



Landbird Monitoring 2016 Annual Report

Channel Islands National Park

Natural Resource Report NPS/MEDN/NRR—2017/1546



ON THE COVER

Rock Wren (*Salpinctes obsoletus*) on the Channel Islands. Photo by Andrew Yamagiwa with permission.

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Executive Summary

Channel Islands National Park has monitored landbirds as part of their long-term ecological monitoring program since 1993. The program seeks to determine the long-term trends in species composition, distribution and abundance of both native and nonnative landbird species on the islands.

For the 2016 monitoring year, a total of 9 line transects (3 on Santa Barbara Island, 1 on East Anacapa Island, and 5 on San Miguel Island) and 338 out of 346 point count sites (33 on Santa Barbara Island, 8 on Anacapa Island, 112 of 120 on Santa Cruz Island, 145 on Santa Rosa Island, and 40 on San Miguel Island) were counted using distance-based sampling methods by staff with the Western Foundation of Vertebrate Zoology. All data were entered into the park's landbird monitoring database and subsequently verified, validated and certified. Data summaries were generated in Program R.

In 2016, 64 landbird species were counted, with the 10 most commonly detected landbirds parkwide being, in descending order, Spotted Towhee, Song Sparrow, Western Meadowlark, Orange-crowned Warbler, Horned Lark, Bewick's Wren, White-crowned Sparrow, House Finch, Common Raven, and Chipping Sparrow. Birds exhibiting decreased detections were Song Sparrow and Western Meadowlark on Anacapa Island, and Allen's Hummingbird on Santa Cruz Island. Species exhibiting increased detections were Rock Wren (on Anacapa and Santa Barbara), White-crowned Sparrow (on Anacapa, Santa Barbara, Santa Cruz, and San Miguel); Horned Lark (on Santa Barbara); House Finch, Orange-crowned Warbler, and Rufous-crowned Sparrow (on Santa Cruz); Spotted Towhee (on Santa Cruz and Santa Rosa); and Song Sparrow and Western Meadowlark (on Santa Rosa).

Species richness graphs were summarized for each island. These graphs can be used to determine whether species are appearing on or disappearing from the islands, however, these results must be interpreted with caution since the present evaluation only relied on a simple assessment of detections. Trends in bird numbers are better revealed by analyses of densities, such as through distance analyses (i.e., Coonan et al. 2015, Coonan et al. 2011b) to account for differences in detection rates.

Notable findings on each island for 2016 were:

1. Anacapa Island: 24 species have been counted since 1993; 10 were counted in 2016, with no new vagrant species observed.
2. Santa Barbara Island: 46 species have been counted since 1993; 18 were counted in 2016. Golden-crowned Sparrow and House Finch appears to be increasing. Bewick's Wren was the only new vagrant observed, but Burrowing Owl, Sharp-shinned Hawk, and Spotted Towhee also showed back up for the second or third time on the island, as did Short-eared Owl, which hadn't been detected since 2007.
3. San Miguel Island: 69 species have been counted since 1993; 21 were counted in 2016. Rufous-crowned Sparrow was detected for only the second time in 2016, and Rufous Hummingbird was detected for the first time in 2016.

4. Santa Rosa Island: 70 species have been detected since 1994; 40 were detected in 2016. Eurasian Collared Dove and European Starling, both nonnative to the islands, occur infrequently on the island but were detected in both 2015 and 2016. American Robin, Black-throated Gray Warbler, and Cooper's Hawk were detected for the first time in 2016, and Hermit Warbler was detected for only the second time since 1998.
5. Santa Cruz Island: 64 species have been counted since 2013; 53 were counted in 2016. Black-headed Grosbeak was detected every year but 2016. American Goldfinch, Brewer's Blackbird, and a Prairie Falcon were detected for the first time in 2016.

Across all five islands, eight vagrant bird species were newly recorded in 2016, and 10 were recorded in 2016 for only the second time. Non-native birds were counted on only two of the five islands: Eurasian Collared Dove and European Starling on Santa Rosa, and European Starling on Santa Cruz. However, sightings of non-native species, including Rock Pigeons and the brood parasite, Brown-headed Cowbird, are routinely made on all or a majority of the islands.

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Introduction

Channel Islands National Park (CHIS) comprises 5 of the 8 Channel Islands that lie off the coast of southern California. The park islands range in size from <300 hectares (Anacapa and Santa Barbara Islands) to >20,000 hectares (Santa Rosa and Santa Cruz Islands). Fifty-one terrestrial bird species (hereafter, “landbird species”) are known to breed regularly or occasionally on the park islands (Collins and Jones 2015, and Appendix A; note that Golden Eagle is no longer a resident breeder on the island), and 11 endemic bird taxa occur in the park (Johnson 1972, Coonan et al. 2011b, Collins and Jones 2015).

The National Park Service (NPS) began monitoring landbirds at CHIS in 1993 as part of its long-term ecological monitoring program for the park (Davis et al. 1994), which also became part of the NPS Inventory and Monitoring Program’s Mediterranean Coast Network (MEDN; Cameron et al. 2005). Data were originally collected on line transects (van Riper III et al. 1988), until the program shifted to point count methods as a result of a program review in 2000 (McEachern 2000, Coonan et al. 2011a). The monitoring typically is conducted by CHIS staff, partners, experienced interns, and volunteers, however in 2016, outside contractors (Western Foundation of Vertebrate Zoology and California Institute of Environmental Studies) were hired to coordinate and implement the monitoring, due to changes in CHIS program staff in 2015/2016.

The objectives of the landbird monitoring program (van Riper III et al. 1988, Coonan et al. 2011a) are as follows:

1. Determine long-term trends in species composition, distribution, and abundance of native and non-native landbird species in selected areas of Channel Islands National Park.
2. Improve our understanding of breeding bird – habitat relationships and the effects of management actions such as alien plant and animal control on bird populations by correlating changes in landbird species composition, distribution, and abundance with changes in specific habitat variables

In this report, we summarize data collected during landbird monitoring in 2016. We present simple summaries of raw observational data. A more complete analysis using analysis techniques to address differences in detection rates among species, habitats and observers will be provided in a future trend report.

Methods

In 2016, landbird monitoring at Channel Islands National Park was conducted on both line transects (as per van Riper et al. 1998) and point counts (as per Coonan et al. 2011a). Monitoring of landbirds was conducted between 28 February and 24 May 2016 (see tour dates summarized in Table 1). Using distance-based sampling methods (Buckland et al. 2001), we surveyed birds on 9 line transects (3 on Santa Barbara Island, 1 on East Anacapa Island, and 5 on San Miguel Island), and at 338 of 346 point count sites (33 on Santa Barbara, 8 on Anacapa, 112 of 120 on Santa Cruz, 145 on Santa Rosa, and 40 on San Miguel).

Table 1. Start and end dates of landbird monitoring survey tours on each island in 2016, with the number of line transects or 10-minute point counts listed for each tour.

Island	Start Date	End Date	# Transects	# Point Counts
Anacapa	03/09/2016	03/11/2016	1	8
Santa Barbara	02/28/2016	03/05/2016	3	33
Santa Cruz	03/19/2016	03/29/2016	0	112
San Miguel	04/05/2016	04/19/2016	5	40
Santa Rosa	04/05/2016	04/12/2016	0	33
Santa Rosa	05/01/2016	05/08/2016	0	51
Santa Rosa	05/17/2016	05/24/2016	0	61

On Santa Cruz Island in 2016 we conducted a fourth year of monitoring, at 100 point count sites established by R. C. Klinger of The Nature Conservancy in 1993, and at 12 point count sites we established using the same method as Klinger (1998) on East Santa Cruz Island. This year we were not able to count the 8 point count stations in the Prisoner's Harbor wetland restoration area because a skilled observer was not available.

On transects, observers estimated the perpendicular distance from the transect midline to each bird detected. Similarly, on point counts, observers estimated the radial distance from the point to each bird detected. Counts were conducted for 10 minutes at each point count site. Observations began at sunrise and continued until four hours after sunrise. A total of 7 observers conducted landbird monitoring in 2016 (Appendix B).

The methodology used in 2016 did not deviate from the protocol (Coonan et al. 2011a), except for the following modifications that were adopted in 2015 and repeated this year:

- The minimum visibility distance necessary to conduct monitoring was reduced from 400 m to 150 m. This was a matter of practicality; fog can often restrict visibility, but not necessarily detectability. Most birds are detected at distances <150 m. This change allowed more point counts and transects to be monitored, particularly on San Miguel Island, but also on Santa Rosa Island in 2016, when fog was heavy.

- Elephant Seal Cove transect on Santa Barbara Island was not sampled due to the need to avoid Western Gulls nesting in the vicinity.

Data were entered into the CHIS Landbird Database by the observers, and were quality-checked and verified for errors by MEDN Data Manager L. Lee, and contractors L. Hall and P. Larramendy. Validation queries were run to highlight field values that were not consistent with expected results (i.e., out-of-range values). These values were double-checked against field datasheets and discrepancies were corrected as appropriate and/or noted in the database. All data collected in 2016 were verified, validated, and certified to ensure they were error-free to the greatest extent possible. Data summaries were then generated using an automated report run in Program R.

The locations of landbird monitoring point count sites and line transects are presented in Figures 1-5.

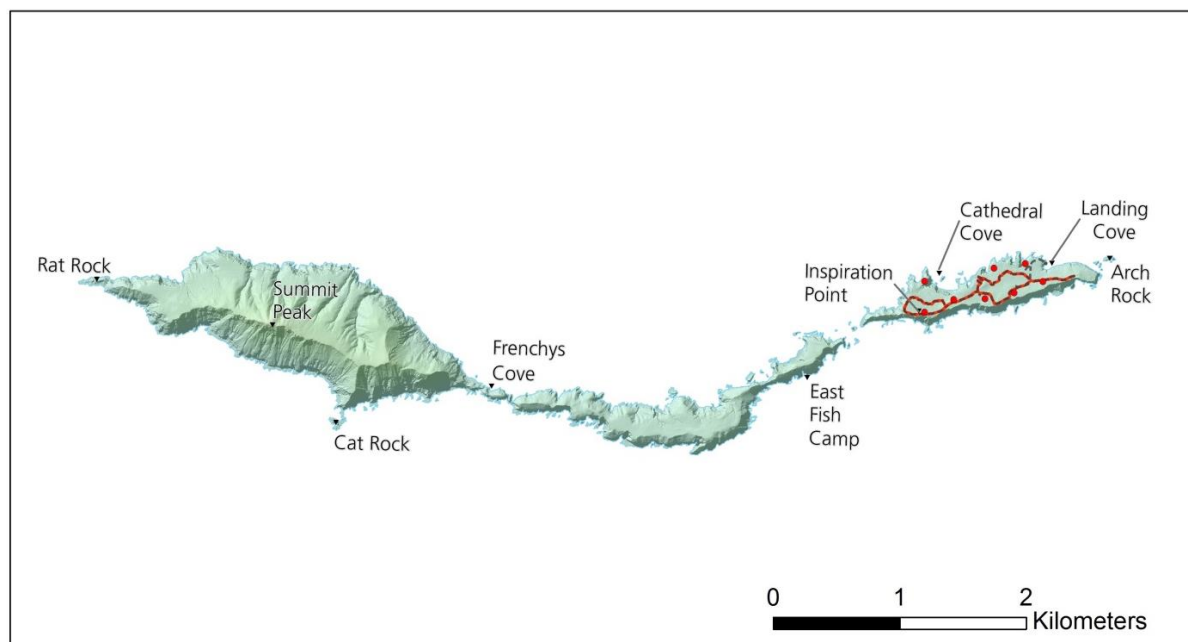


Figure 1. Location of landbird monitoring point count sites and line transects on Anacapa Island.

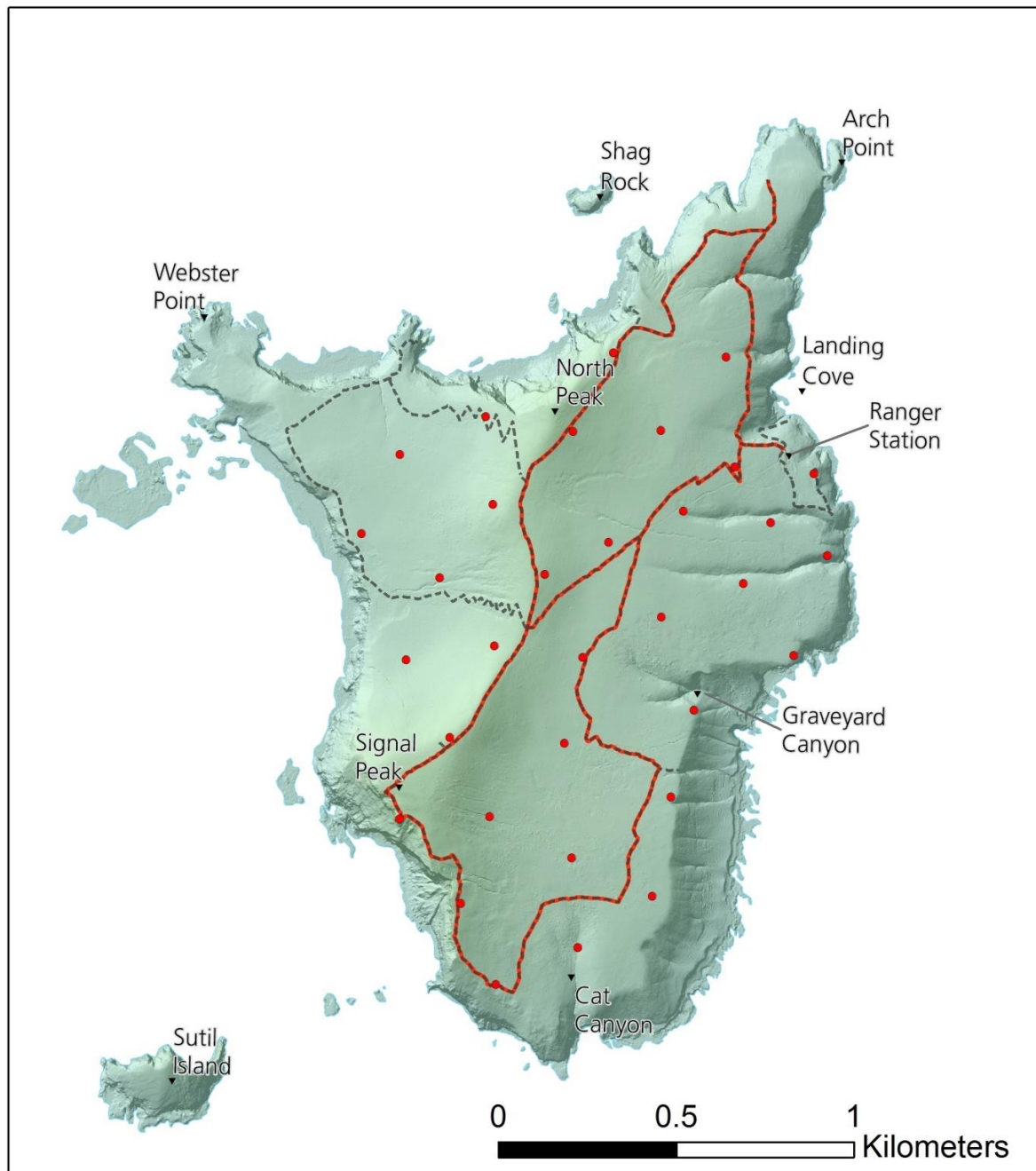


Figure 2. Location of landbird monitoring point count sites and line transects on Santa Barbara Island.

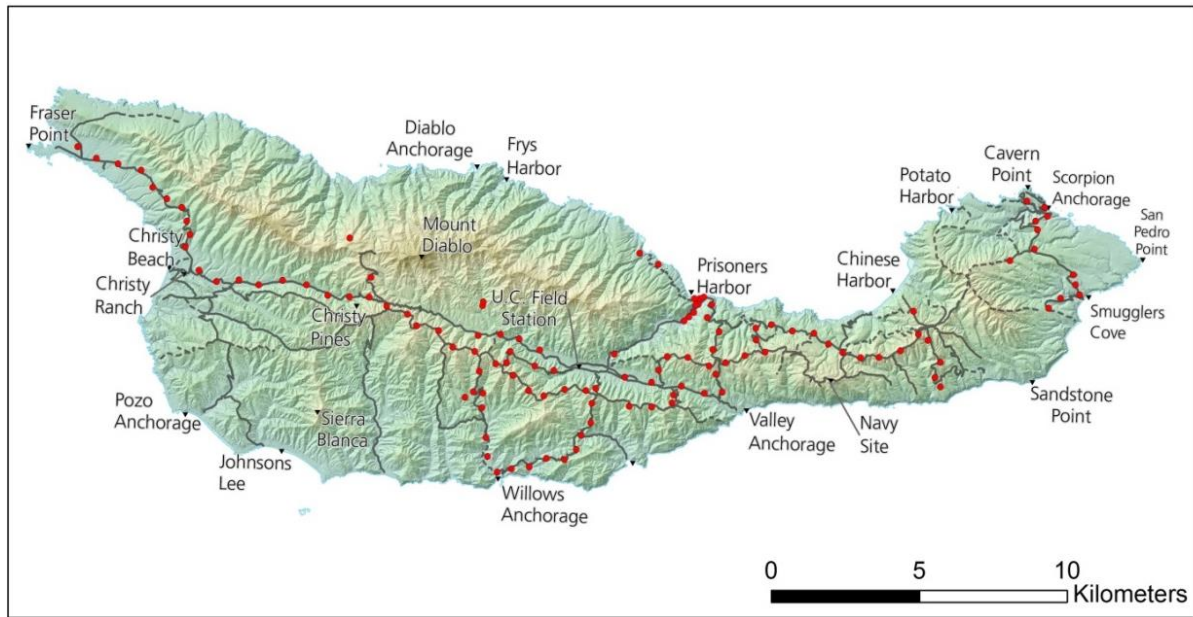


Figure 3. Location of landbird monitoring point count sites on Santa Cruz Island.

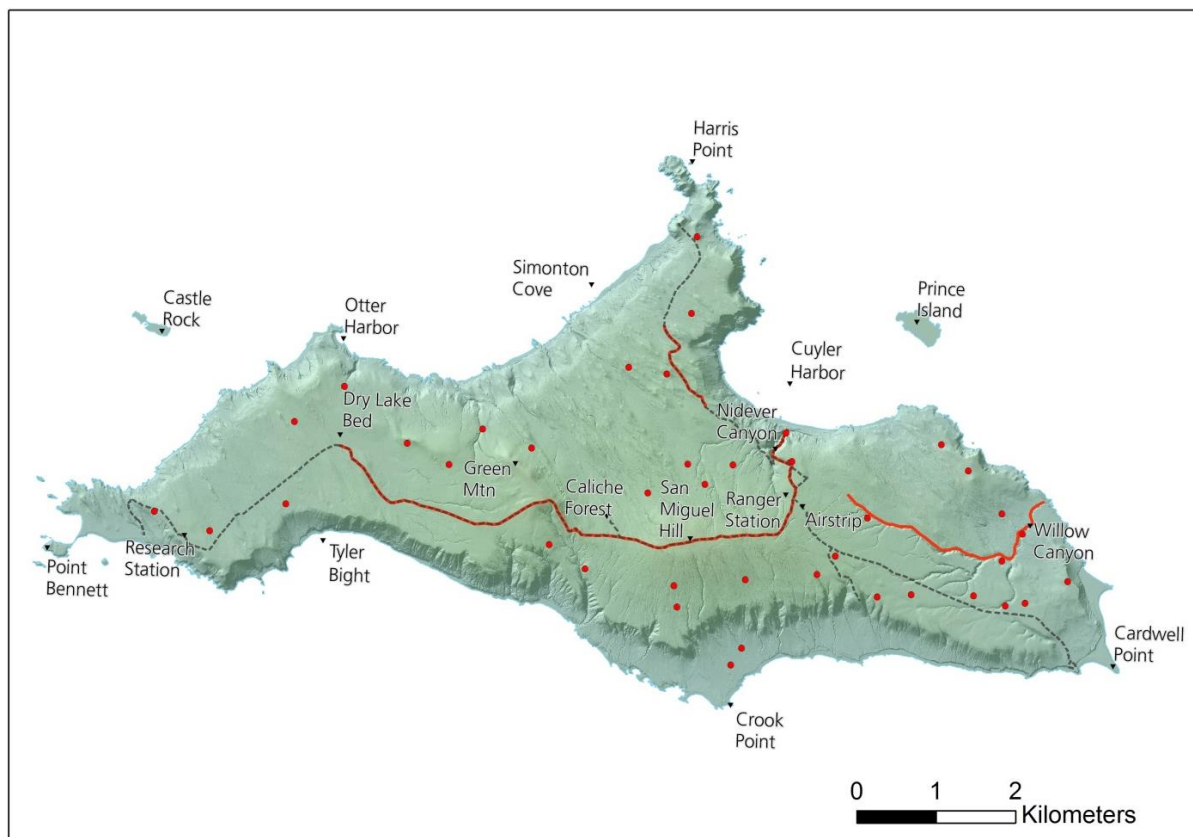


Figure 4. Location of landbird monitoring point count sites and line transects on San Miguel Island.

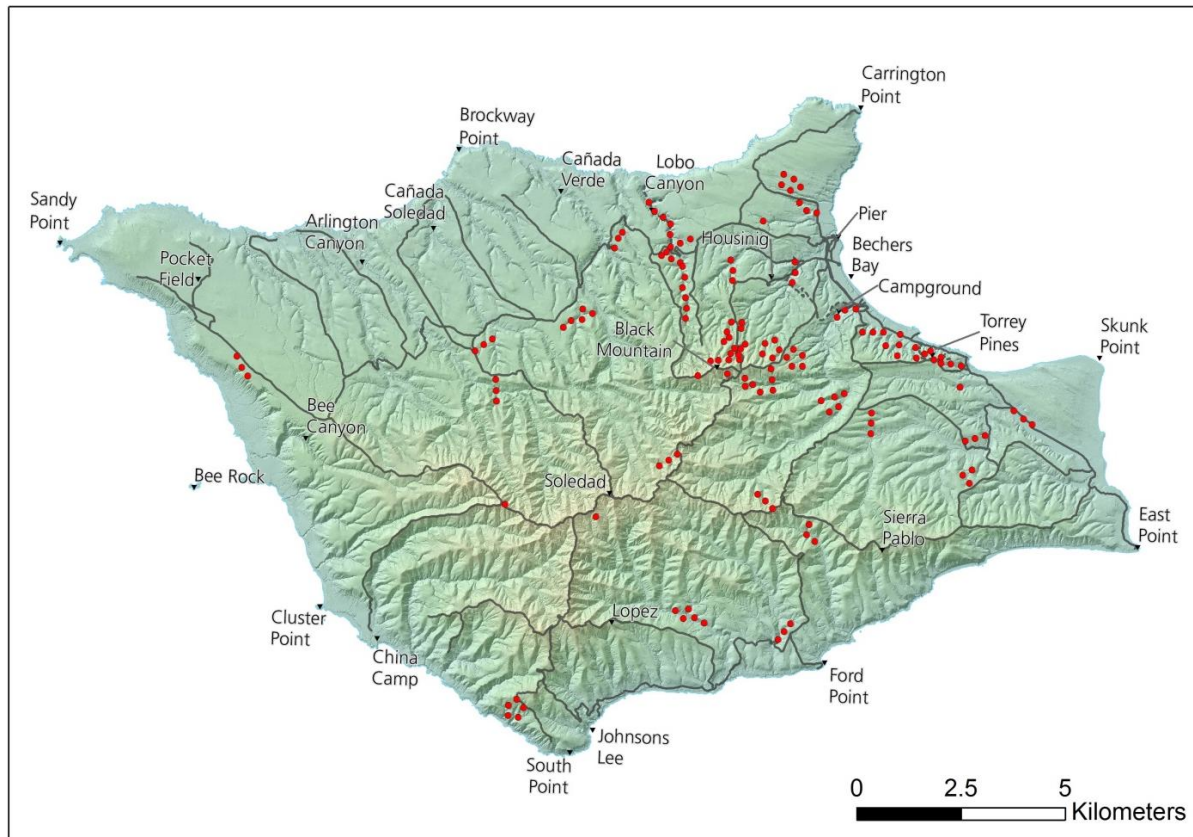


Figure 5. Location of landbird monitoring point count sites on Santa Rosa Island.

Results

The numbers of individuals of each species that were detected on all islands in 2016 are given in Table 2. Indices of abundance on point counts (number of birds counted and mean number of birds per station) are given for Anacapa Island (Table 3), Santa Barbara Island (Table 4), Santa Cruz Island (Table 5), San Miguel Island (Table 6), and Santa Rosa Island (Table 7). An index of abundance on transects is presented in Table 8.

Sixty-four landbird species were counted on points or transects across all of the islands in 2016 (Table 2). Parkwide, the 10 most commonly detected landbirds in 2016 were, in descending order, Spotted Towhee (scientific names given in Table 2), Song Sparrow, Western Meadowlark, Orange-crowned Warbler, Horned Lark, Bewick's Wren, White-crowned Sparrow, House Finch, Common Raven, and Chipping Sparrow (Table 2).

Species that occurred at $\geq 50\%$ of point count sites were Orange-crowned Warbler and White-crowned Sparrow on Anacapa Island (Table 3); Horned Lark on Santa Barbara Island (Table 4); Spotted Towhee, Bewick's Wren, Orange-crowned Warbler, Island Scrub-Jay, and Northern Flicker on Santa Cruz Island (Table 5); Song Sparrow, Orange-crowned Warbler, Common Raven, Western Meadowlark, and Horned Lark on San Miguel Island (Table 6); and Spotted Towhee, Western Meadowlark, Bewick's Wren, Song Sparrow, Orange-crowned Warbler, Chipping Sparrow, House Finch, and Pacific-slope Flycatcher on Santa Rosa Island (Table 7). Also notably, Rufous-crowned Sparrows occurred at 34% of the stations on Santa Cruz Island.

Table 2. Number of individuals of each species detected during bird surveys on all islands in 2016. Data include detections on both line transects and point counts, and do not include birds observed before or after the counts.

Common Name	Scientific Name	Total # Detected	Anacapa	Santa Barbara	Santa Cruz	San Miguel	Santa Rosa
Acorn Woodpecker	<i>Melanerpes formicivorus</i>	36	—	—	22	—	14
Allen's Hummingbird	<i>Selasphorus sasin</i>	56	—	—	6	14	36
American Goldfinch	<i>Carduelis tristis</i>	26	—	—	6	—	20
American Kestrel	<i>Falco sparverius</i>	13	—	11	2	—	—
American Robin	<i>Turdus migratorius</i>	4	—	—	3	—	1
Anna's Hummingbird	<i>Calypte anna</i>	42	—	—	13	2	27
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	1	—	—	1	—	—
Bald Eagle	<i>Haliaeetus leucocephalus</i>	3	—	—	2	—	1
Barn Swallow	<i>Hirundo rustica</i>	27	—	—	11	—	16
Belted Kingfisher	<i>Ceryle alcyon</i>	1	—	—	1	—	—
Bewick's Wren	<i>Thryomanes bewickii</i>	500	3	2	203	1	291
Black Phoebe	<i>Sayornis nigricans</i>	15	—	—	5	—	10
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	1	—	—	—	—	1
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	16	—	—	16	—	—
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	1	—	—	1	—	—
Burrowing Owl	<i>Athene cunicularia</i>	3	—	3	—	—	—
Bushtit	<i>Psaltiriparus minimus</i>	21	—	—	13	—	8
California Quail	<i>Callipepla californica</i>	66	—	—	57	—	9
Chipping Sparrow	<i>Spizella passerine</i>	181	1	—	43	1	136
Common Raven	<i>Corvus corax</i>	299	—	—	79	124	96
Common Yellowthroat	<i>Geothlypis trichas</i>	2	—	—	2	—	—
Cooper's Hawk	<i>Accipiter cooperii</i>	4	—	—	—	—	4
Eurasian Collared Dove	<i>Streptopelia decaocto</i>	1	—	—	—	—	1
European Starling	<i>Sturnus vulgaris</i>	6	—	—	3	—	3
Fox Sparrow	<i>Passerella iliaca</i>	5	—	—	5	—	—
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	24	2	5	15	1	1
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	34	—	—	20	7	7

Table 2 (continued). Number of individuals of each species detected during bird surveys on all islands in 2016. Data include detections on both line transects and point counts, and do not include birds observed before or after the counts.

Common Name	Scientific Name	Total # Detected	Anacapa	Santa Barbara	Santa Cruz	San Miguel	Santa Rosa
Hermit Thrush	<i>Catharus guttatus</i>	12	–	–	10	2	–
Hermit Warbler	<i>Dendroica occidentalis</i>	1	–	–	–	–	1
Hooded Oriole	<i>Icterus cucullatus</i>	1	–	–	1	–	–
Horned Lark	<i>Eremophila alpestris</i>	507	–	326	8	126	47
House Finch	<i>Carpodacus mexicanus</i>	350	7	2	99	45	197
House Wren	<i>Troglodytes aedon</i>	1	–	1	–	–	–
Hutton's Vireo	<i>Vireo huttoni</i>	49	–	–	34	–	15
Island Scrub-Jay	<i>Aphelocoma insularis</i>	143	–	–	143	–	–
Lesser Goldfinch	<i>Carduelis psaltria</i>	71	–	–	32	–	39
Loggerhead Shrike	<i>Lanius ludovicianus</i>	32	–	–	9	–	23
Mallard	<i>Anas platyrhynchos</i>	5	–	–	2	–	3
Mourning Dove	<i>Zenaida macroura</i>	19	–	–	7	–	12
Northern Flicker	<i>Colaptes auratus</i>	93	–	–	93	–	–
Northern Harrier	<i>Circus cyaneus</i>	5	–	1	4	–	–
Northern Mockingbird	<i>Mimus polyglottos</i>	25	–	–	8	–	17
Orange-crowned Warbler	<i>Vermivora celata</i>	637	26	25	164	199	233
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	153	–	–	2	–	151
Peregrine Falcon	<i>Falco peregrinus</i>	9	4	2	1	1	1
Prairie Falcon	<i>Falco mexicanus</i>	1	–	–	1	–	–
Red-breasted Nuthatch	<i>Sitta canadensis</i>	9	–	–	8	–	1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	10	–	–	4	1	5
Rock Wren	<i>Salpinctes obsoletus</i>	46	5	16	7	7	11
Ruby-crowned Kinglet	<i>Regulus calendula</i>	2	–	–	2	–	–
Rufous Hummingbird	<i>Selasphorus rufus</i>	1	–	–	–	1	–
Rufous-crowned Sparrow	<i>Aimophila ruficeps</i>	65	–	–	64	1	–
Savannah Sparrow	<i>Passerculus sandwichensis</i>	4	–	3	–	1	–
Say's Phoebe	<i>Sayornis saya</i>	10	–	7	3	–	–
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1	–	1	–	–	–

Table 2 (continued). Number of individuals of each species detected during bird surveys on all islands in 2016. Data include detections on both line transects and point counts, and do not include birds observed before or after the counts.

Common Name	Scientific Name	Total # Detected	Anacapa	Santa Barbara	Santa Cruz	San Miguel	Santa Rosa
Short-eared Owl	<i>Asio flammeus</i>	1	–	1	–	–	–
Song Sparrow	<i>Melospiza melodia</i>	782	2	–	130	289	361
Spotted Towhee	<i>Pipilo maculatus</i>	835	–	1	318	–	516
Townsend's Warbler	<i>Dendroica townsendi</i>	2	–	–	2	–	–
Western Meadowlark	<i>Sturnella neglecta</i>	663	10	65	93	159	336
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	474	93	291	45	41	4
White-throated Swift	<i>Aeronautes saxatalis</i>	4	–	–	3	–	1
Wilson's Warbler	<i>Wilsonia pusilla</i>	3	–	–	–	–	3
Yellow-rumped Warbler	<i>Dendroica coronata</i>	7	–	–	5	2	–

Table 3. Anacapa Island point-count sampling results: number of individuals detected, mean per station and standard error, frequency (number of stations) and percent of stations detected for bird species recorded in 2016 (8 stations).

Species	Common Name	#Detect	Mean	S.E.	# Stns	% Stns
BEWR	Bewick's Wren	2	0.25	0.16	8	25.0
CHSP	Chipping Sparrow	1	0.12	0.12	8	12.5
HOFI	House Finch	6	0.75	0.75	8	12.5
OCWA	Orange-crowned Warbler	15	1.88	0.52	8	87.5
PEFA	Peregrine Falcon	2	0.25	0.25	8	12.5
ROWR	Rock Wren	4	0.50	0.27	8	37.5
WCSP	White-crowned Sparrow	38	4.75	2.09	8	75.0

Table 4. Santa Barbara Island point-count sampling results: number of individuals detected, mean per station and standard error, frequency (number of stations) and percent of stations detected for bird species recorded in 2016 (25 stations).

Species	Common Name	#Detect	Mean	S.E.	# Stns	% Stns
AMKE	American Kestrel	5	0.15	0.07	33	15.2
BEWR	Bewick's Wren	1	0.03	0.03	33	3.0
GCSP	Golden-crowned Sparrow	1	0.03	0.03	33	3.0
HOLA	Horned Lark	178	5.39	0.67	33	75.8
HOWR	House Wren	1	0.03	0.03	33	3.0
NOHA	Northern Harrier	1	0.03	0.03	33	3.0
OCWA	Orange-crowned Warbler	10	0.30	0.18	33	12.1
PEFA	Peregrine Falcon	1	0.03	0.03	33	3.0
ROWR	Rock Wren	9	0.27	0.13	33	18.2
SAVS	Savannah Sparrow	3	0.09	0.06	33	9.1
SAPH	Say's Phoebe	3	0.09	0.06	33	9.1
SPTO	Spotted Towhee	1	0.03	0.03	33	3.0
WEME	Western Meadowlark	39	1.18	0.65	33	30.3
WCSP	White-crowned Sparrow	100	3.03	0.77	33	48.5

Table 5. Number of individuals detected, mean per station and standard error, frequency (number of stations) and percent of stations detected for bird species recorded during point count sampling on Santa Cruz Island in 2016 (112 stations).

Species	Common Name	#Detect	Mean	S.E.	# Stns	% Stns
ACWO	Acorn Woodpecker	22	0.20	0.06	112	10.7
ALHU	Allen's Hummingbird	6	0.05	0.02	112	4.5
AMGO	American Goldfinch	5	0.04	0.03	112	2.7
AMKE	American Kestrel	2	0.02	0.01	112	1.8
AMRO	American Robin	3	0.03	0.02	112	1.8
ANHU	Anna's Hummingbird	13	0.12	0.03	112	10.7
ATFL	Ash-throated Flycatcher	1	0.01	0.01	112	0.9
BAEA	Bald Eagle	2	0.02	0.01	112	1.8
BARS	Barn Swallow	9	0.08	0.07	112	1.8
BEKI	Belted Kingfisher	1	0.01	0.01	112	0.9
BEWR	Bewick's Wren	203	1.81	0.14	112	80.4
BLPH	Black Phoebe	5	0.04	0.02	112	4.5
BGGN	Blue-gray Gnatcatcher	16	0.14	0.04	112	10.7
BRBL	Brewer's Blackbird	1	0.01	0.01	112	0.9
BUSH	Bushtit	13	0.12	0.04	112	8.0
CAQU	California Quail	57	0.51	0.14	112	27.7
CHSP	Chipping Sparrow	43	0.38	0.08	112	23.2
CORA	Common Raven	57	0.51	0.08	112	30.4
COYE	Common Yellowthroat	2	0.02	0.01	112	1.8
EUST	European Starling	3	0.03	0.03	112	0.9
FOSP	Fox Sparrow	5	0.04	0.02	112	3.6
GCSP	Golden-crowned Sparrow	15	0.13	0.07	112	3.6
GRSP	Grasshopper Sparrow	20	0.18	0.06	112	8.9
HETH	Hermit Thrush	10	0.09	0.03	112	7.1
HOOR	Hooded Oriole	1	0.01	0.01	112	0.9
HOLA	Horned Lark	8	0.07	0.04	112	3.6
HOFI	House Finch	89	0.79	0.27	112	28.6
HUVI	Hutton's Vireo	34	0.30	0.06	112	24.1
ISJA	Island Scrub-Jay	143	1.28	0.15	112	58.0
LEGO	Lesser Goldfinch	26	0.23	0.06	112	14.3
LOSH	Loggerhead Shrike	9	0.08	0.03	112	7.1
MALL	Mallard	2	0.02	0.02	112	0.9
MODO	Mourning Dove	7	0.06	0.04	112	3.6
NOFL	Northern Flicker	93	0.83	0.11	112	52.7
NOHA	Northern Harrier	2	0.02	0.01	112	1.8
NOMO	Northern Mockingbird	8	0.07	0.03	112	6.2
OCWA	Orange-crowned Warbler	164	1.46	0.15	112	60.7
PSFL	Pacific-slope Flycatcher	2	0.02	0.02	112	0.9
PEFA	Peregrine Falcon	1	0.01	0.01	112	0.9
PRFA	Prairie Falcon	1	0.01	0.01	112	0.9
RBNU	Red-breasted Nuthatch	8	0.07	0.04	112	3.6

Table 5 continued. Number of individuals detected, mean per station and standard error, frequency (number of stations) and percent of stations detected for bird species recorded during point count sampling on Santa Cruz Island in 2016 (112 stations).

Species	Common Name	#Detect	Mean	S.E.	# Stns	% Stns
RTHA	Red-tailed Hawk	4	0.04	0.02	112	3.6
ROWR	Rock Wren	7	0.06	0.03	112	5.4
RCKI	Ruby-crowned Kinglet	2	0.02	0.01	112	1.8
RCSP	Rufous-crowned Sparrow	64	0.57	0.09	112	33.9
SAPH	Say's Phoebe	3	0.03	0.02	112	2.7
SOSP	Song Sparrow	130	1.16	0.14	112	49.1
SPTO	Spotted Towhee	318	2.84	0.15	112	90.2
TOWA	Townsend's Warbler	2	0.02	0.01	112	1.8
WEME	Western Meadowlark	93	0.83	0.18	112	23.2
WCSP	White-crowned Sparrow	45	0.40	0.16	112	12.5
WTSW	White-throated Swift	1	0.01	0.01	112	0.9
YRWA	Yellow-rumped Warbler	5	0.04	0.03	112	2.7

Table 6. Number of individuals detected, mean per station and standard error, frequency (number of stations) and percent of stations detected for bird species recorded during point count sampling on San Miguel Island in 2016 (40 stations).

Species	Common Name	#Detect	Mean	S.E.	# Stns	% Stns
ALHU	Allen's Hummingbird	6	0.15	0.07	40	12.5
CORA	Common Raven	83	2.08	0.36	40	77.5
GRSP	Grasshopper Sparrow	1	0.02	0.02	40	2.5
HETH	Hermit Thrush	2	0.05	0.03	40	5.0
HOLA	Horned Lark	62	1.55	0.31	40	57.5
HOFI	House Finch	25	0.62	0.17	40	32.5
OCWA	Orange-crowned Warbler	107	2.67	0.29	40	87.5
PEFA	Peregrine Falcon	1	0.02	0.02	40	2.5
ROWR	Rock Wren	6	0.15	0.06	40	15.0
SAVS	Savannah Sparrow	1	0.02	0.02	40	2.5
SOSP	Song Sparrow	186	4.65	0.36	40	97.5
WEME	Western Meadowlark	97	2.42	0.33	40	72.5
WCSP	White-crowned Sparrow	28	0.70	0.16	40	40.0
YRWA	Yellow-rumped Warbler	2	0.05	0.05	40	2.5

Table 7. Number of individuals detected, mean per station and standard error, frequency (number of stations) and percent of stations detected for bird species recorded during point count sampling on Santa Rosa Island in 2016 (145 stations).

Species	Common Name	#Detect	Mean	S.E.	# Stns	% Stns
ACWO	Acorn Woodpecker	14	0.10	0.03	145	6.2
ALHU	Allen's Hummingbird	35	0.24	0.04	145	21.4
AMGO	American Goldfinch	16	0.11	0.04	145	6.9
AMRO	American Robin	1	0.01	0.01	145	0.7
ANHU	Anna's Hummingbird	25	0.17	0.04	145	15.2
BARS	Barn Swallow	7	0.05	0.03	145	2.1
BEWR	Bewick's Wren	287	1.98	0.12	145	81.4
BTGW	Black-throated Gray Warbler	1	0.01	0.01	145	0.7
BLPH	Black Phoebe	10	0.07	0.04	145	4.1
BUSH	Bushtit	8	0.06	0.06	145	0.7
CAQU	California Quail	9	0.06	0.02	145	4.8
CHSP	Chipping Sparrow	136	0.94	0.09	145	53.8
CORA	Common Raven	64	0.44	0.09	145	29.7
COHA	Cooper's Hawk	3	0.02	0.01	145	2.1
ECDO	Eurasian Collared Dove	1	0.01	0.01	145	0.7
EUST	European Starling	3	0.02	0.02	145	0.7
GCSP	Golden-crowned Sparrow	1	0.01	0.01	145	0.7
GRSP	Grasshopper Sparrow	7	0.05	0.02	145	3.4
HEWA	Hermit Warbler	1	0.01	0.01	145	0.7
HOLA	Horned Lark	42	0.29	0.10	145	11.7
HOFI	House Finch	183	1.26	0.14	145	53.1
HUVI	Hutton's Vireo	15	0.10	0.03	145	7.6
LEGO	Lesser Goldfinch	37	0.26	0.06	145	13.1
LOSH	Loggerhead Shrike	23	0.16	0.04	145	11.7
MALL	Mallard	3	0.02	0.02	145	1.4
MODO	Mourning Dove	12	0.08	0.03	145	6.9
NOMO	Northern Mockingbird	17	0.12	0.03	145	11.0
OCWA	Orange-crowned Warbler	223	1.54	0.11	145	71.0
PSFL	Pacific-slope Flycatcher	151	1.04	0.11	145	51.0
PEFA	Peregrine Falcon	1	0.01	0.01	145	0.7
RBNU	Red-breasted Nuthatch	1	0.01	0.01	145	0.7
RTHA	Red-tailed Hawk	2	0.01	0.01	145	1.4
ROWR	Rock Wren	11	0.08	0.03	145	4.1
SOSP	Song Sparrow	361	2.49	0.17	145	81.4
SPTO	Spotted Towhee	515	3.55	0.17	145	94.5
WEME	Western Meadowlark	336	2.32	0.14	145	89.0
WCSP	White-crowned Sparrow	4	0.03	0.02	145	1.4
WIWA	Wilson's Warbler	2	0.01	0.01	145	1.4

On transect counts on the smaller islands (Table 8), White-crowned Sparrows, Orange-crowned Warblers, and Western Meadowlarks were the most commonly detected birds on the transect on East Anacapa. On Santa Barbara Island, White-crowned Sparrows, Horned Larks, and Western Meadowlarks were most common. On San Miguel Island, Song Sparrows, Orange-crowned Warblers, and Western Meadowlarks were most common.

Table 8. Number of individuals of each species detected on line transects 2016.

Species	AN- TRLS	SB- ARCH	SB- CNYN	SB- SGNL	SM- HRRS	SM- LKBD	SM- NDVR	SM- SMHL	SM- WLLW
Allen's Hummingbird	—	—	—	—	—	—	—	—	8
American Kestrel	—	—	5	1	—	—	—	—	—
Anna's Hummingbird	—	—	—	—	—	—	2	—	—
Bewick's Wren	1	—	1	—	—	—	—	—	1
Burrowing Owl	—	1	2	—	—	—	—	—	—
Chipping Sparrow	—	—	—	—	—	—	—	1	—
Common Raven	—	—	—	—	6	13	5	2	5
Golden-crowned Sparrow	2	1	3	—	1	—	—	—	—
Grasshopper Sparrow	—	—	—	—	—	6	—	—	—
House Finch	1	—	2	—	1	2	—	—	9
Horned Lark	—	39	34	69	2	51	—	11	—
Lincoln's Sparrow	1	—	—	—	—	—	—	—	—
Orange-crowned Warbler	11	2	13	—	16	14	15	8	39
Peregrine Falcon	2	—	—	1	—	—	—	—	—
Rufous-crowned Sparrow	—	—	—	—	—	—	—	—	1
Rock Wren	1	1	—	6	—	1	—	—	—
Red-tailed Hawk	—	—	—	—	—	—	—	—	1
Rufous Hummingbird	—	—	—	—	—	—	—	—	1
Say's Phoebe	—	—	3	1	—	—	—	—	—
Sage Thrasher	—	—	—	1	—	—	—	—	—
Short-eared Owl	—	—	1	—	—	—	—	—	—
Song Sparrow	2	—	—	—	19	38	14	13	19
Sharp-shinned Hawk	—	—	—	1	—	—	—	—	—
White-crowned Sparrow	55	29	124	38	4	1	3	—	5
Western Meadowlark	10	6	20	—	1	33	5	19	4

AN=Anacapa Island, SB=Santa Barbara Island, SM=San Miguel Island, TRLS=trails, ARCH=Arch Point, SGNL=Signal, HRRS=Harris Point, LKBD=Lakebed, NDVR=Nidever, SMHL=San Miguel Hill, WLLW=Willow.

Figures 6-10 summarize the average number of birds per station and species, on each island, in 2016 compared to the average number of birds per station in all years of sampling. Bird species exhibiting decreased detections in 2016 were Song Sparrow and Western Meadowlark on Anacapa Island, and Allen's Hummingbird on Santa Cruz Island (Figures 6 and 8). Species exhibiting increased detections in 2016 were Rock Wren (on Anacapa and Santa Barbara), White-crowned Sparrow (on Anacapa, Santa Barbara, Santa Cruz, and San Miguel); Horned Lark (on Santa Barbara); House Finch, Orange-crowned Warbler, and Rufous-crowned Sparrow (on Santa Cruz); Spotted Towhee (on Santa Cruz and Santa Rosa); and Song Sparrow and Western Meadowlark (on Santa Rosa) (Figures 6-10).

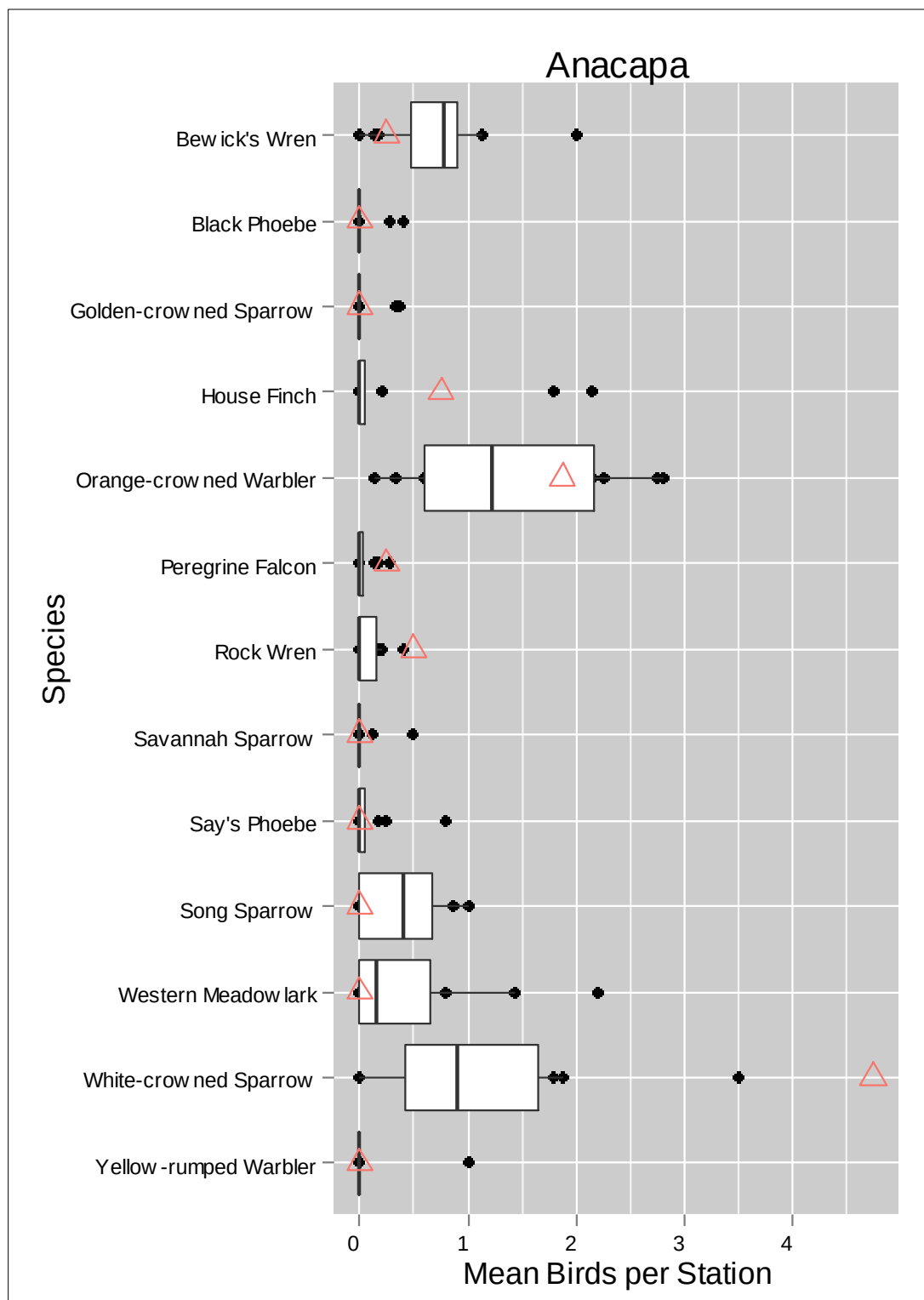


Figure 6. Mean birds per station for species detected on Anacapa Island in 2016, compared to means for previous years. The triangle shows the mean value for 2016. Boxplots for each species summarize data for past years.

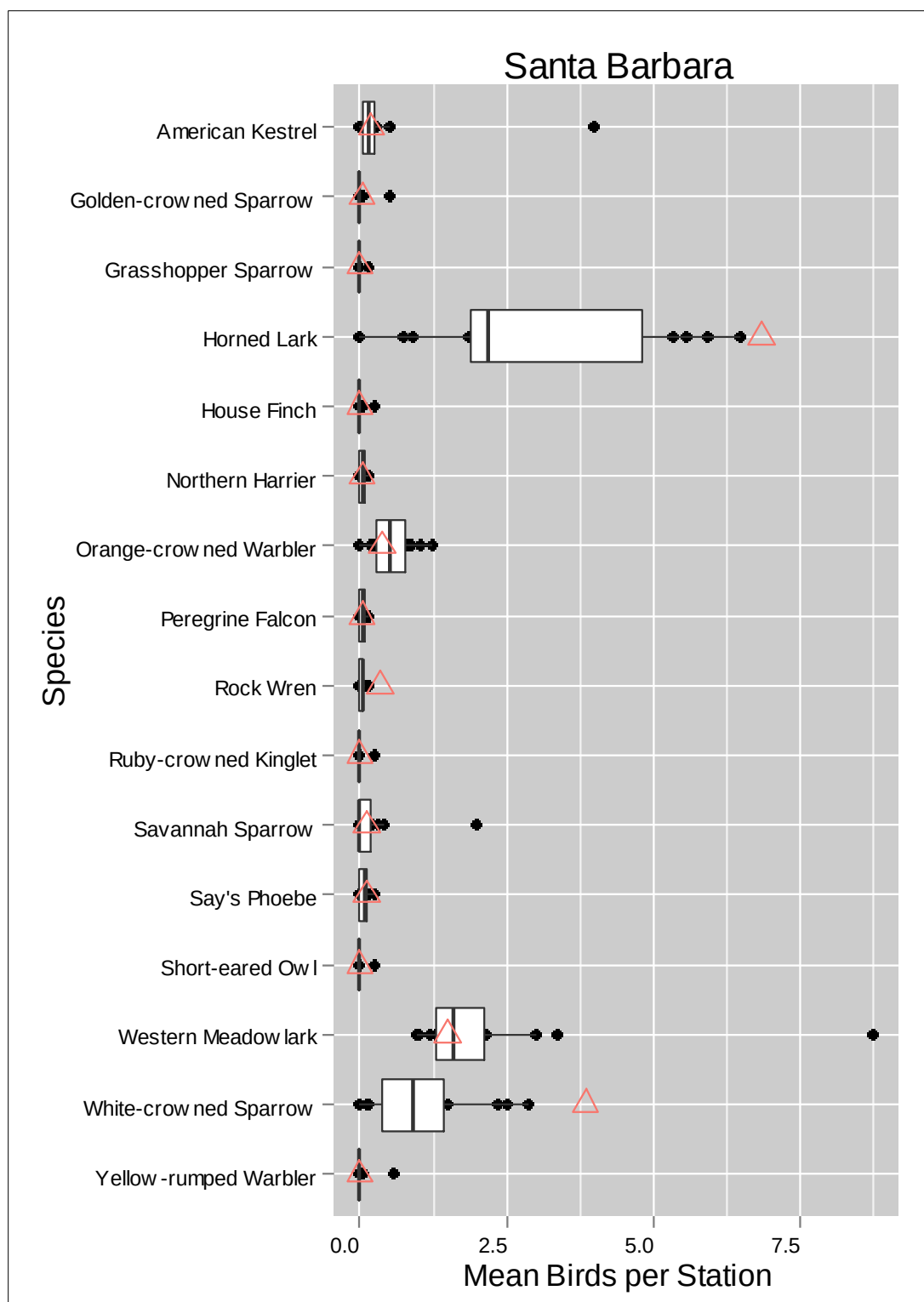


Figure 7. Mean birds per station for species detected on Santa Barbara Island in 2016, compared to means for previous years. The triangle shows the mean value for 2016. Boxplots for each species summarize data for past years.

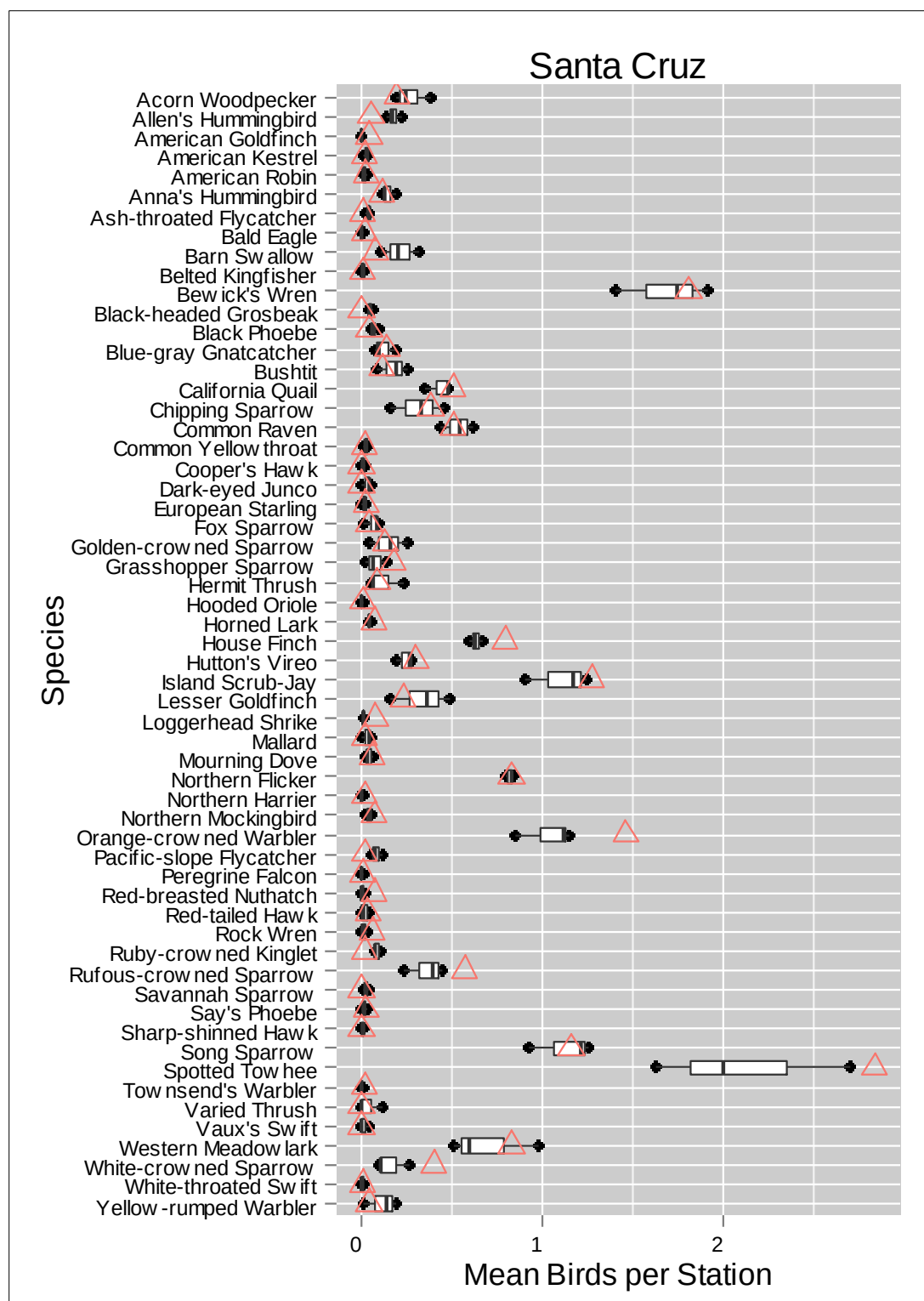


Figure 8. Mean birds per station for species detected on Santa Cruz Island in 2016, compared to means for previous years. The triangle shows the mean value for 2016. Boxplots for each species summarize data for past years.

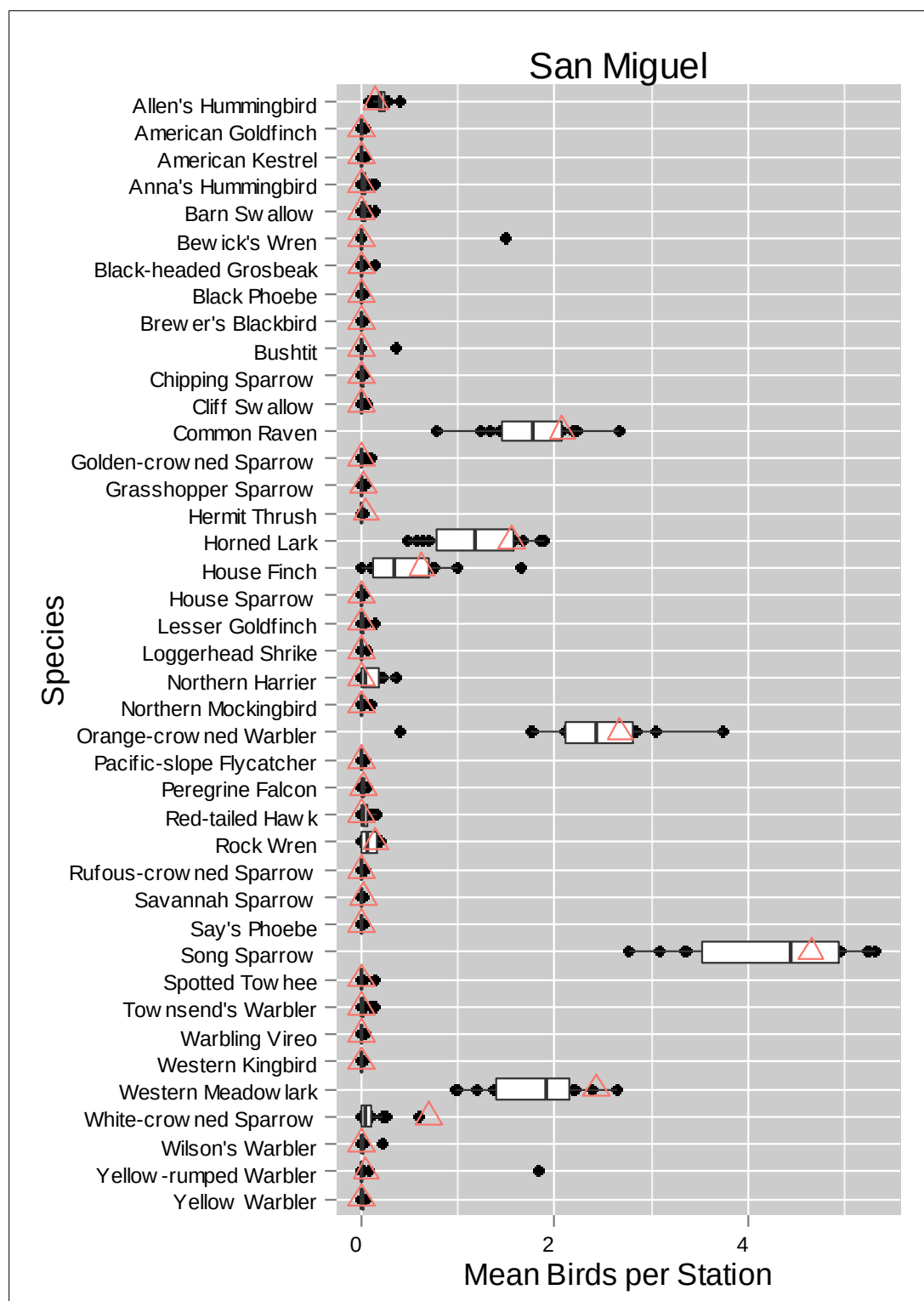


Figure 9. Mean birds per station for species detected on San Miguel Island in 2016, compared to means for previous years. The triangle shows the mean value for 2016. Boxplots for each species summarize data for past years.

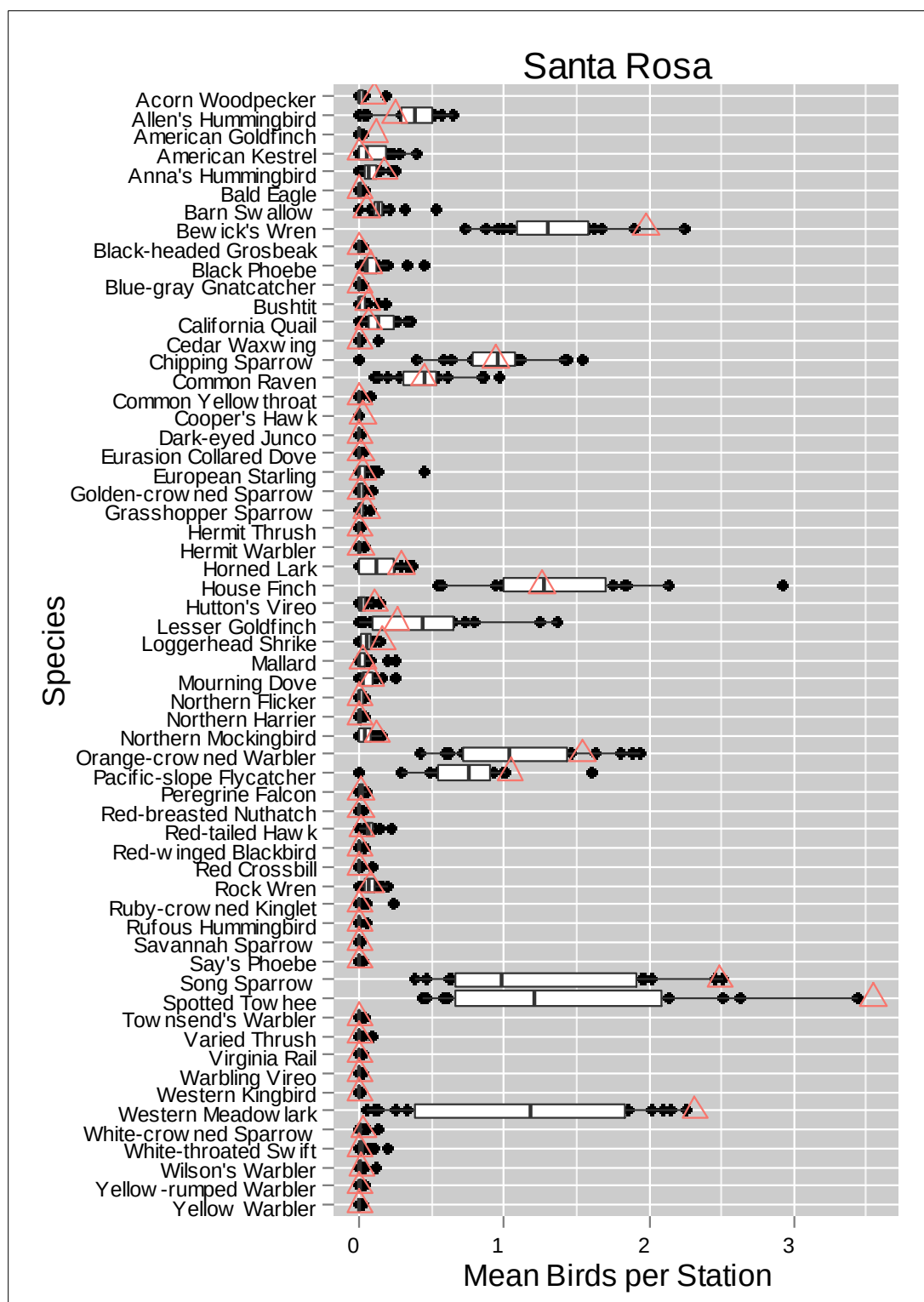


Figure 10. Mean birds per station for species detected on Santa Rosa Island in 2016, compared to means for previous years. The triangle shows the mean value for 2016. Boxplots for each species summarize data for past years.

The species richness graphics in Figures 11-15 summarize patterns of species occurrences on each island since 1993. This particular analysis includes data from both line transects and point counts, but does not include incidental observations of species that occurred outside of the formal line transect or 10-minute point counts (e.g., species observed while *en route* between counting stations are not included). These graphs can be used to determine whether species are appearing on or disappearing from the islands. Notable findings on each island were:

1. Anacapa Island: 24 landbird species have been counted on Anacapa since 1993; 10 were counted in 2016. European Starling was last detected in 1998, American Kestrel was last detected in 2001, Savannah Sparrow in 2005, and Barn Swallow in 2006. Song Sparrows seem to be more common since 2009, and Peregrine Falcons seem to be more common since 2015. There were no new vagrant species observed in 2016 (Table 9); six vagrant species (defined as detected only 1 or 2 years overall) have been counted on the island overall since 1993.
2. Santa Barbara Island: 46 landbird species have been counted on this island since 1993; 18 were counted in 2016. European Starling was last detected in 1997, Merlin in 1998, Allen's Hummingbird in 2002, and Barn Owl in 2003. Golden-crowned Sparrow and House Finch seem to have been increasing since 2014. Bewick's Wren was the only new vagrant observed in 2016 (Table 9), but Burrowing Owl, Sharp-shinned Hawk, and Spotted Towhee also showed back up for the second or third time on the island, as did Short-eared Owl, which hadn't been detected since 2007 (Table 9). A total of 25 vagrant species has been detected on the island since 1993.
3. San Miguel Island: 69 landbird species have been counted on this island since 1993; 21 were counted in 2016. European Starling was last detected in 2001, American Kestrel was last detected in 2003, Eurasian Collared Doves have not been counted since one observation in 2011, House Sparrows have not been detected since 2013, and Northern Harriers have not been detected since 2014. Wilson's Warbler was first detected in 2006, and Townsend's Warbler in 2007; Chipping Sparrow was first detected in 2008, and Grasshopper Sparrow was first detected in 2011. Anna's Hummingbird has been more commonly detected beginning 2002. San Miguel is the only island on which Brown-headed Cowbird was detected, but not since 2007. Rufous-crowned Sparrow was detected for only the second time in 2016, and Rufous Hummingbird was detected for the first time in 2016 (Table 9). A total of 33 vagrant species has been detected on the island since 1993.
4. Santa Rosa Island: 70 landbird species have been detected on this island since 1994; 40 were detected in 2016. American Kestrel was last detected in 2006, and Northern Harrier in 2013. Acorn Woodpecker, Bald Eagle, Red-breasted Nuthatch, and Grasshopper Sparrow have been observed since 2006, and Blue-gray Gnatcatcher, Bushtit, and Virginia Rail since 2009. Eurasian Collared Dove and European Starling occur infrequently on the island but were detected in both 2015 and 2016. American Robin, Black-throated Gray Warbler, and Cooper's Hawk were detected for the first time in 2016, and Hermit Warbler was detected for

only the second time since 1998 (Table 9). A total of 20 vagrant species has been detected on the island since 1994.

5. Santa Cruz Island: 64 landbird species have been counted on this island since 2013, when counts by NPS Channel Islands staff and volunteers began. Fifty-three species were counted in 2016. Notably, Dark-eyed Junco, Cooper's Hawk, and Sharp-shinned Hawk seem to be infrequently detected (i.e., in 2 of 4 years); Black-headed Grosbeak was detected every year but 2016; and European Starling was detected every year but 2014. Black-chinned Sparrow, Red-breasted Sapsucker, Varied Thrush, Vaux's Swift, Violet-green Swallow, and Western Tanager were notable vagrants occurring one time each 2013-2015. American Goldfinch, Brewer's Blackbird, and a Prairie Falcon were detected for the first time in 2016 (Table 9).

Across all five islands, eight vagrant bird species were newly recorded in 2016, and 10 were recorded in 2016 for only the second time (Table 9).

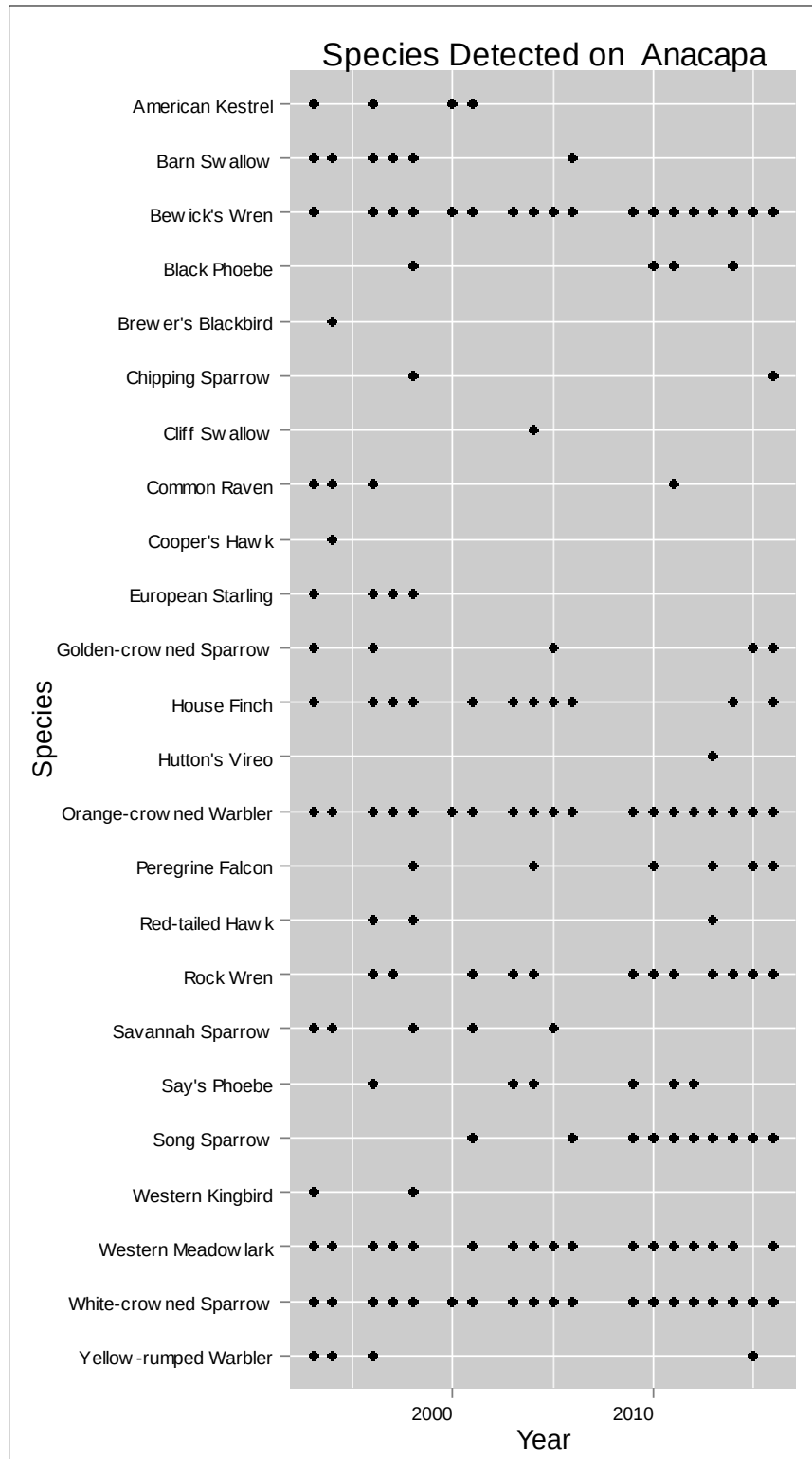


Figure 11. Species occurrence from 1993 to 2016 for Anacapa Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

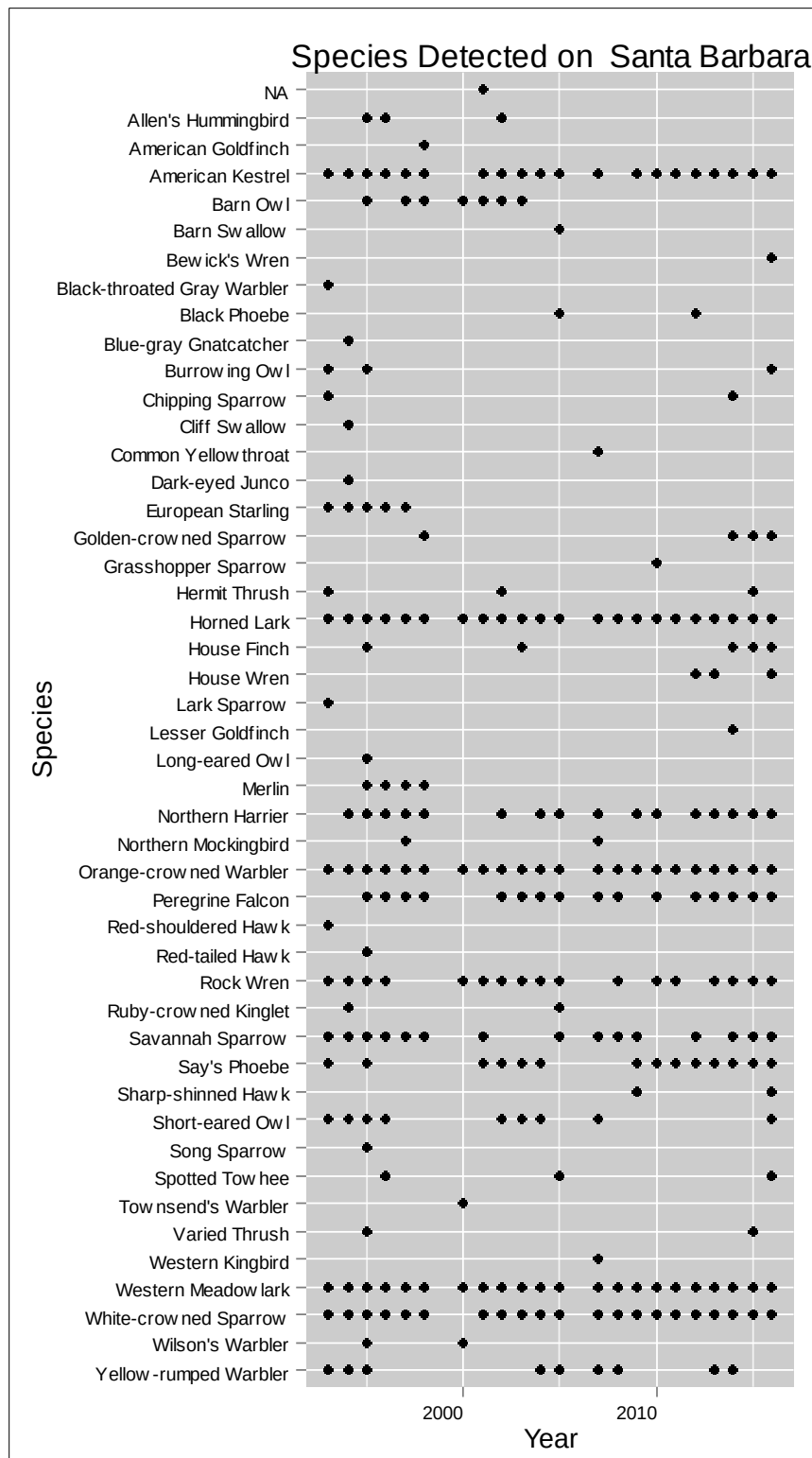


Figure 12. Species occurrence from 1993 to 2016 for Santa Barbara Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

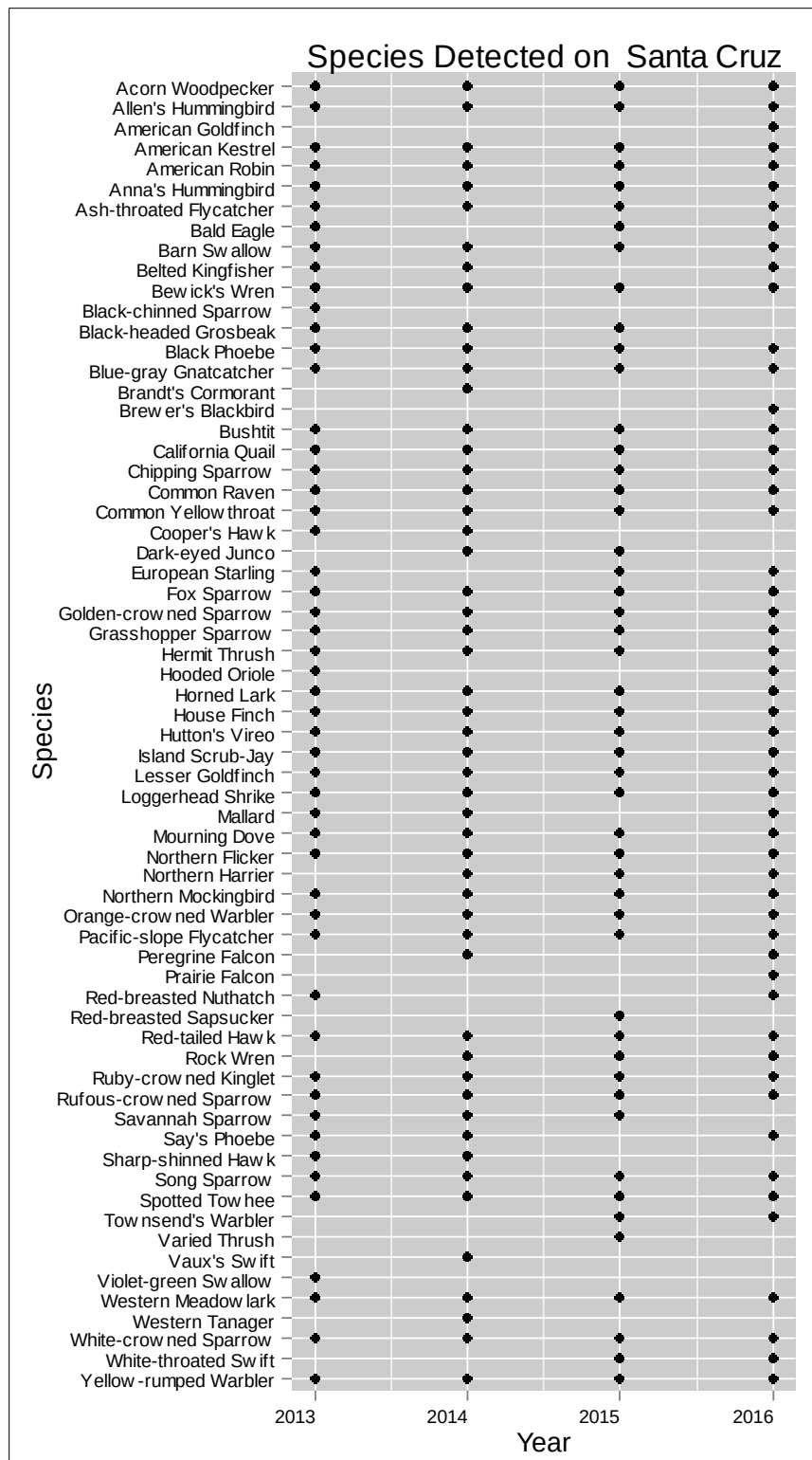


Figure 13. Species occurrence from 2013 to 2016 for Santa Cruz Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

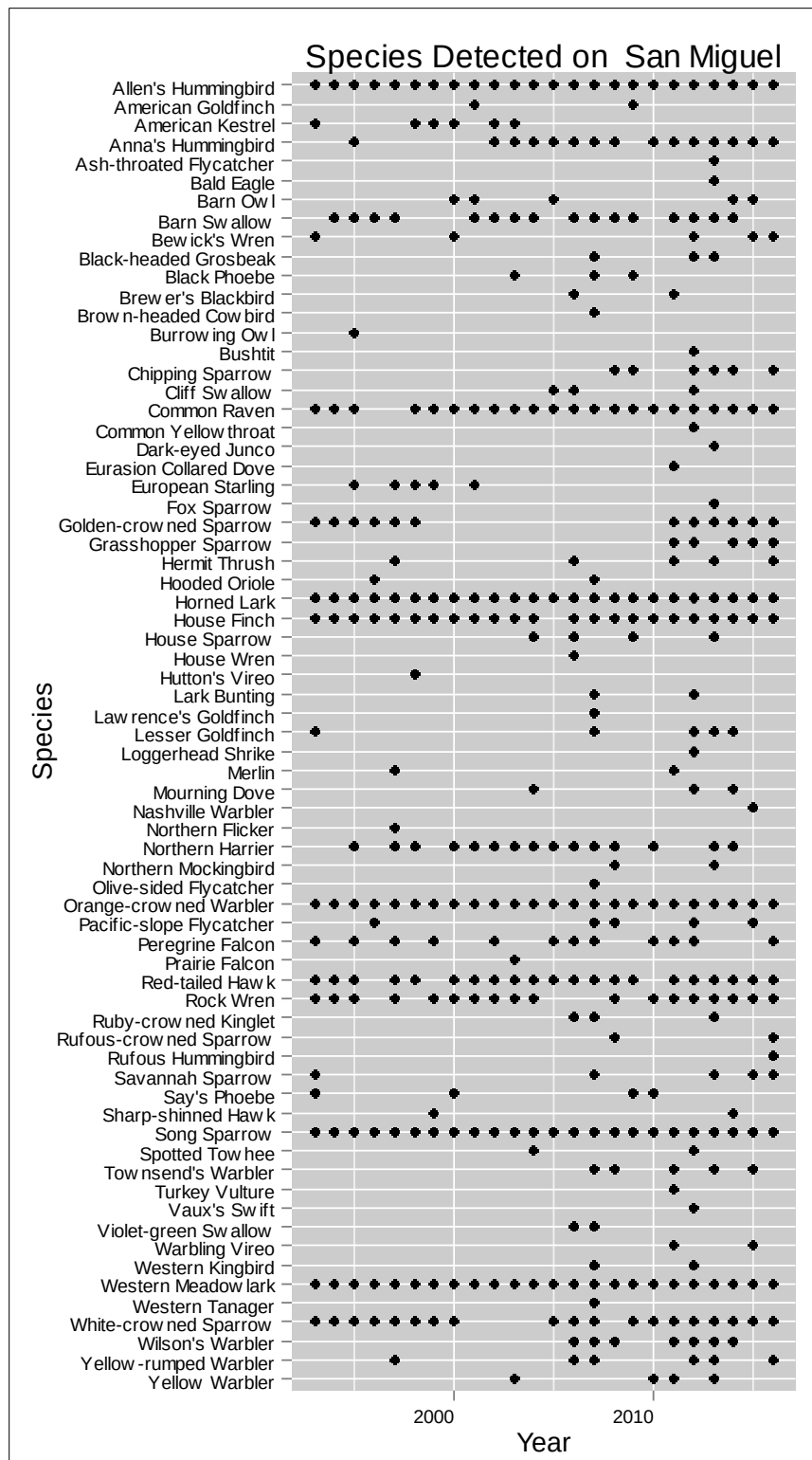


Figure 14. Species occurrence from 1993 to 2016 for San Miguel Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

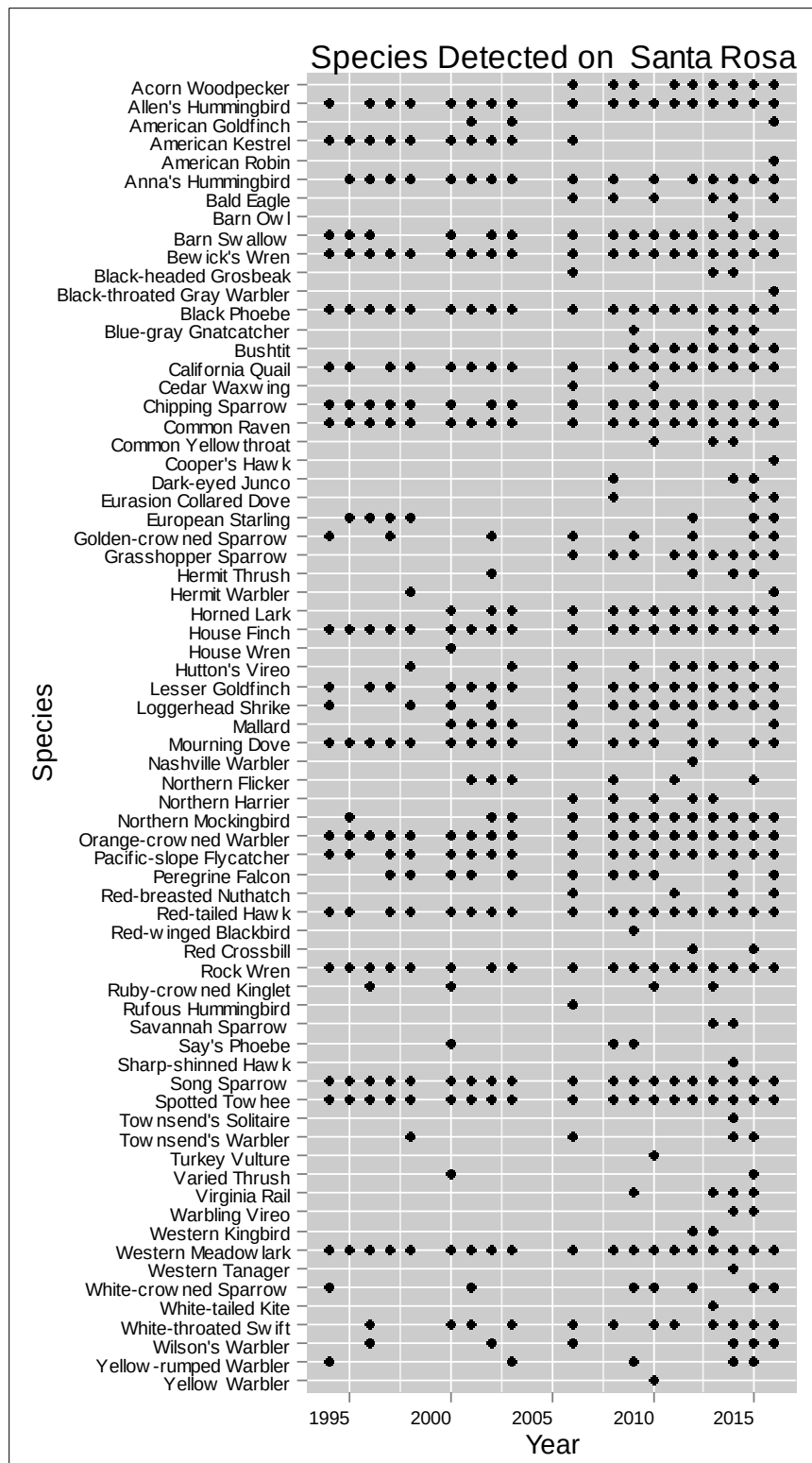


Figure 15. Species occurrence from 1993 to 2016 for Santa Rosa Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

Table 9. New vagrants (“**X**”) and infrequent vagrants (“x”; i.e., counted in only 2 years) recorded in 2016 on the five northern Channel Islands.

Species	AN	SB	SC	SM	SR
American Goldfinch	–	–	X	–	–
American Robin	–	–	–	–	X
Bewick's Wren	–	X	–	–	–
Black-throated Gray Warbler	–	–	–	–	X
Brewer's Blackbird	–	–	X	–	–
Chipping Sparrow	x	–	–	–	–
Cooper's Hawk	–	–	–	–	X
Hermit Warbler	–	–	–	–	x
Hooded Oriole	–	–	x	–	–
Peregrine Falcon	–	–	x	–	–
Prairie Falcon	–	–	X	–	–
Red-breasted Nuthatch	–	–	x	–	–
Rufous Hummingbird	–	–	–	X	–
Rufous-crowned Sparrow	–	–	–	x	–
Sharp-shinned Hawk	–	x	–	–	–
Townsend's Warbler	–	–	x	–	–
White-throated Swift	–	–	x	–	–
Yellow-rumped Warbler	x	–	–	–	–

Non-native birds were counted on only two of the five islands: Eurasian Collared Dove and European Starling on Santa Rosa, and European Starling on Santa Cruz. However, sightings of non-native species, including Rock Pigeons (*Columba livia*) and the brood parasite, Brown-headed Cowbird, are routinely made on all or a majority of the islands. Anecdotal sightings of such species in 2016 were summarized by Paul Collins and are presented here (Table 10; P. Collins, Santa Barbara Museum of Natural History, unpubl. data).

Other anecdotal observations (i.e., collected outside of the point and transect counts) of birds on Santa Rosa Island: Western Tanagers (males and a female) at the Old Ranch House on the mid-May tour; a large flock of Cedar Waxwings by NPS housing on the same tour; a leucistic Song Sparrow in Cherry Canyon by NPS housing on the same tour; and an active nest of a Pacific-slope Flycatcher in a rock cave in the Ironwood Grove in upper Cherry Canyon on this May tour.

Table 10. Sightings of non-native landbirds and brood parasitic cowbirds at Channel Islands National Park in 2016 (P. Collins, Santa Barbara Museum of Natural History, unpubl. data).

Species	Island	Specific Location	Date	Observer	Number
Rock Pigeon	SCI	Scorpion Harbor	6-Oct-16	Theo & Ezra Staengl	3
Rock Pigeon	EACI	–	11-Oct-15	Joel Barrett	1
Rock Pigeon	EACI	–	27-Jul-16	Michael Nicodemus	20
Eurasian Collared-Dove	SRI	Ranch area	12-Sep-15	Jesse Ray	3
Eurasian Collared-Dove	SRI	Historic Ranch	10-Oct-15	Ashley Sajata	2
Eurasian Collared-Dove	SRI	Historic Ranch	23-Oct-15	Joel Barrett	8
Eurasian Collared-Dove	SRI	pier	11-Jul-16	Joel Barrett	1
Eurasian Collared-Dove	SRI	Historic Ranch	9-Oct-16	Phil Capitolo	4
Eurasian Collared-Dove	SCI	–	17-Sep-15	David Rankin	2
Eurasian Collared-Dove	SCI	–	18-Sep-15	David Rankin	7
Eurasian Collared-Dove	SCI	Main Ranch	27-Oct-15	Daniel Aube	2
Eurasian Collared-Dove	SCI	–	24-Jan-16	David Rankin	2
Eurasian Collared-Dove	SCI	Main Ranch	26-Jan-16	David Rankin	2
Eurasian Collared-Dove	SCI	Field Station to Ranch	14-Feb-16	Lyndal Laughrin	2
Eurasian Collared-Dove	SCI	Prisoners Harbor	14-Feb-16	Lyndal Laughrin	4
Eurasian Collared-Dove	SCI	Airport to Valley Anchorage	15-Feb-16	Lyndal Laughrin	2
Eurasian Collared-Dove	SCI	Del Norte	27-Feb-16	Adam Dudley	2
Eurasian Collared-Dove	SCI	–	15-Apr-16	David Rankin	2
Eurasian Collared-Dove	SCI	Prisoners Harbor	23-Apr-16	Jeff Skevington	1
Eurasian Collared-Dove	SCI	Scorpion Harbor	17-Jul-16	Jeff Miller	1
Eurasian Collared-Dove	SCI	–	19-Jul-16	G. A. Murayama	4
Eurasian Collared-Dove	SCI	Scorpion Campground	24-Aug-16	Ross Silcock	1
Eurasian Collared-Dove	SCI	–	4-Sep-16	Nathan Melling	5
Eurasian Collared-Dove	SCI	North shore	6-Sep-16	Ann McDowell	2
Eurasian Collared-Dove	SCI	–	16-Oct-16	LeRoy Dorman, Charlene Glacy	5
Eurasian Collared-Dove	SBI	–	13-May-16	Jim Howard	2
Eurasian Collared-Dove	SBI	–	19-May-16	Jim Howard	3
Eurasian Collared-Dove	SBI	–	20-May-16	An Bui	3
Eurasian Collared-Dove	SBI	Cave Canyon	10-Aug-16	Peter Larramendy	1
European Starling	SMI	–	14-Nov-15	Andy Abate	1
European Starling	SRI	Historic Ranch	23-Oct-15	Joel Barrett	3
European Starling	SCI	–	17-Sep-15	David Rankin	3
European Starling	SCI	–	10-Oct-15	Danielle Aube	8
European Starling	SCI	Scorpion Campground	21-Nov-15	Nick Lethaby	1
European Starling	SCI	Prisoners Harbor Canyon	14-Feb-16	Lyndal Laughrin	13
European Starling	SCI	Airport to Valley anchorage	15-Feb-16	Lyndal Laughrin	14
European Starling	SCI	–	17-Apr-16	Jessi Sieburth	10
European Starling	SCI	North shore	6-Sep-16	Ann McDowell	5
European Starling	SCI	Scorpion Harbor	27-Sep-16	Peter Gaede et al.	1
European Starling	SCI	Scorpion Campground	7-Oct-16	Nick Lethaby	2
European Starling	SCI	Scorpion Harbor	11-Oct-16	Peter Gaede, Glenn Kincaid	2
European Starling	SCI	Prisoners' Harbor	21-Feb-15	Peter Gaede et al.	20

Table 10 continued. Sightings of non-native landbirds and brood parasitic cowbirds at Channel Islands National Park in 2016 (P. Collins, Santa Barbara Museum of Natural History, unpubl. data).

Species	Island	Specific Location	Date	Observer	Number
Brown-headed Cowbird	SMI	–	30-Oct-15	Andy Abate	1
Brown-headed Cowbird	SRI	Historic Ranch	10-Oct-15	Ashley Sujata	15
Brown-headed Cowbird	SRI	Historic Ranch	23-Oct-15	Joel Barrett	2
Brown-headed Cowbird	SRI	Windmill Canyon terrace	12-Sep-16	Peter Larramendy	12
Brown-headed Cowbird	SRI	Historic Ranch	9-Oct-16	Phil Capitolo	2
Brown-headed Cowbird	SCI	–	8-Jun-16	James and Daniel Muller	1
Brown-headed Cowbird	SCI	–	25-Jul-16	Brian O'Shea	1
Brown-headed Cowbird	SCI	Scorpion Campground	25-Jul-16	Devon DeRaad	1
Brown-headed Cowbird	SCI	North shore	6-Sep-16	Ann McDowell	1
Brown-headed Cowbird	SCI	Scorpion Harbor	13-Sep-16	Eugene Kefere	14
Brown-headed Cowbird	SCI	Scorpion Harbor	16-Sep-16	Randy Harwood	1
Brown-headed Cowbird	SCI	Scorpion Campground	25-Sep-16	Nick Lethaby	3
Brown-headed Cowbird	SCI	Scorpion Harbor	27-Sep-16	Peter Gaede	2
Brown-headed Cowbird	SCI	Scorpion Harbor	28-Sep-16	Steven Courtney	4
Brown-headed Cowbird	SCI	Scorpion Harbor	15-Oct-16	Joel Barrett	1
Brown-headed Cowbird	SBI	–	30-Sep-15	Nick Lethaby	1
Brown-headed Cowbird	SBI	–	24-Oct-15	Peter Gaede, Nick Lethaby	2
Brown-headed Cowbird	SBI	–	25-Oct-15	Peter Gaede, Nick Lethaby	2
Brown-headed Cowbird	SBI	–	26-Oct-15	Peter Gaede, Nick Lethaby	1
Brown-headed Cowbird	SBI	–	5-May-16	An Bui	2
Brown-headed Cowbird	SBI	Housing area	13-May-16	Jim Howard	7
Brown-headed Cowbird	SBI	Housing area	19-Oct-16	Jim Howard	1
House Sparrow	SCI	Del Norte Campground	27-Feb-16	Adam Dudley	2
House Sparrow	SCI	Scorpion Harbor	2-Jul-16	Paul & Brenda Galvin	4
House Sparrow	SCI	Scorpion Harbor	13-Sep-16	Eugene Keferl	2
House Sparrow	SCI	Scorpion Campground	24-Sep-16	Eduardo Jimenez	2
House Sparrow	EACI	–	17-Jul-16	Michael Nicodemus	6
Scaly-breasted Munia	SCI	Main ranch	30-Jan-15	David Dewey	10

Discussion

While three terrestrial bird species exhibited fewer detections in 2016 (Song Sparrow and Western Meadowlark on Anacapa Island, and Allen's Hummingbird on Santa Cruz Island) than in previous years, nine species exhibited increased detections compared to previous years (Rock Wren and Spotted Towhee on two islands, White-crowned Sparrow on four islands; Horned Lark, House Finch, Orange-crowned Warbler, Song Sparrow, Rufous-crowned Sparrow, and Western Meadowlark each on one island). The other species did not appear to exhibit marked or dramatic changes in abundances in 2016.

These results must be interpreted with caution, however, since the present evaluation only relied on a simple assessment of graphed detections (which are an index of abundance). Trends in bird numbers are better revealed by analyses of densities, such as through distance analyses (i.e., Coonan et al. 2015, Coonan et al. 2011b) to account for differences in detection rates.

In 2016, each observer was skilled in bird vocalization and sight identification and also island logistics. As a result of the observers' unique qualifications, this year's data collection was efficient and the authors' confidence in detection accuracy is high. However, it is important to note that inter-observer differences, environmental factors (i.e., variability in wind speeds and fog density), and only one count (replicate) per season on each point and transect may affect the accuracy of estimates of species' density. These factors are significant challenges to any monitoring program, and should be evaluated carefully and thoroughly to minimize misrepresentation of trends in density.

Recommendations

Two issues came to our attention during this project in 2016. First, L. Hall and P. Larramendy noted that on Santa Rosa Island annual grassland plant community appears to be under-sampled, given the distribution of sample points. Apparent under-sampling of grassland species such as Grasshopper Sparrows, Horned Larks, Western Meadow Larks, and Loggerhead Shrike may result in an inaccurate assessment of these species' trends on the island. Thus, we recommend that the vegetation type for each sampling point be updated with the classification from the most recent vegetation map, or a field visit if necessary. Once vegetation types are updated, the allocation of sampling points by vegetation type (or other strata) should be evaluated.

Second, conducting only one visit per point or transect per year is a limitation of this monitoring program because of weather biases and bird-detection biases inherent in bird sampling. Trends in abundance based on single visit surveys would likely be highly dependent on untestable assumptions about annual variability in survey timing, conditions, and migratory arrival patterns. The subsequent reduction in power would result in longer time periods necessary to detect population trends, increased potential for detecting false trends, and decreased efficacy of passerine conservation programs in general (Schmidt et al. 2013).

While some biases in bird detections can be, to a certain extent, addressed through analysis and inclusion of covariates (e.g. temperature, wind speed, observer), ideally multiple counts (visits) at each point or transect would be performed within in a season (Schmidt et al. 2013). We recommend MEDN and the park work with a statistician familiar with avian sampling data to evaluate the current protocol in light of several newly available analytical techniques (e.g. Yuichi et al. 2016) that would improve the accuracy of landbird density and abundance estimates.

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Appendix A. Resident Breeder Species List

Scientific Name	Common Name
<i>Accipiter cooperii</i>	Cooper's Hawk
<i>Aeronautes saxatalis</i>	White-throated Swift
<i>Agelaius phoeniceus</i>	Red-winged Blackbird
<i>Aimophila ruficeps</i>	Rufous-crowned Sparrow
<i>Ammodramus savannarum</i>	Grasshopper Sparrow
<i>Anas platyrhynchos</i>	Mallard
<i>Aphelocoma insularis</i>	Island Scrub-Jay
<i>Aquila chrysaetos</i>	Golden Eagle
<i>Asio flammeus</i>	Short-eared Owl
<i>Athene cunicularia</i>	Burrowing Owl
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Callipepla californica</i>	California Quail
<i>Calypte anna</i>	Anna's Hummingbird
<i>Calypte costae</i>	Costa's Hummingbird
<i>Carduelis psaltria</i>	Lesser Goldfinch
<i>Carpodacus mexicanus</i>	House Finch
<i>Colaptes auratus</i>	Northern Flicker
<i>Columba livia</i>	Rock pigeon
<i>Corvus corax</i>	Common Raven
<i>Empidonax difficilis</i>	Pacific-slope Flycatcher
<i>Eremophila alpestris</i>	Horned Lark
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Falco sparverius</i>	American Kestrel
<i>Fulica americana</i>	American Coot
<i>Haliaeetus leucocephalus</i>	Bald Eagle
<i>Hirundo rustica</i>	Barn Swallow
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Melanerpes formicivorus</i>	Acorn Woodpecker
<i>Melospiza melodia</i>	Song Sparrow
<i>Mimus polyglottos</i>	Northern Mockingbird
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow
<i>Phalacrocorax penicillatus</i>	Brandt's Cormorant
<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak
<i>Pipilo maculatus</i>	Spotted Towhee
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher
<i>Psaltiriparus minimus</i>	Bushtit
<i>Rallus limicola</i>	Virginia Rail
<i>Salpinctes obsoletus</i>	Rock Wren
<i>Sayornis nigricans</i>	Black Phoebe
<i>Selasphorus sasin</i>	Allen's Hummingbird
<i>Sitta canadensis</i>	Red-breasted Nuthatch
<i>Spizella passerine</i>	Chipping Sparrow
<i>Sturnella neglecta</i>	Western Meadowlark
<i>Sturnus vulgaris</i>	European Starling
<i>Thryomanes bewickii</i>	Bewick's Wren
<i>Turdus migratorius</i>	American Robin

Scientific Name	Common Name
<i>Tyto alba</i>	Barn Owl
<i>Vermivora celata</i>	Orange-crowned Warbler
<i>Vireo huttoni</i>	Hutton's Vireo
<i>Zenaida macroura</i>	Mourning Dove

Appendix B. 2016 Landbird Monitoring Site Observers

Anacapa Island

Site	Point Count or Line Transect	Survey Date	Observer
AE01	PC	3/10/2016	Larramendy_Peter
AE02	PC	3/10/2016	Larramendy_Peter
AE03	PC	3/10/2016	Larramendy_Peter
AE04	PC	3/11/2016	Larramendy_Peter
AE05	PC	3/10/2016	Larramendy_Peter
AE06	PC	3/10/2016	Larramendy_Peter
AE07	PC	3/10/2016	Larramendy_Peter
AE08	PC	3/10/2016	Larramendy_Peter
TRLS	LT	3/11/2016	Larramendy_Peter

San Miguel Island

Site	Point Count or Line Transect	Survey Date	Observer
HRRS	LT	4/7/2016	Larramendy_Peter
LKBD	LT	4/16/2016	Larramendy_Peter
NDVR	LT	4/9/2016	Larramendy_Peter
SM01	PC	4/8/2016	Larramendy_Peter
SM02	PC	4/8/2016	Larramendy_Peter
SM03	PC	4/17/2016	Larramendy_Peter
SM04	PC	4/6/2016	Larramendy_Peter
SM05	PC	4/7/2016	Larramendy_Peter
SM06	PC	4/7/2016	Larramendy_Peter
SM07	PC	4/7/2016	Larramendy_Peter
SM08	PC	4/7/2016	Larramendy_Peter
SM09	PC	4/9/2016	Larramendy_Peter
SM10	PC	4/9/2016	Larramendy_Peter
SM11	PC	4/9/2016	Larramendy_Peter
SM12	PC	4/9/2016	Larramendy_Peter
SM13	PC	4/10/2016	Larramendy_Peter
SM14	PC	4/8/2016	Larramendy_Peter
SM15	PC	4/11/2016	Larramendy_Peter
SM16	PC	4/11/2016	Larramendy_Peter
SM17	PC	4/10/2016	Larramendy_Peter
SM18	PC	4/10/2016	Larramendy_Peter
SM19	PC	4/8/2016	Larramendy_Peter
SM20	PC	4/6/2016	Larramendy_Peter
SM21	PC	4/6/2016	Larramendy_Peter
SM22	PC	4/6/2016	Larramendy_Peter
SM23	PC	4/6/2016	Larramendy_Peter
SM24	PC	4/6/2016	Larramendy_Peter
SM25	PC	4/6/2016	Larramendy_Peter
SM26	PC	4/6/2016	Larramendy_Peter
SM27	PC	4/6/2016	Larramendy_Peter
SM28	PC	4/8/2016	Larramendy_Peter

San Miguel Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SM29	PC	4/8/2016	Larramendy_Peter
SM30	PC	4/8/2016	Larramendy_Peter
SM31	PC	4/11/2016	Larramendy_Peter
SM32	PC	4/11/2016	Larramendy_Peter
SM33	PC	4/16/2016	Larramendy_Peter
SM34	PC	4/16/2016	Larramendy_Peter
SM35	PC	4/16/2016	Larramendy_Peter
SM36	PC	4/16/2016	Larramendy_Peter
SM37	PC	4/17/2016	Larramendy_Peter
SM38	PC	4/17/2016	Larramendy_Peter
SM39	PC	4/17/2016	Larramendy_Peter
SM40	PC	4/17/2016	Larramendy_Peter
SMHL	LT	4/11/2016	Larramendy_Peter
WLLW	LT	4/15/2016	Larramendy_Peter

Santa Barbara Island

Site	Point Count or Line Transect	Survey Date	Observer
ARCH	LT	3/5/2016	Larramendy_Peter
CNYN	LT	3/3/2016	Larramendy_Peter
SB01	PC	2/28/2016	Larramendy_Peter
SB02	PC	2/28/2016	Larramendy_Peter
SB03	PC	3/3/2016	Larramendy_Peter
SB04	PC	2/28/2016	Larramendy_Peter
SB05	PC	2/28/2016	Larramendy_Peter
SB06	PC	3/3/2016	Larramendy_Peter
SB07	PC	2/28/2016	Larramendy_Peter
SB08	PC	2/28/2016	Larramendy_Peter
SB09	PC	2/28/2016	Larramendy_Peter
SB10	PC	3/3/2016	Larramendy_Peter
SB11	PC	3/3/2016	Larramendy_Peter
SB12	PC	3/3/2016	Larramendy_Peter
SB13	PC	2/28/2016	Larramendy_Peter
SB14	PC	2/28/2016	Larramendy_Peter
SB15	PC	3/3/2016	Larramendy_Peter
SB16	PC	2/28/2016	Larramendy_Peter
SB17	PC	2/28/2016	Larramendy_Peter
SB18	PC	2/28/2016	Larramendy_Peter
SB19	PC	2/28/2016	Larramendy_Peter
SB20	PC	3/1/2016	Larramendy_Peter
SB21	PC	3/2/2016	Larramendy_Peter
SB22	PC	2/28/2016	Larramendy_Peter
SB23	PC	3/3/2016	Larramendy_Peter
SB24	PC	3/3/2016	Larramendy_Peter
SB25	PC	2/29/2016	Larramendy_Peter
SB26	PC	3/3/2016	Larramendy_Peter
SB27	PC	2/29/2016	Larramendy_Peter

Santa Barbara Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SB28	PC	3/3/2016	Larramendy_Peter
SB29	PC	3/3/2016	Larramendy_Peter
SB30	PC	3/3/2016	Larramendy_Peter
SB31	PC	3/3/2016	Larramendy_Peter
SB32	PC	3/3/2016	Larramendy_Peter
SB33	PC	3/3/2016	Larramendy_Peter
SGNL	LT	3/4/2016	Larramendy_Peter

Santa Cruz Island

Site	Point Count or Line Transect	Survey Date	Observer
SC001	PC	3/24/2016	Villasenor_Cedrick_E
SC002	PC	3/24/2016	Villasenor_Cedrick_E
SC003	PC	3/24/2016	Villasenor_Cedrick_E
SC004	PC	3/24/2016	Villasenor_Cedrick_E
SC005	PC	3/24/2016	Searcy_Adam_J
SC006	PC	3/24/2016	Searcy_Adam_J
SC007	PC	3/24/2016	Searcy_Adam_J
SC008	PC	3/24/2016	Searcy_Adam_J
SC009	PC	3/26/2016	Searcy_Adam_J
SC010	PC	3/26/2016	Searcy_Adam_J
SC011	PC	3/26/2016	Searcy_Adam_J
SC012	PC	3/26/2016	Searcy_Adam_J
SC013	PC	3/26/2016	Searcy_Adam_J
SC014	PC	3/26/2016	Searcy_Adam_J
SC015	PC	3/26/2016	Villasenor_Cedrick_E
SC016	PC	3/24/2016	Hall_Linnea_S
SC017	PC	3/24/2016	Hall_Linnea_S
SC018	PC	3/24/2016	Hall_Linnea_S
SC019	PC	3/25/2016	Laughrin_Lyndal
SC020	PC	3/25/2016	Laughrin_Lyndal
SC021	PC	3/25/2016	Laughrin_Lyndal
SC022	PC	3/25/2016	Laughrin_Lyndal
SC023	PC	3/25/2016	Laughrin_Lyndal
SC024	PC	3/25/2016	Laughrin_Lyndal
SC025	PC	3/26/2016	Villasenor_Cedrick_E
SC026	PC	3/26/2016	Hall_Linnea_S
SC027	PC	3/26/2016	Laughrin_Lyndal
SC028	PC	3/26/2016	Laughrin_Lyndal
SC029	PC	3/26/2016	Laughrin_Lyndal
SC030	PC	3/27/2016	Laughrin_Lyndal
SC031	PC	3/27/2016	Laughrin_Lyndal
SC032	PC	3/27/2016	Searcy_Adam_J
SC033	PC	3/27/2016	Searcy_Adam_J
SC034	PC	3/27/2016	Searcy_Adam_J
SC035	PC	3/27/2016	Searcy_Adam_J

Santa Cruz Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SC036	PC	3/27/2016	Searcy_Adam_J
SC037	PC	3/27/2016	Searcy_Adam_J
SC038	PC	3/27/2016	Villasenor_Cedrick_E
SC039	PC	3/27/2016	Villasenor_Cedrick_E
SC040	PC	3/27/2016	Villasenor_Cedrick_E
SC041	PC	3/27/2016	Villasenor_Cedrick_E
SC042	PC	3/25/2016	Searcy_Adam_J
SC043	PC	3/25/2016	Searcy_Adam_J
SC044	PC	3/25/2016	Searcy_Adam_J
SC045	PC	3/25/2016	Searcy_Adam_J
SC046	PC	3/25/2016	Searcy_Adam_J
SC047	PC	3/25/2016	Searcy_Adam_J
SC048	PC	3/25/2016	Searcy_Adam_J
SC049	PC	3/25/2016	Searcy_Adam_J
SC050	PC	3/25/2016	Villasenor_Cedrick_E
SC051	PC	3/25/2016	Villasenor_Cedrick_E
SC052	PC	3/25/2016	Villasenor_Cedrick_E
SC053	PC	3/25/2016	Villasenor_Cedrick_E
SC054	PC	3/25/2016	Villasenor_Cedrick_E
SC055	PC	3/25/2016	Villasenor_Cedrick_E
SC056	PC	3/25/2016	Villasenor_Cedrick_E
SC057	PC	3/21/2016	Larramendy_Peter
SC058	PC	3/21/2016	Larramendy_Peter
SC059	PC	3/21/2016	Larramendy_Peter
SC060	PC	3/21/2016	Larramendy_Peter
SC061	PC	3/21/2016	Larramendy_Peter
SC062	PC	3/21/2016	Larramendy_Peter
SC063	PC	3/21/2016	Larramendy_Peter
SC064	PC	3/21/2016	Larramendy_Peter
SC065	PC	3/21/2016	Larramendy_Peter
SC066	PC	3/21/2016	Larramendy_Peter
SC067	PC	3/27/2016	Hall_Linnea_S
SC068	PC	3/27/2016	Hall_Linnea_S
SC069	PC	3/24/2016	Laughrin_Lyndal
SC070	PC	3/24/2016	Laughrin_Lyndal
SC071	PC	3/24/2016	Laughrin_Lyndal
SC072	PC	3/27/2016	Hall_Linnea_S
SC073	PC	3/26/2016	Hall_Linnea_S
SC074	PC	3/24/2016	Laughrin_Lyndal
SC075	PC	3/24/2016	Laughrin_Lyndal
SC076	PC	3/24/2016	Laughrin_Lyndal
SC077	PC	3/24/2016	Hall_Linnea_S
SC078	PC	3/24/2016	Hall_Linnea_S
SC079	PC	3/24/2016	Hall_Linnea_S
SC080	PC	3/24/2016	Hall_Linnea_S
SC081	PC	3/25/2016	Hall_Linnea_S
SC082	PC	3/25/2016	Hall_Linnea_S

Santa Cruz Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SC083	PC	3/25/2016	Hall_Linnea_S
SC084	PC	3/26/2016	Laughrin_Lyndal
SC085	PC	3/25/2016	Hall_Linnea_S
SC086	PC	3/25/2016	Hall_Linnea_S
SC087	PC	3/25/2016	Hall_Linnea_S
SC088	PC	3/25/2016	Hall_Linnea_S
SC089	PC	3/26/2016	Hall_Linnea_S
SC090	PC	3/26/2016	Hall_Linnea_S
SC091	PC	3/26/2016	Hall_Linnea_S
SC092	PC	3/26/2016	Hall_Linnea_S
SC093	PC	3/26/2016	Hall_Linnea_S
SC094	PC	3/25/2016	Hall_Linnea_S
SC095	PC	3/27/2016	Villasenor_Cedrick_E
SC096	PC	3/26/2016	Laughrin_Lyndal
SC097	PC	3/26/2016	Laughrin_Lyndal
SC098	PC	3/24/2016	Searcy_Adam_J
SC099	PC	3/26/2016	Villasenor_Cedrick_E
SC100	PC	3/26/2016	Searcy_Adam_J
SC109	PC	3/19/2016	Larramendy_Peter
SC110	PC	3/19/2016	Larramendy_Peter
SC111	PC	3/19/2016	Larramendy_Peter
SC112	PC	3/19/2016	Larramendy_Peter
SC113	PC	3/19/2016	Larramendy_Peter
SC114	PC	3/19/2016	Larramendy_Peter
SC115	PC	3/19/2016	Larramendy_Peter
SC116	PC	3/19/2016	Larramendy_Peter
SC117	PC	3/19/2016	Larramendy_Peter
SC118	PC	3/19/2016	Larramendy_Peter
SC119	PC	3/19/2016	Larramendy_Peter
SC120	PC	3/19/2016	Larramendy_Peter

Santa Rosa Island

Site	Point Count or Line Transect	Survey Date	Observer
SR001	PC	5/20/2016	Hall_Linnea_S
SR002	PC	5/20/2016	Hall_Linnea_S
SR003	PC	5/20/2016	Hall_Linnea_S
SR004	PC	5/6/2016	Searcy_Adam_J
SR005	PC	5/6/2016	Searcy_Adam_J
SR006	PC	5/6/2016	Searcy_Adam_J
SR007	PC	5/23/2016	Larramendy_Peter
SR008	PC	5/23/2016	Larramendy_Peter
SR009	PC	5/23/2016	Larramendy_Peter
SR010	PC	5/5/2016	Schwarz_Christian_F
SR011	PC	5/20/2016	Hall_Linnea_S

Santa Rosa Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SR012	PC	5/20/2016	Hall_Linnea_S
SR013	PC	5/20/2016	Larramendy_Peter
SR014	PC	5/20/2016	Larramendy_Peter
SR015	PC	5/20/2016	Larramendy_Peter
SR016	PC	5/6/2016	Searcy_Adam_J
SR017	PC	5/6/2016	Searcy_Adam_J
SR018	PC	5/6/2016	Searcy_Adam_J
SR019	PC	5/18/2016	Larramendy_Peter
SR020	PC	5/18/2016	Larramendy_Peter
SR021	PC	5/18/2016	Larramendy_Peter
SR022	PC	5/4/2016	Schwarz_Christian_F
SR023	PC	5/4/2016	Schwarz_Christian_F
SR024	PC	5/4/2016	Schwarz_Christian_F
SR025	PC	5/4/2016	Searcy_Adam_J
SR026	PC	5/4/2016	Searcy_Adam_J
SR027	PC	5/4/2016	Searcy_Adam_J
SR028	PC	5/22/2016	Larramendy_Peter
SR029	PC	5/22/2016	Larramendy_Peter
SR030	PC	5/22/2016	Larramendy_Peter
SR031	PC	5/2/2016	Schwarz_Christian_F
SR032	PC	5/2/2016	Schwarz_Christian_F
SR033	PC	5/2/2016	Schwarz_Christian_F
SR034	PC	4/7/2016	Villasenor_Cedrick_E
SR035	PC	4/7/2016	Villasenor_Cedrick_E
SR036	PC	4/7/2016	Villasenor_Cedrick_E
SR037	PC	5/2/2016	Searcy_Adam_J
SR038	PC	5/2/2016	Searcy_Adam_J
SR039	PC	5/2/2016	Searcy_Adam_J
SR040	PC	5/19/2016	Hall_Linnea_S
SR041	PC	5/19/2016	Hall_Linnea_S
SR042	PC	5/19/2016	Hall_Linnea_S
SR043	PC	5/18/2016	Hall_Linnea_S
SR044	PC	5/18/2016	Hall_Linnea_S
SR045	PC	5/18/2016	Hall_Linnea_S
SR046	PC	4/9/2016	Villasenor_Cedrick_E
SR047	PC	4/9/2016	Villasenor_Cedrick_E
SR048	PC	4/9/2016	Villasenor_Cedrick_E
SR049	PC	5/18/2016	Larramendy_Peter
SR050	PC	5/18/2016	Larramendy_Peter
SR051	PC	5/18/2016	Larramendy_Peter
SR052	PC	4/11/2016	Villasenor_Cedrick_E
SR053	PC	4/11/2016	Villasenor_Cedrick_E
SR054	PC	4/11/2016	Villasenor_Cedrick_E
SR055	PC	4/6/2016	Villasenor_Cedrick_E
SR056	PC	4/6/2016	Villasenor_Cedrick_E
SR057	PC	4/6/2016	Villasenor_Cedrick_E
SR058	PC	5/19/2016	Larramendy_Peter
SR059	PC	4/6/2016	Villasenor_Cedrick_E

Santa Rosa Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SR060	PC	4/6/2016	Villasenor_Cedrick_E
SR061	PC	4/11/2016	Villasenor_Cedrick_E
SR062	PC	5/3/2016	Searcy_Adam_J
SR063	PC	5/3/2016	Searcy_Adam_J
SR064	PC	4/11/2016	Villasenor_Cedrick_E
SR065	PC	5/3/2016	Searcy_Adam_J
SR066	PC	5/3/2016	Searcy_Adam_J
SR067	PC	5/3/2016	Searcy_Adam_J
SR068	PC	5/3/2016	Schwarz_Christian_F
SR069	PC	5/3/2016	Schwarz_Christian_F
SR070	PC	5/3/2016	Schwarz_Christian_F
SR071	PC	5/3/2016	Schwarz_Christian_F
SR072	PC	5/3/2016	Schwarz_Christian_F
SR073	PC	5/7/2016	Searcy_Adam_J
SR074	PC	5/7/2016	Searcy_Adam_J
SR075	PC	4/8/2016	Villasenor_Cedrick_E
SR076	PC	5/18/2016	Larramendy_Peter
SR077	PC	5/18/2016	Larramendy_Peter
SR078	PC	5/18/2016	Larramendy_Peter
SR079	PC	5/20/2016	Hall_Linnea_S
SR080	PC	5/5/2016	Schwarz_Christian_F
SR081	PC	5/5/2016	Schwarz_Christian_F
SR082	PC	5/5/2016	Schwarz_Christian_F
SR083	PC	5/5/2016	Searcy_Adam_J
SR084	PC	4/10/2016	Villasenor_Cedrick_E
SR085	PC	5/5/2016	Searcy_Adam_J
SR086	PC	5/5/2016	Searcy_Adam_J
SR087	PC	4/10/2016	Villasenor_Cedrick_E
SR088	PC	4/10/2016	Villasenor_Cedrick_E
SR089	PC	5/7/2016	Searcy_Adam_J
SR090	PC	4/8/2016	Villasenor_Cedrick_E
SR091	PC	5/7/2016	Searcy_Adam_J
SR092	PC	5/19/2016	Larramendy_Peter
SR093	PC	5/7/2016	Searcy_Adam_J
SR094	PC	4/10/2016	Villasenor_Cedrick_E
SR095	PC	5/19/2016	Larramendy_Peter
SR096	PC	5/21/2016	Hall_Linnea_S
SR097	PC	5/21/2016	Larramendy_Peter
SR098	PC	5/21/2016	Larramendy_Peter
SR099	PC	5/22/2016	Hall_Linnea_S
SR100	PC	5/7/2016	Searcy_Adam_J
SR101	PC	4/8/2016	Villasenor_Cedrick_E
SR102	PC	4/8/2016	Villasenor_Cedrick_E
SR103	PC	4/6/2016	Villasenor_Cedrick_E
SR104	PC	4/8/2016	Villasenor_Cedrick_E
SR105	PC	5/24/2016	Larramendy_Peter
SR106	PC	4/7/2016	Villasenor_Cedrick_E
SR107	PC	4/7/2016	Villasenor_Cedrick_E

Santa Rosa Island (continued)

Site	Point Count or Line Transect	Survey Date	Observer
SR108	PC	4/7/2016	Villasenor_Cedrick_E
SR109	PC	4/7/2016	Villasenor_Cedrick_E
SR110	PC	4/7/2016	Villasenor_Cedrick_E
SR111	PC	5/19/2016	Larramendy_Peter
SR112	PC	5/19/2016	Larramendy_Peter
SR113	PC	5/19/2016	Larramendy_Peter
SR114	PC	5/19/2016	Larramendy_Peter
SR115	PC	5/19/2016	Larramendy_Peter
SR116	PC	5/18/2016	Hall_Linnea_S
SR117	PC	5/18/2016	Hall_Linnea_S
SR118	PC	5/18/2016	Hall_Linnea_S
SR119	PC	5/18/2016	Hall_Linnea_S
SR120	PC	5/18/2016	Hall_Linnea_S
SR121	PC	5/4/2016	Schwarz_Christian_F
SR122	PC	5/4/2016	Schwarz_Christian_F
SR123	PC	5/4/2016	Schwarz_Christian_F
SR124	PC	5/4/2016	Searcy_Adam_J
SR125	PC	5/4/2016	Searcy_Adam_J
SR126	PC	5/22/2016	Larramendy_Peter
SR127	PC	5/22/2016	Larramendy_Peter
SR128	PC	5/22/2016	Larramendy_Peter
SR129	PC	5/22/2016	Larramendy_Peter
SR130	PC	5/22/2016	Larramendy_Peter
SR131	PC	5/24/2016	Larramendy_Peter
SR132	PC	5/5/2016	Searcy_Adam_J
SR133	PC	5/5/2016	Searcy_Adam_J
SR134	PC	5/5/2016	Searcy_Adam_J
SR135	PC	5/5/2016	Schwarz_Christian_F
SR136	PC	5/5/2016	Schwarz_Christian_F
SR137	PC	5/19/2016	Hall_Linnea_S
SR138	PC	5/19/2016	Hall_Linnea_S
SR139	PC	5/19/2016	Hall_Linnea_S
SR140	PC	5/19/2016	Hall_Linnea_S
SR141	PC	5/21/2016	Hall_Linnea_S
SR142	PC	5/21/2016	Larramendy_Peter
SR143	PC	4/11/2016	Villasenor_Cedrick_E
SR144	PC	4/10/2016	Villasenor_Cedrick_E
SR145	PC	5/19/2016	Larramendy_Peter

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
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