

**National Park Service  
Channel Islands National Park**

**CHANNEL ISLANDS NATIONAL PARK ISLAND LOGGERHEAD SHRIKE SURVEY  
SANTA ROSA ISLAND - SPRING BREEDING SEASON 2006**



**Technical Report CHIS-09-02**

**Linda Dye  
Cedrick Villasenor  
Tim Coonan**

**Channel Islands National Park  
1901 Spinnaker Drive  
Ventura, California 93001  
August 2009**

Loggerhead Shrike  
Drawing by: F. Morris

## Abstract

The purpose of this project was to conduct an initial survey using existing Channel Islands National Park (CHIS) Landbird Monitoring Program resources to obtain preliminary information about the loggerhead shrike subspecies (*Lanius ludovicianus anthonyi*) shrike population on Santa Rosa Island. Such a survey is a first step necessary for protection of this rare island endemic. The survey design was patterned after the proven methods used for the San Clemente Island shrike surveys (Lynn et al. 2004). The survey focus was on shrike breeding habitat, mostly canyons areas characterized by chaparral, woodland and coastal sage scrub. Priority survey areas were canyons and those vegetated by *Artemisia californica* (California sage), *Rhus integrifolia* (lemonade berry), *Prunus ilicifolia lyonii* (island cherry), *Quercus* sp. (oak) and *Heteromeles arbutifolia* (toyon). Surveys were conducted by one surveyor walking down canyons, carefully looking for shrikes. The surveys were done after morning landbird monitoring point counts were completed or after clearing of conditions that precluded regular monitoring. In addition, other Santa Rosa Island park staff members were requested to report date, location and activity of any shrike sightings. A total of 22 canyons were surveyed during the spring of 2006. The total survey area was approximately 64.5 square kilometers, or 30% of the island. Shrikes were observed in 19 of the 22 canyons monitored. The most common type of habitat where shrikes were observed was coastal scrub and *Baccharis* scrub. Of 58 total observations of shrikes, 27 were unique and 31 were possibly duplicate sightings of the same birds. From the unique sightings, we observed 37 adults (15 pairs), 3 fledglings, 28 juveniles, and 1 of an unknown age group. Of the 8 pairs of adults observed with fledglings and juveniles, the average fledglings/juveniles per pair were 1.75. The United States Geological Survey (USGS) has funded a more extensive survey for Santa Rosa and Santa Cruz Islands shrikes to be conducted in the spring of 2009 and 2010.\\

## **Acknowledgements**

We thank the many people who contributed to completion of this work: Kate Faulkner for her support to this program, Rocky Rudolph for his wonderful mapping skills, Paul Collins, Melissa Brooker, Linnea Hall and Doug Cooper for sharing their shrike knowledge, Ulysses Huerta for ongoing support to keep the information and communications equipment and software working, Doretta Burgess and dispatch staff for their unwavering logistics support and kindness; Diane Brooks, Dwight Wiley, Keith Duran and transportation staff for getting us there and back safely, Mark Senning, Earl Whetsell and island staff for their field logistical support and administration personnel for keeping the purchasing and other essential processes going to support us all. And last but not least, we thank the reviewers who took the time to make this a better publication.

## Introduction

In response to concern regarding the status of island loggerhead shrike subspecies (*Lanius ludovicianus anthonyi*), a subspecies which occur only in the Channel Islands, an information summary workshop was held at the University of California Geography Department at Los Angeles (UCLA) during October 2005. Information presented at the workshop cited from Eggert et al. (2004) demonstrated genetic uniqueness of the northern Channel Island loggerhead shrikes. A summary of the existing Channel Islands National Park Santa Rosa and Santa Cruz Islands loggerhead shrike population data (Collins, 2005) clearly demonstrated the lack of information available to determine the status of this species on the islands within Channel Islands National Park. Information is lacking on the status of shrikes prior to use of the islands for grazing, when the islands were in a native state.

The purpose of this project was to conduct a preliminary survey using existing CHIS Landbird Monitoring Program resources to obtain preliminary information about the loggerhead shrike population on Santa Rosa Island and to take the opportunity to be proactive regarding protection of this species in Channel Islands National Park. Concurrent with this initial survey, funding was requested from the United States Geological Survey (USGS) Biological Research Division (BRD) for a more thorough and extensive survey utilizing successful methodology implemented on San Clemente Island.

The island loggerhead shrike is currently considered a Bird Species of Special Concern by the California Department of Game and Fish (1992). The island loggerhead shrike is endemic to Santa Catalina, Anacapa, Santa Cruz, Santa Rosa, and San Miguel islands; Collins (2005) reports that numbers have declined on all breeding islands in recent years. *L. l. anthonyi* is a weakly differentiated race that can be easily distinguished from adjacent mainland shrikes and is closely allied with the San Clemente loggerhead shrike (*L. l. mearnsi*) (Collins 2005). The island loggerhead shrike occurs on the islands year round; the breeding season occurs between mid-February and late July (Collins 2005).

Collins (2005) reports that the status of island loggerhead shrikes has changed during the latter half of the 20<sup>th</sup> century. Island loggerhead shrikes bred historically on Santa Catalina, Anacapa, Santa Cruz, Santa Rosa and San Miguel islands but there are no records since the mid to late 1970s of shrikes breeding on San Miguel Island or on West Anacapa Island (Collins 2005). Important breeding and foraging habitat for shrikes has been degraded by vegetation stripping by alien grazers. Since there is no quantitative information on the number of shrikes on these islands prior to the introduction of alien grazing species, it is difficult to assess the degree of population decline (Collins 2005). Island loggerhead shrikes were considered fairly common and widespread breeding residents on Santa Rosa Island until the late 20<sup>th</sup> century (Collins 2005). Previous Santa Rosa Island shrike population estimates were given in non quantitative estimates. Shrikes were observed to be abundant by C. P. Streater in 1892 (unpubl. field notes, Collins 2005), and “much in evidence” by H. H. Sheldon in 1927 (unpubl. field notes, Collins 2005), Miller (1951) noted that they were “much more numerous” on Santa Rosa than on Santa Cruz, and in 1968 Diamond (unpubl. field notes, Collins 2005) observed small numbers of shrikes but noted that they were widespread and common. The CHIS landbird monitoring point counts conducted between 1994 and 2006 recorded an average of 1.75 shrikes per station, with shrikes observed at an average of 8.0% (16) of the 199 stations monitored (Channel Islands National Park Landbird Monitoring Data; 1993-2006). Today, shrikes on Santa Rosa Island are considered to be uncommon and locally distributed (Collins 2005).

Methodology utilized for this survey was shared with UCLA faculty and students so that what has been learned from work done on San Clemente Island could be utilized to have the best surveys possible utilizing existing resources. UCLA faculty and students have obtained some initial observations regarding the shrike population on Santa Cruz Island in the past and continued that effort in the spring of 2006 (Hicks 2006). The 2006 UCLA student survey (Hicks 2006) focused on sites where shrikes had been seen in the past, and used remote sensing methods to determine year round potential shrike grassland habitat that was accessible by road, but did not specifically survey breeding areas concentrated in canyons as shown to be a successful method of survey by the San Clemente shrike researchers (Lynn et al. 2004). Twelve shrikes were observed: pairs were seen at Chinese Harbor, Christy Beach, Del Norte Ranch, the valley Airstrip (two pairs), and single individuals were seen on the Potato Harbor Trail and at the end of Pozo Canyon (Hicks 2006).

In October 2006, Dr. Hartmut Walter, UCLA Geography Department professor, filed a petition with USFWS to list the island shrike as endangered. Dr. Walter subsequently withdrew his petition based on the plans to conduct more shrike surveys to for an estimation of shrike numbers. Dr. Walter (2006) estimated a total three island population of 45 to 85 individual shrikes. He estimated that there were 300 to 900 individual birds in the early 20<sup>th</sup> century. Dr. Walter reported that he saw 4.1 shrikes per year in his 1991 to 2004 casual surveys on Santa Cruz Island.

USFWS funded an initial survey on Santa Cruz Island during the spring of 2008. This project used three different survey methods to document shrikes: point counts, line transects and area counts, dependent on the number of observers conducting surveys. Location, habitat, and potential shrike predator information was recorded. Preliminary survey information and discussion with island staff were used to choose survey areas that were considered “good” shrike habitat. Twenty-two shrikes were detected. Area search surveys were the most productive, and further refinement of techniques was recommended. This study confirmed that shrikes are a rare resident on Santa Cruz Island. It was not feasible to survey the entire island, but shrikes observed did not appear to be randomly distributed on the island.

Research has been conducted on the San Clemente loggerhead shrike (*Lanius ludovicianus mearnsi*) for many years. This subspecies was listed as endangered in 1977 due to critically low population numbers, localized range, low productivity, predation pressure from exotic species and feral goat habitat degradation. In 1998 the population numbers fell to 14 individual birds (Juloa et al. 1997, Mader et al. 2000). Ongoing studies and management actions include captive breeding and release, spring and fall surveys, predator control, and habitat restoration. Previous studies have evaluated habitat and dietary requirements. Currently there are approximately 80 birds in the wild, and 60 birds in captivity. There is no recovery plan or goal for the desired number of wild established birds.

The ecological requirements of the island loggerhead shrike are likely similar to those of the intensively-studied San Clemente loggerhead shrike (Scott and Morrison 1990, Collins 2005). Loggerhead shrike habitat includes ecotones, bare ground, grasslands, and other open habitats with scattered shrubs and trees and sparse cover with suitable perches (Zeiner et al. 1990, Yosef 1996, Collins 2005). The basic habitat requirements for shrikes include elevated perches, roosting and nesting cover, open foraging areas, and invertebrate and small vertebrate prey. It is likely that island loggerhead shrikes are non-migratory, that males retain a year-round territory and that females maintain separate breeding and non-breeding territories (Blackford et al. 2001, Collins 2005). Shrikes on the Channel Islands are found in grassland and coastal sage scrub

habitats on terraces and brush-covered canyon slopes (Grinnell and Miller 1944, Miller 1951, Laughrin 1982, Jones 1991, Collins 2005).

Key nesting habitat parameters important to San Clemente Island shrikes include the extent of bare ground, number of perches, and height and amount of shrub cover (Scott and Morrison 1990, Mader and Warnock 1999, Mader et al. 2000, Collins 2005). Shrikes obtain escape cover, nesting substrates, and perches from shrubs and trees (Lynn et al. 2002). Shrike nests are generally well concealed below the crown in a densely foliated, <2m tall, shrub or tree such as lemonade berry (*Rhus integrifolia*), California sagebrush (*Artemisia californica*), Catalina cherry (*Prunus ilicifolia lyonii*), toyon (*Heteromeles arbutifolia*), blue elderberry (*Sambucus mexicana*), and oaks (*Quercus* sp. (Miller 1931, Bent 1950, Scott and Morrison 1990, Shuford 1993, Blackford et al. 2001, Collins 2005). Yosef (1996) observed that shrike pairs generally raise a single brood and can nest again following nest failure. Since island loggerhead shrikes have an extended breeding season, pairs can raise two broods in some years (Collins 2005)

Collins (2005) describes shrikes as efficient search-type predators; whose diet is more related to prey abundance, detectability, and size than to specific prey type. Scott and Morrison (1990) and Lynn et al. (2000) observed that San Clemente Island shrikes feed on a wide diversity of prey including a variety of ground-dwelling and aerial insects, small lizards, birds, and mice, snails, pillbugs, spiders and scorpions, centipedes, silverfish, and millipedes. Shrikes require open and semi-open habitats with scattered taller vegetation for foraging and search for prey from diverse perches of varied height above the ground.

Factors that threaten island loggerhead shrikes are likely to be similar to those affecting the mainland species *Lanius mearni* such as habitat degradation from overgrazing by exotic grazers, increased rates of predation on all life stages of shrikes by native island fox (*Urocyon littoralis*), common raven [*Corvus corax*], red-tailed hawk (*Buteo jamaicensis*) predators, reduction in prey availability for shrikes due to a proliferation of exotic annual grasses following feral herbivore removal and a reduction in available hunting perches due to feral grazers (Scott and Morrison 1990, Lynn et al. 2000, Cooper et al. 2001, Collins 2005). Mader et al. (2000) observed that productivity of San Clemente Island loggerhead shrikes may be affected by the pressure of predation and competition, severe weather, inbreeding, human disturbance, and/or nutritional imbalance due to low food availability or quality. Similar factors also may be affecting other island loggerhead shrikes. The small population size of Channel Islands loggerhead shrikes increases its vulnerability to extinction from factors such as environmental variation, catastrophes, demographic stochasticity, and/or decreasing genetic diversity (Collins 2005).

## Methods

The survey methods were based on those used for the San Clemente Island shrike surveys (Lynn et al. 2004). The survey focus was on shrike spring breeding habitat: canyons areas associated with chaparral, woodland and coastal sage scrub, and in particular canyon areas vegetated by *Artemisia californica* (California sage), *Rhus integrifolia* (lemonade berry), *Prunus ilicifolia lyonii* (island cherry), *Quercus* sp. (oak) and *Heteromeles arbutifolia* (toyon). Priority survey areas were canyons with year round water: Water, Quemada, Verde, Lobo, Arlington, and La Jolla Vieja. Other less wet canyons such as Windmill, Wreck, Pedragosa, Trancion, St. Augustine and Cherry were surveyed as time allowed.

Using the CHIS RM GIS system, survey transects were created (Figure 1) and GPS navigation points were set up to ensure that areas with suitable nesting vegetation were surveyed. The total area surveyed was estimated using GIS software to calculate area for portions of the canyons that were surveyed. In addition emphasis was placed on watching for shrikes while traveling around the island and while conducting morning spring breeding season landbird monitoring point counts, and making sure to include survey of areas where shrikes had been reported in the past.

Surveys were conducted by one surveyor walking down canyons, carefully looking for shrikes. Care was taken to avoid nesting disturbance. Notes were taken on shrike behavior and habitat where sightings were made. The surveys were done after morning landbird monitoring point counts were completed (usually from 10am to mid to late afternoon) or after clearing of conditions that precluded regular monitoring. This timing worked well since shrikes are generally most active between 11am and 3pm (Hall 2009, personal communication). In addition, other Santa Rosa Island park staff members were requested to report date, location and activity of any shrike sightings.

## Results

We surveyed 22 of the significant Santa Rosa Island canyons for a total survey area of approximately 64.5 square kilometers; or 30% of the island. Figure 1 depicts the canyons surveyed and notes the locations where shrikes were observed. Shrikes were observed in 19 of the 22 canyons monitored.

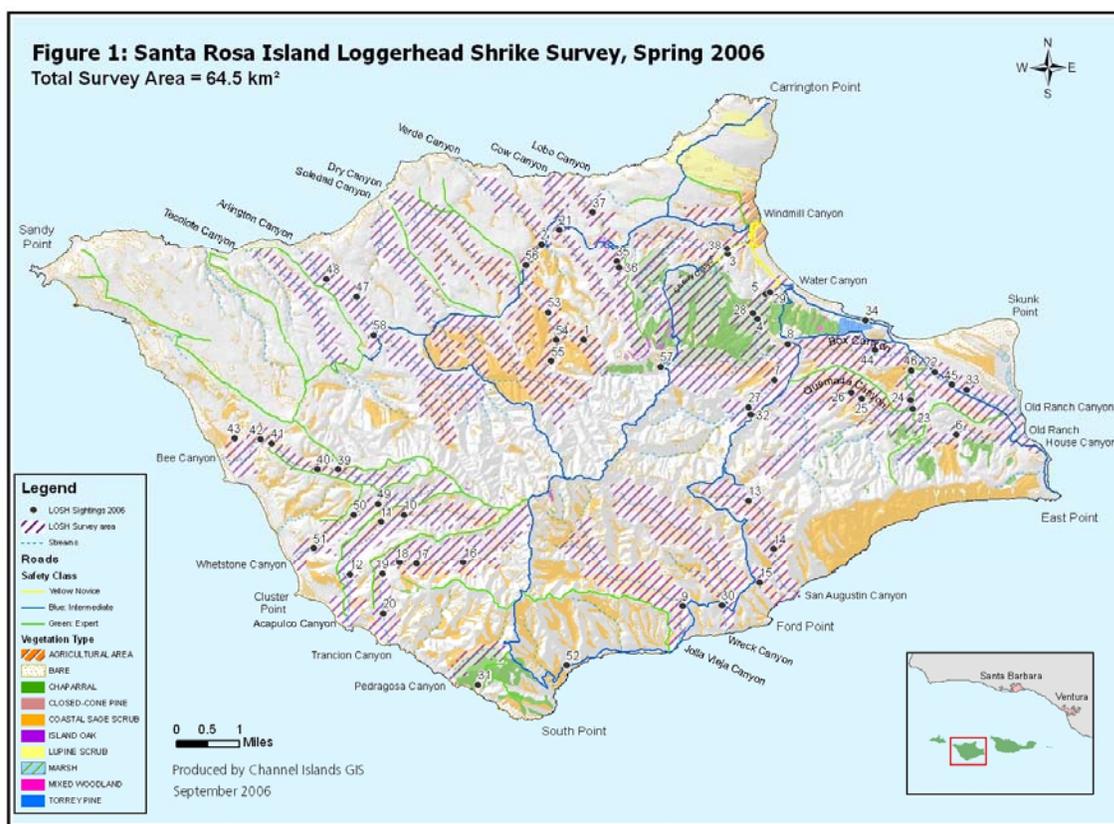
The most common type of habitat where shrikes were observed was coastal scrub and *Baccharis* scrub. Other types of habitat where shrikes were commonly observed included mixed woodland, riparian woodland, areas of scattered shrubs and trees and areas of bare rock/soil.

Of 58 total observations of shrikes, 27 were unique and 31 were possibly duplicate sightings of the same birds. From the unique sightings, we observed 37 adults (15 pairs), 3 fledglings, 28 juveniles, and 1 of an unknown age group. Of the 8 pairs of adults observed with fledglings and juveniles, the average fledglings/juveniles per pair were 1.75.

## Discussion

The overall shrike survey effort resulted in survey of all significant canyons on Santa Rosa Island and confirmed that shrikes are an uncommon resident on Santa Rosa Island. Suggestions for future survey would be that the survey is the primary objective and use a double count method with two observers. In addition, it would be beneficial to survey as much of the island as possible simultaneously or in a short time span such as is done on San Clemente Island. This type of survey is not currently feasible with Santa Rosa Island logistics and Park resources,

The landbird monitoring point count methodology does not adequately estimate populations of birds present in low numbers. Since the project was done over several months with one surveyor, it is possible that there were more shrikes on the islands than detected in this survey. Though the results showed low numbers of shrikes, the detection of 15 adult pairs in 22 canyons showed that there were more shrikes on the island than previously thought.



Management and research recommendations made by Collins (2005) focus on actions to enhance survival such as feral herbivore eradication, habitat restoration, and predator control. More specific recommendations made by Collins (2005) include creating a set of recovery goals based on knowledge gained by San Clemente Island shrike recovery success; assessing the status of shrike populations; enhancing shrike habitat by adding perches, decreasing exotic grasses, and creating more clearings; conducting field studies to fill missing aspects of life history; and conducting research to identify specific habitat requirements and supporting ecological conditions for this species.

More genetics research may result in information that will quantify the uniqueness of the island loggerhead shrike subspecies, and possibly determine the species' evolutionary history. NPS staff applied for and received a research grant to conduct the genetics research which is currently in process.

In response to concern regarding the status of the shrike population, USGS has funded surveys of Santa Rosa and Santa Cruz Islands shrikes in 2009 and 2010 as requested by NPS staff. The primary investigator, Thomas Stanley, is a biometrician at the Ft. Collins Colorado USGS Office, and will use the survey information to estimate population size for shrikes on both islands. Information gained from the 2006 Santa Rosa Island survey, the 2008 Santa Cruz Island survey, the continuing list of shrike sighting information, as well as San Clemente research techniques and results provide useful background information for defining the survey work which was initiated in the spring of 2009 and will be repeated in the spring of 2010.

*LOGGERHEAD SHRIKE SURVEY REPORT*

**Table 1. Locations of loggerhead shrikes recorded during spring 2006 survey on Santa Rosa Island. For age, A=adult, J=juvenile; F=fledgling, U=unknown age.**

| Obs. No.# | Date      | Unique Sighting | Age | Number | Canyon          | Habitat  |
|-----------|-----------|-----------------|-----|--------|-----------------|--|
| 1         | 4/25/2006 | No              | A   | 1      | Trap            | grass, mixed woodland  |
| 2         | 4/25/2006 | No              | A   | 2      | Trap/Verde      | Baccharis scrub  |
| 3         | 4/29/2006 | Yes             | A   | 2      | Cherry          | coastal scrub, riparian woodland                             |
| 4         | 4/30/2006 | No              | A   | 1      | Water           | mixed woodland, chaparral                                    |
| 5         | 4/30/2006 | No              | A   | 1      | Water           | grass, mixed woodland, coastal scrub                         |
| 6         | 5/12/2006 | Yes             | A   | 1      | Old Ranch House | grass, mixed woodland  |
| 7         | 5/13/2006 | No              | A   | 2      | Water           | Baccharis scrub, grass, riparian woodland                    |
| 8         | 5/13/2006 | No              | A   | 1      | Box/Water       | Baccharis scrub, coastal scrub, scattered shrubs/trees       |
| 9         | 5/25/2006 | Yes             | A   | 2      | La Jolla Vieja  | coastal scrub, riparian woodland                             |
| 9         | 5/25/2006 | Yes             | F   | 2      | La Jolla Vieja  | coastal scrub, riparian woodland                             |
| 10        | 5/26/2006 | Yes             | A   | 2      | Acapulco        | coastal scrub, bare soil rock, scattered shrubs/trees        |
| 11        | 5/26/2006 | No              | A   | 1      | Acapulco        | coastal scrub  |
| 12        | 5/26/2006 | Yes             | U   | 1      | Acapulco        | coastal scrub, bare soil rock, scattered shrubs/trees        |
| 13        | 5/27/2006 | No              | A   | 1      | San Augustin    | coastal scrub, grass, scattered shrubs/trees                 |
| 14        | 5/27/2006 | Yes             | A   | 2      | San Augustin    | mixed woodland, coastal scrub, Baccharis scrub               |
| 14        | 5/27/2006 | Yes             | J   | 2      | San Augustin    | mixed woodland, coastal scrub, Baccharis scrub               |
| 15        | 5/27/2006 | No              | A   | 1      | Dune            | grass, scattered shrubs/trees                                |
| 16        | 5/28/2006 | No              | A   | 1      | Trancion        | riparian woodland  |
| 17        | 5/28/2006 | No              | A   | 1      | Trancion        | mixed woodland, chaparral, grass, coastal scrub              |
| 18        | 5/28/2006 | No              | A   | 1      | Trancion        | mixed woodland, chaparral, grass, coastal scrub              |
| 19        | 5/28/2006 | Yes             | A   | 2      | Trancion        | coastal scrub, scattered shrubs/trees                        |
| 20        | 5/28/2006 | Yes             | A   | 2      | Trancion        | coastal scrub, scattered shrubs/trees                        |
| 21        | 6/8/2006  | Yes             | A   | 2      | Cow             | Baccharis scrub, coastal scrub grass, scattered shrubs/trees |
| 21        | 6/8/2006  | Yes             | J   | 1      | Cow             | Baccharis scrub, grass, scattered shrubs/ trees              |
| 22        | 6/9/2006  | Yes             | J   | 3      | Old Ranch       | Baccharis scrub, coastal scrub, bare soil/rock               |
| 23        | 6/9/2006  | No              | J   | 3      | Quemada         | Baccharis scrub, coastal scrub, scattered shrubs/trees       |
| 24        | 6/9/2006  | Yes             | A   | 1      | Quemada         | coastal scrub, Baccharis scrub, grass                        |
| 25        | 6/9/2006  | Yes             | A   | 2      | Quemada         | Baccharis scrub, mixed woodland, scattered shrubs/trees      |
| 26        | 6/9/2006  | No              | A   | 2      | Quemada         | Baccharis scrub, coastal scrub, grass                        |
| 27        | 6/9/2006  | Yes             | A   | 2      | Water           | Baccharis scrub, coastal scrub, scattered shrubs/trees       |
| 28        | 6/9/2006  | No              | A   | 2      | Water           | mixed woodland, chaparral                                    |
| 29        | 6/9/2006  | Yes             | J   | 2      | Water           | grass, mixed woodland, chaparral                             |
| 29        | 6/9/2006  | Yes             | A   | 1      | Water           | grass, mixed woodland, chaparral                             |
| 30        | 6/10/2006 | Yes             | J   | 2      | Wreck           | coastal scrub, grass, scattered shrubs/trees                 |
| 30        | 6/10/2006 | Yes             | A   | 1      | Wreck           | coastal scrub grass, scattered shrubs/trees                  |
| 31        | 6/11/2006 | Yes             | A   | 2      | South Point     | chaparral, mixed woodland                                    |
| 31        | 6/11/2006 | Yes             | J   | 3      | South Point     | chaparral, mixed woodland                                    |
| 32        | 6/12/2006 | No              | A   | 1      | Water           | grass, bare soil rock  |
| 33        | 6/20/2006 | No              | U   | 1      | Old Ranch       | Baccharis scrub, grass, bare soil/rock                       |
| 34        | 6/20/2006 | No              | J   | 1      | Torrey Pine     | Torrey pine, coastal bluff scrub                             |
| 34        | 6/20/2006 | No              | U   | 1      | Torrey Pine     | Torrey pine, coastal bluff scrub                             |
| 35        | 6/21/2006 | No              | A   | 1      | Lobo            | riparian woodland, coastal scrub                             |
| 36        | 6/21/2006 | Yes             | J   | 4      | Lobo            | riparian woodland, coastal scrub                             |
| 36        | 6/21/2006 | Yes             | A   | 2      | Lobo            | riparian woodland, coastal scrub                             |
| 37        | 6/21/2006 | No              | J   | 1      | Lobo            | riparian woodland, coastal scrub                             |
| 38        | 6/22/2006 | No              | A   | 1      | Cherry          | coastal scrub, riparian woodland                             |

| Obs. No.# | Date      | Unique Sighting | Age | Number | Canyon       | Habitat   |
|-----------|-----------|-----------------|-----|--------|--------------|---|
| 39        | 6/25/2006 | Yes             | J   | 1      | Bee          | coastal scrub, Baccharis scrub                            |
| 40        | 6/25/2006 | Yes             | A   | 1      | Bee          | coastal scrub, Baccharis scrub                            |
| 41        | 6/25/2006 | Yes             | A   | 2      | Bee          | bare soil/rock, coastal scrub                             |
| 41        | 6/25/2006 | No              | J   | 1      | Bee          | bare soil/rock, coastal scrub                             |
| 42        | 6/25/2006 | No              | J   | 1      | Bee          | bare soil/rock, coastal scrub                             |
| 42        | 6/25/2006 | No              | A   | 1      | Bee          | bare soil/rock, coastal scrub                             |
| 43        | 6/25/2006 | No              | A   | 1      | Bee          | bare soil/rock  |
| 44        | 6/26/2006 | No              | U   | 1      | Box          | Torrey pine, grass  |
| 45        | 7/4/2006  | No              | J   | 1      | Old Ranch    | Baccharis scrub, coastal scrub, bare soil/rock            |
| 46        | 7/4/2006  | No              | A   | 1      | Quemada      | riparian, Baccharis scrub, grass, scattered shrubs, trees |
| 47        | 7/5/2006  | Yes             | A   | 1      | Arlington    | coastal scrub, Baccharis scrub, bare soil/rock            |
| 48        | 7/5/2006  | Yes             | J   | 3      | Arlington    | coastal scrub, Baccharis scrub, bare soil/rock            |
| 48        | 7/5/2006  | Yes             | A   | 1      | Arlington    | coastal scrub, Baccharis scrub, bare soil/rock            |
| 49        | 7/6/2006  | No              | A   | 2      | Whetstone    | Baccharis scrub   |
| 50        | 7/6/2006  | Yes             | A   | 2      | Whetstone    | riparian woodland, coastal scrub, Baccharis scrub         |
| 50        | 7/6/2006  | Yes             | J   | 2      | Whetstone    | riparian woodland, coastal scrub, Baccharis scrub         |
| 50        | 7/6/2006  | Yes             | F   | 1      | Whetstone    | riparian woodland, coastal scrub, Baccharis scrub         |
| 51        | 7/6/2006  | Yes             | J   | 3      | Whetstone    | coastal scrub, scattered shrubs/trees                     |
| 52        | 7/6/2006  | No              | A   | 1      | Johnsons Lee | grass, Baccharis scrub                                    |
| 53        | 7/7/2006  | No              | J   | 1      | Trap         | Baccharis scrub, coastal scrub                            |
| 54        | 7/7/2006  | No              | A   | 2      | Trap         | Baccharis scrub, coastal scrub                            |
| 55        | 7/7/2006  | Yes             | A   | 2      | Trap         | Baccharis scrub, coastal scrub                            |
| 55        | 7/7/2006  | Yes             | J   | 1      | Trap         | Baccharis scrub, coastal scrub                            |
| 56        | 7/7/2006  | Yes             | J   | 1      | Trap         | coastal scrub, scattered shrubs/trees                     |
| 57        | 7/8/2006  | No              | J   | 1      | Lobo         | grass, Baccharis scrub                                    |
| 58        | 7/8/2006  | Yes             | A   | 2      | Arlington    | Baccharis scrub   |

## Literature Cited

- Bent, A. C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. Bulletin of the United States National Museum 197.
- Blackford, A.V., Couroux, C., Carlisle, H., Plissner, J., and Warnock, N. 2001. Breeding report: 2000 population monitoring of the loggerhead shrike on NALF, San Clemente Island, California, Department of Defense., U.S. Navy, Natural Resources Management Branch, Southwest Div., Nav. Fac. Eng. Command, San Diego, California.
- California Department of Fish and Game. 1992. Bird species of special concern. Unpublished list, July 1992, Calif. Dept. Fish & Game, 1416 Ninth St., Sacramento, CA 95814.
- Cooper, D. M., Kershner, E. L., Schmidt, G. A., and Garcelon, D. K. 2001. San Clemente loggerhead shrike predator research and management program – 2000. Final Report. U.S. Navy, Natural Resources Management Branch, Southwest Division Naval Facilities Engineering Command, San Diego, California. 136 pp.

- Eggert, L. S, Mundy, L.S., and Woodruff, D.S. 2004. Population structure of loggerhead shrikes in the California Channel Islands. *Molecular Ecology* 13: 2121-2133.
- Grinnell, J., and Miller, A. H. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* 27.
- Hall, Linnea S., 2009 Personal communication. Director, Western Foundation of Vertebrate Zoology, Camarillo, CA.
- Hicks, J. 2006. An initial census of the island loggerhead shrike (*Lanius ludovicianus anthonyi*). Unpublished report on file at headquarters, Channel Islands National park, Ventura, California.
- Jones, H. L. 1991. Annotated checklist of the birds of Santa Catalina Island and adjacent water. Unpublished report to the Santa Catalina Island Conservancy, Avalon, California.
- Jones, H. L., and Collins, P. W. In press. Birds of California's Channel Islands: their status and distribution. Santa Barbara Museum of Natural History, Santa Barbara, California.
- Juola F., Everett, W.T., and Koehler, C.E. 1997. Final report: 1996 population and habitat survey of the loggerhead shrike on NALF San Clemente Island, California. Department of Defense, U.S. Navy, Natural Resources Specialist Support Team, Southwest Division, Naval Facilities Engineering Command, San Diego, California.
- Laughrin, L. 1982. The vertebrates of Santa Cruz Island: Review, current status, and management recommendations. Unpublished report to The Nature Conservancy, Santa Cruz Island Preserve, Santa Barbara, California.
- Lynn, S., Martin, J. A., Cooper, D. M., Wakelee, K. M., Schmidt, G. A., and Garcelon, D. K. 2000. Research Efforts to Aid in the Recovery of the San Clemente Loggerhead Shrike – 1999, Final Report. Department of Defense, U.S. Navy, Natural Resources Management Branch, Southwest Div., Nav. Fac. Eng. Command, San Diego, California.
- Lynn, S., Cesh, L. S., Kershner, E., and Garcelon, D. K. 2002. Research efforts to aid in the recovery of the San Clemente loggerhead shrike – 2001. Unpublished Report. Department of Defense, U.S. Navy, Natural Resources Management Branch, Southwest Div., Nav. Fac. Eng. Command, San Diego, California.
- Lynn, S., B. L. Sullivan, H. A. Carlisle, N. A. Chartier, and N. Warnock. 2004. 2003 Population monitoring of the San Clemente loggerhead shrike on NALF, San Clemente Island, California. Unpublished report, Department of Defense, U.S. Navy, Environmental Department, Southwest Division, Naval Facilities Engineering Command, San Diego, California. 184pp + electronic appendices.
- Mader, T., Ostheimer, W., and Warnock, N. 2000. Final report: 1999 population monitoring of the loggerhead shrike on NALF, San Clemente Island, California. Unpublished report, Department of Defense, U.S. Navy, Natural Resources Management Branch, Southwest Div., Nav. Fac. Eng. Command, San Diego, California.
- Mader, T., and Warnock, N. 1999. Final Report: 1998 population monitoring of the Loggerhead Shrike on NALF, San Clemente Island, California. Unpublished report, Department of

Defense, U.S. Navy, Natural Resources Management Branch, Southwest Div., Nav. Fac.  
Eng. Command, San Diego, California.

- Miller, A. H. 1931. Systematic revision and natural history of the American shrikes (*Lanius*).  
University of California Publications in Zoology 38:11-242.
- Miller, A. H. 1951. A comparison of the avifauna of Santa Cruz and Santa Rosa Islands,  
California. Condor 53:117-123.
- Scott, T. A., and Morrison, M.L. 1990. Natural history and management of the San Clemente  
loggerhead shrike. Proceedings of the Western Foundation of Vertebrate Zoology 4:23-  
57.
- Sheldon, H. H. 1928. Santa Cruz Island mammal and bird report. Pp. 189-205 in A Step Back in  
Time: Unpublished Channel Islands Diaries (M. Daily, ed.), Santa Cruz Island Foundation  
Occasional Paper 4. Santa Cruz Island Foundation, Santa Barbara, California.
- Shuford, W. D. 1993. The Marin County breeding bird atlas: a distributional and natural history  
of coastal California birds. Avifauna Series #1. Bushtit Books, Bolinas, California.
- Walter, H. S. 2005. Extinction at our doorstep: What happened to the island loggerhead shrike?  
Western Tanager 71: 1-3.
- Walter, H. S. 2006. Petition to list the island loggerhead shrike (*Lanius ludovicianus anthonyi*  
Mearns 1898) as an endangered species. Submitted to U. S. Fish and Wildlife Service,  
Ventura, California.
- Yosef, R. 1996. Loggerhead shrike (*Lanius ludovicianus*), in The Birds of North America (A.  
Poole and F. Gill, eds.), no. 231. The Birds of North America, Inc., Philadelphia.
- Zeiner, D., Laudenslayer, W., Mayer, K., and White, M. 1990. California's wildlife. Volume II.  
Birds. California Department of Fish & Game, Sacramento, California.