

Bird Banding Station, Zuma Canyon Santa Monica Mountains National Recreation Area

Annual Report of 2020 Activities Walter H. Sakai

INTRODUCTION

A permanent, year round, constant effort bird banding station was established in Zuma Canyon in the Santa Monica Mountains National Recreation Area (NRA) in the spring of 1995 under the leadership of Norm Hogg. Birds were mist netted and banded near the mouth of Zuma Canyon to monitor resident and migrant species as well as train students and other volunteers in bird banding techniques. This year, 2020, was the 26th full year of this station. Reports of these prior years are available from Walter H. Sakai. Here I present the banding results for 2020 at Zuma Canyon.

METHODS

The banding station is located in the parking lot of Zuma Canyon trail head in the Santa Monica Mountains NRA at the end of Bonsall Avenue. The site (34°02'55" N, 118°48'44" W) is located about 1.5 km north of the mouth of Zuma Canyon, which is located at Zuma Beach. The station was in operation for 25 cycles in 2020. A typical cycle now consists of up to 20 mist nets. Mist nets are standard 12 meter nets with a 30 mm mesh. During each full cycle, up to 20 mist nets, but more typically 16 mist nets were operated mostly on Saturdays for six hours beginning at sunrise for a total of 96 (e.g. 16 x 6) net hours. One net hour (nh) is one 12 m mist net open for one hour. At times we operated with fewer/more nets or for fewer hours, as when we were short, had set up problems [missing equipment, fallen vegetation], or had weather problems [windy, rain]. This year we continued to operate every two weeks throughout the year except for holidays and other commitments.

The SARS-CoV-2 (colloquially Covid-19 Pandemic) created quite a challenge for us, although oddly enough, we did not miss a beat banding-wise. This might have been because of our and National Park Service's (NPS) experience with the Woolsey fire. NPS responded quickly for us to continue our work, and we were able to develop a banding plan that took into account CDC safety protocol through the efforts of banders across the U.S. and local epidemiologists.

Volunteers and students have been the source of banders. Graduate students occasional ask to come out and learn how to band birds in order to work on their theses. A few members from the general public (Audubon Society members and/or bird watchers), several teachers, and professionals (ornithologists, consultants, veterinarians) have volunteered; often these volunteers

are retired. Several people from other banding stations have started to come out to hone or maintain their bird banding skills. However, the majority of long term assistants are participants for several years, one since the station started in 1994.

Perhaps most gratifying is that I have two young banders. One has to get a ride from his parents to come to Zuma Canyon to band birds with us. The effort of the parents giving up their Saturdays to sleep in and bring their kids to bird banding is commendable.

In this report, the birds are noted by their common names as well as their Alpha Codes and AOU numbers (see Tables 2 and 3), but in the text only the common names are used. The Alpha Code is a four-letter code uniquely assigned to each species by the Bird Banding Laboratory (BBL) to conserve space and make it easier to computerize data. The AOU number is a unique four digit number (555.0) with the last number generally "0" and assigned by the American Ornithological Union for each species. New species splits and subspecies have a non "0". The Western Scrub-Jay has recently been split into the California and Woodhouse's scrub-jays; however, the split is not reflected in the BBL species code. The former is found in Zuma Canyon.

Conditions of and Changes in Zuma Canyon in 2020

The 2020 rain year was 37.64 cm (14.82") which is essentially equal to the long term average of 37.92 cm (14.93") at the Downtown Los Angeles weather station and follows the above average rainfall of 2019 drought year (47.88 cm). The 2018 rains were the third lowest on record. Since seven out of the last 10 years have experienced below average rainfall, the Santa Monica Mountains is still a drought mode.

The Woolsey fire burned through the canyon in Nov 2018. Annual species, both ruderal and native, have since dominated the landscape in 2019, but native perennials are slowly making a comeback in 2020. The NPS did some replanting in the area between the parking lot and the creek. The impact of the Woolsey fire is the most important event to occur in Zuma Canyon, at least since we started bird banding in the canyon. Although the fire technically occurred in early November, 2018, its impact affected everything in 2019 and 2020. Presently, we are following the recovery of the avifauna post-Woolsey fire. How will recovery proceed? How long will it take for individual species to reach pre-fire numbers? Will new opportunistic species appear? Will some species not return? Other questions will undoubtedly come up.

RESULTS

Our banding effort for 2020 was 2147 net hours (nh). We lost no banding days due to inclement weather or Covid-19-related problems, but several cycles had reduced numbers of net. There were 1163 birds encounters in 2020, which are summarized in Table 1. The banding effort for 2020 yielded an average of 54.17 birds per 100 net hours (b/100nh). Both 2019 and 2020

bird encounters were much higher than the long term average for the Zuma Canyon banding station. Birds Released Unbanded represents 4.98% of our encounters. (The numbers do not add up in part as birds caught twice in one cycle are only counted once, and some birds were entered in two categories).

Table 1. Summary of Banding Results for Zuma Canyon for 2020.

Total encounters	Birds banded	Recaptures	Escaped birds	Released unbanded
1163	831	253	22	58

Table 2 lists the 51 species/taxa of birds encountered during 2020 ranked in abundance from most to least. Both Tables 2 and 3 have gotten too cumbersome to present here and are separate PDF. The 231 Gambel's White-crowned Sparrows were the most encountered species. The rest of the "Top Ten" were species that typically make the lists in previous years with several notable exceptions. We had 45 Lazuli Buntings in 2019; none were caught in 2020. Two species that usually make the top ten list were Wrentits and Hermit Thrushes. In 2020, Wrentits ranked 8th in abundance with 47 birds (compared to the typical #1 ranking with 175+ birds), and Hermit Thrushes ranked 25th with seven birds (compared to the typical 40+ individuals and a top 10 ranking). For the fourth year in a row, Allen's Hummingbirds outnumbered Anna's Hummingbird. I understand that Allen's Hummingbirds are beginning to displace the once more common Anna's Hummingbirds.

The overall record of birds encountered by species/taxa from 1995-2020 is presented in Table 3. We have now encountered 106 species (taxa) over the twenty-six years and encountered 23,495 birds since 1995 at this station. In 2020, we encountered one new taxon. We banded our first Merlin. The bird winters in southern California. It is likely present all winter, although we do not record it regularly. We also encountered some rarer birds for our station. We banded our fifth American Kestrel, our fourth and fifth Western Kingbird, our third Blue Grosbeak, and our second Least Bell's Vireo. The kestrel is a regular and probably breeds in the canyon most years.

The station has been in operation long enough, and enough birds have been banded that we are starting to get some long-lived bird records. There was undoubtedly a heavy mortality of resident birds in the canyon due to the Woolsey fire, but we did capture an "old" California (Western) Scrub-Jay, that was 10 years 10 months old. We also caught an eight year old Black-headed Grosbeak.

Capture of Resident Species

The resultant mortality of birds and the change in habitat due to the fire have led to a decline or rise in the number of birds per species. We caught only two woodpeckers in 2020 (none in 2019) compared to an annual average of about 10 pre-fire. We caught only five

California Thrasher (one in 2019) compared to an annual average of about 15 pre-fire. The latter number is obvious as we did not hear the cocophany of thrashers calling and defending territories from large shrub, absent due to the fire. Some species like Wrentits suffered major declines. Yet others like Lesser Goldfinches, Song Sparrows, Common Yellowthroat, and Blue-gray Gnatcatcher populations increased after the fire.

Capture of Migrant Species

Black-headed Grosbeak, Lincoln Sparrow, Gambel's White-crowned Sparrow, and Golden-crowned Sparrow populations rose in 2019 and continued to have high numbers in 2020. The numbers of Lincoln and Gambel's White-crowned Sparrows in 2019 and 2020 represented almost half of the total number of each species caught over the entire span of this station. Lazuli Bunting population rose almost 100-fold in 2019 but literally "disappeared" in 2020, as we caught none. This latter rise is expected, as Lazuli Buntings seem to follow fires, colonizing recent burns. Yet Fox Sparrow and Hermit Thrush populations remained low. (One and seven birds in 2020; normally 11.5 and 47.7 birds/year). We captured about half as many migrant warblers.

Recaptures of bird banded before the fire

The expectation is that a good percentage of the birds living in Zuma Canyon died in the Woolsey fire, including previously banded birds. In past years, the percentage of recaptured (previously banded) birds has been growing until it reached 29.60% in 2018. In 2019, this dropped to 11.21%, but rose in 2020 to 22.34%, close to pre-fire levels. Most of these recaptures were banded post-fire. What is of particularly interesting related to the Woolsey fire is how many birds banded before the fire survived, escaping the fire, and were recaptures. By the end of 2020, these encompassed 43 individuals representing 17 species. The three most abundant species, California Scrub-Jay, California Towhee, and Black-headed Grosbeak, are larger birds. The first two are permanent residents in the canyon, while the grosbeaks are summer breeders and were wintering in Latin America when the fire passed through. I expect I will encounter fewer and fewer such birds as the years proceed.

Mortality

Mortality was 0.42 %, as we lost 5 birds and is lower than in previous years. All specimens will be prepared as study skins and deposited at the Western Foundation of Vertebrate Zoology.

DISCUSSION

The 1163 birds we captured in 2020 averaging 54.17 b/100 nh followed the high numbers in 2019. The high number of birds we encountered is probably associated with the higher

primary productivity associated with early succession stages. This shows that fires are not necessarily “bad” for the avifauna. Almost all of the species banded prior to the Woolsey fire are still present post-fire with the exception of rarer species. Although there has been a decline in some species, the number in other species have increased. The next question may be when will the avifauna numbers return, at least, “close” to the pre-fire numbers.

Already two years after the fire, results are coming. Lazuli Bunting numbers are following what bird watchers have long known. Numbers rose from pre-fire numbers (0.5 birds/year) to 45 birds/year the year after the fire to 0 birds/year two years after the fire. Wrentit numbers are slowly creeping upward. There were 25 birds caught the year after the fire, and 47 birds two years after the fire.

The high number of sparrows and finches is likely due to the high density of annuals that dominate post-fire, early succession vegetation. The species composition and abundances will likely change as plant succession proceeds. For example, prior to the fire Spotted Towhees outnumbered California Towhee. Post-fire, the reverse is true. The same observation can be made with Bewick’s and House wrens. Pre-fire, Bewick’s Wren outnumbered House Wrens. Post-fire, the opposite is true. Some groups of birds are now uncommon due to the fire. Wrentits, which used to be the numerically dominant bird we banded, are 10-20% of their pre-fire numbers. The same can be said about woodpeckers and thrashers. Last, an interesting bird is the Lazuli Bunting, which seems to be post-fire specialist that appears in the first few years after a fire in a great variety of habitats. They were very abundant in 2019, one year after the fire

The Future

One of the potential issues is that I have been getting numerous request to teach/train new bird banders. While I normally get 10-15 inquiries each year, 2020 with the Covid-19 pandemic has understandably been an exception with many fewer inquiries. In addition, teaching how to band birds requires close quarters, hand-on training, not in keeping with Covid-19 safety protocol. Most of my newer banders came with some previous banding experience; hence, the very hands-on nature (no social distancing) of teaching new folks the finer points of bird banding was not as necessary. As we all hope, by the latter part of 2021, the vaccine will widely available.

I try to take on new banders, as the original intent of Zuma Canyon was as a teaching bird banding station. The general reticence of taking on too many new banders to train is illustrated in part with the mortality issue and the fact that this is a scientific research project, where accurate data collection is paramount. This year I took on three new banders. One is a graduate of UC Santa Barbara and is presently Director at Los Angeles Audubon Habitat Restoration and Education. The second is a graduate of Humboldt State University. The third is a middle school student and a member of Pasadena Audubon Society’s Young Birder’s program. There are already two other young banders (young as in high school), although both were on track to graduate and have gone on to college.

We are pleased to have maintained this station for over 25 years. With over 25 years of data (27 years as of May 2020) and over 20,000 bird encounters, we have begun to analyze some of our data. The most recent analysis has been related to site fidelity, migrant birds either remaining at Zuma for the entire winter, and/or returning to Zuma Canyon in successive winters.

Banding in Revegetated Area

One of the unknowns about revegetation programs is when the effort is considered “successful.” Often in the eyes of the restoration ecologist, it is the density or cover of plants. Does the restored area look like the adjacent mature habitat? However, the real answer may be whether the resident animals will find the restored habitat sufficiently similar to the mature habitat and begin using it. The 14-15 year old revegetated area does have a fairly robust stand of shrubs with many over two meters, so the vegetation is nearly as tall as the mature chaparral. And in fact, one can see the beginnings of the next successions stage (oak woodland), as young Coast Live Oak (*Quercus agrifolia*) have colonized and are now in the area. This is mostly due to the openness of the area and lack of shading. However, the mature chaparral has much denser, woody vegetation. The 14-15 year old area has more annual grasses and less woody material. Since the fire burned all of these areas, I need to begin analyze this study’s banding data.

Banders and Visitors

We often have eclectic groups of visitors at the site. However, Covid-19 has reduced this number to a mere trickle.

Peripheral Ornithological Studies

We continue to collect (two) feathers (the rectrices or tail feathers) of new birds we band (with a limit of 50 samples of two feathers per bird) and deposit the feathers at Colorado State University’s Genoscape Project (formerly at UCLA’s Center for Tropical Research) to add to their avian genetic bank. The quill of the feathers contains enough tissue or cells for genetic studies as well as stable hydrogen isotope studies. We also made a specific collection of feather samples of Golden-crowned Sparrows for a UC Davis graduate student’s dissertation work. We have been vigilant for ectoparasites (mostly ticks and lice) on the birds we encounter, and typically send a dozen or so specimens each year to a researcher at the Smithsonian/Peabody Museums.

The Zuma Canyon bird banding station has spawned several “F-1’s” (a genetics euphemism for offspring or children). These are subpermittees under myself as the Master Bander. Mike Morrison has started a bird banding station in LaVerne looking at a remnant natural habitat in a sea of urbanization. Jan Goerrissen, a biology professor at Orange Coast College, has started banding in Orange County, hoping to train another generation of bird banders. Mark Osokow, another Master bander, continue his banding station at the Santa Susanna Field Station near Chatsworth. I continue to band at other stations/locales, in Kern County to monitor the

American Kestrel population, and the University of California's Burns Piñon Ridge Reserve in San Bernardino County. Crystal Willet has started studying the wren population in Zuma Canyon, as well as birds in Ojai, CA.

FUTURE PLANS IN ZUMA CANYON

The immediate plan is to continue banding the Zuma Canyon bird banding station after the Woolsey fire. One of the unknowns is the dynamics of the birds, immediately after a fire.

I would like to write a few other manuscripts based on the banding work at Zuma Canyon on a variety of subject matters related to our bird banding effort. We also have sufficient data to begin to look at arrival and departure dates.

ACKNOWLEDGMENTS

We would like to thank the Santa Monica Mountains National Recreation Area for their continued support of our program. Avinet, Inc. and Sam Sumida continue supporting our efforts in numerous ways. We continue to use the mist nets purchased through two ornithological research grants from Pasadena Audubon Society. In alphabetical order, Jim DeBaise, Declan Debler, Minah Kim, Susy Mateos, Marty Reedy, Allen Saute, Crystal Willet, Amy Worell, and **especially Aaron Gomperts**, who conducted most of the area searches.

Respectfully submitted,

Walter H. Sakai, Professor of Biology (ret)
Federal Master Bird Banding Permit No. 22030

Table 2. Species and the numbers of each species captured at Zuma Canyon in 2020

Rank	Species	Alpha	AOU#	Nos.	Rank	Species	Alpha	AOU#	Nos.
1	Gambel's White-crowned Sparrow	GWCS	555.0	231	43	Costa's Hummingbird	COHU	430.0	1
2	House Finch	HOFI	519.0	136	44	Western Wood-Pewee	WEWP	462.0	1
3	Common Yellowthroat	COYE	681.0	107	45	Brown-headed Cowbird	BHCO	495.0	1
4	Lincoln Sparrow	LISP	583.0	65	46	Fox Sparrow	FOSP	585.0	1
5	Golden-crowned Sparrow	GCSP	557.0	63	47	Blue Grosbeak	BLGR	597.0	1
6	Bushtit	BUSH	743.0	61	48	Least Bell's Vireo	LBVI	633.4	1
7	Song Sparrow	SOSP	581.0	54	49	Yellow Warbler	YEWA	652.0	1
8	Wrentit	WREN	742.0	47	50	McGillivray's Warbler	MGWA	680.0	1
9	Audubon's Warbler	AUWA	656.0	37	51	Yellow-breasted Chat	YBCH	683.0	1
10	Allen's Hummingbird	ALHU	434.0	35	total				1163
11	Lesser Goldfinch	LEGO	530.0	31					
12	House Wren	HOWR	721.0	30					
13	California Towhee	CALT	591.1	28					
14	Bewick's Wren	BEWR	719.0	26					
15	Black-headed Grosbeak	BHGR	596.0	24					
16	Anna's Hummingbird	ANHU	431.0	20					
17	Spotted Towhee	SPTO	588.0	20					
18	Ruby-crowned Kinglet	RCKI	749.0	20					
19	Orange-crowned Wrbler	OCWA	646.0	15					
20	Blue-gray Gnatcatcher	BGGN	752.0	15					
21	Pacific-slope Flycatcher	PSFL	464.1	11					
22	Bullock's Oriole	BUOR	508.0	10					
23	Warbling Vireo	WAVI	627.0	10					
24	Oregon Junco	ORJU	567.1	8					
25	Hermit Thrush	HETH	759.0	7					
26	California Thrasher	CATH	710.0	5					
27	Cassin's Kingbird	CAKI	448.0	4					
28	Black Phoebe	BLPH	458.0	4					
29	Hooded Oriole	HOOR	505.0	4					
30	Wilson's Warbler	WIWA	685.0	4					
31	Oak Titmouse	OATI	733.0	4					
32	Nuttall's Woodpecker	NUWO	397.0	2					
33	Western Kingbird	WEKI	447.0	2					
34	Ash-throated Flycatcher	ATFL	454.0	2					
35	Willow Flycatcher	WIFL	466.0	2					
36	Western Scrub-Jay	WESJ	481.0	2					
37	Puget Sound Wh-crwnd Sparrow	PSWS	554.7	2					
38	Nashville Warbler	NAWA	645.0	2					
39	Mourning Dove	MODO	316.0	1					
40	Merlin	MERL	357.0	1					
41	American Kestrel	MAKE	360.0	1					
42	Black-chinned Hummingbird	BCHU	429.0	1					

Table 3. Number of birds encountered by year and taxa at Zuma Canyon Bird Banding Station.

#	SPECIES	ALPHA	AOU#	95-02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	Sum
1	California Quail	CALQ	294.0	12	1	6		5					5	4	1	5	2	4	4	3			52
2	Mourning Dove	MODO	316.0	6	2		1	1			1	1	1	2	1		2	1	3	2	3	1	28
3	Sharp-shinned Hawk	SSHA	332.0	3	1		1		1						1		1						8
4	Cooper's Hawk	COHA	333.0				1													1			2
5	Red-tailed Hawk	RTHA	337.0	1																1			2
6	Merlin	MERL	357.0																			1	1
7	American Kestrel	AMKE	360.0				1	1								1					1	1	5
8	Western Screech Owl	WESO	373.2	1				1															2
9	Greater Roadrunner	GRRO	385.0	1																			1
10	Downy Woodpecker	DOWO	394.0	13	1		3	1		1	1	3			1								24
11	Nuttall's Woodpecker	NUWO	397.0	76	7	4	12	13	5	7	9	7	11	3	12	6	8	12	6	6		2	206
12	Red-breasted Sapsucker	RBSA	403.0	1	1																		2
13	Acorn Woodpecker	ACWO	407.0	2		1								1									4
14	Red-shafted Flicker	RSFL	413.0	13		2	2	1	4		4		2	2	1		1	1					33
15	Common Poorwill	COPO	418.0	2				2															4
16	Black-chinned Hummingbird	BCHU	429.0	9	2	1	9	4	3	5	7	1	6	2	9	2	4	3	7	2		1	77
17	Costa's Hummingbird	COHU	430.0	35	1	3	4	3	2	1	9	3	5						1	2		1	70
18	Anna's Hummingbird	ANHU	431.0	181	31	46	37	36	21	12	30	49	51	30	23	24	20	23	42	38	28	20	742
19	Rufous Hummingbird	RUHU	433.0	10	3	2	2	11	3	3	5		1	1	2	1	1	2	1	8	1		57
20	Allen's Hummingbird	ALHU	434.0	35	18	7	16	16	12	2	13	31	20	28	35	18	31	13	65	51	33	35	479
21	Calliope Hummingbird	CAHU	436.0						1						1								2
	Unidentified Hummingbird	UNHU	440.9	39	2	3	1	5	4	4	1	7	4		6	1	1	2	3	1	1		85
22	Western Kingbird	WEKI	447.0	2					1													2	5
23	Cassin's Kingbird	CAKI	448.0								3	1						1		2		4	11
24	Ash-throated Flycatcher	ATFL	454.0	11	1	3	1	1	1	2	3	2	3	2	1	2	2		3	1	4	2	45
25	Say's Phoebe	SAPH	457.0														1				1		2
26	Black Phoebe	BLPH	458.0	68	4	6	17	6	10	6	2	2	1	1			1	1	4		10	4	143
27	Western Wood-Pewee	WEWP	462.0	11		1	1	1			1											1	16
28	Pacific-slope Flycatcher	PSFL	464.1	198	30	32	36	28	11	10	29	32	25	13	18	21	11	32	40	36	13	11	626
29	Willow Flycatcher	WIFL	466.0	17	3	1	1	6				6	4	1	1	X	1	1				2	44
30	Hammond Flycatcher	HAFL	468.0	1					1					1					1	1			5
31	Dusky Flycatcher	DUFL	469.0	1													1						2
32	Gray Flycatcher	GRFL	469.1	1	1													1					3
33	Western Scrub-Jay	WESJ	481.0	85	4	4	2	5	1	2	6	2	8	2	3	2	6	4	9	11	5	2	163

[illegible]

Table 3. Number of birds encountered by year and taxa at Zuma Canyon Bird Banding Station.

#	SPECIES	ALPHA	AOU #	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20		
68	Violet-green Swallow	VGSW	615.0	1																		1	
69	No. Rough-winged Swallow	NRWS	617.0	5																		5	
70	Cedar Waxwing	CEDW	619.0	1																		1	
71	Phainopepla	PHAI	620.0	4			2	1		1												8	
72	Loggerhead Shrike	LOSH	622.0	3		1	1			3												8	
73	Warbling Vireo	WAVI	627.0	25	2	4	5	4		2	3	1		7	1	5	2	5	6	3	10	85	
74	Cassin's Vireo	CAVI	629.1												1							1	
75	Solitary Vireo	SOVI	629.9	2									1									3	
76	Hutton's Vireo	HUVI	632.0	6	1		6		1	2	4	1		1		2		3				27	
77	Least Bell's Vireo	LBVI	633.4															1			1	2	
78	Black-and-White Warbler	BAWW	636.0	2																		2	
79	Nashville Warbler	NAWA	645.0	1								1									2	4	
80	Orange-crowned Warbler	OCWA	646.0	16	4	3	11	11	1	4	13	5	8	6	6	4	15	10	12	14	15	158	
81	Yellow Warbler	YEWA	652.0	6	1	2	2	3	2	1			2	5		1		2	2	7	1	37	
82	Myrtle Warbler	MYWA	655.0	4		2	1											1				8	
	Unidnt Yel-rmpd Warbler	UYRW	655.6		1					1								1				3	
83	Audubon's Warbler	AUWA	656.0	485	38	41	78	111	120	68	57	43	40	55	47	71	57	57	24	37	23	37	1489
84	Blk-throated Gray Warbler	BTYW	665.0											1					2			3	
85	Blk-throated Green Warbler	BTNW	667.0	1																		1	
86	Townsend's Warbler	TOWA	668.0				1						1	2								4	
87	MacGillivray's Warbler	MGWA	680.0	5		4	2					1	1			3		1	1		1	19	
88	Common Yellowthroat	COYE	681.0	153	63	37	66	94	50	36	60	79	58	63	50	24	73	25	85	37	93	107	1253
89	Yellow-breasted Chat	YBCH	683.0	8	1	6	7	1	1		5			1				2	2		1	35	
90	Wilson's Warbler	WIWA	685.0	48	5	3	17	19	12	3	5	4	3	8	4	13	4	9	23	3	4	187	
91	Northern Mockingbird	NOMO	703.0	73	1	2	14			6	1	3						1				101	
92	California Thrasher	CATH	710.0	126	19	15	11	10	4	22	18	12	6	13	15	10	12	11	12	5	1	5	327
93	Canyon Wren	CANW	717.0									1			1			2				4	
94	Bewick's Wren	BEWR	719.0	129	49	40	74	61	7	18	44	71	76	65	38	20	18	36	77	30	21	26	900
95	House Wren	HOWR	721.0	20	14	23	39	41	18	7	24	19	15	4	7	8	13	4	34	18	42	30	380
96	Marsh Wren	MAWR	725.0									1										1	
97	White-breasted Nuthatch	WBNU	727.0																1			1	
98	Oak Titmouse	OATI	733.0	34	5	9	12	5	6	5	7	8	9	5	2	7	1	8	11	6	5	4	149
99	Wrentit	WREN	742.0	1321	225	205	197	142	101	259	226	289	140	175	289	190	137	160	365	171	25	47	4664
100	Bushtit	BUSH	743.0	190	48	58	48	85	91	50	68	44	87	101	62	41	35	99	109	64	36	61	1377

Table 3. Number of birds encountered by year and taxa at Zuma Canyon Bird Banding Station.

#	SPECIES	ALPHA	AOU #		03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	
101	Ruby-crowned Kinglet	RCKI	749.0	58	12	29	35	42	16		11	21	13	20	4	6	2		9	5	18	20	321
102	Blue-gray Gnatcatcher	BGGN	751.0	5		1					1	1	1	3		3	2			3	13	15	48
103	Swainson's Thrush	SWTH	758.0	23	2	1		3		1	1	2	2	1	1		1	1	3	6			48
104	Hermit Thrush	HETH	759.0	381	23	32	61	45	53	10	58	42	41	45	69	46	90	49	58	42	2	7	1154
105	American Robin	AMRO	761.0	3	2													2	1				8
106	Western Bluebird	WEBL	767.0									1									1		2
	Unidentified Flycatcher	UNFL									1												1
	ANNUAL TOTAL				881	883	1067	1130	801	705	929	1037	900	948	944	743	752	732	1349	883	1240	1163	23495
	species				47	46	54	58	49	40	45	49	54	50	48	43	48	43	52	50	46	51	
	cummulative number of species				84	84	86	87	88	88	90	91	94	95	97	98	99	99	101	103	105	106	