Island Night Lizard
(Xantusia riversiana)

5-Year Review:
Summary and Evaluation

island night lizard (*Xantusia riversiana)*. Photo credit: Dr. William Mautz.

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

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5-YEAR REVIEW
Island Night Lizard
(Xantusia riversiana)

I. GENERAL INFORMATION

Purpose of 5-year Reviews:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the Federal List of Endangered and Threatened Wildlife (List), 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:

The island night lizard (*Xantusia riversiana*) is a small, slow-growing, late- maturing, and long-lived lizard that is endemic to three Channel Islands (San Clemente, San Nicolas, and Santa Barbara) and one islet (Sutil Island) off the southern California coast (Goldberg and Bezy 1972, pp. 355–358; Bezy *et al*. 1980, p. 579; Fellers and Drost 1991, p. 28). At listing, the island night lizard was threatened by habitat loss and modification from the introduction of nonnative herbivores, nonnative plant species, and predation. Many of these threats have since been ameliorated or are now actively managed. All known occurrences are located on Federal lands owned by the U.S. Navy (Navy) or the National Park Service (NPS). Both the Navy and NPS have regulatory mechanisms to assist in the conservation and management of the island night lizard, its habitat, and potential threats to the species.

The island night lizard was listed as threatened under the Act in 1977, and is not listed by the State of California pursuant to the California Endangered Species Act.

Methodology Used to Complete This Review:

This review was prepared by Jason Stayer of the Carlsbad Fish and Wildlife Office, following the Region 8 guidance issued in March 2008. We used information from the Listing Rule (42 FR 40682), California Channel Islands Species Recovery Plan (USFWS 1984), 2006 5-year review

(USFWS 2006), field observations by field office staff, regional conservation planning documents, internal documents and files, and published manuscripts and white papers. We also had extensive communications with researchers and experts from San Clemente Island (Melissa Booker and associated staff (Navy); Bill Mautz (University of Hawaii)), San Nicolas Island (Grace Smith and associated staff (Navy); Gary Fellers and Charles Drost (USGS)), and Santa Barbara Island (Dirk Rodriguez and associated staff (NPS); Gary Fellers and Charles Drost (USGS)). We received one comment from the public in response to our **Federal Register** (FR) notice initiating this 5-year review and information presented in that comment relevant to the island night lizard is incorporated (Navy 2010a, *in litt*.; USFWS 2010, pp. 28636–28642). 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 and since the 2006 5-year review. We focus on current threats to the species pursuant to the five listing factors in the Act. This review synthesizes 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 herein recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years and any necessary change in the Recovery Priority Number for the species.

Contact Information:

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Federal Register Notice Citation Announcing Initiation of This Review:

A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day comment period to receive information from the public was published on May 21, 2010 (USFWS 2010, p. 28636). One response was received and information relevant to the taxon reviewed here is incorporated (Navy 2010a, *in litt*).

Listing History:

Federal Listing
FR Notice: 42 FR 40682
Date of Final Listing Rule: August 11, 1977
Entity Listed: Island night lizard *(Xantusia riversiana)*, a reptile species
Classification: Threatened

Critical Habitat: Critical habitat has not been designated for this species.

State Listing
Island night lizard *(Xantusia riversiana)* is not listed by the State of California.

Associated Rulemakings:

The Service published a 90-day finding on August 22, 2006, in response to two petitions, one from the National Wilderness Institute in 1997 and the other from the Navy in 2004, to delist the island night lizard (USFWS 2006a, p. 48900). In the 90-day finding, the Service determined the 1997 petition from the National Wilderness Institute did not present substantial information indicating delisting the species was warranted (USFWS 2006a, p. 48902). However, the Service found the 2004 petition from the Navy did provide substantial information and a status review was initiated to provide the basis for a subsequent 12-month finding.

Review History:

The Service initiated 5-year status reviews for the island night lizard in 1982, 1987, and 1991; all reviews were completed with no recommended change in status (USFWS 1982, p. 42387; USFWS 1987, p. 25527; USFWS 1991, 56882). In 2006, a 5-year review of the island night lizard was completed in response to a notice initiating the review published on July 7, 2005 (USFWS 2005, pp. 39327–39329; USFWS 2006a). A preliminary Distinct Population Segment (DPS) analysis, conducted in the 2006 5-year review, recommended designation of each island as a separate DPS and a status change (delist) to the San Clemente Island DPS (USFWS 2006b, pp. 4–5, 24–26).

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

The recovery priority number for the island night lizard is 8 according to the Service's 2011 Recovery Data Call, based on a 1–18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (USFWS 1983a, pp. 43098–43105; USFWS 1983b, p. 51985). This number indicates that the taxon is a species that faces a moderate degree of threat and has a high potential for recovery.

Recovery Plan or Outline:

Name of plan: Recovery Plan for the Endangered and Threatened Species of the California Channel Islands (Recovery Plan)
Date: January 26, 1984
Date of previous revisions: None

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy:

The Act defines "species" as including any subspecies of fish, or wildlife, or plants, and any DPS of any species of vertebrate wildlife. This definition of species under the Act limits listing as a DPS to species of vertebrate fish or wildlife. The 1996 Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the 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.

A preliminary analysis of the 1996 DPS policy for the island night lizard was conducted in the 2006 5-year review (USFWS 2006b, pp. 4–5). The analysis indicated that San Clemente, San Nicolas, and Santa Barbara Islands may each qualify as a DPS (USFWS 2006b, p. 5). The 2006 5-year review also noted the Service would continue the evaluation of data and available scientific and commercial information to determine if San Clemente, San Nicolas, and Santa Barbara Islands constitute separate DPS's during the preparation of the 12-month finding (USFWS 2006b, p. 5) in response to the petition from the Navy. In this 5-year review we will forgo a DPS analysis of each island because the island night lizard is currently listed at the species level and we recommend reclassifying the listed entity throughout its entire range due to the amelioration of substantial threats and current management of potential threats to the species and its habitat. There is no relevant new information regarding the application of the DPS policy to the island night lizard, and the DPS policy is not addressed further in this review.

Information on the Species and its Status:

Species Description

Island night lizard adults average 2.6 to 4.3 inches (in) (65 to 109 millimeters (mm)) in length from snout to vent (Goldberg and Bezy 1972, p. 356; Fellers and Drost 1991, p. 28; Mautz 1993, p. 422). Dorsal coloration ranges from pale ash-gray and beige, to shades of brown, and shades of black with varying uniform, mottled, and striped patterns (Bezy *et al*. 1980, p. 575; Fellers and Drost 1991, pp. 42–44). Both coloration and patterning are highly variable between island night lizards on all islands throughout the lizard's range (Bezy *et al*. 1980, p. 575; Fellers and Drost 1991, pp. 42–44).

Species Distribution

The island night lizard is endemic to three Channel Islands (San Clemente, San Nicolas, and Santa Barbara) located off the southern California coast (Goldberg and Bezy 1972, pp. 355–358; Fellers and Drost 1991, p. 28) and a small islet (Sutil Island) located just southwest of Santa Barbara Island (Bezy *et al*. 1980, p. 579) (Figure 1; Appendix 1). All islands are under Federal ownership and are subject to the laws, regulations, and policies administered by the U.S. Government.

Figure 1: Distribution of the island night lizard (*Xantusia riversiana*).

San Clemente Island

San Clemente Island is the largest and southernmost of the Channel Islands occupied by island night lizards and is located approximately 68 miles (mi) (109 kilometers (km)) west of San Diego, California and 55 mi (89 km) south of Long Beach, California (Navy 2002, p. 1.1). San Clemente Island is owned by the Navy and, with its associated offshore range complex, is the primary maritime training area for the Navy Pacific Fleet; Navy Sea, Air and Land; and supports the U.S. Marine Corps, U.S. Air Force, and other users (Navy 2002, p. 1.1).

San Nicolas Island

San Nicolas Island is the second largest and westernmost of the three Channel Islands inhabited by the island night lizard and is located approximately 28 mi (45 km) southwest of Santa Barbara Island and 50 mi (80 km) northwest of San Clemente Island (Fellers *et al.* 1998, p. 5). San Nicolas Island is owned by the Navy and supports the Research Development Assessment Testing and Evaluation of air weapons and associated aircraft systems of the Naval Air Warfare Center Weapons Division Point Mugu Sea Range (Navy 2010, p. xxi).

Santa Barbara Island

Santa Barbara Island is the smallest and northernmost island occupied by island night lizards; located approximately 38 mi (61 km) from the mainland of southern California (Fellers and Drost 1991, pp. 5, 29) and 28 mi (45 km) northeast of San Nicolas Island. Santa Barbara Island is managed by the NPS as a unit of the Channel Islands National Park, for which management is focused on the preservation of natural, archaeological, and aesthetic resources (NPS 2006a, pp. 44–62).

Sutil Island

Sutil Island is an islet located approximately 0.4 mi (0.65 km) southwest of Santa Barbara Island (Figure 2). At listing (USFWS 1977, pp. 40682–40685), island night lizards were not known to occur on Sutil Island. Since listing, we are aware of only two instances in which island night lizards were documented on Sutil Island and currently, little information concerning island night lizard ecology on Sutil Island exists. Because of its extremely small size and close proximity to Santa Barbara Island, Sutil Island is considered part of Santa Barbara Island, and island night lizards on Sutil Island are assumed to be part of the Santa Barbara Island population.

Species Biology and Life History

The island night lizard is a slow-growing, late-maturing, and long-lived lizard (Goldberg and Bezy 1972, pp. 355–358; Fellers and Drost 1991, pp. 36–42). Island night lizards can live on average 11 to 13 years, with some individuals estimated to be 30 years of age, based on the span of years between captures and recaptures (Fellers and Drost 1991, p. 38; Mautz 1993, p. 420; Fellers *et al*. 1998, p. 25). Members of the genus *Xantusia* are primarily active during the day

Figure 2: Proximity of Sutil Island to Santa Barbara Island.

(Bezy 1988, p. 8); however, they are highly sedentary and tend to remain under shelter such as dense vegetation or rocks (Fellers and Drost 1991, pp. 50, 55; Mautz 1993, p. 419). These sheltered areas provide suitable cover to protect the species from predation and allow sufficient amounts of sunlight to penetrate to the ground providing a thermal mosaic for thermal regulation (Mautz 2001a, pp. 9–12). Island night lizards are omnivorous with their diet primarily consisting of insects and plant matter (Knowlton 1949, p. 45; Brattstrom 1952, pp. 168–171; Mautz 1993, p. 417). Island night lizards are viviparous (bearing live young) and reach sexual maturity at approximately 3 to 4 years of age (Goldberg and Bezy 1972, p. 355; Fellers and Drost 1991, p.

40). Breeding begins around March or April and single broods of young are born around September (Goldberg and Bezy 1972, p. 353). Females demonstrate irregular intervals between reproductive cycles, but appear to approach a biennial cycle (Goldberg and Bezy 1972, p. 358). The island night lizard is unique within the genus *Xantusia* for having a brood size greater than two (Fellers and Drost 1991, p. 59); however, brood sizes differ between each of the islands where the species occurs, with females on San Nicolas Island averaging 5.3 young per brood and females on both San Clemente and Santa Barbara Islands averaging 3.9 young per brood (Fellers and Drost 1991, p. 60). We have no information specifically addressing the island night lizard's biology or life history on Sutil Island.

Habitat or Ecosystem

San Clemente, San Nicolas, and Santa Barbara Islands vary in size and the amount of suitable habitat available for island night lizards. Different surveys and descriptions of the vegetation types on each of the Islands have referred to the habitat supporting the lizard under various names and descriptions (Figure 3).

Figure 3: Island night lizard habitat (above and below). Photo credit: Jason Stayer.

Two vegetation types identified by Sawyer *et al.* (2009) support most of the known dominant plant taxa associated with the lizard. These are Coast prickly pear scrub, in which cacti such as *Opuntia littoralis* (coastal prickly pear), *O. oricola* (chaparral prickly pear), and *Cylindropuntia prolifera* (coast cholla) are dominant or co-dominant among the shrub canopy (Sawyer *et al.* 2009, pp. 599–601); and *Lycium californicum* (boxthorn) provisional shrubland alliance, characterized by the prevalence of *L. californicum* (Sawyer *et al.* 2009, p. 588). *Cylindropuntia prolifera* is referred to by its older Latin name, *Opuntia prolifera*, in numerous references cited in this 5-year review (e.g., Fellers and Drost 1991, pp. 34, 68; Mautz 2001a, p. 17; Navy 2002, p. 3.54). While the Service recognizes that *C. prolifera* is the currently accepted name of this species and is used in discussions that reference current literature (for example Sawyer *et al.* 2009 and NPS 2011a, *in litt.*), we will use the older name of *O. prolifera* when referencing previous literature. Vegetation now classified as Coast Prickly Pear Scrub includes vegetation variously referred to as Maritime Succulent Scrub and Maritime Desert Scrub in several references cited in this 5-year review (Fellers and Drost 1991, pp. 34, 68; Mautz 2001a, p. 17;

Navy 2002, p. 3.54). *Lycium californicum* Provisional Shrubland Alliance (Sawyer *et al.* 2009, p. 588) is a vegetative community in which *L. californicum* is a dominant or co-dominant species and where taxa such as *Coreopsis gigantea* (giant coreopsis), *Bergerocactus emoryi* (golden-spined cereus), and *C. prolifera* are present. This is also referred to as Maritime Succulent Scrub, Maritime Desert Scrub, or boxthorn habitat by numerous references included within this 5-year review (for example Fellers and Drost 1991, pp. 34, 68; Mautz 2001a, p. 17; Navy 2002, p. 3.54). To eliminate any confusion we will refer to the vegetation types that comprise high-quality habitat and supports high island night lizard densities as *L. californicum* and *Opuntia* spp. habitats.

Surveys conducted on the islands occupied by the island night lizard indicate strong habitat preferences for *Lycium californicum* and *Opuntia* spp. habitats (Fellers and Drost 1991, p. 34; Schwemm 1996, pp. 3–4; Mautz 2001a, p. 23; Mautz 2004, p. 18). These habitats are considered high-quality because they offer suitable cover to protect the species from predation and allow sufficient amounts of sunlight to penetrate to the ground providing a thermal mosaic for thermal regulation (Mautz 2001a, pp. 9–11, 17–18). Island night lizards are also known to occupy grasslands, *Coreopsis gigantea* stands, mixed shrub communities, rocky outcrops, and cobble and driftwood habitats (Fellers and Drost 1991, p. 34; Schwemm 1996, pp. 3–4; Fellers *et al.* 1998, p. 62; Mautz 2001a, p. 23; Mautz 2004, p. 18). Loose rocks or crevices in clay soils are also important habitat components within island night lizard habitat (Fellers and Drost 1991, p. 53; Mautz 2001a, p. 17). Mautz (2001a, pp. 17–18) suggested that vegetation community characteristics may be as important to island night lizard habitat as the species. This assertion is corroborated by Fellers *et al*. (1998, p. 16) who concluded that plywood debris, serving as cover in grasslands with scattered *Haplopappus* and few to no other shrub species, was a factor contributing to high densities of island night lizards recorded at sampling sites on San Nicolas Island. In addition to natural cover, it is apparent that artificial cover, created by human presence on San Clemente, San Nicolas, and Santa Barbara Islands is utilized by island night lizards thereby enabling them to persist in areas of otherwise unsuitable habitat. Very little information exists concerning the vegetative communities on Sutil Island.

San Clemente Island

San Clemente Island supports approximately 19,640 acres (ac) (7,948 hectares (ha)) of high-quality island night lizard habitat distributed primarily along the western marine terraces (Navy 2002, p. 3.54) (Figure 4; identified as Maritime Desert Scrub (MDS) vegetation types). There are approximately 13,791 ac (5,581 ha) of *Opuntia* spp. habitat and 5,849 ac (2,367 ha) of *Lycium californicum* habitat (USFWS 1997, p. 6; Navy 2002, p. 3.54, Table 1). From 1992 to 2008, a long-term trend analysis was conducted and indicated there was no clear trend in *Opuntia* spp. or *L. californicum* numbers on San Clemente Island, but there was a reduction in the percent cover of those habitats on the island (Tierra Data Inc. 2010, pp. 48–67). However, this reduction in percent cover was likely associated with the reduction in rainfall; high rainfall amounts were experienced in baseline years from 1991 to 1993, in comparison to subsequent years (Tierra Data Inc. 2010, p. 125).

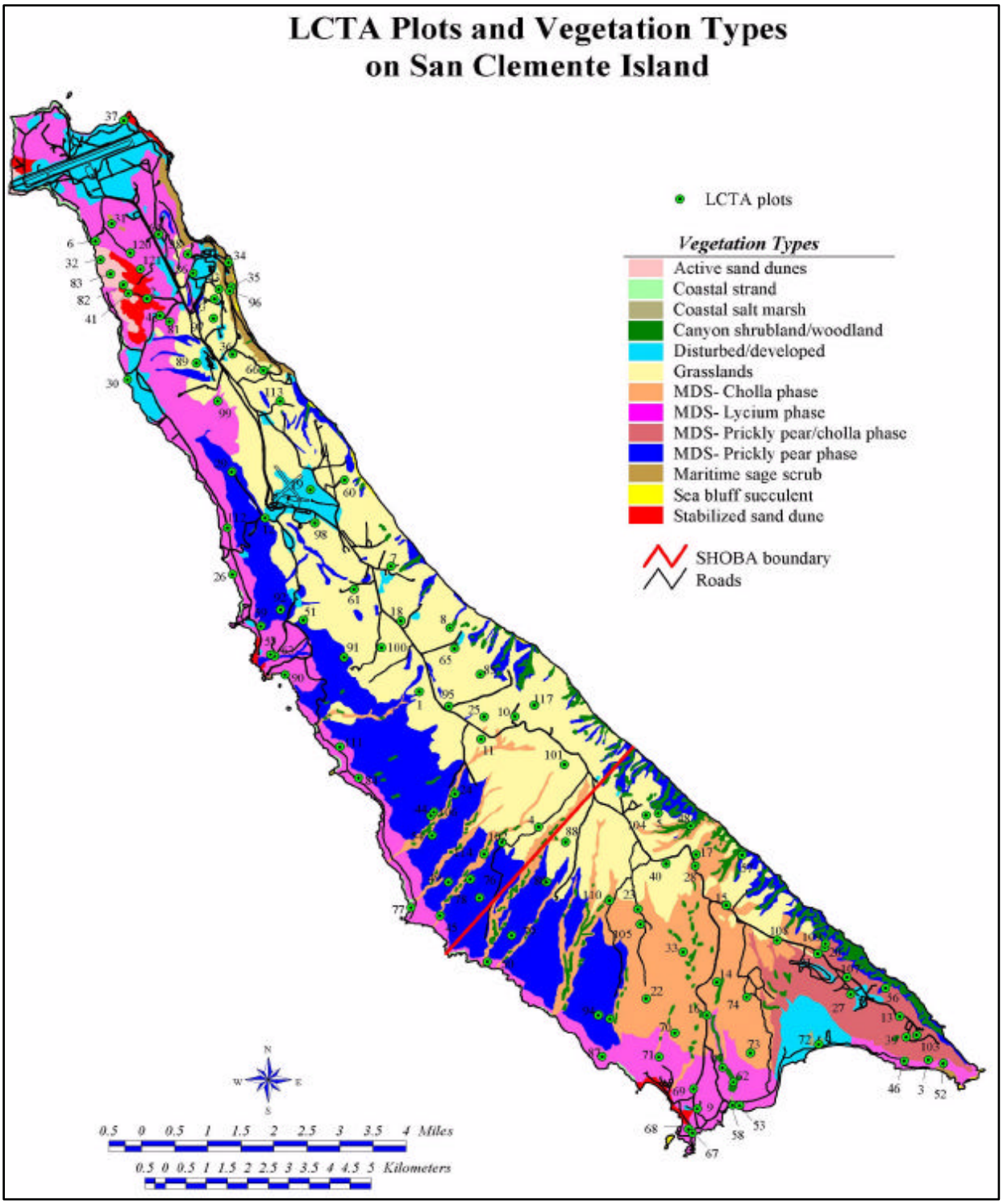

Figure 4: Distribution of vegetation communities and Land Condition Trend Analysis (LCTA) monitoring plots on San Clemente Island including high-quality island night lizard habitat (identified as Maritime Desert Scrub (MDS) vegetation types) (Shore Bombardment Area (SHOBA). Excerpted from Tierra Data Inc. (2010, p. 8).

Table 1: Acreage of high-quality (HQ) island night lizard habitats on San Clemente (Navy 2002, p. 3.54), San Nicolas (Navy 2005, p. 29; Junak 2003, p. 7), and Santa Barbara Islands (NPS 2012, *in litt.*).

Habitat	Island ac (ha)		
	San Clemente	San Nicolas*	Santa Barbara**
Lycium californicum	5,849 (2,367)	3.6 (1.5)	16.6 (6.7)
Opuntia spp.	13,791 (5,581)	7.6 (3.1)	9.3 (3.8)
Cobble/Driftwood	Not Applicable	0.6 (0.2)	Not Applicable
HQ Habitat Total***	19,640 (7,948)	11.8 (4.8)	25.9 (10.5)

** Habitat measurements were converted from square meters.*
***Data represents results from 2010 NPS preliminary draft analysis in which these species represent greater than 39 percent of the vegetative cover. Cylindropuntia prolifera is not included in the estimate.*
****Total ac (ha) may vary due to decimal rounding.*

Low- to moderate-quality island night lizard habitat consisting of *Artemisia* spp. (sagebrush), *Eriogonum* spp. (buckwheat), *Deinandra clementina* (Catalina tarweed), as well as *Lycium californicum* and *Opuntia* spp. occupies approximately 386 ac (156 ha) of the northeastern escarpment of the San Clemente Island (Navy 2002, p. 3.65). Low-quality grassland habitat occupies approximately 11,831 ac (4,788 ha) on the central plateau and eastern scarp of the island (Navy 2002, p. 3.54). The Navy established the Island Night Lizard Management Area (INLMA) on San Clemente Island in 1997 (USFWS 1997, p. 5), which includes approximately 11,051 ac (4,474 ha) of habitats with high densities of island night lizards, where approximately half of the species' population exists (Mautz 2001a, p. 29). Lizards on San Clemente Island have not been found in closed-canopy canyon or woodland habitats, which do not allow sufficient amounts of sunlight to penetrate the canopy cover for thermoregulation (regulation of body temperature), or active sand dunes that do not offer sufficient cover for the species (Mautz 2001a, pp. 4, 9, 18).

San Nicolas Island

Research conducted on San Nicolas Island in 1996 showed the notable absence of *Lycium californicum* and *Opuntia* spp., in all transects, which is an indication of the limited distribution of these plant taxa on the island (Chess *et al.* 1996, pp. 19–46). Fellers *et al*. (1998, p. 46) estimated 1.9 ac (0.8 ha) of high-quality island night lizard habitat and approximately 161 ac (65 ha) of lower-quality mixed shrub habitat for the island night lizard on San Nicolas Island (Table 1). Subsequently, Junak (2003, p. 7) revised the estimated amount of *L. californicum and Opuntia* spp. on San Nicolas Island, and determined there were approximately 11.2 ac (4.6 ha) of high-quality habitats on the island (Table 1). High-quality island night lizard habitat is patchily distributed (Figure 5) through otherwise relatively low-quality habitat (Figure 6), typically consisting of a mixed shrub plant community on the eastern half of the island (Fellers *et al.* 1998, pp. 13–14). This mixed shrub community consists primarily of *Haplopappus* spp., *Calystegia macrostegia* (island morning- glory), *Coreopsis gigantea*, *Atriplex semibaccata* (Australian saltbush), *Deinandra clementina*, *Lupinus albifrons* (silver lupine), *Baccharis pilularis* (coyote brush), and *Artemesia* spp. (Fellers *et al.* 1998, pp. 16–17). Taxa important for island night lizards in this mixed shrub include *Haplopappus* spp., *C. macrostegia*, *D. clementina*, and

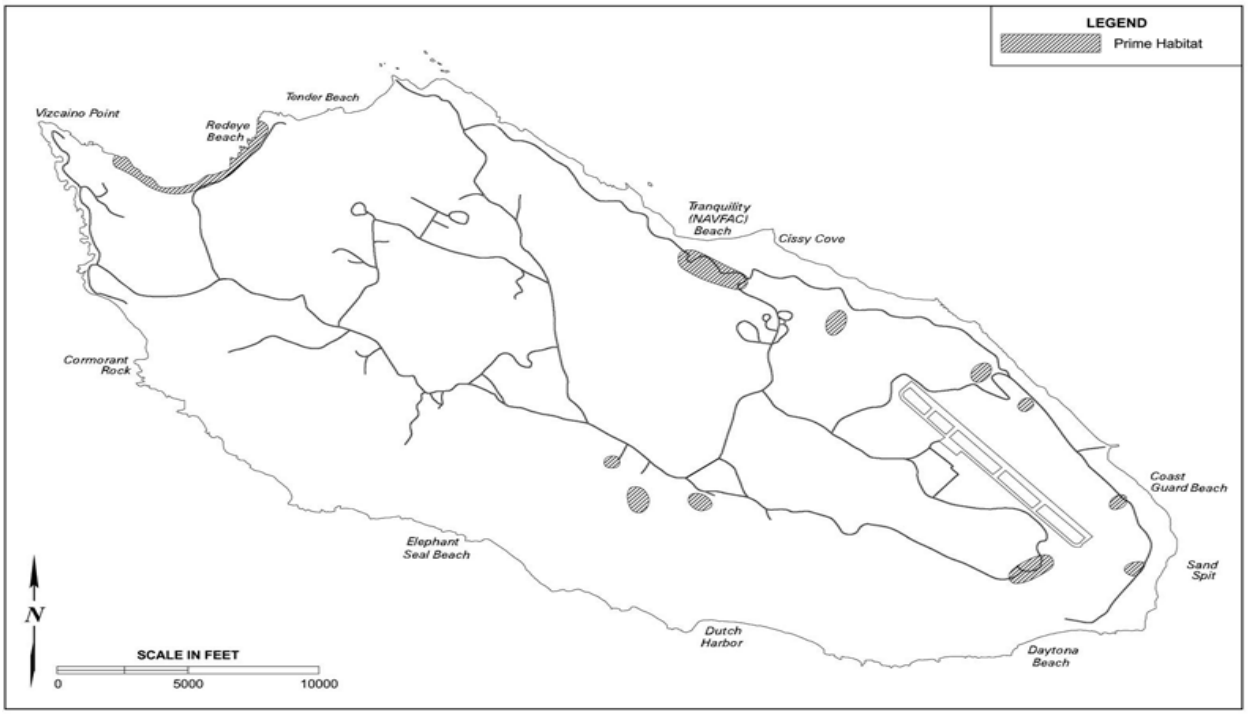

Figure 5: Distribution of high-quality island night lizard habitat (*L. californicum*, *Opuntia* spp., and cobble/driftwood at Redeye Beach) on San Nicolas Island. Excerpted from Navy (2005, p. 30).

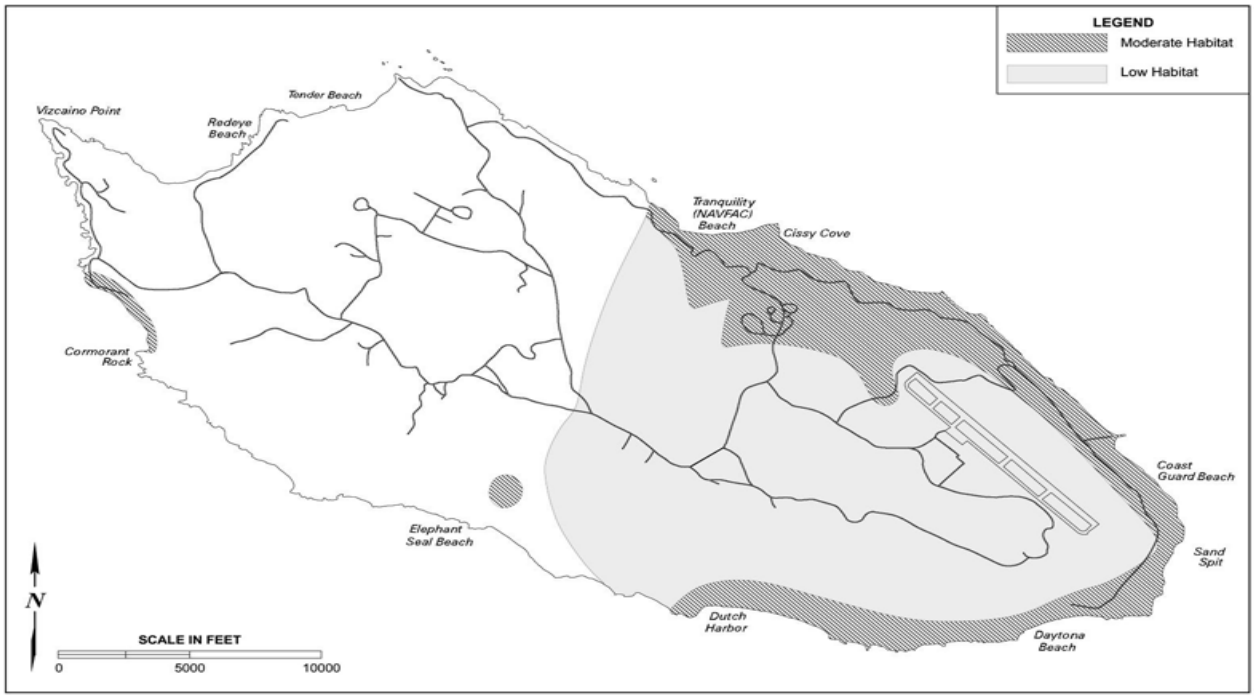

Figure 6: Distribution of low and moderate-quality ("mixed shrub" and grassland) island night lizard habitat on San Nicolas Island. Excerpted from Navy (2005, p. 30).

possibly *Artemesia* spp. (Fellers *et al.* 1998, pp. 11–12). Island night lizards do not inhabit the western half of San Nicolas Island due to a lack of suitable vegetative or rock cover, except for a 0.6 ac (0.2 ha) cobble and driftwood habitat at Redeye Beach that is just above the intertidal zone on the northwestern side of the island (Fellers *et al.* 1998, p. 11) (Table 1). Occupancy within this habitat, which supports the highest density of lizards on the island, is unique to San Nicolas Island (Fellers *et al.* 1998, p. 11).

Santa Barbara Island

Habitat on Santa Barbara Island is limited due to the size of the island and the extensive habitat damage that occurred historically through overgrazing by nonnative herbivores (USFWS 1984, pp. 45–46; Fellers and Drost 1991, p. 70). Using aerial photographs of the island from 1983 and ground surveys, Fellers and Drost (1991, p. 68) identified approximately 14.8 ac (6 ha) high-quality habitat on Santa Barbara Island that included *Lycium californicum* and *Opuntia* spp. (Table 1). Low- to moderate-quality habitat on the island also contains some *L. californicum* and *Opuntia* spp., but is more dominated by *Coreopsis gigantea*, *Eriogonum giganteum* var. *compactum* (Santa Barbara Island buckwheat), and *Eriophyllum nevinii* (silver-lace) (Fellers and Drost 1991, p. 70); these native shrub communities are patchily distributed in grasslands across a majority of the island (Halvorson *et al.* 1988, p. 111). Since completion of the 2006 5-year review of the island night lizard (USFWS 2006b), a restoration effort to reestablish native plant species to Santa Barbara Island has been ongoing (Harvey and Barnes 2009). To date, the Montrose Settlements Restoration Program (MSRP) has restored approximately 5.0 ac (2.0 ha) of native habitat for seabirds to Santa Barbara Island (Little 2011, pers. obs.). This restoration effort has outplanted approximately 15,000 native plants to the island, some of which provide moderate-quality habitat for island night lizards (Little 2011, pers. obs.). Currently, a new preliminary vegetative analysis of Santa Barbara Island is being drafted by the NPS, but has not been finalized (NPS 2011a, *in litt.*) (Figure 7). Preliminary results from surveys conducted in 2010 by the NPS indicate that approximately 16.6 ac (6.7 ha) of *L. californicum* and 9.3 ac (3.8 ha) of *O. oricola* habitats exist

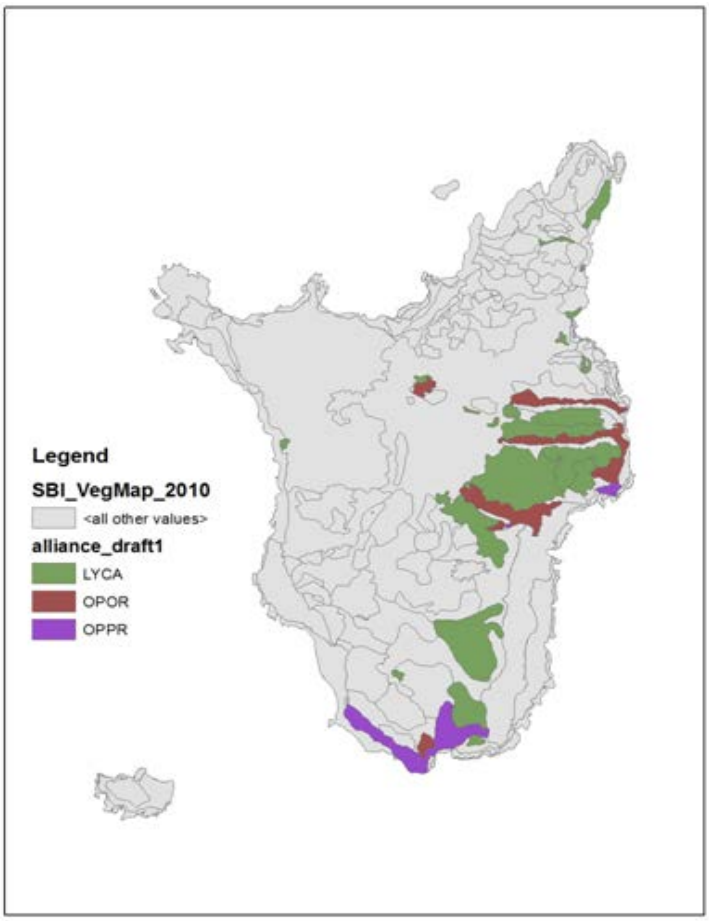

Figure 7: Draft analysis of the distribution of *L. californicum* (LYCA) and *Opuntia* spp. (OPOR, OPPR) on Santa Barbara Island (R. Rudolph 2011b, pers. obs.).

in which these species comprise greater than 39 percent of the vegetative cover (Rodriguez 2011b, pers. obs.) and thus are dominant among the habitat. The preliminary analysis concerning *Cylindropuntia prolifera*, another habitat for the lizard, is not yet available.

Sutil Island

Little is known about the habitat on Sutil Island. Sutil Island consists of approximately 13.7 ac (5.5 ha) (Rudolph 2011a, pers. obs.), much of it unbroken bedrock, with some sparsely distributed vegetation identified as island night lizard habitat, such as low shrubs, *Lycium californicum*, and rocks and fissures (Drost 2011b, pers. obs.).

Species Abundance

At listing (USFWS 1977, pp. 40682–40685) island night lizard population densities were not known on any of the inhabited Channel Islands. Island night lizards appear to show preference for several habitat types (Fellers and Drost 1991, p. 68; Mautz 2001a, pp. 17–19); however, determining an overall population estimate is difficult due to the sedentary and reclusive behavior of the species. The highest lizard population densities are observed in *Lycium californicum* and *Opuntia* spp. habitats (Fellers and Drost 1991, pp. 34, 68; Mautz 2001a, p. 17). Island night lizards are found in lower densities throughout shrub communities, rocky outcrops, grasslands, and in stands of *Coreopsis gigantea* (USFWS 1984, p. 93; Fellers and Drost 1991, p. 35; Mautz 2001a, pp. 17–22). Mautz (2004, p. 8) reported that a large number of island night lizards are repeatedly recaptured in survey traps. High recapture rates, in conjunction with large survey grids relative to island night lizard home range size, indicates that standardized trapping provides a good estimate of local densities (White 1982, p. 130). Therefore, trapping in suitable cover on San Clemente, San Nicolas, and Santa Barbara Islands can be a good indicator of island night lizard density and overall abundance (Mautz 2001a, p. 17).

San Clemente Island

San Clemente Island contains the most robust population of island night lizards. To calculate population density, researchers utilized data from pitfall traps, cover boards, and rock turn surveys collected from 1991 to 1998, arranged in transects or grid arrays, which were located in *Lycium californicum* and *Opuntia* spp. habitats (Mautz 2001a, pp. 17–23, 43–54). This approach was also used by the Navy to conduct surveys in 2009 and 2010; these surveys are currently being analyzed by the Navy (Mautz 2011, pers. comm.).

Annual surveys were conducted from 1991 to 1998 by Mautz using pitfall traps and rock turn surveys (Mautz 2001a, pp. 15–16). Density estimates were assessed by analyzing capture rates and mark-recapture data using three methodologies: (1) A Lincoln Index; (2) a Regression Index; and (3) a minimum estimate measure of the number of animals intercepted in a single sample (Mautz 2001a, pp. 21–23). The Lincoln Index, which Mautz (2001, pp. 43–44) suggested may result in a possible underestimate of lizards because inadequate mixing of those captured will result in a higher proportion of recaptures, resulted in an estimate of 16.71 million

lizards. Additionally, the Regression Index, which Mautz (2001, p. 51) suggested may result in a possible overestimate of lizards because the extended time period of sampling required may increase immigration and emigration on the study plots, resulted in an estimate of 25.89 million lizards. To acquire a reasonable estimate of island night lizard density on San Clemente Island, a midpoint (average) between the Lincoln and Regression Indexes was utilized resulting in an estimate of 21.3 million lizards on the island (Mautz 2001a, pp. 21–23). The midpoint result estimated densities in high-quality habitat on San Clemente Island of 1,934 lizards per 2.47 ac (1 ha) in *Lycium californicum*; 2,558 lizards per 2.47 ac (1 ha) in *Opuntia littoralis* and *O. oricola*; and 1,423 lizards per 2.47 ac (1 ha) *O. prolifera* (Mautz 2001a, p. 23). Island night lizards were also estimated at 1,142 lizards per 2.47 ac (1 ha) in upland plateau grasslands and 926 lizards per 2.47 ac (1.0 ha) in scarp grassland and coastal sage (Mautz 2001a, p. 23). No lizards were found in canyon woodland and active sand dunes on the island (Mautz 2001a, p. 23).

The San Clemente Island population is the largest estimated at approximately 21.3 million lizards through analysis of habitat maps and extrapolating densities estimated by Mautz (2001a, pp. 44, 54). The high-quality habitats on the lower marine terraces of the west side of the island support approximately half of the estimated population (10.4 million) of lizards (Mautz 2001a, p. 29). This area has been recognized as the INLMA since 1997 by the Navy (USFWS 1997, p. 5).

San Nicolas Island

Research of island night lizards on San Nicolas Island was conducted from 1992 to 1995 using pitfall traps, coverboards, and Sherman small mammal traps (Fellers *et al.* 1998, p. 7). Traps were arranged in transects through suitable habitat and on the edges of impenetrable habitats (Fellers *et al.* 1998, p. 7). Island night lizard population size was determined using density estimates from Fellers *et al.* (1998, p. 19) research on San Nicolas Island for the cobble and driftwood habitat, and density estimates for the remaining habitats established on Santa Barbara Island; Fellers *et al.* (1998, p. 19) extrapolated these estimates to corresponding habitats on San Nicolas Island. Estimates of distribution and extent of habitat on San Nicolas Island were determined using aerial photographs and field surveys (Fellers *et al.* 1998, p. 46). Island night lizard densities were estimated at 2,500 lizards per 2.47 ac (1 ha) in *Opuntia* spp.; 3,200 lizards per 2.47 ac (1 ha) in *Lycium californicum*; and 200 lizards per 2.47 ac (1 ha) in mixed shrub habitat (Fellers *et al.* 1998, p. 46). Currently, it is unknown how island night lizards utilized this low density mixed shrub habitat and whether it constitutes a sink (breeding group that cannot sustain its population without immigration from outside populations) for lizards dispersing from areas of higher densities, or whether this plant association supports self-sustaining island night lizard populations (Fellers *et al*. 1998, p. 28). Island night lizards are only found on the eastern half of San Nicolas Island and not the western half which is characterized by sandy substrate; however, the island does support an exceptionally high density of island night lizards (4,000 per 2.47 ac (1 ha)) in cobble and driftwood habitat located on Redeye Beach at the northwestern end of the island (Fellers *et al*. 1998, pp. 11, 20). Through examination of aerial photographs and ground surveying efforts, Fellers *et al.* (1998, p. 46), estimated approximately 1.17 ac (0.47 ha) of *Opuntia* spp. and 0.13 ac (0.05 ha) of *L. californicum* existed on San Nicolas Island. Lizard abundance on San Nicolas Island was estimated at 15,350 individuals (Fellers *et al.* 1998, p. 20).

Subsequent to Fellers *et al.* (1998), Junak (2003, p. 7) revised the estimated amount of *Opuntia* spp. and *Lycium californicum* on San Nicolas Island, and concluded there was approximately 11.2 ac (4.6 ha) of these habitats available on the island. A new population assessment of island night lizards on San Nicolas Island has not been conducted, and as a result, the Navy's 2010 Integrated Natural Resources Management Plan (INRMP) for San Nicolas Island continues to recognize the population size of approximately 15,000 lizards established by Fellers *et al.* (1998, p. 20) as the current population estimate (Navy 2010b, p. 1.49). Though a new population estimate has not been assessed, it is likely that that the population has increased in response to the increase of *Opuntia* spp. and *L. californicum* habitats on San Nicolas Island and reduction of threats to the species (see **Five-factor Analysis** below).

Santa Barbara Island

Surveys to assess island night lizard population status were conducted on Santa Barbara Island from 1981 to 1988 using pitfall traps and Sherman small mammal traps in transects and grid arrays depending on the island's topography (Fellers and Drost 1991, p. 30). Island night lizard densities were estimated at 3,213 lizards per 2.47 ac (1 ha) in *Lycium californicum*, 2,476 lizards per 2.47 ac (1 ha) in *Opuntia* spp., and 1,665 lizards per 2.47 ac (1 ha) in rock habitat (Fellers and Drost 1991, p. 68). All other habitat types or vegetative communities on the island displayed a density of zero (Fellers and Drost 1991, p. 68). Based on estimates of available habitat types and extrapolation of lizard densities within those habitat types, a total of 17,599 lizards were estimated to occur on Santa Barbara Island in 1991 (Fellers and Drost 1991, p. 68). A new preliminary vegetative analysis of Santa Barbara Island is being drafted and until it is finalized we will refer to Fellers and Drost (1991, p. 68). Additionally, no current estimates of island night lizard densities within preferred habitats on Santa Barbara Island have been analyzed since Fellers and Drost (1991, p. 68). As a result, the NPS continues to recognize the estimate of 17,599 island night lizards established by Fellers and Drost (1991, p. 68) (NPS 2006c).

Sutil Island

Sutil Island was not known to be occupied at the time the island night lizard was listed. In 1978, a survey of Sutil Island was conducted and 12 island night lizards were identified (Wilson 1979 as cited in Power 1979, p. 8.5). In 1991, Drost (2011, pers. obs.) spent less than 24 hours on Sutil Island and identified one lizard. We have no surveys for the island night lizard since 1978. Because Sutil Island was not identified at listing as occupied by the island night lizard, is within close proximity to Santa Barbara Island, has very few to no visitors annually, and like Santa Barbara Island is managed by the NPS, we will incorporate Sutil Island in the discussion of Santa Barbara Island for the remainder of this review.

Genetics

A study of divergence using electrophoretic analysis on *Xantusia* species from San Clemente, San Nicolas, and Santa Barbara Islands; and two mainland relatives: the granite night lizard (*Xantusia henshawi)* from the San Jacinto Mountains, California, and the desert night lizard

(*Xantusia vigilis*) from the Antelope Valley, California, was performed (Bezy *et al*. 1980, pp. 578–580). Significant divergence was detected between the island populations of *Xantusia riversiana* and the mainland species' *X. henshawi* and *X. vigilis* (Bezy *et al*. 1980, pp. 565, 581). This study did not detect significant divergence among island populations of *X. riversiana*, but did identify significant morphological differences in scalation patterns, color pattern, body size (not significant between San Clemente and Santa Barbara Island populations), and clutch size (Bezy *et al.* 1980, pp. 565–577).

Changes in Taxonomic Classification or Nomenclature

The island night lizard was classified in a monotypic genus as *Klauberina riversiana* at the time it was listed (USFWS 1977, p. 40683). However, there has been discussion about the genus and potential subspecies both prior to and since listing. Cope (1884, p. 29) originally described *Xantusia riversiana* based on a collection by Dr. J.G. Cooper. Cooper visited all three of the islands known to support populations of the island night lizard in 1863. However, Cope did not identify the island of origin of the collection he used for his description of *X. riversiana* in his publication, only that it was California (Cope 1884, p. 29). Rivers (1889, p. 1100) subsequently published a short notice stating the type (original) specimen was collected on San Nicolas Island. Smith (1946, p. 392) segregated animals on San Clemente Island from those on San Nicolas based on morphological traits and described them as *X. riversiana reticulata*. Smith also remarked (1946, p. 393) that based on specimens from San Nicolas Island and an illustration of an animal from Santa Barbara Island, that those two populations might be consubspecific (*X. riversiana riversiana).* Subsequent analysis of morphological, life history, and habits of all known members of the family Xantusiidae led Savage (1957 p. 83) to erect a monotypic genus to accommodate the island night lizard as *Klauberina riversiana*. Savage made no mention of Smith's subspecies, *X. r. reticulata.* Bezy (1972, pp. 16–17) explains that based on his studies of karyotype evolution in the family Xantusiidae and an assessment of available morphological evidence, he does not recognize *Klauberina,* with a single species *K. riversiana,* as distinct from *Xantusia* and in fact points out that *X. riversiana* is more closely related to *X. vigilis* and *X. henshawi* than any of these three species are related to any other individuals within Xantusiidae. Bezy (1972, p. 2) did not recognize *Klauberina* as a distinct genus and returned the island night lizard to its original status and name as *Xantusia riversiana.* However; at listing (USFWS 1977, p. 40683), we retained the taxonomic status and name of *Klauberina riversiana*. We did not discriminate subspecies in the listing rule, consequently any subspecies then or subsequently recognized are protected under the Act.

Additional electrophoresis and allozyme studies support reclassification of the island night lizard as *Xantusia riversiana* (Bezy *et al.* 1980, pp. 565–583; Bezy and Sites 1987, pp. 280–292). These data along with DNA sequence data prompted Hedges *et al.* (1991, p. 776) to state that "… *X. riversiana* was derived from within *Xantusia* and should not be considered as a separate genus [*Klauberina*]". The Service noted the change in the scientific name to *X. riversiana* for the island night lizard in the Channel Islands species recovery plan (USFWS 1984, p. 89) and again when we initiated a 5-year review of the species in 1987 (USFWS 1987, p. 25523). Since that time we have identified the island night lizard as *Xantusia riversiana.*

Species-specific Research and/or Grant-supported Activities

San Clemente Island

Island night lizard monitoring is conducted annually by the Navy at a subset of established pitfall traps and coverboards positioned in transects and grid arrays. The objective of this monitoring effort is to assess body condition of individual lizards. Additionally, every third year there is a full monitoring effort conducted in which all established pitfall traps and coverboards are utilized to assess individual lizard body condition.

San Nicolas Island

Beginning in April of 2012, the USGS in cooperation with the Navy will conduct monitoring efforts on San Nicolas Island. Objectives of this monitoring effort include:

1. Sampling of established island night lizard monitoring locations to provide data on lizard growth, longevity, individual movement of marked lizards, and changes in populations;
2. Review of current data on lizard distribution and habitat condition;
3. Assessment of *L. californicum* and *Opuntia* spp. sites mapped by Steve Junak to evaluate size and suitability for lizards;
4. Synthesize data of overall habitat area, population estimates by habitat, and provide a more current estimate of lizard distribution and abundance;
5. Field surveys for population status and distribution of nonnative lizards (side-blotched (*Uta stanisburiana*) lizard and southern alligator lizard (*Elgaria multicarinata*)); and
6. Collecting tissue samples for a population genetic analysis.

Santa Barbara Island

The NPS conducts annual monitoring of established coverboard transects through different habitats on Santa Barbara Island. Objectives of this research are:

1. Establish an index of capture trend data to roughly assess stability of the population; and
2. Assess individual body condition of captured lizards.

Five-factor Analysis

The final listing rule indicated that browsing by feral goats and rooting by feral pigs were a threat to island night lizard habitat on San Clemente Island; and that any additional loss of habitat on San Nicolas and Santa Barbara Islands would seriously imperil the species (USFWS 1977, pp. 40683–40684). Additional threats to the island night lizard at that time included predation by feral cats on San Clemente Island, competition from the southern alligator lizard (*Elgaria multicarinata*) on San Nicolas Island, and the introduction of nonnative plants throughout the species' range.

Since listing, some threats were ameliorated and a status review was subsequently conducted for the island night lizard in 2006 (USFWS 2006b, pp. 10–26; Appendix 1). Threats identified at that time in the 5-year review included:

Factor A: effects of grazing by domestic and feral animals, nonnative species, fire, and land use for all island occurrences;
Factor C: predation by feral cats (*Felis catus*) and southern alligator lizards on San Nicolas Island; and
Factor E: vulnerability to environmental stochasticity and natural catastrophes (fire, landslides, and prolonged drought) due to limited distribution on San Nicolas and Santa Barbara Islands.

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

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

At listing, the present or threatened destruction, modification, or curtailment of habitat or range as it relates to the island night lizard was identified as a threat to the species on San Clemente, San Nicolas, and Santa Barbara Islands (USFWS 1977, pp. 40683–40684). In the 2006 5-year review, we concluded that domestic and feral grazing animals had been removed from the islands and ongoing habitat modification due to browsing and grazing had been eliminated. However, consequences of historical grazing impacts to the habitat (nonnative plant proliferation, erosion, changes in soil composition) remain and we continue to agree with that assessment in this 5-year review; impacts from these threats are discussed in the appropriate threat section below. Additional habitat threats identified in the 2006 5-year review included nonnative plants, fire, and land use (USFWS 2006b, pp. 10–18). To those we add a discussion concerning the potential threat from erosion in this status review.

Nonnative plants

At listing, the introduction of nonnative plants was noted as having had disastrous effects on all California Channel Islands (USFWS 1977, p. 40684). While the introduction of nonnative herbivores decimated much of the native vegetation, nonnative plants may adversely affect the island night lizard by reducing the extent of the habitat types where this taxon occurs. In the 2006 5-year review we note that nonnative plant species may alter ecosystem dynamics by changing soil nitrogen cycling, and may outcompete native plants for space or other resources such as light, water, and nutrients (USFWS 2006b, p. 12). Nonnative plant species can also alter ecological processes, such as fire frequency, that otherwise could affect the persistence of the island night lizard (USFWS 2006b, p. 12). Low densities of lizards observed in some of the nonnative plant communities suggest that modification of the native plant communities can reduce the available resources for this taxon. The 2006 island night lizard 5-year review concluded that habitat destruction or modification from nonnative plants was of potential

concern, but due to current management and preventative actions implemented on all occupied islands at that time, was not a substantial threat to the species throughout its range (USFWS 2006b, p. 13).

San Clemente Island

Previous invasions of nonnative plants probably occurred through introduction of plants preferred for livestock grazing; however, current nonnative species invasions are typically introduced by military activities and training on the island. The potential impacts from nonnative plants are minimized through annual implementation of the Navy's island-wide nonnative plant control program (Munson 2011, pers. comm.). The Navy focuses management efforts on nonnative plant species that have the potential to adversely impact habitat for federally listed species, including the island night lizard (USFWS 2008, pp. 58–59). In accordance with the Federal Noxious Weed Act (7 U.S.C. 2801), and as implemented through the Navy's San Clemente Island INRMP, the Navy is taking steps to reduce the risk of additional nonnative plant introductions to San Clemente Island and manage the removal of nonnative plant species already present on the island (Navy 2002, p. 3.115). The INRMP provides guidance to assure that only native plant species are used in landscaping practices; roadbed material is weed-free prior to shipping to the island; and all vehicles are washed and cleaned prior to entry on the island (Navy 2002, pp. 3.115–3.116). Nonnative plant management techniques described within the INRMP include; controlled burns; mechanical removal; or herbicide treatment. Although nonnative plants will continue to pose a risk to the island night lizard habitat, the Navy has taken steps to curtail habitat and plant community alteration by nonnative plants.

To restore the structure and function of native island ecosystems, the Navy has implemented a Native Habitat Restoration Program (NHRP) on San Clemente Island (Navy 2002, p. 3.51). To assist the NHRP, the Navy constructed a native plant nursery where plants are currently grown from seed, and stem and root cuttings, including species that provide a benefit to island night lizard habitat such as *Lycium californicum*, *Artemesia californica*, and *Coreopsis gigantea* (Navy 2002, p. 3.51). The Navy conducts five outplantings each year to promote habitat for the San Clemente Island loggerhead shrike (*Lanius ludovicianus mearnsi*), including plant species that are also identified as providing island night lizard habitat such as *A. californica* (Munson 2011, pers. obs.). The Navy has also planted *Lycium californicum* at Wilson Cove on the northeastern side of San Clemente Island for habitat enhancement of disturbed areas (Munson 2011, pers. obs.). Impacts to lizard habitat from nonnative plants may be a persistent threat, but due to implementation of the Navy's INRMP, current nonnative species management, and native species restoration, it is not currently a substantial threat to the island night lizard or its habitat on San Clemente Island.

San Nicolas Island

Information available since the 2006 5-year review of the island night lizard indicates that just over half of the 278 plant taxa on San Nicolas Island are nonnative species and that San Nicolas Island has the highest proportion (approximately 51 percent) of nonnative plant taxa of any of

the eight Channel Islands (Junak 2008, p. 67). This is an increase from the 40 percent presented in the previous island night lizard 5-year review (USFWS 2006b, p. 13), which likely represents improved accuracy of survey and monitoring data. In accordance with the Federal Noxious Weed Act, and as implemented through objectives set forth within the Navy's INRMP, the Navy continues to reduce the risk of introducing additional nonnative plants to San Nicolas Island and to manage the removal of nonnative plant taxa already occurring on the island (Navy 2005, p. 61). The Navy's first objective is requiring all vehicles and equipment to be cleaned prior to shipment to the island, and between uses at different island construction sites; documentation that all gravel and fill materials being brought to the island are certified "weed-free;" and prohibiting the use of nonnative plants for landscaping unless specifically approved by the Environmental Division (Navy 2010b, p. 2.20). The second objective is to remove high-priority nonnative plant species and evaluate the necessity for removal of other species by completing a nonnative plant species management plan; expand the current weedy species removal program; continue to investigate the best methods for removal, control, and timing of nonnative plants removal; ensure compliance with applicable regulations governing removal; and map the distribution of noxious weeds, and those that have the potential to become noxious, every 5 years (Navy 2005, p. 61). The third objective is to manage roads, access routes, and new construction sites to minimize the spread of nonnative plant species; require that maintenance or repair of existing roads stay within established footprints; clean roadside mowing equipment of adhering dirt and vegetation between mowing cycles; schedule roadside mowing to minimize weedy species seed distribution; and require construction projects in predominantly native island habitat to set aside topsoil for redistribution post-construction, to conserve the native plant species seed bank and reduce conditions for weedy species invasion (Navy 2005, p. 61).

Additionally, the Navy treats and monitors select nonnative species annually on San Nicolas Island, such as *Brassica tournefortii* (Saharan mustard) and *Foeniculum vulgare* (fennel) (Ruane 2011, pers. obs.). We anticipate that implementation of the measures described above will reduce the rate of introduction and dominance of nonnative plant taxa on San Nicolas Island. We agree with the conclusion in the 2006 5-year review of the island night lizard (USFWS 2006b) that habitat destruction or modification from the introduction of nonnative plants is potentially of concern, but not currently a substantial threat to the species or its habitat on San Nicolas Island due to current management efforts occurring.

Santa Barbara Island and Sutil Island

In accordance with the NPS Organic Act (see **FACTOR D: Inadequacy of Existing Regulatory Mechanisms** below) the NPS management policies prohibit the introduction of nonnative plants into parks, including Santa Barbara Island (NPS 2006a, p. 47). All nonnative species already occurring on Santa Barbara Island will be managed, where practicable, if they interfere with…" natural processes and the perpetuation of natural features, native species, or natural habitats" (NPS 2006b, p. 48). From 2007 to 2011 the NPS in coordination with the MSRP conducted nonnative plant species removal on 4.5 ac (1.8 ha) of Santa Barbara Island (Harvey 2012, pers. comm.).

In 2007, the MSRP began propagating a native stock of seeds, previously collected on Santa Barbara Island, at the Channel Islands National Park greenhouse in Ventura, CA (Harvey and Barnes 2009, p. 7). Propagated species include those identified within low- to moderate-quality island night lizard habitat such as *Coreopsis gigantea, Eriogonum giganteum* var. *compactum, Deinandra clementina, Eriophyllum nevinii, Artemisia nesiotica* (sage), and *Baccharis pilularis*; and *Lycium californicum,* identified as a dominate species within high-quality island night lizard habitat (Fellers and Drost 1991, p. 34; Fellers *et al.* 1998, p. 11–12; Mautz 2001a, p. 23, Navy 2005, p. 30). In 2008, to reduce the threat of nonnative species introduction, the MSRP began growing all native plant species in a nursery on Santa Barbara Island (Little 2012b, pers. comm.). As stated above, the MSRP has restored approximately 5.0 ac (2.0 ha) of native habitat, consisting of 15,000 native plants, to Santa Barbara Island (Little 2011, pers. obs.), some of which provide a benefit to island night lizards as discussed above in this paragraph. Currently, the NPS is drafting a General Management Plan for the Channel Islands, including Santa Barbara Island, which will address the continuing effort to monitor and restore native vegetation to Santa Barbara Island (Faulkner 2011, pers. comm.). We agree with the conclusion in the 2006 5-year review of the island night lizard (USFWS 2006b) that habitat destruction or modification from the introduction of nonnative plants is potentially of concern, but not currently a substantial threat to the species or its habitat due to ongoing management efforts on Santa Barbara Island.

The Service has no information concerning habitat destruction or modification as it relates to the introduction of nonnative plant species occurring on Sutil Island and does not consider it a current threat to the island night lizard or its habitat.

Land Use and Development

At listing (USFWS 1977, pp. 40683–40684), the destruction or modification of habitat from land use and development was not considered a threat to the island night lizard. In the 2006 status review we concluded that land use and development is not a substantial threat to the species or its habitat on any of the three occupied islands, although there is the potential for land use to pose a threat (USFWS 2006b, p. 18).

San Clemente Island

San Clemente Island is owned and administered by the Navy and provides operating facilities and support services for the U.S. Pacific Fleet (Navy 2002, p. 1.1). Training and testing activities on and around the island cover the entire spectrum of military mission areas, including aviation training, undersea warfare, amphibious warfare, special warfare, and joint Task Force Exercises (Navy 2002, pp. 2.1–2.2). Intensive training, foot traffic, off-road vehicle maneuvers, and construction activities impact island night lizards in the areas where such activities occur. The western portion of the island is recognized as the INLMA by the Navy, and has historically received little training usage. Since completion of the 2006 5-year review of the island night lizard, the Navy initiated consultation with the Service, pursuant to section 7 of the Act, for proposed new training activities for San Clemente Island (USFWS 2008, p. 3), including designation of several new ranges along the western portion of the island. Many of the proposed

activities covered by the consultation occur at fixed ranges or in areas already receiving sustained use by the military (USFWS 2008, p. 10). We estimated that approximately 2.5 percent of the island night lizard population on San Clemente Island could incidentally be harmed or killed directly, through modification of habitat from 2009 to 2014 due to these proposed activities through increased fires, off-road assault vehicle use, construction of buildings, and other military-related activities (USFWS 2008, pp. 10, 206). However, due the island's size, current amount of high-quality habitat and distribution of the population across the island, and the species' population size on the island, this potential level of take would not jeopardize the continued existence of the species or appreciably reduce its recovery (USFWS 2008, pp. 205, 209). We continue to believe that land use poses a potential threat to island night lizards and their habitat on San Clemente Island, but is not currently a substantial threat to the species.

San Nicolas Island

San Nicolas Island serves as a launch platform for missile testing (Navy 2010b, p. 1.7). In 2006, we concluded that land use was not a substantial threat to the island night lizard, but was a potential threat impacting island night lizard habitat on San Nicolas Island (USFWS 2006b, p. 18). Since completion of the 2006 5-year review of the island night lizard, and as part of a consultation with the Service on the effects of a wind energy project on San Nicolas Island, a biological opinion (8-8-10-F-35) was completed on August 26, 2010, and subsequently amended on April 22, 2011. During a 4 to 5 year span, beginning in 2010, the Navy will install up to 11 wind-powered turbines and an energy storage facility on San Nicolas Island (USFWS 2010, p. 3). The project is estimated to directly affect 10.6 ac (4.3 ha) and indirectly affect 35 ac (14.2 ha) on the island. Although the project will adversely affect the lizard through habitat loss and loss of habitat connectivity, the project is not expected to affect high-quality island night lizard habitat due to the limited amount of high-quality habitat in the action area (USFWS 2011, pp. 4–7). The project is expected to adversely affect some lizards through increased perching opportunities for known predators such as the American kestrel (*Falco sparverius*) and barn owl (*Tyto alba*), and causing injury or death of individual lizards by foot traffic and construction (Service 2011, pp. 5–7). However; the Navy will implement numerous avoidance and minimization measures in accordance with management practices stated in the INRMP (including capture and relocation), species monitoring, management of nonnative plant species, erosion control, and contaminant cleanup to reduce the project's effects on the lizard (USFWS 2011, p. 5). Due to active management efforts set forth within the Navy's INRMP, we continue to find that land use is not currently a substantial threat to the species or its habitat on the San Nicolas Island.

Santa Barbara Island and Sutil Island

Santa Barbara Island is managed as a unit of the NPS and land management is focused on the preservation of natural, archaeological, and aesthetic resources (NPS 2006a, pp. 44–62). Public use of the island is limited to primitive camping, hiking, wildlife viewing, and other non-consumptive uses (NPS 2011b). Though recreational land use on Santa Barbara Island could

increase the potential for accidental fires and the spread of nonnative plants, the 2006 5-year review concluded that is not a substantial threat to the species (USFWS 2006b, p. 18).

With the exception of potential fire caused by human-related activities (see Fire discussion below), we continue to agree with the threat analysis in the 2006 5-year review that land use does not currently pose a substantial threat to the island night lizard or its habitat on Santa Barbara Island due to actions implemented by the NPS (see discussion of the Organic Act below **under FACTOR D: Inadequacy of Existing Regulatory Mechanisms**).

The Service has no information concerning habitat destruction or modification as it relates to land use or development occurring on Sutil Island and does not consider it a current threat to the island night lizard.

Fire

At listing, (USFWS 1977) fire was not identified as a threat to the island night lizard or its habitat. We concluded in the 2006 5-year review of the island night lizard that fire is a threat to the species on all islands, but is not considered a substantial threat on any island due to the low potential for human-caused ignition on San Nicolas and Santa Barbara Islands and current fire management policies on all islands (USFWS 2006b, pp. 13–15); however, increased fuel load associated with the invasion of nonnative grasses such as *Bromus* spp., may increase the potential for fire (USFWS 2006b, p. 13). Additionally, *Lycium californicum*, *Opuntia* spp., and *Coreopsis gigantea*, which support moderate- to high-densities of island night lizards throughout the species' range, are not well-adapted to fire (Navy 2002, p. 3.59; Sawyer *et al.* 2009, pp. 483, 588, 600). Where fires do occur, they may destroy habitat, thereby reducing cover and the ability of the species to thermoregulate; this loss of habitat may create a short-term reduction in prey availability, increase their exposure to predators, and potentially harm individuals (Mautz 2001, p. 27; USFWS 2006b, p. 13).

San Clemente Island

Since 1997, prevention measures (scheduling operations with high ignition potential outside a "fire season" and electrical system improvement), containment measures (vegetation management and use of prophylactic fire retardants), and suppression measures (staging and use of suppression resources) have been implemented through the Navy's INRMP to reduce the frequency of wildfire on San Clemente Island (USFWS 2008, p. 51). Since completion of the 2006 5-year review of the island night lizard, the Navy proposed a new training expansion on San Clemente Island that could potentially increase the occurrence of fire (USFWS 2008, p. 5). Currently, the portions of the island at greatest risk of fire are the impact areas associated with the ship-to-shore bombardment located at the southern end of the island, and areas containing unexploded ordnance for which access for fire prevention has been closed (USFWS 2008, pp. 56–57; Navy 2009, p. 1.13). As part of a consultation with the Service on the effects of the new training and testing activities (USFWS 2008, pp. 2–3), a comprehensive Fire Management Plan (FMP) was completed for San Clemente Island (Navy 2009). The Service concluded that

although these activities are likely to adversely affect the island night lizard, fires are not expected to have a significant effect on the island-wide population due to the number of lizards on the island (USFWS 2008, pp. 203–204). Additionally, fuelbreaks and suppression measures are outlined within the FMP to prevent a significant increase in fire frequency, where high-quality habitat occurs (USFWS 2008, p. 204).

The Navy's focus on fire management is related to military training and other human-related activities and facilities, as these activities represent the primary source of ignition on the island (USFWS 2008, p. 3). Seasonal range and training modifications are efforts taken by the Navy to assist in the prevention of fire ignition, containment, and fire suppression (USFWS 2008, pp. 3–4). The primary purpose of the FMP is to provide military users a full and complete range of training opportunities, while adhering to environmental laws and achieving sustainable management of island ecosystems (Navy 2009, p. 1.1). The plan implements three fuel management strategies consisting of high-intensity fuel management buffer zones; defensible space around structures; and low-intensity landscape modification with prescribed fire that meets fuels management, resource protection, and habitat restoration objectives (Navy 2009, p. ES-3).

Fire can negatively impact high-quality habitat, such as *Lycium californicum* (Navy 2009, p. 2.26), and if intervals between fires are too short within this vegetation type, there is a risk of type conversion of the habitat or long-term loss of *L. californicum* (Navy 2009, p. 4.7). However, prescribed fires in high-quality *L. californicum* may be the best management tool to control nonnative grasses that degrade native vegetative community values (Navy 2009, pp. 4.7–4.8). Because a potential benefit could result from less-severe fires in *L. californicum* areas, fires of moderate-severity will be managed to less than 5 ac (2.0 ha) habitat and no more than 45 ac (18.2 ha) will be burned over a 5-year time frame (Navy 2009, p. 4.8). In moderate-quality *L. californicum* habitat, prescribed burns will be managed to less than 20 ac (8 ha); and in low-density *L. californicum* habitat, prescribed burns will be managed to less than 40 ac (16 ha) (Navy 2009, p. 4.8). There has been a reduction in *Opuntia prolifera* in some areas of San Clemente Island which may be a result of current fire patterns on the island; however, there is no clear trend to indicate that there is an overall decline of *O. prolifera* on the island (Navy 2009, p. 2.18). Within *Opuntia* spp., and interspersed with grasslands and shrublands, fires that are excessively hot, large, or frequent can delay or prevent woody plant recovery (Navy 2009, pp. 4.11–4.12). The FMP concludes that fire does not greatly affect island night lizards on San Clemente Island, due to the high numbers and wide distribution across the island, unless the frequency or size of the fire is so high that it removes the necessary thermal cover for long periods of time and over large areas (Navy 2009. pp. 2.26, 2.32).

We continue to believe that fire is a potential threat on San Clemente Island, based on the historical and current fire patterns, limitations to access for fire management in some areas, and proximity of ignition sources to island night lizard habitat. However, given the extent of high-quality island night lizard habitat across the island, the high estimated abundance and broad distribution of the species, and active fire management proposed to reduce the spread of fires, we do not consider fire to be a substantial threat to the island night lizard or its habitat on San Clemente Island.

San Nicolas Island

We agree with the conclusion in the 2006 5-year review that, although the potential for fire exists on San Nicolas Island because of human presence, the potential for human-caused ignition of fire appears low for the island (USFWS 2006b, p. 15). We also agree with the conclusion that the potential impacts of fire is of greater concern on San Nicolas Island than San Clemente Island due to the limited amount of island night lizard habitat. However, if fire were to occur, it would likely be outside of island night lizard habitat, in the vicinity of two missile launch sites that are located on the west side of the island (USFWS 2006b, p. 15). Also, a fire station is located on the eastern side of San Nicolas Island (Navy 2010b, p. 1.7) near the distribution of high-quality island night lizard habitat, which increases the chance that any fire in the vicinity will be managed quickly. Currently, the Navy has not developed a fire management plan for San Nicolas Island, but does have an existing "let it burn" policy as long as the fire does not threaten people or structures (Navy 2010b, p. 4.13). Though the potential for fire exists on San Nicolas Island, it is not currently a substantial threat to the lizard or its habitat. This is due to the low potential for human-caused ignition of fire and distribution of habitat away from potential fire starting activities. Additionally, the high-quality island night lizard habitat on the eastern portion of the island is near humans and structures, including a fire station, and is therefore not subject to the "let it burn" policy. Therefore, fires in this area will have a reduced response time and increased likelihood of being managed quickly.

Santa Barbara and Sutil Island

As a unit of Channel Islands National Park, visitation to Santa Barbara Island is conducted in a manner to ensure the biological and archaeological values of the island are not diminished. Human visitation to Santa Barbara Island is minimal, and although smoking is limited to a cement area adjacent to the visitor center and campfires are not permitted on the island, wildfire on Santa Barbara Island would most likely be human-caused. We concluded in the 2006 island night lizard 5-year review that fire was a potential threat to the species and that if a fire occurred on Santa Barbara Island there are no resources available on the island to suppress the fire (USFWS 2006b, p. 15). The Channel Islands National Park has a Fire Management Plan (CHIS FMP) in place that covers all units of the Channel Islands National Park. The CHIS FMP calls for the suppression of all wildfires within the National Park and to utilize Minimum Impact Suppression Tactics where feasible to reduce impacts to natural and cultural resources (NPS 2006b, p. 12). Although no resources are available on Santa Barbara Island to suppress wildfires, the U.S. Forest Service's Los Padres National Forest will provide fire-fighting support including air and ground resources, incident command, communications, and ordering (NPS 2006b, p. 10). The potential for fire exists on Santa Barbara Island; however, it is currently not a substantial threat to the island night lizard or its habitat due to limited human presence on the island, prohibition of fire at campgrounds, and the current CHIS FMP.

Due to limited amounts of vegetation and a lack of human presence we do not consider fire a current threat to island night lizards on Sutil Island.

Erosion

Erosion was not identified as a threat to the island night lizard at listing (USFWS 1977), but was identified in the 2006 5-year review as a threat to lizard habitat on San Clemente, San Nicolas, and Santa Barbara Islands as a continuing consequence of the introduction of nonnative herbivores and land uses (USFWS 2006b, p. 12, 16).

San Clemente Island

Erosion on San Clemente Island has been exacerbated as a consequence of the historical introduction and overgrazing by nonnative herbivores in conjunction with current land use operations by the Navy, and wind and water wearing away land surface (Navy 2002, 9. 3.22; USFWS 2006b, p. 16; USFWS 2008, pp. 47, 199–200). Since completion of the 2006 5-year review, as part of a consultation with the Service on increased training and testing activities, and as set forth within the Navy's INRMP (Navy 2002, p. 4.89), the Navy is currently developing an erosion control plan to reduce the potential for erosion (USFWS 2008, pp. 62, 87; Escola 2011, pers. comm.). Additionally, the Navy, in accordance with the Soil Conservation and Domestic Allotment Act of 1935 (16 U.S.C. 590(a, b), 49 Stat. 163), and as implemented through the Navy's INRMP for San Clemente Island, is required to prevent and control erosion through surveys and implementation of conservation measures (Navy 2002, p. 3.22). Current erosion control measures, as set forth by the Navy's INRMP include locating ground disturbing activities on previously disturbed sites when possible and assuring that all project work areas and transit routes are clearly identified and marked, and by restricting vehicular activities within those areas (Navy 2002, p. 3.23). Though erosion on San Clemente Island has been exacerbated as a consequence of historical grazing regimes by nonnative herbivores and current land use operations by the military, we do not currently consider erosion to be a substantial threat to the island night lizard or its habitat due to the Navy's compliance with the Soil Conservation and Domestic Allotment Act to prevent and control erosion, coordination with the Service to avoid impacts to island night lizard habitat, and ongoing prevention measures to reduce erosion on the island.

San Nicolas Island

Erosion on San Nicolas Island was exacerbated as a consequence of the introduction of nonnative herbivores (Navy 2010b, p. 2.4). Additionally, poor soil structure, winds, and rain also exacerbate erosion on San Nicolas Island (Navy 2010b, pp. 3.5–3.8). Almost all of the moderate- to high-quality island night lizard habitat on San Nicolas Island occurs in areas considered by the Navy to have a moderate- to high-soil erodibility (Navy 2005, pp. 30, 44). Halvorson *et al.* (1996, p. 25) noted the north and south slope of San Nicolas Island may need active restoration for the recovery of native plants due to soil erosion. Since 2000, the Navy has incorporated erosion control measures into San Nicolas Island construction projects (Navy 2005, p. 42), and repaired roads with measures in design to specifically address and reduce erosion (Ruane 2011, pers. comm.). Since completion of the 2006 5-year review, the Navy has entered into consultation with the Service concerning a proposed wind energy project that could

potentially affect island night lizards (USFWS 2010). In response to potential impacts from this project, the Navy may plant native shrubs used by island night lizards to control erosion in the proposed action area (USFWS 2010, p. 3).

Effects from historical land use and overgrazing remain a potential concern due to the limited amount of, and time required to reestablish, high-quality lizard habitat. Currently, steps are being taken by the Navy to reduce and manage current impacts from erosion on San Nicolas Island. Island biologists have also reported that little high-quality habitat is likely to be lost because of unnatural causes of erosion (related to land use) (Fellers 2009, pers. obs.). Therefore, we do not consider erosion to be a substantial threat to the island night lizard or its habitat on San Nicolas Island.

Santa Barbara Island & Sutil Island

Erosion from wind, wave action, and the effects of overgrazing are less evident on Santa Barbara Island. New sources of human-caused erosion on the island are very minimal given the limited amount of human use there. Though wind and wave action may still cause natural erosion on the island, any possible new erosion resulting from direct human use would likely be related to erosion along existing trails. We have no information concerning the effects of erosion on Sutil Island. Although erosion from wind, wave action, and the effects of overgrazing are evident on Santa Barbara Island, we have no current information to indicate that erosion is currently a substantial threat to the island night lizard or its habitat on Santa Barbara or Sutil Islands.

Summary of Factor A

The loss and modification of habitat for the island night lizard as a result of the introduction of nonnative herbivores was cited by the Service as a threat to the species at the time it was listed under the Act (USFWS 1977, pp. 40683–40684). In our 2006 5-year review of the island night lizard we noted that, although grazing animals were removed from the islands, we were concerned with the apparent slow pace of recovery of the vegetation on San Nicolas Island and Santa Barbara Island. Currently, there is evidence that native vegetation, including that favored by the lizard is recovering on all three occupied islands. There are no longer any nonnative herbivores on San Clemente, San Nicolas, and Santa Barbara Islands, so the threat of habitat destruction and modification to the island night lizard or its habitat as a result of the introduction of nonnative herbivores has been ameliorated.

At listing (USFWS 1977, pp. 40683–40684), the introduction of nonnative plants was identified as a threat to the island night lizard. In the 2006 5-year review we considered the presence of nonnative plants a potential concern on all three islands inhabited by the island night lizard, all of which have undergone vegetation composition changes due to the introduction of nonnative plant species. The Navy and NPS recognize the threat of nonnative species introductions, and are implementing management efforts to reduce this risk. Additionally, there are current nonnative plant removal and control efforts being implemented on all three islands. We do not have any information about the introduction or presence of nonnative plants on Sutil Island. Although

nonnative plants are a potential threat rangewide, we do not consider the introduction and persistence of nonnative plants to be a substantial threat to the island night lizard or its habitat on any of the occupied islands.

Development activities can potentially result in a reduction in available habitat for island night lizards and the direct loss of individuals. We have determined that land use impacts on San Clemente Island could potentially pose a threat to the island night lizard and its habitat; however, because impacts are relatively limited in relation to the size of the San Clemente Island, the remaining amount of available habitat, and the number of island night lizards (estimated 21 million) that inhabit the island, we do not consider land use or development a substantial threat to the species on San Clement Island. We have determined that land use impacts on San Nicolas Island could potentially pose a threat to the island night lizard due to the limited amount of suitable habitat for the species. However, land use and development activities are likely to have only a minimal impact on the species and its remaining habitat. Aside from road repair projects and a new wind energy proposal that may impact a small amount of island night lizard habitat, we do not have any information regarding proposed future land use development activities on San Nicolas Island and do not consider land use or development a substantial threat to the species on the island. The current status of Santa Barbara Island and Sutil Island as a unit of the National Park System protects the island night lizard from impacts related to future land use or development. Although there is potential for land use impacts and development on San Clemente and San Nicolas Islands, we do not consider development a substantial threat to the island night lizard or its habitat on any of the occupied islands.

A potential for fire exists on all three islands due to human activity, with higher potential on San Clemente and San Nicolas Islands due to military activities and nonnative annual grasses increasing the availability of readily flammable fuels. Based on historical records and current land use, high fire frequency on Santa Barbara Island is unlikely and would be limited to human negligence that may provide an ignition source. There is no information concerning the threat of fire to Sutil Island. Although fire is a potential threat on all islands, we do not consider fire a substantial threat to the island night lizard or its habitat because of current fire management policies, plans, and actions being implemented on all occupied islands.

Historical land use and overgrazing by nonnative herbivores exacerbated the impacts of erosion on San Clemente, San Nicolas, and Santa Barbara Islands and will likely continue for many years to come. However, all nonnative herbivores have been removed from the islands and the slow process of natural recovery is ongoing. In accordance with the Navy's INRMPs and NPS's management policies, and through the development of erosion control plans, efforts to control new and existing sources of erosion on all occupied islands will help minimize future impacts to the island night lizard and its habitat from erosion. The Service has no information that indicates the effects of erosion on Sutil Island are a threat to the island night lizard. We conclude that erosion is of potential concern, but is not currently a substantial threat to the island night lizard or its habitat on any of the occupied islands.

In conclusion, we do not find that habitat destruction or modification from the introduction of nonnative plants, land use and development, fire, or erosion currently pose a substantial threat to the island night lizard or its habitat on San Clemente, San Nicolas, and Santa Barbara Islands.

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

Overutilization for commercial, recreational, scientific, or educational purposes was not identified as a threat to the island night lizard at listing (USFWS 1977, p. 40684), or in our previous 5-year review (USFWS 2006b, p. 18). The species is protected from collection by its occurrence on oceanic islands that are not easily accessible. Access to San Clemente and San Nicolas Islands is limited to military and civilian personnel conducting training or military support activities and the NPS prohibits collection of wildlife on Santa Barbara and Sutil Island except as allowed by section10(a)(1)(A) permits issued pursuant to the Act. Fellers *et al.* (2009, p. 17) noted that a high proportion of small lizards was detected at one survey site and considered whether anyone might be collecting the larger individuals; though no evidence of collecting exists. We continue to agree with the conclusion in the 2006 5-year review of the island night lizard (USFWS 2006b, p. 18) that overutilization for commercial, recreational, scientific, or educational purposes is not a current threat to the island night lizard throughout its range.

FACTOR C: Disease or Predation

Disease

Disease was not identified as a threat to island night lizard at listing (USFWS 1977, p. 40684) or in the 2006 5-year review (USFWS 2006b, p. 19). Currently, we have no information to indicate that disease is a threat to the lizard.

Predation

At listing (USFWS 1977, p. 40684), predation by feral cats was noted as a probable threat on San Clemente Island. The listing rule also indicated that the introduction of the nonnative southern alligator lizard to San Nicolas Island might pose a serious threat to the island night lizard through depredation of the species (USFWS 1977, p. 40684). The 2006 island night lizard 5-year review stated that predation of feral cats on San Nicolas Island was of particular concern. Other predators identified in the 2006 5-year review included the black rat (*Rattus rattus*) and gopher snake (*Pituophis catenifer*) on San Clemente Island, and the side-blotched lizard on San Nicolas Island; however, impacts from these nonnative predators were unknown (USFWS 2006b, pp. 19–21).

San Clemente Island

As identified in the 2006 5-year review, nonnative predators (feral cats, black rats, gopher

snakes) on San Clemente Island are potential threats to island night lizards. However, only feral cats have been documented to prey upon island night lizards (Mautz 2001, p. 9). There are ongoing efforts on San Clemente Island by the Navy to control feral cats in order to benefit the San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*), San Clemente Island sage sparrow (*Amphispiza belli clementeae*), and other federally listed species, which provide an ancillary benefit to the island night lizard (USFWS 2008, p. 59). In 2010, the Navy removed 221 cats from San Clemente Island (Biteman *et al.* 2011, p. 22). Gut contents were analyzed for 188 of the 221 cats and island night lizards made up 13 percent of the diet (Biteman *et al.* 2011, p. 22). Based on our review of the best available scientific and commercial information, there is no indication of the extent to which black rats may predate upon island night lizards nor is there an estimate of the total population of black rats on the island. Additionally, in 2010, 214 rats were removed from San Clemente Island (Biteman *et al.* 2011, p. 29). There has been only one documented account of gopher snake presence on the island and since its removal none have been reported. Despite the continued presence of feral cats and black rats on the island, island night lizard numbers remain high.

San Clemente island is home to native predators of the island night lizard such as American kestrels, common ravens (*Corvus corax*), San Clemente loggerhead shrikes, burrowing owls, and the island fox (*Urocyon littoralis*); however we do not consider them a threat to the species as documented predation rates are low and these species have persisted simultaneously throughout time (Navy 2002, p. D.44). We conclude that predation from nonnative species does not currently pose a substantial threat to the island night lizard on San Clemente Island, due to the large population size of the species and current predator control measures being implemented on the island.

San Nicolas Island

In the 2006 5-year review of the island night lizard, we indicated our concern that the introduction of two nonnative lizards (southern alligator lizard and side-blotched lizard) may have a negative impact on the island night lizard (USFWS 2006b, p. 20). Specifically, there was concern that the southern alligator lizard may pose a threat to island night lizards as a competitor or possible predator on San Nicolas Island (USFWS 2006b, p. 20). Since completion of the 2006 5-year review, Fellers *et al.* (2009, pp. 18–19) noted the range of both nonnative lizards have expanded on San Nicolas Island and that both taxa occupy similar distributions on the island. However, we have no information to indicate that the side-blotched lizard currently presents a threat to the island night lizard. Fellers *et al.* (2009, p. 18) also noted that southern alligator lizards occur in different habitats than island night lizards and that they see no indication of negative impacts to the island night lizard.

In the 2006 island night lizard 5-year review we concluded that the feral cat population was a threat to island night lizards on San Nicolas Island (USFWS 2006b, p. 20). Since the completion of the 2006 status review, and as recommended by the San Nicolas Island INRMP (Navy 2005, p. 52), the Navy implemented and completed a feral cat removal program to protect Federal or State listed species inhabiting San Nicolas Island, including the island night lizard (USFWS

2008, pp. 3–4; Hanson and Bonham 2011, pp. 1–4). Removal of feral cats from San Nicolas Island was identified as a priority project by the MSRP to improve nesting success for the Brandt's cormorant (*Phalacrocorax panicillatus*) and western gull (*Larus occidentalis*) (MSRP 2005, pp. D3.1–D3.2). Removal of feral cats on San Nicolas Island began in 2009 and was completed in 2010 with the removal of 59 individual feral cats (Hanson and Bonham 2010, p. 2). Several methods were utilized to detect and remove cats from the island including the installation of camera traps to detect the location and presence of feral cats, use of modified padded leg-hold live traps, and spotlight hunting (Hanson and Bonham 2011, pp. 2, 4–5). Since June 27, 2010, no sign or sightings of feral cats have occurred on the island (Hanson and Bonham 2011, p. 19). From June 27, 2010, to December 9, 2011, a total of 27,224 camera trap nights occurred with zero cat detections. The successful completion of this project was announced in February 2012 (Little 2012a, pers. comm.). Due to the removal of all feral cats from San Nicolas Island, we no longer consider feral cats a predatory threat to the island night lizard on the island.

Additionally, a new wind-energy project (see Habitat Destruction or Modification from Potential Land Use and Development) for San Nicolas Island will install approximately 5,960 feet (ft) (1,817 meters (m)) of new utility lines and associated utility poles, which will increase perching opportunities for native predators of the island night lizard, such as the American kestrel and barn owl, that could potentially predate on island night lizards (USFWS 2011, p. 2). However, the Navy is implementing impact avoidance measures, such as perch deterrents, that will be placed on the arms of all utility poles to minimize the potential for raptors to use the poles as perch sites and potentially increase predation impacts on island night lizards (USFWS 2011, pp. 3–4).

In 2011, the Navy completed a Biosecurity Plan for San Nicolas Island to prevent the transport and establishment of all nonnative vertebrate species on the island (Navy 2011, p. 1). These measures will reduce the potential for nonnative vertebrate species to be introduced to San Nicolas Island that could prey upon the island night lizard or outcompete it for natural resources.

Predation is no longer a substantial threat to the island night lizard on San Nicolas Island, because of the removal of feral cats and management actions in place to reduce the introduction of nonnative predators on the island.

Santa Barbara Island & Sutil Island

We continue to agree with the conclusion of the 2006 5-year review that Santa Barbara Island does not support any nonnative predators, but does support populations of native predators of the island night lizard including the burrowing owl (*Athene cunicularia*), American kestrel, and barn owl (USFWS 2006b, p. 19). While these predators pose a threat to individual island night lizards (USFWS 2006b, p. 19), they do not pose a substantial threat to the continued existence of the species on the island due to the current number of lizards on the island, highly sedentary nature of the lizard, and tendency to remain under shelter such as dense vegetation or rocks, which limits the exposure to aerial predators. The Service has no information indicating the occurrence

of predators of the island night lizard inhabiting Sutil Island and do not consider predation a current threat to the species.

Summary of Factor C

Disease was not identified as a threat to the island night lizard at listing or in the 2006 5-year review, and we have no new information to indicate that disease is a current threat to the lizard. At listing, predation by feral cats on San Clemente Island and by the southern alligator lizard on San Nicolas Island were identified as potential threats to the island night lizard. In the 2006 5-year review we concluded that predation by feral cats was no longer of concern on San Clemente Island due to the size of the lizard's population, but that feral cat presence on San Nicolas Island was a potential threat to the island night lizard. Additionally, the 2006 5-year review noted that southern alligator lizards, rats, and introduced snakes were potential predatory threats to the island night lizard, but that the imminence and magnitude of the threat were unknown at that time. More recent research indicates that neither the southern alligator lizard nor the more recently introduced nonnative side-blotched lizard negatively impact the island night lizard on San Nicolas Island. Since 2006, the Navy implemented and completed a feral cat removal program, from 2009 to 2010, on San Nicolas Island in which all feral cats were successfully removed. The Navy has also developed and is implementing a Biosecurity Plan to reduce the possibility of introducing new nonnative predators to San Nicolas Island. The Navy has also implemented efforts to control black rats and feral cats on San Clemente Island as part of the recovery efforts for the San Clemente loggerhead shrike and San Clemente Island sage sparrow and thus they do not currently pose a substantial threat to the species on San Clemente Island. Additionally, nonnative predators of the island night lizard do not exist on Santa Barbara Island or Sutil Island. Therefore, we conclude that predation or disease are currently not substantial threats to the island night lizard on any of the occupied islands.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

The inadequacy of existing regulatory mechanisms was not indicated as a threat to the island night lizard at listing (USFWS 1977, p. 40684) or the 2006 5-year review (USFWS 2006b, p. 21). The range of island night lizard is restricted to Federal military installations on San Clemente and San Nicolas Islands and a national park on Santa Barbara and Sutil Islands. Federal protections that currently afford protection to island night lizard are discussed below and include: the Endangered Species Act, Sikes Act, National Environmental Policy Act (NEPA), and NPS Organic Act.

Federal Protections

<u>Endangered Species Act of 1973, as amended (Act):</u>

The Endangered Species Act of 1973, as amended, is the primary Federal law that provides protection for the island night lizard. The Service is responsible for administering the Act, including sections 7, 9, and 10. Section 7(a)(1) of the Act requires all Federal agencies to utilize

their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed species. 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. Since listing, the Navy, and more recently the NPS, have consulted and coordinated with the Service, under the Act, regarding the effects of various activities on the island night lizard, on federally owned San Clemente, San Nicolas, and Santa Barbara Islands (see **FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range** above).

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the "take" of federally listed wildlife. Section 9 of the Act 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. Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of a Federal 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 Improvement Act (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 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. INRMPs are developed in coordination with the State and the Service, and are generally updated every 5 years. Although INRMP implementation is subject to funding availability, it is an important guiding document that helps to integrate natural resource protection with military readiness and training.

San Clemente Island INRMP

Pursuant to the Sikes Act, the Navy adopted an INRMP for San Clemente Island that targets multiple objectives towards protection of the island night lizard and its habitat that help to reduce

threats to this taxon (Navy 2002). The INRMP complies with such legislation and regulations as the Act, NEPA, Federal Noxious Weed Act, and Soil Conservation and Domestic Allotment Act. The goal of the San Clemente Island INRMP is to support the military requirements of the Pacific Fleet while maintaining long-term ecosystem health (Navy 2002, p. 1.2). Specifically, this goal will:

(1) Facilitate sustainable military readiness and foreclose no options for future requirements of the Pacific Fleet.
(2) Protect, maintain, and restore priority native species to reach self-sustaining levels.
(3) Ensure ecosystem resilience to testing and training impacts.
(4) Maintain the full suite of native species, emphasizing the endemics.

In 1997, the Navy established the INLMA (USFWS 1997, p. 5), an area encompassing 11,051 ac (4,474 ha) of the western shore of San Clemente Island in which the majority of high-quality *Lycium californicum* and *Opuntia* spp. habitats and approximately half of the island night lizard population exists (Mautz 2001a, p. 29). The objective proposed by the INRMP is to manage the INLMA as a demonstration project, where emphasis is placed on demonstrating, through an active monitoring and review program, the potential for integration of military operational needs with conserving sensitive and other species (Navy 2002, p. 4.43). The INLMA provides a benefit to the species (Navy 2002, pp. 4.43–4.47) through the following measures:

(1) Monitoring habitat condition annually and monitor the island night lizard population every 3 years.
(2) Incorporate high-quality habitat into Navy land use planning process by managing it as an area of limited disturbance.
(3) Direct habitat disturbance due to military operation or construction to areas other than high-quality habitat to the extent practicable.
(4) Control or reverse expansion of nonnative plants in high-quality habitat.
(5) Prevent access to unused roads and/or unauthorized routes in high-quality habitat.
(6) Prevent expansion or introduction of nonnative vegetation by ensuring all vehicles admitted to the island are free of mud and weed seed.
(7) Base wildland fire strategy and control on designated Management Units. When human life and high-valued structures are not at risk, the priority for fire suppression will be to keep wildland fires within the Management Unit boundaries or firebreaks.
    (a) A Fire Management Plan for San Clemente Island was developed in 2009 (see Factor A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range above).

Although the INRMP includes objectives targeted toward habitat protection of high-quality island night lizard habitat, Navy Operational needs may supersede INRMP goals. The 2002 INRMP is currently under revision and future iterations of this plan and management strategies may differ from the existing INRMP. The INLMA will be incorporated into the new INRMP without any expansion of the designated area (Booker 2011, pers. comm.). In the interim the Navy continues to implement the 2002 INRMP.

San Nicolas Island INRMP

Pursuant to the Sikes Act, the Navy adopted an INRMP for San Nicolas Island that targets multiple objectives towards protection of the island night lizard and its habitat that help to reduce threats to this taxon (Navy 2010b). The INRMP complies with such legislation and regulations as the Act, NEPA, Federal Noxious Weed Act, and Soil Conservation and Domestic Allotment Act. The purpose of the San Nicolas INRMP is to provide a viable and implementable framework for the management of natural resources at Naval Base Ventura County, California, San Nicolas Island (Navy 2010b, p. 1.1). The current management strategy objective for island night lizards on San Nicolas Island is to maintain a viable population (Navy 2010b, p. 4.56). The strategies to accomplish this objective (Navy 2010b, p. 4.56) are as follows:

(1) Continue to develop and implement protocols to resolve any baseline biological data gaps and to monitor distribution, population size, population trends, and habitat usage of the island night lizard population by:
   (a) conducting site-specific surveys in known or suitable habitat prior to disturbance activities.
(2) Protect and maintain island night lizard habitat quality and integrity by:
   (a) conducting an invasive nonnative control, monitoring, and removal program in island night lizard habitat in order to reduce impacts upon the species' population;
   (b) defining and clearly marking work areas during road maintenance and other activities to prevent island night lizard mortality in accordance with the Terms and Conditions listed in the Biological Opinion (Service 2001);
   (c) excluding areas of high-quality island night lizard habitat from mowing regimes;
   (d) maintaining a bare ground buffer zone around equipment and storage areas in high-quality island night lizard habitat where practicable; and
   (e) siting staging areas for storage of equipment and materials in areas with low island night lizard densities, whenever feasible.
(3) Conduct relocation of island night lizards in accordance with the Terms and Conditions identified in the current Biological Opinion (Service 2001).
(4) Support studies to investigate the effectiveness of island night lizard management strategies by:
   (a) supporting scientific studies of competition relationships between alligator lizards and island night lizards; and
   (b) supporting genetic studies of isolated island night lizard populations to determine population structure and size.
(5) Educate island personnel on laws covering prohibition on taking listed species for pets or for sale in pet trade. Support recovery plan goals to establish stable island night lizard populations and eventual delisting by:
   (a) supporting Channel Islands-wide review of population status of the species.

The Navy incorporates erosion control measures into San Nicolas Island construction projects (Navy 2005, p. 42), and road repairs, including measures in design to specifically address and reduce erosion (Ruane 2011, pers. comm.).

Additionally, in 2011, the Navy completed a Biosecurity Plan for San Nicolas Island, with the goal to protect the biodiversity of San Nicolas Island through preventing the transport and establishment of all nonnative vertebrate species on the island (Navy 2011, p. 1). Through implementation of this plan, the Navy has established biosecurity measures for personnel, barge operations, airfield operations, and monitoring to eliminate the introduction of nonnative vertebrate species to San Nicolas Island (Navy 2011, pp. 7–19). All personnel must be trained in biosecurity protocols, report sightings and suspicions, display and distribute information signs and pamphlets, ensure biosecurity language is included in all contracts, and review for biosecurity compliance (Navy 2011, p. 19). Barge and airfield operations staff must thoroughly inspect all cargo, aircraft, and vessels; keep staging areas clean, clear, and well lit; set bait stations or chew blocks and maintain traps in staging areas; create indoor and outdoor quarantined staging areas; keep vehicle and container doors closed, seal holes in containers, maintain traps on barges, tugboats, or aircraft, and deploy additional traps and mooring line cones when barge and tugboats are at port (Navy 2011, p. 19). Additionally, the Navy will monitor for nonnative vertebrate species by visually surveying for signs of animal activity around landing points; deploying cameras around introduction points, key habitat, and travel areas; expand current biological surveys to target potential introductions; monitor nest boxes or chew sticks; and survey for additional nonnative species (sign search, trapping) (Navy 2011, p. 19). With funding, these measures will benefit the island night lizard by reducing the potential for nonnative vertebrate species to be introduced to San Nicolas Island, which could prey upon the island night lizard or outcompete it for natural resources.

National Environmental Policy Act (NEPA):

All Federal agencies are required to adhere to NEPA of 1970 (42 U.S.C. 4321 *et seq.*) for projects they fund, authorize, or carry out. The Council on Environmental Quality's regulations for implementing NEPA (40 CFR parts 1500–1518) state that agencies shall include a discussion on the environmental impacts of the various project alternatives (including the proposed action), any adverse environmental effects that cannot be avoided, and any irreversible or irretrievable commitments of resources involved (40 CFR part 1502). NEPA is a disclosure law, and does not require subsequent minimization or mitigation measures by the Federal agency involved. Although Federal agencies may include conservation measures for island night lizard as a result of the NEPA process, any such measures are typically voluntary in nature and are not required by the statute. NEPA does not itself regulate activities that might affect island night lizard, but it does require full evaluation and disclosure of information regarding the effects of contemplated Federal actions on sensitive species and their habitats. On San Clemente and San Nicolas Islands, the Navy must meet the NEPA requirements for actions significantly affecting the quality of the human environment. Typically, the Navy prepares Environmental Assessments and Environmental Impact Statements on operation plans and new or expanding training actions. On Santa Barbara Island, and incorporated Sutil Island, the NPS must also meet NEPA requirements for actions significantly affecting the quality of the human environment. The NPS prepares Environmental Assessments and Environmental Impact Statements on actions and projects in national parks. Absent the listing of island night lizard, we would expect the Navy

and NPS to continue to meet the procedural requirements of NEPA for its actions. However, as explained above, NEPA does not itself regulate activities that might affect island night lizards.

National Park Service (NPS) Organic Act:

The NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), states that the NPS "shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations…to conserve the scenery and the national and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The 2006 NPS Management Policies indicate that the Park Service will "meet its obligations under the NPS Organic Act and the Endangered Species Act to both pro-actively conserve listed species and prevent detrimental effects on these species." This includes working with the Service and undertaking active management programs to inventory, monitor, restore, and maintain listed species habitats, among other actions.

Summary of Factor D

The inadequacy of existing regulatory mechanisms was not indicated as a threat to the island night lizard at listing or in the 2006 5-year review. Because all islands are under Federal ownership, existing regulatory mechanisms including various laws, regulations, and policies administered by the U.S. Government aid in abating known threats and provide protective mechanisms for the species and its habitat. Primary Federal law that provide some benefit for the species and its habitat include the Act, Sikes Act, NEPA, NPS Organic Act, Federal Noxious Weed Act, and the Soil Conservation and Domestic Allotment Act. Although Navy operational needs may supersede INRMP goals and objectives the island night lizard population and habitats on San Clemente and San Nicolas Islands are currently afforded protections through implementation of the Navy's San Clemente Island INRMP, and San Nicolas Island INRMP, respectively. The implementation of these INRMPs have allowed for active management and reduced impacts on island night lizards and their habitats. The management of nonnative plant species, to allow for recovery of native plant communities that support island night lizards, is performed on San Nicolas and San Clemente Island by the Navy in accordance with the Federal Noxious Weed Act. Management efforts are also in place on San Clemente Island to control erosion in accordance with the Soil Conservation and Domestic Allotment Act. The population of island night lizards and their habitat on Santa Barbara Island and Sutil Island are afforded protections by the NPS's Organic Act, which undertakes active management programs to inventory, monitor, restore, and maintain listed species habitats. In conclusion, island night lizards are afforded protection through Federal and military mechanisms, and in absence of the Act, these existing regulatory mechanisms are adequate to conserve the island night lizard and its habitat throughout its range both now and in the future. Therefore, we confirm that the inadequacy of existing regulatory mechanisms is not a current threat to the species.

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

The listing rule (USFWS 1977, p. 40684) states that island-adapted taxa are often detrimentally affected by accidental or intentional introduction of nonnative species. This was the only threat attributed to Factor E for any of the seven taxa included in the listing rule. The discussion of introduced nonnative plants is now discussed in Factor A as it pertains to habitat destruction. The 2006 5-year review (p. 24) concluded that the restricted distribution of the island night lizard on San Nicolas and Santa Barbara Islands makes these populations susceptible to natural catastrophes such as fires, landslides, or prolonged droughts. See Factor A as they pertain to habitat destruction for a discussion concerning the threats of fire or erosion (landslides) in this status review. Although climate change is not specifically mentioned in the 2006 5-year review of the island night lizard, the review does discuss the species vulnerability to environmental stochasticity and prolonged drought due to its restricted distribution on San Nicolas and Santa Barbara Islands (USFWS 2006b, p. 24).

Climate Change

Our analyses under the Endangered Species Act include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Since listing (USFWS 1977, p. 40684) and the 2006 5-year review of this species (USFWS 2006b), potential threats to flora and fauna of the United States from ongoing, accelerated climate change have been identified (IPCC 2007, pp. 1–52; PRBO 2011, pp. 1–68). A recent study examined the effects of climate change scenarios as they pertain specifically to the different ecoregions of California (PRBO 2011, pp. 1–68). An ecoregional approach was examined because climate change effects will vary in different areas of California due to the State's size and diverse topography (PRBO 2011, p. 1). Climate projections, as they relate to temperature, precipitation, and sea-level rise, for these ecoregions were established by analyzing numerous IPCC emission scenarios (2007, pp. 44–54), the core of most climate projections, for atmospheric and oceanic global circulation models (PRBO 2011, p. 1). The ecoregion consisting of San Clemente, San Nicolas, Santa Barbara, and Sutil Islands, is the Southern Bight ecoregion (PRBO 2011, p. 4); however, this ecoregion refers only to the marine environment and not the

terrestrial environment occupied by island night lizards. Therefore, projections made for the Southwestern California ecoregion will be used in the threat analysis, as vegetation found on these Islands and of importance to the island night lizard, including *Lycium californicum*, *Opuntia* spp., *Coreopsis gigantea*, *Deinandra clementina*, *Artemisia californica*, and *Baccharis pilularis*, similarly occur in the Southwestern California ecoregion (Sawyer *et al.* 2009, pp. 387, 423, 483, 493, 588, 599–600).

Currently, San Clemente, San Nicolas, Santa Barbara, and Sutil Islands are located within a Mediterranean climatic regime, but with a significant maritime influence. Climate change models indicate a 1 to 3 degrees Celsius (1.8 to 5.4 degrees Fahrenheit) increase in average temperature for southern California by the year 2070 (Field *et al.* 1999, p. 5; Cayan *et al.* 2008a, p. S26; PRBO 2011, p. 40). As daily temperatures become greater, lizard species spend greater amounts of time burrowing or in refuges and less time spent foraging (Sinervo *et al.* 2010, p. 894). This additional amount of time in refuge and less time spent foraging could possibly pose a threat to the island night lizard considering its already highly sedentary nature. Over the same time span, a 10 to 37 percent decrease in annual precipitation is indicated (PRBO 2011, p. 40); however, other modeling predictions indicate little to no change in annual precipitation (Field *et al.* 1999, pp. 8–9; Cayan *et al.* 2008a, p. S26). Although the islands experience a short rain season (generally November through April), the presence of fog during the summer months helps to reduce moisture stress for many plant species on the islands (Halvorson *et al.* 1988, p. 111). Currently, climate modeling as it relates to fog projections remains a subject of uncertainty (Field *et al.* 1999, pp. 21–22). There is also substantial uncertainty in precipitation projections and relatively little consensus concerning precipitation patterns and projections for the Southwestern California ecoregion (PRBO 2011, p. 40). In the event of a prolonged period of warmer air temperatures and lower rainfall amounts, the island night lizard's habitat and food supply could potentially be reduced. Drought conditions reduce the amount of arthropod populations (a food source) in the spring, compounding the effects of climate change (Knowlton 1949, p. 45; Schwenkmeyer 1949, pp. 37–40; Bolger *et al*. 2000, p. 1242). Additionally, although Sinervo *et al.* (2010, p. 898) found the species extinction risk for Xantusidae to be zero, viviparous species may be more vulnerable to extinction because high active body temperatures can compromise embryonic development in utero (Sinervo *et al.* 2010, p. 894).

Rising sea level may also pose a threat to island night lizard habitat on the inhabited islands. By the end of the 21st century sea level is projected to rise, dependent upon emission scenario modeling, from 0.36 to 2.36 ft (11 to 72 centimeters) globally (Cayan *et al.* 2008b, S62; PRBO 2011, p. 41). A rise in sea level can potentially affect the islands that support the island night lizard by inundating low lying portions of the islands. Sea level rise, accompanied with more frequent severe storms associated with climate change, and high-tide wave action, could also potentially affect island night lizard habitat by accelerating erosion along coastal areas (PRBO 2011, p. 41). Currently, we do not have information regarding projected impacts of sea level rise on San Clemente Island or San Nicolas Island. Although, the cobble/driftwood habitat that occurs just above the intertidal zone at Redeye Beach on San Nicolas Island and supports approximately 1,000 island night lizards (Fellers *et al.* 1998, p. 46), could potentially be altered by a rise in sea level. Island night lizard habitat on Santa Barbara Island does occur at sea level

and a rise could potentially alter this habitat (Fellers 2011, pers. obs.); however the U.S. Geological Survey's Coastal Vulnerability Index for the Channel Islands National Park indicates Santa Barbara Island to have a low vulnerability ranking (Pendleton *et al*. 2005, p. 28). On San Clemente Island, Mautz (2011 pers. comm.) indicates that high-quality island night lizard habitat, at its lowest elevation occurrence, is approximately 32.8 ft (10 m) above sea level and that a rise in sea level, even at an extreme projection of 2.4 ft (0.72 m), does not pose a threat to the continued existence of the species. We have no information indicating that sea level rise is a threat to the island night lizard on Sutil Island.

Summary of Factor E

At listing (USFWS 1977, p. 40684) we did not indicate Factor E, pertaining to climate change as a threat to the island night lizard. However, the 2006 5-year review suggested that because the island night lizard is an insular endemic species that it is vulnerable to extirpation from random factors such as environmental stochasticity and natural catastrophes (USFWS 2006b, p. 24). We continue to agree with this conclusion due to the restricted distribution of the island night lizard on San Nicolas and Santa Barbara Islands where the species may be more susceptible to natural catastrophes. However, it is currently unknown how climate change will affect the island night lizard and its habitat on San Clemente, San Nicolas, Santa Barbara, and Sutil Islands specifically. While we recognize that climate change is an important issue with potential effects to the island night lizard and its habitat, we lack adequate information to make accurate predictions regarding its effects to the island night lizard and it's habitat at this time. Therefore, we do not have information that indicates that climate change is a substantial threat to the species now or will be in the future.

III. RECOVERY CRITERIA

The Service published a final Recovery Plan for California Channel Islands species, including the island night lizard, in 1984 (USFWS 1984). In general, 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. Many paths are available to accomplish 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, overall, 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 the species status in this 5-year review on progress that has been made toward recovery since the species was listed 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. The Recovery Plan (USFWS 1984) does not contain threat-based recovery criteria; however it does contain a step-down outline for objectives that need to be addressed to minimize further decline of Channel Island species, including the island night lizard, and degradation of their habitats.

Recovery Criteria

The primary objective of the 1984 Recovery Plan is to restore endangered or threatened species to nonlisted status by restoring and protecting habitat that can support viable self-sustaining populations (USFWS 1984, p. 105); however, the size and extent of the populations necessary for recovery needed to be determined. Once threats to these taxa have been removed or minimized and habitats are restored, adequately protected, and properly managed, reclassification for some taxa may be considered. The basic objectives to accomplish reclassification or delisting for all taxa, including the island night lizard, discussed within the Recovery Plan are as follows:

(1) Identify present adverse impacts to biological resources and strive to eliminate or minimize them.

The Navy has taken steps to eliminate incidental impacts to the island night lizard by educating all Navy personnel stationed on San Clemente and San Nicolas Islands. All Navy personnel are provided with handouts/pamphlets/posters presenting information on the distribution, threats, and management responsibilities of sensitive resources, such as federally threatened and endangered species, including the island night lizard. The NPS has also taken steps to eliminate incidental impacts to the island night lizard by educating all visitors to Santa Barbara Island (including Sutil Island). Brochures discussing the island's unique wildlife, including the island night lizard, as well as maps of designated trails to which all visitors must use to decrease disturbance to wildlife and lessen damage to resources are available to all visitors of the island at the visitors center or online at the park's webpage.

The Recovery Plan also recommends that existing laws and regulations be used to protect threatened and endangered species, including the island night lizard. Based on the occurrences of this species on federally owned land, the primary laws with potential to protect the island night lizard include the Sikes Act and the Endangered Species Act. NEPA also requires Federal action agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. Since listing of the island night lizard in 1977, the Navy and more recently the NPS have consulted and coordinated with the Service under the Act regarding the effects of various activities on San Clemente, San Nicolas, and Santa Barbara Islands. Finally, pursuant to the Sikes Act Improvement Act of 1997, the Navy adopted INRMPs for San Clemente Island in 2002 and San Nicolas Island in 2010 that help guide the management and protection of each island's natural resources (Navy 2002, Navy 2010b). Each INRMP has specific management actions and objectives to address the Recovery Plan task of incorporating

recovery actions into existing management plans (see **Factor D: Inadequacy of Existing Regulatory Mechanisms** above). Through these mechanisms, the Navy is required to identify and address all threats to these species during the INRMP planning process. If possible, threats are ameliorated, eliminated, or mitigated through this procedure. The Navy has strived to fulfill this objective through both internal planning (INRMP) and through compliance with Federal law (consultations with the Service under the Act and preparing environmental review documents under NEPA). The actions taken by the Navy under the INRMPs have not completely eliminated all threats, but many threats have been greatly reduced. These contributions to the elimination of adverse impacts fulfill a majority of the requirements of this objective as stated in the Recovery Plan.

(2) Protect known resources from further degradation by: (a) Removing feral herbivores, carnivores, and selected exotic plant species; (b) controlling of unnatural erosion in sensitive locations; and (c) directing military operations and adverse recreational uses away from biologically sensitive areas.

In 1992, the Navy fulfilled a major part of this objective by removing the last of the feral goats and pigs from San Clemente Island. Currently, the Navy has an ongoing predator control program which traps and removes feral cats and rats from San Clemente Island. From 2009 to 2010, the MSRP assisted the Navy by removing all feral cats from San Nicolas Island. In 1985, the last of the European rabbits were removed from Santa Barbara Island. These actions to remove predators, or develop removal programs for potential predators, have fully met the requirements in the Recovery Plan. Additionally, both San Clemente and San Nicolas Islands, in accordance with the Federal Noxious Weed Act and through implementation of the Navy's INRMPs, conduct actions to reduce or eliminate all transport of nonnative plants to each island and have facilitated programs to remove nonnative taxa that currently occur on the islands. Santa Barbara Island through implementation of the NPS Organic Act restricts all nonnative plant species from the island. Additionally, in partnership with the MSRP, nonnative plant removal is currently occurring on Santa Barbara Island. These actions to prevent and control nonnative plants on all islands occupied by the island night lizard have fully met the requirements of this objective as stated in the Recovery Plan.

The Navy is also taking steps to minimize the effects of erosion on San Clemente Island. Erosion control measures are being incorporated into project designs to minimize the potential to exacerbate existing erosion (O'Connor 2009c, pers. comm.). With the expansion of military operational areas, the Navy committed to prepare and implement an erosion control plan that will minimize soil erosion within and adjoining the operational areas (Navy 2008b, pp. 5–30; USFWS 2008 p. 62). This plan has not been finalized and it remains unclear what erosion control measures will be implemented consistently or at all in areas that are operationally closed to monitoring and access due to unexploded ordnance. The proposed erosion control plan includes development and application of best management practices (BMPs) such as: establishing setbacks and buffers from steep slopes, drainages, and sensitive resources; constructing site-specific erosion control structures; conducting revegetation and routine maintenance; and monitoring and adjusting the BMPs as

appropriate. While the erosion control plan is being prepared, the Navy has postponed all major battalion movements and training, and is using BMPs when creating and approving projects that might contribute to erosion on the island. The Navy has taken steps to reduce the threat of erosion on the island and contribute to the achievement of this objective.

Through implementation of INRMPs on San Clemente and San Nicolas Islands, the Navy conducts measures to avoid areas consisting of highly erodible soils. Additionally, San Clemente has a nursery to grow native island plants and conducts outplanting of the vegetation to assist in erosion control of disturbed sites. San Nicolas is currently in the process of developing a nursery for similar erosion control measures. These actions to prevent erosion fulfill a majority the requirements of this objective as stated the Recovery Plan.

The Navy on San Clemente Island, as recommended within their INRMP, has established the INLMA, an area that is avoided to the maximum extent practicable, to assist in the recovery of the island night lizard and its habitat. Additionally, through implementation of INRMPs on both San Clemente and San Nicolas Islands, the Navy defines and marks work areas to prevent lizard mortality. The NPS has designated trails on Santa Barbara Island to allow visitors to view the island's ecosystems without being obtrusive or destructive to the natural resources. These actions to avoid biologically sensitive areas fulfill a majority of the requirements of this objective as stated in the Recovery Plan.

(3) Restore habitats by revegetating disturbed areas using native species.

To restore the structure and function of native island ecosystems, the Navy, through implementation of its INRMP on San Clemente Island, has developed the Native Habitat Restoration Program and constructed a native plant nursery where plants including species that provide a benefit to island night lizard habitat, are grown from seed, and stem and root cuttings, and outplanted annually. Additionally, the MSRP currently grows native plant species in a nursery on Santa Barbara Island and outplants for restoration projects providing a benefit to the island night lizard. To date approximately 15,000 native plants, some providing a benefit to the island night lizard, have been restored to Santa Barbara Island. These actions to restore habitat by revegetation fulfill a majority of the requirements of this objective as stated in the Recovery Plan.

(4) Identify areas of San Clemente Island where habitat restoration and population increase of certain addressed taxa may be achieved through a careful survey of the island and research on habitat requirements of each taxon.

Since listing, research on the life history and biology of the island night lizard has been ongoing on San Clemente Island. Research has determined the island night lizard's distribution and density in differing habitats on San Clemente Island. Additionally, as implemented through the Navy's 2002 INRMP, the Navy developed the INLMA to conserve the largest area consisting of high-quality habitat with the highest densities of island night

lizards. The Navy avoids and minimizes impacts to the lizard for any projects or training activities proposed in this area through consultation with the Service. These actions completely fulfill the requirements of this objective pertaining to island night lizard as stated in the Recovery Plan.

(5) Delist or upgrade the listing status of those taxa that achieve vigorous, self-sustaining population levels as the result of habitat stabilization, restoration, and preventing or minimizing adverse human-related impacts.

Since listing, threats to the island night lizard have been largely ameliorated, including removal of all nonnative herbivores from San Clemente and Santa Barbara Islands and removal of feral cats from San Nicolas Island and San Clemente Island. Populations of the island night lizard on the three islands appear to be stable and habitat types that are strongly associated with the island night lizard appear to be increasing slowly through natural recovery and restoration projects. Remaining threats, such as nonnative plants, land use and development, fire, and erosion are potentially of concern, but are actively managed through implementation of management plans and measures described in the Navy's INRMPs, NPS's management policies and active management plans.

(6) Monitor effectiveness of recovery effort by undertaking baseline quantitative studies and subsequent follow-up work.

Since listing and publication of the Recovery Plan, island night lizard monitoring has been conducted on San Clemente Island, with one assessment of the population estimated at approximately 21 million island night lizards. Although no subsequent population assessments have occurred, density of island night lizards strongly corresponds to certain vegetation types; and there have been updates and a trend analysis regarding the abundance of these habitats. San Clemente Island supports the largest amount of high-quality island night lizard habitat. From 1992 to 2008 there was no clear long-term trend in the amounts of *Opuntia* spp. or *Lycium californicum* on San Clemente Island, but there was a reduction in the percent cover of those habitats on the island (Tierra Data Inc. 2010, pp. 48–67). This reduction in percent cover was likely due to high rainfall amounts experienced in baseline years from 1991 to 1993, in comparison to subsequent years (Tierra Data Inc. 2010, p. 125). A reduction in cover may influence the ability of the species to thermoregulate. Loss of habitat may also create a short-term reduction in prey availability, increase their exposure to predators, and potentially harm individuals (Mautz 2001, p. 27; USFWS 2006b, p. 13). Monitoring continues on San Clemente Island and through ongoing and proposed habitat restoration projects, we expect island night lizard populations will remain stable or increase on the island. On San Nicolas Island there has only been one assessment of the island night lizard's population and two assessments of the vegetation types associated with high densities of island night lizards. The first vegetation assessment was conducted in 1998 by Fellers *et al.* (1998). A second was conducted by Junak in 2003, which indicated an increase in high-quality *Opuntia* spp. and *L. californicum* habitats from 1.9 ac (0.8 ha) in 1998 to 11.2

ac (4.6 ha). This increase was probably due to more current data and up-to-date mapping technology. Monitoring of lizards is scheduled for funding on San Nicolas Island every 5 years in partnership with the U.S. Geological Survey, and through proposed habitat restoration projects. We expect island night lizard populations will remain stable or increase on the island. On Santa Barbara Island there has been one assessment of the island night lizard population and two assessments of high-quality habitat consisting of *Opuntia* spp. and *L. californicum.* The first assessment was conducted from an examination of aerial photographs from 1983 and indicated a total of 14.8 ac (6.0 ha) of *Opuntia* spp. and *L. californicum* habitats (Fellers and Drost 1991, p. 31). However, there is currently a new preliminary draft assessment indicating that approximately 16.6 ac (6.7 ha) of *L. californicum* and 9.3 ac (3.8 ha) of *O. oricola* habitats exist in which these species comprise greater than 39 percent of the vegetative cover (Rodriguez 2011b, pers. obs.). Additionally, the MSRP continues to restore native habitat to Santa Barbara Island, including species that provide some moderate-quality habitat for the island night lizard. Therefore, we expect island night lizard populations to remain stable or increase on Santa Barbara Island. These actions fulfill a majority of the requirements of this objective as stated in the Recovery Plan.

Summary of Recovery Criteria

In summary, the primary objective of the Recovery Plan is to restore the endangered and threatened species to nonlisted status through restoration of habitat, implementation of management recommendations for endangered and threatened species, protection of habitat, development of delisting criteria, evaluation of the success of management actions, increase in public support, and using existing laws and regulations protecting endangered and threatened species. While the Recovery Plan does not include taxon-specific downlisting or delisting criteria for measuring the recovery of the island night lizard, many of the actions identified in the Recovery Plan have been implemented to benefit this species. With the exception of a few recommended recovery actions that are still ongoing, all recovery criteria have largely been met through research and monitoring efforts on all occupied islands, implementation of the Navy's INRMPs on San Clemente and San Nicolas Islands, and implementation of the NPS's Organic Act and current management policies on Santa Barbara Island.

Most significantly, the Navy completed removal of feral goats and pigs from San Clemente Island in 1992 and feral cats from San Nicolas Island in 2010. There are currently a number of programs in place to improve habitat suitability, prevent introductions of nonnative species, guide and track management efforts, and protect occurrences of the island night lizard. We investigated other potential threats for this taxon and concluded that they do not pose significant threats to the island night lizard. As a result of the management actions conducted by the Navy and NPS, substantial threats were ameliorated throughout the species' range and a majority of the objectives discussed in the Recovery Plan were fulfilled.

Based on our review of the Recovery Plan, we conclude that the status of the island night lizard has improved due to management activities that were, or are currently, being implemented by the Navy and NPS.

IV. SYNTHESIS

The island night lizard is endemic to three federally owned California Channel Islands (San Clemente, San Nicolas, and Santa Barbara) and a small islet (Sutil Island) located just southwest of Santa Barbara Island. At listing, the island night lizard was threatened by habitat loss and modification from the introduction of nonnative plants throughout the species range, nonnative herbivores and predation by feral cats on San Clemente Island, and predation by the southern alligator lizard on San Nicolas Island. Additionally, the 2006 5-year review identified the threat of fire, erosion, and drought on San Nicolas and Santa Barbara Islands; and predation by feral cats on San Nicolas Island. Island night lizards were not known to occupy Sutil Island at listing.

Since listing, all nonnative herbivores were removed from San Clemente and Santa Barbara Islands. Recent data indicate that the southern alligator lizard occupies different habitats than the island night lizard on San Nicolas Island and is no longer considered a threat. Additionally, the threat of predation on San Nicolas Island was ameliorated through the removal of all feral cats since the 2006 status review. Currently, island night lizards on San Clemente and San Nicolas Islands are afforded protections through implementation of the Navy's INRMPs on those islands. Potential threats from the introduction of nonnative plant species, land use and development, and fire on San Clemente and San Nicolas Islands; erosion on San Nicolas Island; and predation by feral cats and rats on San Clemente Island are currently managed through actions defined within the Navy's INRMPs on both islands and a Fire Management Plan on San Clemente Island. The population of island night lizards on Santa Barbara Island (including Sutil Island) is afforded protections through implementation of the NPS's Organic Act and current management policies, which undertake active management programs to inventory, monitor, restore, and maintain listed species and their habitats. Potential threats from the introduction of nonnative plants and fire on Santa Barbara Island are currently managed through the actions defined within the NPS's Organic Act and Fire Management Plan in place for the Channel Islands National Park, including Santa Barbara Island. Currently, it is unknown how climate change will affect San Clemente, San Nicolas, and Santa Barbara Islands specifically. While we recognize that climate change might have potential effects to the island night lizard and its habitat, we do not have information sufficient to indicate that climate change is a threat to the species or its habitat at this time.

With the exception of a few actions, recovery objectives for the island night lizard as described in the 1984 California Channel Islands Recovery Plan are ongoing or have been completed. Based on our review of the current status of the species and factors affecting the species, we no longer believe the island night lizard is likely to become an endangered species in the foreseeable future throughout all of its range; all threats have been ameliorated or are being actively managed. Therefore, we recommend removing the island night lizard from the List (delisting) due to recovery.

V. RESULTS

Recommended Listing Action:

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

New Recovery Priority Number and Brief Rationale: 14

We recommend changing the recovery priority number for the island night lizard from 8 to 14. Threats identified at listing and in the 2006 5-year review, such as habitat destruction or modification resulting from the introduction of nonnative herbivores on San Clemente, San Nicolas, and Santa Barbara Islands, and predation by feral cats on San Nicolas Island have been ameliorated. Additionally, potential threats to the island night lizard such as the introduction of nonnative species, fire, land development, and erosion are currently managed by the Navy through implementation of INRMPs on San Clemente and San Nicolas Islands in accordance with the Sikes Act, and current management policies on Santa Barbara Island in accordance with the NPS's Organic Act. Because all threats to the island night lizard have been ameliorated or are currently managed throughout the species range, we recommend the recovery priority number be changed to 14 to reflect a low degree of threat and a high potential for recovery.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

The actions listed below are recommendations to be completed over the next 5 years. These will help guide continuing recovery of the island night lizard by providing information to better manage populations on the three islands. Conservation of the island night lizard is dependent on continued cooperation with our partners (i.e. Navy, NPS) to minimize impacts from current threats and aid future restoration.

(1) Remove nonnative plant species throughout the island night lizard's range and restore suitable island night lizard habitat on all occupied islands through active restoration such as growing and planting of native species.

(2) Continue to implement management actions set forth within the Navy's INRMPs, and NPS's Organic Act and current management policies to reduce the potential threat of fire throughout the island night lizard's range; and potential threat of erosion on San Nicolas and San Clemente Island.

(3) Conduct research on San Nicolas and Santa Barbara Islands to acquire more recent population estimates of the island night lizard.

(4) Create a consistent, rangewide, Standard Operating Procedure for monitoring island night lizards throughout the species' range.

(5) Coordinate with the Navy and NPS to develop a long-term monitoring plan for island night lizard and the species' preferred habitats on each of the islands.

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Appendix 1: Occurrence distribution and threat analysis of the island night lizard *(Xantusia riversiana)*; prepared for 5-year review, 2012.

Element Occurrence Location	**Factor A**				**Factor B**	**Factor C**	**Factor D**	**Factor E**	Land Ownership
	Habitat Destruction or Modification from				Overutilization for Commercial, Recreational, Scientific, or Educational Purposes	Disease or Predation	Inadequacy of Regulatory Mechanisms	Climate Change	
	Introduction of Nonnative Plants	Land Use and Development	Fire	Erosion					
San Clemente Island	**P**	**P**	**P**	**P**	N	**P** (predation)	N	**P**	Department of Defense (U.S. Navy)
San Nicolas Island	**P**	**P**	**P**	**P**	N	N	N	**P**	
Santa Barbara Island	**P**	N	**P**	**P**	N	N	N	**P**	National Park Service (Channel Islands National Park)
Sutil Island	N	N	N	N	N	N	N	**P**	

P - Potential threat, but not currently a substantial threat due to active management efforts as implemented by the Navy and NPS.

N - Not currently a potential or substantial threat to the island night lizard.

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

Island Night Lizard
(Xantusia riversiana)

Current Classification: Threatened

Recommendation Resulting from the 5–year Review:

____ Downlist to Threatened
____ Uplist to Endangered
_X_ Delist
____ No change needed

Review Conducted By: Carlsbad Fish and Wildlife Office

Date Submitted to Region 8: _____

FIELD OFFICE APPROVAL:

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

Approve _____ Date SEP 13 2012

Scott A. Sobiech

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

Approve Stephen P. Henry Date 9/6/12

REGIONAL OFFICE APPROVAL:

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

Approve _____ *Acting* Date 10/5/12