

Island Night Lizard
(Xantusia (=Klauberina) riversiana)

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

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

5-YEAR REVIEW

Species reviewed: Island night lizard /*Xantusia*(=*Klauberina*) *riversiana*

TABLE OF CONTENTS

General Information.....1

Review Analysis.....3

Results.....26

Recommendations for Future Actions.....27

References.....28

5-YEAR REVIEW
Island Night Lizard/*Xantusia (=Klauberina) riversiana*

I. GENERAL INFORMATION

I.A. Methodology used to complete the review: This review was compiled by Sandy Vissman of the Carlsbad Fish and Wildlife Office (CFWO). The review was completed using documents from office files in CFWO and in Ventura Fish and Wildlife Office as well as available literature and input from experts on the island night lizard. No information was received in response to the Federal Register notice announcing the initiation of this review.

I.B. Reviewers

Lead Region: Diane Elam, California-Nevada Operations Office, 916-414-6464.

Lead Field Office: Jim A. Bartel, Carlsbad Fish and Wildlife Service, 760-431-9440.

Cooperating Field Office(s): Chris Dellith, Ventura Fish and Wildlife Office, 805-644-1766.

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: On July 7, 2005, the U.S. Fish and Wildlife Service announced initiation of the five-year review for *X. riversiana* and asked the public to submit information regarding the species' status (70 FR 39327). A second notice, published on November 3, 2005 (70 FR 66842), extended the period during which information could be submitted until January 3, 2006. No information was received.

I.C.2. Species status: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office the status of this species was described as "Stable," indicating that there had been no change to the species' numbers or threats since the last reporting period.

I.C.3. Recovery achieved: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office the species was categorized as category "2", which indicates that 25-50% of the recovery objectives for the species were estimated to have been met.

I.C.4. Listing history: The island night lizard was listed as a threatened species on August 11, 1977 (42 FR 40682, U.S. Fish and Wildlife service 1997a).

I.C.5. Associated rulemakings: None.

I.C.6. Review History: This document constitutes the first 5-year review for island night lizard. Below are listed seven biological opinions that assessed the status of island night lizard in relation to the Department of the Navy's training activities on San Clemente Island and one biological opinion that assessed the impacts of Navy operations on San Nicolas Island. None of these were comprehensive status reviews that included a 5-factor analysis (see section II.C.2 below).

Biological Opinion (F-97-F-18) on SEDRP Windfarm Project, San Clemente Island. Completed March 12, 1997. (U.S. Fish and Wildlife Service 1997b).

Biological/Conference Opinion (1-6-97-F-21) on Training Activities on San Clemente Island. Completed March 15, 1997. (U.S. Fish and Wildlife Service 1997c).

Biological Opinion (1-97-F-42) on Utility Pole Replacement Project, San Clemente Island. Completed May 15, 1997. (U.S. Fish and Wildlife Service 1997d).

Biological Opinion (1-6-97-F-58) on Existing and Proposed Naval Activities on San Clemente Island. Completed on December 15, 1997. (U.S. Fish and Wildlife Service 1997e).

Biological Opinion (1-6-00-F-19) on Training Area Ranges on San Clemente Island. Completed January 17, 2001. (U.S. Fish and Wildlife Service 2001a).

Biological Opinion (1-8-01-F-14) on Activities on San Nicolas Island, California. Completed on October 15, 2001. (U.S. Fish and Wildlife Service 2001b).

Re-Initiation of Consultation (1-6-97-F-21/ FWS-LA-2808) on Naval Training Activities that Cause Fires on San Clemente Island. Completed July 23, 2002. (U.S. Fish and Wildlife Service 2002).

Biological Opinion (1-6-04-F-3934.1) on San Clemente Island Road Improvement Project (Military Construction Project P-493). Completed on May 14, 2004. (U.S. Fish and Wildlife Service 2004).

I.C.7. Species' Recovery Priority Number at start of review: In the 2005 Recovery Data Call for the Carlsbad Fish and Wildlife Office island night lizard was assigned a recovery priority of "8", meaning that this is a full species with moderate degree of threat and a high recovery potential.

I.C.8. Recovery Plan or Outline: The California Channel Island Species Recovery Plan was approved in January of 1984 and addresses seven listed taxa, including four plant species and three animal species on the Islands of San Clemente, Santa Barbara and San Nicolas.

II. REVIEW ANALYSIS

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

II.A.1. Is the species under review listed as a DPS? No.

II.A.2. Was the DPS listed prior to 1996? Not applicable.

II.A.3. Is there relevant new information that would lead you to consider listing this species as a DPS in accordance with the 1996 policy? Under the Act, a species is defined as including any subspecies and any distinct population segment of a vertebrate species (16 U.S.C. 1532). To implement the measures prescribed by the Act and its Congressional guidance, we and the National Marine Fisheries Service (National Oceanic and Atmospheric Administration-Fisheries), developed a joint policy that addresses the recognition of DPSs of vertebrate species for potential listing actions (Service and NMFS 1996a (61 FR 4722)). The policy allows for a more refined application of the Act that better reflects the biological needs of the taxon being considered, and avoids the inclusion of entities that do not require its protective measures.

It has been suggested that listing portions of island night lizard as DPSs in accordance with the 1996 policy (U.S. Fish and Wildlife Service 1996) might be appropriate. We received a petition dated March 22, 2004, from the U.S. Navy (U.S. Navy 2004), suggesting that the San Nicolas, San Clemente, and Santa Barbara Islands all qualify as DPSs, meeting the discreteness and significance criteria of the 1996 DPS policy (61 FR 4722). The petition requested that we recognize the island night lizard populations on San Clemente Island and San Nicolas Island, California, as DPSs pursuant to section 4(b)(3) of the Act and delist them.

The petition asserts that the three island night lizard populations are discrete from each other because (1) they are separated physically as islands of the Pacific Ocean, between which the lizards are not able to travel, and (2) they are separated administratively by ownership. The U.S. Navy administers San Clemente and San Nicolas Islands, and the National Park Service administers Santa Barbara Island. The petition states that the three populations on the islands meet the significance element of the DPS policy because (1) the island night lizard is found on only three of the six California Channel Islands and the loss of one population segment may be considered a gap in the range of the species and (2) phenotypic (characteristics that are the product of interaction between genes and the environment, including morphological and life history characters) differences, such as variation in scalation, body size, and brood size, occur between the different island night lizard populations. We have published a substantial 90-day finding on this petition, indicating that the petition contained substantial information and that the action may be warranted (71 FR 48900). We are proceeding with a 12-month finding on the petition.

DPS analysis

The DPS policy specifies that we are to use three elements to assess whether a population segment under consideration for listing may be recognized as a DPS: (1) the population segment's discreteness from the remainder of the species to which it belongs; and (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the ESA's standard for listing (61 FR 4722, 4725). If we determine that a population segment meets the discreteness and significance standards, then the level of threat to that population segment is evaluated based on the five listing factors established by section 4(a) of the Act to determine whether listing the DPS as either threatened or endangered is warranted. The DPS policy also states: "Listing, delisting, or reclassifying distinct vertebrate population segments may allow the Services to protect and conserve species and the ecosystems upon which they depend before large-scale decline occurs that would necessitate listing a species or subspecies throughout its entire range. This may allow protection and recovery of declining organisms in a more timely and less costly manner, and on a smaller scale than the more costly and extensive efforts that might be needed to recover an entire species or subspecies" (61 FR 4722, 4725). Below is our preliminary analysis of island night lizard populations on the three islands per our DPS policy.

Discreteness. The DPS policy states that a vertebrate population segment may be considered discrete if it satisfies either of the following two conditions:

- (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or
- (2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

The following discussion addresses only the first condition since the island night lizard's distribution does not abut an international boundary. With respect to the first condition, island night lizard populations on each island are markedly separated from the populations on the other islands by a physical gap of at least 48 kilometers (30 miles). In addition, differences in productivity, morphology and genetics have been observed among islands. Productivity variation has been observed between islands, with lizards on San Clemente and Santa Barbara Islands producing 3.9 young per brood and lizards on San Nicolas Island producing 5.3 young per brood (Bezy *et al.* 1980). Morphological analysis (i.e., stepwise discriminant function analysis) of seven characters demonstrates both within and between island variation in scalation. In this analysis, the researchers were able to correctly assign an average of 85 percent of specimens to their home island (Bezy *et al.* 1980). While early genetic analysis of proteins indicated that the genetic distances between island populations are relatively small compared to distances between species within *Xantusia* (Bezy *et al.* 1980), more recent genetic analysis, using nuclear and mitochondrial DNA, suggests that lizards on the three islands are genetically

different from one another. According to this study, the San Clemente Island and Santa Barbara Island populations are distinct, but they have not been isolated as long as the San Nicolas population (Sites, in litt. 2006).

The information available at this time suggests that the San Clemente Island, San Nicolas Island and Santa Barbara Island populations of island night lizard may each be markedly separate from populations on the other islands by physical, physiological, morphological and genetic differences.

Significance. Under our DPS policy (61 FR 4722), once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to, the following factors:

- (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
- (2) Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon,
- (3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or
- (4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Here we address only significant gap in the range of the taxon because it is the significance criterion which most clearly applies, given current information. The island night lizard is found on three oceanic islands. Loss of the island night lizard from any one island would represent loss of one third of the island occurrences of this species. Such loss would likely constitute a significant gap in the range of the taxon.

This preliminary analysis of island night lizard populations on each island, per our DPS policy, suggests that each may qualify as a DPS. We will continue our evaluation of the data bearing on the question of whether island night lizards on San Clemente, San Nicolas and Santa Barbara islands each constitute a separate DPS as we complete the 12-month finding on the U.S. Navy's petition to delist on San Clemente Island and San Nicolas Island.

II. B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria? No. The island night lizard is considered in the California Channel Island Species Recovery Plan (U.S. Fish and Wildlife Service 1984), which addresses several listed taxa on the Islands of San Clemente, Santa Barbara and San

Nicolas. The recovery plan identifies overall objectives for recovery for these islands, but it does not include quantified recovery criteria for each species. The Recovery Plan states in the Executive Summary, that “the point or condition when species can be considered “recovered” is...when sufficient habitat has been restored to support viable, self-sustaining populations of the endangered/threatened taxa and when management and use of habitat is such that survivability of the populations is assured.”

II.C. Updated Information and Current Species Status

Our understanding of the island night lizard has improved considerably since it was listed in 1977 (42 FR 40682). This is due to an accumulation of information on the biology, habitat and status of the species (e.g., as described in Bezy *et al.* 1980, Fellers and Drost 1991 and Fellers *et al.* 1998; Mautz 2001). The information is summarized below.

II.C.1. Biology and Habitat

Distribution: The island night lizard is endemic (restricted) to three of the Channel Islands off the coast of southern California (Goldberg and Bezy 1974, Fellers and Drost 1991). The island night lizard occurs on San Clemente Island, San Nicolas Island, and Santa Barbara Island and a small islet (Sutil Island) 1.3 kilometers (km) (0.81 mile) offshore from Santa Barbara Island (Bezy *et al.* 1980). San Clemente Island, at 145 square kilometers (sq km) (56 square miles) (U.S. Navy 2006), is the largest inhabited island (San Nicolas = 57 sq km (22 sq miles), Santa Barbara = 2.6 sq km (1 sq mile)) (U.S. Fish and Wildlife Service 1984). San Clemente Island and San Nicolas Island are managed by the U.S. Navy, and Santa Barbara Island is managed by the National Park Service as part of Channel Islands National Park (Fellers and Drost 1991, U.S. Navy 2002, Fellers *et al.* 1998).

Morphology: The island night lizard is a medium-sized lizard (adults 65 to 109 millimeters (2.6 to 4.3 inches) snout-vent length) (Mautz 2001). Its dorsal coloration is highly variable, and differs between islands, ranging from pale ash gray and beige, shades of brown, to varying amounts of black, with a pattern varying from uniform, mottled, to striped (Bezy *et al.* 1980, Fellers and Drost 1991).

Life History: Although members of *Xantusia* were originally assumed to be nocturnal because of elliptical pupils as well as secretive behavior, they are primarily active during the day (diurnally) (Bezy 1988). The island night lizard is a slow-growing, late maturing and long-lived lizard with a low reproductive potential (Goldberg and Bezy 1974; Mautz 1993, 2001). Goldberg and Bezy (1974) suggested that the island night lizard does not reach sexual maturity until the spring of its 3rd or 4th year, and begins breeding around March or April. The species is viviparous and young are born around September (Goldberg and Bezy 1974, Fellers and Drost 1991, Mautz 1993). The island night lizard is unique for the genus *Xantusia* in having a brood size greater than two (Fellers and Drost 1991). Productivity differs between islands. Females on San Nicolas Island average 5.3 young per brood, and females on San Clemente and Santa Barbara Islands combined averaged 3.9 young per brood (Fellers and Drost 1991). Females demonstrate

irregular intervals between reproduction, but appear to approach a biennial cycle (Goldberg and Bezy 1974, Fellers and Drost 1991, Mautz 1993). Island night lizard can live up to 25 years (one individual record, Fellers 2005) and several individuals of 11 years or more have been recorded (Fellers and Drost 1998; Fellers and Drost 1991 and Mautz 1993 as cited in Mautz 2001).

Habitat: The island night lizard tends to confine its activity to shelter, such as dense vegetation or rock. Therefore, suitable cover is an important habitat component, and appropriate vegetative cover can be a relative indicator of density (see also Abundance section below) (Fellers and Drost 1991, Mautz 2001). Vegetation composition and density on San Clemente, Santa Barbara, and San Nicolas Islands have been affected by the grazing history of the islands and by the resulting habitat changes on each island (see section II.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range).

A number of habitat types provide the characteristics island night lizard appears to prefer. The island night lizard has been found in prickly pear cactus (*Opuntia oricola* and *O. littoralis*), maritime desert scrub, rocky outcrops and patches, and to a lesser extent, grasslands, and giant coreopsis (*Coreopsis gigantea*) stands (U.S. Fish and Wildlife Service 1984, Fellers and Drost 1991, Mautz 2001). The densest populations of island night lizard have been detected in maritime desert scrub communities dominated by boxthorn (*Lycium californicum*) (Fellers and Drost 1991). High densities also occur in prickly pear and rocky areas (Mautz 2001). Mautz (2001) and Fellers and Drost (1991) also point out that retreat sites (such as loose rocks or crevices in clay soils) are important.

On San Clemente Island at least 2,351 hectares (5,809 acres) of maritime desert scrub is expected to provide optimum habitat conditions of the island night lizard, as defined by persistent high densities of lizards. The area that supports the highest densities of island night lizards is believed to have escaped the intensive sheep grazing on the island (U.S. Navy 2002). Optimum habitat on San Clemente Island is primarily distributed in a band along the western marine terraces of the island, although lizards are found at lower densities in many parts of the island (Mautz 2001).

On San Nicolas Island, island night lizards are found on roughly half of the island (the eastern half) and less than 1 hectare (2.5 acres) of optimal, patchily distributed, high density habitat is reported (Fellers *et al.* 1998). The sandy substrate that characterizes the western half of San Nicolas Island (and is devoid of lizards) likely resulted from the intensive sheep grazing conducted in the mid-1800's followed by a drought that occurred between 1862-1864 (Schwartz 1994). According to Fellers *et al.* (1998), the majority of island night lizard habitat on San Nicolas Island is spread out through relatively low quality habitat that consists of a "mixed shrub" plant association that is occupied at densities an order of magnitude less than observed in *Lycium californicum* or *Opuntia* spp. habitat (200 lizards/hectare). Researchers have not determined whether this low density "mixed shrub" habitat that is the most extensive habitat on San Nicolas Island constitutes "sinks" for island night lizards dispersing from higher density populations on

more optimal habitat or whether this plant association supports self-sustaining island night lizard populations. On San Nicolas Island, the island night lizard is also found in a unique setting in which lizards occupy cobbles adjacent to the westernmost beach of the island at high densities but are absent in the adjacent habitat. Island night lizard utilization of this habitat type is restricted to San Nicolas Island (Fellers *et al.* 1998).

Habitat on Santa Barbara Island is limited both by the island's size (approximately 260 hectares or 1 square mile) and by extensive habitat damage that occurred during goat and sheep grazing followed by rabbit infestation. Iceplant, grasslands, and giant coreopsis stands on Santa Barbara Island support few island night lizards. Approximately 6 hectares (14.8 acres) of optimal habitat, including boxthorn scrub, rock, and prickly pear was identified on Santa Barbara Island in 1991 (Fellers and Drost 1991).

Abundance: At the time of listing in 1977, densities of island night lizard were not known. Measuring population numbers is challenging because of the secretive behavior of the animals. Nevertheless, abundance of the island night lizard has been estimated on the three islands of occurrence using similar techniques. The density of the species has been estimated on survey plots or transects within different habitat types or plant communities. The densities obtained have been extrapolated across each habitat type or plant community on each island to obtain an abundance estimate for each island (Mautz 2001).

The island night lizard occurs in extremely high densities within undisturbed patches of optimum habitat as well as lower densities in other habitat (Fellers and Drost 1991, Fellers *et al.* 1998, Mautz 2001). Mautz (2001) has postulated that the species may require an extremely dense population to be viable over the long term due to its highly sedentary behavior. Although island night lizard densities in optimum habitat are comparable on the three islands of occurrence, the islands differ in size and habitat availability (see above discussion of habitat), and the island night lizard populations vary accordingly.

San Clemente Island. The island night lizard is most abundant and widespread on San Clemente Island, which is the largest of the islands on which it occurs. Island night lizards have been observed at varying densities on San Clemente Island in most plant communities. The principal vegetation communities that support island night lizards are marine succulent scrub communities, including Maritime Desert Scrub *Lycium* Phase (a boxthorn dominated community, estimated 2341 lizards/hectare), Maritime Desert Scrub Prickly Pear Phase (estimated 2969 lizards/hectare, and Maritime Desert Scrub Cholla Phase (estimated 2613 lizards/hectare) (Mautz 2001). If the high densities estimated by Mautz (2001) are extrapolated across the plant communities mapped on the island, between 2 and 20 million lizards are estimated on San Clemente Island (Mautz pers comm., Mautz 2001). These numbers can be attributed to the large size of the island and extent of Maritime Desert Scrub plant communities that support high lizard densities.

Approximately half of the population on San Clemente Island is estimated from the West Shore in Maritime Desert Scrub communities on the lower marine terraces. The Navy has recognized an Island Night Lizard Management Area in this area since 1997 (U.S.

Fish and Wildlife Service 1997e). The area includes approximately 4,500 hectares (11,100 acres), where Mautz estimates that approximately half of the island population is found (Mautz 2001).

One limitation to the techniques used to generate population estimates on San Clemente Island is that, while 13 plots/transects have been sampled over time, these plots cover a small percentage of the island area and are not distributed across the island. No assessment of the variability within plant communities on different parts of the island is available.

San Nicolas Island. High quality island night lizard habitat is very limited and patchy in distribution on San Nicolas Island. High quality habitat patches are separated by expanses of mixed shrub habitat that support lower lizard densities. As on San Clemente and Santa Barbara Islands, lizard populations appear dense in optimal habitat. However, less than one hectare (2.5 acres) of such habitat was measured on San Nicolas Island. San Nicolas Island has approximately 65.76 hectares (162.5 acres) of island night lizard habitat. Most of the habitat identified on San Nicolas Island consists of “mixed shrub” habitat that supports an order of magnitude fewer island night lizards per unit area than the optimal habitat types identified on all of the islands. Island night lizards occur in high densities in one habitat type unique to San Nicolas Island, a boulder beach habitat found at a few isolated sites around the west end of the island. Habitat on San Nicolas Island includes: 0.47 hectare (1.17 acres) cactus; 0.05 hectare (0.12 acre) boxthorn; 0.25 hectare (0.617 acre) boulder beach; and 65 hectares (160.6 acres) of mixed shrub habitat. The habitat that supported the highest density at the time of the most recent study was boulder beach (4000 lizards/hectare), followed by boxthorn (3200 lizards/hectare), cactus (2000 lizards/hectare), and mixed shrub (200 lizards/hectare). The population estimate for San Nicolas Island is comparable to that of the much smaller Santa Barbara Island. Approximately 15,350 island night lizards were estimated on San Nicolas Island using data collected from 1992-1995 (Fellers *et al.* 1998).

Santa Barbara Island. On Santa Barbara Island, the island night lizard population is very dense in a limited amount of optimal habitat. Santa Barbara Island is approximately 260 hectares (one square mile) in area, and habitat for island night lizard was recorded over less than 6 hectares (15 acres) of the island in 1991 (Fellers and Drost 1991). Within the restricted available habitat on the island, calculated lizard densities were high and comparable to densities recorded for San Clemente Island: 1,665 lizards/hectare in rock, 2,476 lizards/hectare in prickly pear, and 3,213 lizards/hectare in boxthorn scrub (Fellers and Drost 1991). The island, however, supports only 4.55 hectares (11.25 acres) boxthorn, 1.02 hectares (2.54 acres) prickly pear, and 0.25 hectare (0.63 acre) rock. (Fellers and Drost 1987). The estimated island night lizard population for Santa Barbara Island is approximately 17,600 (Fellers and Drost 1991).

Genetics, genetic variation, or trends in genetic variation: A study of divergence in the island night lizard identified morphological differences between island populations but did not detect significant genetic distance values using electrophoretic analysis of proteins (Bezy *et al.* 1980). Morphological differences included significant differences in scalation patterns, color pattern, body size (not significant between San Clemente and

Santa Barbara), clutch size, and size (not significant between San Clemente and Santa Barbara). More recently, another genetic analysis, using nuclear and mitochondrial DNA, suggests that lizards on the three islands are genetically different from one another, with San Nicolas Island being the most distinct. According to this study, the San Clemente Island and Santa Barbara Island populations are also distinct, but they have not been isolated as long as the San Nicolas population has (Sites, in litt. 2006).

Taxonomic classification or changes in nomenclature: Savage (1957) placed *Xantusia riversiana* in the monotypic genus (a genus with only one species) *Klauberina*. The island night lizard was classified as *Klauberina riversiana* at the time of listing but was subsequently included within the genus *Xantusia* (Bezy *et al.* 1980). Some authors have continued to recognize *Klauberina riversiana* (Crother *et al.* 1986 as cited in Mautz 2001). Morphological differences between the island populations have lead some authors to recognize two subspecies of island night lizard: *Xantusia riversiana reticulata* (San Clemente Island and Santa Barbara Island) and *Xantusia riversiana riversiana* (San Nicolas Island) (Smith 1946, Savage 1955, Fellers and Drost 1991).

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

II.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range: Island night lizard has been characterized by Mautz (2001) as a species that is potentially “sensitive to ecological disturbance” (pp. 4, 9) because of its life history characteristics (e.g., slow growth, late maturation, long life span, low reproductive rate). When it was listed as threatened in 1977, we determined that the habitat used by the island night lizard on San Clemente Island was being modified by the browsing effect of feral goats (*Capra hircus*) and the rooting of feral pigs (*Sus scrofa*) (42 FR at 40683). We stated that the habitats on Santa Barbara and San Nicolas Islands were already reduced and any future reduction would seriously imperil the island night lizard populations on those islands (42 FR at 40684). Since the time of listing, active grazing by domestic and feral animals has been eliminated on all three islands (see below). In addition, several threats not noted at the time of listing relative to habitat modification have been identified, including invasive non-native species, fire and certain land use activities.

Grazing by domestic and feral animals. The Channel Islands have all been affected by a history of grazing by sheep, exotic deer, pigs and European rabbits. The impacts of grazing resulted in long-term changes to the islands’ vegetation and soils that persist and affect the amount distribution and quality of the habitat on each island (Corry 2006, Schwartz 1994, U.S. Navy 2002, U.S. Navy 2003).

San Clemente Island has a history of sheep ranching along with the introduction of goats and pigs. Sheep were removed from San Clemente in the 1930’s, and the Navy completed removal of all feral goats and pigs from the island in the early 1990’s (Kellogg and Kellogg 1994, 62 FR 42692). Exotic mule deer were also removed by the early 1990’s (Mautz 2001). According to Mautz (2001), goats had a severe and long term

negative impact on the San Clemente Island ecosystem in general. Pigs probably had a smaller and more scattered impact on island night lizard. Since the removal of the grazing animals, some plant species on San Clemente Island now exhibit signs of recovery, including seedling establishment (absent for many species during intensive grazing), increases in plant cover, or observations of new occurrences of particular species (Tierra Data Systems 2005, Junak and Wilken 1998). Nevertheless, the frequency of boxthorn and cactus (optimal habitat for island night lizards) was highly variable on long-term monitoring plots. Plots where *Lycium* appears to be decreasing occurred predominantly on the north end of the island, while those that exhibited increases occurred to the south (Tierra Data Systems 2005). A decrease in the extent or health of the maritime desert scrub-boxthorn community would likely adversely affect the island night lizard, since this plant community supports high densities of lizards and shrub cover appears to contribute to the quality of this habitat (Mautz 2001). Despite the apparent variation in and slow pace of vegetation recovery on San Clemente, more island night lizard habitat is available and more island night lizards are present on San Clemente than on San Nicolas Island and Santa Barbara Island.

San Nicolas Island also has a history of sheep ranching, which began in about 1857 and ended in 1943. The initial sheep management practice of allowing the sheep to roam the island, coupled with an excessive number of sheep and drought conditions, quickly caused the removal of most of the vegetation on the island and resulted in the extensive dunes found on the island today (Schwartz 1994). Despite this, in 1998, Fellers *et al.* reported several habitat types that were used by island night lizards. They indicated that optimal habitat areas were limited and that moderate quality habitat will also be important for lizard survival on San Nicolas Island. If natural processes take their course, they noted that an increase in shrub cover is expected. This increase is expected to result from invasion of shrubs into non-native grassland (which supports almost no island night lizards. No vegetation monitoring data from San Nicolas Island is available to assess the trend of plant communities that support high densities of island night lizards.

European rabbits were introduced to Santa Barbara Island and heavily impacted native shrubs and succulents, in some areas removing all plant cover prior to their removal in 1985 (Halvorson 1994). In 1991, Fellers and Drost indicated that the number of island night lizards on Santa Barbara Island is probably less than it was in the past, given the decline of boxthorn habitat, the native shrub community and the bunchgrass community. They suggested that, given their high density, the island night lizard has the capacity to recover well from the disturbances. In addition, they noted that since the last rabbits were removed, native plant communities are increasing (W. Halvorson, pers. comm. as cited in Fellers and Drost 1991). Increases in some native plant communities are expected to result in increases in island night lizard numbers (Fellers and Drost 1991). Recovery and increase of boxthorn and cactus in particular would likely benefit the island night lizard since these plant communities support high densities of island night lizards. Analysis of post-grazing vegetation changes on Santa Barbara Island, however, indicate that although some native communities have increased, boxthorn cover on the island may have decreased. Recent analysis of vegetation detected a decrease in boxthorn cover and an increase in prickly pear cover on sampled transects (Corry 2006). Ongoing vegetation

monitoring has detected only slight vegetation change in recent years (Rodriguez, pers. comm.). Overall, if the expansion of plant communities that support high densities of island night lizards, such as boxthorn and prickly pear cactus, is not yet occurring on Santa Barbara Island, then it is likely that the island night lizard population remains very narrowly distributed on this small island.

In summary, domestic and feral grazing animals have been removed from the islands, and ongoing habitat modification due to grazing and browsing has been eliminated. However, consequences of these past activities remain (including erosion, reduced shrub cover, changes in soil composition (Schwartz 1994, Halvorson 1994, U.S. Navy 2002)) and may continue to influence island night lizard habitat. We expect island night lizards to benefit as the vegetation on these islands continues to recover. However re-establishment of plant communities that support high densities of island night lizards is likely to take many years. We remain particularly concerned about the slow pace of vegetation recovery on San Nicolas Island and Santa Barbara Island, which have very small amounts of high quality habitat. This small amount of habitat exacerbates the continuing effects of introduced grazers on these islands. In contrast, on San Clemente Island, the continuing effects of introduced grazers are of less concern because island night lizards are more abundant and more habitat is currently available than on the other two islands.

Invasive non-native species. The island night lizard may be adversely affected by the spread of invasive non-native plants into its habitat because they may reduce in extent the habitat types that island night lizards appear to prefer. Non-native species may compete with *Lycium californicum* or *Opuntia* spp. (common cover species representative of optimal island night lizard habitat, see Habitat section above) for space or other resources such as light, water and nutrients. Non-native invasives can also alter ecological processes such as fire frequency that otherwise could affect the persistence of the island night lizard (U.S. Navy 2002).

Invasion of the Channel Islands by several species of annual non-native grasses is of particular concern. Island night lizards are found at lower densities in grasslands than in the optimal habitat characterized by boxthorn and cactus cover (Mautz 2001, Fellers and Drost 1991, Fellers and Drost 1991). If grasses expand at the expense of native shrubs that provide food resources, cover, and opportunity for thermoregulation for island night lizards, the density of island night lizards could be reduced. Expansion of annual grasses may also increase the fuel load and modify fire regimes as discussed below. Among the annual grasses of particular concern are *Schismus* sp., *Bromus madritensis rubens*, *Avena* spp., *Erharta* sp., and *Brachypodium distachyon* (Kim O'Connor pers. comm.).

Invasive annual grasses covered a significant percentage of baseline transects established in Maritime Desert Scrub on San Clemente Island. While *Lycium californicum* (boxthorn) covered 21.8% of transects, *Bromus madritensis rubens* (non-native annual grass) covered 24.1% of these transects, and *Avena barbata* (non-native annual grass) covered 10.5% (U.S. Navy 2002). Subsequent monitoring along one long term transect on San Clemente Island documented an increase in cover of *Avena barbata* from 5% in

1992 to 29% in 1994 (Tierra Data Systems 2005). Twenty four plant taxa not previously documented and presumed to be introduced to the island were recorded in 1996 and 1997 (Junak and Wilken 1998), including the grass *Bromus madritensis madritensis*.

San Nicolas Island is comprised of 40% non-native plant species (Halvorson 1994). Non-native plants on the island include extensive stands of non-native annual grasslands that do not support island night lizards (U.S. Navy 2003, Fellers *et al.* 1998). Information regarding the vegetation trend on this island is not available at the time of this status review.

Santa Barbara Island is comprised of 30% non-native plant species (Halvorson 1994). Corry (2006) detected decreases in cover of some annual grass species on monitoring transects between 1984 and 2002, but predicts that passive restoration will tend to occur slowly, if at all, in annual grasslands on Santa Barbara Island.

In summary, non-native invasives are of concern on all three islands. However, we do not consider them a primary threat to island night lizard on any island.

Fire. Natural fires on the Channel Islands are infrequent at the present time. In contrast, human-caused wildfires have been relatively common, especially on islands with much human activity (Carroll *et al.* 1993). Increased fuel load associated with invasion of some grass species, as described above, may increase the threat of fire. Invasion and proliferation of non-native annual grasses in the genera *Bromus* and *Schismus* in the Mojave desert have been implicated as a major factor responsible for reduced fire intervals and increased fire intensity in this biome. Grasses exploit many different microhabitats and create a continuous and persistent fuel bed by filling in what was once plant free space with living plants and thatch. Because annual grasses vary in density with rainfall they have potential to significantly alter the fuel condition in wet years. Grasses also provide a “flashy” fuel that is easily ignitable due to the short time needed for fuel moisture to drop to low levels, even during a diurnal cycle (Simonin 2001). In addition, the plant communities that support high density island night lizard populations include maritime desert scrub communities that are not considered well adapted to fire (U.S. Navy 2002).

Where they occur, fires may threaten island night lizards by harming or killing some of the lizards within the fire footprint and by creating short term reduction in prey availability and cover. Reduced cover decreases the ability to thermoregulate and can increase lizard exposure to predators. However, island night lizards have been observed in some areas on San Clemente Island that have experienced fires, leading researchers to postulate that some lizards may take refuge underground and avoid harm during fires. Repeated fires could alter vegetation composition and structure and ultimately change lizard densities (Mautz 2001). The threat from fire is described below for each island.

San Clemente Island. The island night lizard is most susceptible to the threat of fire on San Clemente Island, where military training activities increase the potential for ignitions. High fire frequency could result in changes to plant communities that would

reduce the availability of resources (i.e., prey, cover for predator avoidance or thermoregulation) to support island night lizards in a particular area. Based on existing land use patterns, the threat of high fire frequency is greatest within the Shore Bombardment Area (SHOBA) and at the northern end of the island near SEAL Team training areas (U.S. Navy 2002). While both areas support maritime desert scrub plant communities, these communities are also broadly distributed in areas that have not experienced repeated fires, such as the West Shore. (U.S. Navy *in litt.* 2001).

SHOBA is subject to ship to shore bombardment and use of live munitions and pyrotechnics in two Impact Areas at the southern end of the island. Much of the remainder of SHOBA serves a buffer function where there is less intensive use and fire suppression can be used to protect sensitive resources. The Navy has adopted a set of fire management practices to minimize the risk of fires spreading from the impact areas to adjoining habitat, including: maintenance of fire breaks around impact areas; restrictions on the times and conditions when certain munitions can be used during the fire season, and; the presence of a fire-fighting helicopter on-island during periods of military training within SHOBA (U.S. Navy 2002, U.S. Fish and Wildlife Service 1997c, U.S. Fish and Wildlife Service 2002). These factors help to minimize, but do not eliminate, the threat of fire and fire suppression activities. Using the current management practices, the incidence and extent of wildfires on San Clemente Island has decreased significantly since 1997 (U.S. Navy 2005). The Navy proposes to change fire management policies and practices in the near future through adoption of a Fire Management Plan (FMP) that it is hoped will provide greater flexibility regarding when various munitions can be used during the fire season. The FMP will also likely modify the conditions under which certain fire protection resources must be available and ready for use on the Island (e.g. a dedicated fire helicopter) (U. S. Navy 2002, U.S. Navy 2005). These modifications to the fire management practices are untested and could change the frequency of ignition on San Clemente Island. For example, fire suppression resources are currently required during live fire exercises that occur during a “Fire Season” declared each year based on vegetation conditions (U.S. Fish and Wildlife Service 2002). The Fire Season lasts from approximately May of each year until November. Under the proposed FMP, suppression resources may only be required during periods of very high ignition potential identified on a daily basis (U.S. Navy 2005). The currently recognized Fire Season and current management practices result in fire-fighting coverage under a greater variety of conditions than will be present under the FMP guidelines.

The San Clemente Island Integrated Natural Resources Management Plan (INRMP) (U.S. Navy 2002) includes a set of Fire Management Guiding Principles which reference the draft FMP. These guiding principles emphasize the allocation of fire protection resources for human life and firefighter safety first, with high value, vulnerable facilities, structures, habitats and natural and cultural resources ranked second. The guiding principles also call for the use of pre-suppression management to reduce the risk of ignitions and adverse ecological effects of wildland fire. When pre-suppression management strategies are needed to protect natural resource assets, highest priority is given to those assets that fall under regulatory compliance (e.g. listed species).

The Navy proposes to establish 2 live-fire ranges within the boundaries of the existing Island Night Lizard Management Area (INLMA) (U.S. Navy 2000). The introduction of increased foot traffic and increased ignition potential into this area could adversely affect habitat quality and lizard density in the optimal habitat on San Clemente Island.

San Nicolas Island and Santa Barbara Island. A potential for fire also exists on both San Nicolas Island and Santa Barbara Island due to human presence. However, based on historical records and current land use, high fire frequency is not likely. As with other Channel Islands, natural fires are infrequent at the present time. Human-caused ignition sources, while present, are not as prevalent as on San Clemente Island due to the absence of live fire military training and pyrotechnics use, and the lower number of people present on each island. San Nicolas has experienced some small scale fires associated with missile launches, but has not experienced fires in recent years (Grace Smith, pers. comm., Carroll *et al.* 1993). The potential for human-caused ignition appears low for San Nicolas Island and ignitions would be most likely to occur in the vicinity of two missile launch sites which lie outside of documented island night lizard habitat (U.S. Navy 2003).

Santa Barbara Island has some potential for fire because recreational camping is allowed on the island (Channel Islands National Park web site). Although campfires are not allowed, Park Rangers are not always present on this remote island to enforce this rule (Dirk Rodriguez, pers comm.) Santa Barbara Island did experience one accidental fire in 1959 that apparently burned half of the island (Philbrick 1972, as cited in Carroll 1993.) Santa Barbara Island is also estimated to have experienced 4 fires between 10 and 99 hectares between the years 1830 and 1986. If an ignition occurred, no fire fighting resources are available on this island.

In summary, fire is a threat to island night lizard on all three islands. However, we do not consider it a substantial threat on any island. On San Clemente Island, in particular, the severity of the threat is lessened by the distribution and numbers of island night lizards on the island. The potential for human-caused ignition appears low for San Nicolas Island, and ignitions would be most likely in the vicinity of two missile launch sites which are not in the vicinity of documented island night lizard habitat (U.S. Navy 2003). Although some potential for fire exists on Santa Barbara Island from recreational use, we consider the likelihood to be relatively low. Nevertheless, compared to San Clemente Island, fire is a greater threat on San Nicolas Island and on Santa Barbara Island because of the limited amount of habitat on these islands, and thereby, the potential for catastrophic loss on these islands due to fire (see also section II.C.2.e below).

Land Use. Land use varies between San Clemente, San Nicolas, and Santa Barbara Islands. Land use activities that pose threats to the island night lizard include uses that increase risk of fire (discussed above), uses that modify natural or created island night lizard habitat, and uses that increase the potential for introduction of invasive non-native species. While the greatest amount of anthropogenic disturbance occurs on San Clemente Island, the impacts of human activities on the island are ameliorated by the size

and distribution of the island night lizard population on this island. Land use activities that introduce threats to the island night lizard are listed by island below.

San Clemente Island. San Clemente Island is owned and administered by the U.S. Navy and is a primary maritime training area for the U.S. Department of Navy Pacific Fleet and U.S. Navy Sea Air and Land Team (SEAL Team). The island also supports training for the U.S. Marine Corps, the U.S. Air Force, and other users (U.S. Navy 2002).

Training operations include ship-shore bombardment, amphibious warfare training, Naval special warfare training, airfield operations, research and development test and evaluation. Other island operations include natural resource activities, archaeological resource activities, communications exercises, Composite Training Unit Intelligence exercises, barge operations, Boy Scout and Girl Scout camping, combat search and rescue, and airfield and weather support (U.S. Navy 2002).

Numerous facilities are present on San Clemente Island to support training operations and other activities. More than 300 buildings and structures are located on the island, which house and support between 500 and 1000 personnel (U.S. Navy 2002). Transmission lines are found along the north-south axis of the island and extend to various facilities. Firing ranges, impact areas, and other “fixed” ranges support localized intensive training opportunities. An airfield and associated facilities includes aircraft training and support. Several quarries and borrow pits are in use to provide road construction materials. Ongoing use and maintenance of these facilities may result in impacts to island night lizards if surface disturbance occurs (U.S. Fish and Wildlife Service 1997e).

Land uses on San Clemente Island threaten island night lizards in localized areas of intense training, construction, or foot traffic. Current land use also increases risks of non-native introduction and expansion (discussed above), fire (discussed above), and erosion which may threaten island night lizards in portions of the island. A significant acreage of optimal island night lizard habitat, however, occurs along the west shore of San Clemente Island, an area that currently receives little training use and is recognized as an Island Night Lizard Management Area (INLMA, discussed below). Some uses proposed within the boundaries of the INLMA have the potential to affect the integrity of this area in the future (discussed below).

A minimum of 60.5 hectares (149.6 acres) of surface disturbance has occurred within plant communities identified as island night lizard habitat since 1997, however only 9 hectares (22.4 acres) of this area was in maritime desert scrub habitats, considered optimal habitat on the island (Fish and Wildlife Service 2004). An additional 60.4 hectares (149.37 acres) of surface disturbance has occurred in previously disturbed areas some of which could still support island night lizards (under debris, etc.) (U.S. Fish and Wildlife Service 2004). In 1997, the Navy projected future disturbance of approximately 299 hectares (740 acres) on the island, including 15 hectares (37 acres) of maritime desert scrub, 85 hectares (210 acres) of grassland. In 2002, the Service identified 2,099 hectares (5,186 acres) of island night lizard habitat bounded by firebreaks (surrounding impact areas at the southern end of the island), that could be modified by fires and fire

management activities. The Service anticipated reduced lizard populations over time in the advent of continued ignitions.

An Operations Management Plan (OMP) and associated Environmental Impact Statement (EIS) are in progress that will outline future training proposals for San Clemente Island. The Service has been briefed on the OMP and EIS, which will increase the area of surface disturbance on San Clemente Island and thereby increase impacts to the island night lizard (U.S. Navy *in litt.* 2005). The OMP/EIS draft is not yet released, so details regarding projected acreage of impacts are not currently available. Several components of the OMP may increase threats to the island night lizard population in some portions of San Clemente Island, as described below.

As part of the OMP, the Navy proposes to conduct off-road Assault Vehicle Maneuver exercises on San Clemente Island using a variety of off-road amphibious tanks (Amphibious Assault Vehicles and Advanced Amphibious Assault Vehicles) and other vehicles. This new activity is likely to adversely affect island night lizard populations where it occurs, by crushing lizards, modifying the plant community, and causing erosion. Two Assault Vehicle Maneuver Areas (AVMAs) are proposed. One of the two AVMAs is proposed in extensive annual grassland that supports low densities of island night lizards. The second is proposed in an area that supports some boxthorn and rocky substrates (characteristic of island night lizard habitat) (U.S. Navy *in litt.* 2005). Both AVMAs are proposed outside of the recognized INLMA (discussed below).

The Navy proposes to conduct battalion sized landings on the island and to recognize an infantry operations area that extends the length of the island. The infantry operations area would be used by foot traffic during battalion-sized (1500 troops) landings. The infantry operations area is proposed outside of the INLMA in grassland habitat that supports lower densities of island night lizards (U.S. Navy *in litt.* 2005).

Two SEAL Team live-fire training ranges are proposed for use within the boundaries of the INLMA. The ranges may increase disturbance and fire frequency in the vicinity of optimal island night lizard habitat along the west shore. The extent of potential impacts of these proposed ranges are being analyzed by the Navy (U.S. Navy *in litt.* 2005).

In 1997, the U.S. Navy identified habitat along the western shore of San Clemente Island as the Island Night Lizard Management Area (INLMA) (U.S. Fish and Wildlife Service 1997e). The area has received continued recognition in recent management plans, although the Navy has not signed a Memorandum of Agreement to recognize the management area into the future as prescribed in our 1997 biological opinion (U.S. Fish and Wildlife Service 1997e). Objectives targeted towards habitat protection in this area include: (1) Monitor habitat condition annually and monitor the island night lizard population every three years; (2) Incorporate prime habitat into the Navy land use planning process by managing it as an area of limited disturbance; (3) Direct habitat disturbance due to military operations or construction to areas other than prime habitat to the extent practicable; (4) Control or reverse expansion of non-native plants in prime habitat; (5) Prevent access to unused roads and/or unauthorized routes in prime habitat;

(6) Prevent expansion or new introductions of non-native vegetation by ensuring that all vehicles brought on island are free of mud and weed seed.

San Nicolas Island. Like San Clemente Island, San Nicolas Island is owned and administered by the U.S. Navy. The island is part of the Naval Air Warfare Center Weapons Division Sea Range, managed by the Naval Air Weapons Station at China Lake. The Sea Range covers 36,000 square nautical miles of open ocean. As part of the Sea Range, San Nicolas Island provides a platform for launches of missiles and targets, while facilities on the island conduct radar tracking and control, range surveillance, telemetry, and communications for weapons testing. Amphibious exercises and explosive ordnance disposal are conducted on the island. Berthing facilities, a barge loading area, a reverse osmosis plant, equipment storage areas, and associated utilities are also found on the island (U.S. Navy 2003). Proposed projects include a pier, a new reverse osmosis plant, and a multi-purpose instrumentation sit (U.S. Fish and Wildlife Service 2001b).

Land use of San Nicolas Island may result in adverse modification of island night lizard habitat in instances where surface disturbance occurs. No quantification of recent or proposed surface disturbance is available at the time of this review.

Santa Barbara Island. Santa Barbara Island is owned and administered by the National Park Service. Land use on Santa Barbara Island includes low-impact recreational activities such as primitive camping, hiking, wildlife observation, and marine activities (U.S. National Park Service 2006). These activities pose a low degree of threat to the limited island night lizard habitat on Santa Barbara Island, although there is a risk of ignition and non-native introduction associated with regular human ingress and egress from the island.

In summary, as with fire, land use is a potential threat to island night lizard on all three islands. However, we do not consider it a substantial threat on any island. Again, on San Clemente Island, the severity of the threat is lessened by the distribution and numbers of island night lizards on the island. For San Nicolas Island, we have no indication that substantial surface disturbance of the type that would negatively impact island night lizard is planned. Land uses on Santa Barbara Island are low-impact and unlikely to be a substantial threat to the island night lizard.

II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes: Overutilization was not identified as a threat to island night lizards at the time of listing and is not known to be a threat now. 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. The National Park Service prohibits collection of wildlife on Santa Barbara Island except under permit (cit.)

II.C.2.c. Disease or predation:

Disease and parasitism. Some ectoparasites (parasites that live on the outside of their hosts), including ticks and chiggers, have been identified on island night lizards (Fellers and Drost 1991). In addition, a non-parasitic nematode has been observed in island night lizard feces (Fellers and Drost 1991) and an eimeriid coccidian (a parasitic protozoan) infection has been documented (Goldberg and Bursey 1990). We have no information at this time to suggest that these organisms threaten the continued survival of the island night lizard.

Predation. Island night lizards may be prey for native and non-native predators. Mautz (2001) identified kestrels, shrikes, owls and other larger raptorial species on San Clemente Island as native island night lizard predators. On Santa Barbara Island, remains of island night lizards were found in barn owl (*Tyto alba*) and burrowing owl (*Athene cunicularia*) pellets, and American kestrels (*Falco sparverius*) have been observed eating lizards (Fellers and Drost 1991). We have no reason to expect that these native predators pose a substantial threat to island night lizard survival. However, non-native predators may pose a threat. Island night lizard depredation by feral housecats (*Felis catus*) on San Clemente Island and by alligator lizards (*Elgaria multicarinata webpii*) on San Nicolas Island were identified as possible threats to the continued existence of the island night lizard at the time of listing (42 FR at 40684). Threats from these animals and from rats and California gopher snake are described below.

The final rule indicated that we received evidence that feral cats feed on island night lizard, but at the time, we did not know whether this was a serious threat. Cats were introduced to San Clemente Island and San Nicolas Island during the ranching era of the late 1800's and early 1900's. Feral cats rely on small rodents as well as lizards as their primary food source. In 2002, 314 cat stomachs analyzed from San Clemente Island contained 177 island night lizards, or 15% of the identified prey items (Cooper *et al.* 2003). In 2003, the contents of 161 feral cats removed from San Clemente Island included the remains of 50 island night lizards (Kershner *et al.* 2004). In 2004, 288 cat stomachs contained 50 island night lizards, or 4.1% of the identified prey items (Cooper *et al.* 2005). Gut content analyses conducted during predator management activities document the temporal change in cat diet throughout the year (2005/2006), with island night lizards comprising 100% of the gut contents in June and July (IWS 2006). Feral cat populations remain high on San Clemente Island, despite intermittent control efforts that began in 1986 and ongoing year-round efforts at predator control that began in 1998. Between 1999 and November 2003, approximately 2,439 cats were removed from San Clemente Island.

Despite the persistence of the cat population on San Clemente Island and documentation of predation, the island night lizard density has remained very high on sample plots, and the population appears stable (Mautz 2001). Therefore, we do not consider cats to be a substantial threat to island night lizard on San Clemente Island. However, if the cat populations were left unchecked, they could become a more substantial threat (Mautz 2001).

Cats are also present on San Nicolas Island and have been observed in nearly all parts of

the island (Fellers *et al.* 1998). On San Nicolas Island, the feral cat population has been subject to limited control. Therefore, the current cat population continues to be a threat to island night lizard populations on San Nicolas Island.

The first record of southern alligator lizard (*Elgaria multicarinata*) on San Nicolas is a specimen collected by E. D. Mitchell on April 9, 1960 (Banta and Wilson 1976). The pattern of occurrence (localized near Navy buildings and debris) and slow spread suggests an introduction of the species to the island in shipments of lumber or other materials brought from the mainland. The initial introduction was likely near the Telemetry Building (referred to as the Eucalyptus site during lizard monitoring), with a range increase of up to 0.18 km per year (197 yards per year) (Fellers 1999). The alligator lizard is as large as or larger than most island night lizards. Alligator lizards prey on a variety of invertebrates and small vertebrates and can inhabit habitat similar to that of island night lizards, so there is potential for interaction between the species. Fellers *et al.* (1998) evaluated the amount of overlap between alligator lizards and island night lizards at the four trap areas where alligator lizards had been trapped, and found island night lizards and alligator lizards trapped together in 43% of the traps at one of the trap sites (Eucalyptus site). Negative impacts to the island night lizard are not apparent based on data reflecting the 11 year time span between 1984 and 1995 (Fellers *et al.* 1998). However, island night lizard individuals have disappeared from some areas of overlap (Grace Smith, pers. comm.) and it is unclear whether the alligator lizard and the side-blotched lizard (*Uta stansburiana*), also an introduced species, may have a negative impact on the island night lizard on San Nicolas Island (Fellers 2003).

While not identified in the final rule, rats (*Rattus rattus*) are another generalist predator that could present a threat to island night lizards. Rats are known to prey on lizards in other island situations (McCallum 1986) and prefer the same dense shrubby habitats that are best for island night lizards (Fellers *et al.* 1998). Rats are found throughout San Clemente Island but are not currently known from San Nicolas or Santa Barbara Islands. Efforts to prevent rat introduction are implemented at San Nicolas Island, although the potential for rat introduction exists due to the ongoing transport of people and materials to the island. The impact of rat predation on island night lizards has not been examined.

A California gopher snake (*Pituophis catenifer*) was captured by a passerby on San Clemente Island in June 2006 (IWS 2006). The snake was captured near the town of Wilson Cove and may have been an isolated, recently introduced individual. No other records of snakes on San Clemente Island are available. Any establishment of a lizard-eating snake population on any of the islands could adversely affect island night lizard populations.

In summary, of the non-native predators discussed above, we are particularly concerned with feral cats on San Nicolas Island, which have been subject to limited control. The abundant night lizard population on San Clemente Island, on the other hand, appears large enough to withstand the effects of predation by the current controlled cat population. We consider the other non-native predators (alligator lizards, rats and introduced snakes) discussed above to be potential threats to the island night lizard, but

the imminence and magnitude of the threat is not clear at this time.

II.C.2.d. Inadequacy of existing regulatory mechanisms: Several regulatory mechanisms may provide some protection for the island night lizard, including the Sikes Act Improvement Act of 1977 (Sikes Act) and the Endangered Species Act. In addition, the National Park Service has guidelines that pertain to management of listed species on their lands.

Sikes Act and INRMP. The Sikes Act instructed military installations to develop Integrated Natural Resources Management Plans (INRMPs) for all installations. An INRMP is a plan that is intended "...to guide installation commanders in managing their natural resources in a manner that is consistent with the sustainability of those resources while ensuring continued support of the military mission. Although an INRMP may involve adaptation of policies, it technically is not a regulatory mechanism because its implementation is subject to funding availability and there is nothing to compel implementation of identified goals and objectives. Additionally, INRMPs are subject to change as they are intended to be updated every five years (U.S. Navy 2002).

San Clemente Island INRMP. The San Clemente Island INRMP (U.S. Navy 2002) identifies the area along the western shore of San Clemente Island as the Island Night Lizard Management Area (INLMA). Specific INRMP objectives targeted towards habitat protection in this area include:

- (1) Monitor habitat condition annually and monitor the island night lizard population every three years.
- (2) Incorporate prime habitat into the Navy land use planning process by managing it as an area of limited disturbance.
- (3) Direct habitat disturbance due to military operations or construction to areas other than prime habitat to the extent practicable.
- (4) Control or reverse expansion of non-native plants in prime habitat.
- (5) Prevent access to unused roads and/or unauthorized routes in prime habitat.
- (6) Prevent expansion or new introductions of non-native vegetation by ensuring that all vehicles brought on 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.

Since the INRMP is scheduled for revision every 5 years (U.S. Navy 2002), future iterations of this plan, and the management it recommends, are likely to differ from the

existing INRMP. If the island night lizard were to be delisted, it is unknown whether or not the designation and protection of the INLMA and other conservation measures directed towards island night lizards would be retained as part of the INRMP.

Although the INRMP for San Clemente Island includes objectives targeted toward habitat protection of optimal island night lizard habitat, Navy Operational needs may supercede INRMP goals. For example, two live-fire SEAL Team training areas are proposed for designation within the boundaries of the Island Night Lizard Management Area (U.S. Navy 2000). If this land use is adopted, the area would likely be subject to a higher fire frequency that could adversely affect boxthorn cover and habitat suitability over an unknown acreage. The San Clemente Island INRMP (U.S. Navy 2002) includes a set of Fire Management Guiding Principles which reference a Fire Management Plan that is under development as described above in the Fire section. The presence of other listed species on San Clemente Island may confer some fire protection benefit to the island night lizard, but projects specific to the distribution of the island night lizard may not rank as high if the species were to be delisted.

San Nicolas Island INRMP. The San Nicolas Island INRMP (U.S. Navy 2003) also contains conservation goals for island night lizard habitat that should provide some protection, including:

- (1) Revegetate disturbed and unused areas with cactus (*Opuntia* spp.) and boxthorn (*Lycium californicum*) to provide habitat for island night lizards.
- (2) Locate staging areas for temporary storage of equipment and materials to areas where surveys have shown island night lizard densities to be low to the extent practicable.
- (3) Survey debris and stored materials that may harbor island night lizards before such materials are removed. If island night lizards are found, relocate them to suitable habitat.
- (4) Exclude areas of high quality island night lizard habitat from mowing regimes.
- (5) Place multi-purpose instrumentation sites in areas that avoid island night lizard habitat.
- (6) Maintain island night lizard habitat quality and integrity.
- (7) Support scientific studies of competitive relationships between alligator lizards and island night lizards.
- (8) Monitor distribution, population trends, and habitat usage of the island night lizard population at 3-5 year intervals.

In conclusion, although INRMPs are technically not regulatory, they are

important guiding documents that help to integrate the military's mission with natural resource protection on San Clemente Island and San Nicolas Island. Because implementation of the INRMPs is subject to the allocation of funds from Congress and funding priority is usually given to listed species, the benefits of the INRMPs for island night lizard could diminish if the species were delisted.

Endangered Species Act. Since the island night lizard is currently listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*), this law is a primary mechanism for protecting it. Multiple sections of the Act contain provisions that promote conservation of listed species. Section 2(c)(1) states the policy of Congress that all Federal agencies shall seek to conserve listed species and utilize their authorities to further purposes of the Act. Section 4 outlines: the threat factors for which a species can be listed; the formation of recovery teams and development of recovery plans to address those threats; reclassifications and delisting, and post delisting monitoring requirements; and protective regulations (special rules) for threatened species. Section 5 discusses conservation of listed species through land and water acquisition. Section 6 calls for cooperation with the States by entering into management and cooperative agreements, and providing funding to those States with cooperative agreements. Section 7 requires Federal agencies to carry out programs to conserve listed species and to consult with the Service to ensure that their actions do not jeopardize the continued existence of listed species. Section 9 makes it unlawful to import, export, take, or violate any regulation pertaining to listed wildlife, and on Federal lands, plants. Section 10 authorizes: scientific permits for research or to enhance the survival and recovery of listed species; incidental take permits based on a habitat conservation plan that will not appreciably reduce the likelihood of survival and recovery of the listed species; and experimental populations outside a species' current range. Section 11 assesses civil and criminal penalties for violations of the Act or its implementing regulations. These provisions are applicable to the protection of a species while it is on the Federal List of Endangered and Threatened Wildlife and Plants. If removed from the list, the island night lizard would no longer receive the protections of listing or from the designation of critical habitat (if it were designated). Federal agencies would no longer consult with us concerning the impacts of actions that may affect island night lizard to ensure that such actions do not jeopardize the continued existence of island night lizard, nor would individuals seek section 10(a)(1) permits for private actions affecting the species.

Protections afforded the threatened San Clemente sage sparrow (*Amphispiza belli clementae*) under the Endangered Species Act may confer some protection to the island night lizard if the lizard is delisted. The sage sparrow occurs in a restricted distribution on San Clemente Island that includes some of the optimum habitat for the island night lizard (U.S. Navy 2002). If the island night lizard were to be delisted, it is likely that optimum habitat that overlaps with the range of the San Clemente sage sparrow would continue to receive some protection.

National Park Service (NPS) Organic Act. The NPS Organic Act became law on August 25, 1916 (39 Stat. 535, 16 U.S.C. 1) and has been amended twice. The NPS Organic Act, 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 wild life 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 NPS Management Policies (U.S. National Park Service 2001) indicates that NPS 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 FWS and undertaking active management programs to inventory, monitor, restore and maintain listed species habitats, among other actions. The National Park Service prohibits collection of wildlife except under permit (cit.).

II.C.2.e. Other natural or manmade factors affecting its continued existence:

Because the island night lizard is an insular endemic species it is particularly vulnerable to extirpation from random factors such as environmental stochasticity (uncertainty) and natural catastrophes (Shaffer 1981, 1987).

Environmental uncertainty arises from random or unpredictable changes in weather, food supply or populations of competitors, predators, and parasites (Shaffer 1981, 1987). While demographic and genetic uncertainty are more important in smaller populations, environmental uncertainty can affect the viability of larger populations as well (Meffe and Carroll 1997).

The conservation biology literature also commonly notes the vulnerability of taxa known from one or very few locations to catastrophic events (e.g., Shaffer 1981, 1987; Meffe and Carroll 1997, Primack 1998). The restricted distribution of island night lizard on San Nicolas and Santa Barbara Islands makes the populations on these islands susceptible to natural catastrophes such as a fires, landslides or prolonged droughts on either island that could lead to the extirpation of the species from that Island. On San Clemente Island the population is distributed across a much larger and diverse area, which improves the prospects for continued survival of the species on this island, and for the species as a whole. The presence of island night lizard on three geographically separate Islands improves the prospects for continued survival of the species in the event of a natural catastrophe.

II.D. Synthesis -

The amount of information available concerning the abundance of island night lizards, availability of habitat on each island of occurrence, and differences between island populations has increased since the time of listing. Some of the threats to the species cited in the final listing rule have been removed, and others not noted at the time of listing have been identified.

San Clemente Island. The best quality habitat and largest numbers of island night lizards occur on San Clemente Island. As with all three islands, the threat to island night lizard habitat from introduced grazing animals, which was identified as the primary threat to the lizard at the time of listing, has been removed although effects of past damage still

remain. Since the removal of the grazing animals, some plant species on San Clemente Island have exhibited signs of recovery, but the frequency of boxthorn and cactus (optimal habitat for island night lizards) can be variable. We expect that, over time, recovery of vegetation on San Clemente Island will benefit island night lizard. However, a decrease in the extent or health of the maritime desert scrub-boxthorn community would likely adversely affect the island night lizard since this plant community supports high densities of lizards and shrub cover appears to contribute to the quality of this habitat. Despite the apparent variation in and slow pace of vegetation recovery on San Clemente, more island night lizard habitat is available and more island night lizards are present on San Clemente than on San Nicolas Island and Santa Barbara Island. The continuing effects of introduced grazers are lessened on San Clemente Island because of the distribution and abundance of island night lizards there.

Feral cat predation was also a threat noted at the time of listing. At this time, the abundant island night lizard population on San Clemente Island appears large enough to withstand the effects of predation by the current cat population because cat control measures are currently in place.

Military activities of the U.S. Navy on San Clemente Island are a threat not identified at the time of listing. Construction of new facilities and increasing amounts of training activity and associated disturbance are occurring here, but the distribution and numbers of the island night lizard on this island lessens the severity of the threat since military activities are localized and mostly outside of areas that support high lizard density. A secondary threat to island night lizard on San Clemente Island is non-native invasive species.

San Nicolas Island. San Nicolas Island has significantly less habitat available for island night lizard than San Clemente Island does. Although the island could potentially support more habitat than it currently does, due to the effects of grazing and a lack of restoration efforts, habitat for the island night lizard remains extremely limited. As on San Clemente Island, the removal of introduced grazing animals could potentially allow the habitat to recover. Because the amount of high quality habitat on San Nicolas Island is extremely limited, because recovery of vegetation can occur slowly and because no vegetation monitoring data are available to assess vegetation trends, the effects of long-term overgrazing remain a concern on San Nicolas Island.

Other threats identified in the final rule that are relevant to San Nicolas Island are predation by feral cats and competition with or predation by alligator lizards. We continue to be concerned about feral cat predation on San Nicolas Island. While the abundant island night lizard population on San Clemente Island appears large enough to withstand the effects of predation by the current controlled cat population, the cat population on the smaller San Nicolas Island has been subject to limited control. The alligator lizard range on San Nicolas Island is expanding, but the effects on the island night lizard are uncertain.

These primary threats to island night lizard on San Nicolas Island are exacerbated by the extremely small extent of high quality habitat on the island. Secondary threats to island night lizard on San Nicolas Island, which were not identified at the time of listing, include military activities and non-native invasive species.

Santa Barbara Island. Like San Nicolas Island, Santa Barbara Island has a very small amount of high quality island night lizard habitat, and vegetation recovery subsequent to removal of introduced grazers appears to be slow. Therefore, the effects of introduced grazers remain a concern on Santa Barbara Island.

Recommendation. Our recommendation at this time, based on the preliminary DPS analysis above and on our assessment of current threats to island night lizard, is to designate each island a separate DPS.

On San Clemente Island, the ongoing threats posed by introduced grazers and feral cats have been largely ameliorated since the time of listing, and the severity of these threats and of the threat from military activities, is lessened by the distribution and numbers of island night lizards on San Clemente Island. Therefore, our analysis indicates that the island night lizard population on San Clemente Island, no longer meets the definition of threatened and should be delisted, once it is designated as a DPS.

In contrast, our analysis indicates that the small amount of high quality habitat on San Nicolas Island and Santa Barbara Island exacerbates the continuing effects of introduced grazers on these islands. In addition, we remain concerned about feral cat predation and the effects of alligator lizards on San Nicolas Island. Therefore, we recommend that the populations on these two islands remain listed as threatened. We will continue to seek additional information, evaluate the available information, and refine our preliminary DPS analysis and our analysis of the status of the island night lizard as we complete the 12-month finding.

III. RESULTS

III. A. Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist** (San Clemente Island)
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No change is needed** (San Nicolas Island and Santa Barbara Island)

III. B. New Recovery Priority Number 8

The island night lizard has a moderate level of threat and high potential for recovery. The level of threat is considered “moderate” because the species is locally abundant in optimal habitat which is widespread on one of the three islands of occurrence. Increasing levels of human activity are occurring within the species range.

Based on this review, indicate the appropriate Recovery Priority Number for the species. The 5-year review should substantiate this change, so provide only a brief rationale. For further guidance on determining the species recovery priority number, refer to Appendix E.

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

Reclassification (from Threatened to Endangered) Priority Number: _____

Reclassification (from Endangered to Threatened) Priority Number: _____

Delisting (Removal from list regardless of current classification) Priority Number: _____

IV. RECOMMENDATIONS FOR FUTURE ACTIONS -

- (1) Complete and peer review genetics studies to determine the magnitude of genetic differences between island night lizard populations on San Clemente, Santa Barbara, and San Nicolas Islands.
- (2) Continue feral cat management on San Clemente Island and pursue cat eradication on San Nicolas Island.
- (3) Sign Memorandum of Agreement with the U.S. Navy regarding continued recognition of the Island Night Lizard Management Area, as prescribed in U.S Fish and Wildlife Service 1997.
- (4) Determine whether “mixed shrub” habitat on San Nicolas Island supports a self-sustaining population, or whether this area functions as a “sink”.
- (5) Re-examine island night lizard density, distribution, and habitat recovery on Santa Barbara Island to assess habitat and population trends that have occurred since 1984.
- (6) Peer review population estimate techniques and studies.

- (7) Develop specific recovery criteria for delisting the island night lizard on San Clemente Island, San Nicolas Island, and Santa Barbara Island.
- (8) Restoration of over-grazed habitat to island night lizard preferred habitat.
- (9) Investigate the role of rats within the context of island night lizard ecology.

References

- Banta, B.H. and R.L. Wilson. 1976. On the occurrence of *Gerrhonotus multicarinatus* on San Nicolas Island, Ventura County, California. *Bull. Maryland Herp. Soc.* 12:99-100.
- Bezy, Robert L. G.C. Gorman, G.A. Adest, and Y.J. Kim. 1980. Divergence in the Island Night Lizard *Xantusia riversiana*. In: Power D.M. (ed.) *The California Islands: Proceedings of a multidisciplinary symposium*. Santa Barbara Natural History Museum, Santa Barbara, Ca.
- Bezy, Robert L. and Jack W. Sites Jr. 1987. A preliminary study of Allozyme Evolution in the Lizard Family Xantusiidae. *Herpetologica*, 43(3). Pp. 280-292.
- Bezy, Robert L. 1988. *The Natural History of the Night Lizards, Family Xantusiidae*. Proceedings of the Conference on California Herpetology. Edited by H.F. De Lisle, P.R. Brown, B. Kaufman, and B.M. McGurty.
- Carroll, Mary C., Lyndall L. Laughrin, and Ann C. Bromfield. Fire on the California Islands: does it play a role in chaparral and closed cone pine forest habitats? In: *Third California Islands Symposium*. Edited by F.G. Hochberg. Santa Barbara Museum of Natural History, Santa Barbara, California.
- Cooper, D.M., E.L. Kershner, B.L. Sullivan, and D.K. Garcelon. 2003. San Clemente loggerhead shrike predator research and management program- 2002. Final Report. U.S. Navy Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, California. 125 pp.
- Cooper, D.M., E.L. Kershner, and D.K. Garcelon. 2005. San Clemente Loggerhead Shrike non-native predator control program-2004. Final Report. U.S. Navy Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, California. 66 pp.
- Corry, Patricia M. 2006. *Vegetation Dynamics following grazing cessation on the Channel Island, California*. Doctoral Dissertation, University of North Carolina, Chapel Hill.
- Crother, B.I., M.M. Miyamoto and W.F. Presch. 1986. Phylogeny and Biogeography of the Lizard Family Xantusiidae. *Systematic Zoology* 35: 37-45.

- Fellers, Gary M., and Charles A. Drost. 1987. Population Status and Ecology of the Island Night Lizard on Santa Barbara Island. Unpublished Report.
- Fellers, Gary M. and Charles A. Drost. 1991. Ecology of the Island Night Lizard, *Xantusia riversiana*, on Santa Barbara Island, California. Herpetological Monographs, 5: 28-78.
- Fellers, Gary M., Charles A. Drost, William J. Mautz, Thomas Murphy. 1998. Ecology of the Island Night Lizard on San Nicolas Island, California. Unpublished Report.
- Fellers, Gary M. and Charles A. Drost. 1991. *Xantusia riversiana*. In: Catalogue of American Amphibians and Reptiles.
- Fellers, Gary M. 1999. Reptile populations on San Nicolas Island, California. 1999 survey.
- Fellers, Gary M. 2003. 2003 Annual report for FWS under permit TE-844852. Ventura FWS Office, Ventura, California. 12 pp.
- Fellers, Gary M. 2005. 2005. Annual report for FWS under permit TE-844852. Ventura FWS Office, Ventura, California. 5 pp.
- Goldberg, S.R., and R.L. Bezy and Bezy. 1974. Reproduction in the island night lizard, *Xantusia riversiana*. Herpetologica 30:350-360.
- Goldberg, Stephen R. and Charles R. Bursey. 1990. Prevalence of *Eimeria noctisauris* (Apicomplexa: Eimeriidae) in Island Night Lizard, *Xantusia riversiana* (Xantusiidae). Journal of Herpetology 24(2): 204-207.
- Halvorson, William. 1994. Ecosystem Restoration on the California Channel Islands. In, *The Fourth California Islands Symposium: Update on the Status of Resources*, Edited by W.L. Halvorson and G.J. Maender. 1994. Santa Barbara Museum of Natural History, Santa Barbara, Ca.
- IWS 2006. Weekly report prepared as part of predator management activities to benefit the San Clemente Loggerhead Shrike.
- Junak, Steven A. and Dieter H. Wilken. 1998. Sensitive plant status survey NALF San Clemente Island, California. Final Report. Prepared for Department of Navy Southwest Division, Naval Facilities Engineering Command and Natural Resources Office Naval Air Station, North Island San Diego, California. Letter of Agreement N68711-95-LT-C0025.
- Kellogg, Elizabeth and Jim Kellogg 1994. San Clemente Island Vegetation Condition and Trend . Final Report. U.S. Navy, Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Commonad, San Diego, California.

- Kershner, Eric L., Douglass M. Cooper, and David K. Garcelon. 2004. San Clemente Loggerhead Shrike non-native predator control program 2003. Final Report. U.S. Navy, Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, California. 59 pp.
- Mautz, William J. 1993. Ecology and energetics of the Island Night Lizard, *Xantusia riverisana*, on San Clemente Island, California. Pp. 417-428 In: F.G. Hochberg, ed. Third California Island Symposium: Santa Barbara, Ca.
- Mautz, William J. 2001. The Biology and Management of the Island Night Lizard on San Clemente Island. Final Report. U.S. Navy, Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, California. 69 pp.
- McCallum, John. 1986. Evidence of predation by kiore upon lizards from the Mokohinau Islands. *New England Journal of Ecology* 9: 83-87.
- Meffe, G.K. and C.R. Carroll. 1997. Principles of conservation biology. Sinauer Associates, Sunderland, Massachusetts.
- Philbrick, R.N. 1972. The plants of Santa Barbara Island, California. *Madrono* 21:303-329.
- Primack, R.B. 1998. Essentials of conservation biology. Sinauer Associates, Sunderland, Massachusetts.
- Savage, J.M. 1951. Studies on the lizard family Xantusiidae. II. Geographical variation in *Xantusia riversiana* from the Channel Islands of California. *J. Washington Acad. Sci.* 41:357-360.
- Savage, J.M. 1955. The lizard family Xantusiidae: An evolutionary study. PhD. Dissertation, Stanford Univ. Palo alto, California.
- Savage, J.M. 1957. Studies on the lizard family Xantusiidae. III. A new genus for *Xantusia riversiana* Cope, 1883. *Zoologica* 42: 83-86.
- Schwartz, Steven J. 1994. Ecological Ramifications of Historic Occupation of San Nicolas Island. In Proceedings: The Fourth California Islands Symposium: Update on the Status of the Resources. Edited by W.L. Halvorson and G.L. Maender.
- Shaffer, M.L. 1981. Minimum population sizes for species conservation. *Bioscience* 31: 131-134.
- Shaffer, M.L. 1987. Minimum viable populations: coping with uncertainty. Pp69-86 in M.E. Soulé, *Viable Populations for Conservation*, Cambridge University Press.

- Simonin, Kevin A. 2001. *Bromus Rubens, Bromus madritensis*. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available at: <http://www.fs.fed.us/database/feis>
- Smith, H.M. 1946. A subspecies of the lizard *Xantusia riverisana*. J. Wash. Acad. Sci. 36:392-393.
- Tierra Data Systems. 2005. San Clemente Island Vegetation Condition and Trend Analysis 1992-2003. Final Report. U.S. Navy, Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, California. 428 pp.
- U.S. Fish and Wildlife Service. 1977. Final Rule listing island night lizard as threatened species. Federal Register Volume 42 page 40682.
- U.S. Fish and Wildlife Service. 1980. Selected Vertebrate Endangered Species of the Seacoast of the United States; Island Night Lizard.
- U. S. Fish and Wildlife Service. 1984. Recovery Plan for the Endangered and Threatened of the California Channel Islands. U.S. Fish and Wildlife Service, Portland, Oregon. 165 pp.
- U.S. Fish and Wildlife Service, Interior and National Marine Fisheries, Commerce. 1996. Policy regarding the recognition of distinct vertebrate population segments under the Endangered Species Act. Federal Register Volume 61 page 4722.
- U. S. Fish and Wildlife Service. 1997a. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Three Plants From the Channel Islands of Southern California. Federal Register 62: 42692-42702.
- U. S. Fish and Wildlife Service. 1997b. Biological Opinion (F-97-F-18) on SEDRP Windfarm Project, San Clemente Island.
- U. S. Fish and Wildlife Service. 1997c. Biological/Conference Opinion (1-6-97-F-21) on Training Activities on San Clemente Island. On file at Carlsbad Fish and Wildlife Office, Carlsbad, CA.
- U.S. Fish and Wildlife Service. 1997d. Biological Opinion (1-97-F-42) on Utility Pole Replacement Project, San Clemente Island.
- U. S. Fish and Wildlife Service. 1997e. Biological Opinion (1-6-97-F-58) on Existing and Proposed Naval Activities on San Clemente Island. Completed on December 15, 1997.
- U. S. Fish and Wildlife Service. 2001a. Biological Opinion (1-6-00-F-19) on Training Area Ranges on San Clemente Island. Completed January 17, 2001.

- U. S. Fish and Wildlife Service. 2001b. Biological Opinion (1-8-01-F-14) on Activities on San Nicolas Island, California.
- U. S. Fish and Wildlife Service. 2002. Re-Initiation of Consultation (1-6-97-F-21/ FWS-LA-2808) on Naval Training Activities that Cause Fires on San Clemente Island. On file at Carlsbad Fish and Wildlife Office, Carlsbad, CA.
- U. S. Fish and Wildlife Service. 2004. Biological Opinion (1-6-04-F-3934.1) on San Clemente Island Road Improvement Project (Military Construction Project P-493).
- U.S. Geological Survey 1999. USGS website. www.werc.usgs.gov/news/1999-09-16b.html
- U.S. National Park Service. 2001. Management Policies 2001. U.S. Department of Interior. National Park Service. Chapter 4.
- U.S. National Park Service. 2006. Channel Islands National Park Website. <http://www.nps.gov/archive/chis/sbipage.htm>
- U. S. Navy, Southwest Division (USDoN, SWDIV). 2000. Draft Operations management plan for the ranges and operational areas at San Clemente Island, California.
- U. S. Navy, Southwest Division (USDoN, SWDIV). 2002. San Clemente Island Integrated Natural Resources Management Plan. Prepared by Tierra Data Systems, Escondido, CA.
- U.S. Navy, Southwest Division (USDoN, SWDIV). 2003. San Nicolas Island Integrated Natural Resources Management Plan 2004-2008. Prepared by Tierra Data Systems, Escondido, California.
- U.S. Navy. 2004. Petition to designate San Clemente Island and San Nicolas Island populations of island night lizard (*Xantusia riversiana*) as distinct population segments and removal as such from the Federal List of Threatened Species pursuant to the Endangered Species Act of 1973. Prepared by Commander, Navy Region Southwest. March 22, 2004.
- U.S. Navy, Southwest Division. 2005. Draft San Clemente Island Fire Management Plan. Prepared by Tierra Data Systems, Escondido, California.
- U.S. Navy. 2006. San Clemente Island Website. [Http://www.scisland.org](http://www.scisland.org)

Personal Communications:

The following people were contacted for information relevant to the status of the island night lizard. These people provided a range of expertise based on their involvement with specific survey efforts, genetic research, other scientific studies and/or management of Channel Island biological resources.

Mautz, William. Island night lizard researcher. May 24, 2006. Telephone conversation between Dr. Mautz and Sandy Vissman of the Carlsbad Field Office.

O'Connor, Kimberly. U.S. Navy botanist. August 20, 2006. Discussion regarding invasive plants on San Clemente Island with Sandy Vissman of the Carlsbad Field Office.

Rodriguez, Dirk. National Park Service botanist. August 23, 2006. Discussion regarding status of plant communities on Santa Barbara Island with Sandy Vissman of the Carlsbad Field Office.

Sites, Jack W. Geneticist, taxonomist. June 6, 2006. Telephone conversation between Dr. Sites and Sandy Vissman of the Carlsbad Field Office.

Smith, Grace. U.S. Navy biologist. August 17, 2006. Discussion regarding vegetation status and trend on San Nicolas Island with Sandy Vissman of the Carlsbad Field Office.

In Litt. References

Sites, Jack W. 2006. Summary of Xantusiid phylogentic tree constructed using nuclear and mitochondrial DNA, pertaining to *Xantusia riversiana*.

U.S. Navy. 2001. Fire frequency maps distributed to US Fish and Wildlife Service.

(U.S. Navy. 2005). Briefing materials pertaining to proposed operations on San Clemente Island that are addressed in Operations Management Plan and EIS.

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


Current Classification Threatened
Recommendation resulting from the 5-Year Review

- Downlist to Threatened**
- Uplist to Endangered**
- Delist** (San Clemente Island)
- No change is needed** (San Nicolas Island and Santa Barbara Island)

Review Conducted By Sandy Vissman


FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 9-21-06

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve  Date 9/26/2006