

Myrtle's silverspot butterfly
(Speyeria zerene myrtleae)

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



Photo: Geoff Smick

**Sacramento Fish and Wildlife Field Office
U.S. Fish and Wildlife Service
Sacramento, California
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5-YEAR REVIEW

Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)

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:

Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*) is a medium sized butterfly and member of the brush-foot family (Nymphalidae). The wingspan of the Myrtle's silverspot butterfly averages 55 to 60 millimeters (2.1 to 2.3 inches) with the upper surface of both hind and fore wings being golden brown to fulvous with many conspicuous black spots, lines, and other markings, while the undersides of the wings are light tan, reddish brown, and brown with black lines and distinctive silver spots and black spots. The base of the wings, as well as the body, is covered with hairs. Myrtle's silverspot butterfly is one of the several related subspecies of the *Speyeria zerene* complex that are distributed from southeast Alaska and southwest Canada southward through most of the western United States and eastward to southwest Colorado. The host plant for the Myrtle's silverspot butterfly is *Viola adunca* (western dog violet). This violet serves as the only known larval food plant for Myrtle's silverspot butterfly, while a variety of other flowering plants serve as nectar sources for the adult. Typical habitat supporting the Myrtle's silverspot butterfly and its host plant are coastal dunes, coastal scrub, or coastal prairie at elevations ranging from sea level to 300 meters (1,000 feet) and as far as 5 kilometers (3 miles) inland (USFWS 1998).

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. The Recovery Plan and personal communications with experts were our primary sources of

information used to update the species' status and threats. We received one letter from the public in response to our Federal 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.

Contact Information:

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Federal Register (FR) Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the five year review of this taxon and the opening of a 60-day period of time to receive information from the public was published on March 5, 2008 (73 FR 11945). We received one letter from the public.

Listing history:

Original Listing

FR notice: 57 FR 27848

Date listed: June 22, 1992

Entity listed: Myrtle's silverspot butterfly, an insect subspecies.

Classification: Endangered

Associated rulemakings:

A final rule for critical habitat for the Myrtle's silverspot butterfly was never completed. At the time of listing it was not considered prudent to reveal to the public the location of the limited amount of habitat available for this rare insect, as it may increase the threat of vandalism, collection, or other undesirable activities.

Review History: Since the original listing in 1992 there have been no significant reviews of the Myrtle's silverspot butterfly.

Species' Recovery Priority Number at start of review: 9. From the 2008 Recovery Data Call prepared by the Sacramento Fish and Wildlife Office. Myrtle's silverspot butterfly is a subspecies that was considered to be confronted with a moderate degree of threats and to have a high potential for recovery. Recovery efforts for this species did not have significant conflict with local economic and land development practices. This insect faces possible extinction due to a variety of present day threats.

Recovery Plan or Outline

Name of plan: Recovery Plan for Seven Coastal Plants and Myrtle's silverspot butterfly

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 an invertebrate, 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

The Myrtle's silverspot butterfly is univoltine (has a single reproductive event per year). Adult Myrtle's silverspot butterflies emerge from their pupae between mid-June and mid-July and live up to five weeks. The total flight period, however, lasts for two to three months since adult emergence is staggered. Females oviposit single eggs solely on the dried leaves and stems of the host plant, *Viola adunca*. Larvae apparently eclose (emerge) from eggs a few weeks after oviposition. New larvae migrate a short distance into suitable foliage or leaf litter and spin a silk web where they remain in a suspended and inactive state known as diapause through the fall and winter. In spring, diapause ends and larvae began searching for and feeding on the fresh leaves of the host plant. It is unknown if the Myrtle's silverspot butterfly larvae will feed off other *Viola* species, although studies show that related subspecies of *S. zerene* will feed from several closely related violet species (Scott 1986). Larvae feed for 7 to 10 weeks and then form a pupal chamber from leaf debris and silk. The pupal stage for the Myrtle's silverspot butterfly lasts for about two weeks.

At the time of listing, the majority of information about the life history and ecology of the Myrtle's silverspot butterfly was derived from Murphy and Launer (1991), Hammond and McCorkle (1983), and from correspondence with the entomologists, Sterling Mattoon and John Steiner. Some life history information about the Myrtle's silverspot butterfly was extrapolated from studies performed on closely related subspecies (USFWS 1992). Following the listing of the Myrtle's silverspot butterfly, the study of a population of this subspecies at Point Reyes (Launer et al. 1992; Launer and Murphy 1993 in USFWS 1998) provided additional information on the life history and ecology of the butterfly. This new information was incorporated into the 1998 recovery plan (USFWS 1998). Since 1998, a thesis was published which updated the habitat use and population dynamics of the Myrtle's silverspot butterfly at Point Reyes National Seashore (Adams 2004). There has been no additional information published on Myrtle's silverspot butterfly life history since 2004.

Spatial Distribution

The historic range of the Myrtle's silverspot butterfly is believed to have included the northern California coastal dunes and bluffs from the river mouth (south bank) of the Russian River in Sonoma County, and southward to Point Ano Nuevo in San Mateo County (Launer *et al.* 1992; USFWS 1998). When listed, four areas were known to be inhabited by Myrtle's silverspot butterfly in western Marin and southwestern Sonoma Counties as follows: one population was inhabiting the coastal dunes at the Point Reyes National Seashore, two populations occurred within state beaches in Sonoma County, and a single female was found about 13 kilometers (8 miles) inland from the community of Bodega Bay which may represent a single member of a colony or a dispersing individual (USFWS 1992). The distribution and range of the Myrtle's silverspot butterfly has not significantly changed since listing in 1992. However, recent surveys reveal a slight shifting of population densities. Two populations inhabit Point Reyes National Seashore within coastal dune habitat, instead of a single population as described in the listing (USFWS 1998; Adams 2004). There may be additional separate populations at the Point Reyes National Seashore, but this is difficult to determine without a mark recapture program (G. Smick, Wetlands Resource Associates, *in litt.* 2008). The Bodega Bay population described in the listing have not been observed for the last fifteen years with the exception of the sighting of a single individual in foggy weather in 2003 (A. Launer, Stanford University, *in litt.* 2008; Smick, *in litt.* 2008) and the Valley Ford population, just north of Point Reyes National Seashore, appears to be larger and more dense than originally described (Adams 2004; Smick, *in litt.* 2008). The area from Bodega Head and southward has not been recently surveyed and the property that was proposed for a golf course was purchased by private landowners (Launer, *in litt.* 2008).

Abundance

A Stanford University (Center for Conservation Biology) study conducted in 1991 through 1993 using a mark/recapture survey method found that there were two separate populations of Myrtle's silverspot butterfly at the Pt. Reyes National Seashore at Tomales Point and North Beach numbering about 5,000 and several hundred individuals respectively. Two other populations from that study were found at Estero de San Antonio (including land reserved for a proposed golf resort) in Marin County and east of Bodega Bay. The total combined estimated population size for the Myrtle's silverspot butterfly from that study numbered approximately 10,000 individuals, which is the combined maximum estimate for the Point Reyes National Seashore populations from 1993 and the proposed golf resort site (the third large population center) in 1991 (Launer *et al.* 1992; USFWS 1998).

Myrtle's silverspot butterfly population surveys were conducted by the Center for Conservation Biology from 1994 to 1998 and again in 2001. A small decline in overall numbers was observed up to 1998 and, apparently reversed in 2001, when higher numbers were observed (Adams 2004). Adams (2004) conducted a survey in 2002 at North Beach and Tomales Point at the Point Reyes National Seashore, at locations corresponding to the two previously noted populations, using the Pollard method for counting at pre-determined transects. That study revealed a total of 534 butterflies counted during the survey; however, that number can not be compared comprehensively with previous population figures as the survey transects were not in the same locations and the counting method differed (Adams 2004). A 2003 survey was the last complete survey performed for the Myrtle's silverspot butterfly and was performed using the same methods and transects as the 2002 survey, and revealed a total of 558 butterflies counted over the adult flight season (J. Rodgers, National Park Service, *in litt.* 2008; Smick, *in litt.* 2008).

During informal observations after the 2003 survey, Smick (*in litt.* 2008) found three additional areas at the Point Reyes National Seashore that appeared to support viable populations of the Myrtle's silverspot butterfly. These populations appeared to be discontinuous with either the North Beach or the Tomales Bay headlands populations. These separate populations were within grasslands and headlands located at Drake's Estero, at Drake's Beach, and between Marshal Beach and Kehoe Beach trailheads across from Kehoe Beach. These populations used two flowering plants as nectar sources, the grasslands *Grindelia* sp. (gumweed) and the *Solidago* sp. (goldenrod). A single Myrtle's silverspot butterfly was also found near Bodega Head near Bodega Bay during the 2003 season. Butterflies were observed during the 2007 flight season on private land north of the Point Reyes National Seashore and at several locations on the National Park Service Property; however, a population estimate was not obtained (Smick, *in litt.* 2008).

Populations of butterflies are dynamic, and their ecology may vary spatially and temporally (Opler and Wright 1999; Ehrlich and Hanski 2004) owing to a variety of interacting physical and biological factors. As an example, the length of the adult flight season was observed to vary between two and three months for a population of the Myrtle's silverspot butterfly (Launer *et al.* 1992). Butterfly population size estimates may, therefore, be difficult to determine for several reasons. Myrtle's silverspot butterfly may undergo a diapause (period of inactivity) either as a larvae or as an adult female (reproductive diapause where ovarian development occurs after mating) which can occur as a result of climatic cues as is seen in many butterfly species inhabiting Mediterranean climates (Sims 1984; Powell 1987; Kopper *et al.* 2001). These diapause periods may affect adult emergence and result in underestimates of true population size. Further, if the distribution of Myrtle's silverspot butterflies follows a "meta-population" model then the pulses in populations that are observed annually may actually be an effect of immigration and emigration between a core population and satellite populations (Ehrlich and Hanski 2004). In any event, single season population counts are not accurate estimates of the total population sizes of the butterfly. Repeated surveys, consistent in method and transect placement, provide the best data to support the statistical inferences for determining population numbers and trends (Longcore *et al.* 2004).

Habitat or Ecosystem

Typically, the distribution and dynamics of butterfly populations are influenced by larval host plant health and abundance, nectar source availability, topography, size of available habitat and its degree of isolation from other habitat, and weather (Arnold 1983; Matter *et al.* 2003; Ehrlich and Hanski 2004). The Myrtle's silverspot butterfly is found in association with coastal dunes, coastal prairies and coastal scrub that are protected from winds (Launer *et al.* 1992). Apparently, the amount and quality of habitat supporting the Myrtle's silverspot butterfly has not changed significantly since listing, although some threats to the habitat, like the threat of invasive and non-native plants, are currently being diminished by funded restoration efforts at Point Reyes National Seashore.

One of the critical factors in the distribution of the Myrtle's silverspot butterfly is the presence of the violet host plant, *Viola adunca*, although the presence of host plant alone will not reliably predict the presence of the Myrtle's silverspot butterfly (Launer *et al.* 1992). The availability of a number of preferred nectar sources are also habitat requirements for the Myrtle's silverspot butterfly. The fecundity of females of a related species was found to correlate positively with the consumption of nectar (Boggs and Ross 1993). The Myrtle's silverspot butterfly has been

observed obtaining nectar from the following plants: *Cirsium vulgare* (bull thistle), *Carduus pycnocephalus* (Italian thistle), *Grindelia* sp. (gumweed), *Monardella undulata* (western pennyroyal), *Abronia latifolia* (yellow sand verbena), *Erigeron glaucus* (seaside daisy), *Wyethia* sp. (mule ears), *Solidago californica* (California goldenrod), *Achillea millefolium* (common yarrow), *Camissonia cheiranthifolia* ssp. *cheiranthifolia* (beach primrose), *Jaumea carnosa* (marsh jaumea), *Ericameria ericoides* (California heathgoldenrod), *Amsinckia spectabilis* var. *spectabilis* (seaside fiddleneck), and *Hypochaeris radicata* (hairy cat's-ear). Two other plant species that may serve as nectar sources include *Cirsium quercetorum* (brownie thistle) and *Senecio* sp. (groundsel) [(Arnold 1990;McIver *et al.* 1990; Murphy and Launer 1991) as cited in USFWS 1998]. In her 2002 surveys, Adams (2004) found that the *M. undulata* was the most used nectar plant for the Myrtle's silverspot butterfly, followed by *Grindelia* spp., *E. glaucus*, and *A. latifolia*. Less used nectar sources were *C. vulgare*, *S. californica*, *A. millefolium*, *C. cheiranthifolia* ssp. *cheiranthifolia*, *J. carnosa*, *E. ericoides*, *A. spectabilis* var. *spectabilis*, and *Hypochaeris radicata*.

The coastal areas inhabited by the Myrtle's silverspot butterfly are commonly buffeted by strong onshore winds, and, although the adults of both sexes are known to be fairly strong flyers, Myrtle's silverspot butterfly prefer areas that are sheltered from the prevailing winds (Launer *et al.* 1992). During days of reduced winds, Myrtle's silverspot butterfly may be found flying out of the sheltered areas (USFWS 1998). The weather in the coastal region inhabited by the Myrtle's silverspot butterfly is strongly influenced by the moderating effect of fog, which may, in turn, provide favorable growing conditions for the host plant, which is typically found in damp banks or on the edge of forest meadows (Little 1993). Adams (2004) found during a 2002 population and habitat use study that the Myrtle's silverspot butterfly were seen most often when the air temperature was greater than 13.3 degrees Celsius (56 degrees Fahrenheit) on sunny days and above 14.4 degrees Celsius (58 degrees Fahrenheit) on overcast days, and when the wind speed did not exceed 10 to 15 knots. The peak count during the 2002 season for the Pt. Reyes National Seashore populations was observed on July 24, with the first adult observed June 28 (Adams 2004). The butterflies were seen more often in grazed dune and grazed grassland areas than in un-grazed areas; however, this was not statistically compared (Adams 2004).

Changes in Taxonomic Classification or Nomenclature

There are three coastal subspecies of *S. zerene* which form a single clade (taxonomic grouping of individuals with a single common ancestor), and each of the subspecies within this clade are found in restricted habitat types and geographic areas, have all been impacted by human activities, and are federally listed as threatened or endangered (Launer *et al.* 1992; USFWS 1998). The other two listed subspecies include the threatened Oregon silverspot butterfly (*Speyeria zerene hippolyta*) and the endangered Behren's silverspot (*Speyeria zerene behrensii*). Myrtle's silverspot butterfly occupies the southern-most range of this subspecies complex.

Although the historical distribution of the Myrtle's silverspot butterfly included San Mateo County as far south as Pescadero Beach, its current extant range is believed to be restricted to the region within or near the Point Reyes National Seashore (USFWS 1998). It is also believed that the Myrtle's silverspot butterfly was extirpated from south of the Marin Headlands during the 1970s (Launer *et al.* 1992; USFWS 1998). However, an intensive survey of coastal prairie habitat within the historical distribution of this sub-species has not been performed recently and is necessary to establish a new baseline for the extant range. The classification of this subspecies is based on morphology and geographic distribution (Emmel and Emmel 1998). Two recent

works have challenged the taxonomy of the subspecies classifications of some of the *S. zerene* complex (Emmel 1998):

(1) John Emmel and Thomas Emmel (1998) described the new subspecies, *S. z. puntareyes*. This new subspecies resulted from a re-evaluation of the Myrtle's silverspot butterfly (*S. z. myrtleae*) at the northernmost extent of its range. Emmel and Emmel (1998) argue that the phenotype of the newly evaluated subspecies, *S. z. puntareyes*, is unique, and different from the subspecies that it has been previously designated (*S. z. myrtleae*) in that it is smaller in size, has a lighter ventral hue, and has black scaling on the medial aspect of the ventral hindwing. In addition, Emmel and Emmel (1998) point out that the Myrtle's silverspot butterfly (*S. z. myrtleae*), which they consider to have inhabited only the coastal region of the San Francisco peninsula south to Point Ano Nuevo, may be extinct throughout its former range owing to the loss of habitat and lack of any sightings since the 1970s. It was also noted in the recovery plan that the Myrtle's silverspot butterfly collected at Point Reyes varied from the description of the Myrtle's silverspot butterfly, which was based on seven specimens from south of the Golden Gate bridge (USFWS 1998). However, the Service is not aware of any further technical publications either supporting or disputing this taxonomic change and has not yet determined if the taxonomic expansion is warranted. Thus, the Service will continue to classify the populations of *Speyeria zerene* at the Point Reyes National Seashore, at the Estero de San Antonio, and east of Bodega Bay to be *S. z. myrtleae*, until further technical review is completed.

(2) John Emmel, Thomas Emmel, and Sterling Mattoon (1998) described a previously unrecognized subspecies of *S. zerene* found at the southern end of the Sonoma Mountains near Sears Point. This subspecies was named *S. z. sonomensis* and was distinguished from what they believe to be its nearest relative, *S. z. myrtleae*, by its larger size and the lighter aspect noted both ventrally and dorsally. As in the case with the *S. z. puntareyes* the Service is not aware of any further technical publications either supporting or disputing this taxonomic change and has not yet determined if the taxonomic expansion is warranted. Thus, the Service will continue to classify the populations of *Speyeria zerene* at Sears Point as an undescribed subspecies, until further technical review is completed.

Genetics

The Service is not aware of any published genetic studies of the Myrtle's silverspot butterfly.

Species-specific Research and/or Grant-supported Activities

One of the recovery strategies for Myrtle's silverspot butterfly is determining which grazing levels would reduce invasive plant abundance without eliminating the native nectaring plants and the violet host plant for the Myrtle's silverspot butterfly (USFWS 1998). In response to the recovery action 3.3 (Study differing management techniques of cattle grazing to improve the habitat of the Myrtle's silverspot butterfly), Dawn Adams conducted a thesis project studying the effects of grazing on the two Pt. Reyes National Seashore Myrtle's silverspot butterfly populations at Tomales Point and North Beach (Adams 2004). Adams compared grazed and ungrazed vegetation communities for differences in the density and distribution of nectar sources and the host plant. Adams also determined to what degree both native and non-native nectar sources were used by the Myrtle's silverspot butterfly. Adams found the following:

- 1) Nectar source species richness was not significantly affected by grazing.
- 2) Nectar source species density was greater within grazed areas.

- 3) Although cattle graze the dune areas, they appear to prefer grazing within grasslands rather than on the dunes, thus, cattle grazing may have little effect on the composition of dune plants.
- 4) Seasonal fluctuations in plant phenology and seasonal weather may be highly variable and could affect the distribution of butterflies between dunes and grasslands.
- 5) Nectar sources: The Myrtle's silverspot butterfly uses more nectar sources in grazed lands than predicted. The most commonly used nectar source observed being used by the species in this study was western pennyroyal, a plant found almost exclusively in the dune community. Twelve other nectar sources were observed being used by the animals.
- 6) There were not enough of the larval host plants in the transects to ascertain the effect of grazing on this plant.

The results of this study, showing that grazing did not negatively affect Myrtle's silverspot butterfly nectar source richness or composition, indicate that grazing does not appear to be a serious a threat to the Myrtle's silverspot butterfly, but in fact, moderate grazing may benefit the species. However, further studies on the effects of grazing on the host plant, *Viola adunca*, need to be conducted before the overall effects of grazing on the Myrtle's silverspot butterfly are known.

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

The amount and quality of habitat available for the Myrtle's silverspot butterfly does not appear to have significantly changed since listing. The listing refers to various threats to the habitat of the Myrtle's silverspot butterfly which have, in only a few cases, diminished over the last 15 years. One of the most dominate threats to the Myrtle's silverspot butterfly when listed was the proposed construction of a 1,254-acre golf course north of Dillon Beach which would have eliminated one of the most populous section of Myrtle's silverspot butterfly habitat (USFWS 1992). The proposed golf course was not built; however, a smaller, low density residential development was proposed, but never constructed (USFWS 1998). Development in this area will remain a threat until sufficient habitat for the Myrtle's silverspot butterfly is acquired and protected.

One additional threat under Factor A that was known at the time of listing was an increase in foot traffic which resulted when the area was opened for recreational use. This increased traffic was considered a hazard to the larval stages of the butterfly, inadvertent trampling of the host plant (USFWS 1992). Trampling by recreationalist is no longer considered a serious threat because the area where the butterflies occur has not been frequently visited by recreationalists since the park opened the area to the public. Put in perspective, this threat is quite small when compared to the intensity and duration of trampling by cattle in pastures that support the host plant. However, the threat remains, however small, that hikers could inadvertently trample and kill Myrtle's silverspot butterfly larvae or damage host plant (J. Rodgers, pers. comm. 2008).

Since listing no additional threats in this category were discovered, however, any urban development of the private lands to the north of the Point Reyes National Seashore should be considered a threat since the Myrtle's silverspot butterfly habitat is so severely limited in area and range (G. Fellers, U.S. Geological Survey, *in litt.* 2008).

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

Illegal take of the Myrtle's silverspot butterfly was not considered a serious threat when the species was listed; however, when the recovery plan was written over-collecting was considered a threat (USFWS 1992, 1998). Launer *et al.* (1992) also proposed that it would be prudent to deter poachers by patrolling Myrtle's silverspot butterfly habitat during the flight season. Specimens of Myrtle's silverspot butterfly are known to have been illegally collected at the Point Reyes National Seashore (USFWS 1998) and illegal take of the Myrtle's silverspot butterfly is still considered a present-day threat. This is primarily due to the finding that small populations of moths and butterflies are vulnerable to harm from collection of adults (Gall 1984). A population may be reduced below sustainable numbers (Allee effect) by removal of females, reducing the probability that new colonies will be founded. Collectors may not always realize if they are depleting colonies of butterflies or moths to below threshold limits for the survival or recovery of the colony (Collins and Morris 1985). For example, the extirpation of the large copper butterfly (*Lycaena dispar*) in Great Britain was preceded by heavy bouts of collecting (Duffey 1968, 1977). Adult specimens of Myrtle's silverspot butterfly are also highly valued by private collectors, and an international market exists for illegally collected specimens, as well as other listed and rare butterflies (Ehrlich 1984; Collins and Morris 1985; U.S. Attorney's Office 1994). Poachers may use various methods to escape detection or to evade prosecution (Thelander 1994).

FACTOR C: Disease or Predation

Disease or predation were not believed to present a threat to the Myrtle's silverspot butterfly at the time of listing (USFWS 1992), or when the recovery plan was written (USFWS 1998). It still remains unknown if predation or disease poses a major threat to the Myrtle's silverspot butterfly. No studies were performed since listing to identify predation sources and the presence of diseases or parasites.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

The following are the regulatory mechanisms that provide some degree of protection for the Myrtle's silverspot butterfly:

Federal Protections:

Endangered Species Act: The Endangered Species Act of 1973, as amended (Act), is the primary Federal law that provides protection for the Myrtle's silverspot butterfly since the designation of this species as endangered in 1992. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed species. To jeopardize the continued existence of a species means to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild. If it is

determined the proposed project will not result in jeopardy to the affected listed species, the Service may require the agency to implement reasonable and prudent measures, along with the terms and conditions, to minimize the amount of incidental take. Incidental take is the take of a listed species that are incidental to, but are not the purpose of an otherwise lawful activity. If a Federal agency is not involved in the project, and federally listed species may be taken as part of the project, then the project proponent must obtain an incidental take permit pursuant to section 10(a)(1)(B) of the Endangered Species Act.

National Environmental Policy Act (NEPA): The National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.] was signed into law on January 1, 1970. The Act establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment, and it provides a process for implementing these goals within the Federal agencies. The Act also establishes the Council on Environmental Quality (CEQ). Title I of NEPA contains a Declaration of National Environmental Policy which requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Section 102 requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all federal agencies are to prepare detailed statements assessing the environmental impact of and alternatives to major Federal actions significantly affecting the environment. These statements are commonly referred to as Environmental Impact Statements (EISs). Section 102 also requires Federal agencies to lend appropriate support to initiatives and programs designed to anticipate and prevent a decline in the quality of mankind's world environment. All federally listed species that may be affected by a federal project must be addressed by the environmental assessment and environmental impact statements. (Environmental Protection Agency 2008). 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.

The Lacey Act: The Myrtle's silverspot butterfly is protected by the Lacey Act (P.L. 97-79), as amended in 16 U.S.C. 3371. The Lacey Act makes unlawful the import, export, or transport of any wild animals whether alive or dead taken in violation of any U.S. or Indian tribal law, treaty, or regulation as well as the trade of any of these items acquired through violations of foreign law, and further makes unlawful the selling, receiving, acquisition or purchasing of any wild animal, alive or dead. The designation of wild animal includes parts, products, eggs, or offspring.

National Seashore designation: The National Park Service designated the Point Reyes National Seashore in September 1962. Designation as a National Seashore affords protection to all plant and animal species under the National Park Service's policy. Following is the National Park Service's Policy on Management of Threatened or Endangered Plants and Animals (Rodgers, *in litt.* 2008):

The (National Park) Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The Park Service will fully meet its obligations under the NPS Organic Act and the

Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. To meet these obligations, the (National Park) Service will cooperate with both the U.S. Fish and Wildlife Service and the NOAA Fisheries to ensure that National Park Service actions comply with both the written requirements and the spirit of the Endangered Species Act. This cooperation should include the full range of activities associated with the Endangered Species Act, including consultation, conferencing, informal discussions, and securing all necessary scientific and/or recovery permits; undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats; control detrimental nonnative species; manage detrimental visitor access; and reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend; manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for the recovery of threatened and endangered species; cooperate with other agencies to ensure that the delineation of critical habitat, essential habitat, and/or recovery areas on park-managed lands provides needed conservation benefits to the total recovery efforts being conducted by all the participating agencies; participate in the recovery planning process, including the provision of members on recovery teams and recovery implementation teams where appropriate; cooperate with other agencies, states, and private entities to promote candidate conservation agreements aimed at precluding the need to list species; and conduct actions and allocate funding to address endangered, threatened, proposed, and candidate species.

The National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. In addition, the (National Park) Service will inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and will manage them to maintain their natural distribution and abundance. The (National Park) Service will determine all management actions for the protection and perpetuation of federally, state, or locally listed species through the park management planning process, and will include consultation with lead federal and state agencies as appropriate. In summary, management of National Park Service lands for the Myrtle's silverspot butterfly, is dependant on the species status under laws such as the Endangered Species Act.

State and Local Protections:

California Endangered Species Act (CESA): The California Endangered Species Act (CESA) does not provide protection to insects (sections 2062, 2067, and 2068, California Fish and Game Code).

California Environmental Quality Act (CEQA): The California Environmental Quality Act (CEQA) requires full public disclosure of the potential environmental impact of proposed projects. The public agency with primary authority or jurisdiction over the project is designated as the lead agency and is responsible for conducting a review of the project and consulting with other agencies concerned with resources affected by the project. Section 15065 of CEQA guidelines requires a finding of significance if a project has the potential to "reduce the number or restrict the range of a rare or endangered plant or animal" (including insects). Species that are eligible for listing as rare, threatened or endangered but are not so listed are given the same

protection as those species that are officially listed with the State. Once significant impacts are identified, the lead agency has the option to require mitigation for effects through changes in the project or to decide that overriding considerations make mitigation infeasible. In the latter case, projects may be approved that cause significant environmental damage, such as destruction of endangered species. Protection of listed species through CEQA is, therefore, at the discretion of the lead agency. CEQA provides that, when overriding social and economic considerations can be demonstrated, project proposals may go forward, even in cases where the continued existence of the species may be jeopardized, or where adverse impacts are not mitigated to the point of insignificance.

California Coastal Act: 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. In particular the spirit of this act has two important precepts:

1. To promote the public safety, health, and welfare, and to protect public and private property, wildlife, marine fisheries, and other ocean resources, and the natural environment, it is necessary to protect the ecological balance of the coastal zone and prevent its deterioration and destruction.
2. That existing developed uses, and future developments that are carefully planned and developed consistent with the policies of this division, are essential to the economic and social well-being of the people of this state and especially to working persons employed within the coastal zone.

The California Coastal Act protects the habitat of the Myrtle's silverspot butterfly because of two requirements presented in the legislation:

1. Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
2. Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

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.

County and City

The Service is not aware of any specific county or city ordinances or regulations that provide direct protection for the Myrtle's silverspot butterfly.

Summary of Regulatory Mechanisms

The Myrtle's silverspot butterfly receives some protections under the various Federal and State laws and regulations discussed above. However, the protection afforded the species in many cases relies on the species status under the Endangered Species Act for protections to be extended to the Myrtle's silverspot butterfly. Therefore, regulatory mechanisms are inadequate to meet the conservation needs of this subspecies

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

At the time of listing other manmade or natural factors that were considered threats to the Myrtle's silverspot butterfly included the possible stochastic extinction of the remaining small and isolated populations, the effect of inappropriate grazing regimes on the host plant, and the competitive effects of invasive plants on the host plant and nectar sources (USFWS 1992). Below is the most updated information we have regarding other natural or manmade factors affecting the continued existence of Myrtle's silverspot butterfly

Small population size: The current numbers of individuals in each of the populations is not known and it is possible that some of the populations may drop to significantly low levels during certain years. The Service is not aware of any research which has been completed to estimate the minimum effective population size for the Myrtle's silverspot butterfly. However, the small population and its limited range were, for the reasons stated, considered a threat at the time of listing, when the recovery plan was written, and is still considered a threat (USFWS 1992, 1998).

There are several important factors to consider in the management and recovery of rare species such as the Myrtle's silverspot butterfly. The first factor is that, in general, rare species demonstrate decreased genetic variability or heterozygosity (Spielman *et al.* 2004). Another important factor is low populations of any organism are also threatened by extinction through a single catastrophic event, such as an abnormally violent storm, a prolonged drought, or other climatic event; from an infectious disease; or from "stochastic" demographic fluctuations (Awise 2004). Certain density dependent effects, not directly related to genetics, stemming from low population numbers are considered a threat to the Myrtle's silverspot butterfly population (USFWS 1992, 1998). These effects include reduced reproduction potential that results from the lack of necessary social interactions, or the difficulty in finding a mate. Another example of a density dependent factor that may reduce a populations' fitness is the consequences of asynchronous reproduction (male and female sexual maturity is offset in time) which may be favorable in greater population densities but deleterious in low densities (Awise 2004; Calabrese and Fagan 2004).

Inappropriate grazing regimes: The recovery plan includes inappropriate grazing as a threat to the Myrtle's silverspot butterfly, which is based on the report that overgrazing in suitable Myrtle's silverspot butterfly habitat within the range of the species was reducing the availability of important nectar producing plants. A study by Dawn Adams (2004) found that the moderate grazing regime at Point Reyes National Seashore at the time of the study did not negatively affect the density or diversity of nectar plants, and that butterflies were found more frequently in the areas that were grazed. The Myrtle's silverspot butterfly has co-existed with cattle for over 100 years at Point Reyes National Seashore (Adams 2004). Other studies have shown that optimal grazing increases the density of native plants, which may support butterfly populations (Heitschmidt and Stuth 1991); however, the effect of extensive grazing has been shown to be

either beneficial or deleterious to native plants depending on the ecology of the species (DeVries and Raemakers 2001; Vogel *et al.* 2007). Inadvertent trampling of the Myrtle's silverspot host plants by grazing cattle may be considered a relatively minor threat

The effects of invasive, non-native plants: The overgrowth of invasive plants was recognized as a threat at the time of listing, and remains one of the most serious present-day threats to the Myrtle's silverspot butterfly. It has been recognized as a threat to other listed butterflies as well (USFWS 1992, 1998; Adams 2004; Ehrlich and Hanski 2004; Severns 2007). *Carpobrotus chilensis* (sea fig or iceplant) and *Ammophila arenaria* (European beachgrass) are consistently identified as invasive plant species that could out-compete and eliminate the host plant for this subspecies as well as several of its nectar sources, particularly in the absence of grazing or fires (USFWS 1992, 1998). Point Reyes National Seashore is funded for and continues to reduce the threat of European beachgrass spreading at several key locations on the park property, including Kehoe Beach which may provide nectar plants for one of the two populations at the National Seashore.

Road Mortalities: Although not previously identified as a threat, mortalities of Myrtle's silverspot butterfly due to direct strikes of individuals by cars appear to be significant. G. Smick (*in litt.* 2008) has observed multiple individuals along the roadside at North Beach that appeared to have been killed and/or mutilated by vehicle strikes. The threat of road mortalities to butterfly populations have been confirmed in several studies (Ries *et al.* 2001; Rao and Girish 2007; Severns 2008). Posting reduced speed limits during the adult flight period may help reduce this threat.

Climate Change: The global average temperature has risen by approximately 0.6 degrees centigrade during the 20th Century (International Panel on Climate Change 2001, 2007; Adger *et al.* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (International Panel on Climate Change 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to increasing concentrations of greenhouse gases (carbon dioxide, methane, nitrous oxide, and others) in the global atmosphere from burning fossil fuels and other human activities (Cayan *et al.* 2005; Adger *et al.* 2007; Environmental Protection Agency 2009). Eleven of the twelve years between 1995 and 2006 rank among the twelve warmest years since global temperatures began in 1850 (Adger *et al.* 2007). The warming trend over the last fifty years is nearly twice that for the last 100 years (Adger *et al.* 2007). Looking forward, under a high emissions scenario, the International Panel on Climate Change estimates that global temperatures will rise another four degrees centigrade by the end of this Century; even under a low emissions growth scenario, the International Panel on Climate Change estimates that the global temperature will go up another 1.8 degrees centigrade (International Panel on Climate Change 2001). The increase in global average temperatures affects certain areas more than others. The western United States, in general, is experiencing more warming than the rest of the Nation, with the 11 western states averaging 1.7 degrees Fahrenheit warmer temperatures than this region's average over the 20th Century (Saunders *et al.* 2008). California, in particular, will suffer significant consequences as a result of global warming (California Climate Action Team 2006). In California, reduced snowpack will cause more winter flooding and summer drought, as well as higher temperatures in lakes and coastal areas. The incidence of wildfires in the Golden State also will increase and the amount of increase is highly dependent upon the extent of global warming. No less certain than the fact of global warming itself is the fact that global warming, unchecked, will harm biodiversity

generally and cause the extinction of large numbers of species. If the global mean temperatures exceed a warming of two to three degrees centigrade above pre-industrial levels, twenty to thirty percent of plant and animal species will face an increasingly high risk of extinction (International Panel on Climate Change 2001, 2007). The mechanisms by which global warming may push already imperiled species closer or over the edge of extinction are multiple. Global warming increases the frequency of extreme weather events, such as heat waves, droughts, and storms (International Panel on Climate Change 2001, 2007; Lenihan *et al.* 2003; California Climate Action Team 2006). Extreme events, in turn may cause mass mortality of individuals and significantly contribute to determining which species will remain or occur in natural habitats. As the global climate warms, terrestrial habitats are moving northward and upward, but in the future, range contractions are more likely than simple northward or upslope shifts. Ongoing global climate change (Travis 2003; Inkley *et al.* 2004; Anonymous 2007; Adger *et al.* 2007; Kanter 2007) likely imperils many species of California butterflies and the resources necessary for their survival (Boggs and Murphy 1997; Hill *et al.* 1999; Hill *et al.* 2002). Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat. Studies have demonstrated that the distribution and range of many species of butterflies are susceptible to subtle shifts in the local climate, particularly temperature changes (Boggs and Murphy 1997; Hill *et al.* 1999; Hill *et al.* 2002; Travis 2003). The range of the Myrtle's silverspot butterfly will, therefore, most likely be similarly affected in the upcoming years if global temperatures continue to rise.

III. RECOVERY CRITERIA

The 1998 Recovery Plan is a final, approved plan containing objective, measurable recovery criteria for both down-listing the Myrtle's silverspot butterfly from endangered to threatened and for delisting. The recovery criteria, which serves as a measure of the success of the recovery effort, is based on information that appears to remain valid. New information about Myrtle's silverspot butterfly includes a series of surveys that revealed population trends for the butterfly from 1991 to 2004. In addition, a published thesis on the Myrtle's silverspot demonstrated new insights into the habitat use of this butterfly. New information has not substantially changed the validity of the recovery criteria.

Recovery plans are not regulatory documents and are instead intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. There are many paths to accomplishing recovery of a species and recovery may be achieved without all criteria being fully met. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, the Service may judge that over all criteria, the threats have been minimized sufficiently, and the species is robust enough, to reclassify the species from endangered to threatened or perhaps delist the species. In other cases, recovery opportunities may have been recognized that were not known at the time the recovery plan was finalized. These opportunities may be used instead of methods identified in the recovery plan. Likewise, information on the species may be learned that was not known at the time the recovery plan was finalized. The new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery of species is a dynamic process requiring

adaptive management and judging the degree of recovery of a species is also an adaptive management process that may, or may not, fully follow the guidance provided in a recovery plan.

Downlisting:

Protection in perpetuity of the Myrtle's silverspot butterfly habitat in northwestern Marin County and in southwestern Sonoma County.

Is criterion still valid: Yes.

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. E. Other natural or manmade factors affecting its continued existence (Small population size, inappropriate grazing, effect of invasive plants).

Status as of April 2008: Point Reyes National Seashore protects in perpetuity all habitat on the Park Service property, including habitat supporting at least two populations of Myrtle's silverspot butterfly located in the vicinity of North Beach and Tomales Point. At this time no other habitat is protected and all known remaining Myrtle's silverspot butterfly habitat is located on private lands (Fellers, *in litt.* 2008; Launer, *in litt.* 2008; Smick, *in litt.* 2008). This criterion has been partially met.

Either the discovery of two new populations of Myrtle's silverspot butterfly or that Myrtle's silverspot butterfly are introduced into suitable habitat at two sites that are protected in perpetuity.

Is criterion still valid: Yes.

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. E. Other natural or manmade factors affecting its continued existence (Small population size, inappropriate grazing, effect of invasive plants).

Status as of April 2008: No progress or changes since the recovery plan was approved and published. Three populations of Myrtle's silverspot butterfly have been observed within the Point Reyes National Seashore that appear to be distinct from the original two main population centers of the species (Smick, *in litt.* 2008). These three populations may represent either satellite populations or core populations, however, the status of these new sites is unknown at this time. This criterion has not been met.

Adequate funding for the management of all Myrtle's silverspot butterfly sites is assured and adaptive management plans have been developed and are being implemented.

Is criterion still valid: Yes

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. E. Other natural or manmade factors affecting its

continued existence (Small population size, inappropriate grazing, effect of invasive plants).

Status as of April 2008: The Point Reyes National Seashore habitat is protected by management practices that identify areas that are being threatened by the predominance of invasive grasses and forbs and taking actions to eliminate the threat and reduce the effects of the non-native invasive plants. Typically, many of the species of invasive grasses and forbs will out compete and eliminate native endemic plants, which at Point Reyes National Seashore include the host and nectar producing plants for the Myrtle's silverspot butterfly. The location of the remaining habitat on private land is to the north of the Point Reyes National Seashore and current uses on the private land include a cattle ranch and a low density residential development. Adaptive management plans specifically addressing the Myrtle's silverspot butterfly have not yet been created at any occupied site.

Funding is provided to the Point Reyes National Seashore to maintain native coastal habitats, but there is currently no funding specifically targeted for Myrtle's silverspot butterfly habitat maintenance and restoration. Funding is assured at Point Reyes to restore 300-acres of coastal dune habitat by removing *Ammophila arenaria* (European beachgrass). Once restored, this area is likely to support a greater number and diversity of nectar sources for Myrtle's silverspot butterfly; additionally, removal of European beachgrass from adjacent dunes could lower the risk of *A. arenaria* invasion into *Viola adunca* habitat. There is no funding for any recovery actions for this species on private lands. This criterion has not been met.

Annual monitoring shows that the three existing and two new populations of Myrtle's silverspot butterfly have a cumulative total of more than 10,000 adults in each of ten years, with no single population having fewer than 200 adults in any year.

Is criterion still valid: Yes

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. B. Overutilization for commercial, recreational, scientific, or educational purposes, C. Disease or predation, D. Inadequacy of existing regulatory mechanisms.

Status as of April 2008: Annual monitoring of the three known populations of Myrtle's silverspot butterfly has been sporadic since 2003. This criterion has not been met.

Delisting: The Myrtle's silverspot butterfly will be recommended for delisting with the completion of the following three criteria:

Nine total populations have been established on habitat that is protected in perpetuity. If appropriate sites have been identified in the screening and prioritization process, at least two of these populations should be south of the Golden Gate.

Is criterion still valid: Yes

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. E. Other natural or manmade factors affecting its continued existence (Small population size, inappropriate grazing, effect of invasive plants).

Status as of April 2008: See downlisting criteria number 2 above for status. This criterion has not been met.

Adequate funding for management for all sites is assured and adaptive management plans have been developed or are being implemented.

Is criterion still valid: Yes

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. E. Other natural or manmade factors affecting its continued existence (Small population size, inappropriate grazing, effect of invasive plants).

Status as of April 2008: See downlisting criteria number 3 above for status. This criterion has not been met.

Annual monitoring has shown that the nine populations cumulatively have a total of more than 45,000 adults in at least eight of ten years, no fewer than 10,000 adults cumulatively in any year, no individual populations having fewer than 100 adults in any year, and no recent severe declines.

Is criterion still valid: Yes

Listing factors addressed: A. Present or threatened destruction, modification or curtailment of its habitat or range. B. Overutilization for commercial, recreational, scientific, or educational purposes, C. Disease or predation, D. Inadequacy of existing regulatory mechanisms.

Status as of April 2008: See downlisting criteria number 4 above for status. This criterion has not been met.

Summary of the progress in fulfilling down listing and delisting criteria: None of the downlisting or de-listing criteria in the recovery plan have been fully met as of April 2008. Of the three known extant populations of Myrtle's silverspot butterfly, two are currently on National Park Service property and, along with their specific habitat, will be protected in perpetuity. This property is currently being managed to remove invasive, non-native plants and to maintain appropriate grazing regimes. The National Park Service is funded to manage the park landscape, but not the particular requirements to maintain the Myrtle's silverspot butterfly habitat. The other extant population is located on private land consisting of an open cattle ranch and on a large undeveloped sea-side lot. This habitat remains unprotected, but still provides adequate habitat (Smick, *in litt.* 2008). Both delisting and downlisting criteria require the discovery or reintroduction of more self sustaining Myrtle's silverspot butterfly populations on suitable

habitat that is funded for proper management. To date no additional populations have been confirmed or founded nor has additional habitat been protected and managed.

IV. SYNTHESIS: At the time of listing 4 populations of Myrtle’s silverspot butterflies were known and described, and included the sighting of a single animal that was assumed to be part of a larger population near Valley Ford. Its distribution and abundance has not changed significantly since listing. It appears that at least three stable populations of Myrtle’s silverspot butterfly currently exist. Two populations are protected within the Point Reyes National Seashore at North Beach and at the Tomales Bay headlands, while another relatively dense population remains unprotected on private lands in the area west of the small town of Valley Ford. There may be up to three more separate populations at the Point Reyes National Seashore, but this can not be determined without a mark-recapture study. In addition populations may occur at Bodega Head and along the coastal terrace southward to Dillon Beach but these areas have not been recently surveyed. None of the criteria for down-listing or delisting have yet been fully met. It was believed at the time of listing that cattle grazing significantly decreased the habitat quality of the Myrtle’s silverspot butterfly; however, a recent study revealed that the cattle grazing regime currently used at the Pt. Reyes National Seashore does not significantly affect the distribution of Myrtle’s silverspot butterfly at that site. Current threats to the Myrtle’s silverspot butterfly include urban or industrial development of any property with suitable habitat for the butterfly, poaching, small population size, the effects of reduced host and nectar plant density due to invasive plants and forbs, road mortalities during the adult flight season, and the probable constriction of the range and distribution of this butterfly due to global climate change.

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 is needed**

New Recovery Priority Number 9

No change is recommended at this time to the recovery priority number for the Myrtle’s silverspot butterfly because none of the criteria for downlisting or delisting have been met. Its population sizes and distribution are not known to have changed significantly since the species was listed in 1992. Although some of the original threats to the Myrtle’s silverspot butterfly have been reduced or eliminated, such as the decision not to build the golf course on habitat near Dillon Beach, there are still a moderate number of threats either directly to the butterfly or to the habitat supporting the animal.

VI. RECOMMENDATIONS FOR FUTURE ACTIONS:

Renew annual surveys of the three known populations of the Myrtle's silverspot butterfly using a consistent survey methodology.

Search for new populations of Myrtle's silverspot butterfly throughout its historic range.

Acquire property with suitable habitat for the Myrtle's silverspot butterfly and protect the habitat at these new locations. Restore and maintain habitat for the Myrtle's silverspot butterfly host plant and known nectar sources at all protected habitat locales. Develop management plans for the specific locale.

Conduct life history and behavior research of the Myrtle's silverspot butterfly. Topics of interest for investigation include diapause (life stages, intervals, triggering cues), metapopulation dynamics, the effects of management practices on the butterfly and host plant (examples include the use of herbicides or disking), the autecology of the host plant and the responses of the host plant to climatic fluctuations (global climate change), natural successional changes, competition from invasive, non-native plants, or finding an estimated minimum population size that will be self-sustaining in specified normal habitat conditions.

Captive breeding for this species may be determined necessary to prevent extirpation or extinction, thus studies which assist in implementing future captive breeding or rearing efforts for this species should be funded or encouraged.

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Range Map for Myrtle's Silverspot Butterfly



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

Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review

Downlist to Threatened

Uplist to Endangered

Delist

No change is needed

Review Conducted By: Sacramento Fish and Wildlife Office staff

Date Submitted to Region 8: _____

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve



Date

10/17/08

REGIONAL OFFICE APPROVAL:

Lead Regional Director, U.S. Fish and Wildlife Service, Region 8

Approve



Date

2-4-09