



Photo: Abe Borker

Acoustic monitoring of Santa Cruz Rufous-Crowned Sparrow (*Aimophila ruficeps obscura*) on West Anacapa Island - 2011

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Executive Summary

The Santa Cruz Island Rufous-crowned Sparrow *Aimophila ruficeps obscura* is an endemic subspecies found only on Santa Cruz and Anacapa Islands in the Channel Islands National Park (California, USA). In 2002, a successful project was undertaken to remove non-native rats from Anacapa Island. The Rufous-crowned Sparrow (RCSP) was identified as a species at risk of un-intended mortality during the eradication through direct ingestion of rodenticide in the cereal-based bait pellets. Mitigation measures were carried out on West Anacapa Island (WAI) to create areas without exposed bait. Post eradication surveys suggested a decline in the RCSP population on WAI, but these surveys were conducted after the end of breeding season. In 2008, a day-long field survey for RCSP was conducted on WAI during the breeding season (Hamilton 2008). Two RCSP breeding pairs were observed in an area on the eastern side of WAI known as Cherry Canyon. Efforts to organize additional surveys were hampered by several factors, including the difficulty of landing field-crews on WAI, the potential harmful impacts that field-crews might cause to Brown Pelicans (*Pelecanus occidentalis*), and the elusiveness of RCSP.

This report summarizes the results of a pilot acoustic monitoring project designed to increase the spatial and temporal scale of surveys for RCSP while minimizing impacts to pelicans breeding on WAI. Specifically, we deployed 12 passive acoustic sensors programmed to record ambient acoustic activity at dawn during the entire 2011 breeding season.

Seven RCSP individuals were detected across the island by field crews deploying sensors on 29-30 March, 2011. Analysis of over 1,000 hours of recordings from acoustic sensors on WAI, however, detected only four songs, likely from one individual. Despite the potential advantages offered by automated sensors, clear technical hurdles prevent detection of RCSP songs against a complex background of bird songs in the dawn chorus. Although a challenge for any species, the spectral qualities of RCSP song make them especially difficult to detect compared to some other species present on the island (i.e. Bewick's Wren, Orange-crowned Warbler, Spotted Towhee, Chipping Sparrow, Song Sparrow, and others). Acoustic data obtained opportunistically from Santa Cruz Island in 2012 suggest that acoustic surveys in the late afternoon may be a more effective sampling period for RCSP, either because the species is more active and/or because there are less songs from other species present.

Introduction

In 2002, the American Trader Trustee Council (AT Council), National Park Service (NPS), and Island Conservation implemented a successful rat eradication on Anacapa Island (Howald, et al. 2010). The removal of black rats (*Rattus rattus*) was carried out to benefit native species threatened by this invasive mammalian predator including seabirds like Scripps's Murrelet (*Synthliboramphus scrippsi*, formerly Xantus's Murrelet), the endemic Anacapa deer mouse (*Peromyscus maniculatus anacapae*), native landbirds, reptiles, and plants. The eradication was accomplished with an aerial broadcast of granular pellets containing brodifacoum, an anticoagulant rodenticide toxin. Several native vertebrate species were expected to face a possible non-target primary poisoning threat by ingesting rodenticide bait (native mice and granivorous birds), or secondary poisoning through ingestion of other animals that had ingested the toxicant (raptors).

Mitigation programs were designed to reduce these non-target impacts. Specifically, native deer mice were taken into captivity from each of the three islets (East, Middle, and West Anacapa), and released after the eradication. Raptors were captured and moved off of the island during the eradication to prevent secondary poisoning. Finally, a 15-hectare no-bait zone was established on West Anacapa island in an attempt to provide a safe harbor for the Santa Cruz Island Rufous-crowned Sparrow (*Aimophila ruficeps obscura*), a granivorous landbird endemic to Anacapa and Santa Cruz Islands. Determining the status of the RCSP on West Anacapa Island (WAI) is a post-project priority for the America Trader Council and NPS. In addition, because the RCSP is a Species of Special Concern in California, it is important to gain a better understanding of the breeding range of this species within the Channel Islands National Park (Collins 2008). Three factors have complicated efforts to gather more quantitative data on the status of RCSP on WAI:

1. The island is an important breeding colony for California Brown Pelicans (*Pelecanus occidentalis*), a species that is particularly susceptible to disturbance by human activity near nesting sites. Detrimental impacts from human disturbance are most probable during incubation and the first 3 weeks of chick rearing, when eggs/chicks are exposed to the elements and predators when adults are flushed from the nest. Though pelicans have a variable breeding season, the critical incubation and early chick rearing stages of the breeding season typically overlap with periods when RCSP are most active (Apr – Aug).
2. RCSP are relatively secretive sparrows. Males defend territories year-round and are vocal during the breeding season but the species is notoriously elusive and can easily be missed during traditional transect or point count surveys (Collins 1999, 2008).

3. Access to West Anacapa is logistically challenging and weather dependent, further complicating the ability of field-crews to conduct intensive surveys in appropriate RCSP habitat.

This project was designed to test the use of automated acoustic sensors, a technology which can vastly increase the spatial and temporal scale of wildlife surveys while eliminating disturbance, and minimizing logistical hassles. Specifically, the primary goals of this project were to:

1. determine the presence of RCSP at 12 survey points by detecting songs on acoustic recordings,
2. document the number of days/weeks of RCSP acoustic activity during the breeding season, and
3. test the effectiveness of a wireless system to monitor the relative abundance of RCSP and other species of interest on WAI and other islands in the Channel Islands National Park.

Automated acoustic sensors for ecological monitoring

Acoustic cues have long been an important part of bird monitoring projects (Sauer et al. 1994). Recent innovations now make it possible to deploy weatherproof acoustic sensors that can reliably sample the ambient acoustic environment over long-periods of time (months). Hundreds of hours of field recordings can then be processed with pattern recognition software to derive measures of acoustic activity rates by species of interest. Passive acoustic sensors and automated call detections are thus a tool that can facilitate monitoring programs for rare/elusive species in remote locations (Acevedo et al. 2006, Agranat 2007, Brandes 2008a, Brandes 2008b).

To date, passive acoustic sensors have been deployed to search for rare bird species (e.g. Ivory-billed Woodpeckers; Swiston et al. 2009), to monitor the presence and abundance of secretive land mammals (e.g. elephants in African rainforests; Thompson et al. 2010), and to document the movement of songbirds and bats during migration (Farnsworth et al. 2004, Farnsworth and Russell 2007; Kunz et al. 2007). Most relevantly, acoustic sensors can be an effective tool for monitoring endangered songbirds (e.g., Black-capped Vireo *Vireo atricapilla*, and Golden-cheeked Warbler *Dendroica chrysoparia* in Texas) (Clark and Fristrup, 1999). The Coastal Conservation and Action lab at U.C. Santa Cruz uses these sensors to monitor bird populations before and after ecological restoration projects in remote locations (including Rat Island AK, Desecheo I. PR, South East Farallon Island, Palmyra Atoll, and 3 seabird colonies in Chile; McKown 2009, McKown et al. 2012). By decreasing costs and logistical constraints and increasing sampling effort and statistical power, Automated sensors are helping to provide rigorous metrics of the success of management actions, a key step for improving conservation efforts (Sutherland et al. 2004)

Existing sensor models can record for 3-6 months, a period that would allow equipment to be installed before the pelicans begin to breed, but still encompass periods of breeding activity by RCSP. In addition, new sensor models can extend deployment periods and telemeter data to the mainland for analysis in real time (*see below*).

Methods

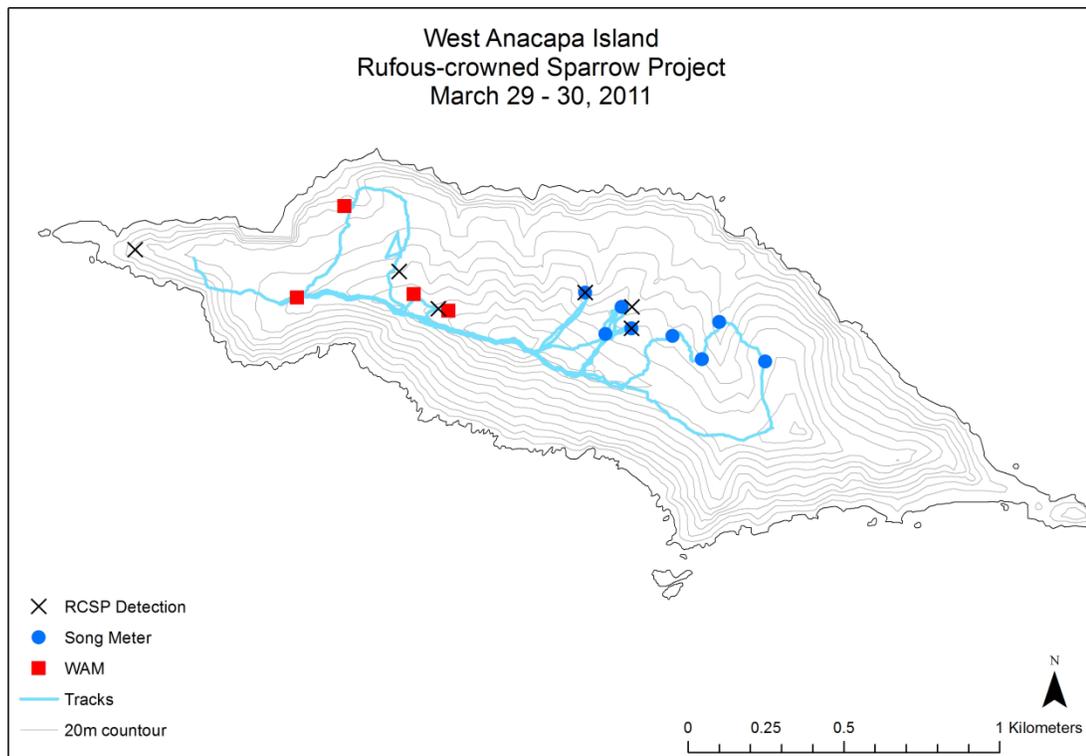
Survey Sites

Acoustic sensors were deployed and retrieved by a team from U.C. Santa Cruz accompanied and assisted by staff from the Channel Islands National Park and Montrose Settlement Restoration Project. A total of 12 acoustic survey sites were selected by field crews based on locations of previous RCSP sightings, habitat characteristics preferred by RCSP (slopes with *Coreopsis gigantea*, *Artemisia californica*, *Dudleya caespitosa*, *Lycium californicum*, Collins 1999; Hamilton 2008), and based on detections of RCSP individuals responding aggressively to conspecific recordings broadcast in the field (Table 1, Figure 1). Acoustic sensors were deployed on 29-30 March and recovered on 27 September, 2011.

Table 1 Acoustic survey points and observations of RCSP at deployment.

<i>Survey Point</i>	<i>Sensor Type</i>	<i>Latitude</i>	<i>Longitude</i>	<i>RCSP Detected by field observers</i>
SM17	Song Meter	34.01056	-119.42068	0
SM24	Song Meter	34.01165	-119.42012	0
SM34	Song Meter	34.01121	-119.42173	0
SM58	Song Meter	34.01054	-119.41849	0
SM59	Song Meter	34.0114	-119.42316	1
SM60	Song Meter	34.01202	-119.42351	1
SM61	Song Meter	34.01241	-119.42479	1
SM62	Song Meter	34.01122	-119.42405	0
WAM8	WAM	34.01207	-119.4348	0
WAM9	WAM	34.01225	-119.43075	0
WAM10	WAM	34.01179	-119.42953	1
WAM11	WAM	34.01475	-119.43323	0
Between points	-	<u>34.01289</u>	<u>-119.43127</u>	1
Between points	-	<u>34.01334</u>	<u>-119.44046</u>	2
Total				7

Figure 1 Map of acoustic survey point locations and Rufous-crowned Sparrow observations on West Anacapa Island (X's).



Brown Pelicans

As in previous surveys on WAI, one of the primary challenges was the presence of breeding Brown Pelicans throughout the island. To prevent Brown Pelican disturbance, field crews crawled on hands and knees near pelican breeding areas when traveling between the campsite and survey sites on the eastern end of the island. These pelican colonies were traversed only twice per day and only as a complete group (all seven individuals).

Acoustic sensor hardware

A total of 12 acoustic sensors were deployed on WAI. Of these, 8 were Song Meter-2 acoustic sensors, while 4 were prototype wireless acoustic monitoring systems.

Song Meter 2 (SM2s) sensors (www.wildlifeacoustics.com) are single-board computers enclosed in a weatherproof housing and powered by four internal D-cell alkaline batteries. SM2s were deployed with one 32 GB SD memory card to store all field recordings. Sensors were fitted with a single SMX-II omni-directional microphone (Wildlife Acoustics, Inc.) recording on the left channel at a sampling rate of 22 kHz. Sound files were stored as uncompressed “.wav” files.

All sensors are designed to record ambient acoustic activity and do not emit any sounds.

The wireless acoustic monitoring system (WAMs) is a passive acoustic sensor that uses modified Android cellular handsets to record and then telemeter data and status reports from remote field sites. WAMs are powered by an internal lead acid battery that is recharged with an external 10W solar panel. Phones were equipped with a 32 GB microSD memory card for back-up of sound files that could not be telemetered. For this project, WAMs were fitted with the same SMX-II omnidirectional microphone (Wildlife Acoustics, Inc.), and programmed to record “wav” files at a sampling rate of 22 kHz. Sufficient cellular coverage was only available at 2 deployment locations and only at relatively low-bandwidths (connection speeds). The 2 WAMs deployed at sites without cellular coverage were programmed to act as data-loggers.

Recording Schedules

Acoustic sensors were programmed to record samples of the ambient acoustic environment during the dawn chorus on West Anacapa Island. Previous research on RCSP singing behavior suggested that RCSP sing throughout the day, with peaks at dawn and at dusk (Collins 1999). However, these studies also reported that individuals sing fewer song bouts per hour as the day progresses. We decided to concentrate recordings at dawn – a peak activity period with long song bouts - to increase the probability of detecting RCSP songs. We could not record both at dawn and dusk without reducing the overall survey effort below the 90-100 day target. Acoustic data collected on Santa Cruz Island after this study, however, suggest that afternoon recordings may actually increase RCSP detectability (*see Results*).

Song Meters were programmed using the SMCONFIG program (Version 2.2.4 Wildlife Acoustics, Inc.) to record 1 minute of every 5 minutes (i.e. 12 recordings per hour) for a 4-hour period starting 30 minutes before local sunrise. This recording schedule was estimated to provide ~90 days in the field before needing fresh batteries (actual battery-life exceeded this estimate, see Table 2).

WAMs were programmed to record 1 minute of every 5 minutes for 5 hours starting at 5:00. Units were also programmed to record 1 minute of every 10 minutes from midnight to 01:00 to look for signs of seabird activity.

Estimated sampling area

It is challenging to characterize the sampling area of acoustic surveys. The active space of acoustic signals depends on a number of factors such as the amplitude of the sound of interest, the spectral qualities of the sound, distance and elevation of sound source, the amplitude of biotic/abiotic background noise near the microphone, wind, meteorological conditions, habitat structure, and other physical features of the survey site (Brenowitz 1982, Wiley and Richards 1978). These same factors will influence human observers as well as the effective area of RCSP and vocalizations.

Playback experiments at the Long Marine Lab at UCSC suggest that songbird calls (Winter Wren, *Troglodytes hiemalis*) are regularly detected at 50m in calm wind conditions. For this project we assumed an average effective monitoring radius was (~0.8 of a hectare) and kept sensors at least 100m apart to minimize potential sampling overlap.

One of the primary advantages of automated sensors is that they can sample continuously for long periods of time thereby recording under good, bad, and intermediate recording conditions. Assuming regular acoustic activity at breeding sites, the continuous survey effort of automated sensors can greatly improve the probability of detecting events at surveys sites, and generate more accurate estimates of mean calling activity rates than traditional auditory surveys.

Automated call detection

Automated analysis of all field recordings from West Anacapa Island was carried out with the eXtensible BioAcoustic Tool (XBAT, <http://www.xbat.org>), a bioacoustic analysis software package for Matlab that includes algorithms for detecting sounds of interest on acoustic recordings. Specifically, we used an image processing technique known as spectrogram cross correlation to detect and classify sounds on our field recordings that were correlated with the spectral qualities of RCSP song elements (Mellinger & Clark 2000). We manually reviewed all events detected during the analysis process to confirm true calls and/or remove all sounds misidentified as RCSP vocalizations.

Our primary automated search templates included exemplars of RCSP song elements copied from recordings downloaded from the Macaulay Library at the Cornell Lab of Ornithology (MLS#125296, Sander, 1986 and MLS#120403, Keller, 2002), as well as RCSP recordings from the Bird Songs of California CD (Vol. 3, Track 30; Geoff Keller and Cornell Lab of Ornithology).

Results

Field Observations

The field crew spent a total of 8 hours searching for RCSP while deploying sensors on WAI on 29 and 30 March. The team split into two groups and collectively covered 12.9 km over both days (See tracks in Figure 1).

A total of 7 RCSP individuals were detected on the island (Figure 1 and Appendix A). Five of these observations were RCSP individuals responding to audio broadcasts of RCSP songs played in areas of likely habitat (rocky/brushy slopes) using hand-held Radio-Shack speakers and MP3 players. A pair of RCSPs were observed on the west end of the island as field crews were descending to the boat landing.

A number of other species were observed by field crews including a nesting pair of Bald Eagles (*Haliaeetus leucocephalus*, Figure 6), a Barn Owl (*Tyto alba*) as well as other raptors and songbirds (Appendix B).

Acoustic Monitoring Effort

The automated sensors recorded a total of 1,078 hours during the survey period (Table 2). The 8 Song Meter-2 units recorded as programmed without any loss of data. The two WAM prototypes deployed in sites with cellphone coverage recorded and transmitted data throughout the survey period (WAM9 and WAM10). WAM8 and WAM11 both had insufficient power to record; the 10W solar panel was too small to power the units in the partly shady conditions at their deployment sites. WAM9 had some intermittent loses of power, but managed to record and transmit data from 77% of the 148 survey days (Table 2).

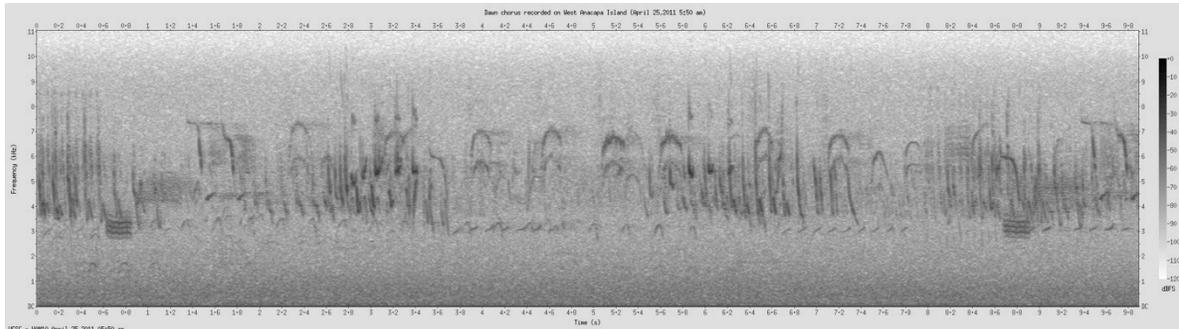
Table 2 Total acoustic survey effort, hours analyzed manually, and RCSP detected.

<i>Survey Point</i>	<i>Total Recording Effort (Hours)</i>	<i>Total Recording Effort (Days)</i>	<i>Hours Analyzed Manually</i>	<i>Mornings Analyzed Manually</i>	<i>RCSP Songs Detected</i>
<i>SM17</i>	106	148	35	50	0
<i>SM24</i>	106	148	35	50	0
<i>SM34</i>	106	148	35	50	0
<i>SM58</i>	106	148	35	50	0
<i>SM59</i>	106	148	35	50	0
<i>SM60</i>	106	148	35	50	0
<i>SM61</i>	106	148	35	50	4
<i>SM62</i>	106	148	35	50	0
<i>WAM08</i>	3	2	0	0	0
<i>WAM09</i>	85	114	50	50	0
<i>WAM10</i>	142	131	50	50	0
<i>WAM11</i>	0	0	0	0	0
TOTAL	1078	1431	380	500	4

Automated call detection

We analyzed the entire dataset (1078 hours) with three 3 different RCSP automated search templates. The computer algorithm flagged over 23,000 sounds as potential RCSP songs, none of which were actual RCSP songs. The complexity of the West Anacapa Island soundscape at dawn, which included songs from multiple individuals of multiple species, complicated the accuracy of the automated detectors (Figure 2).

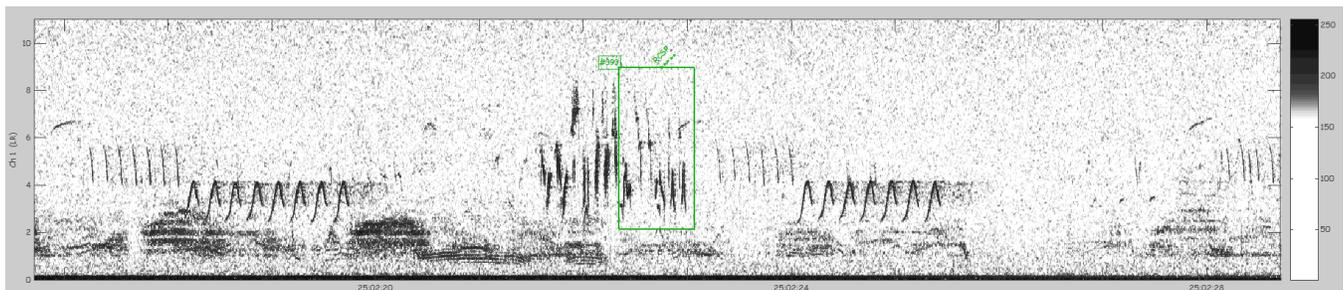
Figure 2 Spectrogram showing complexity of dawn chorus on West Anacapa Island, with multiple individuals of multiple species singing at once (recorded by WAM 10 on April 25, 2011 (05:55)).



Manual review of recordings

To check the validity of the automated results we manually reviewed recordings from 50 randomly selected mornings at each location made in April, May, and June (500 total mornings, 380 hrs). Human auditors detected only 4 RCSP songs at survey site SM61 on May 5, 2011 (Figure 3). All 4 songs are likely from the same individual because of their similarity, even spacing, and presence on the same minute-long recording. Review of additional recordings from this site did not detect any additional songs.

Figure 3 Spectrogram of a Rufous-crowned Sparrow song detected (green box) on a recording from West Anacapa Island on May 05, 2011 (08:55).



We confirmed the identification of the RCSP songs recorded on WAI with 3 outside experts by sending a compilation of these recordings, as well as an exemplar of RCSP song from the Bird Songs of California CD (file submitted electronically with this report).

Recordings of RCSP obtained from Santa Cruz Island

In April 2012, we took the opportunity to obtain Song Meter recordings in areas of RCSP habitat on Santa Cruz Island (during a UCSC field course). We programmed these sensors to record 2-hour blocks at dawn and also added 2-hour afternoon/evening blocks and recorded over three days. Automated analysis of

these recordings detected 5 RCSP songs at one site (Using the same automated search template used on WAI recordings). Manual review of the Santa Cruz Island recordings detected a further 19 RCSP songs at the site (24 total songs over 2 days). Interestingly, 22 of the 24 songs detected were recorded during the afternoon/evening block (earliest = 18:59 or ~1 hour before sunset, latest = 19:13 or ~45 minutes before local sunset).

Conclusion

It is clear that the automated acoustic survey approach for RCSP is currently not as effective as human observers with playback equipment. Two field surveys using the latter method have observed Rufous-crowned Sparrows on West Anacapa Island in recent years (2008 and this survey). Our intensive acoustic survey only detected 4 songs on over 1,000 hrs of recordings made during the 2011 breeding season. Although RCSP are notoriously elusive species to detect (Collins 1999), the lack of RCSP detections is puzzling.

RCSP are clearly present on WAI during the breeding season. Field crews detected RCSP at 6 locations on WAI at the start of the breeding season, and 5 of these individuals responded aggressively to conspecific songs. While the dawn chorus is a challenging acoustic environment for automated detection software, the songs of other species (Bewick's Wren, Orange-crowned Warbler, Chipping-Sparrow and others) were clearly detected on recordings by automated detectors and human observers. At least 3 factors may help to explain the lack of RCSP songs detected on the WAI acoustic recorders:

- 1) RCSP are present in low densities on WAI;
- 2) RCSP songs were completely masked by the songs of other species during the dawn chorus, and/or
- 3) RCSP are more acoustically active outside of the dawn chorus period recorded for this study.

We feel a combination of all three factors best explain the results of this study. Recordings obtained opportunistically from RCSP habitat on Santa Cruz Island in 2012 strongly suggest that RCSP are quite active in the late afternoon. Furthermore, these songs are more easily detected by automated detectors and human observers in the quieter evening period. Although the 2012 survey effort on Santa Cruz was limited, the results are compelling and suggest that the choice to focus the WAI recordings to samples at dawn seems likely to have reduced the overall effectiveness of this acoustic survey. Again, the choice to focus on dawn was based on previous studies of RCSP singing activity (Collins, 1999) and an effort to extend the overall survey period to 90+ days. We recommend that future acoustic surveys for songbirds in the Channel Islands National Park be programmed to record long blocks during peak and off-peak activity periods. The use of solar powered wireless sensors, such as the WAMs prototypes used in this study, could facilitate this by

allowing for longer deployment periods. In addition, the ability to telemeter data and to remotely re-program the devices (in latest prototypes) could allow researchers to test different recording periods until an optimum monitoring hour is detected.

Given the current state of knowledge about the density of RCSP on West Anacapa Island, it would be useful to conduct further human surveys. In our view, a 3-day survey of the island with 6 individuals and playback equipment could better establish the density of territories on the island. Confirming the presence of RCSP through the entire breeding season, however, will likely be difficult to accomplish with human observers alone. A follow up acoustic surveys on West Anacapa Island, and at control sites on Santa Cruz Island, could complement a more intensive human survey effort.

In summary, two post-eradication surveys clearly show that RCSP are present on WAI. Automated acoustic surveys failed to increase our understanding of the status of RCSP on the island beyond the initial observations when sensors were deployed. Modifying the time of recordings and incorporating a control site on Santa Cruz Island may make automated acoustic monitoring of RCSP on WAI a viable monitoring tool.

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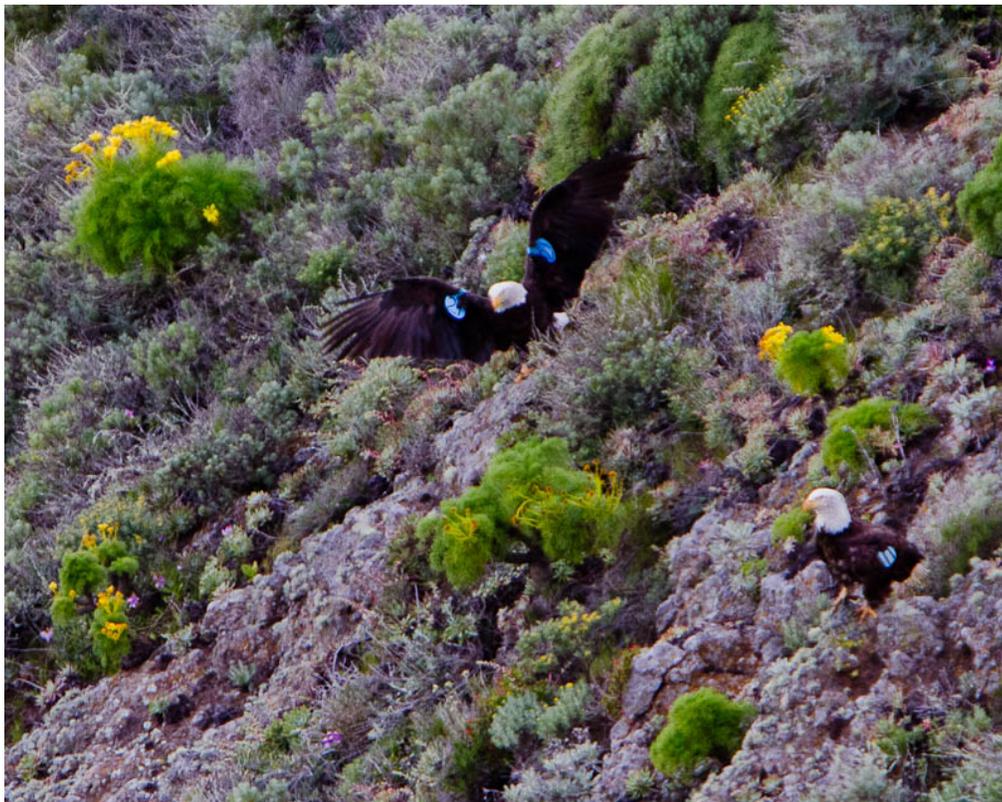
Figure 4 Wireless acoustic sensor (brown box lower right) deployed on West Anacapa



Figure 5 Song Meter 2 acoustic sensor (green box on lower right) deployed on West Anacapa



Figure 6 Nesting pair of Bald Eagles (#11 and # 21) observed on West Anacapa



Appendix A - RCSP Observation Details

Acoustic detections

March 29th, 2010

Time: 16:25-16:45

Location: Lat. 34.01140° / Long. -119.42316°

Observer: Dena Spatz

Deploying SM 59 and conducting playbacks. Facing east at top of small canyon between East Interior Bluff and Middle Interior Bluff. Abe Borker and Emma Bishop were visible to the east. Playback called-in RCSP. RCSP within 100m on other side of the narrow canyon. Rocky outcrop habitat with thick *Coreopsis* to the north. Borker and Bishop also conducting playback around same time but RCSP vocalizations we heard were much closer. Site revisited next morning @0830-0840 and no RCSPs vocalized after playback.

Time: 17:00-17:15

Location: Lat. 34.01202° / Long. -119.42351°

Observer: Dena Spatz

Deploying SM 60 and conducting playbacks on the east slope facing west towards the top of the canyon. BRPE colony ~200 meters down-slope on both sides of canyon. SongMeter placed and playbacks conducted on rocky-outcrop out of sight from BRPE colonies. Good RCSP habitat on both sides of canyon. RCSP heard responding with song from southwest. Returned next morning @8:50-9:00 and conducted playbacks. No RCSPs vocalized after playback.

Time: 17:50-18:10

Location: Lat. 34.01241° / Long. -119.42480°

Observer: Dena Spatz

Started playbacks ~70m north of SM61 location before placing song meter on slope. Conducted playbacks while walking down terrace, "W.Interior Bluff". Shrubby habitat with rocky surface on terrace and shrubby/rocky habitat on canyon slope. Conducted playbacks and heard RCSP response down slope to our NW. Walked towards where RCSP response was coming from (on eastern slope) and deployed SM 61. BRPE colony ~200 meters down-slope. Visible caves on both sides of slope and lots of rocky outcrops in this canyon.

March 30th, 2010

Time 08:45-8:50

Location: Lat. 34.012890° / Long. -119.431272°

Observer: Abe Borker

Emma Bishop and Abe sat down for a snack break while climbing the steep canyon. We had conducted RCSP song broadcast for approximately 4-5 minutes when a RCSP responded from across the canyon with characteristic song. Other species present and singing included Orange-crowned Warbler (OCWA), Chipping Sparrow

(CHSP), Song Sparrow (SOSP). Despite approximately 10 minutes of intermittent playback, the RCSP never showed itself, sang about 5 times remaining more than 25m away.

Time 09:45-10:10

Location: Lat. 34.011840° / Long. -119.429880°

Observer: Abe Borker

At 9:45 Emma Bishop and Abe were waiting in Oak Canyon to rendezvous with the other team. After audio playback, an RCSP responded from across the canyon within 30 seconds. I attempted to draw the bird closer for the next 25 minutes with intermittent playback, but the bird remained over 25m away. The bird continued singing for about half an hour, dozens of times. Other birds present and calling included CHSP, Bewick's Wren (BEWR), OCWA.

Time: 15:00

Location: Lat. 34.013340° / Long. -119.440463°

Observer: Abe Borker

At approximately 3pm Abe was traversing the saddle on the west end, with Dirk Rodriguez carrying gear from the terrace down to the boat landing. I had no camera, and no binoculars, each of us were carrying heavy packs on steep slopes. Two RCSP were observed during the descent, individuals were 10m away perched on a bare stick close to the ground for approximately 7 seconds and then flew past within 7m. When perched, the **rufous crowns** on both individuals were initially apparent to both of us. One bird had a **dusky breast than a Chipping Sparrow (CHSP)**, and **lacked a prominent white eye-stripe** (also a CHSP characteristic). **Faint white eye-ring** observed without the need of any optics for magnification. When the birds flew one clearly had a **rounded tail** (distinctly separating this species from CHSP).

Appendix B- List of Species Observed

Landbird Species List	# Observed
Bald Eagle*	2
Sharp-shinned Hawk	1
Red-tailed Hawk	1
Peregrine Falcon	2
<i>Selasphorus</i> Hummingbird (Rufous/Allen's)	Common
Northern Flicker (Red-shafted)	1
Say's Phoebe	1
Common Raven	2
Rock Wren	1
Bewick's Wren	Common
Ruby-crowned Kinglet	1
Orange-crowned Warbler	Common
Yellow-rumped Warbler	5
<u>Rufous-crowned Sparrow***</u>	<u>7</u>
Chipping Sparrow	Common
Song Sparrow**	Common
White-crowned Sparrow	6
Bullock's Oriole	1
House Finch	12
Barn Owl	1

* Bald Eagles with blue wingtags, #11 and #21 were observed on March 30th. Cedrick Villasenor documented and photographed a nest low to the ground in a Toyon amongst Channel Island Oaks in "Oak Canyon". Approximate location is Lat 34.013619° / Long -119.430107°. Contact Cedrick for details.

** Song Sparrows were observed carrying food items

*** Detailed observation accounts above

Other birds observed: Black Oystercatcher, Brandt's Cormorant, Brown Pelican, Pelagic Cormorant, Western Gull, Double-Crested Cormorant

Mammals and Reptiles Observed: Anacapa Deer Mouse, Common Side-blotched Lizard, Southern Alligator Lizard

Offshore Mammals Observed: Common Dolphin Spp., Gray Whale, California Sea Lion, Harbor Seal

Appendix C – Electronic File Submitted With Report

An audio file (RCSP_from_MLS_and3_fromWAI.wav) was submitted with the original copy of this report. The recording begins with one Rufous-crowned Sparrow song copied from the “Bird Songs of California” CD (Vol. 3, Track 30; Geoff Keller and Cornell Lab of Ornithology). This is then followed by 3 RCSP songs recorded at the SM61 survey site on WAI.