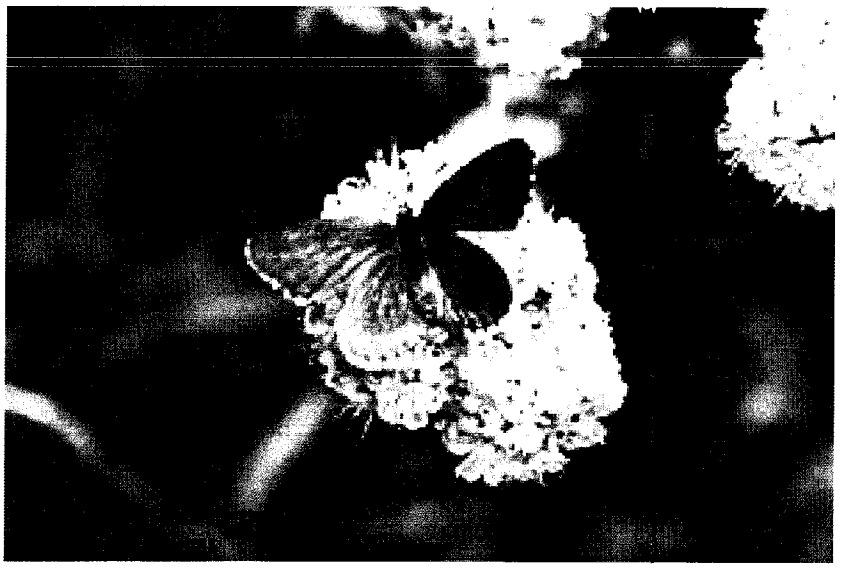
Smith's blue butterfly
(Euphilotes enoptes smithi)

5-Year Review:
Summary and Evaluation



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

September 2006

5-YEAR REVIEW

Smith's blue butterfly *(Euphilotes enoptes smithi)*

I. GENERAL INFORMATION

A. Methodology used to complete the review: The Ventura Fish and Wildlife Office of the U.S. Fish and Wildlife Service (Service) initiated a 5-year review of the Smith's blue butterfly (*Euphilotes enoptes smithi*) in July 2005. The Service solicited information from the public through two Federal Register notices (70 FR 39327 and 70 FR 66842).

We reviewed all information that has become available on the subspecies since its listing in 1976. We relied heavily on research conducted by Dr. Richard A. Arnold (1978, 1981, 1983, 1991) for information regarding the subspecies' ecology and life history. In 2003, the Service prepared a partial status review of the Smith's blue butterfly, which focused on the southern portion of its range. We expanded the 2003 review to include additional information about the northern portion of the range by searching our files and contacting scientists and land managers for available information regarding status, available habitat, and threats to the subspecies. We solicited independent opinions from knowledgeable individuals who have expertise with the species and the geographic region where the species occurs, and/or familiarity with the principles of conservation biology. We incorporated all comments and information from our files and the public into our review, as appropriate.

B. Reviewers

Lead Region:

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Lead Field Office:

Ventura, Jacob Martin, (805) 644-1766, extension 285

Cooperating Field Office(s):

None

Cooperating Region(s):

None

C. Background

1. FR Notice citation announcing initiation of this review:

The FR notice initiating this review was published on July 7, 2005 (70 FR 39327). This notice opened a 60-day request for information period, which closed on September 6, 2005. A second FR notice was published on November 3, 2005 (70 FR 66842), which extended the request for information period for an additional 60 days until January 3, 2006.

2. Species status:

Unknown per 2005 recovery data call.

3. Recovery achieved:

1 (0-25 percent) per 2005 recovery data call.

4. Listing history:

Original Listing

FR notice: 41 FR 22041
Date listed: June 1, 1976
Entity listed: Smith's blue butterfly (*Euphilotes enoptes smithi*)
Classification: Endangered

Revised Listing, if applicable

Not applicable

5. Associated actions:

Critical habitat was proposed February 8, 1977 (42 FR 7972), but the proposal was not finalized; therefore, no critical habitat has been designated for this species.

6. Review History:

An unpublished partial status review focusing on the southern portion of the subspecies' range and the Los Padres National Forest was produced in November of 2003 by the Ventura Fish and Wildlife Office of the Service with funding from the U.S. Forest Service (USFS). The information collected in the 2003 review is incorporated into this status review.

7. Species' Recovery Priority Number at start of review: 9 (A recovery priority number of 9 indicates a subspecies with a moderate degree of threat and a high potential for recovery.)

8. Recovery Plan or Outline

Name of plan: Smith's Blue Butterfly Recovery Plan
Date issued: November 9, 1984
Dates of previous revisions: None

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

1. Is the species under review listed as a DPS?

No. The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct populations segment of any species of vertebrate wildlife. This definition limits listing as a DPS to only vertebrate species of fish and wildlife. Because the species under review is an insect and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan?

Yes.

2. Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria?

No. The recovery plan includes "recovery objectives," which are similar to the recovery criteria in more recent recovery plans. However, due to changes in our knowledge of the subspecies' range and the threats that it faces, the objectives are largely obsolete. The range is larger and shifted to the south, relative to what was known in 1984, and several of the localities identified for protection in the recovery plan do not have suitable habitat or are outside the currently accepted range (Service 2003). Of the 18 sites identified for protection in the recovery plan (Service 1984, pp 28-29), three are north of the currently accepted range (Service 1986) and one was likely misidentified, as it is at a higher elevation than any other occupied site and has no suitable habitat (Service 2003).

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Smith's blue butterflies are univoltine (having one generation per year). Synchronous with peak flowering of their host buckwheat plants, adult Smith's blue butterflies emerge from their pupal cases for a single flight season extending from mid-June to early September. Smith's blue butterflies require their host buckwheat plants (coast buckwheat (*Eriogonum latifolium*) and seacliff buckwheat (*E. parvifolium*)). All life stages are dependent on these plants, with adults feeding on the nectar and depositing eggs on the flowers and larvae feeding on the flowers and seeds and pupating on or beneath the plants. Adults may also take nectar from naked buckwheat (*E. nudum*), but use of this species by larvae has not been observed (Arnold 1991). At a particular location, adults are generally active for about four to ten weeks, but the adult activity period and duration can vary dramatically from year to year and from one location to another (Arnold 2002). Females oviposit eggs in flower heads, and larvae hatch four to eight days later and mature in approximately a month. Smith's blue butterflies overwinter as pupae and emerge as adults the following flight season (Service 2003).

Arnold (1978) studied the fecundity of a sample of 20 female Smith's blue butterflies in the lab. Females carried an average of 32 eggs (range 5-67). Of eggs laid, an average of 86 percent hatched (range 43-100 percent).

Parasitism of larvae has been observed as a substantial source of mortality of Smith's blue butterflies. Arnold (1978) observed a sample of 259 larvae and found that approximately 42 percent were parasitized by an unidentified fly of the family Tachinidae. Smith's blue butterfly larvae may also be parasitized by wasps of the family Braconidae (Arnold 1986). Arnold (1978) also observed predation of adults by spiders of the genera *Clubiona* and *Theridion.*

Capture-recapture studies of Smith's blue butterfly populations have been conducted at two sites at Fort Ord (Arnold 1978, 1981, 1983) and a third site at Marina State Beach (Arnold 1986). The northern Fort Ord site included approximately 5.7 acres (ac) (2.3 hectares (ha)) of suitable habitat, with *E. latifolium* as the food plant. The southern Fort Ord site included approximately 11.9 ac (4.8 ha) of suitable habitat, with *E. parvifolium* as the food plant. The Marina State Beach site was larger, totaling 37.6 ac (15.2 ha), and included both *E. latifolium* and *E. parvifolium,* with *E. latifolium* predominant. All sites included non-native plants (especially iceplant (*Carpobrotus*) and beach grass (*Ammophila*)) that tend to invade and stabilize dune systems to the detriment of Smith's blue butterfly habitat. Over 3 years (1977-1979), population estimates ranged from 3,081-5,201 individuals at the northern Fort Ord site. Data were

collected at the southern Fort Ord site only in 1978, which yielded a population estimate of 2,753 individuals. Data were collected at the Marina State Beach site only in 1986 and yielded a population estimate of 4,511 individuals. There are no longer-term population studies of the Smith's blue butterfly that would yield information on population trends. Lacking data on population trends within the subspecies as a whole, we can use trends in habitat quantity and quality as a surrogate to estimate population trends (Service 2003). As discussed below in section II.C.1.d, the quantity and quality of Smith's blue butterfly habitat is decreasing, which indicates that populations levels are likely declining also.

Arnold's capture-recapture studies of adult Smith's blue butterflies (1983, 1986) generated average residency times (the estimated time an average adult remains within a study area before either dying or emigrating) of approximately 1 week. Female residency times (mean 5.8-10.1 days) were longer than those of males (mean 4.0-7.9 days). One male and one female were recaptured 18 days after their initial capture (Arnold 1986), indicating that adults can survive at least that long. Average home ranges of both sexes were relatively small, but variable with larger home ranges observed at the Marina State Beach site than the Fort Ord sites 2.2-8.3 ac (0.9-3.4 ha) for males and 3.2-7.7 ac (1.3-3.1 ha) for females).

b. **Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):**

We are aware of no studies on Smith's blue butterfly genetics.

c. **Taxonomic classification or changes in nomenclature:**

The Smith's blue butterfly was originally described as *Philotes enoptes smithi* by Mattoni (1954). Shields (1975) realigned several genera of butterflies, moving the Smith's blue butterfly into the genus *Shijimiaeoides*. The Smith's blue was listed under the Act as *Shijimiaeoides enoptes smithi* in 1976. Mattoni (1977) realigned several genera of butterflies, moving the Smith's blue butterfly into the genus *Euphilotes*, resulting in its current scientific name *Euphilotes enoptes smithi*.

Pratt and Emmel (1998) proposed a new subspecies, *Euphilotes enoptes arenacola*, which would be formed by splitting off those Smith's blue butterflies that inhabit sand dunes along Monterey Bay and feed on coast buckwheat. This proposal appeared in a chapter of a book on butterfly systematics edited by Emmel (1998). They proposed this taxonomic split based primarily on: 1) use of a different food plant by the newly proposed subspecies (coast buckwheat, as opposed to seacliff buckwheat, which is the primary food plant used by Smith's blue butterflies in more inland and southerly locations); 2) their observation that the proposed new subspecies has an earlier flight period; and 3) minor differences in wing coloration between the proposed new subspecies and other Smith's blue butterflies.

We are aware of no peer reviewed articles that have commented on the proposed taxonomic split. We have received information indicating that the same individual Smith's blue butterfly has been observed to nectar and/or lay eggs on both coast and seacliff buckwheat plants (R. White, in litt. 2000; R. Arnold, Entomological Consulting Services, pers. comm. 2006), indicating that individual butterflies do not always assort by food plant. We have received a letter stating a professional opinion that the differences in flight period likely represent phenotypic plasticity within a single subspecies (allowing adults to synchronize their activities with the blooming of available food plants), rather than genetic differences between subspecies (R. White, in litt. 2000). Flight periods have also been observed to vary geographically (Arnold 1991), such that the flight period of more inland populations feeding on seacliff buckwheat coincides with that of coastal populations feeding on coast buckwheat. We have also received consultant's reports (Thomas Reid Associates 1987, 1999) indicating that Smith's blue butterflies may shift from one host plant species to the other, as one host plant becomes more abundant in an area. Because of the uncertainty relative to the proposed taxonomic split, and the presence of substantial threats (see discussion below) to Smith's blue butterflies throughout their range (including those proposed to be split off as *E. e. arenacola*), we at this time continue to recognize the Smith's blue butterfly as occurring from the mouth of the Salinas River in Monterey County south to San Carpoforo Creek in northern San Luis Obispo County. We will revisit this issue as new information and analyses become available.

Intergrades between the Smith's blue and Tilden's blue butterflies (*E. e. tildeni*) have been observed in inland Santa Cruz County (Service 1986) and possibly in the Carmel Valley of Monterey County (Arnold 1991).

d. **Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species within its historic range, etc.):**

At the time they were listed, Smith's blue butterflies were known primarily from coastal dune habitats along Monterey Bay (41 FR 22041), plus a few localities on the Big Sur coast (Mattoni 1954, Donahue 1975). Subsequent to listing, additional surveys have located Smith's blue butterflies over a wider range. The most current information on historic and recent localities indicates that the Smith's blue butterfly's historic range includes two areas within an approximately 80 linear mile (mi) (129 kilometers (km)) strip along the California coast, including: 1) dune habitats along Monterey Bay, from the Salinas River south to the City of Monterey and 2) the coast of Monterey and northern San Luis Obispo Counties, from the Carmel River area south to San Carpoforo Creek (including inland in the Carmel Valley at least 10 mi (16 km) (Service 2003). Smith's blue butterflies in the northern portion of the range along Monterey Bay are significant

in that they occupy approximately 15 percent (as measured linearly along the coast) of the range and use different habitat relative to those in the southern portion of the range (dune vs. chaparral, scrub, and grassland). See attached map for the range of the Smith's blue butterfly. Please note that the limits of distribution of suitable habitat on the attached map are based on vegetation types and elevation, but only those areas within the limits that support host plants could actually be occupied by Smith's blue butterflies. All available information on the amount and distribution of suitable and occupied habitat is discussed in section II.C.1.e., below.

A lack of Smith's blue butterfly survey data makes it difficult to discuss trends in the subspecies' spatial distribution. However, as discussed in the next section, habitat degradation is likely to have caused the subspecies' distribution to be reduced and become more fragmented in the northern part of the range. There are no documented localities (historic or current) between the City of Monterey and Point Lobos State Reserve (approximately 6.5 mi (10.5 km)). Comparisons of historic accounts and current conditions of habitats in the intervening area, which includes the Monterey Peninsula, indicates that development, tree planting, and fire suppression may have reduced habitat suitability for Smith's blue butterflies (Service 2003). Smith's blue butterflies have not been detected recently between Sand City and Carmel Highlands (approximately 9 mi (14.5 km)) (Service 2003; R. Arnold, pers. comm. 2006), indicating that this gap in the range is expanding. Those populations north of the City of Monterey are likely isolated from more southerly populations.

e. **Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):**

Vegetation within the range of the Smith's blue butterfly is very dynamic. Seacliff buckwheat seedlings in scrub, chaparral, and grassland communities depend upon disturbances, such as fire and erosion (including landslides), for the development of site conditions favorable for germination and establishment (Service 2003). Similarly, dune plants, including seacliff and coast buckwheat, are dependent on the deposit of windblown sand to create open spaces for germination (Arnold 1981). The quality of habitat can change quickly due to natural successional processes and invasive, non-native plants.

Wildfire suppression may have adversely affected Smith's blue butterfly habitat by reducing the frequency of low intensity wildfires needed for seacliff buckwheat germination (Service 2003; R. Arnold, pers. comm. 2006). The introduction of invasive, non-native plants has also altered natural successional processes. In scrub, chaparral, and grassland habitats, invasive, non-native plants (including kikuyu grass (*Pennisetum clandestinum*), pampas grass (*Cortaderia jubata*), Cape ivy (*Delaireria odorata*), and French broom (*Genista monspessulana*)) compete with and displace seacliff buckwheat, especially in disturbed areas (Service 2003). Invasive, non-native plants (especially iceplant

(*Carpobrotus*) and beach grass (*Ammophila*)) colonize and stabilize dune habitats, competing with coast buckwheat and seacliff buckwheat and reducing the deposit of windblown sand that is needed for establishment of these and other native dune plants (Arnold 1981).

Habitat has been degraded and lost due to human activities; including, residential and commercial development, recreation, sand mining, military activities, and possibly livestock grazing (Service 1984, 2003). Each of these is discussed in the five factor analysis, below.

The following discussion of habitat conditions is geographically divided into two subsections with dune habitats along Monterey Bay discussed separately from areas within the Carmel Valley and along the coast south of the Carmel River.

Dune Habitats along Monterey Bay

This subsection discusses the available information on the locations, quantities, and known threats to Smith's blue butterfly habitat in the northern portion of the range along Monterey Bay (which historically covered approximately 11.5 linear mi (18.5 km). In the northern portion of the range, the Smith's blue butterfly uses dune habitats and feeds on both coast and seacliff buckwheat, with coast buckwheat predominant. Much of this habitat has been lost. The Seaside-Marina dunes complex, which extends approximately 10 mi (16 km) and encompasses most of the dune habitat along Monterey Bay, has been over 50 percent destroyed or significantly altered (Service 1984). The dune complex is bisected by Highway 1. Development projects such as hotels, housing and shopping centers exist throughout the dune system and additional development is being planned. In addition, much of the remaining habitat is degraded or threatened by invasive plants. Specific geographic sections, running from north to south, are discussed below.

The Salinas River National Wildlife Refuge, located along Monterey Bay on the southern bank of the Salinas River, is the northernmost known locality of the Smith's blue butterfly. The Refuge contains approximately 50 ac (20 ha) of foredune and dune scrub habitats, some of which are occupied by seacliff and/or coast buckwheat and Smith's blue butterflies (Service 2001). Recent reconnaissance level surveys at the Refuge have documented that Smith's blue butterflies remain present (D. Kodama, U.S. Fish and Wildlife Service, pers. comm. 2006). The primary threat to the Smith's blue butterfly and its habitat at this location is invasion by non-native plants. Federal ownership is expected to protect this area from development. Efforts by Service staff to control invasive plants are ongoing. Recreational use by pedestrians may pose some threat to Smith's blue butterflies at the Salinas River National Wildlife Refuge; however, most foot traffic occurs on existing trails and open beach areas outside of suitable habitat.

There is an area of mixed ownership parcels in the Marina Dunes west of Highway 1 that extends approximately 2.5 mi (4 km) south along Monterey Bay from the Salinas River National Wildlife Refuge to Marina State Beach. Threats to the Smith's blue butterfly in all or part of this area include invasive, non-native plants, sand mining, off highway vehicle and other recreational use, and development. Surveys of this area in 1987 and 1997 (Thomas Reid Associates 1999) indicate that it is occupied by Smith's blue butterflies. The amount of available habitat was not quantified, but a rough estimate from maps provided in Thomas Reid Associates (1999) indicates that 300-400 ac (121-162 ha) of habitat containing coast buckwheat is found is this area. Most of this habitat is found on the two largest parcels, which border Monterey Bay immediately south of the Salinas River National Wildlife Refuge (the Martin Parcel and the Lonestar Parcel). The Big Sur Land Trust has acquired a 67 percent interest in the Martin Parcel (320 ac (129.5 ha)), which should protect it from commercial development. The Lonestar Parcel is currently used for sand mining. Monterey Peninsula Regional Parks District has acquired two of the smaller parcels near Marina State Beach (50.0 ac (20 ha) and 9.6 ac (3.9 ha)), which should protect them from commercial development.

The Smith's blue butterfly has been observed at Marina State Beach, which encompasses approximately 1.3 mi (2.1 km) along Monterey Bay. Arnold (1986) found the Smith's blue butterfly to be widely but patchily distributed at Marina State Beach, as were its buckwheat host plants. The subspecies was found to be primarily associated with coast buckwheat plants at this site. At the time of his study in 1986, Arnold characterized six subsites containing Smith's blue butterflies at Marina State Beach, totaling 112 ac (45 ha). Threats at Marina State Beach include recreational use, occasional recreational development (e.g., bike paths and sidewalks were recently constructed near the northern end of Marina State Beach, which resulted in removal of approximately 100 host plants (Service 2002)), and invasive, non-native plants. Recreational use in this area may include walking, horseback riding, and bicycling. In general, pedestrians, equestrians, and bicyclists can trample host plants, cause erosion, and facilitate the establishment of invasive plants (Service 2003), although the frequency of these events at specific locations has not been quantified. State ownership is expected to protect this area from most development and the California Department of Parks and Recreation has conducted restoration projects at Marina State Beach to remove invasive plants and restore native plants.

Fort Ord includes dune habitats that support seacliff and coast buckwheat and Smith's blue butterflies. Fort Ord extends approximately 4.1 mi (6.6 km) along Monterey Bay. Fort Ord has ceased military operations and is in the process of conversion to a variety of recreational and commercial uses by public and private landowners, including California State Parks and the U.S. Bureau of Land Management. Most of the Smith's blue butterfly habitat on Fort Ord occurs in areas that will be managed by the California Department of Parks and Recreation. An estimated 70-80 ac (28-32 ha) of Smith's blue butterfly habitat are currently

found on Fort Ord (Zander Associates 2006). Eleven percent of this habitat is expected to be removed or adversely affected by development and 1 percent is expected to be adversely affected (at least temporarily) by restoration activities (Zander Associates 2006). Threats to remaining habitat include invasive, non-native plants and recreational activities (similar to those discussed above regarding Marina State Beach). Surveys at Fort Ord of 11 ac (5 ha) of habitat containing seacliff and/or coast buckwheat in the late 1990s (Harding Lawson Associates 1998) indicated that 25-30 percent of those ac were occupied by Smith's blue butterflies. Those surveys were focused on areas where lead remediation activities were planned and should not be considered a random sample.

The southernmost known occupied localities of the Smith's blue butterfly along Monterey Bay occur in the Sand City area, south of Fort Ord (Service 1999; Service 2003; R. Arnold, pers. comm. 2006). West of Highway 1 along Monterey Bay, there are 1.1 ac (0.4 ha) of coastal scrub habitat, immediately south of Fort Ord, where Smith's blue butterflies and their habitat have been located (EMC Planning 2006). This area is patchily distributed with seacliff buckwheat plants (EMC Planning 2006). Although the area of habitat is relatively small, it may provide dispersal habitat (EMC Planning 2006) that would be important for future recolonization of unoccupied suitable habitat to the south. Such recolonization would be likely if habitat continuity is established through restoration efforts. Comparisons of vegetation mapping between 1987 and the present (Thomas Reid Associates 1987; EMC Planning 2006) indicate that the distribution of seacliff buckwheat has declined in this area, likely due to the ongoing spread of invasive iceplant (*Carpobrotus*). This area is proposed for development (EMC Planning 2006).

Additional Smith's blue butterfly habitat occurs west of Highway 1 along Monterey Bay between Sand City and the City of Monterey, including restored areas on lands administered by the California Department of Parks and Recreation and the U.S. Navy's Postgraduate School. However, there are no recent observations of Smith's blue butterflies in this area (Service 1999; U.S. Navy 2001; California Natural Diversity Database 2006).

Additional occupied Smith's blue butterfly habitat occurs in Sand City in dune habitats east of Highway 1 (Thomas Reid Associates 1987; LSA 1988). An approximately 13 ac (5 ha) area of restored dunes adjacent to Highway 1 was set aside as mitigation for development (Sand City Planning 1995; Service 1996). This area is occupied by Smith's blue butterflies (Thomas Reid Associates 2001). To the south of the Sand Dollar and Edgewater shopping centers is an area designated by Sand City as the East Dunes Planning Area, which includes occupied Smith's blue butterfly habitat (Thomas Reid Associates 1993). Habitat in this area was not quantified, but a rough estimate from maps provided in Thomas Reid Associates (1993) indicates that approximately 15-20 ac (6-8 ha) of habitat containing seacliff and/or coast buckwheat is found there. Sand City and

its local landowners are interested in additional commercial, industrial, and residential development within Smith's blue butterfly habitat, as indicated by their development of draft habitat conservation plans for projects both in the East Dunes area and the coastal area immediately south of Fort Ord (discussed above) (Thomas Reid Associates 1993; Sand City Planning 1995; EMC Planning 2006). We expect that additional development within Sand City would lead to removal of occupied Smith's blue butterfly habitat and potentially widen the gap in the subspecies' range (discussed above in the spatial distribution section). However, we also expect that any finalized habitat conservation plans would include habitat restoration to mitigate for project effects. Pedestrian and off-highway vehicle use (Sand City Planning 1995) and invasive plants also threaten Smith's blue butterflies and their habitat in Sand City.

Carmel Valley and Coastal Areas South of the Carmel River

This subsection discusses available information on the locations and quantities of and known threats to Smith's blue butterfly habitat in the Carmel Valley and along the coast of Monterey and San Luis Obispo Counties south of the Carmel River. In this approximately 66-linear-mi (106 km) long southern portion of the Smith's blue butterfly's range, the subspecies uses scrub, chaparral, and grassland plant communities and their ecotones and has been observed as far north as Point Lobos State Reserve (approximately 5 mi (8 km)) southwest of the Carmel River mouth) and as far south as San Carpoforo Creek in northern San Luis Obispo County (Service 2003).

The easternmost known locality in the Carmel Valley is at Robles Del Rio, just south of the town of Carmel Valley (Service 2003). West of Robles Del Rio is Garland Ranch Regional Park, an approximately 4,500-ac (1,821 ha) area administered by the Monterey Peninsula Regional Parks District, which includes habitat for the Smith's blue butterfly (Arnold 1991). Surveys of this area revealed seacliff buckwheat at 31 sites and naked buckwheat at two additional sites, with an estimated 130-160 ac (53-65 ha) of habitat containing one or both of these species. Smith's blue butterflies were observed at 18 of the sites, all of which supported seacliff buckwheat (Arnold 1991). Threats in this area include road and trail maintenance and recreational use. Administration of this area by the Monterey Peninsula Regional Parks District is expected to protect it from most development.

Immediately west of Garland Ranch Regional Park is Rancho San Carlos (also known as the Santa Lucia Preserve). Smith's blue butterflies and their habitat have been documented at Rancho San Carlos, which is an approximately 18,600-ac (7,527 ha) former cattle ranch. Rancho San Carlos includes at least 131 scattered locations where seacliff buckwheat grows, of which Smith's blue butterflies were observed at 25 during 2003 surveys (Tillotson 2005). Rancho San Carlos is being converted to a combination of residential and recreational development and preserved habitat/open space. Threats on Rancho San Carlos

include residential and recreational development and use, road maintenance, invasive plants, succession, and livestock grazing (Tillotson 2005). Much of the Smith's blue butterfly habitat at Rancho San Carlos is expected to be protected from development under a habitat conservation plan, which is being developed for the area (Tillotson 2005).

Immediately west of Rancho San Carlos is Palo Corona Ranch, a 9,898 ac (4,006 ha) parcel, which was acquired by the Nature Conservancy, Big Sur Land Trust, and Monterey Peninsula Regional Parks District and will be managed by the latter two organizations. Smith's blue butterflies and their habitat have been observed at Palo Corona Ranch (Buggy Database 2006) and further study of the subspecies and its habitat is planned at this location. Threats at this location include road and trail maintenance, recreational use, invasive plants, and livestock grazing. Administration of this area by the Big Sur Land Trust and Monterey Peninsula Regional Parks District is expected to protect it from most development.

Between and surrounded by Rancho San Carlos and Palo Corona Ranch is the approximately 1,100 ac (445 ha) Mitteldorf Preserve. Mitteldorf Preserve was acquired by the Big Sur Land Trust in 1990 and includes some Smith's blue butterfly habitat (S. Danner, Big Sur Land Trust, pers. comm. 2006) of unknown occupancy. Administration of this area by the Big Sur Land Trust is expected to protect it from most development.

The area to the west of Palo Corona Ranch is in mixed ownership, including the Big Sur Land Trust (Point Lobos Ranch), California Department of Parks and Recreation (Point Lobos State Reserve and Garrapata State Park), and a large area of private land. Habitat is found on Point Lobos State Reserve and Garrapata State Park and there are historic sightings of the Smith's blue butterfly on both (Service 2003; CNDDB 2006; Buggy Database 2006). State ownership is expected to protect Point Lobos State Reserve and Garrapata State Park from most development. Smith's blue butterfly habitat has been confirmed on Point Lobos Ranch (Rana Creek Restoration 2004), but has not been quantified or surveyed for the subspecies. Big Sur Land Trust intends to eventually transfer this area to California State Parks (S. Danner, pers. comm. 2006) and we expect that most of the habitat will be protected from development; however, widening of an existing access road across Point Lobos Ranch is expected to adversely affect the Smith's blue butterfly through removal of approximately 600 seacliff buckwheat plants (Rana Creek Restoration 2004). Privately owned lands include the developed Carmel Highlands area and largely undeveloped areas further inland. Residential development on private land in occupied Smith's blue butterfly habitat has occurred recently and is planned in the near future in this area (Arnold et al. 2001; County of Monterey 2006). Invasive plants are also threatening Smith's blue butterfly habitat at Point Lobos Ranch (Rana Creek Restoration 2004) and on private lands.

Immediately south of Palo Corona Ranch is Joshua Creek Ecological Preserve, which is administered by the California Department of Fish and Game. This area may be occupied by Smith's blue butterflies, but has not been surveyed for the subspecies or its habitat (J. Cann, California Department of Fish and Game, in litt. 2006).

There is a large area of mixed ownership (mostly private) land along the northern Big Sur coast, roughly between Joshua Creek Ecological Preserve in the north and Andrew Molera State park in the South. This area includes parcels administered by the Monterey Peninsula Regional Park District (Mill Creek Preserve) and the USFS (Brazil Ranch). Mill Creek preserve is largely in forested habitats, but includes some grassland and scrub habitats, which have not been surveyed for Smith's blue butterflies or their host plants. The Brazil Ranch includes habitat containing seacliff buckwheat plants (Service 2004) and was found to be occupied by Smith's blue butterflies in surveys conducted during 2003 and 2004 (K. Malengo, USFS, in litt. 2006). Threats present in all or part of this area include development, road maintenance, livestock grazing, recreational use, invasive plants, and succession.

The majority of Smith's blue butterfly habitat along the Big Sur coast is on the Monterey Ranger District of the Los Padres National Forest, administered by the USFS. The USFS has determined that approximately 23,600 ac (9,950 ha) within its jurisdiction occur in appropriate vegetation types and elevational ranges to support Smith's blue butterfly host plants (almost exclusively seacliff buckwheat within this area) (Service 2003). Of this acreage, Norman (1994) estimated that at least 2,000 ac (809 ha) include seacliff buckwheat and therefore may support Smith's blue butterflies. Surveys (Norman 1994, 1999, 2000; Service 2003) have confirmed the presence of seacliff buckwheat on 574 of these ac (232 ha). Habitat along the Big Sur coast has also been confirmed on land administered by the California Department of Parks and Recreation. There are known occupied sites at Pfeiffer-Big Sur State Park (Service 2003) and Julia Pfeiffer Burns State Park (Arnold 2005). Habitat of unknown occupancy has been confirmed at Andrew Molera State Park (Service 2003). Federal and State ownership is expected to protect these areas from most development. Additional habitat also occurs on private land along the Big Sur coast, including a known occupied locality on the Post Ranch Inn property (Gilchrist et al. 2006). Most of the Smith's blue butterfly habitat at Post Ranch Inn (approximately 1 ac (0.4 ha)) is expected to be protected from development under a habitat conservation plan, which is being developed for the area (Gilchrist et al. 2006). Although widespread in this area, Smith's blue butterfly habitat is patchily distributed and not all habitat is occupied (Service 2003). The partial status review conducted by the Service (2003) includes a detailed discussion of Smith's blue butterfly habitat and localities on USFS land and along the Big Sur coast from Andrew Molera State Park south to San Carpoforo Creek (see especially sections 4 through 7 and appendices D through G).

2. Five Factor Analysis (threats, conservation measures, and regulatory mechanisms)

a. Present or threatened destruction, modification, or curtailment of its habitat or range:

The range of the Smith's blue butterfly is larger than was known at the time the subspecies was listed, primarily due to location of additional occupied habitat along the coast of Monterey County south of the Monterey Peninsula and extending into northern San Luis Obispo County. Although the range is larger than was previously known, threats to the subspecies continue to be present, particularly in the northern portion of the range.

The decline of the Smith's blue butterfly across its range is attributed to degradation and loss of habitat as a result of urban development, recreational activities, sand mining, military activities, fire suppression, and encroachment of invasive, non-native plants (Service 2003). All of these threats, except for military activities, are ongoing within occupied Smith's blue butterfly habitat (for more site specific information, see the habitat and ecosystem conditions section, above). Loss of habitat for the Smith's blue butterfly in the coastal dunes north of the Monterey Peninsula has been particularly significant. More than 50 percent of the dunes within the Seaside-Marina complex have been destroyed or significantly altered (Service 1984). Development projects including hotels, housing, and shopping centers have occurred throughout this dune complex. Highway 1 also bisects the dune system and may present a dispersal barrier for Smith's blue butterflies. Some of the habitat for the Smith's blue butterfly south of the Monterey Peninsula is privately owned and could be or has been proposed for development, especially in the vicinity of the Carmel Highlands. Within the limits of distribution of suitable habitat south of the Monterey Peninsula (see attached map and section II.C.1.d), approximately 125,000 ac (71%) are in private ownership, approximately 21,000 ac (12%) are in State or local government ownership, and approximately 30,000 ac (17%) are in Federal (mostly USFS) ownership. In addition to the permanent loss of habitat, secondary effects from urban development, including the introduction of invasive, non-native plants and increased recreational use, can result in habitat degradation. Recreational activities and trail maintenance result in damage to individual buckwheat plants in some areas, and may cause erosion and facilitate the establishment of invasive plants (Service 2003).

Aggressive, disturbance-oriented, invasive species such as kikuyu grass (*Pennisetum clandestinum*), pampas grass (*Cortaderia jubata*), Cape ivy (*Delaireria odorata*), and French broom (*Genista monspessulana*) are found throughout the range of the Smith's blue butterfly on sites otherwise suitable for buckwheat. In sand dunes along Monterey Bay, non-native iceplant (*Carpobrotus*) and beach grass (*Ammophila*) have covered hundreds of ac of formerly suitable habitat for the Smith's blue butterfly. Non-native annual

grasses form dense ground covers that severely limit, and often prohibit, seedlings of native perennial plants, including seacliff buckwheat, from becoming established. Seedlings of native species often cannot compete for resources with weedy annuals because of the latter's faster growth rates. Although landslides and other erosional features can provide disturbances that allow establishment of seacliff buckwheat, such disturbed sites are also vulnerable to invasion by noxious weeds, which colonize faster than native species and reduce the regeneration of seacliff buckwheat stands (Service 2003).

The establishment of invasive, non-native plants has resulted in a gradual reduction in the abundance of host plants and continues to threaten habitat for the Smith's blue butterfly in the southern portion of its range. This change is especially evident along the Highway 1 corridor. Several areas of coastal bluffs that were previously documented as being occupied by seacliff buckwheat and the Smith's blue butterfly have been overtaken by invasive, non-native plants, particularly pampas grass, kikuyu grass, and French broom (Diane Pratt, personal observation as cited in Service 2003). The USFS has identified invasion by pampas grass as especially problematic on their lands on the coast of Monterey County (USFS 1999). Non-native plants are contributing to the fragmentation of habitat for the Smith's blue butterfly; the quality of the remaining suitable habitat is degraded and the distance dispersing adults must travel to reach other suitable habitat is increased. The presence of non-native species increases the likelihood that any area disturbed by either natural or human-caused processes will be converted to a higher percentage of non-native individuals and species; this process further exacerbates habitat degradation (Service 2003).

Ongoing land uses that have likely contributed to loss or degradation of habitat for the Smith's blue butterfly include wildfire suppression, recreation, and the maintenance, repair and use of trail and road systems. Wildfire suppression increases the risk of large-scale, high-intensity wildfires and reduces the frequency of smaller fires. Smaller fires would be expected to create disturbances that favor establishment of seacliff buckwheat plants; while large, high-intensity fires would be more likely to damage soils and destroy seed banks to the detriment of native plant communities. Maintenance of existing roads and trails throughout the range of the Smith's blue butterfly may cause loss of seacliff buckwheat plants and, potentially, of Smith's blue butterflies, because it requires the cutting or removal of vegetation. Recreational use of trails, roads, and other areas is also an ongoing threat to the Smith's blue butterfly because pedestrians, equestrians, and bicyclists trample plants, cause erosion, and facilitate the establishment of invasive plants (Service 2003).

Habitat fragmentation (resulting from development, ground disturbing activities, and invasive, non-native plants) causes diminished quality of the remaining suitable habitat. This is due at least in part to an increase in the distance that dispersing adults must travel to reach the nearest buckwheat stand. Overall, groups of Smith's blue butterflies occupying smaller, more isolated stands of

suitable habitat are more likely to be extirpated by stochastic or anthropogenic actions. The low vagility of adults, coupled with fragmentation of suitable habitat, reduces the probabilities of colonization events and migratory exchange between populations (Service 2003).

The effects of livestock grazing on Smith's blue butterflies and their habitat need further study. Grazing can result in the loss of Smith's blue butterflies and their host plants because livestock may graze on or trample buckwheat plants. However, light-to-moderate grazing may also serve to maintain habitat for Smith's blue butterflies by reducing competition with exotic grasses and maintaining areas in grassland and scrub habitats that might otherwise be colonized by woody shrubs. The Service is currently assisting the Nature Conservancy, The Big Sur Land Trust, and Monterey Peninsula Regional Park District, as they develop a research project to assess the effects of grazing on Smith's blue butterfly habitat at Palo Corona Ranch (The Nature Conservancy 2006).

In summary, the primary threat facing the Smith's blue butterfly in the Monterey Bay area is habitat loss by development. This threat was identified at the time of listing, and it continues to be the predominant threat in the north. South of Monterey Bay along Big Sur/Los Padres National Forest, a number of threats have been identified, including invasive species, fire suppression/succession, and maintenance of roads and recreational trails. Of these threats, we believe that invasive species colonization is likely the most significant. Since the time of listing, however, additional occupied and unoccupied suitable habitat has been found along the southern part of the range. We therefore conclude that the likelihood of extirpation due to habitat loss in the southern part of the range is lower than was believed at the time of listing, because additional occupied habitat has been located.

b. Overutilization for commercial, recreational, scientific, or educational purposes:

We are not aware of any threats to the Smith's blue butterfly due to overutilization.

c. Disease or predation:

As discussed above in the Biology and Habitat section, heavy parasitism of Smith's blue butterfly larvae has been observed. However, it is unknown how widespread such parasitism is or how it affects Smith's blue butterflies at the population level.

d. Inadequacy of existing regulatory mechanisms:

The Smith's blue butterfly is not listed under the California Endangered Species

Act and therefore receives no protection therefrom.

The California Environmental Quality Act (CEQA) requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. When a project with potential impacts on the Smith's blue butterfly is reviewed, the subspecies would be considered endangered under section 15380 of CEQA because it is federally listed. 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 Sec. 21002). In the latter case, projects may be approved that cause significant environmental damage, such as destruction of listed endangered species or their habitat. Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

Occupied habitat of a federally listed species, occurring within the coastal zone, is considered an "environmentally sensitive area" under the California Coastal Act (section 30107.5). The California Coastal Act requires that environmentally sensitive habitat areas "shall be protected against any significant disruption of habitat values" (section 30241). Therefore, the California Coastal Act can provide protection to Smith's blue butterflies in those cases where they would be affected by a proposed project requiring a coastal development permit. The California Coastal Act would not provide benefits to those Smith's blue butterflies occurring outside the coastal zone or those affected by ongoing activities.

The Smith's blue butterfly is considered a rare or at risk species by the USFS because of its Federal listing as endangered (USFS 1999). Each National Forest was required to complete a Land and Resource Management Plan (LRMP) by the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976 (NFMA). Those acts require that the LRMPs provide for multiple use and sustained yield of the products and services obtained from the National Forests, including wildlife. Consideration of the subspecies by the USFS under NFMA and through consultations with the Service under the Act has lead to important surveys for the subspecies and its habitat and measures to minimize adverse effects of USFS actions. This has ensured that USFS actions do not jeopardize the continued existence of the Smith's blue butterfly and has contributed substantially to our knowledge of the subspecies (Arnold 2002; Service 2003). However, substantial threats to Smith's blue butterfly habitat due to invasive plants and lack of disturbance (as by fire) are ongoing on USFS lands.

The Smith's blue butterfly is listed as endangered under the Federal Endangered Species Act of 1973, as amended (Act). The Act and its implementing regulations provide substantial benefits to the Smith's blue butterfly by requiring consultation between the Service and other Federal agencies on the effects of Federal projects, to ensure that they are not likely to jeopardize the continued

existence of the subspecies. Consultation between the Service and USFS has led to surveys of USFS land, which have revealed additional habitat and populations (Service 2003). Consultation between the Service and USFS has also lead to measures to minimize the effects of the USFS' ongoing activities (including grazing, road maintenance, and recreation) on Smith's blue butterflies (Service 2004). Grazing use and seasons have been adjusted to allow continued grazing while minimizing its potential adverse effects on Smith's blue butterflies. Seasonal timing of actions, relocation procedures, and habitat restoration have been developed to minimize mortality of Smith's blue butterflies in cases where host plants are removed (such as during road maintenance) (Service 2004). Similar minimization has been incorporated in projects conducted, funded, or permitted by the U.S. Army Corps of Engineers (Service 2005) and Federal Highway Administration (Service 2000).

The Act and its implementing regulations provide benefits to the Smith's blue butterfly through the habitat conservation planning process, by requiring non-Federal entities that seek a permit to take Smith's blue butterflies to minimize and mitigate for such take. This has lead to restoration and permanent protection of habitat on non-Federal lands (Arnold et al. 2001, Gilchrist et al. 2006).

Section 6 of the Act provides a mechanism to fund research and recovery actions in partnership with the State, such as a recent restoration project at Marina State Beach (California State Parks 2006).

It is unlikely that these restoration, minimization, mitigation, and avoidance measures would continue to be implemented if the Smith's blue butterfly were not listed under the Act. The subspecies' status as endangered under the Act also ensures its consideration under other Federal and State acts, as discussed above. If the Smith's blue butterfly were not listed under the Act, land use and development projects on public and private lands would likely be implemented without consideration of the subspecies' needs, resulting in accelerated losses of habitat and decreases in populations.

e. Other natural or manmade factors affecting its continued existence:

Small or localized populations are particularly susceptible to catastrophic events (Shaffer 1981, Shaffer 1987, Meffe and Carroll 1997, Primack 1998). Extirpation of localized populations of Smith's blue butterflies due to stochastic events (weather, natural disasters, etc.) may adversely affect the subspecies as a whole. Throughout the range of the Smith's blue butterfly, the distance that dispersing adults must travel to reach the nearest buckwheat stand has likely increased in many areas due to habitat fragmentation, making it less likely that patches of habitat will be recolonized after local extirpations. The low vagility of adults coupled with fragmentation of suitable habitat reduces the probabilities of colonization events and migratory exchange between populations.

D. Synthesis

We recommend that the Service propose a downlisting of the Smith's blue butterfly's current status, from endangered to threatened. The occupied range of the Smith's blue butterfly is larger than was known at the time the subspecies was listed, and numerous new occupied sites have been found throughout the southern part of its range. We remain concerned that threats to the Smith's blue butterfly in the northern portion of the its range, along the coast of Monterey Bay from the Salinas River to Sand City, could result in extirpation of the subspecies from this area. This area is highly fragmented due to residential and industrial development, is isolated from the larger southern portion of the subspecies' range, and is threatened by planned future development and by ongoing habitat degradation due to invasive, non-native plants and industrial and recreational use. The best available locality information indicates that the subspecies' range has contracted substantially in this area, with historic localities from the Salinas River to the city of Monterey (approximately 11.5 mi (18.5 km)) and current localities only from the Salinas River to Sand City (approximately 9 mi (14.5 km)).

The larger, southern portion of the Smith's blue butterfly's range faces different threats than the northern portion. Habitat loss due to residential and commercial development is present but does not appear to be as imminent or large-scale as in the north. Invasive, non-native plants, which are largely unmanaged in the southern range, are widespread, and have been shown to cause local extirpations of suitable butterfly habitat. However, we consider this threat to be less imminent than it was at the time of listing due to the greatly increased number of known butterfly occurrences. A likely benefit to the Smith's blue butterfly population in this area is that it faces a lower level of threat due to the substantial amount of habitat found on public lands, especially the Los Padres National Forest.

We considered but rejected a recommendation to delist the subspecies based on the new occurrence information since the time of listing. Most of the occupied sites have been surveyed only once, and we have no substantial information on the persistence of such occurrences in the southern portion of the range. Further, the northern portion of the range continues to be threatened by urban development activities.

III. RESULTS

A. Recommended Classification: *Given your responses to previous sections, particularly Section II.D, Synthesis, do you recommend a change in the listing classification of the species (briefly summarize the reasons for this recommendation)?*

__X_ Yes, propose downlist to Threatened
____ Yes, uplist to Endangered

____ Yes, delist
___ No, no change is needed

B. New Recovery Priority Number 9C

Prior to this 5-year review, the recovery priority number for the Smith's blue butterfly was 9. Though the northern portion of the range is substantially more at risk than the southern portion, when averaged over the subspecies' entire range, the level of threats is moderate. The recovery potential for the subspecies is high, as it remains distributed over a relatively large range (although patchily) and a substantial amount of habitat occurs on protected lands. The appropriate recovery priority number for a subspecies with moderate threats and high recovery potential is 9. We have added the letter designation "C" to indicate that conflict between recovery of the subspecies and development projects may occur.

C. If applicable, indicate the Listing and Reclassification Priority Number (FWS only): 6

We expect that downlisting of the Smith's blue butterfly would have a low impact on management, as we expect that the level of management the subspecies receives under the Act would be very similar to the current level, if it were downlisted from endangered to threatened. We have not received a petition to downlist the Smith's blue butterfly. The appropriate reclassification priority number for a species where the reclassification would have a low impact on management and has not been petitioned is 6 (48 FR 43098).

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

We recommend that the recovery plan be revised to reflect our current knowledge of the subspecies' range and threats and to stress the importance of habitat restoration and connectivity. Updated delisting criteria should be included in the revised recovery plan.

We recommend that the overall effect of non-native species be evaluated, and the Service work with its partners to implement non-native species removal, as appropriate, throughout the range of the Smith's blue butterfly.

We recommend further surveys to quantify habitat and determine occupancy throughout the subspecies' range.

We recommend study of the effects of livestock grazing on Smith's blue butterflies and their habitat.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Smith's blue butterfly*

Current Classification ___Endangered___
Recommendation resulting from the 5-Year Review

__X_ Propose Downlist to Threatened
____ Uplist to Endangered
____ Delist
___No change is needed

Appropriate Listing/Reclassification Priority Number: 6

Review Conducted By ___Jacob Martin of the Ventura Fish and Wildlife Office___

FIELD OFFICE APPROVAL:
Lead Field Supervisor, Fish and Wildlife Service

Approve _____Date_____

REGIONAL OFFICE APPROVAL:
Lead Regional Director, Fish and Wildlife Service

Approve_____Date_____

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Smith's blue butterfly*

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____ Delist
___ No change is needed

Appropriate Listing/Reclassification Priority Number: 6

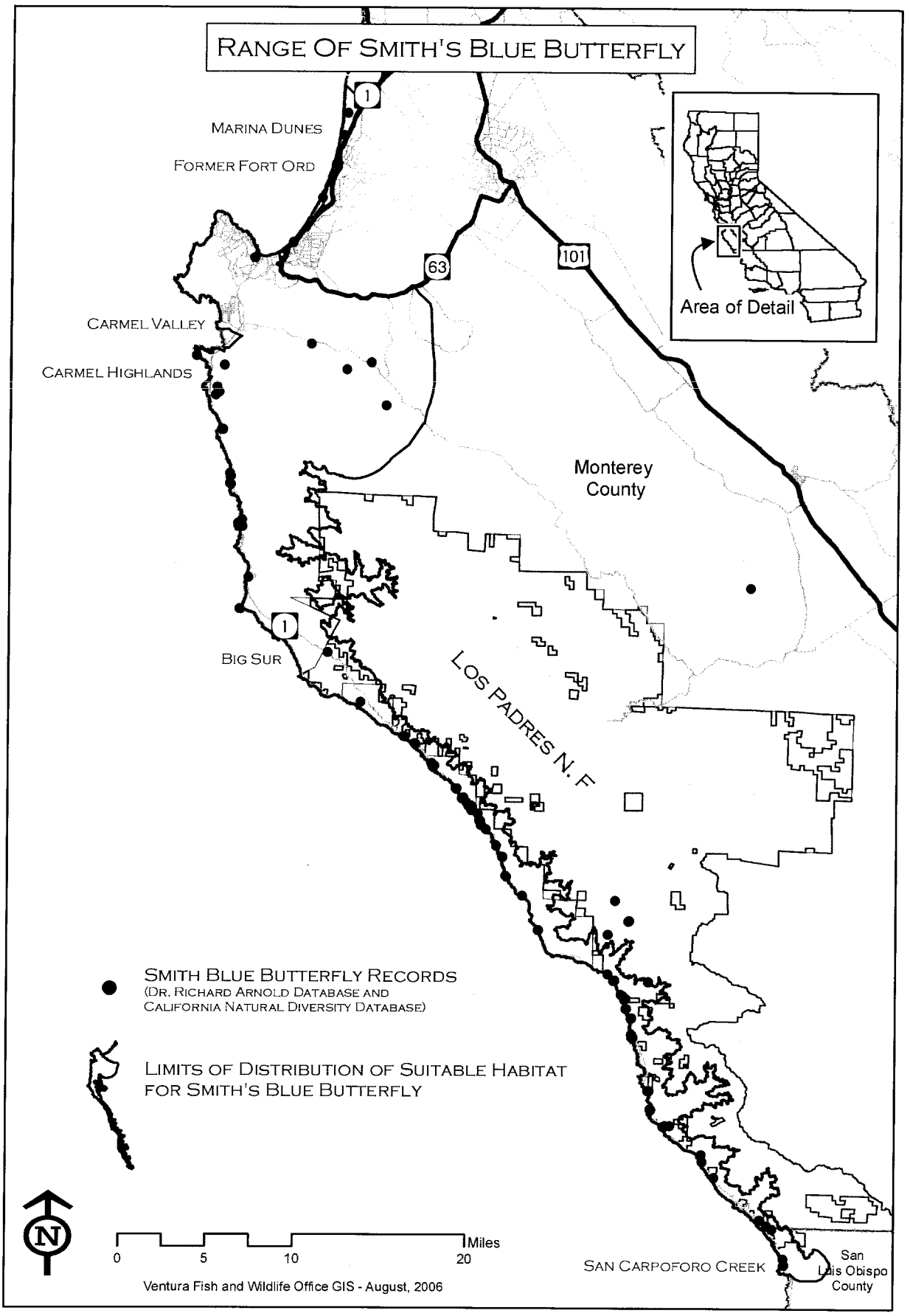
Review Conducted By ___Jacob Martin of the Ventura Fish and Wildlife Office___

FIELD OFFICE APPROVAL:
Lead Field Supervisor, Fish and Wildlife Service

Approve Diane K Noda Date 9/26/06

REGIONAL OFFICE APPROVAL:
Lead Regional Director, Fish and Wildlife Service

Approve Steve Thompson Date 9/26/2006


RANGE OF SMITH'S BLUE BUTTERFLY
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FORMER FORT ORD
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Area of Detail
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CARMEL HIGHLANDS
Monterey
County
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LOS PADRES N. F
SMITH BLUE BUTTERFLY RECORDS
(DR. RICHARD ARNOLD DATABASE AND
CALIFORNIA NATURAL DIVERSITY DATABASE)
LIMITS OF DISTRIBUTION OF SUITABLE HABITAT
FOR SMITH'S BLUE BUTTERFLY
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Ventura Fish and Wildlife Office GIS - August, 2006
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County