

**NEOTROPICAL MIGRATORY BIRD
MONITORING STUDY
AT
MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

FIRST PROGRESS REPORT
1995**

Prepared for

U.S. Marine Corps
Environmental and Natural Resources Office
Camp Pendleton, California

Prepared by

Barbara E. Kus, Ph.D.
Department of Biology
San Diego State University
San Diego, California 92182

Cooperative Letter Agreement N68711-94-LT-4049

Introduction

The purpose of this progress report is to briefly summarize the first year's activities at two "MAPS" stations established at Marine Corps Base Camp Pendleton. "MAPS", or "Monitoring Avian Productivity and Survival", is an international program designed to monitor through capture and banding basic demographic parameters of migratory species, many of which are imperiled regionally and even globally. Age- and sex-specific data on annual survival, reproduction, and recruitment can be gathered and compared across stations to identify population trends for species of interest, and can be used to identify factors responsible for trends; in particular, negative trends. In turn, information obtained from long-term monitoring of bird populations can be used to guide management activities intended to maintain or re-establish viable populations throughout the species' ranges.

Two MAPS stations were operated at Camp Pendleton in 1995; one in riparian habitat along De Luz Creek, and the other in an oak woodland near Case Springs in a mountainous region of the Base. These stations were established as part of a long-term study of the status of neotropical migratory birds at Camp Pendleton, and are being operated in a manner consistent with other banding stations participating in an effort to monitor birds world-wide.

Methods

Each banding station was operated once during every 10-day period between April 1 and August 31, 1995, for a total of 16 days per station. Ten mistnets were erected at each site in fixed locations. Nets were opened at dawn and run for several hours, depending on the weather. Nets were checked every 15-30 minutes by observers working circuits. Birds removed from nets were held in mesh holding bags labeled with the net number and time of capture, taken to a central location for processing and banding with National Biological Service numbered aluminum bands, and then released at the net in which they had been captured. Data recorded for each individual caught included age, sex, breeding condition, weight, wing chord, fat level, feather wear, and molt status (see attached data sheet). Typically, four field personnel operated the De Luz station, and two the Case Springs station, working on consecutive days.

Results

De Luz Creek

Four hundred and forty-three individuals of 42 species were caught during 739 net-hours (see attached list of A.O.U. codes for common and taxonomic species names). Of these, 423 (95 percent) were banded; birds not banded included hummingbirds, which were excluded from banding because of an expectation of low capture rate, and birds that escaped prior to banding (Table 1). The most abundant species at the station included residents such as common yellowthroats, song sparrows, rufous-sided towhees, wrentits, and California towhees, but also locally breeding migrants such as yellow-breasted chats, black-headed grosbeaks, and Pacific slope flycatchers, as well as migrants in passage, such as Swainson's thrush (Figure 1).

The sex ratio of birds of known sex was roughly 1:1, with 48 percent of 293 birds female and 52 percent male (Table 1). Eighty percent of the known-aged birds were adults or second-year birds, and 20 percent were young-of-the-year.

Individual birds were caught between one and five times, for a total of 540 capture-events (hereafter referred to as captures) (Table 2). Species with the highest recapture rates were also those that were most abundant: song sparrows, rufous-sided towhees, black-headed grosbeaks, common yellowthroats, yellow-breasted chats, Bewick's wrens, and wrentits. Overall capture rate at the De Luz station was 73.1 captures per 100 net-hours (Table 3). Capture rate was highest in early April (Table 4), dropping to a rate approximately half that for the duration of the nesting season (through late July). A second peak in capture rate occurred in mid-May when large numbers of Swainson's thrushes passed through the site. Capture rates were lowest during August.

Overall capture rates did not differ widely between nets, ranging from 55 to 88 captures per 100 net-hours, although not all nets performed comparably on any given day (Figure 2).

Case Springs

Two hundred and twenty-nine individuals of 36 species were caught during 729 net-hours at the Case Springs station (Table 5). Although species richness of the two stations was comparable, bird abundance at Case Springs was roughly half that of the De Luz station. The most commonly caught species at Case Springs were lesser goldfinches, California towhees, plain titmice, Swainson's thrushes, Anna's hummingbird, and chipping sparrow (Figure 3).

Forty-seven percent of the birds of known sex banded at Case Springs were females, again indicating a roughly 1:1 sex ratio (Table 5). Of the birds of known age, 76 percent were adults.

Recapture of banded birds occurred less often than at De Luz, but approximately 10 percent of the banded birds were caught more than once (Table 6). The most commonly recaptured species were acorn woodpecker, California towhee, house wren, white-breasted nuthatch, and plain titmouse, all species breeding at the site. Overall capture rate was 34.6 per 100 net-hours (Table 7). The seasonal pattern of capture rate differed dramatically from that at De Luz (Table 8). Unlike at the latter site, capture rates at Case Springs were low during April, not peaking until mid-May when Swainson's thrushes and other migrants passed through. Capture rate was generally highest in August.

Capture rates varied more between nets at Case Springs than at De Luz, ranging from 11 to 69 captures per 100 net-hours (Table 8, Figure 4). This is probably a reflection of the greater habitat heterogeneity at Case Springs.

Table 1
Age and Sex of Individuals Captured: De Luz

Species	Female				Female Total	Male				Male Total	Unknown			Unknown Total	Species Total
	Age*					Age*					Age*				
	A	H	S	U		A	H	S	U		A	H	U		
CAQU	1	0	0	0	1	1	0	0	0	1	0	0	0	0	2
DOWO	1	0	0	0	1	1	0	0	0	1	0	0	0	0	2
NUWO	2	0	0	0	2	2	0	0	0	2	0	0	0	0	4
BCHU	0	0	0	0	0	3	0	0	0	3	0	0	0	0	3
COHU	0	0	0	0	0	2	0	0	0	2	0	0	0	0	2
ANHU	0	0	0	1	1	1	1	0	0	2	0	0	2	2	5
HUMM	2	0	0	2	4	0	1	0	0	1	0	2	4	6	11
ATFL	4	0	0	0	4	1	0	0	0	1	5	0	0	5	10
WEFL	4	0	0	0	4	1	0	0	0	1	5	4	0	9	14
WIFL	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
HOOR	1	0	0	0	1	1	0	0	0	1	0	0	0	0	2
BUOR	1	0	0	0	1	3	0	0	0	3	0	1	0	1	5
HOFI	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
LEGO	1	0	0	0	1	9	0	1	0	10	0	3	1	4	15
LASP	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1
BCSP	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1
GCSP	0	0	0	0	0	1	0	0	0	1	1	0	0	1	2
RCSP	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1
SOSP	14	0	0	0	14	17	0	0	0	17	3	15	2	20	51
LISP	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
RSTO	10	1	0	0	11	16	0	0	0	16	0	7	0	7	34
BRTO	4	0	0	0	4	7	0	0	0	7	0	6	0	6	17
BHGR	15	0	0	0	15	8	1	0	0	9	0	2	0	2	26
LAZB	6	0	0	0	6	1	0	0	0	1	0	5	0	5	12
WETA	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1
PHAI	1	0	0	0	1	1	0	0	0	1	0	0	0	0	2
HUVI	2	0	0	0	2	0	0	0	0	0	0	0	0	0	2
BEVI	5	0	0	0	5	1	0	0	0	1	0	3	0	3	9
NAWA	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
OCWA	3	0	0	0	3	5	0	0	0	5	4	1	0	5	13
YWAR	0	0	0	0	0	2	0	0	0	2	0	0	1	1	3
YRWA	0	0	1	0	1	1	0	0	0	1	0	0	0	0	2
COYE	17	3	0	0	20	21	4	0	0	25	0	17	1	18	63
YBCH	15	0	0	1	16	20	0	0	0	20	1	2	0	3	39
WIWA	0	0	0	0	0	1	0	0	1	2	0	0	0	0	2
CATH	0	0	0	0	0	1	0	0	0	1	0	0	1	1	2
BEWR	7	0	0	0	7	3	0	0	0	3	3	2	1	6	16
HOWR	0	0	0	0	0	1	0	0	0	1	1	1	0	2	3
PLTI	2	0	0	0	2	3	0	0	0	3	0	1	0	1	6
WREN	4	0	0	0	4	0	0	0	0	0	21	1	8	30	34
COBU	4	0	0	0	4	2	0	0	0	2	0	1	3	4	10
SWTH	3	0	0	0	3	2	0	0	0	2	17	0	0	17	22
HETH	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1
Sex Total	131	4	1	4	140	144	7	1	1	153	63	74	24	161	454

* Age Key
A = After Hatching Year
H = Hatching Year
S = Second Year
U = Unknown Age

Table 2
Capture Frequency of Individuals: De Luz

Species	# Individuals / Capture Incidence (Banded Birds)					Total Individuals Banded	Captures: Banded Birds	Captures: Unbanded Birds	Captures: All Birds
	1 Capture	2 Captures	3 Captures	4 Captures	5 Captures				
CAQU	0	0	0	0	0	0	0	2	2
DOWO	2	0	0	0	0	2	2	0	2
NUWO	4	0	0	0	0	4	4	0	4
BCHU	0	0	0	0	0	0	0	3	3
COHU	0	0	0	0	0	0	0	2	2
ANHU	0	0	0	0	0	0	0	5	5
HUMM	0	0	0	0	0	0	0	11	11
ATFL	8	1	1	0	0	10	13	0	13
WEFL	14	0	0	0	0	14	14	0	14
WIFL	1	0	0	0	0	1	1	0	1
HOOR	2	0	0	0	0	2	2	0	2
BUOR	5	0	0	0	0	5	5	0	5
HOFI	1	0	0	0	0	1	1	0	1
LEGO	15	0	0	0	0	15	15	0	15
LASP	1	0	0	0	0	1	1	0	1
BCSP	1	0	0	0	0	1	1	0	1
GCSP	2	0	0	0	0	2	2	0	2
RCSP	1	0	0	0	0	1	1	0	1
SOSP	35	14	1	1	0	51	70	0	70
LISP	1	0	0	0	0	1	1	0	1
RSTO	29	4	0	0	0	33	37	1	38
BRTO	15	1	1	0	0	17	20	0	20
BHGR	21	3	2	0	0	26	33	0	33
LAZB	12	0	0	0	0	12	12	0	12
WETA	1	0	0	0	0	1	1	0	1
PHAI	2	0	0	0	0	2	2	0	2
HUVI	2	0	0	0	0	2	2	0	2
BEVI	8	1	0	0	0	9	10	0	10
NAWA	1	0	0	0	0	1	1	0	1
OCWA	12	0	0	0	0	12	12	1	13
YWAR	3	0	0	0	0	3	3	0	3
YRWA	2	0	0	0	0	2	2	0	2
COYE	53	7	2	0	0	62	73	1	74
YBCH	30	4	3	2	0	39	55	0	55
WIWA	2	0	0	0	0	2	2	0	2
CATH	0	0	0	0	0	0	0	2	2
BEWR	10	6	0	0	0	16	22	0	22
HOWR	2	0	0	0	0	2	2	1	3
PLTI	5	1	0	0	0	6	7	0	7
WREN	24	5	3	0	1	33	48	1	49
COBU	9	0	0	0	0	9	9	1	10
SWTH	22	0	0	0	0	22	22	0	22
HETH	1	0	0	0	0	1	1	0	1
Total	359	47	13	3	1	423	509	31	540

Table 3
Number of Captures by Date: De Luz

Species	Date															Total Captures 1995	Captures per Total Net Hours*	
	4/1/95	4/12/95	4/21/95	5/1/95	5/15/95	5/22/95	5/31/95	6/12/95	6/21/95	7/5/95	7/11/95	7/20/95	8/1/95	8/10/95	8/22/95			8/30/95
CAQU	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0.0027
DOWO	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0.0027
NUWO	2	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	4	0.0054
BCHU	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3	0.0041
COHU	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0.0027
ANHU	0	0	1	0	0	0	0	0	0	0	1	0	2	1	0	0	5	0.0068
HUMM †	0	0	0	0	2	2	0	0	1	1	0	1	0	3	1	0	11	0.0149
ATFL	0	0	0	1	4	1	1	1	0	3	0	2	0	0	0	0	13	0.0176
WEFL	0	0	1	1	0	4	1	1	0	2	0	0	2	0	0	2	14	0.0189
WIFL	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.0014
HOOR	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.0027
BUOR	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	0	5	0.0068
HOFI	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.0014
LEGO	3	0	0	0	0	1	0	0	1	2	0	7	1	0	0	0	15	0.0203
LASP	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
BCSP	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
GCSP	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0027
RCSP	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
SOSP	8	4	8	4	8	6	5	4	4	5	4	2	1	2	3	2	70	0.0947
LISP	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
RSTO	3	0	6	1	5	0	1	5	0	2	4	2	2	1	5	1	38	0.0514
BRTO	1	2	0	3	0	1	2	4	2	2	2	0	0	0	1	0	20	0.0271
BHGR	0	4	2	3	1	2	3	3	2	1	4	7	0	0	1	0	33	0.0446
LAZB	0	0	0	0	0	0	1	2	0	4	2	0	0	3	0	0	12	0.0162
WETA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0014
PHAI	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0.0027
HUVI	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2	0.0027
BEVI	0	0	0	0	0	0	0	0	3	2	0	1	3	0	0	1	10	0.0135
NAWA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
OCWA	1	2	2	4	0	0	0	0	0	1	0	0	0	2	0	1	13	0.0176
YWAR	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0.0041
YRWA	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0027
COYE	7	1	4	2	3	6	7	6	7	7	3	4	5	5	6	1	74	0.1001
YBCH	0	5	4	3	6	2	3	3	7	6	6	5	0	3	2	0	55	0.0744
WIWA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	0.0027
CATH	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0.0027
BEWR	1	3	1	1	4	2	1	0	2	1	1	1	1	1	2	0	22	0.0298
HOWR	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	3	0.0041
PLTI	0	1	0	0	0	3	0	0	0	0	1	1	0	0	1	0	7	0.0095
WREN	1	1	3	2	1	5	3	4	3	3	6	1	5	3	7	1	49	0.0663
COBU	0	0	0	3	3	0	1	0	0	0	0	0	0	1	0	2	10	0.0135
SWTH	0	0	0	3	14	4	1	0	0	0	0	0	0	0	0	0	22	0.0298
HETH	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
Captures	30	27	35	34	57	41	33	36	36	46	36	34	26	28	30	11	540	0.7306
Species	11	12	13	16	15	14	16	12	12	17	13	11	12	13	10	8	42	0.0568

* 739:05 Total Net Hours

Table 4
Capture Rates by Net and Date: De Luz

Date		Net										Date Totals
		1	2	3	4	5	6	7	8	9	10	
4/1/95	Net Hours	2:00	2:00	2:00	2:30	2:30	2:30	2:00	2:00	2:00	2:00	21:30
	Captures	5	3	4	1	5	3	4	1	3	1	30
	Captures/Net Hour	2.50	1.50	2.00	0.40	2.00	1.20	2.00	0.50	1.50	0.50	1.40
4/12/95	Net Hours	4:20	4:20	4:20	4:20	4:20	4:20	4:20	4:20	4:20	4:20	43:20
	Captures	3	2	9	1	1	4	3	2	1	1	27
	Captures/Net Hour	0.69	0.46	2.08	0.23	0.23	0.92	0.69	0.46	0.23	0.23	0.62
4/21/95	Net Hours	0:00	5:40	5:35	5:55	5:28	5:34	5:55	6:00	6:00	5:45	51:52
	Captures	0	5	3	1	4	4	2	6	2	8	35
	Captures/Net Hour	0.00	0.88	0.54	0.17	0.73	0.72	0.34	1.00	0.33	1.39	0.67
5/1/95	Net Hours	4:35	4:55	4:40	5:10	5:05	5:20	5:00	5:05	5:05	4:50	49:45
	Captures	1	3	5	3	6	2	2	0	11	1	34
	Captures/Net Hour	0.22	0.61	1.07	0.58	1.18	0.38	0.40	0.00	2.16	0.21	0.68
5/15/95	Net Hours	5:50	5:35	5:25	5:45	5:25	5:15	5:10	4:46	4:56	5:20	53:27
	Captures	6	4	8	9	9	4	5	5	1	6	57
	Captures/Net Hour	1.03	0.72	1.48	1.57	1.66	0.76	0.97	1.05	0.20	1.13	1.07
5/22/95	Net Hours	6:15	6:10	6:15	6:25	6:05	6:15	6:15	6:20	6:10	6:00	62:10
	Captures	4	6	4	4	2	5	4	4	3	5	41
	Captures/Net Hour	0.64	0.97	0.64	0.62	0.33	0.80	0.64	0.63	0.49	0.83	0.66
5/31/95	Net Hours	5:50	5:40	5:25	5:05	5:15	5:20	5:45	5:50	5:50	5:35	55:35
	Captures	4	4	2	4	3	1	7	2	2	4	33
	Captures/Net Hour	0.69	0.71	0.37	0.79	0.57	0.19	1.22	0.34	0.34	0.72	0.59
6/12/95	Net Hours	4:15	4:10	4:05	4:00	4:10	4:15	3:45	3:30	3:30	4:15	39:55
	Captures	4	3	5	4	0	2	4	1	6	7	36
	Captures/Net Hour	0.94	0.72	1.22	1.00	0.00	0.47	1.07	0.29	1.71	1.65	0.90
6/21/95	Net Hours	5:17	5:07	4:55	5:10	4:58	5:20	5:07	5:01	4:58	5:10	51:03
	Captures	5	3	7	3	2	3	5	3	0	5	36
	Captures/Net Hour	0.95	0.59	1.42	0.58	0.40	0.56	0.98	0.60	0.00	0.97	0.71
7/5/95	Net Hours	5:10	5:00	5:05	5:30	5:30	5:30	5:27	5:44	5:40	5:05	53:41
	Captures	1	9	5	4	7	3	2	3	3	9	46
	Captures/Net Hour	0.19	1.80	0.98	0.73	1.27	0.55	0.37	0.52	0.53	1.77	0.86
7/11/95	Net Hours	4:40	4:25	4:21	4:25	4:45	4:45	4:27	4:25	4:30	4:37	45:20
	Captures	2	4	3	3	1	2	9	3	3	6	36
	Captures/Net Hour	0.43	0.91	0.69	0.68	0.21	0.42	2.02	0.68	0.67	1.30	0.79
7/20/95	Net Hours	4:50	4:40	4:40	4:47	4:53	5:02	4:30	4:40	4:40	5:00	47:42
	Captures	4	0	3	1	2	1	11	2	9	1	34
	Captures/Net Hour	0.83	0.00	0.64	0.21	0.41	0.20	2.44	0.43	1.93	0.20	0.71
8/1/95	Net Hours	4:00	4:00	4:00	4:00	4:55	4:40	4:45	4:35	4:35	4:30	44:00
	Captures	4	2	2	1	2	5	0	2	4	4	26
	Captures/Net Hour	1.00	0.50	0.50	0.25	0.41	1.07	0.00	0.44	0.87	0.89	0.59
8/10/95	Net Hours	5:07	4:54	4:43	4:53	5:13	4:31	5:22	5:19	5:14	4:41	49:57
	Captures	2	1	0	4	6	5	1	0	4	5	28
	Captures/Net Hour	0.39	0.20	0.00	0.82	1.15	1.11	0.19	0.00	0.76	1.07	0.56
8/22/95	Net Hours	3:32	5:07	4:57	5:30	5:02	4:40	3:35	4:25	3:55	4:25	45:08
	Captures	4	2	2	0	6	2	1	8	2	3	30
	Captures/Net Hour	1.13	0.39	0.40	0.00	1.19	0.43	0.28	1.81	0.51	0.68	0.66
8/30/95	Net Hours	0:00	4:00	4:00	4:20	4:00	4:10	0:00	0:00	0:00	4:10	24:40
	Captures	0	6	2	0	0	2	0	0	0	1	11
	Captures/Net Hour	0.00	1.50	0.50	0.00	0.00	0.48	0.00	0.00	0.00	0.24	0.45
Net Totals	Net Hours	65:41	75:43	74:26	77:45	77:34	77:27	71:23	72:00	71:23	75:43	739:05
	Captures	49	57	64	43	56	48	60	42	54	67	540
	Captures/Net Hour	0.75	0.75	0.86	0.55	0.72	0.62	0.84	0.58	0.76	0.88	0.73

Figure 1
Number of Individuals Caught by Species: De Luz

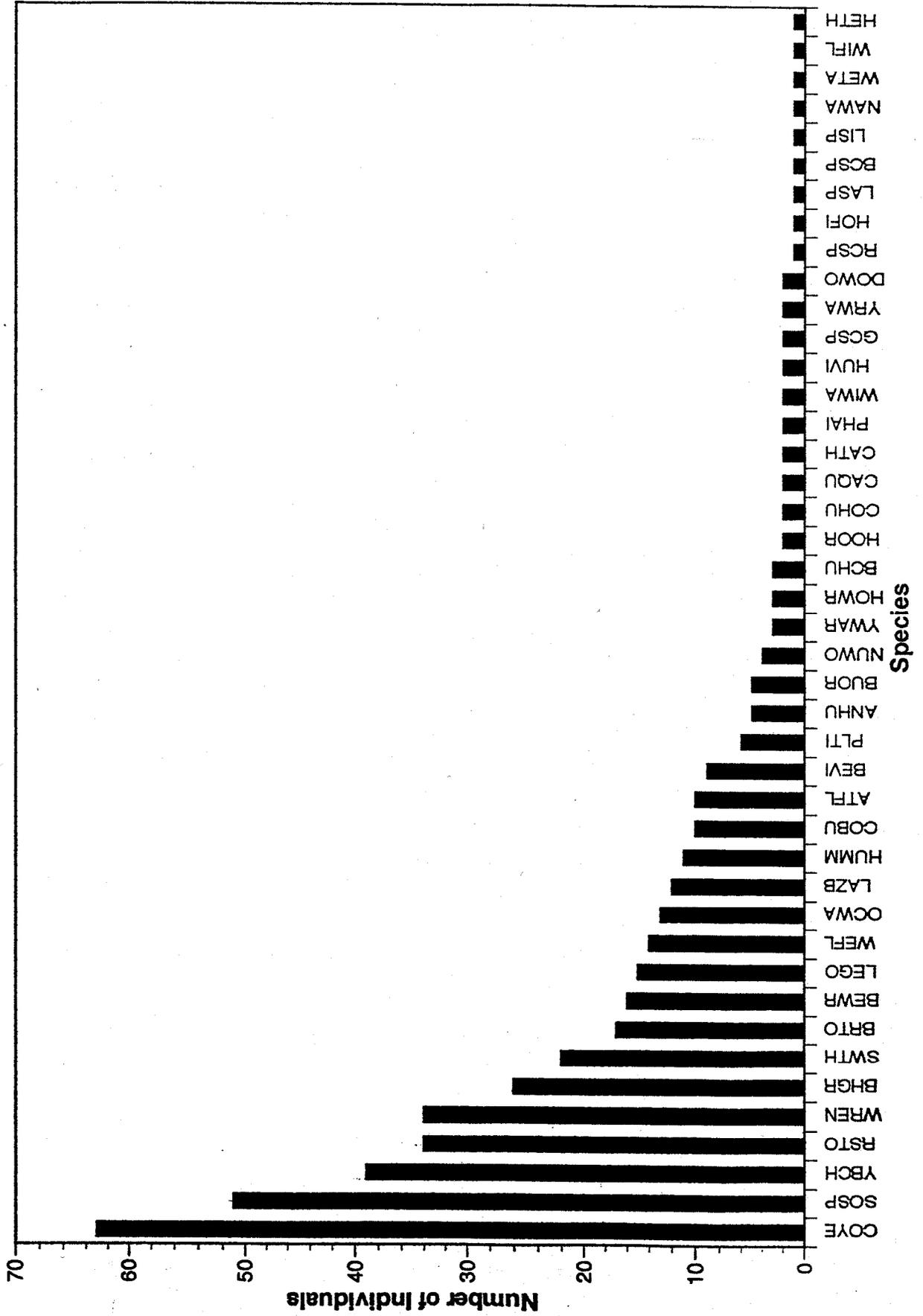


Figure 2
Captures, Net Hours, and Capture Rate by Net: De Luz

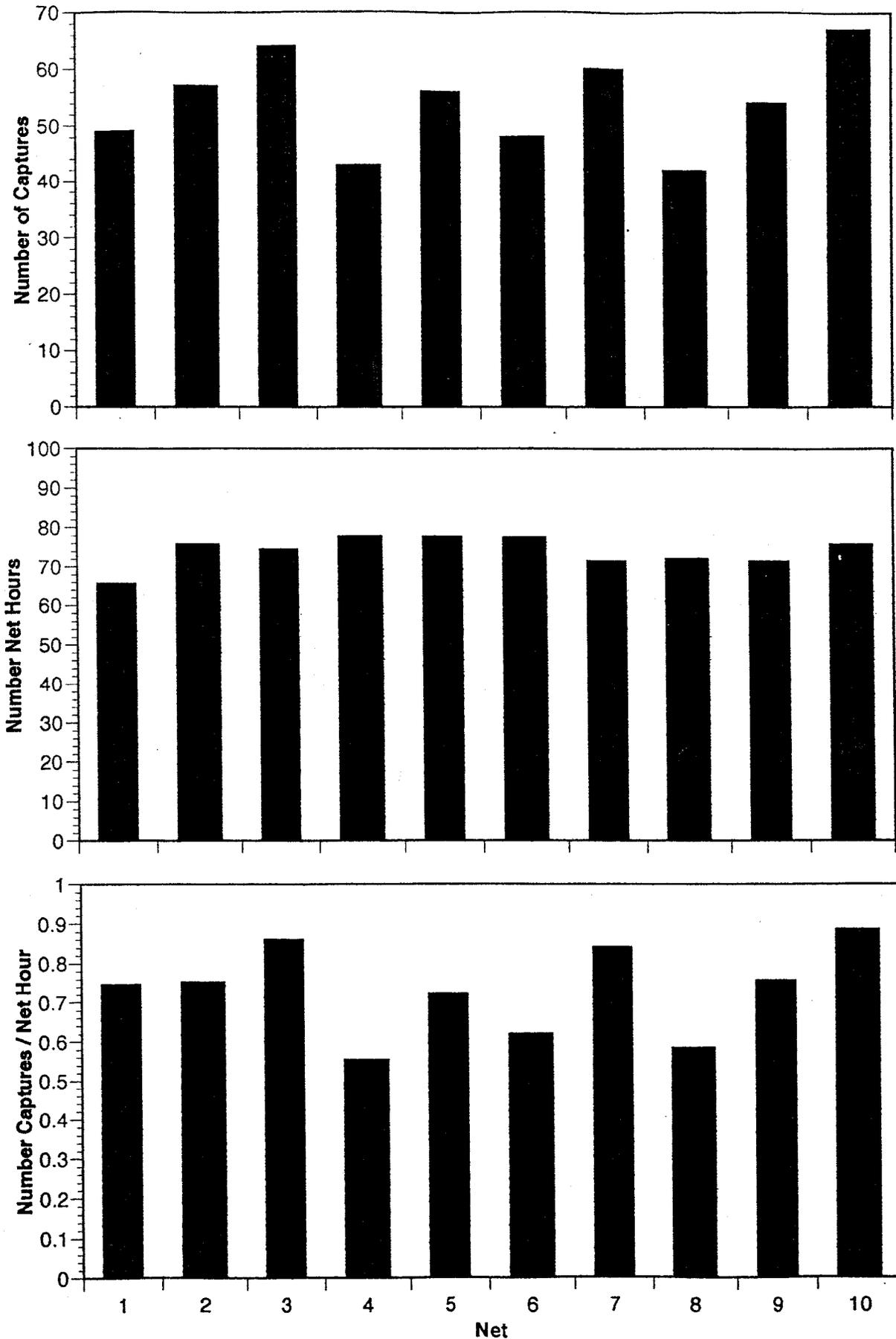


Table 5
Age and Sex of Individuals Captured: Case Springs

Species	Female				Female Total	Male				Male Total	Unknown			Unknown Total	Species Total
	Age*					Age*					Age*				
	A	H	S	U		A	H	S	U		A	H	U		
NUWO	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
ACWO	2	0	0	0	2	4	1	0	3	8	2	0	0	2	12
NOFL	1	0	0	0	1	0	0	0	0	0	0	0	1	1	2
COHU	0	0	0	0	0	0	2	0	0	2	0	0	0	0	2
ANHU	1	0	0	2	2	0	5	0	0	5	0	5	2	7	15
ALHU	0	0	0	0	0	1	1	0	0	2	0	0	2	2	4
HUMM	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
ATFL	4	0	0	0	4	0	0	0	0	0	0	0	0	0	4
WEWP	2	0	0	0	2	0	0	0	0	0	0	0	0	0	2
WEFL	0	0	0	0	0	0	0	0	0	0	6	3	0	9	9
HAFL	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
SCJA	1	0	0	0	1	0	0	0	0	0	1	1	0	2	3
LEGO	5	9	1	0	15	5	2	1	0	8	0	0	1	1	24
LASP	0	0	0	0	0	5	0	0	0	5	1	0	0	1	6
CHSP	2	0	0	0	2	0	0	0	0	0	10	2	0	12	14
DEJU	2	0	0	0	2	1	0	0	0	1	3	0	0	3	6
RCSP	1	0	0	0	1	2	0	0	0	2	0	0	0	0	3
RSTO	2	0	0	0	2	3	0	0	0	3	0	0	0	0	5
BRTO	3	0	0	0	3	6	0	0	0	6	2	7	0	9	18
BHGR	5	1	0	0	6	5	0	0	0	5	0	0	0	0	11
LAZB	4	0	0	0	4	4	0	0	0	4	0	1	0	1	9
WETA	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
WAVI	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
OCWA	1	0	0	0	1	1	0	0	0	1	1	0	0	1	3
YWAR	2	0	0	0	2	1	0	0	0	1	0	0	0	0	3
BTYW	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
TOWA	0	0	0	0	0	3	0	0	0	3	0	0	0	0	3
HEWA	1	0	0	0	1	1	0	0	0	1	0	0	0	0	2
WIWA	1	0	0	0	1	2	0	0	0	2	0	0	0	0	3
BEWR	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
HOWR	2	0	0	0	2	5	0	0	1	6	0	0	0	0	8
WBNU	4	0	0	1	5	0	0	0	0	0	2	2	0	4	9
PLTI	3	0	0	0	3	2	0	0	0	2	2	4	6	12	17
COBU	0	0	0	0	0	1	0	0	0	1	0	0	1	1	2
SWTH	0	0	0	0	0	1	0	0	0	1	15	0	0	15	16
HETH	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
WEBL	1	1	0	0	2	0	1	0	0	1	0	1	0	1	4
Sex Total	51	11	1	2	65	53	12	2	5	72	49	26	16	91	229

* Age Key
A = After Hatching Year
H = Hatching Year
S = Second Year
U = Unknown Age

Table 6
Capture Frequency of Individuals: Case Springs

Species	# Individuals / Capture Incidence (Banded Birds)				Total Individuals Banded	Captures: Banded Birds	Captures: Unbanded Birds	Captures: All Birds
	1 Capture	2 Captures	3 Captures	4 Captures				
NUWO	1	0	0	0	1	1	0	1
ACWO	8	3	0	0	11	14	1	15
NOFL	1	0	0	0	1	1	1	2
COHU	0	0	0	0	0	0	2	2
ANHU	0	0	0	0	0	0	15	15
ALHU	0	0	0	0	0	0	4	4
HUMM	0	0	0	0	0	0	2	2
ATFL	3	1	0	0	4	5	0	5
WEWP	2	0	0	0	2	2	0	2
WEFL	9	0	0	0	9	9	0	9
HAFL	2	0	0	0	2	2	0	2
SCJA	3	0	0	0	3	3	0	3
LEGO	23	1	0	0	24	25	0	25
LASP	5	1	0	0	6	7	0	7
CHSP	14	0	0	0	14	14	0	14
DEJU	6	0	0	0	6	6	0	6
RCSP	3	0	0	0	3	3	0	3
RSTO	4	0	0	0	4	4	1	5
BRTO	13	3	0	0	16	19	2	21
BHGR	10	1	0	0	11	12	0	12
LAZB	9	0	0	0	9	9	0	9
WETA	1	0	0	0	1	1	0	1
WAVI	1	0	0	0	1	1	0	1
OCWA	3	0	0	0	3	3	0	3
YWAR	3	0	0	0	3	3	0	3
BTYW	1	0	0	0	1	1	0	1
TOWA	3	0	0	0	3	3	0	3
HEWA	2	0	0	0	2	2	0	2
WIWA	3	0	0	0	3	3	0	3
BEWR	1	0	0	0	1	1	0	1
HOWR	5	3	0	0	8	11	0	11
WBNU	7	1	1	0	9	12	0	12
PLTI	12	2	1	1	16	23	1	24
COBU	2	0	0	0	2	2	0	2
SWTH	16	0	0	0	16	16	0	16
HETH	1	0	0	0	1	1	0	1
WEBL	4	0	0	0	4	4	0	4
Total	181	16	2	1	200	223	29	252

Table 7
Number of Captures by Date: Case Springs

Species	Date														Total Captures 1995	Captures per Total Net Hours*		
	4/2/95	4/13/95	4/22/95	5/2/95	5/11/95	5/21/95	6/5/95	6/13/95	6/22/95	7/4/95	7/12/95	7/21/95	7/31/95	8/9/95			8/23/95	8/31/95
NUWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.0014
ACWO	0	0	4	1	0	0	0	0	1	1	0	1	2	2	3	0	15	0.0206
NOFL	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0.0027
COHU	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	0.0027
ANHU	0	0	1	0	0	0	0	4	1	1	0	2	5	0	1	0	15	0.0206
ALHU	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0.0055
HUMM ‡	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0.0027
ATFL	0	0	0	1	0	0	2	2	0	0	0	0	0	0	0	0	5	0.0069
WEWP	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0.0027
WEFL	0	0	0	1	4	0	0	0	0	1	0	0	2	0	1	0	9	0.0123
HAFL	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0.0027
SCJA	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	3	0.0041
LEGO	0	0	0	0	0	0	0	1	0	1	2	4	7	1	4	5	25	0.0343
LASP	1	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	7	0.0096
CHSP	0	0	0	0	0	0	0	0	0	0	1	0	1	4	2	6	14	0.0192
DEJU	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.0082
RCSP	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0.0041
RSTO	0	0	0	0	0	0	3	0	1	0	0	0	0	1	0	0	5	0.0069
BRTO	0	2	1	0	1	2	0	2	2	0	0	2	2	0	4	3	21	0.0288
BHGR	0	0	3	2	1	0	0	0	0	1	0	0	5	0	0	0	12	0.0165
LAZB	0	0	0	0	0	0	0	3	0	1	0	3	0	2	0	0	9	0.0123
WETA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
WAVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.0014
OCWA	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	3	0.0041
YWAR	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	0.0041
BTYW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.0014
TOWA	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.0041
HEWA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0027
WIWA	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	0.0041
BEWR	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.0014
HOWR	0	2	1	1	1	1	3	1	0	0	1	0	0	0	0	0	11	0.0151
WBNU	0	1	0	0	0	1	2	0	3	1	0	0	0	1	1	2	12	0.0165
PLTI	1	2	1	0	1	1	1	1	2	0	1	4	3	1	2	3	24	0.0329
COBU	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0.0027
SWTH	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	16	0.0219
HETH	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0014
WEBL	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	4	0.0055
Captures	5	15	17	8	33	5	14	17	11	8	7	24	27	16	20	25	252	0.3456
Species	3	8	8	6	10	4	8	9	7	8	5	11	8	10	10	11	36	0.0494

* 739:05 Total Net Hours

‡ Not included in species total

Table 8
Capture Rates by Net and Date: Case Springs

Date		Net										Date Totals
		1	2	3	4	5	6	7	8	9	10	
4/2/95	Net Hours	5:15	5:15	0:00	0:00	4:00	5:15	4:00	4:30	5:15	5:15	38:45
	Captures	0	0	0	0	0	3	2	0	0	0	5
	Captures/Net Hour	0.00	0.00	0.00	0.00	0.00	0.57	0.50	0.00	0.00	0.00	0.13
4/13/95	Net Hours	5:00	5:00	5:00	5:00	5:00	5:00	5:00	5:00	3:30	5:00	48:30
	Captures	0	0	1	0	0	4	2	3	3	2	15
	Captures/Net Hour	0.00	0.00	0.20	0.00	0.00	0.80	0.40	0.60	0.86	0.40	0.31
4/22/95	Net Hours	6:00	6:30	6:00	6:00	6:00	5:50	6:05	5:45	5:40	6:00	59:50
	Captures	0	2	1	1	1	4	5	2	1	0	17
	Captures/Net Hour	0.00	0.31	0.17	0.17	0.17	0.69	0.82	0.35	0.18	0.00	0.28
5/2/95	Net Hours	5:08	4:49	5:10	5:05	5:13	5:22	5:26	5:15	5:37	5:16	52:21
	Captures	0	0	0	0	1	0	1	2	3	1	8
	Captures/Net Hour	0.00	0.00	0.00	0.00	0.19	0.00	0.18	0.38	0.53	0.19	0.15
5/11/95	Net Hours	1:25	1:10	3:00	2:45	2:35	1:10	2:18	2:24	2:00	1:55	20:42
	Captures	6	4	1	1	1	8	1	3	3	5	33
	Captures/Net Hour	4.24	3.43	0.33	0.36	0.39	6.86	0.43	1.25	1.50	2.61	1.59
5/21/95	Net Hours	6:31	6:20	6:25	6:35	6:20	6:10	6:21	6:09	6:30	6:23	63:44
	Captures	1	0	0	0	0	0	1	2	0	1	5
	Captures/Net Hour	0.15	0.00	0.00	0.00	0.00	0.00	0.16	0.33	0.00	0.16	0.08
6/5/95	Net Hours	5:22	5:00	5:25	5:25	5:20	5:27	5:21	5:20	5:14	5:16	53:10
	Captures	5	1	1	0	2	0	1	3	1	0	14
	Captures/Net Hour	0.93	0.20	0.18	0.00	0.38	0.00	0.19	0.56	0.19	0.00	0.26
6/13/95	Net Hours	4:18	4:29	4:51	4:47	4:43	5:03	4:45	4:37	4:44	4:21	46:38
	Captures	0	0	3	5	2	1	2	3	0	1	17
	Captures/Net Hour	0.00	0.00	0.62	1.05	0.42	0.20	0.42	0.65	0.00	0.23	0.36
6/22/95	Net Hours	3:15	4:10	4:05	3:40	4:00	0:00	4:05	4:00	4:10	4:10	35:35
	Captures	2	0	2	1	3	0	0	3	0	0	11
	Captures/Net Hour	0.62	0.00	0.49	0.27	0.75	0.00	0.00	0.75	0.00	0.00	0.31
7/4/95	Net Hours	6:20	7:05	6:25	6:10	6:15	6:20	6:35	6:35	6:50	7:00	65:35
	Captures	2	0	2	0	0	0	1	1	1	1	8
	Captures/Net Hour	0.32	0.00	0.31	0.00	0.00	0.00	0.15	0.15	0.15	0.14	0.12
7/12/95	Net Hours	4:31	5:00	4:55	4:50	4:50	0:00	4:58	5:03	4:47	4:40	43:34
	Captures	1	0	1	3	0	0	0	0	0	2	7
	Captures/Net Hour	0.22	0.00	0.20	0.62	0.00	0.00	0.00	0.00	0.00	0.43	0.16
7/21/95	Net Hours	4:00	5:15	5:28	5:25	5:25	3:15	4:15	4:15	4:05	3:40	45:03
	Captures	0	0	2	9	2	2	2	4	3	0	24
	Captures/Net Hour	0.00	0.00	0.37	1.66	0.37	0.62	0.47	0.94	0.73	0.00	0.53
7/31/95	Net Hours	4:00	3:00	5:10	5:05	4:40	2:35	4:45	4:50	2:30	4:40	41:15
	Captures	2	0	0	11	0	0	11	3	0	0	27
	Captures/Net Hour	0.50	0.00	0.00	2.16	0.00	0.00	2.32	0.62	0.00	0.00	0.65
8/9/95	Net Hours	3:30	3:22	3:35	4:10	4:10	0:00	4:11	4:00	3:49	3:39	34:26
	Captures	0	1	3	5	2	0	2	2	0	1	16
	Captures/Net Hour	0.00	0.30	0.84	1.20	0.48	0.00	0.48	0.50	0.00	0.27	0.46
8/23/95	Net Hours	5:22	5:27	5:23	4:20	4:20	4:43	4:23	4:28	5:01	5:12	48:39
	Captures	2	0	3	9	0	3	2	0	0	1	20
	Captures/Net Hour	0.37	0.00	0.56	2.08	0.00	0.64	0.46	0.00	0.00	0.19	0.41
8/31/95	Net Hours	4:30	0:00	4:35	3:35	3:25	3:40	3:30	3:40	0:00	4:25	31:20
	Captures	6	0	5	5	4	1	2	2	0	0	25
	Captures/Net Hour	1.33	0.00	1.09	1.40	1.17	0.27	0.57	0.55	0.00	0.00	0.80
Net Totals	Net Hours	74:27	71:52	75:27	72:52	76:16	59:50	75:58	75:51	69:42	76:52	729:07
	Captures	27	8	25	50	18	26	35	33	15	15	252
	Captures/Net Hour	0.36	0.11	0.33	0.69	0.24	0.43	0.46	0.44	0.22	0.20	0.35

Figure 3
Number of Individuals Caught by Species: Case Springs

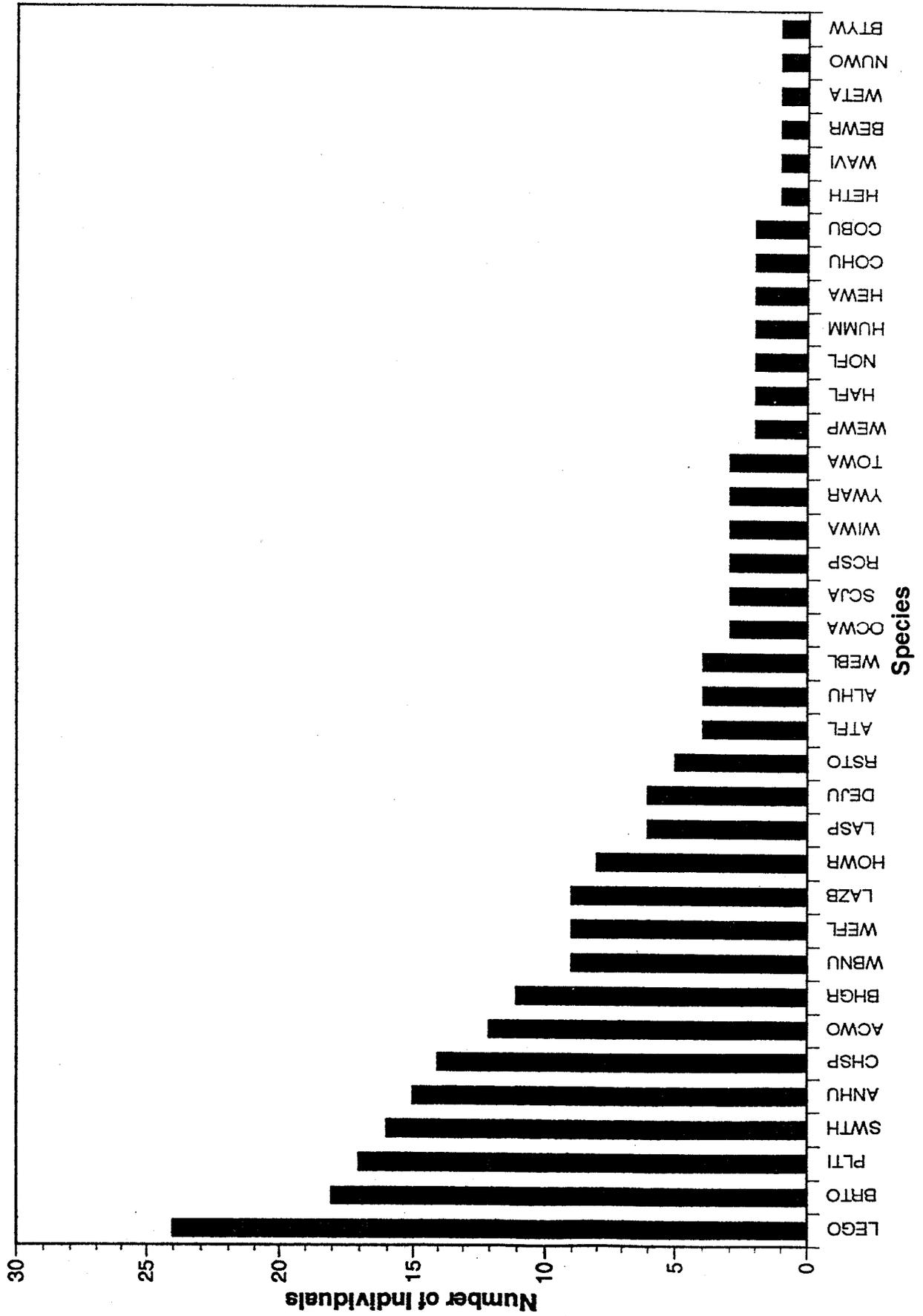
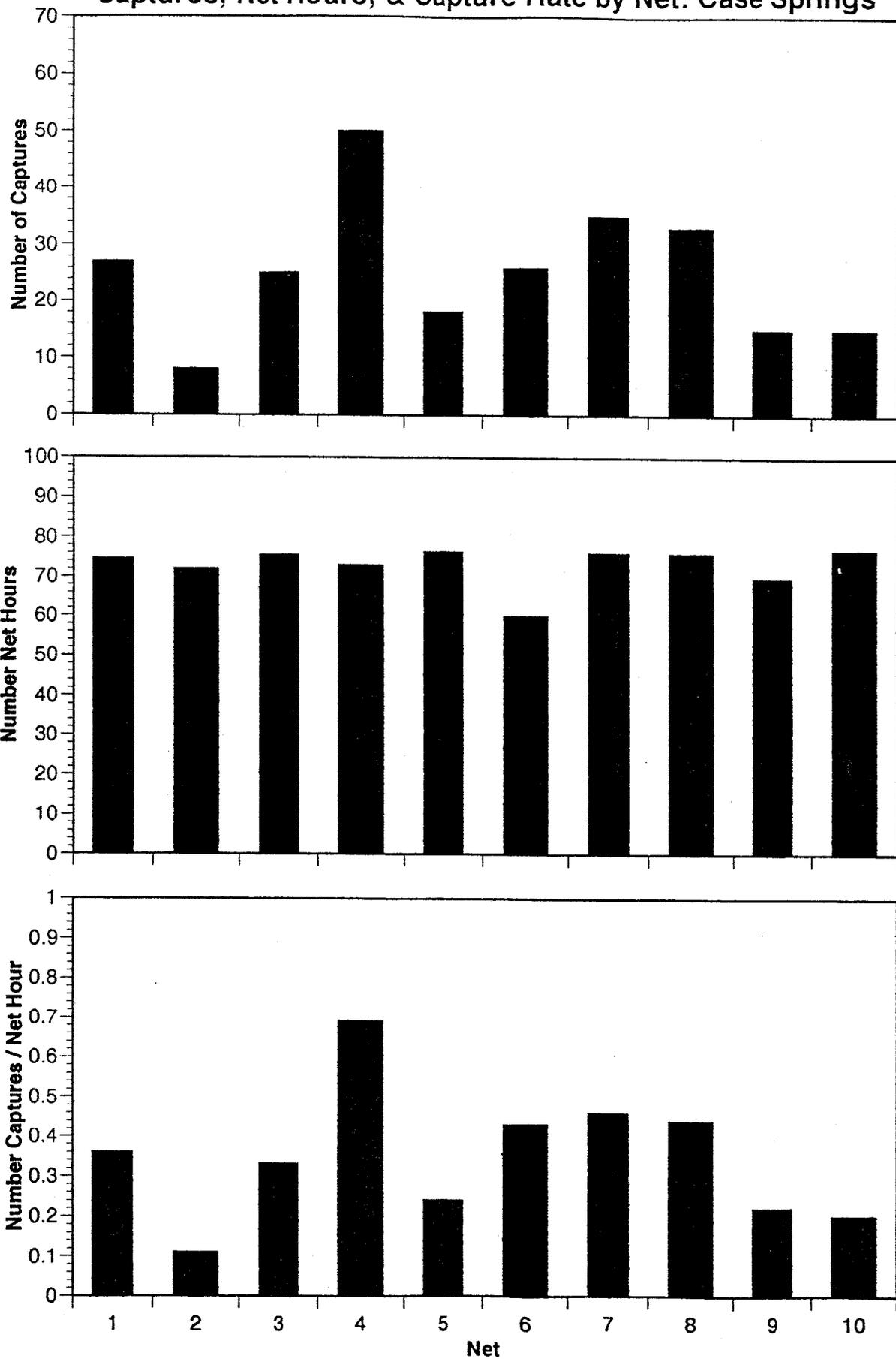


Figure 4
Captures, Net Hours, & Capture Rate by Net: Case Springs



**Alpha Codes, Common Names, and Scientific Names
of Species Caught at MAPS Stations, Camp Pendleton**

Code	Common Name	Scientific Name	AOU #
CAQU	California quail	<i>Callipepla californica</i>	0.0
DOWO	Downy woodpecker	<i>Dendrocopos pubescens</i>	394.0
NUWO	Nuttall's woodpecker	<i>Dendrocopos nuttallii</i>	397.0
ACWO	Acorn woodpecker	<i>Melanerpes formicivorus</i>	407.0
NOFL	Northern Flicker	<i>Colaptes auratus</i>	413.0
BCHU	Black-chinned hummingbird	<i>Archilochus alexandri</i>	429.0
COHU	Costa's hummingbird	<i>Archilochus costae</i>	430.0
ANHU	Anna's hummingbird	<i>Archilochus anna</i>	431.0
ALHU	Allen's hummingbird	<i>Selasphorus sasin</i>	434.0
ATFL	Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	454.0
WEWP	Western wood-pewee	<i>Contopus sordidulus</i>	462.0
PSFL	Pacific-slope flycatcher	<i>Empidonax difficilis</i>	464.1
WIFL	Willow flycatcher	<i>Empidonax traillii</i>	466.0
HAFL	Hammond's flycatcher	<i>Empidonax hammondii</i>	468.0
SCJA	Scrub jay	<i>Aphelocoma californica</i>	481.0
HOOR	Hooded oriole	<i>Icterus cucullatus</i>	505.0
BUOR	Northern oriole	<i>Icterus galbula</i>	508.0
HOFI	House finch	<i>Carpodacus mexicanus</i>	519.0
LEGO	Lesser goldfinch	<i>Carduelis psaltria</i>	530.0
LASP	Lark sparrow	<i>Chondestes grammacus</i>	552.0
GCSP	Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	557.0
CHSP	Chipping sparrow	<i>Spizella passerina</i>	560.0
BCSP	Black-chinned sparrow	<i>Spizella atrogularis</i>	565.0
DEJU	Dark-eyed junco	<i>Junco hyemalis</i>	567.1
RCSP	Rufous-crowned sparrow	<i>Aimophila ruficeps</i>	580.0
SOSP	Song sparrow	<i>Melospiza melodia</i>	581.0
LISP	Lincoln's sparrow	<i>Melospiza lincolnii</i>	583.0
RSTO	Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>	587.0
CALT	California towhee	<i>Pipilo crissalis</i>	591.1
BHGR	Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	596.0
LAZB	Lazuli bunting	<i>Passerina amoena</i>	599.0
WETA	Western tanager	<i>Piranga ludoviciana</i>	607.0
PHAI	Phainopepla	<i>Phainopepla nitens</i>	620.0
WAVI	Warbling vireo	<i>Vireo gilvus</i>	627.0
HUVI	Hutton's vireo	<i>Vireo huttoni</i>	632.0
LBVI	Least Bell's vireo	<i>Vireo bellii pusillus</i>	633.4
NAWA	Nashville warbler	<i>Vermivora ruficapilla</i>	645.0
OCWA	Orange-crowned warbler	<i>Vermivora celata</i>	646.0
YWAR	Yellow warbler	<i>Dendroica petechia</i>	652.0
YRWA	Yellow-rumped warbler	<i>Dendroica coronata</i>	655.6
BTYW	Black-throated gray warbler	<i>Dendroica nigrescens</i>	665.0
TOWA	Townsend's warbler	<i>Dendroica townsendi</i>	668.0
HEWA	Hermit warbler	<i>Dendroica occidentalis</i>	669.0
COYE	Common yellowthroat	<i>Geothlypis trichas</i>	681.0
YBCH	Yellow-breasted chat	<i>Icteria virens</i>	683.0
WIWA	Wilson's warbler	<i>Wilsonia pusilla</i>	685.0
CATH	California thrasher	<i>Toxostoma redivivum</i>	710.0
BEWR	Bewick's wren	<i>Thyromanes bewickii</i>	719.0
HOWR	House wren	<i>Troglodytes aedon</i>	721.0
WBNU	White-breasted nuthatch	<i>Sitta carolinensis</i>	727.0
OATI	Plain titmouse	<i>Baeolophus inornatus</i>	733.0
WREN	Wrentit	<i>Chamaea fasciata</i>	742.0
BUSH	Bushtit	<i>Psaltriparus minimus</i>	743.0
SWTH	Swainson's thrush	<i>Catharus ustulata</i>	758.0
HETH	Hermit thrush	<i>Catharus guttatus</i>	759.0
WEBL	Western bluebird	<i>Sialia mexicana</i>	767.0