



Landbird Monitoring 2013 Annual Report

Channel Islands National Park

Natural Resource Data Series NPS/MEDN/NRDS—2014/713



ON THE COVER

Song Sparrow (*Melospiza melodia*) on San Miguel Island. Photo by Brad Sillasen with permission.

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The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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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 $<3 \text{ km}^2$ (Anacapa and Santa Barbara Islands) to $>200 \text{ km}^2$ (Santa Rosa and Santa Cruz Islands). Forty-four landbird species are known to breed on the park islands. Nine endemic bird taxa occur on the five park islands (Johnson 1972).

The National Park Service (NPS) established a monitoring program for landbirds at CHIS in 1988 as part of its long-term ecological monitoring program for the park (Davis et al. 1994). Landbirds have been monitored annually at Channel Islands National Park since 1993. Data were originally collected according to van Riper III et al. (1988), until the program underwent a review in 2000 (McEachern 2000) and the protocol was revised (Coonan et al. 2011). This monitoring is implemented by CHIS staff in collaboration with the NPS Mediterranean Coast Network Inventory and Monitoring Program. The overall objective of the landbird monitoring program is to detect changes in the abundance or distribution of the breeding landbirds in the park (van Riper III et al. 1988, Coonan et al. 2011).

Summary of Landbird Monitoring in 2013

In 2013, landbird monitoring at Channel Islands National Park was conducted from late February to early July on both line transects and point counts according to the methods described in Coonan et al. (2011). In 2013 we also began monitoring on Santa Cruz Island, at 100 point count sites established by R.C. Klinger of The Nature Conservancy in 1993, and at 12 point count sites we established on East Santa Cruz Island (Fig. 1; see Coonan et al. 2011 for maps of landbird sites on other islands). The TNC sites, as well as the 12 on East Santa Cruz Island, were spaced $\frac{1}{2}$ mile apart on the island's major roads and trails, with a random compass bearing to the plot (within 150 m of the road or trail) (Klinger 1998).

Island tour dates for data collection are given in Table 1. Data were collected by park staff, interns and experienced volunteers. Using distance-based sampling methods (Buckland et al. 2001), we surveyed birds on at 11 line transects (4 on Santa Barbara Island, 1 on east Anacapa Island, and 5 on San Miguel Island), and at 339 point count sites. The methodology used in 2013 did not vary from the protocol (Coonan et al. 2011).

Data were entered into the CHIS Landbird Database and quality checked and verified for errors by program staff. 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 2013 have been verified, validated, and certified to ensure they are error-free to the greatest extent possible.

The total number of individuals of each species detected on all islands in 2013 is 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.

Parkwide, the most commonly detected landbirds in 2013 were, in descending order, Song Sparrow, Western Meadowlark, Spotted Towhee, Orange-Crowned Warbler, Bewick's Wren and House Finch. The most common birds on each island were different. Species that occurred at $\geq 50\%$ of point count sites included one on Anacapa Island (Song Sparrow), two on Santa Barbara Island (Horned Lark and Western Meadowlark), six on Santa Cruz Island (Bewick's Wren, Island Scrub-Jay, Northern Flicker, Orange-crowned Warbler, Song Sparrow and Spotted Towhee), four on San Miguel Island (Common Raven, Orange-crowned Warbler, Song Sparrow and Western Meadowlark) and seven on Santa Rosa Island (Bewick's Wren, Chipping Sparrow, House Finch, Orange-crowned Warbler, Song Sparrow, Spotted Towhee and Western Meadowlark).

Figures 2 - 5 show, for each species on each island, the mean number of birds per station in 2013 compared to the average number of birds per station over all years of sampling. Only one year of data is available for Santa Cruz Island landbirds, so no observations of trends are possible. On Anacapa, Orange-crowned Warblers and Western Meadowlarks were less abundant than in the past, whereas Song Sparrows were more abundant. The latter may have returned to regularly breeding on the island. On Santa Barbara, White-crowned Sparrows and Yellow-rumped Warblers were less abundant in 2013. Both species are migrants that do not breed on park islands. Horned Larks, House Finches, Orange-crowned Warblers, Song Sparrows and Western Meadowlarks were relatively more abundant on San Miguel, as were Bewick's Wrens, House Finches, Orange-crowned Warblers, Song Sparrows, Spotted Towhees and Western Meadowlarks on Santa Rosa. American Kestrels were less abundant in Santa Rosa in 2013.

The species richness graphics in Figures 6-10 summarize patterns of species occurrences on each island since 1993. This analysis includes data from both line transects and point counts, but does not include incidental observations of species recorded 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. On Anacapa Island, Yellow-rumped warblers have not been detected during counts since 1996, and American Kestrel were last detected in 2001, whereas a Hutton's Vireo was observed for the first time in 2013. On Santa Barbara Island, Burrowing Owls were last detected in 1995, and Merlins in 1998. On San Miguel Island, Wilson's Warblers first started showing up in 2006, and Townsend's Warbler began being detected on counts in 2007. On Santa Rosa, Bushtits, which breed on neighboring Santa Cruz Island, have been detected since 2009, and may now be breeding on Santa Rosa.

Only one non-native species was observed during landbird monitoring in 2013. Three European Starlings were observed on Santa Cruz Island. Starlings were not observed on Santa Rosa in 2013, though 6 had been observed in 2012, after being absent since 1998. Starlings were last observed on Anacapa in 1998, on Santa Barbara in 1997, and on San Miguel in 2001. No Eurasian Collared Doves were observed in 2013, though one was observed on San Miguel in 2011, and on Santa Rosa in 2008.

Table 1. Start and end dates of landbird monitoring survey tours on each island in 2013, with the number of line transects or 10-minute point counts listed for each tour.

Island	Start Date	End Date	# Transects	# Point Counts
Anacapa	03/23/2013	03/24/2013	1	7
Santa Barbara	02/27/2013	03/06/2013	4	24
Santa Cruz	03/22/2013	03/28/2013	0	98
Santa Cruz	04/17/2013	04/19/2013	0	5
Santa Cruz	04/02/2013	04/05/2013	0	8
Santa Cruz	04/29/2013	05/06/2013	0	8
Santa Cruz	04/09/2013	04/11/2013	0	7
Santa Cruz	04/09/2013	04/16/2013	0	2
San Miguel	04/09/2013	04/16/2013	3	3
San Miguel	05/07/2013	05/14/2013	0	13
San Miguel	06/25/2013	07/02/2013	0	3
San Miguel	06/04/2013	06/11/2013	2	21
Santa Rosa	04/23/2013	04/30/2013	0	54
Santa Rosa	05/14/2013	05/21/2013	0	25
Santa Rosa	05/21/2013	05/28/2013	0	29
Santa Rosa	05/07/2013	05/14/2013	0	32

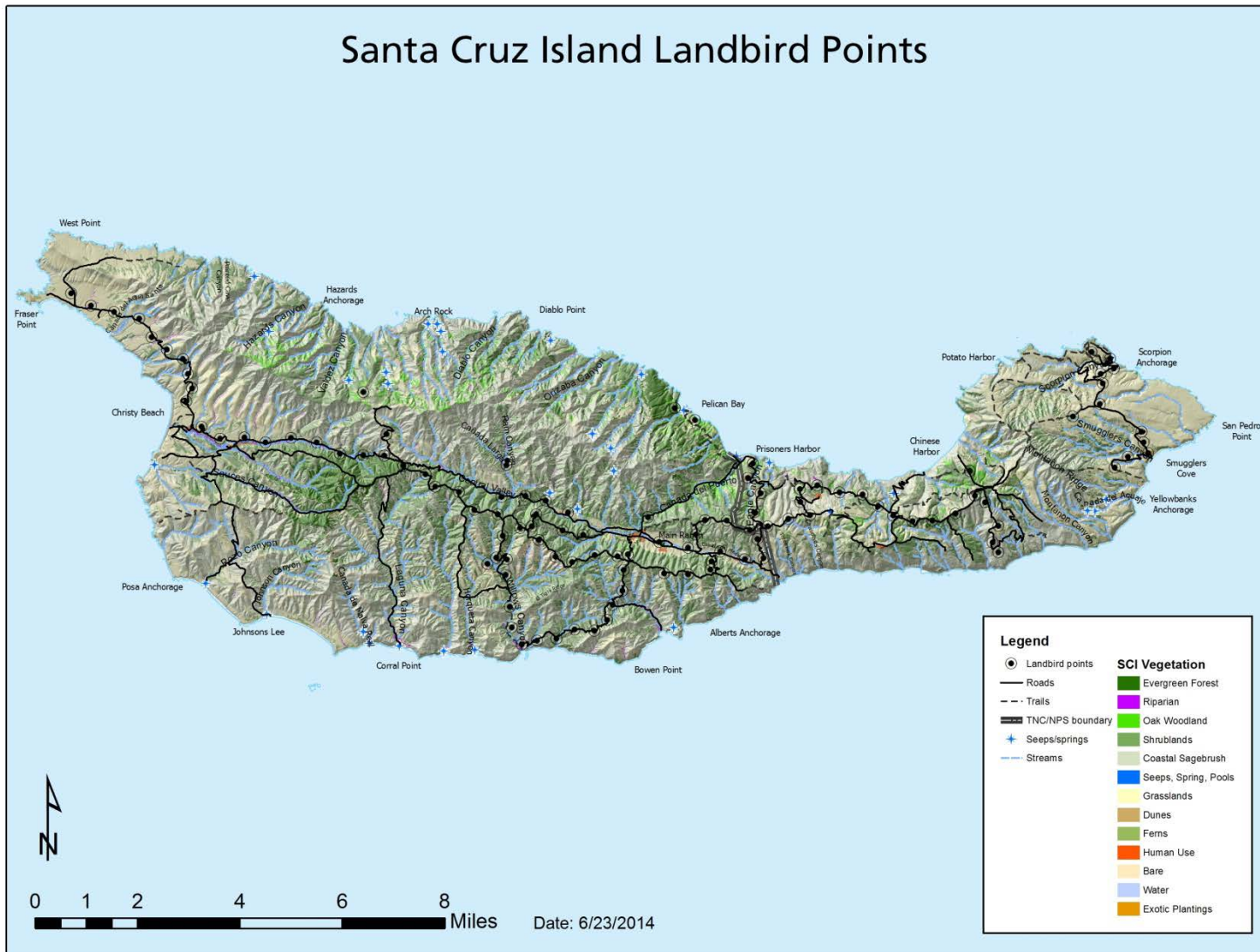


Figure 1. Location of point count sites on Santa Cruz Island.

Table 2. Number of individuals of each species detected during bird surveys on all islands in 2013. 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>	59			55		4
Allen's Hummingbird	<i>Selasphorus sasin</i>	121			33	39	49
American Kestrel	<i>Falco sparverius</i>	16		12	4		
American Robin	<i>Turdus migratorius</i>	1			1		
Anna's Hummingbird	<i>Calypte anna</i>	49			31	7	11
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	5			4	1	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	3			1	1	1
Barn Swallow	<i>Hirundo rustica</i>	85			59	3	23
Belted Kingfisher	<i>Ceryle alcyon</i>	1			1		
Bewick's Wren	<i>Thryomanes bewickii</i>	505	11		266		228
Black-chinned Sparrow	<i>Spizella atrogularis</i>	1			1		
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	8			6	1	1
Black Phoebe	<i>Sayornis nigricans</i>	15			9		6
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	10			9		1
Bushtit	<i>Psaltirparus minimus</i>	57			32		25
California Quail	<i>Callipepla californica</i>	78			60		18
Chipping Sparrow	<i>Spizella passerina</i>	182			42	1	139
Common Raven	<i>Corvus corax</i>	215			55	89	71
Common Yellowthroat	<i>Geothlypis trichas</i>	5			3		2
Cooper's Hawk	<i>Accipiter cooperii</i>	3			3		
Dark-eyed Junco	<i>Junco hyemalis</i>	1				1	
European Starling	<i>Sturnus vulgaris</i>	3			3		
Fox Sparrow	<i>Passerella iliaca</i>	3			2	1	
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	30			20	10	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	21			18		3
Hermit Thrush	<i>Catharus guttatus</i>	10			8	2	
Hooded Oriole	<i>Icterus cucullatus</i>	1			1		
Horned Lark	<i>Eremophila alpestris</i>	287		144	6	113	24

Common Name	Scientific Name	Total # Detected	Anacapa	Santa Barbara	Santa Cruz	San Miguel	Santa Rosa
House Finch	<i>Carpodacus mexicanus</i>	412			90	61	261
House Sparrow	<i>Passer domesticus</i>	3				3	
House Wren	<i>Troglodytes aedon</i>	1		1			
Hutton's Vireo	<i>Vireo huttoni</i>	32	1		25		6
Island Scrub-Jay	<i>Aphelocoma insularis</i>	166			166		
Lesser Goldfinch	<i>Carduelis psaltria</i>	151			65	1	85
Loggerhead Shrike	<i>Lanius ludovicianus</i>	13			2		11
Mallard	<i>Anas platyrhynchos</i>	5			5		
Mourning Dove	<i>Zenaida macroura</i>	7			3		4
Northern Flicker	<i>Colaptes auratus</i>	121			121		
Northern Harrier	<i>Circus cyaneus</i>	9		6		1	2
Northern Mockingbird	<i>Mimus polyglottos</i>	13			3	5	5
Orange-crowned Warbler	<i>Vermivora celata</i>	586	8	17	158	211	192
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	121			10		111
Peregrine Falcon	<i>Falco peregrinus</i>	5	1	4			
Red-breasted Nuthatch	<i>Sitta canadensis</i>	3			3		
Red-tailed Hawk	<i>Buteo jamaicensis</i>	22	1		6	1	14
Rock Wren	<i>Salpinctes obsoletus</i>	16	1	1		8	6
Ruby-crowned Kinglet	<i>Regulus calendula</i>	11			9	1	1
Rufous-crowned Sparrow	<i>Aimophila ruficeps</i>	56			56		
Savannah Sparrow	<i>Passerculus sandwichensis</i>	11			5	4	2
Say's Phoebe	<i>Sayornis saya</i>	9		5	4		
Sharp-shinned Hawk	<i>Accipiter striatus</i>	1			1		
Song Sparrow	<i>Melospiza melodia</i>	772	17		179	325	251
Spotted Towhee	<i>Pipilo maculatus</i>	643			270		373
Townsend's Warbler	<i>Dendroica townsendi</i>	2				2	
Violet-green Swallow	<i>Tachycineta thalassina</i>	1			1		
Virginia Rail	<i>Rallus limicola</i>	1					1
Western Kingbird	<i>Tyrannus verticalis</i>	1					1

Common Name	Scientific Name	Total # Detected	Anacapa	Santa Barbara	Santa Cruz	San Miguel	Santa Rosa
Western Meadowlark	<i>Sturnella neglecta</i>	653	11	67	123	153	299
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	136	39	61	17	19	
White-tailed Kite	<i>Elanus leucurus</i>	1					1
White-throated Swift	<i>Aeronautes saxatalis</i>	1					1
Wilson's Warbler	<i>Wilsonia pusilla</i>	1				1	
Yellow-rumped Warbler	<i>Dendroica coronata</i>	26		4	18	4	
Yellow Warbler	<i>Dendroica petechia</i>	1				1	

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 2013 (8 stations).

Species	# Detected	Mean per Stn	S.E.	# Stns	% Stns
Bewick's Wren	4	0.50	0.28	3	37.5
Orange-crowned Warbler	1	0.12	0.13	1	12.5
Red-tailed Hawk	1	0.12	0.13	1	12.5
Rock Wren	1	0.12	0.13	1	12.5
Song Sparrow	6	0.75	0.24	5	62.5
White-crowned Sparrow	4	0.50	0.40	2	25.0

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 during point count sampling in 2013 (24 stations).

Species	#Detected	Mean per Stn	S.E.	# Stns	% Stns
American Kestrel	7	0.29	0.14	5	20.8
Horned Lark	88	3.67	0.95	19	79.2
Northern Harrier	2	0.08	0.06	2	8.3
Orange-crowned Warbler	7	0.29	0.18	4	16.7
Peregrine Falcon	2	0.08	0.06	2	8.3
Rock Wren	1	0.04	0.04	1	4.2
Say's Phoebe	2	0.08	0.06	2	8.3
Western Meadowlark	31	1.29	0.31	12	50.0
White-crowned Sparrow	3	0.12	0.07	3	12.5
Yellow-rumped Warbler	1	0.04	0.04	1	4.2

Table 5. Santa Cruz 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 during point count sampling in 2013 (126 stations).

Species	#Detected	Mean per Stn	S.E.	# Stns	% Stns
Acorn Woodpecker	31	0.25	0.07	13	10.3
Allen's Hummingbird	28	0.22	0.04	25	19.8
American Kestrel	4	0.03	0.02	4	3.2
American Robin	1	0.01	0.01	1	0.8
Anna's Hummingbird	24	0.19	0.04	21	16.7
Ash-throated Flycatcher	3	0.02	0.01	3	2.4
Bald Eagle	1	0.01	0.01	1	0.8
Barn Swallow	40	0.32	0.13	7	5.6
Belted Kingfisher	1	0.01	0.01	1	0.8
Bewick's Wren	242	1.92	0.12	102	81.0
Black-chinned Sparrow	1	0.01	0.01	1	0.8
Black-headed Grosbeak	5	0.04	0.02	5	4.0
Black Phoebe	8	0.06	0.02	7	5.6
Blue-gray Gnatcatcher	9	0.07	0.03	7	5.6

Species	#Detected	Mean per Stn	S.E.	# Stns	% Stns
Bushtit	32	0.25	0.10	8	6.3
California Quail	60	0.48	0.09	34	27.0
Chipping Sparrow	42	0.33	0.06	28	22.2
Common Raven	55	0.44	0.07	36	28.6
Common Yellowthroat	3	0.02	0.01	3	2.4
Cooper's Hawk	3	0.02	0.01	3	2.4
European Starling	3	0.02	0.02	1	0.8
Fox Sparrow	2	0.02	0.01	2	1.6
Golden-crowned Sparrow	20	0.16	0.08	5	4.0
Grasshopper Sparrow	18	0.14	0.05	11	8.7
Hermit Thrush	8	0.06	0.02	7	5.6
Hooded Oriole	1	0.01	0.01	1	0.8
Horned Lark	6	0.05	0.02	5	4.0
House Finch	75	0.60	0.24	27	21.4
Hutton's Vireo	24	0.19	0.05	17	13.5
Island Scrub-Jay	157	1.25	0.12	77	61.1
Lesser Goldfinch	62	0.49	0.09	35	27.8
Loggerhead Shrike	2	0.02	0.01	2	1.6
Mallard	5	0.04	0.03	2	1.6
Mourning Dove	3	0.02	0.01	3	2.4
Northern Flicker	106	0.84	0.08	73	57.9
Northern Mockingbird	3	0.02	0.01	3	2.4
Orange-crowned Warbler	141	1.12	0.11	70	55.6
Pacific-slope Flycatcher	7	0.06	0.02	6	4.8
Red-breasted Nuthatch	3	0.02	0.02	1	0.8
Red-tailed Hawk	6	0.05	0.02	5	4.0
Ruby-crowned Kinglet	9	0.07	0.03	8	6.3
Rufous-crowned Sparrow	56	0.44	0.08	35	27.8
Savannah Sparrow	5	0.04	0.02	3	2.4
Say's Phoebe	4	0.03	0.02	3	2.4
Sharp-shinned Hawk	1	0.01	0.01	1	0.8
Song Sparrow	153	1.21	0.14	67	53.2
Spotted Towhee	253	2.01	0.12	104	82.5
Violet-green Swallow	1	0.01	0.01	1	0.8
Western Meadowlark	123	0.98	0.28	31	24.6
White-crowned Sparrow	14	0.11	0.05	8	6.3
Yellow-rumped Warbler	18	0.14	0.07	5	4.0

Table 6. San Miguel 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 during point count sampling in 2013 (40 stations).

Species	#Detected	Mean per Stn	S.E.	# Stns	% Stns
Allen's Hummingbird	11	0.28	0.09	8	20.0
Anna's Hummingbird	1	0.02	0.02	1	2.5
Bald Eagle	1	0.02	0.02	1	2.5
Barn Swallow	3	0.08	0.06	2	5.0
Black-headed Grosbeak	1	0.02	0.02	1	2.5
Common Raven	62	1.55	0.28	28	70.0
Horned Lark	61	1.52	0.31	19	47.5
House Finch	40	1.00	0.24	16	40.0
Lesser Goldfinch	1	0.02	0.02	1	2.5
Northern Mockingbird	4	0.10	0.05	4	10.0
Orange-crowned Warbler	109	2.73	0.39	32	80.0
Red-tailed Hawk	1	0.02	0.02	1	2.5
Rock Wren	8	0.20	0.09	6	15.0
Savannah Sparrow	1	0.02	0.02	1	2.5
Song Sparrow	209	5.22	0.49	38	95.0
Townsend's Warbler	2	0.05	0.05	1	2.5
Western Meadowlark	106	2.65	0.34	30	75.0
White-crowned Sparrow	2	0.05	0.05	1	2.5
Wilson's Warbler	1	0.02	0.02	1	2.5
Yellow Warbler	1	0.02	0.02	1	2.5

Table 7. Santa Rosa 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 during point count sampling in 2013 (140 stations).

Species	#Detected	Mean per Stn	S.E.	# Stns	% Stns
Acorn Woodpecker	4	0.03	0.02	3	2.1
Allen's Hummingbird	49	0.35	0.05	42	30.0
Anna's Hummingbird	11	0.08	0.03	8	5.7
Bald Eagle	1	0.01	0.01	1	0.7
Barn Swallow	22	0.16	0.05	13	9.3
Bewick's Wren	227	1.62	0.11	106	75.7
Black-headed Grosbeak	1	0.01	0.01	1	0.7
Black Phoebe	6	0.04	0.02	6	4.3
Blue-gray Gnatcatcher	1	0.01	0.01	1	0.7
Bushtit	25	0.18	0.07	7	5.0
California Quail	18	0.13	0.04	13	9.3
Chipping Sparrow	139	0.99	0.10	78	55.7
Common Raven	69	0.49	0.06	51	36.4
Common Yellowthroat	2	0.01	0.01	2	1.4
Grasshopper Sparrow	3	0.02	0.02	2	1.4
Horned Lark	23	0.16	0.04	17	12.1
House Finch	258	1.84	0.21	82	58.6
Hutton's Vireo	6	0.04	0.02	5	3.6
Lesser Goldfinch	85	0.61	0.12	33	23.6
Loggerhead Shrike	11	0.08	0.03	7	5.0
Mourning Dove	4	0.03	0.01	4	2.9
Northern Harrier	2	0.01	0.01	2	1.4
Northern Mockingbird	5	0.04	0.02	4	2.9
Orange-crowned Warbler	192	1.37	0.13	84	60.0
Pacific-slope Flycatcher	111	0.79	0.08	68	48.6
Red-tailed Hawk	13	0.09	0.03	12	8.6
Rock Wren	6	0.04	0.02	6	4.3
Ruby-crowned Kinglet	1	0.01	0.01	1	0.7
Savannah Sparrow	2	0.01	0.01	2	1.4
Song Sparrow	249	1.78	0.19	78	55.7
Spotted Towhee	368	2.63	0.13	133	95.0
Virginia Rail	1	0.01	0.01	1	0.7
Western Kingbird	1	0.01	0.01	1	0.7
Western Meadowlark	294	2.10	0.15	110	78.6
White-tailed Kite	1	0.01	0.01	1	0.7
White-throated Swift	1	0.01	0.01	1	0.7

Table 8. Number of individuals of each species detected on line transects, 2013.

Species	AN- TRLS	SB- ARCH	SB- CNYN	SB- SGNL	SM- HRRS	SM- LKBD	SM- NDVR	SM- SMHL	SM- WLLW
Allen's Hummingbird							3		26
American Kestrel		1	3	1					
Anna's Hummingbird							1	1	4
Ash-throated Flycatcher									1
Barn Swallow								2	
Bewick's Wren	7								
Chipping Sparrow								1	
Common Raven					1	5	11	5	4
Dark-eyed Junco									1
Fox Sparrow								1	
Golden-crowned Sparrow					3			3	4
Hermit Thrush								1	1
House Finch					3		3		13
Horned Lark		29	5	22	3	32		15	2
House Sparrow								3	
House Wren			1						
Hutton's Vireo	1								
Lincoln's Sparrow									2
Northern Harrier		1	1	2				1	
Northern Mockingbird							1		
Orange-crowned Warbler	7		8	2	19	7	13	14	50
Peregrine Falcon	1			2					
Ruby-crowned Kinglet									1
Say's Phoebe			2	1					
Savannah Sparrow						3			
Song Sparrow	11				36	15	8	33	38
White-crowned Sparrow	35	9	39	10				5	12
Western Meadowlark	11	10	21	5	1	32		14	1
Yellow-rumped Warbler			3					2	2

ACI-TRSL = East Anacapa Island Trail Transect

SB-ARCH = Santa Barbara Island Arch Point Trail Transect

SB-CNYN = Santa Barbara Island Canyons Transect

SB-SGNL = Santa Barbara Island Signal Peak Trail Transect

SM-HRRS = San Miguel Island Harris Point Trail Transect

SM-LKBD = San Miguel Island Dry Lakebed Trail Transect

SM-NDVR = San Miguel Island Nidever Trail Transect

SM-SMHL = San Miguel Island San Miguel Hill Trail Transect

SM-WLLW = San Miguel Island Willow Canyon Transect

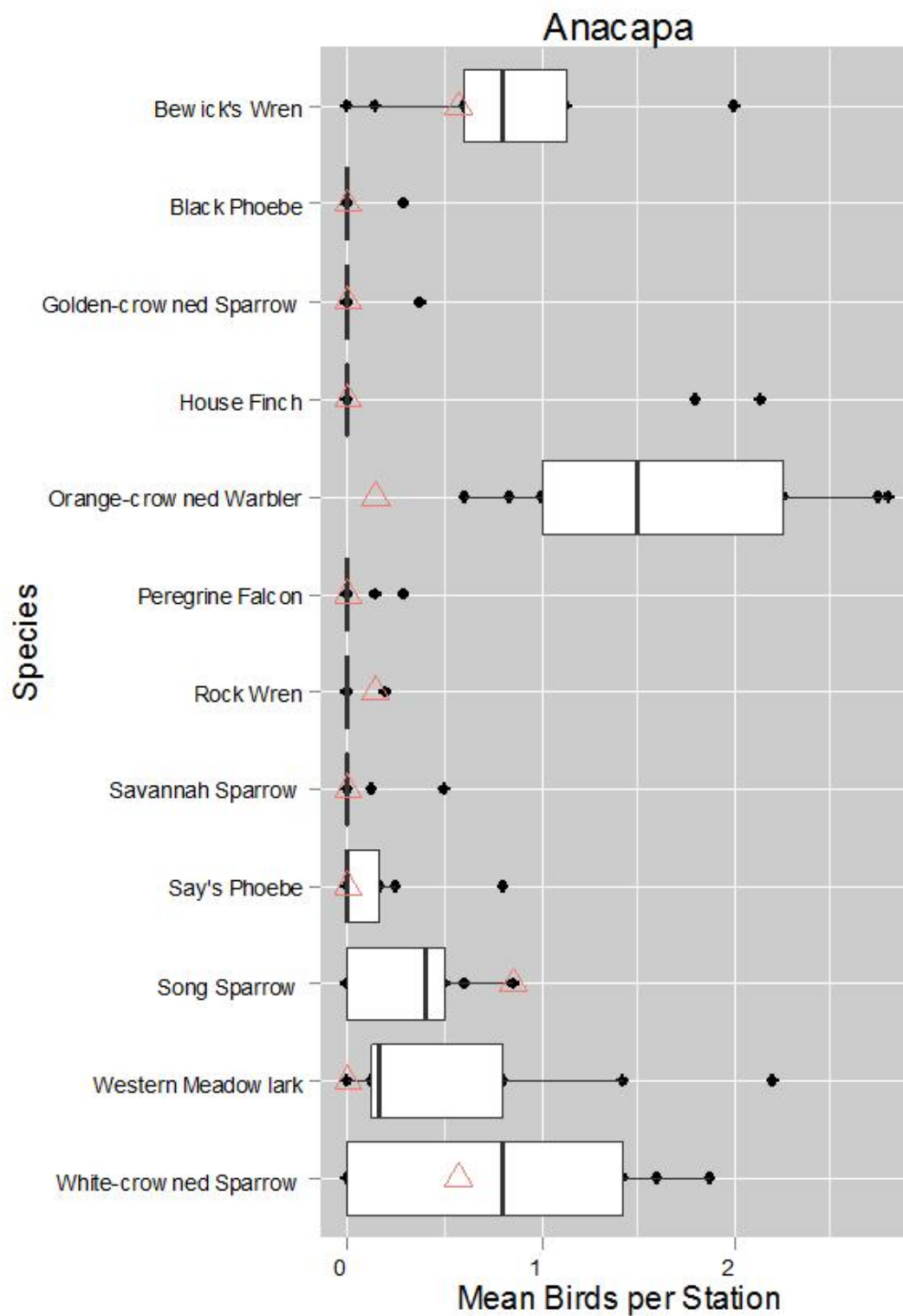


Figure 2. Mean birds per station for species detected on Anacapa Island in 2013, compared to means for previous years. The triangle shows the mean value for 2013. Boxplots for each species summarize data for past years.

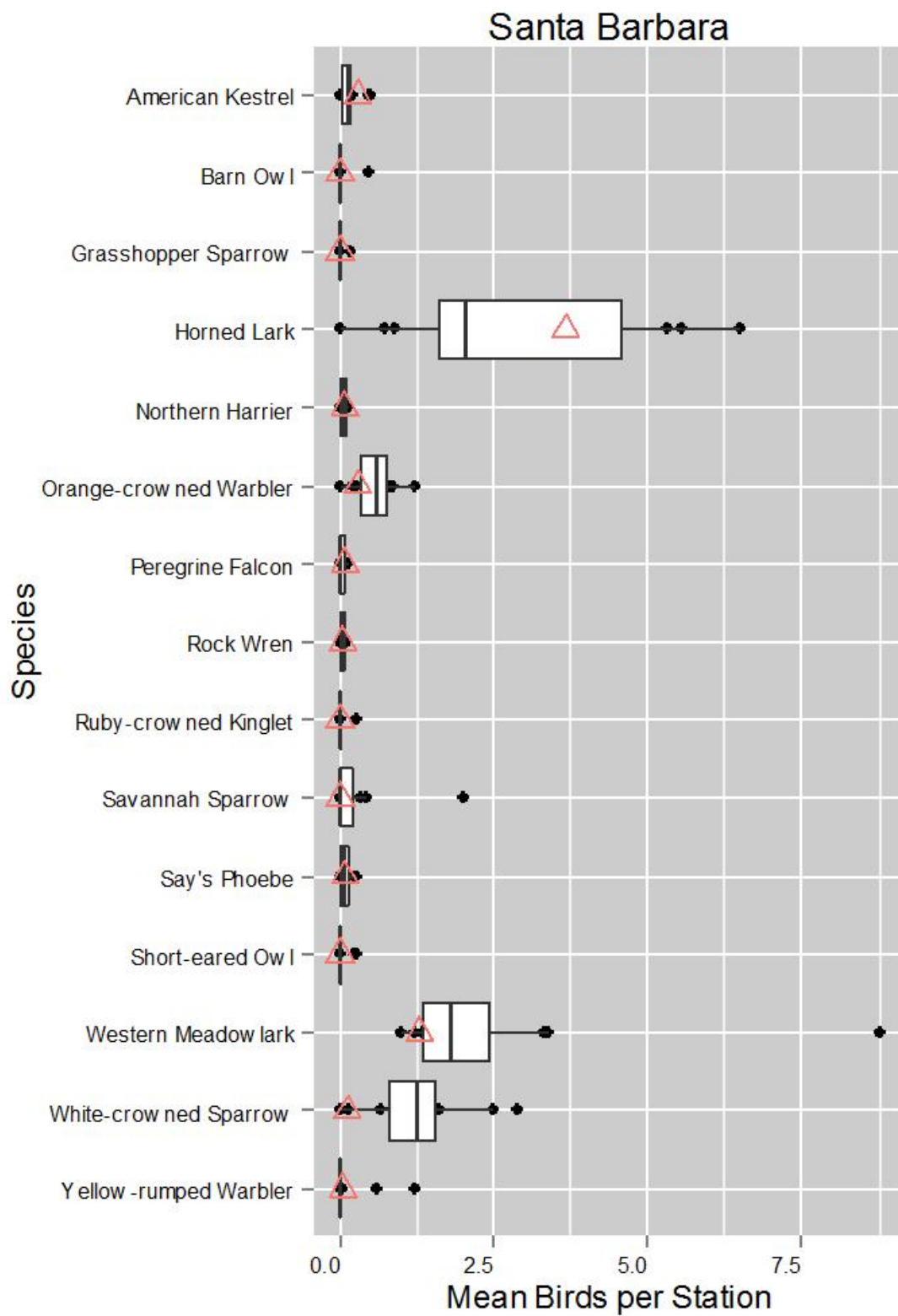


Figure 3. Mean birds per station for species detected on Santa Barbara Island in 2013, compared to means for previous years. The triangle shows the mean value for 2013. Boxplots for each species summarize data for past years.

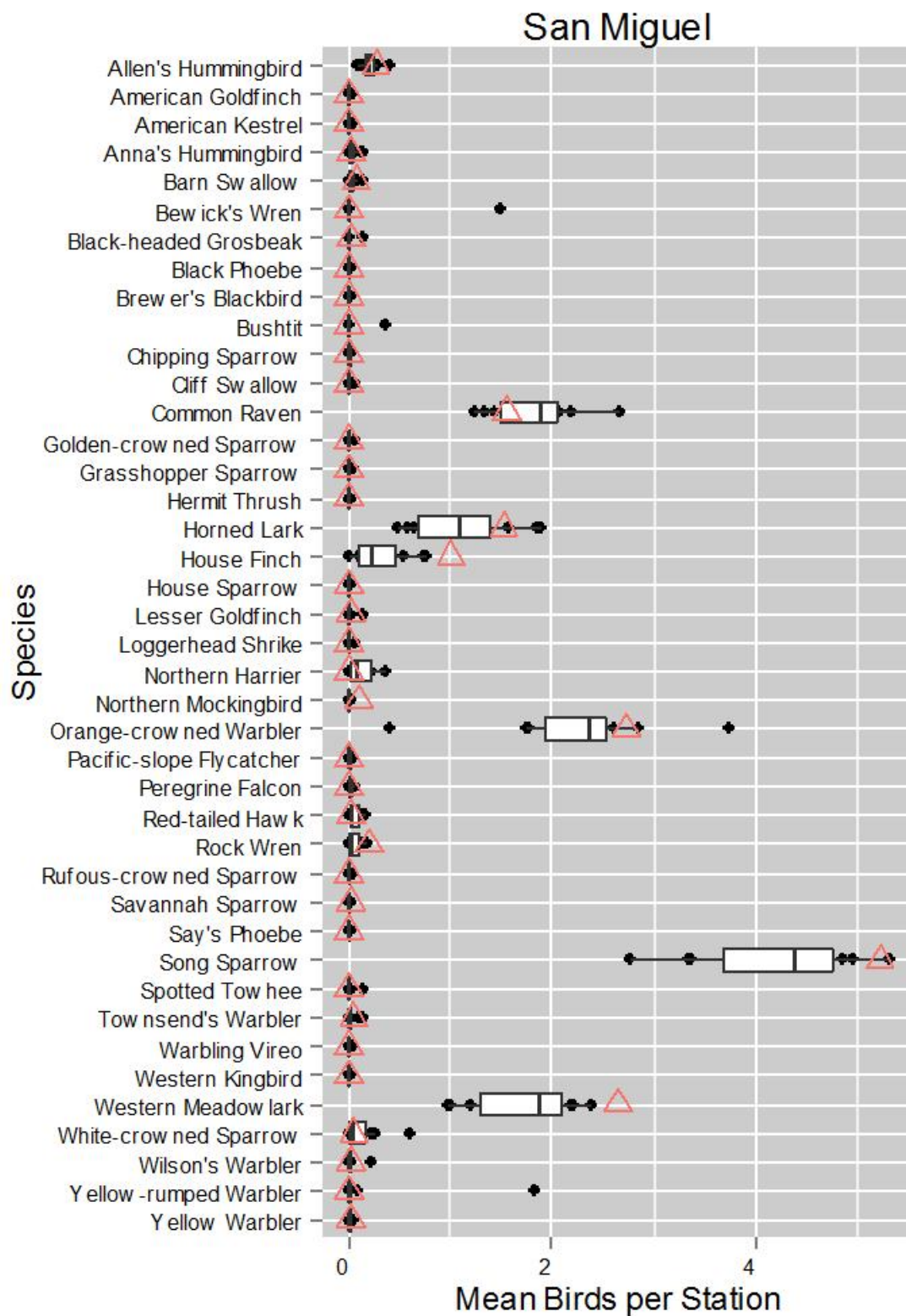


Figure 4. Mean birds per station for species detected on San Miguel Island in 2013, compared to means for previous years. The triangle shows the mean value for 2013. Boxplots for each species summarize data for past years.

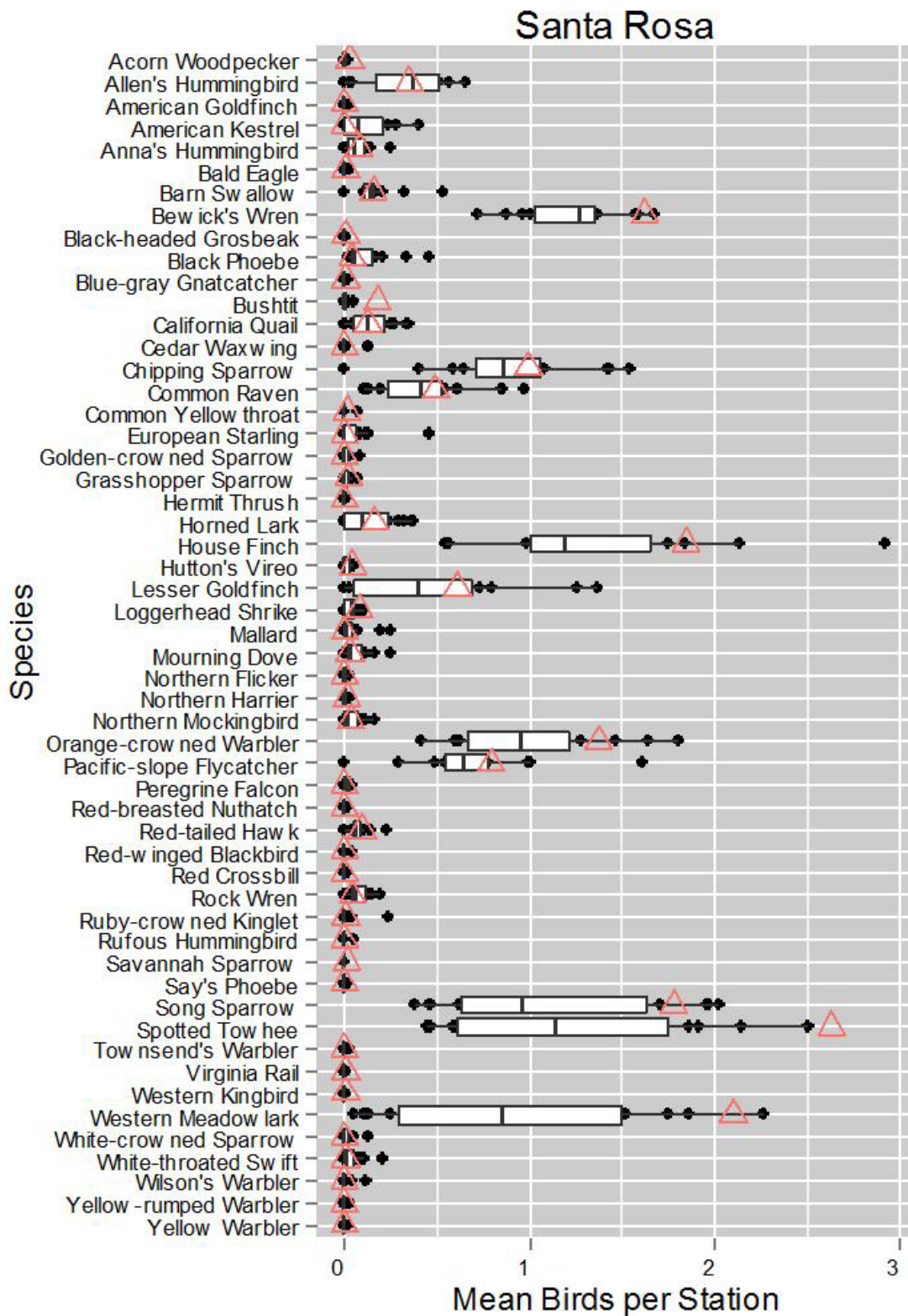


Figure 5. Mean birds per station for species detected on Santa Rosa Island in 2013, compared to means for previous years. The triangle shows the mean value for 2013. Boxplots for each species summarize data for past years.

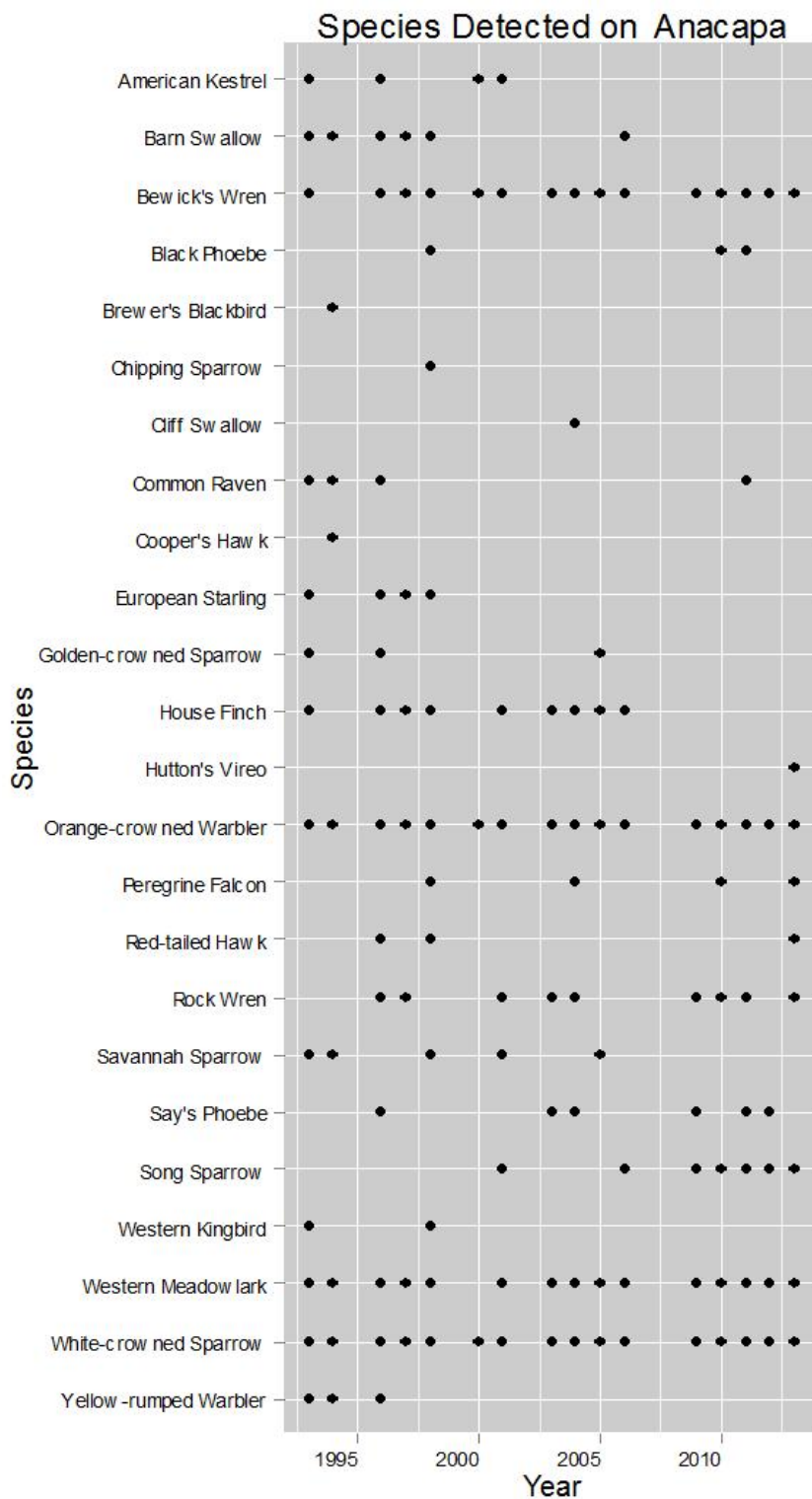


Figure 6. Species occurrence from 1993-2013 for Anacapa Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

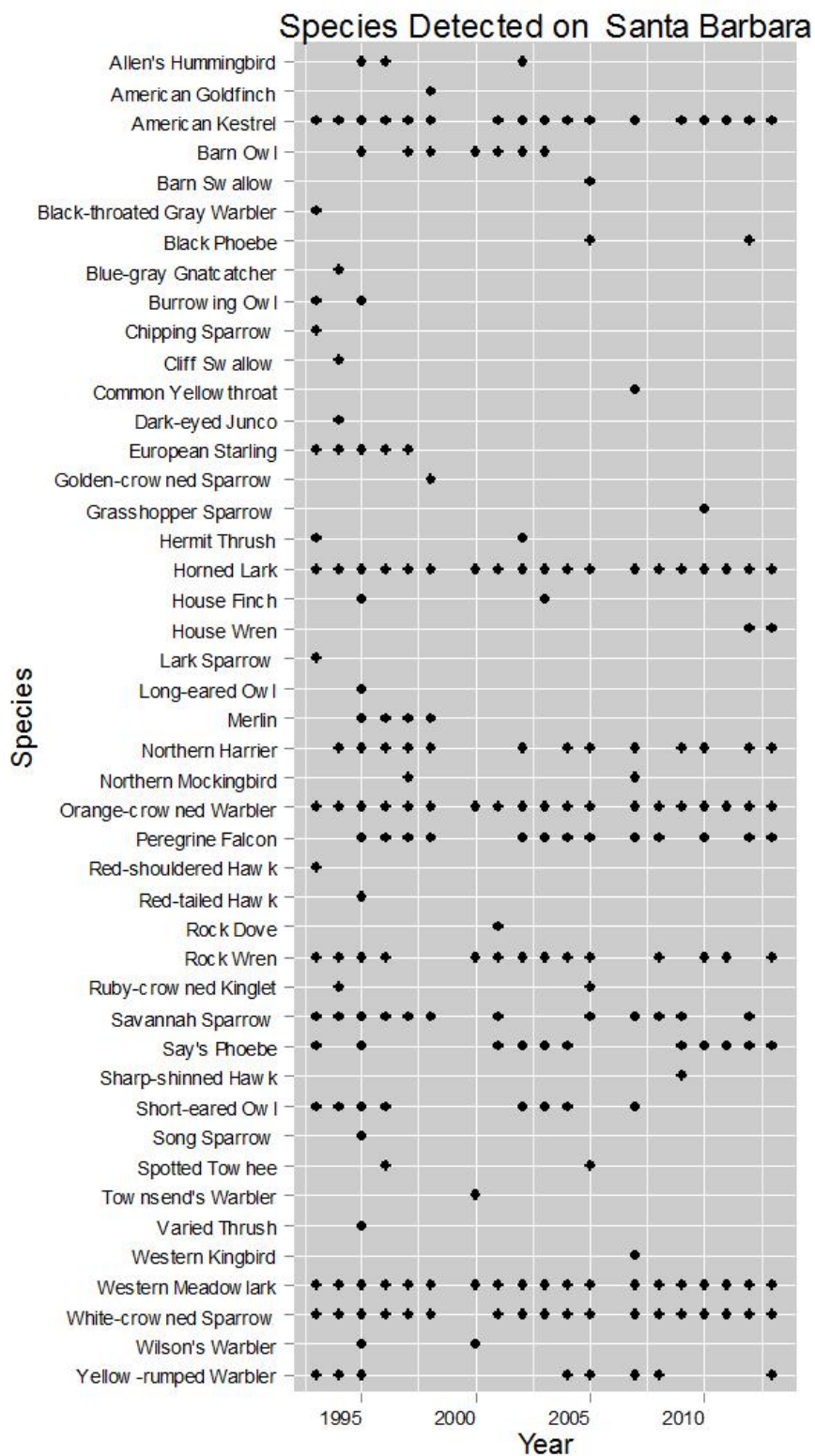


Figure 7. Species occurrence from 1993-2013 for Santa Barbara Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

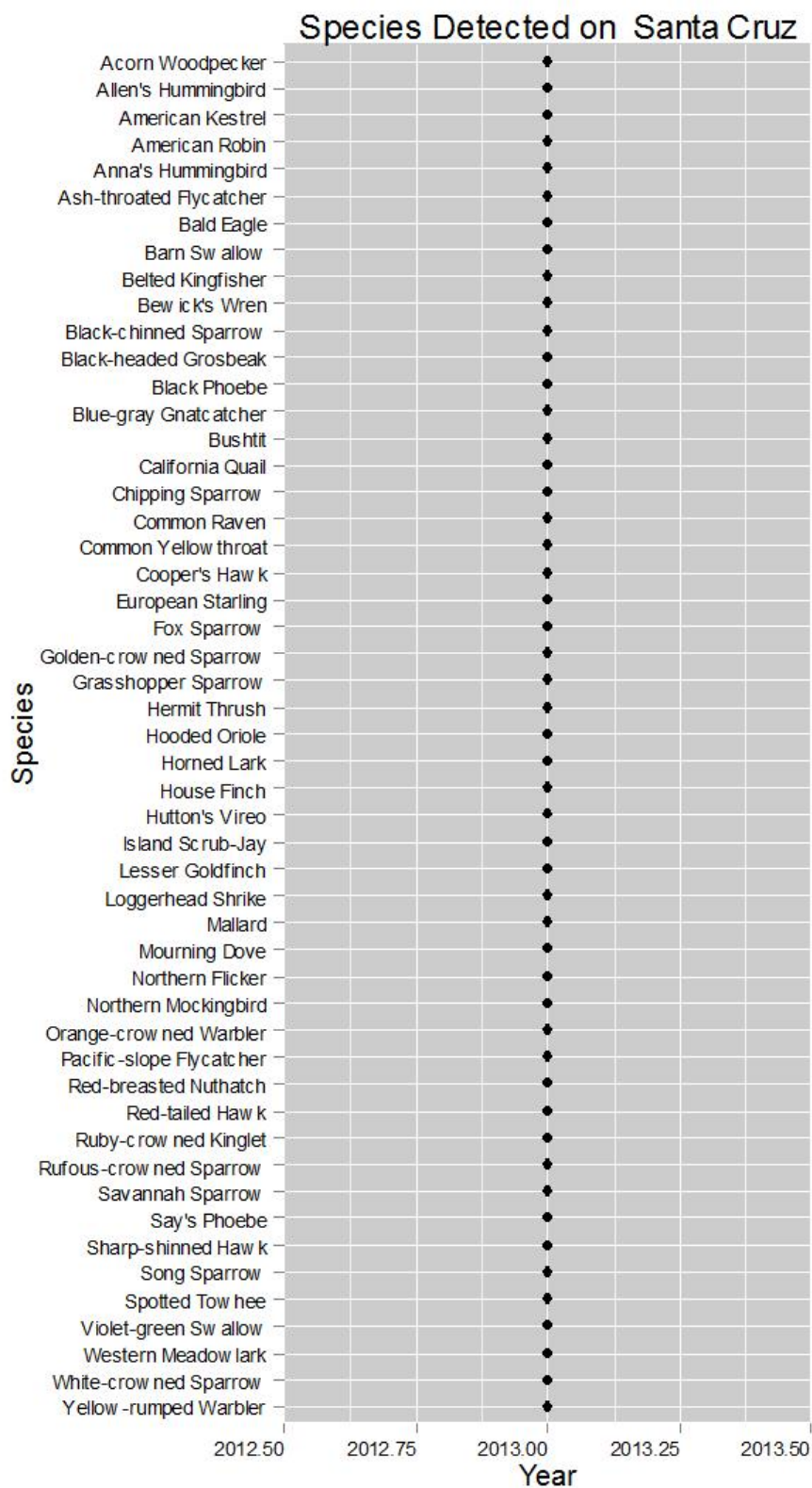


Figure 8. Species occurrence from 1993-2013 for Santa Cruz Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

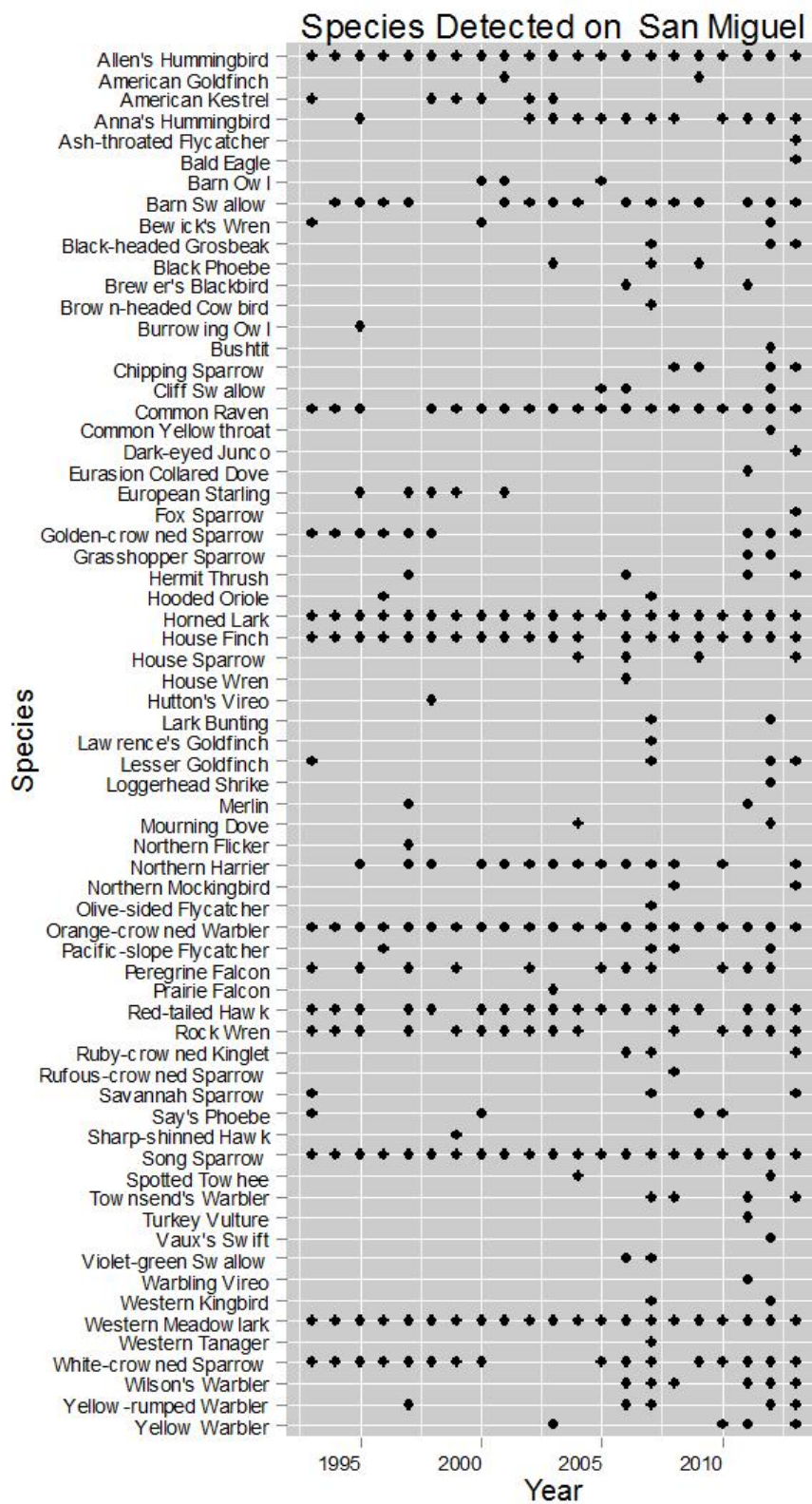


Figure 9. Species occurrence from 1993-2013 for San Miguel Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

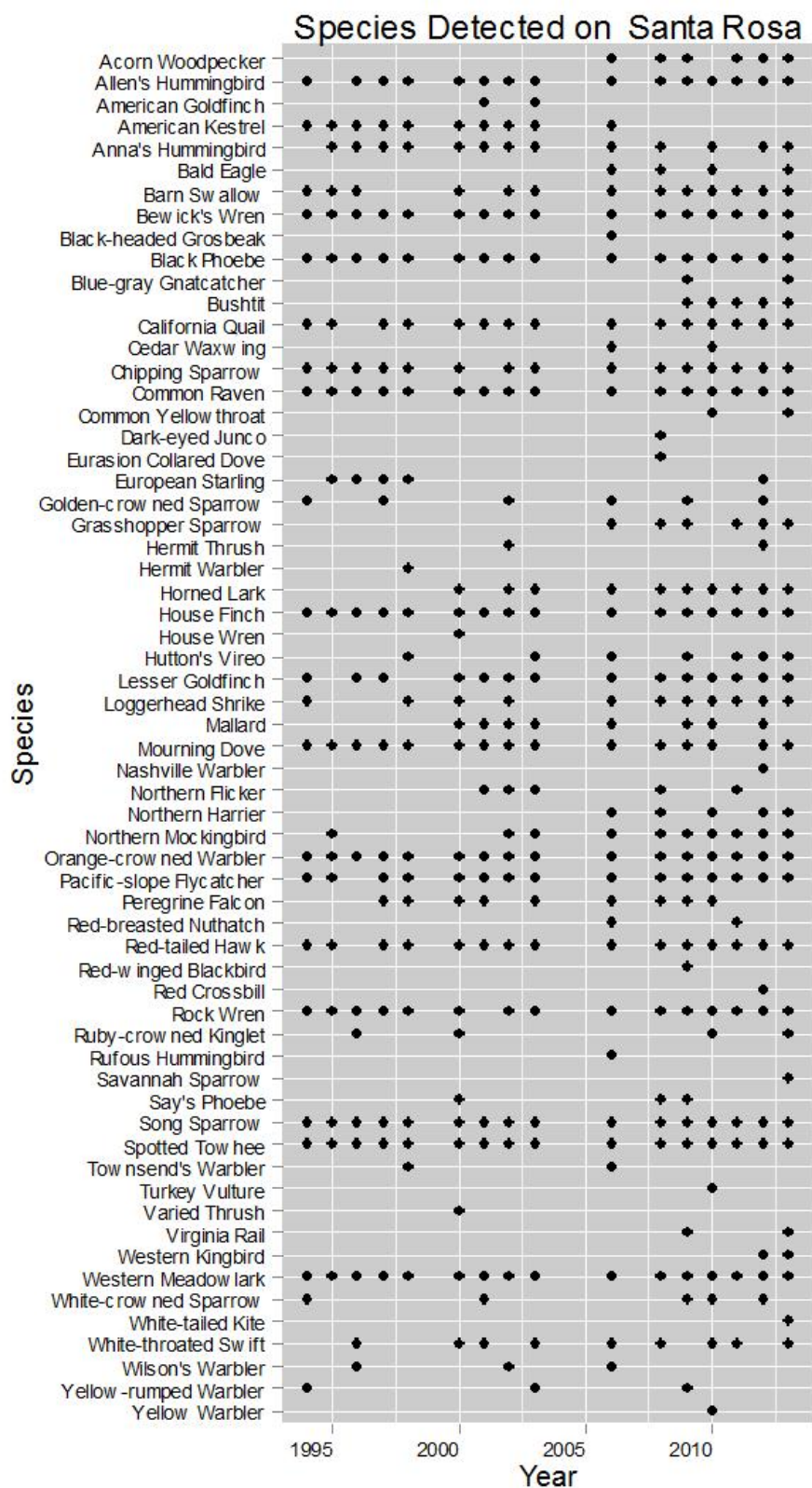


Figure 10. Species occurrence from 1993-2013 for Santa Rosa Island. A dot for a particular species and year indicates that the species was detected on either a line transect or point count during that year.

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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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