

San Clemente sage sparrow
(Amphispiza belli clementeae)

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



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

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5-YEAR REVIEW

San Clemente sage sparrow (*Amphispiza belli clementeae*)

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 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:

As summarized in the listing document (USFWS 1977, pp. 40682-40685), the San Clemente sage sparrow (*Amphispiza belli clementeae*) is a small songbird found only on San Clemente Island, California. The San Clemente sage sparrow has been found throughout xeric habitat on the island, preferring the maritime desert scrub where California boxthorn is common. The lowest population survey was recorded in 1984 at 38 individuals; contemporary populations have ranged from 452 individuals in 2000 to a high of 1,519 individuals in 2002. The current population was estimated to be 539 adults in 2008. The wild population can fluctuate annually in number, reproduces naturally, and has low annual juvenile survivorship. The San Clemente sage sparrow has been closely monitored by the U.S. Navy's (Navy) long-term sage sparrow contractor, the Institute for Wildlife Studies, Arcata, California (IWS).

Methodology Used to Complete This Review:

This review was prepared by the Carlsbad Fish and Wildlife Office (CFWO) using the Region 8 guidance issued in March 2008. We used information from the listing decision, unpublished annual survey information from species specialists who have been monitoring this species, and published literature. We received no information from the public. We received one letter from the State of California and information relevant to this review is discussed below. 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 within the next 5 years.

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Federal Register (FR) Notice Citation Announcing Initiation of This Review:

A notice announcing initiation of 5-year reviews of 58 species in California and Nevada and the opening of a 60 day period to receive information was published in the Federal Register (FR) on March 5, 2008 (USFWS 2008a, pp. 11945-11950). One letter from the State of California was received and relevant information was incorporated.

Listing History:

Original Listing

FR Notice: 42 FR 40682-40685

Date of Final Listing Rule: August 11, 1977

Entity Listed: San Clemente sage sparrow (*Amphispiza belli clementeae*), a bird subspecies.

Classification: Threatened

State Listing

San Clemente sage sparrow (*Amphispiza belli clementeae*) was listed by the State of California as a bird species of special concern in 1977.

Review History:

The Service initiated a 5-year review of San Clemente sage sparrow (*Amphispiza belli clementeae*) on September 27, 1982 (USFWS 1982, p. 42387) and opened a 120 day period to receive information. An additional 90-day period to receive information was reopened on February 3, 1983 (USFWS 1983a, p. 4860). The review was completed and no change in the listing status was recommended; however, at that time no summary was required to be published. Subsequently another review of the listing status of the species was initiated on July 7, 1987 (USFWS 1987, p. 25523). The results of this review were not published; however, the species continued to be listed as threatened in the table at 50 CFW 17.11. No change in status was recommended and no other review of the listing status of this species has been initiated since 1987.

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

The recovery priority number for San Clemente sage sparrow is 9 according to the Service's 2008 Recovery Data Call for the Carlsbad Fish and Wildlife Office based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (USFWS 1983b, p. 43098). This number indicates that the taxon is a subspecies that faces moderate degree of threat and has a high recovery potential.

Recovery Plan or Outline:

Name of Plan or Outline: U.S. Fish and Wildlife Service. 1984. Recovery Plan for the Endangered and Threatened Species of the California Channel Islands. U.S. Fish and Wildlife Service, Portland, OR.

Date Issued: January 26, 1984

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 limits listing as distinct population segments to vertebrate species of fish and wildlife. The 1996 Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act (USFWS 1996, p. 4722) clarifies the interpretation of the phrase "distinct population segment" for the purposes of listing, delisting, and reclassifying species under the Act. The San Clemente sage sparrow was listed as a subspecies. Since listing, information in the scientific literature suggests the subspecies' diagnosability is questionable and remains unresolved (see Taxonomy section, below). Until these questions are resolved, we continue to consider the sage sparrows on San Clemente Island a subspecies, as listed. Therefore, the DPS policy does not apply.

Information on the Species and its Status

Species Biology and Life History

The San Clemente sage sparrow is a small, monogamous passerine, endemic on San Clemente Island, California. It is a neutral grayish-brown colored sparrow with a small dark breast spot, complete white eye rings, and distinctive white and black malar stripes approximately 13-15 centimeter (5.1 - 5.9 inches) long, and weighs on average, 16.8 grams (0.59 ounces) (Martin and Carlson 1998, p. 2; Turner et al. 2005, p. 27).

The San Clemente sage sparrow is a ground gleaner and eats available insects and spiders, and also seeds taken from the ground and low vegetation. During the winter, San Clemente sage sparrows feed on prickly pear and cholla cactus fruit and moths (Hyde 1985, p. 24). Open nest cups are constructed of grass, lichen, and twigs and lined with feathers, flower heads, hair, and

grasses (Hyde 1985, p. 3; Petersen and Best 1985, pp. 217 - 221). The nests are built in low spiny vegetation approximately 25 centimeter (9.8 inches) above the ground; sparrow nest placement has shown a relatively narrow range of height (Turner et al. 2005, p. 50). Clutch size ranges from 1-5 eggs, with asynchronous hatching after 12-13 days of incubation conducted mostly by the female (Martin and Carlson 1998, p. 9). San Clemente sage sparrows are able to breed their first year and multiple clutches per year have been recorded, with most pairs producing multiple successful broods in favorable years (Martin and Carlson 1998, p. 9; Kaiser et al. 2008, p. 36). San Clemente sage sparrows express site fidelity each nesting season and juveniles disperse from natal area during their first winter.

Spatial Distribution

The San Clemente sage sparrow is a non-migratory island endemic (Kaiser et al. 2008, p. 33); it was historically common throughout the 14,500-hectare (35,830 acres) San Clemente Island (Grinnell 1897, p. 18; Breninger 1904, p. 221; Linton 1908, p. 85), one in the chain of the Channel Islands archipelago located 80 kilometers (49 miles) from the California coastline. It has the smallest distribution of any subspecies of sage sparrow, as it occurs only on San Clemente Island (Turner et al. 2005, p. 1). The San Clemente sage sparrow is distributed primarily within the lower marine terraces along the northwestern portion of San Clemente Island. The species appears closely tied to the maritime desert scrub plant communities on San Clemente Island (Willey 1997, p. 219). Recent estimates of potential available habitat include approximately 2,098 hectares (5,145 acres) of maritime desert scrub communities, approximately 373 hectares of high quality habitat along the lowest and northern-most marine terraces, approximately 667 hectares of medium quality habitat, and approximately 1058 hectares of low quality habitat (Turner et al. 2005, p. 18).

Abundance

The San Clemente sage sparrow has been close to extinction, with a low of 38 individual adults reported in 1984 (Hyde 1985, p. 30). Since that time, the population has fluctuated. Some of this population fluctuation, maybe related to differences in survey methods and areas surveyed (Kaiser et al. 2008, pp. 31-33). Early studies may have underestimated the sage sparrow population in the 1970s and 1980s, as they did not include *Lycium californicum* habitat at higher elevations and thus may have underestimated the total suitable habitat on San Clemente Island (Kaiser et al. 2008, pp. 31-33; Table 1). Contemporary populations have ranged from a low of 452 individuals in 2000 to a high of 1,519 individuals in 2002 (Kaiser et al. 2008, p. 102, USFWS 2008b. p. 170). Current populations (2008) were estimated to be 539 adults (Kaiser et al. 2008, p. 102).

Table 1. San Clemente sage sparrow adult population estimates 1976-2008 (taken from Kaiser et al. 2008, p. 102, and USFWS 2008b, p. 170).

Year	Area (ha)	Adult Population Estimate (individuals)
1976	740	93
1980	502	176
1981	502	360
1982	502	205
1983	502	198
1984	502	38
1985	502	91
1997	1821	294
1999	2098	578
2000	2098	452
2001	2098	578
2002	2098	1519
2003	2098	544
2004	2098	980
2005	2098	729
2006	2098	1216
2007	2098	716
2008	2098	539

There exists ecological complexity pertaining to San Clemente sage sparrow population fluctuations. When habitat quality started to change after nonnative grazers were removed (circa 1991), the San Clemente sage sparrow population started to improve. However, effects of past habitat conversion caused by nonnative animals on the native plant ecosystem persist. Contemporary population fluctuations are correlated to annual precipitation levels and the effect of that on habitat quality (Kaiser et al. 2008, pp. 36, 48).

The Navy's cooperator (IWS) has indicated via monitoring that juvenile sage sparrows experience a high first year mortality rate, and since 2001 annual juvenile survivorship has continued to decline (i.e. mortality has increased) (Kaiser et al. 2008, p. 126; Table 2). Neither adult survival nor juvenile survival, were correlated to rainfall or adult density (Kaiser et al. 2008, p. 37). The Service (USFWS 2008b, p. 171) suggested adult and juvenile survivorship may be underestimated, due to variability in population monitoring, so there may have been more juvenile survivors than currently estimated. The Navy has proposed to investigate juvenile survivorship using telemetry to improve understanding of this variable.

Table 2. Apparent annual survival of juveniles from 1999 to 2007 (from Kaiser et al. 2008, p. 126).

Year	Annual Apparent Juvenile Survival
1999-2000	0.41
2000-2001	0.71
2001-2002	0.39
2002-2003	0.29
2003-2004	0.2
2004-2005	0.03
2005-2006	0.15
2006-2007	0.08

Recent population viability analysis (PVA) modeling by IWS (Beaudry et al. 2003, pp. 46 - 47; Kaiser et al. 2008, p. 47) using current demographic information, suggest that the primary variable contributing to extinction risk is juvenile mortality. However, we note that despite the lowest recorded juvenile survival in 2004-2005, the adult population surged to the second highest recorded level in 2006, indicating the potential resiliency of the species to respond to this risk. Risk of juvenile mortality was followed by the impacts of drought frequency (Kaiser et al. 2008, p. 47), as precipitation affects plant and insect productivity and also affects food and cover availability for the San Clemente sage sparrow. Climate change could potentially exacerbate extant environmental conditions (Karl et al. 2009, pp. 13-152) to create additive and synergistic delimiting factors.

The models did not demonstrate a relationship between species persistence and habitat as long as conversion of sage sparrow habitat to other uses does not negatively impact sage sparrow demographic rates. The relationship between juvenile survivorship and habitat loss has also not been assessed to ascertain long term effects of habitat loss on juvenile survivorship. The Navy intends to continue monitoring this population, and this plan should provide important information on the San Clemente sage sparrow population, as well as juvenile survivorship (USFWS 2008b, pp. 167-185).

Habitat or Ecosystem

As a maritime volcanic island, San Clemente Island historically supported a unique assemblage of maritime sage scrub, coastal salt marsh, and island grassland flora and fauna, many of which were endemic to the island or the Channel Islands. Much of the original vegetation (diversity, structure, and function) has been lost due to habitat conversion caused by sheep ranching from 1862 through 1934 (Scott and Morrison 1990, pp. 25 - 27; Ferguson 1979, pp. 3 - 8), cattle ranching from 1850-1934 (up to 1,000 head of cattle), and feral goats which numbered in the early 1970s to over 12,000 goats (later removed by 1991). Further long term impacts to the island ecology occurred via the introduction of other nonnative plant and animal species, including multiple invasive grass species, feral cats, and black rats (an omnivore).

Habitat conversion caused by nonnative ungulates from the mid 1800s to 1991 altered the California boxthorn (*Lycium californicum*), cactus, and saltbush components of San Clemente sage sparrow nesting and foraging habitat. Changes to the forb and herb layer affected food and prey species (plant and insect). This change has created ecological situations that reduced protective cover and food/prey species for the San Clemente sage sparrow and created an ecosystem different from the pre-existing evolutionary pathway (Kaiser et al. 2008, pp. 27 - 29). Changes to sage sparrow nesting and foraging habitat are most evident in the upper marine terraces and the maritime desert scrub communities on the southern portions of the island.

Currently, approximately 14 percent of the island (2,098 hectares; 5184 acres) has been determined to be suitable for nesting by San Clemente sage sparrow (Turner 2005, p. 16; Kaiser et al. 2007a, p.15). Canyon shrub/woodland and maritime desert scrub boxthorn habitat, including the appropriate nesting substrate for the sage sparrow, has regenerated in some previously affected areas, which affords improved nesting opportunities (USFWS 2008b, p. 173), however this habitat improvement is limited. High quality habitat is located along the western shore in a portion of San Clemente Island that experienced less over grazing than other areas of the island.

San Clemente sage sparrow habitat currently includes approximately 3,000 hectares (7,413 acres) of suitable, xeric maritime desert scrub habitat located predominantly on the lower, marine terraces on San Clemente Island. Most breeding territories are found between 10 – 30 meters (32.8 – 98.4 feet) above sea level (ASL) (up to 150 meters (492.1 feet) ASL) on flat or rolling habitat which host cactus, saltbush, and maritime scrub. The metric, or correlate, for habitat quality which the U.S. Fish and Wildlife Service uses for this subspecies is sage sparrow density; density being defined as the number of sage sparrows per hectare. This translates into a raw percentage of the San Clemente sage sparrow population that occurs in high vs. medium vs. low quality habitat.

Habitat quality and the distinction between high, medium, and low quality habitat is important to understand the subspecies presence throughout San Clemente Island. High quality habitat appears closely related to high productivity of territories with more resources (nesting, roosting, and foraging) or an enlarged territory (Petersen and Best 1987, pp. 217 - 221). Medium quality habitat appears important to species persistence, as during drought years a higher percentage of the breeding population inhabits this habitat type (Hudgens pers. com. 2008). Low quality habitat encompasses approximately 30 percent of the total available habitat, and contains some sage sparrow breeding territories, however expresses low productivity. Low quality and some medium quality habitat may be a “sink” (Pulliam 1988, pp. 652 - 661; Dias 1996, pp. 326 - 330; Runge et al. 2006, pp. 925 - 928), “pseudo sink”, or “ecological trap” (Misenhelter and Rotenberry 2000, p. 2892; Schlaepfer et al. 2002, pp. 474 - 480; Battin 2004, pp. 1482 - 1491), rather than a source of productivity that most medium and high quality habitat appear to express. Habitat quality and resulting productivity generated from areas with varied quality provide an understanding of continued threats to the subspecies. Misenhelter and Rotenberry (2000, p. 2899) showed that per the subspecies of sage sparrows found in adjacent mainland California (*Amphispiza belli belli*), ecological traps may be common in anthropogenically altered habitat, and may have negative effects to habitat occupancy and nest site selection. As noted below, the

sage sparrow habitat on San Clemente Island is fragmented and altered in ways that display similarities to what Misenhelter and Rotenberry (2000, pp. 2892 - 2901) discerned.

Changes in Taxonomic Classification or Nomenclature

The San Clemente sage sparrow (*Amphispiza belli clementeae*) was first recognized as a subspecies by Grinnell (1897); Ridgeway (1898) noted its smaller size and larger bill when contrasted to nominate subspecies (*A. b. belli*) found on the coastal mainland. The diagnosability of the *A. b. clementeae* was supported by van Rossem (1932) who noted the island birds had longer bills, paler backs as adults, and paler juvenile plumage compared to the mainland nominate subspecies. Grinnell and Miller (1944, p. 503) also supported the island subspecies based on longer bills and paler juvenile plumage, but noted that it was “weakly differentiated”. Additionally, the American Ornithologists’ Union (AOU) Committee on Classification and Nomenclature accepted this subspecies (AOU 1957, pp. 605–606) in their fifth edition of the Check-List of North American Birds, which was the last time they explicitly addressed subspecies.

However, since listing, Patten and Unitt (2002) reevaluated the diagnosability of the sage sparrow complex by applying Amadon’s 75 percent rule (Amadon 1949) to morphometric and plumage characteristics. They found no statistically significant difference in bill lengths between the island and mainland birds, but they did find a statistically significant difference in the means of back color of adults (Patten and Unitt 2002, p. 33). However, in applying the 75 percent rule, they found that island and mainland birds were not diagnosable by using back color (see Patten and Unitt 2002 for a discussion comparing diagnosability using the 75 percent rule and differences in arithmetic means). Patten and Unitt (2002) also evaluated other sage sparrow subspecies. In all, they synonymized *Amphispiza belli clementeae* under *A. b. belli*, and *A. b. canescens* under *A. b. nevadensis*.

More recently, Cicero and Johnson (2006) reevaluated Patten and Unitt’s (2002) data using more rigorous criteria for selecting specimens representing *Amphispiza belli canescens* and *A. b. nevadensis*. Cicero and Johnson’s (2006) evaluation of one subspecies pair came to the opposite conclusion from Patten and Unitt’s (2002)—that is, *A. b. canescens* and *A. b. nevadensis* are, diagnosable under the 75 percent rule. Cicero and Johnson (2006) did not reevaluate the data comparing *A. b. clementeae* and *A. b. belli*, but the errors in the specimen selection process used by Patten and Unitt (2002) to evaluate *A. b. canescens* and *A. b. nevadensis* (as identified by Cicero and Johnson (2006)) raises questions over Patten and Unitt’s (2002) conclusion regarding *A. b. clementeae* and *A. b. belli*. Until these questions are resolved, we continue to consider the sage sparrows on San Clemente Island a subspecies, as listed.

Genetics

Because of geographical isolation and separation from the mainland, this non-migratory subspecies presumably evolved enhanced morphological divergence from other mainland lineage comparable to other island species (Grant and Grant 1995, pp. 241 - 251). Johnson and Marten (1992, pp. 1 - 19) examined genetic variation of *Amphispiza belli belli*, *A. b. canescens*, and *A. b. nevadensis*, and recommended *A. b. belli* and *A. b. canescens* are a single subspecies. However, to date there have been no analysis which examine genetic variation of the non-migratory

San Clemente sage sparrow contrasted with both migratory and non-migratory mainland subspecies of sage sparrow.

Species-specific Research and/or Grant-supported Activities

Since 1976, the Navy has supported nearly annual monitoring of the San Clemente sage sparrow population, including color banding to augment demographic analysis of the adult and juvenile population. Nest surveys have also been used to analyze habitat, ascertain nesting success, and examine potential cause of nesting failures and high juvenile mortality. These efforts have been summarized in reports by cooperators and IWS (Hyde 1985; Munkwitz et al. 2000; Munkwitz et al. 2002a, 2002b; Beaudry et al. 2003; Turner et al. 2005, 2006; Kaiser et al. 2007a, 2007b).

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 final listing rule identified that the habitat was being modified by the browsing effect of feral goats and the rooting effect of feral pigs (USFWS 1977, pp. 40682-40685); the recovery plan was more specific and indicated that goats were the primary threat, circa 1984 (USFWS 1984, p. 87).

Since listing, goats and pigs have been eradicated and the threat of browsing has been ameliorated. Approximately 29,000 goats were removed from San Clemente Island between 1972 and 1991 (Keegan et al. 1994, pp. 57). Cessation of the defoliation of native vegetation and soil compaction caused by nonnative grazing animals has stopped direct habitat degradation. However, previous ranching altered multiple aspects of San Clemente Island ecology including herb/forb vegetation and the low shrubs and California boxthorn used for nest and perch sites by the sage sparrow (USFWS 1977, pp. 40682-40685). Current threats include military activities, development of an assault vehicle maneuver area, and fire resulting from military activities.

Military Activities

San Clemente Island reverted from private landowner to Navy control in 1934 by Executive Order 6897 of the Franklin D. Roosevelt Administration. The Navy currently uses much of San Clemente Island for military exercises. Activities resulting in habitat destruction range from high impact bombing and special weapons training, as well as low impact overland foot and vehicle travel, including shoreline, ground, and aerial SEAL covert mission training.

Just over 145 hectares (358 acres) of the island (1.0 percent) have been developed specifically for training and billeting of staff and operators using the island. The developed portion of the island which removed native habitat includes several areas for about 300 buildings and facilities, a primary airfield, and a secondary airfield, now used for vehicle and equipment storage and

troop staging. In addition, some training areas including a Shore Bombardment Area, Missile Impact Range, Training Area Ranges, and other frequently used training areas host conditions that are not conducive to avian nesting due to disruptive human activities. The area directly impacted by ordnance and training activities is a limited portion of the island; much of San Clemente Island is managed for infrequent human use (USFWS 2008b, p. 175). Natural resources conservation activities occur throughout the island. Previously defoliated vegetation in sage sparrow habitat is recovering slowly, and increasing in age and size without the pressure from nonnative herbivores.

At the present time, the impacts to sage sparrows of military training activities have been limited, because most of the intensive impacts occur outside of sage sparrow habitat. Sage sparrows, at low densities, have continued to inhabit and successfully reproduce in habitat adjacent to a frequently utilized Special Warfare training area. The Navy has used adaptive management approaches to alter training activities and flight patterns of helicopters when shrike and sage sparrow breeding areas are found nearby, as well as transect monitoring of habitat to determine sage sparrow population trends.

Implementation of the Navy's sage sparrow monitoring has yielded information that provides a more thorough analysis of the population demography, and distribution of the species in extant habitat. Negative impacts to land and resources have been mostly ameliorated by implementation of the Navy's Integrated Natural Resource Management Plans (INRMP) (U.S. Navy 2002, pp. 7.1 - 7.22), and monitoring (Hyde 1985; Munkwitz et al. 2000; Munkwitz et al. 2002a, 2002b; Beaudry et al. 2003, 2004; Turner et al. 2005, 2006; Kaiser et al. 2007a, 2007b). These surveys have resulted in improved ecological and biological data used to alter human and landscape management practices.

Fire from Military Activities

The Service recently completed a Biological Opinion (USFWS 2008b, pp. 1-237) regarding the Navy's enhancement of San Clemente Island Range Complex capabilities, increases in training exercises, and changes to fire management activities. The potential for accidental fires to occur within occupied sage sparrow habitat exists from military training activities on San Clemente Island. The Navy has developed a model to provide inference into anticipated fire patterns, and has developed fire thresholds for various plant communities to determine if and when adaptive management may become necessary (USFWS 2008b, p. 177). Approximately 169 hectares (418 acres) of sage sparrow habitat, that supports an average of 7 percent of the sage sparrows population (27-93 individuals), occur within existing and proposed operational boundaries under the proposed action (USFWS 2008b, pp. 174-175). The proposed increases in training frequency, and addition of new types of training activities within sage sparrow habitat, are likely to modify or degrade some sage sparrow habitat.

Fire was not considered a threat to the San Clemente sage sparrow in the listing rule; however, our understanding of fire in maritime island scrub habitat and grasslands has changed since the listing of the subspecies in 1977 (Dyer 2002, pp.101 - 111). Fire is a natural component for regeneration and maintenance of many habitats; however, maritime desert scrub communities on San Clemente Island are not believed to have been fire-dependent due to maritime related

humidity, limited natural ignition sources, and adaptations of specific indigenous plants. Sources of fire prior to the mid 1800s have historically been natural lightning (rare) and pre-historic humans (U.S. Navy 2002, p. 3).

Cascading ecological effects of fire introduced specifically in the habitat of San Clemente Island, which now contains areas of dense nonnative plant cover, have not been specifically detailed or studied on the island; however, we believe the general habitat structure and fire ecology processes are comparable to other areas where these effects have been studied (Keane et al. 2002, pp. 3 - 11; D'Antonio and Vitousek 1992, pp. 63 - 87). We believe that fire caused by anthropogenic activities on San Clemente Island habitat affects: 1) nutrient recycling; 2) natural regulation of succession via selecting and regenerating plants; 3) biological diversity; 4) biomass; 5) insect and disease populations; 6) interaction between plants and animals; and 7) biological and biogeochemical processes (i.e., soil property alteration) (Keane et al. 2002, pp. 3-11).

While the Service (USFWS 2008b, p. 210) concluded that, the threat of wildfire associated with proposed increases in training activities would not jeopardize the continued existence of the sage sparrow, the Biological Opinion recognized that fires were likely to adversely affect the sage sparrow and there existed a high degree of uncertainty regarding the extent, intensity, and impact of future fires (USFWS 2008b, p. 177).

Fire may adversely affect regeneration patterns of boxthorn, shrubs, and small trees on San Clemente Island, as well as natural regeneration following potential removal of exotic vegetation. With the implementation of the INRMP (U.S. Navy 2002) and development and implementation of a Fire Management Plan (U.S. Navy 2006; USFWS 2008b), the Navy intends to limit ignitions and effectively control fires on San Clemente Island. The use of helicopters for firefighting and an increase in the on-island firefighting cadre has reduced fire sizes since implementation of these precautionary measures (U.S. Navy 2002, pp. 5-1 – 5-122).

A recent model by Snyder et al. (2002, p. 3) suggests higher average temperatures for every month in every part of California over the next century as a result of climate change, which may also create drier, more combustible fuel types on San Clemente Island, especially where nonnative grasses persist. Small escaped fires on San Clemente Island have the potential to turn into large conflagrations due to wind, and weather conditions of temperature and humidity. However, the aforementioned Fire Management Plan (U.S. Navy 2006; USFWS 2008b) will aid to minimize this potential.

Development of Assault Vehicle Maneuver Area

Approximately 57 hectares (142 acres) of low density sage sparrow habitat lies within the boundaries of an area proposed as an Assault Vehicle Maneuver Area. Off-road vehicle use in this area is expected to result in erosion and the spread of nonnative exotic plant species; however the Navy plans to reduce the potential for off-site erosion impacts via implementation of an erosion control plan and will continue efforts to prevent the spread of invasive plant species into adjacent sage sparrow habitat.

Summary of Factor A:

The primary threat to habitat identified at listing - browsing effect of feral goats and the rooting effect of feral pigs - has been eliminated. While the nonnative ungulates have been physically removed from the island, the lasting effects of defoliation and trampling, plant composition changes, and overgrazing have caused alteration and negative effects to the sage sparrow habitat. The Service recently completed a Biological Opinion (USFWS 2008b, pp. 1-237) regarding the Navy's enhancement of San Clemente Island Range Complex capabilities, increases in training exercises, and changes to fire management activities. These actions impact the subspecies by altering up to 10 percent of current sage sparrow habitat. However, at the present time, the impacts to sage sparrows of military training activities have been limited, because most of the intensive impacts occur outside of sage sparrow habitat. Sage sparrows, at low densities, have continued to inhabit and successfully reproduce in habitat adjacent to a frequently utilized Special Warfare training area, and are also present in areas used less frequently for training. The Navy has initiated an effort to reduce the introduction and spread of invasive plant species. In addition, the Navy has proposed changes to fire management plans to improve protection of native habitats from fire caused by Navy activities.

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

Overutilization for any purpose does not appear to be a threat at this time, nor was it considered a threat in the listing rule (USFWS 1977, p. 40684).

FACTOR C: Disease or Predation

At the time of listing, disease was not identified as a threat in the final listing rule (USFWS 1977, p. 40684). In the listing rule predation by feral cats was noted as a probable factor affecting the San Clemente sage sparrow (USFWS 1977, p. 40684). The recovery plan mentioned predation as a threat to the subspecies (USFWS 1984, p. 87).

Since listing, predation continues to be a threat by introduced black rats and feral cats, and natural predators (San Clemente Island fox (*Urocyon littoralis*), ravens (*Corvus corax*), barn owl (*Tyto alba*), San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*), American kestrels (*Falco sparverius*), red-tailed hawks (*Buteo jamaicensis*), sharp-shinned hawks (*Accipiter striatus*), Coopers' hawks (*Accipiter cooperii*), merlin (*Falco columbarius*), and American peregrine falcons (*Falco peregrinus anatum*)) (Kaiser et al. 2008, p. 29). Rodents subtly affect habitat components, by consuming plant material and preying on eggs and chicks of birds. Predation rates for the sage sparrow on San Clemente Island are currently estimated to be higher than similar species on mainland California (Kaiser et al. 2008, p. 38). Predation is considered to be a factor affecting population resurgence (USFWS 1984, p. 84) and has been considered the greatest cause of annual mortality of the much larger San Clemente loggerhead shrike (Juola et al. 1997, p. 104; Heath et al. 2007, p. 35).

Efforts to negate predation by nonnative vertebrate species are ongoing, and are treated by the Navy's INRMP (U.S. Navy 2002, pp. 4-66), which provides practicable means to reduce and

eliminate feral cats, black rats, and other nonnative rodents. Predator populations and their control are addressed as a part of the predator management program enacted by the Navy (U.S. Navy 2002, pp. 5-1 – 5-122; USFWS 2008b, p. 172). Though this program affords some protection to the sage sparrow, it is focused on protection of the San Clemente loggerhead shrike and does not target areas on the island where sage sparrows are found at higher densities.

To date, complete removal of predators has not been achieved, though removal of feral cats has been performed through trapping and Navy personnel are not allowed to feed feral cats. Rodent control has been effective through traps and bait stations around nest sites using Quintox (active ingredient cholecalciferol). The Navy has removed numerous cats, and rodenticide was calculated to have impacted 26,473 rodents in 2000 (U.S. Navy 2002, pp. 4-66). However, rodents are still abundant and recent efforts to control rats “has little significance to the San Clemente sage sparrow population because efforts are focused at loggerhead shrike breeding sites, with no rat control and limited feral cat control in sage sparrow habitat” (Kaiser et al. 2008, p. 29).

West Nile Virus has been known to be extant in southern California since 2004 (Reisen et al. 2004, p. 1374), but no records suggest that this disease has affected adult or juvenile sage sparrows on San Clemente Island. The closest record of West Nile Virus is on mainland California, and migratory birds use San Clemente Island during fall and winter months. On San Clemente Island, mosquitoes would be present during winter months when migrants were on-island. Avian pox has also been noted as a potential source of mortality; in 2007 and 2008, there were observations of lesions resembling avian pox on sage sparrows which were captured during banding (Kaiser et al. 2007b, p. 81; 2008, p. 38). Avian pox is highly contagious, and has been considered to be a factor contributing to the decline and demise of Hawaiian avifauna (Atkinson et al. 2005, p. 538). To date, no diagnostic work has been conducted on the lesions to determine if they are a form of avian pox. If confirmed to be present on San Clemente, avian pox could cause or contribute towards a rapid population reduction of juvenile and adult sage sparrows. At this time, ecto and endo parasites are not known to be a threat for San Clemente sage sparrows.

Summary of Factor C:

At the time of listing, nonnative predators were considered a probable factor affecting the subspecies, though there was no direct evidence that the San Clemente sage sparrow suffered from its coexistence with feral cats on the island (USFWS 1977, p. 40684). Since listing, predation by feral cats and rodents, have been identified as threats (Kaiser et al. 2008, p. 38). Although focused on San Clemente loggerhead nesting sites and release sites, predator control efforts conducted by the Navy help to reduce the threat of predation. Other potential threats include West Nile virus and avian pox, though no cases have been confirmed on the island.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

State Protections

California Environmental Quality Act (CEQA): CEQA requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant

effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved. Due to San Clemente Island being a Federal installation, few opportunities occur for a State or local government nexus, and CEQA is not mandated.

California Coastal Act (CCA): The California Coastal Commission considers the presence of listed species in determining environmentally sensitive habitat lands subject to section 30240 of the California Coastal Act of 1976, which requires their protection. Some of the major accomplishments of this act include: reduction in overall development, the acquisition of prime habitat along the coast, restoration of coastal streams and rivers, and a reduction in the rate of wetland loss. The CCA was not discussed in the INRMP.

Federal Protections

National Environmental Policy Act (NEPA): NEPA (42 U.S.C. 4371 *et seq.*) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigations that could 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.

Endangered Species Act of 1973, as amended (Act): The Act is the primary Federal law providing protection for this species. The Service's responsibilities include administering the Act, including sections 7, 9, and 10. Since listing, the Service has analyzed the potential effects of Federal projects under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 C.F.R. § 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct". Service regulations (50 CFR 17.3) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that results from, but is not the purpose of,

carrying out an otherwise lawful activity by a Federal agency or applicant (50 C.F.R. § 402.02). Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an incidental take statement.

Sikes Act: The Sikes Act (16 U.S.C. 670) authorizes the Secretary of Defense to develop cooperative plans with the Secretaries of Agriculture and the Interior for natural resources on public lands. The Sikes Act Improvement Act of 1997 requires Department of Defense installations to prepare Integrated Natural Resource Management Plans (INRMPs) that provide for the conservation and rehabilitation of natural resources on military lands consistent with the use of military installations to ensure the readiness of the Armed Forces. INRMPs incorporate, to the maximum extent practicable, ecosystem management principles and provide the landscape necessary to sustain military land uses. While INRMPs are not technically regulatory mechanisms because their implementation is subject to funding availability, they can be an added conservation tool in promoting the recovery of endangered and threatened species on military lands. The Navy prepared the San Clemente Island INRMP in 2002 to provide for mission and natural resource protection on the island (U.S. Navy 2002, pp. 5-1 – 5-122). The Navy continues its commitment for conservation of the San Clemente sage sparrow with multiple conservation approaches as delineated in the INRMP (U.S. Navy 2002, pp. 5-1 – 5-122). Because of the INRMP (U.S. Navy 2002, pp. 1-1 – 7-22), and recently the Biological Opinion regarding expanded training efforts (USFWS 2008b, pp. 1 - 237) the Navy through its contractor IWS continues to monitor the San Clemente sage sparrow via transect surveys, provides for some invasive plant control, and provides for additional cat management that is outside of the San Clemente loggerhead shrike nesting area.

Migratory Bird Treaty Act (MBTA): The MBTA and its implementing regulations (50 CFR Parts 20 and 21) directly protect certain bird species, and their eggs and nests, from being killed, taken, captured, or pursued. However, it does not protect habitat except to the extent that habitat alterations would directly kill birds.

Summary of Factor D:

The Endangered Species Act is the primary Federal law that provides protection for this species since its listing as endangered in 1977, and protection continues via interagency Section 7 consultation processes. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in absence of the Endangered Species Act.

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

The final listing rule identified introduction of nonnative species as a primary threat to the San Clemente sage sparrow (USFWS 1977); the recovery plan indicated that exotic plants and animals and corresponding changes in vegetation were the primary threat, at the time (USFWS

1984, p. 87). This has been discussed in Factor A. Recent Factor E threats discerned after the subspecies was listed include: small population size, stochastic events, and climate change.

Small Population Size

While few nests and only 90 individual sage sparrows were known at listing (1977), the population further declined to 38 individuals in 1984. Current populations (2008) were estimated to be 539 adults or nearly 270 pairs assuming 1:1 sex ratio for 2008 (Kaiser et al. 2008, p. 102). Analysis of the effective population (sex ratio, breeding propensity per individual and pair, mate choice, mortality during breeding, etc.) suggest less than 539 adults were actually breeding during 2008. Monitoring has shown that low density habitat does provide for breeding, however birds utilizing these areas demonstrate low productivity and may not be able to contribute to the populations, because this habitat may be a population sink.

Population modeling conducted by B. Hudgens of IWS postulates that short and long term sage sparrow demography has several vulnerable points that may affect population stability including increasing juvenile mortality, increasing adult mortality, continued and increased levels of drought, lowered prey availability, and variability of productivity in high, medium, and low quality habitat areas (Hudgens pers. com., 2008). Further, the demography may be affected by current and planned future increased training cycles for regular and Special Operations groups operating on the Island. Genetic effects may further influence population demography via inbreeding depression and genetic drift. Allee (1931, pp. 17-50) suggested small, single populations are vulnerable to extirpation when opportunities for reproduction diminish because of reduced opportunity of individuals to find each other (Allee effect or depensation) (Courchamp et al. 2008, pp. vi - 216). Stephens et al. (1999, pp. 185 -190), Dennis (2002, pp. 389 - 401) and Courchamp et al. (2008, pp. vi - 216) suggest that the Allee effect is a density-dependent event that is inversely related to population size.

Caughley (1994, pp. 215 - 244), after Franklin (1980, pp. 135 - 148) asserted differences in conservation biology approaches to rare species management by positing two distinct paradigms that have been used to advance theory, and are directly applicable to the population of San Clemente sage sparrow. One paradigm, small populations, attempts to understand and treat how low population numbers intrinsically affect short and long-term persistence. The second paradigm, declining populations, attempts to gauge the biological and ecological factors that contribute to a species population reduction, and methods to reverse population trends. Both paradigms play pivotal roles in understanding mechanisms of population decline and species loss, while developing conceptual and empirical solutions to thwart extirpation of nodes of metapopulations, reduction of a species' range, loss of peripheral populations, and avoidance of full/sub-species extinction (Asquith 2001, pp. 345 - 352); all factors which have affected the San Clemente sage sparrow. Understanding the differences between these paradigms is necessary to treat the dilemma of the small population of San Clemente sage sparrow and the remaining threats.

Aspects of conservation biology literature commonly note the vulnerability of taxa known from one or very few locations and from small populations. The long term effects on the demography of declining, or in this instance populations that have been small and are slowly increasing are

amply documented (Caughley 1994, p. 227; Groom et al. 2006, pp. 375 - 418). Small populations are highly vulnerable to demographic, genetic, and environmental stochastic events, and natural catastrophes (Caughley 1994, pp. 217 - 227; Asquith 2001, pp. 345 - 352). Genetic stochastic events can further influence population demography via inbreeding depression and genetic drift (Lande 1988, pp. 624 - 635; Whitlock and Bürger 2004, pp.155-170). In particular, the current small population size of San Clemente sage sparrow may already be demographically and/or genetically limited where it may be difficult for the sage sparrow to persist long-term (Whitlock and Bürger 2004, pp. 161, 167-170) without captive breeding and/or population augmentation. At the current low population level, Allee effects make potential population augmentation difficult (Courchamp et al. 2008, pp. 160 - 209) because of a reduced effective population available for breeding.

Forming and analyzing innovative conservation approaches using outside experts (Meffe et al. 1998, p. 268) may be necessary for the Service and the Navy to continue to benefit the species, and move the species towards recovery. Addressing San Clemente sage sparrow population demography will require careful analysis to balance short and long term conservation strategies.

Stochastic events

Floods, fires, or drought, can substantially reduce or eliminate small populations and increase the likelihood of extinction (Lande 1993, p. 912). Small populations are more vulnerable to natural catastrophes and stochastic demographic, genetic, and environmental events. Population modeling (Beaudry et al. 2003, p. 31; Kaiser et al. 2008, pp. 102 - 140) suggests the San Clemente sage sparrow faces a high risk of extinction over the next 35-50 years due to the low apparent juvenile survival rate. We plan to work with the Navy to obtain current and accurate information from the telemetry study on adult and juvenile survival rates.

Drought frequency has been denoted as a threat to the continued existence of the San Clemente sage sparrow (USFWS 2008b, p. 171). Periodic and successive droughts are considered an underestimated ecological stress and selection factor that impact forest and glade biological diversity, shaped by species-specific ability to withstand these effects (Gutschick and BrassiriRad 2003, p. 37; Archaux and Wolters 2006, p. 645). Few studies have assessed the biological impact of summer or seasonal droughts on predator and prey dynamics (Archaux and Wolters 2006, p. 645). The current extended drought effecting San Clemente Island may be having deleterious effects on San Clemente sage sparrow (Kaiser et al. 2007b, p. 48).

Climate Change

Climate change has already had a deleterious effect on natural environments, and is not viewed as a postulated event (Karl et al. 2009, pp. 13 - 152). Climate change is expected to affect plants and wildlife in southern California, as well as throughout the world, by expediting alterations of naturalized conditions in which the species have evolved, and by creating conditions where invasive species out-compete endemics (Field et al. 1999, pp. 17 - 42; CEPA 2006 p. 33; IPCC 2007, pp. 2 - 18). Climate change related effects are not known to be directly causing impacts on site-specific adaptations of species and endemic terrestrial biodiversity on San Clemente Island due to a lack of island-specific climate change related research, but are being experienced in

other locations where they are studied (McDonald and Brown 1992, pp. 410 - 414; Boggs and Murphy 1997, pp. 39 - 48; Parmesan and Yohe 2003, pp. 37 - 41; Parmesan 2006, pp. 638 - 656; Schwartz et al. 2006, pp. 1611 - 1615; Thomas et al. 2004, pp. 145 - 148, 2006, pp. 415 - 416). From an ecological context, current models and scientific thought suggest that southern California likely will be adversely affected by global climate change through prolonged seasonal drought, and rainfall coming at unusual periods and different amounts (Pierce 2004, pp. 1 - 33, Cayan et al. 2005, pp. 3 - 7, CEPA 2006, p. 33). These phenomena are already being experienced on San Clemente Island (USFWS 2008b, p. 171).

Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, pp. 17 - 42; Cayan et al. 2005, pp. 3 - 7; IPCC 2007, pp. 2 - 18; Karl et al. 2009). Predictions of short and long-term climatic conditions for smaller sub-regions such as California, and the Channel Islands, remain uncertain. It is unknown at this time if climate change in California will result in a warmer trend with localized drying, higher precipitation events, and/or more frequent El Niño or La Niña events (Pierce 2004, p. 31). While we recognize that climate change is an important issue with potential effects to listed species and their habitats, we lack adequate information to make precise oceanographic and atmospheric predictions regarding its effects to the San Clemente Island sage sparrow, its food/prey, and its habitat. However, current trends based on demographic and meteorological information suggest climate change has already affected the island by droughts and unpredictable precipitation, El Niño cycles, and in the future may cause worse droughts or extended dry periods on Channel Island archipelago via lessened low stratus cloud regime and hydrologic effects of reduced fog delivery (Fischer et al. 2006, 2007, pp. 783 - 799; NOAA 2009). We are uncertain as to the site specific effects of climate change on San Clemente Island; however, it has been shown that climate change is affecting coastal and inland habitat in the United States (Karl et al. 2009, pp. 13 - 152).

Summary of Factor E:

Threats inherent to small populations exacerbate extant threats to the breeding potential and survival of the sage sparrow. Drought frequency has been denoted as a threat to the continued existence of the San Clemente sage sparrow. Periodic and successive droughts are considered an underestimated ecological stress and selection factor that impact forest and glade biological diversity, shaped by species-specific ability to withstand these effects. Meteorological variations from the historical trend predicted to occur and those that are currently realized may be attributable to climate change.

III. RECOVERY CRITERIA

Recovery plans provide guidance to the Service, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently,

and the species is robust enough, to downlist or delist the species. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on progress that has been made toward recovery since the species was listed (or since the most recent 5-year review) by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated.

No recovery criteria were delineated for the San Clemente sage sparrow in the recovery plan (USFWS 1984, pp. 1 - 165). The plan was written for multiple plant and animal species, and broadly indicated that “*recovery of these endangered and threatened (E/T) taxa will be dependent upon the restoration, enhancement, and management of respective island ecosystems on San Clemente, Santa Barbara, and San Nicolas Islands.*” While not specific to population demography or habitat standards as recovery criteria, the narrative briefly assessed the extant threats to the San Clemente sage sparrow, concentrating mostly on habitat conversion caused by nonnative grazing animals. The Navy has made progress in developing integrative programs to monitor the population and subsequent population fluctuations, and work to address invasive plant and animal issues, despite increasing military activities in sage sparrow habitat. Due to current threats caused by anthropogenic activities, predation, and continued small population size, recovery for the San Clemente sage sparrow has not been attained.

IV. SYNTHESIS

While the San Clemente sage sparrow population has improved from the low of 38 individuals in 1984, it remains small and fluctuates considerably on an annual basis; currently, over 500 adult individuals exist in the wild. The primary threat identified at listing, the browsing effect of feral goats and the rooting effect of feral pigs, has been eliminated, although impacts to the habitat from the historic overgrazing remain. Other factors including: 1) habitat modification from military activities, increased fire frequency, and fire suppression activities (Factor A), 2) predation from introduced and native predators (Factor C), 3) potential threat of disease (Factor C), 4) small population size, low juvenile survivorship, and limited distribution (Factor E), and 5) climate change (Factor E), continue to affect the San Clemente sage sparrow. The Navy has provided considerable leadership to help alleviate remaining threats to the sage sparrow and conserve listed species on the island through implementation of the INRMP, including population monitoring and removal of nonnative plant and animal species in portions of the island. The Navy has worked to manage anthropogenic disturbance to sage sparrow nesting habitat and promote mitigation and avoidance of the sage sparrow during military activities. These efforts have resulted in higher adult populations in the last decade. However, juvenile survivorship has continued to decrease and remains a concern. Due to ongoing threats throughout its range, the San Clemente sage sparrow remains at risk of becoming endangered in the foreseeable future. Consistent with our recommendations in previous reviews when adult

population estimates were much lower than those observed in recent years, we recommend that the status of the San Clemente sage sparrow, as threatened, remain unchanged at this time.

V. RESULTS

Recommended Listing Action:

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

New Recovery Priority Number and Brief Rationale: No change.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

- 1) Work with the Navy to remove all cats, black rats, and other nonnative mammals from San Clemente Island.
- 2) Develop and provide for peer review (Ralls et al. 1996): a) a threats-based recovery plan utilizing recent published and unpublished empirical data, and b) threats-based criteria for recovery under the Act.
- 3) Complete telemetry study to provide additional information regarding adult and juvenile survivorship. Determine the accuracy of current juvenile survivorship estimates.
- 4) Complete appropriate population based wildlife health and mortality studies on all life stages based on current diseases and conditions known to adversely impact wild bird populations in Southern California to assess if mortality causes can be reduced.
- 5) Assess sage sparrow response to adjacent training activities as new weapons ranges become operational to better understand effects/threats associated with military disturbances, such as activities and potential fires.
- 6) Increase emphasis on vegetation restoration at other locations of the island to support expansion of the sage sparrow population throughout San Clemente Island. Increase the quantity of high quality habitat on the island.
- 7) Evaluate the potential need and feasibility for controlled propagation that would not adversely impact the current wild population and determine how it will effectively contribute to recovery of the San Clemente sage sparrow. Develop capture framework, species survival plan, species action plan, and controlled propagation plan reflective of Service policy for a captive breeding program.

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Personal Communication

Brian Hudgens, Institute of Wildlife Studies, Arcata, CA. Sept. 2008.

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

San Clemente sage sparrow (*Amphispiza belli clementeae*)

Current Classification: Threatened

Recommendation Resulting from the 5-Year Review:

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

Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

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

Approve _____



Scott A. Sobiech

Date _____

AUG 13 2009