not subject to large-scale, land-use conversion; however, potential habitat surrounding these areas continues to diminish. Asilomar State Beach occurrence records present in the CNDDDB (2008) were condensed into one geographic population for the purpose of this review. With regard to this population at the time of this review, about 87 percent of the known population is protected on Federal and State preserves; and 13 percent are located on private lands where potential development is not precluded. The City of Carmel North Dune population has no physical protections and is at high risk to trampling from recreational uses and invasive species.

In summary, commercial and residential development along coastal communities continues to be the primary threat to habitat loss while trampling from hikers and livestock, and dune stabilization from invasive species are also contributing threats. These threats are considered to be current and foreseeable and this factor is still valid.

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

Although unrestricted, overutilization for commercial, recreational, scientific or educational purposes was not considered to be a threat in the final listing rule. Overutilization of habitat for recreational purposes does not appear to be a threat at this time on Federal and State preserve lands; however, threats from recreational activities such as trampling from hikers, equestrians, and livestock continues to be a threat on unregulated public and private lands where no protections for this threat are afforded.

This factor is not considered to be a major threat to the species or precluding recovery at the time of this analysis.

Factor C: Disease or Predation

Disease was not considered to be a threat factor at the time of listing and does not appear to be a threat at the time of this review. Grazing effects are not currently a factor threatening the species, but may have led to the extirpation at the Dillon Beach location where there was historic record of grazing before the area was developed. Seed predation by small mammals (*Peromyscus maniculatus*) harbored by the invasive vegetation is a new factor for consideration. *Ammophila arenaria* (European beachgrass) provides shelter from predators for these small mammals which allow them to forage and prey with relative safety on the seeds of *Lupinus tidestromii*. Prior to invasion of non-native plant species, *L. tidestromii* could be found on open dune environments where small mammals would have large amounts of exposure and consequently be at higher risk for predation. The reproductive plants within the Abbott's Lagoon populations consistently have greater than 70 percent of their fruits predated upon based on data collected from 2005-2009

(Knight, in litt. 2009). Because predation typically occurs before fruits are mature, it likely results in reproductive loss to the plants rather than dispersal. Similarly high levels of predation are observed for all *L. tidesstromii* populations occurring in proximity to *A. arenaria*.

In summary, disease is currently not considered a threat to the species; however, predation from small mammals is considered to be a new current and foreseeable threat factor in this analysis. It is recommended that this threat be addressed in the recovery delisting criteria number 3 (Habitat and populations will be free of invasive weeds) as invasive weeds provide shelter for the mammals who prey on the seeds of *L. tidesstromii*.

Factor D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, regulatory mechanisms thought to have some potential to protect *Lupinus tidesstromii* included: listing under the California Endangered Species Act (CESA) and Native Plant Protection Act (NPPA). In addition, the following regulatory mechanisms were considered during this review: (1) the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA); (2) the California Coastal Act (CCA); (3) National Park Service (NPS) Organic Act; and (4) the Federal Endangered Species Act in those cases where *L. tidesstromii* occurs and is incidentally protected in habitat occupied by the listed species. These regulatory mechanisms appear to remain currently valid. There are several State and Federal laws and regulations that are pertinent to federally listed species, each of which may contribute in varying degrees to the conservation of federally listed and non-listed species. These laws, most of which have been enacted in the past 30 to 40 years, have greatly reduced the threat of wholesale habitat destruction. The Endangered Species Act is the primary Federal law that provides protection for this species since its listing as endangered in 1992. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in absence of the Endangered Species Act.

The following list includes a brief summary of laws and regulations that were evaluated for this 5-year review.

State Protections in California:

The State's authority to conserve rare wildlife and plants is comprised of four major pieces of legislation: the California Endangered Species Act, the Native Plant Protection Act, the California Environmental Quality Act, and the Natural Community Conservation Planning Act. Three of these legislative protections apply to *Lupinus tidesstromii*:

California Endangered Species Act (CESA) and Native Plant Protection Act (NPPA): The CESA (California Fish and Game Code, section 2080 *et seq.*) prohibits the unauthorized take of State-listed threatened or endangered species and the NPPA (Division 2, Chapter 10, section 1908) prohibits the unauthorized take of State-listed threatened or endangered plant species. The CESA requires State agencies to consult with the California Department of Fish and Game on activities that may affect a State-listed species and mitigate for any adverse impacts to the

species or its habitat. Pursuant to CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. The State may authorize permits for scientific, educational, or management purposes, and to allow take that is incidental to otherwise lawful activities. Furthermore, with regard to prohibitions of unauthorized take under NPPA, landowners are exempt from this prohibition for plants to be taken in the process of habitat modification. Where landowners have been notified by the State that a rare or endangered plant is growing on their land, the landowners are required to notify the California Department of Fish and Game 10 days in advance of changing land use in order to allow salvage of listed plants. This applies for private land ownership in and around the Monterey Peninsula; however, the NPPA is rarely utilized or enforced for this species (Knight 2008; Madison, pers. comm. 2008).

California Environmental Quality Act (CEQA): The CEQA requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

California Coastal Act (CCA): The California Coastal Commission considers the presence of listed species in determining environmentally sensitive habitat lands subject to section 30240 of the California Coastal Act of 1976, which requires their protection. Certain local jurisdictions have developed their own Local Coastal Programs or Land Use Plans that have been approved by the Coastal Commission. Some of the major accomplishments of this act include reduction in overall development, the acquisition of prime habitat along the coast, restoration of coastal streams and rivers, and a reduction in the rate of wetland loss. The CCA provides additional minimal protections in association with the previous State regulatory mechanisms.

Federal Protections

National Environmental Policy Act (NEPA): NEPA (42 U.S.C. 4371 *et seq.*) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. 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. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects (40 C.F.R. 1502.16). These mitigations usually provide some protection for listed species. However, NEPA does not require that adverse impacts be fully mitigated, only that impacts be assessed and the analysis disclosed to the public.

Clean Water Act: Under section 404, the U.S. Army Corps of Engineers (Corps or USACE) regulates the discharge of fill material into waters of the United States, which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. 1344). In general, the term “wetland” refers to areas meeting the Corps’s criteria of hydric soils, hydrology (either sufficient annual flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). Any action with the potential to impact waters of the United

States must be reviewed under the Clean Water Act, National Environmental Policy Act, and Endangered Species Act. These reviews require consideration of impacts to listed species and their habitats, and recommendations for mitigation of significant impacts. This Act provides very minimal protections as coastal beach communities are not typically considered “wetlands” unless associated with the mouth of rivers or drainages.

Endangered Species Act of 1973, as amended (Act): The Act is the primary Federal law providing protection for this species. The Service’s responsibilities include administering the Act, including sections 7, 9, and 10 that address take. Since listing, the Service has analyzed the potential effects of Federal projects under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. 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 CFR 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines “take” to mean “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Service regulations (50 CFR 17.3) define “harm” to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that result from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 CFR 402.02). For projects without a Federal nexus that would likely result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved Habitat Conservation Plan (HCP) that details measures to minimize and mitigate the project’s adverse impacts to listed species. Regional HCPs in some areas now provide an additional layer of regulatory protection for covered species, and many of these HCPs are coordinated with California’s related Natural Community Conservation Planning program.

With regard to federally listed plant species, section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed plant species. Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the “take” of federally endangered wildlife; however, the take prohibition does not apply to plants. Instead, plants are protected from harm in two particular circumstances. Section 9 prohibits (1) the removal and reduction to possession (i.e., collection) of endangered plants from lands under Federal jurisdiction, and (2) the removal, cutting, digging, damage, or destruction of endangered plants on any other area in knowing violation of a state law or

regulation or in the course of any violation of a state criminal trespass law. Federally listed plants may be incidentally protected if they co-occur with federally listed wildlife species.

National Park Service (NPS) Organic Act: The NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), states that the National Park Service “shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations ... to conserve the scenery and the national and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” The National Park Service Management Policies indicate that the Park Service will “meet its obligations under the National Park Service Organic Act and the Endangered Species Act to both pro-actively conserve listed species and prevent detrimental effects on these species.” This includes working with the Service and undertaking active management programs to inventory, monitor, restore, and maintain listed species habitats, among other actions. Because the populations at PORE are on NPS lands this Act applies for only the individuals on PORE NP.

In summary, the Endangered Species Act is the primary Federal law that provides protection for this species since its listing as endangered in 1992. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in absence of the Endangered Species Act.

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

At the time listing, introduction of invasive species, stochasticity in annual weather patterns and trampling from human and livestock traffic were all considered significant threats. Invasive species continue to be a very significant threat with habitat loss and hybridization. The threat of invasive species is currently being addressed and managed on protected sites; however, unsecured private lands have no protection against such threats. Impacts to the species under predicted future climate change are unclear. Current forecasts of warming are expected to raise mean temperatures and sea levels along of coast of western North America (IPCC 2007). While it appears reasonable to assume that the species may be affected, we have no knowledge of more detailed climate change information or literature specifically for this species. We lack sufficient information to predict with certainty the extent of effect that climate change along the California coast will have on the species. We do not know when or how the changes may occur, the potential changes to the ecosystem, or the level of threat posed by seasonal changes, rising mean temperatures and rising sea levels on the habitat.

In summary, invasive species, human and livestock traffic continue to be current and foreseeable threats. Hybridization from *L. chamissonis* in the Monterey Peninsula is considered to be a new, current and foreseeable threat factor in this analysis. This new threat was not considered in the original listing for *Lupinus tidestromii* and should be considered a new recovery criterion for the Monterey Peninsula populations.

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.

Measures to Downlist:

- 1) Secure habitat for the species at current known occurrences

Is the criterion valid and have they been addressed: Yes, the criterion is still valid and is being addressed. Habitat at PORE, ASB and SCSB has been secured for the species; however, these current protections are not permanent. Point Reyes National Seashore has designated the majority of areas that contain *Lupinus tidestromii* and other federally listed plants as “wilderness” providing protection under the National Parks Service regulations regarding wilderness. This encompasses approximately 33,000 acres and contains greater than 50 percent of the individuals as of the 2008 census (PORE LUTI report 2008). This percentage varies yearly depending on stochastic population fluctuations. Asilomar State Beach has designated 25 acres of dune habitat that contain *L. tidestromii* and other listed species as a Natural Dune Preserve under the California State Parks regulations and is protected by such definition. From a census conducted in 2000 the preserve contains approximately 40 percent of the genetically pure (unhybridized) individuals on ASB (Madison, pers. comm. 2009). A new comprehensive census for *L. tidestromii* is being conducted in 2009 and will include a determination of pure and hybrid populations. Although the “wilderness” and “Dune Preserve” designations provide a higher level of protection for the listed plant and its habitat, these protections can be changed or altered through a policy change or redesignation. Sonoma Coast State Beach currently has no extra protections for the areas that contain the listed plant other than those provided by the California State Parks regulations regarding protected species on State Parks lands. Pebble Beach and Spanish Bay golf courses have protected habitat with a mitigation agreement from the private land owner. The City of Carmel has designated the North Dune an Environmental Sensitive Habitat Area (ESHA). This designation does not provide any physical protections for the plant; however, it does provide limited protection against development unless this designation is

removed or changed. Several private land occurrences on the Monterey Peninsula still remain unprotected. This private land protection on the Monterey Peninsula was a criterion in the Recovery Plan; however, this criterion for private land occurrences may not be feasible at this time with the threat of hybridization in the Monterey Peninsula populations.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

2) Management measures at the secured habitat locations

Is the criterion valid and have they been addressed: Yes, the criterion is still valid and is currently being addressed. Management measures are not permanent and could be altered or withdrawn depending on the status of the protections afforded the species. Management for recovery of the species has been implemented for the secured habitat sites at PORE, SCSB and ASB. Point Reyes National Seashore is under management through National Parks Service and SCSB and ASB are under management through California State Parks. Management plans have been written for all three locations through their respective agency with regards to recovery of the species and include reduction of effects from recreation use of the parks, invasive plants removal, and dune restoration efforts. Pebble Beach and Spanish Bay golf courses in Monterey County also have management plans for the continued conservation and protection of the plant on their respective properties. The City of Carmel North Dune is not considered a secured habitat, but the city has adopted several shoreline management plans and is currently in the process of creating a long term management plan for the North Dune population.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor D) Inadequacy of Existing Regulatory Mechanisms, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

3) Monitoring of recovery for the secured habitat locations

Is the criterion valid and have they been addressed: Yes, this criterion has been met and has been addressed. Monitoring for recovery has been implemented at the PORE, SCSB, and ASB secured habitat sites. Research efforts by Dr. Knight and her colleagues include extensive monitoring at PORE. Monitoring for SCSB is being conducted currently by State ecologist Brendan O'Neil. Point Reyes National Seashore monitoring includes individual population counts, observing for invasive plants, small mammal predation, habitat and plant (*L. tidestromii*) condition. Sonoma Coast State Beach populations are being monitored for rough population counts, effects from human recreational use, habitat and plant (*L. tidestromii*) condition. Asilomar State Beach is being monitored for rough population counts, effects from human recreational use, and hybridization effects. Pebble Beach and Spanish Bay golf courses have private monitoring in accordance with the mitigation agreement which includes monitoring for rough population stands. The City of Carmel North Dune is not considered a secured habitat; however, the population has been monitored and the City's ESHA designation has general monitoring incorporated in the program. This monitoring effort is superficial; it is not guaranteed and is not specific for the listed plant.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor D) Inadequacy of Existing Regulatory Mechanisms, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

4) Additional restored habitat

Is the criterion valid and have they been addressed: Yes, additional restored habitat is being created at the PORE and SCSB sites to extend the range of *Lupinus tidedromii* at those sites. Dune restoration efforts are being conducted on several sites along the California coast; however no restoration efforts specifically for *L. tidedromii* are being conducted. The seed life for *L. tidedromii* is considerably long, so these other dune restoration efforts may provide new occurrences for *L. tidedromii* provided there is a viable seed bank.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor D) Inadequacy of Existing Regulatory Mechanisms, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

Measures for delisting:

1) 15 years of monitoring

Is the criterion valid and have they been addressed: Yes, the criterion is still valid and is being addressed; however, they are not complete. Monitoring efforts at PORE, SCSB and ASB are currently in their 8th year and are planned through 2015. Monitoring on public and private land occurrences are being performed through public city efforts; however no plan has been enacted or planned through a future date. Monitoring has also been done sporadically by California Native Plant Society (CNPS) for the Monterey Peninsula populations on private land when access has been granted.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor D) Inadequacy of Existing Regulatory Mechanisms, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

2) Reintroduced populations within historic range through natural means.

Is the criterion valid and have they been addressed: The criterion is still valid and is being addressed; however, no new occurrences beyond the extent of the populations described from the time of listing and in this review have been identified. The populations at PORE and SCSB have increased in individual numbers since the time of listing, but naturally reintroduced populations on the Monterey Peninsula are generally hybrids and currently being removed.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

3) Habitat and populations will be free of invasive weeds.

Is the criterion valid and have they been addressed: Yes, the criterion is still valid and is being addressed. At the time of listing there was no substantial dune restoration or invasive weed removal efforts. Currently, extensive dune restoration efforts are ongoing at PORE. Sonoma Coast State Beach and ASB are conducting minor dune restoration efforts and continual invasive weed removal. Although these efforts have been enacted, invasive weeds have not been completely removed at any of these locations and will most likely be a continual threat

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

4) Average of 10,000 individuals and progress toward the eradication of beach grass and iceplant at PORE

Is the criterion valid and have they been addressed: Yes, the criterion is still valid and is being addressed. Efforts are currently being conducted and progress towards both criteria has shown positive trends toward meeting recovery. The largest population, located near Abbott's Lagoon is estimated to have over 100,000 individuals, and this number has persisted since 2001. The dunes near Abbott's Lagoon have received a great deal of restoration attention from 2002-2006 (*Ammophila arenaria* removal). The second largest population, located on the dunes west of the Mendoza Ranch, was estimated at 32,528 individuals in 2003 whereas a 2007 census by Dr. Knight *et al.* estimated 11,668 individuals. The third largest population at PORE, located on the dunes near the Davis residence declined from 982 individuals in 2003 to 159 individuals in 2007, likely due to encroachment of iceplant. Removal of beach grass and iceplant surrounding this population was conducted in July 2008 through the mechanical removal of the beach grass (digging 3m into the ground and overturning this invasive grass) and hand removal of the iceplant.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

5) Private land occurrences protected, endowments secured and managed for recovery

Is the criterion valid and have they been addressed: Yes, securing private lands for recovery is still a valid criterion; however, with the current information regarding the hybridization and until the threat of hybridization can be addressed this criterion may become obsolete for the Monterey Peninsula populations unless genetically pure individuals can be reintroduced. No private land occurrences other than Pebble Beach and Spanish Bay golf courses are currently or under process for endowment or managed for recovery at the time of this review.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor D) Inadequacy of Existing Regulatory Mechanisms, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

6) Historic populations at Dillon Beach are restored and occupied

Is the criterion valid and have they been addressed: Yes, the criterion is still valid; however, currently no efforts are being made at Dillon Beach for the reintroduction of *Lupinus tidestromii*. This criterion would be considered vital to the expansion of the species. Dillon Beach provides highly suitable habitat, but is under threat of development and high human usage. More controlled conservation measures would need to be enacted before reintroduction could take place naturally or through manned efforts.

Listing factors addressed: (Factor A) Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range, (Factor D) Inadequacy of Existing Regulatory Mechanisms, (Factor E) Other Natural or Manmade Factors Affecting Its Continued Existence.

IV. SYNTHESIS

The status of *Lupinus tidestromii*, which historically was found extensively along the California coast, had been reduced to three geographic population groups from four and/or possibly five geographic population groups since its listing in 1992. Habitat destruction from commercial and residential development along with invasive species such as European beach grass and iceplant were and continue to be the main threats to *L. tidestromii*. Protections provided on Federal and State lands along with the restoration efforts by the managing agencies have greatly improved the survivorship and number of individuals at those locations. Research efforts at PORE by Dr. Knight and her team are ongoing and will provide new valuable information of the species and levels of threats. Hybridization of the Monterey Peninsula populations and seed predation from small mammals appear to be additional significant threats to recovery and need to be addressed. Further efforts to secure protections for populations on private lands on the Monterey Peninsula also need to be addressed for recovery. Dillon Beach needs to be examined for the potential of repopulating that site. Measures to downlist/delist have are being addressed, but have not yet met their goals. Current recovery criteria efforts need to continue and be completed. It is the determination of this review that the status of the species remains endangered due to the low numbers of populations, restricted range and ongoing threats. Therefore, we believe *L. tidestromii* still meets the definition of endangered, and recommend no status change at this time.

V. RESULTS

Recommended Listing Action:

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

New Recovery Priority Number and Brief Rationale: No change in Recovery Priority number recommended

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

- 1) Continue Dune restoration and eradication of invasive plants at PORE and SCSB.
- 2) Continue monitoring at PORE, SCSB and ASB. Establish structured monitoring plan for Monterey Peninsula populations on private lands.
- 3) Secure further conservation easements and/or acquire lands for protection of Monterey Peninsula populations.
- 4) Continue research of hybridization and seed predation threats.
- 5) Conduct accurate census of the Monterey private land occurrences.
- 6) Examine and implement dune restoration efforts for repopulation at Dillon Beach.

VII. REFERENCES CITED

- [CNDDDB] California Department of Fish and Game, Natural Diversity Data Base. 2008. Element Occurrence Reports for *Lupinus tidestromii*. Unpublished cumulative data current to 2008.
- [IPCC] Intergovernmental Panel on Climate Change. 2007. Climate change 2007: the physical science basis. Summary for policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC Secretariat, World Meteorological Organization and United Nations Environment Programme, Geneva, Switzerland.
- Jones and Stokes Associates, Inc. 1995. Final Results of the Environmentally Sensitive Habitat Area Study Conducted for the City of Carmel-by-the-Sea.
- Knight, T. 2000-2008. Point Reyes National Seashore Annual Reports. Unpublished reports submitted to the U.S. Fish and Wildlife Service, Region 8, Sacramento, California.
- [Service] U.S. Fish and Wildlife Service. 1992. Endangered and threatened wildlife and plants; Six plants and Myrtle's silverspot butterfly from coastal dunes in Northern and Central California determined to be endangered. Federal Register 57(120):27848-27859.
- _____. 1998. Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan, Portland, Oregon. 141 pp.
- _____. 2008. Region 8 guidelines for 5- year review.

Personal Communications

Lynch, S. 2008. Environmental Consultant, Monk & Associates, Walnut Creek, California.

Madison, L. 2008, 2009. Environmental Scientist, Asilomar State Beach, California.

O'Neil, B. 2008. Ecologist, Sonoma Coast State Beach, California.

In Litt. References

Ferreira, J. 2008. Biological consultant, Botanical Consulting Services, California. Written correspondence submitted to the U.S. Fish and Wildlife Service, Region 8, Sacramento, California in response to the 5-year review data call. Re: *Lupinus tidestromii*, clover lupine - City of Carmel North Dunes population

Knight, T. 2009. Department of Biology, Washington University in St. Louis, St. Louis, Missouri. E-mail to Brian Hansen, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, dated March 5, 2009. Subject: Tidestrom's lupine (*Lupinus tidestromii*) population information.

Smith, D. 2008. Botanist, Marin Chapter California Native Plant Society, California. E-mail to Brian Hansen, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, dated October 10, 2008. Subject: Tidestrom's lupine (*Lupinus tidestromii*) population information.

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

***Lupinus tidestromii* (Clover lupine)**

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

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

Review Conducted By: Brian Hansen, Staff Biologist, Sacramento FWO

FIELD OFFICE APPROVAL:

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

Approve _____ Date _____

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

Approve _____ Date _____

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

Lupinus tidestromii (Clover lupine)

Current Classification: Endangered

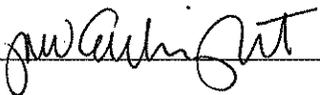
Recommendation Resulting from the 5-Year Review:

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

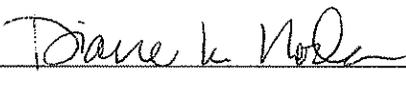
Review Conducted By: Brian Hansen, Staff Biologist, Sacramento FWO

FIELD OFFICE APPROVAL:

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

Approve  Date 2-16-10

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

Approve  Date 1/13/10

IX. APPENDIX A

Areas historically and/or currently occupied by *L. tidestromii* prepared for 5-year review, 2008. Last observed and last surveyed are not representative of the CNDDDB report. They are reflective of current information gathered through personal communication with experts, Federal and State land managers, and private and public land managers for the species

CNDDB #	Name	Current trend	Last observed	Last surveyed	Location and Agency providing protection
1	Point Pinos, Pacific Grove Light House	Stable	2008	2000	City of Pacific grove, City Parks
2	ASB conference grounds	Stable	2008	2000	Asilomar State Beach, State Parks
3	17 Mile Dr., west of spyglass hill	UNK	1988	1988	Monterey Peninsula, PVT
4	Included in occurrence # 3	UNK			
5	Moss Beach and Spanish Bay dunes	UNK	1987	1987	Monterey Peninsula, PVT
6	SE of Point Joe	Extirpated	1987	1987	Monterey Peninsula, PVT
7	Included in occurrence # 6	Extirpated	1985	1985	
8	Pebble Beach, 17 Mile Dr.	UNK			Monterey Peninsula, UNK
9	Included in occurrence # 2				
10	Included in occurrence # 3				
11	Spanish Bay golf course	Stable	2008	UNK	Monterey Peninsula, PVT, Golf course mgmt
12	Point Reyes Nat. Seashore (PORE)	Increasing	2008	2008	PORE, NPS
13	South Abbot's Lagoon, PORE	Stable	2008	2008	PORE, NPS
14	North Beach Access, PORE	Decreasing	2008	2008	PORE, NPS
15	North side Abbot's Lagoon PORE	Stable	2008	2008	PORE, NPS
16	North East of lighthouse PORE	Stable	2008	2008	PORE, NPS
17	Mouth of Russian river At Goat Rock Beach	Increasing	2008	2005	Sonoma Coast State Beach, State Parks
18	Dillon Beach, Marin Coast	Extirpated	1996	2008	Marin County, PVT
19	Included in occurrence #1				
20	West of Mendoza Ranch bldgs PORE	Decreasing	2008	2008	PORE, NPS
22	South of Mendoza Ranch PORE	Stable	2008	2008	PORE, NPS
23	Included in occurrence #13				
24	South Beach parking area PORE	UNK	2003	2003	PORE, NPS
25	West of radio station towers PORE	Stable	2008	2008	PORE, NPS
26	Bodega Head, Sonoma Coast	Extirpated	1932	2008	Sonoma County, PVT

CNDDDB identification # = occurrence number assigned by the California Natural Diversity Database (CNDDDB 2008).