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

FOURTH ANNUAL PROGRESS REPORT 1998

Prepared for

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Introduction

This report is the fourth annual progress update summarizing the activities of three MAPS stations 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 established at Camp Pendleton in 1995 and operated annually thereafter: 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. A third station was established in 1998 in riparian habitat along the Santa Margarita River west of Ysidora Basin, at the site of the former settling ponds. 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

Following the protocol established in past years, the De Luz and Case Springs banding stations were operated once during every 10-day period between April 1 and August 31, 1998, for a total of 15 days per station. Opening of the new Santa Margarita station was delayed until May 1 by weather and flood conditions that prevented site selection and preparation, so only 12 periods were sampled this year. Ten mistnets were erected at each site in fixed locations (Figures 1-3). Nets were opened at dawn and run until late morning, typically between 1100 and noon. Nets were not operated during inclement weather (rain, extreme heat or cold), and any netting time missed as a result was compensated for by netting on the next available day, starting at the time the netting ended on the previous day. Nets were checked every 15-30 minutes by observers working circuits. All birds except hummingbirds, game birds (California quail, mourning dove) and raptors were removed from nets, held in mesh bags labeled with the net number and time of capture, and taken to a central processing location where they were banded with USGS numbered aluminum bands. Data recorded for each individual caught included age, sex, breeding condition, weight, wing chord, fat deposition, feather wear, and molt status. After processing, birds were released in the vicinity of the net in which they had been captured. Hummingbirds, game birds and raptors were not banded, but were identified to species, age, and sex when possible, and released immediately at the capture site. Typically, four field personnel operated the De Luz station, two the Case Springs station, and five to six the Santa Margarita station, working on consecutive days. Field work was conducted by Jim Asmus, Peter Beck, Jason Bennett, Christine Collier, Paul Galvin, Barbara Kus, Karen Schenck, Jennifer Turnbull, and Jeff Wells.

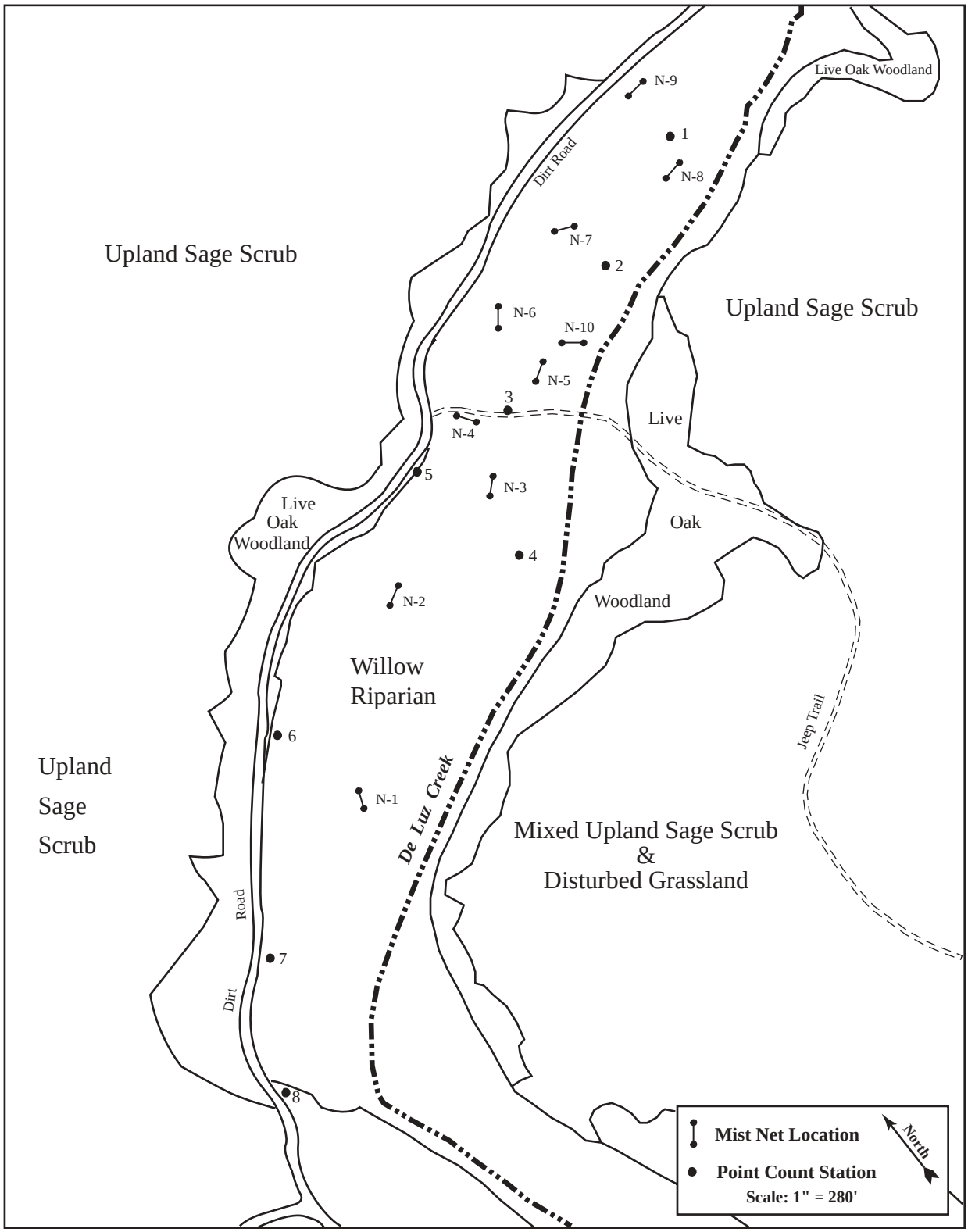


Figure 1. De Luz Creek MAPS Station, Marine Corps Base Camp Pendleton.

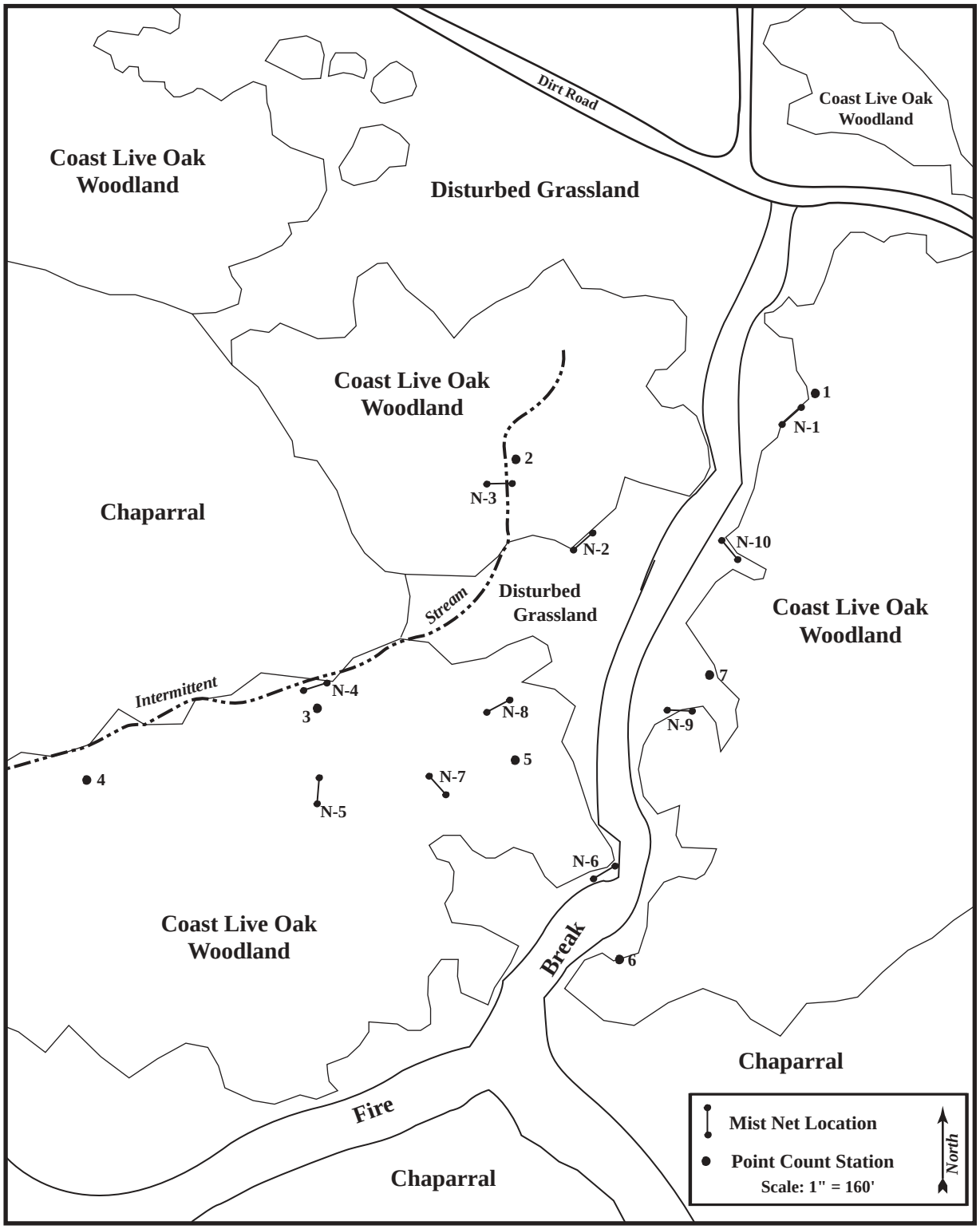


Figure 2. Case Springs MAPS Station, Marine Corps Base Camp Pendleton.

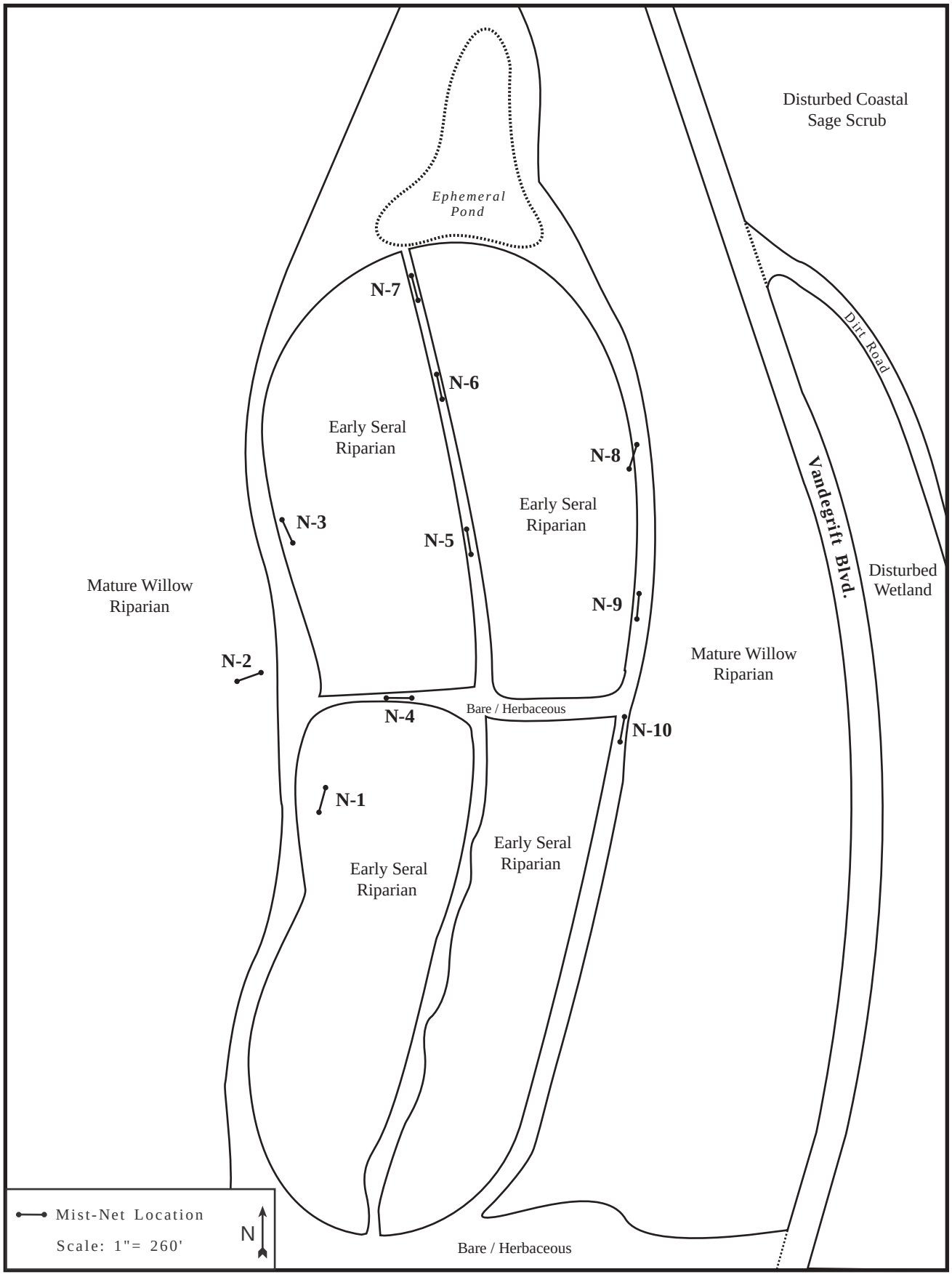


Figure 3. Santa Margarita River MAPS station, Marine Corps Base Camp Pendleton.

Results

De Luz Creek

Overview of 1998 Captures

Four hundred and twenty-nine individuals of 37 species were caught during 796 net-hours (Table 1; see attached list of A.O.U. codes for common and taxonomic species names). Overall, the number of individuals caught in 1998 was 6 percent higher than the number (404) captured in 1997, but comparable to the number (422) caught in 1996. Captures per net hour were identical to those in 1997, at 0.63.

As in previous years, the most abundant species at the station included common yellowthroats and song sparrows, which together made up 32 percent of the individuals captured (Figure 4). Also abundant were yellow-breasted chats, California towhees, spotted towhees, and wrentits, although the relative abundance of these species differed between years (Table 2). Species appearing to decline at the station relative to past years included migrants such as Pacific-slope flycatcher, black-headed grosbeak, and yellow-breasted chat. Wrentits, year-round residents, also declined, possibly in response to a fire that burned the slopes adjacent to the site in 1997. In contrast, several resident species appeared to have undergo population increases, including common yellowthroat, Bewick's wren, house wren, and Nuttall's woodpecker (Table 2). One species, the red-shafted flicker, was captured for the first time at the De Luz station in 1998, bringing the total number of species captured since 1995 to 51.

The sex ratio of birds of known sex (N=233) was approximately even, at 49 percent female and 51 percent male (Table 1). With the exception of 1997, when 58 percent of the birds captured were females, an even sex ratio has characterized the De Luz population. Age composition, however, changed relative to prior years, with an increase in the proportion of the population made up by hatching year birds (Table 1). Thirty percent of the birds captured in 1998 were hatching year individuals (N=396), in contrast to 24 percent in 1997 (N=373), 18 percent in 1996 (N=393), and 20 percent in 1995 (N=425), suggesting an increase in productivity over time.

Three hundred and fifty-six of the birds caught (83 percent), including 33 hummingbirds and two California quail, were new captures. Of these, 97 percent (312/321; hummingbirds and quail excluded), were banded; the remainder escaped prior to banding (8) or were not banded for other reasons (1) (Table 2). The majority of birds were captured only once during the season, but some individuals of the most abundant species were captured 2-3 times, and one common yellowthroat was captured four times (Table 3).

Overall capture rates by net ranged from 24 to 88 captures per 100 net-hours (Table 5), for an overall average capture rate of 63 per 100 net-hours (Table 4). Nets differed in their capture rates relative to previous years; captures at nets 2, 3, and 8 declined, while captures at nets 5 and 7 increased (Figure 5). Changes in the vegetative cover in the vicinity of nets, particularly those in areas scoured by floods, are probably responsible for the shifts in capture rates.

Capture rates peaked at 110 captures per 100-net hours in early June (Table 5), over one

Table 1. Sex and Age of Individuals Captured: De Luz Creek, 1998

	Female						Male					Unknown Sex							
	Age[a]					Female	Age*				Male	Age[a]						Unknown	Species
Species	A	H	O	S	U	Total	A	H	O	S	Total	A	H	L	O	S	U	Total	**Total**
CAQU	0	0	0	0	0	**0**	0	0	0	0	**0**	2	0	0	0	0	0	**2**	**2**
DOWO	0	1	0	0	0	**1**	0	0	0	0	**0**	0	0	0	0	0	0	**0**	**1**
NUWO	0	0	0	0	0	**0**	1	3	4	0	**8**	0	1	0	0	0	0	**1**	**9**
RSFL	0	0	0	0	0	**0**	1	0	0	0	**1**	0	0	0	0	0	0	**0**	**1**
BCHU	1	0	0	0	0	**1**	4	1	0	0	**5**	0	1	0	0	0	0	**1**	**7**
COHU	0	0	0	0	0	**0**	0	2	0	0	**2**	0	0	0	0	0	0	**0**	**2**
ANHU	3	0	0	0	0	**3**	4	1	0	0	**5**	0	1	0	0	0	6	**7**	**15**
ALHU	0	0	0	0	0	**0**	1	0	0	0	**1**	0	0	0	0	0	0	**0**	**1**
UNHU	5	1	0	0	0	**6**	0	0	0	0	**0**	0	1	0	0	0	1	**2**	**8**
ATFL	0	0	1	0	0	**1**	1	0	0	0	**1**	8	1	0	1	0	0	**10**	**12**
PSFL	0	0	0	0	0	**0**	0	0	0	0	**0**	2	0	0	0	0	0	**2**	**2**
WIFL	0	0	0	0	0	**0**	0	0	0	0	**0**	2	0	0	0	0	0	**2**	**2**
HOOR	0	0	1	1	0	**2**	0	0	1	0	**1**	0	0	0	0	0	0	**0**	**3**
BUOR	0	0	1	0	0	**1**	0	0	1	0	**1**	0	1	0	0	0	0	**1**	**3**
HOFI	0	0	0	0	0	**0**	3	0	0	0	**3**	0	3	0	0	0	2	**5**	**8**
LEGO	1	2	5	4	0	**12**	1	0	5	3	**9**	0	4	0	0	0	0	**4**	**25**
GCSP	0	0	0	0	0	**0**	0	0	0	0	**0**	1	0	0	0	0	0	**1**	**1**
SOSP	12	0	0	0	0	**12**	11	0	0	0	**11**	9	28	0	0	0	6	**43**	**66**
SPTO	5	1	0	0	0	**6**	6	1	1	0	**8**	1	5	0	0	0	0	**6**	**20**
CALT	7	0	0	0	0	**7**	2	1	0	0	**3**	3	7	0	0	0	1	**11**	**21**
BHGR	4	0	3	0	0	**7**	2	1	5	0	**8**	0	0	0	0	0	1	**1**	**16**
BLGR	0	0	1	0	0	**1**	0	0	0	0	**0**	0	0	0	0	0	0	**0**	**1**
LAZB	0	0	0	0	0	**0**	0	0	1	0	**1**	0	0	0	0	0	0	**0**	**1**
WAVI	0	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	1	0	0	**1**	**1**
LBVI	3	0	0	0	0	**3**	2	0	0	0	**2**	3	1	0	0	0	0	**4**	**9**
OCWA	2	0	1	2	0	**5**	2	0	1	0	**3**	0	0	0	0	0	0	**0**	**8**
YWAR	0	0	2	0	0	**2**	4	0	0	0	**4**	0	0	0	0	0	0	**0**	**6**
COYE	13	0	0	0	2	**15**	20	8	1	0	**29**	0	25	1	0	0	3	**29**	**73**
YBCH	13	0	1	0	0	**14**	10	0	0	0	**10**	0	0	0	0	0	0	**0**	**24**
WIWA	0	0	0	1	0	**1**	0	0	1	0	**1**	0	0	0	0	0	0	**0**	**2**
CATH	0	0	0	0	0	**0**	0	0	0	0	**0**	1	1	1	0	0	0	**3**	**3**
BEWR	5	0	0	0	0	**5**	0	0	0	0	**0**	6	12	0	0	0	3	**21**	**26**
HOWR	4	0	0	0	0	**4**	2	0	0	0	**2**	7	1	0	0	0	1	**9**	**15**
OATI	0	0	0	0	0	**0**	0	0	0	0	**0**	2	0	0	0	1	0	**3**	**3**
WREN	0	0	0	0	0	**0**	0	0	0	0	**0**	14	0	0	0	0	4	**18**	**18**
BUSH	5	0	0	0	0	**5**	0	0	0	0	**0**	0	0	0	0	0	3	**3**	**8**
SWTH	0	0	0	0	0	**0**	0	0	0	0	**0**	1	0	0	3	0	0	**4**	**4**
HETH	0	0	0	0	0	**0**	0	0	0	0	**0**	2	0	0	0	0	0	**2**	**2**
Total	**83**	**5**	**16**	**8**	**2**	**114**	**77**	**18**	**21**	**3**	**119**	**64**	**93**	**2**	**5**	**1**	**31**	**196**	**429**

[a]Age:
A = After Hatching Year
H = Hatching Year
L = Local (recently fledged)
O = Older than Second Year
S = Second Year
T = Third Year
U = Unknown Age

Figure 4. Number of Individuals Caught per Species: De Luz Creek, 1998

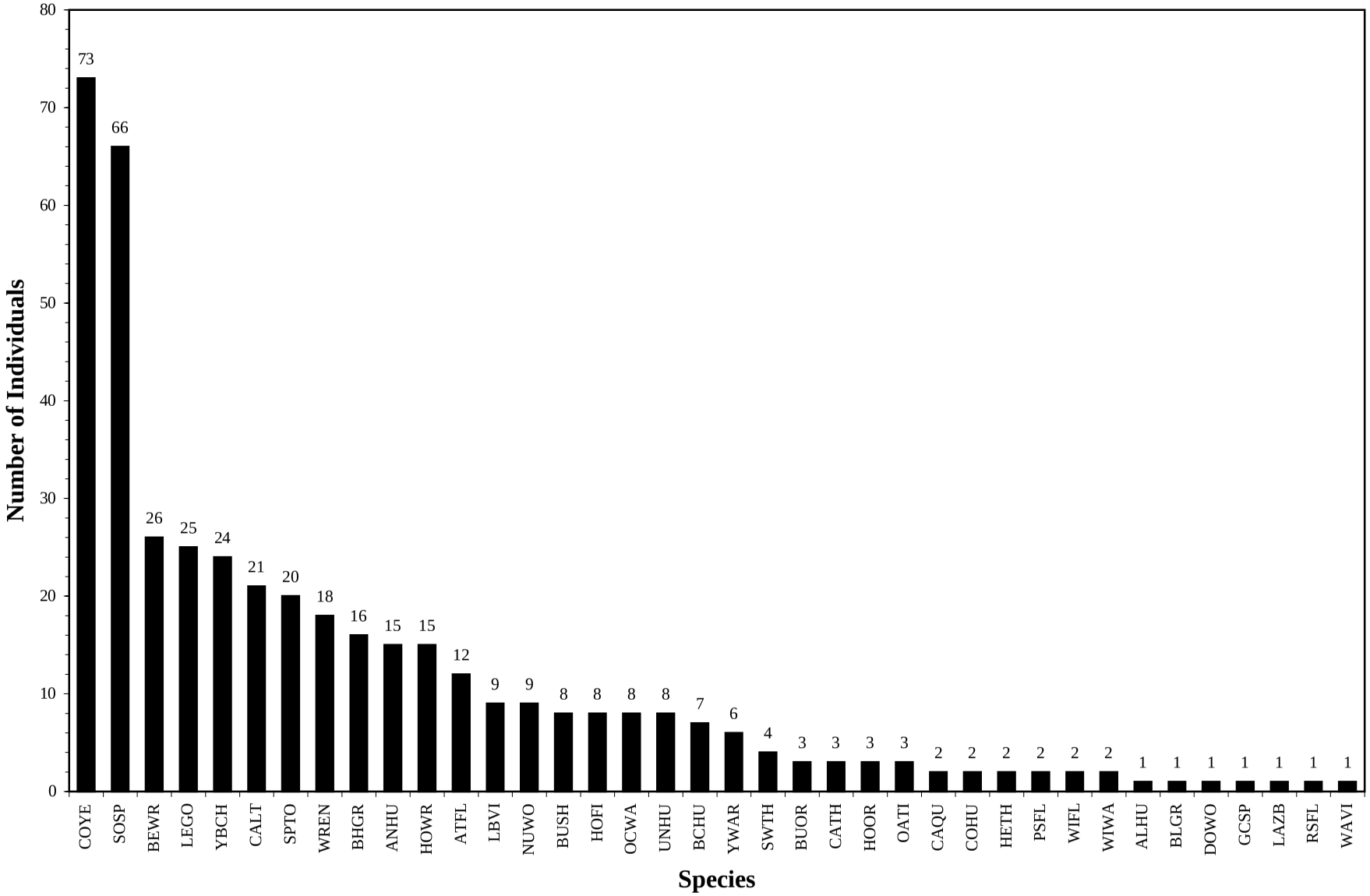


Table 2. Number of Birds Captured, Banded, and Recaptured: De Luz Creek, 1995 - 1998

	Total Captures				New Individuals Banded				Recaptured 1998				
Species	1995	1996	1997	1998	1995	1996	1997	1998	Banded 1995	Banded 1996	Banded 1997	Banded Other [a]	Total
CAQU	2	0	1	2	0	0	0	0	0	0	0	0	0
MODO	0	0	2	0	0	0	0	0	0	0	0	0	0
AMKE	0	0	1	0	0	0	0	0	0	0	0	0	0
DOWO	2	2	2	1	2	2	2	1	0	0	0	0	0
NUWO	4	4	2	12	4	2	1	6	1	1	0	0	2
RSFL	0	0	0	1	0	0	0	1	0	0	0	0	0
BCHU	3	2	5	7	0	0	0	0	0	0	0	0	0
COHU	2	2	1	2	0	0	0	0	0	0	0	0	0
ANHU	5	5	16	15	0	0	0	0	0	0	0	0	0
ALHU	0	0	1	1	0	0	0	0	0	0	0	0	0
UNHU	11	1	2	8	0	0	0	0	0	0	0	0	0
ATFL	13	9	11	15	10	7	9	9	1	0	1	0	2
WEWP	0	1	0	0	0	1	0	0	0	0	0	0	0
PSFL	14	9	7	2	14	9	6	0	0	0	1	0	1
WIFL	1	1	0	2	1	1	0	2	0	0	0	0	0
HOOR	2	0	0	3	2	0	0	3	0	0	0	0	0
BUOR	5	1	7	3	5	1	5	3	0	0	0	0	0
PUFI	0	1	0	0	0	1	0	0	0	0	0	0	0
HOFI	1	23	8	8	1	22	8	8	0	0	0	0	0
LEGO	15	14	14	26	15	13	14	25	0	0	0	0	0
LASP	1	1	0	0	1	1	0	0	0	0	0	0	0
GCSP	3	2	0	1	3	2	0	0	0	0	0	0	0
DEJU	0	1	0	0	0	0	0	0	0	0	0	0	0
RCSP	1	4	1	0	1	4	1	0	0	0	0	0	0
SOSP	70	69	74	75	51	43	45	52	3	2	9	0	14
LISP	1	1	0	0	1	1	0	0	0	0	0	0	0
SPTO	38	27	25	24	33	17	10	14	3	2	0	0	5
CALT	20	25	10	23	17	19	8	16	1	2	2	0	5
BHGR	33	40	36	21	26	33	23	8	5	2	1	0	8
BLGR	0	1	2	1	0	1	2	1	0	0	0	0	0
LAZB	12	1	0	2	12	1	0	1	0	0	0	0	0
WETA	1	0	1	0	1	0	1	0	0	0	0	0	0
PHAI	2	0	0	0	2	0	0	0	0	0	0	0	0
WAVI	0	3	0	1	0	3	0	1	0	0	0	0	0
HUVI	2	0	2	0	2	0	1	0	0	0	0	0	0
LBVI	10	5	8	13	9	5	3	5	0	0	2	2	4
NAWA	1	0	0	0	1	0	0	0	0	0	0	0	0
OCWA	13	4	6	9	12	3	5	8	0	0	0	0	0
YWAR	3	7	3	6	3	6	3	5	0	0	1	0	1
YRWA	2	0	0	0	2	0	0	0	0	0	0	0	0
COYE	74	70	74	96	62	42	42	64	3	0	5	0	8
YBCH	55	51	43	28	39	30	27	18	2	2	2	0	6
WIWA	2	2	2	2	2	2	2	2	0	0	0	0	0
NOMO	0	0	1	0	0	0	1	0	0	0	0	0	0
CATH	2	5	7	3	0	4	6	3	0	0	0	0	0
BEWR	22	11	19	32	16	4	11	22	2	1	0	0	3
HOWR	3	8	8	18	2	8	5	13	0	0	1	0	1
OATI	7	5	1	3	6	1	1	2	1	0	0	0	1
WREN	49	45	50	22	33	26	21	9	2	1	6	0	9
BUSH	10	14	20	8	9	13	18	4	1	0	2	0	3
SWTH	22	8	6	4	22	8	6	4	0	0	0	0	0
HETH	1	0	2	2	1	0	2	2	0	0	0	0	0
Total	540	485	481	502	423	336	289	312	25	13	33	2	73

[a] Banded bird recovered at MAPS station but not banded by this project

Table 3. Capture Frequency of Individuals: De Luz Creek, 1998

Species	# Individuals / Capture Incidence (Banded Birds Only)				# Captures		
	1 Capture	2 Captures	3 Captures	4 Captures	Banded Birds	Unbanded Birds	All Birds
CAQU	0	0	0	0	0	2	2
DOWO	1	0	0	0	1	0	1
NUWO	6	1	1	0	11	1	12
RSFL	1	0	0	0	1	0	1
BCHU	0	0	0	0	0	7	7
COHU	0	0	0	0	0	2	2
ANHU	0	0	0	0	0	15	15
ALHU	0	0	0	0	0	1	1
UNHU	0	0	0	0	0	8	8
ATFL	8	3	0	0	14	1	15
PSFL	1	0	0	0	1	1	2
WIFL	2	0	0	0	2	0	2
HOOR	3	0	0	0	3	0	3
BUOR	3	0	0	0	3	0	3
HOFI	8	0	0	0	8	0	8
LEGO	24	1	0	0	26	0	26
GCSP	0	0	0	0	0	1	1
SOSP	58	7	1	0	75	0	75
SPTO	16	2	1	0	23	1	24
CALT	20	0	1	0	23	0	23
BHGR	13	1	2	0	21	0	21
BLGR	1	0	0	0	1	0	1
LAZB	0	1	0	0	2	0	2
WAVI	1	0	0	0	1	0	1
LBVI	6	2	1	0	13	0	13
OCWA	7	1	0	0	9	0	9
YWAR	6	0	0	0	6	0	6
COYE	57	8	6	1	95	1	96
YBCH	20	4	0	0	28	0	28
WIWA	2	0	0	0	2	0	2
CATH	3	0	0	0	3	0	3
BEWR	20	4	1	0	31	1	32
HOWR	11	3	0	0	17	1	18
OATI	3	0	0	0	3	0	3
WREN	14	4	0	0	22	0	22
BUSH	7	0	0	0	7	1	8
SWTH	4	0	0	0	4	0	4
HETH	2	0	0	0	2	0	2
Total	**328**	**42**	**14**	**1**	**458**	**44**	**502**

Table 4. Number of Captures by Date: De Luz Creek, 1998

Species	MAPS Period[a]															Total Captures 1998	Captures per 100 Net-hours[b]
	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12		
	Date																
	4/1	4/13	4/21	5/3	5/11	5/21	5/31	6/10	6/22	7/1	7/12	7/21	8/2	8/11	8/23		
CAQU	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**0.25**
DOWO	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**	**0.13**
NUWO	0	0	1	1	0	1	0	0	1	1	0	2	2	2	1	**12**	**1.51**
RSFL	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
BCHU	0	0	0	0	1	0	0	0	1	0	0	0	2	2	1	**7**	**0.88**
COHU	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	**2**	**0.25**
ANHU	1	0	2	0	0	0	3	0	0	1	1	2	3	0	2	**15**	**1.88**
ALHU	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**	**0.13**
UNHU[c]	0	0	1	0	0	2	1	0	2	0	0	2	0	0	0	**8**	**1.00**
ATFL	0	0	0	0	1	0	0	0	2	6	5	1	0	0	0	**15**	**1.88**
PSFL	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	**2**	**0.25**
WIFL	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	**2**	**0.25**
HOOR	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	**3**	**0.38**
BUOR	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	**3**	**0.38**
HOFI	0	0	0	0	0	0	2	0	0	0	1	1	1	1	2	**8**	**1.00**
LEGO	0	1	0	1	2	3	5	3	0	1	5	3	1	1	0	**26**	**3.27**
GCSP	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
SOSP	0	1	2	2	1	7	7	3	7	17	6	7	2	8	5	**75**	**9.42**
SPTO	1	0	2	1	5	2	2	1	1	2	0	2	1	1	3	**24**	**3.01**
CALT	0	0	2	2	3	2	0	0	1	1	0	1	5	4	2	**23**	**2.89**
BHGR	0	2	5	1	1	2	1	1	2	3	0	1	0	2	0	**21**	**2.64**
BLGR	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
LAZB	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	**2**	**0.25**
WAVI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
LBVI	1	0	2	0	0	1	0	0	1	5	2	0	1	0	0	**13**	**1.63**
OCWA	0	0	2	3	0	1	2	0	0	0	0	0	0	0	1	**9**	**1.13**
YWAR	0	0	0	1	0	0	1	3	0	0	0	0	0	1	0	**6**	**0.75**
COYE	2	3	1	4	2	5	14	5	14	7	14	5	1	6	13	**96**	**12.06**
YBCH	0	2	2	1	0	1	4	7	1	1	3	4	1	0	1	**28**	**3.52**
WIWA	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	**2**	**0.25**
CATH	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	**3**	**0.38**
BEWR	1	2	0	0	1	0	7	3	4	3	5	2	1	1	2	**32**	**4.02**
HOWR	2	2	2	1	3	1	1	0	2	2	0	0	0	0	2	**18**	**2.26**
OATI	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	**3**	**0.38**
WREN	0	0	1	1	2	3	3	0	3	3	0	0	1	4	1	**22**	**2.76**
BUSH	0	1	0	0	0	1	3	1	0	0	0	0	0	0	2	**8**	**1.00**
SWTH	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	**4**	**0.50**
HETH	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**0.25**
Total	**10**	**17**	**27**	**24**	**27**	**37**	**60**	**29**	**42**	**54**	**43**	**37**	**23**	**34**	**38**	**502**	**63.05**
Species	**7**	**10**	**14**	**17**	**13**	**17**	**18**	**11**	**13**	**15**	**10**	**16**	**14**	**13**	**14**	**37**	**4.65**

[a]MAPS Period 1 = May 1-10. Periods -3, -2, and -1 represent April 1-10, 11-20, and 21-30.

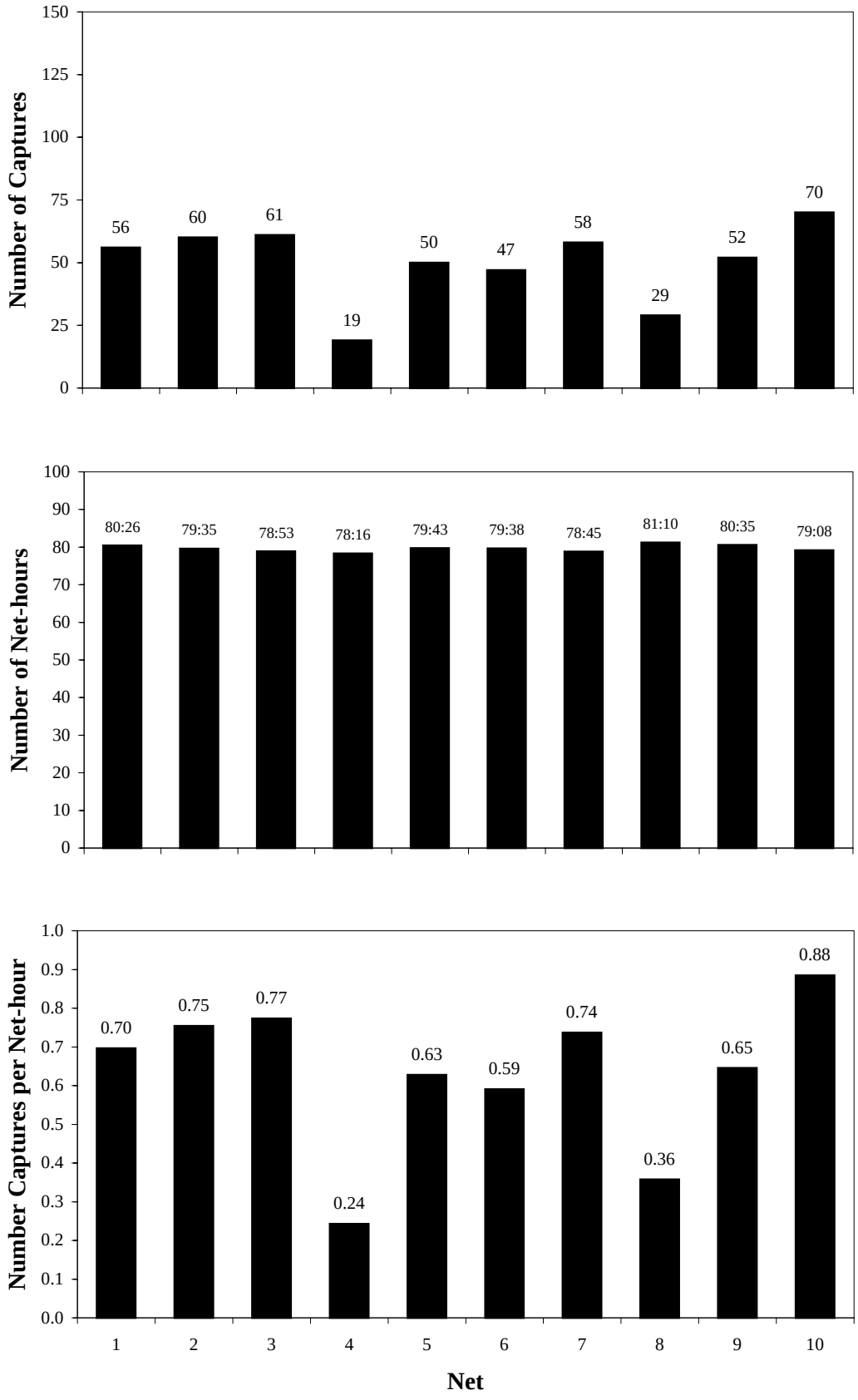
[b]796:09 total net-hours

[c]Not included in species total

Table 5. Capture Rate by Net and Date: De Luz Creek, 1998

MAPS Period	Date		Net 1	2	3	4	5	6	7	8	9	10	Date Totals
-3	4/1	Net-hours	4:55	4:55	4:55	4:50	4:53	5:02	4:45	5:00	4:50	4:49	**48:54**
		Captures	0	3	0	1	2	2	0	2	0	0	**10**
		Captures/Net-hou	0.00	0.61	0.00	0.21	0.41	0.40	0.00	0.40	0.00	0.00	**0.20**
-2	4/13	Net-hours	5:15	5:15	5:15	5:10	4:55	5:07	5:05	5:25	5:15	5:13	**51:55**
		Captures	5	3	1	0	0	1	3	0	1	3	**17**
		Captures/Net-hou	0.95	0.57	0.19	0.00	0.00	0.20	0.59	0.00	0.19	0.58	**0.33**
-1	4/21	Net-hours	5:20	5:08	5:10	5:20	5:15	5:15	5:10	5:10	5:10	5:05	**52:03**
		Captures	2	2	8	0	4	2	2	3	0	4	**27**
		Captures/Net-hou	0.38	0.39	1.55	0.00	0.76	0.38	0.39	0.58	0.00	0.79	**0.52**
1	5/3	Net-hours	5:45	5:30	5:20	5:10	5:51	5:27	5:15	5:25	5:35	5:26	**54:44**
		Captures	5	2	3	0	4	2	2	2	1	3	**24**
		Captures/Net-hou	0.87	0.36	0.56	0.00	0.68	0.37	0.38	0.37	0.18	0.55	**0.44**
2	5/11	Net-hours	5:30	5:40	5:50	5:25	5:43	5:39	5:40	5:35	5:45	5:38	**56:25**
		Captures	4	2	2	2	2	2	2	4	4	3	**27**
		Captures/Net-hou	0.73	0.35	0.34	0.37	0.35	0.35	0.35	0.72	0.70	0.53	**0.48**
3	5/21	Net-hours	5:35	5:25	5:15	5:30	5:25	5:25	5:25	5:25	5:25	5:30	**54:20**
		Captures	6	6	5	3	2	2	2	2	1	8	**37**
		Captures/Net-hou	1.07	1.11	0.95	0.55	0.37	0.37	0.37	0.37	0.18	1.45	**0.68**
4	5/31	Net-hours	5:35	5:23	5:07	5:25	5:50	5:35	5:10	5:35	5:20	5:20	**54:20**
		Captures	5	9	9	1	9	6	3	2	5	11	**60**
		Captures/Net-hou	0.90	1.67	1.76	0.18	1.54	1.07	0.58	0.36	0.94	2.06	**1.10**
5	6/10	Net-hours	5:40	5:30	5:20	5:10	5:35	5:20	5:20	5:20	5:20	5:20	**53:55**
		Captures	3	3	5	1	0	4	0	2	6	5	**29**
		Captures/Net-hou	0.53	0.55	0.94	0.19	0.00	0.75	0.00	0.38	1.13	0.94	**0.54**
6	6/22	Net-hours	5:37	5:26	5:12	5:17	4:58	5:15	5:20	5:35	5:35	5:15	**53:30**
		Captures	2	8	3	1	4	5	6	4	4	5	**42**
		Captures/Net-hou	0.36	1.47	0.58	0.19	0.81	0.95	1.13	0.72	0.72	0.95	**0.79**
7	7/1	Net-hours	6:00	5:45	5:35	5:25	5:45	6:10	5:50	6:05	6:00	5:45	**58:20**
		Captures	4	4	4	2	7	9	8	3	4	9	**54**
		Captures/Net-hou	0.67	0.70	0.72	0.37	1.22	1.46	1.37	0.49	0.67	1.57	**0.93**
8	7/12	Net-hours	5:20	5:20	5:20	5:15	4:50	4:55	5:25	5:45	5:45	5:30	**53:25**
		Captures	1	5	2	4	4	2	8	1	9	7	**43**
		Captures/Net-hou	0.19	0.94	0.38	0.76	0.83	0.41	1.48	0.17	1.57	1.27	**0.80**
9	7/21	Net-hours	5:25	5:25	5:25	5:30	5:30	5:35	5:20	5:45	5:35	5:25	**54:55**
		Captures	7	5	5	1	2	1	6	0	5	5	**37**
		Captures/Net-hou	1.29	0.92	0.92	0.18	0.36	0.18	1.13	0.00	0.90	0.92	**0.67**
10	8/2	Net-hours	4:32	4:41	4:57	4:29	4:45	4:45	4:45	4:50	4:45	4:45	**47:14**
		Captures	3	2	3	1	0	6	1	3	2	2	**23**
		Captures/Net-hou	0.66	0.43	0.61	0.22	0.00	1.26	0.21	0.62	0.42	0.42	**0.49**
11	8/11	Net-hours	5:07	4:57	4:47	5:10	5:10	5:15	5:10	5:10	5:10	5:05	**51:01**
		Captures	5	4	4	1	6	0	10	0	4	0	**34**
		Captures/Net-hou	0.98	0.81	0.84	0.19	1.16	0.00	1.94	0.00	0.77	0.00	**0.67**
12	8/23	Net-hours	4:50	5:15	5:25	5:10	5:18	4:53	5:05	5:05	5:05	5:02	**51:08**
		Captures	4	2	7	1	4	3	5	1	6	5	**38**
		Captures/Net-hou	0.83	0.38	1.29	0.19	0.75	0.61	0.98	0.20	1.18	0.99	**0.74**
Net Totals		Net-hours	**80:26**	**79:35**	**78:53**	**78:16**	**79:43**	**79:38**	**78:45**	**81:10**	**80:35**	**79:08**	**796:09**
		Captures	**56**	**60**	**61**	**19**	**50**	**47**	**58**	**29**	**52**	**70**	**502**
		Captures/Net-hou	**0.70**	**0.75**	**0.77**	**0.24**	**0.63**	**0.59**	**0.74**	**0.36**	**0.65**	**0.88**	**0.63**

Figure 5. Captures, Net-hours, and Capture Rate by Net: De Luz Creek, 1998



month later than the 1997 peak in late April, but closer to the mid-May peak of 1996. Captures per 100-net hours increased from the onset of the season to the peak, then fluctuated between 49 and 93 for the remainder of the season.

Survival and Return Rates of Birds Banded in 1995 - 1997

Seventy-three of the birds caught in 1998 (17 percent) were recaptured individuals originally banded in previous years (Table 2), providing three years of survival data for the 1995 banded cohort, two years for the 1996 cohort, and one year for the 1997 cohort. As discovered last year, estimated survival rates are a function of the number of years of recapture data from which they are calculated, and require adjustment as additional years of data are collected (Table 6). This derives from the failure of birds to return to the banding site, and/or be recaptured, during every year that they are alive. For example, 67 individuals banded in 1995 returned in 1996, producing a first year survival rate of 21 percent (Table 6A). However, an additional 24 birds of the 1995 cohort were recaptured for the first time in 1997, requiring that the previous survival estimate be adjusted upwards by 33 percent (Table 6B). In 1998, recapture of four more birds not seen since 1995 resulted in further adjustment of the cohort's one year survival rate by 4 percent, for an overall rate of 29.4 percent (Table 6C). It is likely that return rates will continue to require adjustment over time as birds are recaptured for the first time years after the original year of banding, but such adjustments are expected to become increasingly minor as the cohort ages.

Similar adjustments were required for previous estimates of the two year survival rates of the 1995 cohort, increasing the estimate of 13.9 percent calculated from two years of recapture data (Table 6D) to 17.6 percent calculated from three years of recapture data (Table 6E), a difference of 27 percent. Likewise, adjustments of the same nature and magnitude as those applied to the 1995 cohort were required for the corresponding 1996 cohort estimates (Table 8).

All of the birds "skipping" years in their recapture histories were banded as adults; no birds banded as hatching year individuals have been observed exhibiting this behavior. Consequently, survival rates for adults are those most affected by adjustments. However, the overall patterns in age- and sex-specific survival rates remain unchanged even with adjustments: males exhibit higher survival than do females (Tables 7 and 9), and birds banded as adults show higher survival rates than those banded as hatching-year individuals (Tables 6 and 8). The factors responsible for the irregular recapture histories of some birds are unknown and need to be investigated. Possible explanations are that birds do not return to the De Luz Creek region every year to breed, that they return to the general vicinity but to a territory outside of the netting station, or that they return to the station but are simply not recaptured. Documentation of either of the first two phenomena would have important implications for collecting and interpreting monitoring data for species of conservation and management concern.

Comparison of the non-adjusted one-year survival rates for the 1995, 1996, and 1997 cohorts indicates that cohorts differ in annual survival during at least the first year after banding

Table 6. Recapture Rates by Age at Banding: 1995 Cohort, De Luz Creek

A. One Year Survival: 1996 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
ATFL	10	2	20.0%	0	0	-	0	0	-	10	2	20.0%
BUOR	4	0	0.0%	1	0	0.0%	0	0	-	5	0	0.0%
SOSP	34	9	26.5%	16	3	18.8%	1	0	0.0%	51	12	23.5%
SPTO	25	6	24.0%	8	0	0.0%	0	0	-	33	6	18.2%
CALT	11	3	27.3%	6	1	16.7%	0	0	-	17	4	23.5%
BHGR	23	4	17.4%	3	0	0.0%	0	0	-	26	4	15.4%
OCWA	11	1	9.1%	1	0	0.0%	0	0	-	12	1	8.3%
COYE	38	13	34.2%	23	0	0.0%	1	0	0.0%	62	13	21.0%
YBCH	36	10	27.8%	2	0	0.0%	1	0	0.0%	39	10	25.6%
BEWR	13	1	7.7%	2	1	50.0%	1	1	100.0%	16	3	18.8%
OATI	5	2	40.0%	1	1	100.0%	0	0	-	6	3	50.0%
WREN	24	6	25.0%	1	0	0.0%	8	1	12.5%	33	7	21.2%
BUSH	6	1	16.7%	1	0	0.0%	2	0	0.0%	9	1	11.1%
Total	**244**	**59**	**24.2%**	**65**	**6**	**9.2%**	**14**	**2**	**14.3%**	**323**	**67**	**20.7%**

B. One Year Survival: 1997 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
ATFL	10	2	20.0%	0	0	-	0	0	-	10	2	20.0%
BUOR	4	1	25.0%	1	0	0.0%	0	0	-	5	1	20.0%
SOSP	34	10	29.4%	16	3	18.8%	1	0	0.0%	51	13	25.5%
SPTO	25	9	36.0%	8	0	0.0%	0	0	-	33	9	27.3%
CALT	11	3	27.3%	6	1	16.7%	0	0	-	17	4	23.5%
BHGR	23	7	30.4%	3	0	0.0%	0	0	-	26	7	26.9%
OCWA	11	2	18.2%	1	0	0.0%	0	0	-	12	2	16.7%
COYE	38	16	42.1%	23	1	4.3%	1	0	0.0%	62	17	27.4%
YBCH	36	11	30.6%	2	0	0.0%	1	0	0.0%	39	11	28.2%
BEWR	13	3	23.1%	2	1	50.0%	1	1	100.0%	16	5	31.3%
OATI	5	2	40.0%	1	1	100.0%	0	0	-	6	3	50.0%
WREN	24	12	50.0%	1	0	0.0%	8	1	12.5%	33	13	39.4%
BUSH	6	2	33.3%	1	0	0.0%	2	1	50.0%	9	3	33.3%
Total	**244**	**81**	**33.2%**	**65**	**7**	**10.8%**	**14**	**3**	**21.4%**	**323**	**91**	**28.2%**

C. One Year Survival: 1998 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
ATFL	10	3	30.0%	0	0	-	0	0	-	10	3	30.0%
BUOR	4	1	25.0%	1	0	0.0%	0	0	-	5	1	20.0%
SOSP	34	10	29.4%	16	3	18.8%	1	0	0.0%	51	13	25.5%
SPTO	25	9	36.0%	8	0	0.0%	0	0	-	33	9	27.3%
CALT	11	4	36.4%	6	1	16.7%	0	0	-	17	5	29.4%
BHGR	23	8	34.8%	3	0	0.0%	0	0	-	26	8	30.8%
OCWA	11	2	18.2%	1	0	0.0%	0	0	-	12	2	16.7%
COYE	38	16	42.1%	23	1	4.3%	1	0	0.0%	62	17	27.4%
YBCH	36	11	30.6%	2	0	0.0%	1	0	0.0%	39	11	28.2%
BEWR	13	3	23.1%	2	1	50.0%	1	1	100.0%	16	5	31.3%
OATI	5	2	40.0%	1	1	100.0%	0	0	-	6	3	50.0%
WREN	24	13	54.2%	1	0	0.0%	8	1	12.5%	33	14	42.4%
BUSH	6	2	33.3%	1	0	0.0%	2	1	50.0%	9	3	33.3%
Total	**244**	**85**	**34.8%**	**65**	**7**	**10.8%**	**14**	**3**	**21.4%**	**323**	**95**	**29.4%**

Table 6 (cont). Recapture Rates by Age at Banding: 1995 Cohort, De Luz Creek

D. Two Year Survival: 1997 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	4	0	0.0%	0	0	-	0	0	-	4	0	0.0%
ATFL	10	0	0.0%	0	0	-	0	0	-	10	0	0.0%
BUOR	4	1	25.0%	1	0	0.0%	0	0	-	5	1	20.0%
SOSP	34	5	14.7%	16	0	0.0%	1	0	0.0%	51	5	9.8%
SPTO	25	5	20.0%	8	0	0.0%	0	0	-	33	5	15.2%
CALT	11	0	0.0%	6	0	0.0%	0	0	-	17	0	0.0%
BHGR	23	5	21.7%	3	0	0.0%	0	0	-	26	5	19.2%
OCWA	11	1	9.1%	1	0	0.0%	0	0	-	12	1	8.3%
COYE	38	6	15.8%	23	1	4.3%	1	0	0.0%	62	7	11.3%
YBCH	36	6	16.7%	2	0	0.0%	1	0	0.0%	39	6	15.4%
BEWR	13	2	15.4%	2	1	50.0%	1	1	100.0%	16	4	25.0%
OATI	5	0	0.0%	1	0	0.0%	0	0	-	6	0	0.0%
WREN	24	9	37.5%	1	0	0.0%	8	0	0.0%	33	9	27.3%
BUSH	6	1	16.7%	1	0	0.0%	2	1	50.0%	9	2	22.2%
Total	**244**	**41**	**16.8%**	**65**	**2**	**3.1%**	**14**	**2**	**14.3%**	**323**	**45**	**13.9%**

E. Two Year Survival: 1998 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
ATFL	10	1	10.0%	0	0	-	0	0	-	10	1	10.0%
BUOR	4	1	25.0%	1	0	0.0%	0	0	-	5	1	20.0%
SOSP	34	5	14.7%	16	1	6.3%	1	0	0.0%	51	6	11.8%
SPTO	25	6	24.0%	8	0	0.0%	0	0	-	33	6	18.2%
CALT	11	1	9.1%	6	0	0.0%	0	0	-	17	1	5.9%
BHGR	23	7	30.4%	3	0	0.0%	0	0	-	26	7	26.9%
OCWA	11	1	9.1%	1	0	0.0%	0	0	-	12	1	8.3%
COYE	38	9	23.7%	23	1	4.3%	1	0	0.0%	62	10	16.1%
YBCH	36	6	16.7%	2	0	0.0%	1	0	0.0%	39	6	15.4%
BEWR	13	2	15.4%	2	1	50.0%	1	1	100.0%	16	4	25.0%
OATI	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
WREN	24	10	41.7%	1	0	0.0%	8	0	0.0%	33	10	30.3%
BUSH	6	1	16.7%	1	0	0.0%	2	1	50.0%	9	2	22.2%
Total	**244**	**52**	**21.3%**	**65**	**3**	**4.6%**	**14**	**2**	**14.3%**	**323**	**57**	**17.6%**

F. Three Year Survival: 1998 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
ATFL	10	1	10.0%	0	0	-	0	0	-	10	1	10.0%
BUOR	4	0	0.0%	1	0	0.0%	0	0	-	5	0	0.0%
SOSP	34	2	5.9%	16	1	6.3%	1	0	0.0%	51	3	5.9%
SPTO	25	3	12.0%	8	0	0.0%	0	0	-	33	3	9.1%
CALT	11	1	9.1%	6	0	0.0%	0	0	-	17	1	5.9%
BHGR	23	5	21.7%	3	0	0.0%	0	0	-	26	5	19.2%
OCWA	11	0	0.0%	1	0	0.0%	0	0	-	12	0	0.0%
COYE	38	3	7.9%	23	0	0.0%	1	0	0.0%	62	3	4.8%
YBCH	36	2	5.6%	2	0	0.0%	1	0	0.0%	39	2	5.1%
BEWR	13	0	0.0%	2	1	50.0%	1	1	100.0%	16	2	12.5%
OATI	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
WREN	24	2	8.3%	1	0	0.0%	8	0	0.0%	33	2	6.1%
BUSH	6	1	16.7%	1	0	0.0%	2	0	0.0%	9	1	11.1%
Total	**244**	**22**	**9.0%**	**65**	**2**	**3.1%**	**14**	**1**	**7.1%**	**323**	**25**	**7.7%**

Table 7. Recapture Rates by Sex for Birds Banded as Adults: 1995 Cohort, De Luz Creek

A. One Year Survival: 1996 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
ATFL	2	0	0.0%	4	2	50.0%	4	0	0.0%	10	2	20.0%
BUOR	1	0	0.0%	3	0	0.0%	0	0	-	4	0	0.0%
SOSP	14	2	14.3%	18	7	38.9%	2	0	0.0%	34	9	26.5%
SPTO	9	2	22.2%	16	4	25.0%	0	0	-	25	6	24.0%
CALT	6	2	33.3%	5	1	20.0%	0	0	-	11	3	27.3%
BHGR	15	2	13.3%	8	2	25.0%	0	0	-	23	4	17.4%
OCWA	3	1	33.3%	4	0	0.0%	4	0	0.0%	11	1	9.1%
COYE	17	5	29.4%	21	8	38.1%	0	0	-	38	13	34.2%
YBCH	15	0	0.0%	21	10	47.6%	0	0	-	36	10	27.8%
BEWR	7	1	14.3%	4	0	0.0%	2	0	0.0%	13	1	7.7%
OATI	2	1	50.0%	3	1	33.3%	0	0	-	5	2	40.0%
WREN	0	0	-	0	0	-	24	6	25.0%	24	6	25.0%
BUSH	4	0	0.0%	2	1	50.0%	0	0	-	6	1	16.7%
Total	**97**	**16**	**16.5%**	**111**	**37**	**33.3%**	**36**	**6**	**16.7%**	**244**	**59**	**24.2%**

B. One Year Survival: 1997 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
ATFL	2	0	0.0%	4	2	50.0%	4	0	0.0%	10	2	20.0%
BUOR	1	0	0.0%	3	1	33.3%	0	0	-	4	1	25.0%
SOSP	14	2	14.3%	18	8	44.4%	2	0	0.0%	34	10	29.4%
SPTO	9	3	33.3%	16	6	37.5%	0	0	-	25	9	36.0%
CALT	6	2	33.3%	5	1	20.0%	0	0	-	11	3	27.3%
BHGR	15	3	20.0%	8	4	50.0%	0	0	-	23	7	30.4%
OCWA	3	1	33.3%	4	1	25.0%	4	0	0.0%	11	2	18.2%
COYE	17	6	35.3%	21	10	47.6%	0	0	-	38	16	42.1%
YBCH	15	0	0.0%	21	11	52.4%	0	0	-	36	11	30.6%
BEWR	7	2	28.6%	4	1	25.0%	2	0	0.0%	13	3	23.1%
OATI	2	1	50.0%	3	1	33.3%	0	0	-	5	2	40.0%
WREN	0	0	-	0	0	-	24	12	50.0%	24	12	50.0%
BUSH	4	1	25.0%	2	1	50.0%	0	0	-	6	2	33.3%
Total	**97**	**21**	**21.6%**	**111**	**48**	**43.2%**	**36**	**12**	**33.3%**	**244**	**81**	**33.2%**

C. One Year Survival: 1998 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
ATFL	2	0	0.0%	4	3	75.0%	4	0	0.0%	10	3	30.0%
BUOR	1	0	0.0%	3	1	33.3%	0	0	-	4	1	25.0%
SOSP	14	2	14.3%	18	8	44.4%	2	0	0.0%	34	10	29.4%
SPTO	9	3	33.3%	16	6	37.5%	0	0	-	25	9	36.0%
CALT	6	3	50.0%	5	1	20.0%	0	0	-	11	4	36.4%
BHGR	15	4	26.7%	8	4	50.0%	0	0	-	23	8	34.8%
OCWA	3	1	33.3%	4	1	25.0%	4	0	0.0%	11	2	18.2%
COYE	17	6	35.3%	21	10	47.6%	0	0	-	38	16	42.1%
YBCH	15	0	0.0%	21	11	52.4%	0	0	-	36	11	30.6%
BEWR	7	2	28.6%	4	1	25.0%	2	0	0.0%	13	3	23.1%
OATI	2	1	50.0%	3	1	33.3%	0	0	-	5	2	40.0%
WREN	0	0	-	0	0	-	24	13	54.2%	24	13	54.2%
BUSH	4	1	25.0%	2	1	50.0%	0	0	-	6	2	33.3%
Total	**97**	**23**	**23.7%**	**111**	**49**	**44.1%**	**36**	**13**	**36.1%**	**244**	**85**	**34.8%**

Table 7 (cont). Recapture Rates by Sex for Birds Banded as Adults: 1995 Cohort, De Luz Creek

D. Two Year Survival: 1997 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	2	0	0.0%	2	0	0.0%	0	0	-	4	0	0.0%
ATFL	2	0	0.0%	4	0	0.0%	4	0	0.0%	10	0	0.0%
BUOR	1	0	0.0%	3	1	33.3%	0	0	-	4	1	25.0%
SOSP	14	1	7.1%	18	4	22.2%	2	0	0.0%	34	5	14.7%
SPTO	9	2	22.2%	16	3	18.8%	0	0	-	25	5	20.0%
CALT	6	0	0.0%	5	0	0.0%	0	0	-	11	0	0.0%
BHGR	15	2	13.3%	8	3	37.5%	0	0	-	23	5	21.7%
OCWA	3	0	0.0%	4	1	25.0%	4	0	0.0%	11	1	9.1%
COYE	17	2	11.8%	21	4	19.0%	0	0	-	38	6	15.8%
YBCH	15	0	0.0%	21	6	28.6%	0	0	-	36	6	16.7%
BEWR	7	1	14.3%	4	1	25.0%	2	0	0.0%	13	2	15.4%
OATI	2	0	0.0%	3	0	0.0%	0	0	-	5	0	0.0%
WREN	0	0	-	0	0	-	24	9	37.5%	24	9	37.5%
BUSH	4	1	25.0%	2	0	0.0%	0	0	-	6	1	16.7%
Total	**97**	**9**	**9.3%**	**111**	**23**	**20.7%**	**36**	**9**	**25.0%**	**244**	**41**	**16.8%**

E. Two Year Survival: 1998 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
ATFL	2	0	0.0%	4	1	25.0%	4	0	0.0%	10	1	10.0%
BUOR	1	0	0.0%	3	1	33.3%	0	0	-	4	1	25.0%
SOSP	14	1	7.1%	18	4	22.2%	2	0	0.0%	34	5	14.7%
SPTO	9	2	22.2%	16	4	25.0%	0	0	-	25	6	24.0%
CALT	6	1	16.7%	5	0	0.0%	0	0	-	11	1	9.1%
BHGR	15	3	20.0%	8	4	50.0%	0	0	-	23	7	30.4%
OCWA	3	0	0.0%	4	1	25.0%	4	0	0.0%	11	1	9.1%
COYE	17	2	11.8%	21	7	33.3%	0	0	-	38	9	23.7%
YBCH	15	0	0.0%	21	6	28.6%	0	0	-	36	6	16.7%
BEWR	7	1	14.3%	4	1	25.0%	2	0	0.0%	13	2	15.4%
OATI	2	1	50.0%	3	0	0.0%	0	0	-	5	1	20.0%
WREN	0	0	-	0	0	-	24	10	41.7%	24	10	41.7%
BUSH	4	1	25.0%	2	0	0.0%	0	0	-	6	1	16.7%
Total	**97**	**12**	**12.4%**	**111**	**30**	**27.0%**	**36**	**10**	**27.8%**	**244**	**52**	**21.3%**

F. Three Year Survival: 1998 Unadjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
ATFL	2	0	0.0%	4	1	25.0%	4	0	0.0%	10	1	10.0%
BUOR	1	0	0.0%	3	0	0.0%	0	0	-	4	0	0.0%
SOSP	14	0	0.0%	18	2	11.1%	2	0	0.0%	34	2	5.9%
SPTO	9	1	11.1%	16	2	12.5%	0	0	-	25	3	12.0%
CALT	6	1	16.7%	5	0	0.0%	0	0	-	11	1	9.1%
BHGR	15	2	13.3%	8	3	37.5%	0	0	-	23	5	21.7%
OCWA	3	0	0.0%	4	0	0.0%	4	0	0.0%	11	0	0.0%
COYE	17	0	0.0%	21	3	14.3%	0	0	-	38	3	7.9%
YBCH	15	0	0.0%	21	2	9.5%	0	0	-	36	2	5.6%
BEWR	7	0	0.0%	4	0	0.0%	2	0	0.0%	13	0	0.0%
OATI	2	1	50.0%	3	0	0.0%	0	0	-	5	1	20.0%
WREN	0	0	-	0	0	-	24	2	8.3%	24	2	8.3%
BUSH	4	1	25.0%	2	0	0.0%	0	0	-	6	1	16.7%
Total	**97**	**6**	**6.2%**	**111**	**14**	**12.6%**	**36**	**2**	**5.6%**	**244**	**22**	**9.0%**

Table 8. Recapture Rates by Age at Banding: 1996 Cohort, De Luz Creek

A. One Year Survival: 1997 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	1	0	0.0%	0	0	-	1	0	0.0%	2	0	0.0%
ATFL	7	1	14.3%	0	0	-	0	0	-	7	1	14.3%
SOSP	19	5	26.3%	22	0	0.0%	2	0	0.0%	43	5	11.6%
SPTO	14	4	28.6%	2	0	0.0%	1	0	0.0%	17	4	23.5%
CALT	16	1	6.3%	3	0	0.0%	0	0	-	19	1	5.3%
BHGR	27	2	7.4%	4	0	0.0%	2	0	0.0%	33	2	6.1%
HUVI	1	1	100.0%	0	0	-	0	0	-	1	1	100.0%
LBVI	5	1	20.0%	0	0	-	0	0	-	5	1	20.0%
COYE	29	6	20.7%	11	1	9.1%	2	0	0.0%	42	7	16.7%
YBCH	28	2	7.1%	2	0	0.0%	0	0	-	30	2	6.7%
CATH	3	1	33.3%	0	0	-	1	0	0.0%	4	1	25.0%
BEWR	2	1	50.0%	2	0	0.0%	0	0	-	4	1	25.0%
HOWR	8	1	12.5%	0	0	-	0	0	-	8	1	12.5%
WREN	17	4	23.5%	1	0	0.0%	8	1	12.5%	26	5	19.2%
Total	**177**	**30**	**16.9%**	**47**	**1**	**2.1%**	**17**	**1**	**5.9%**	**241**	**32**	**13.3%**

B. One Year Survival: 1998 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	1	1	100.0%	0	0	-	1	0	0.0%	2	1	50.0%
ATFL	7	1	14.3%	0	0	-	0	0	-	7	1	14.3%
SOSP	19	6	31.6%	22	1	4.5%	2	0	0.0%	43	7	16.3%
SPTO	14	5	35.7%	2	0	0.0%	1	0	0.0%	17	5	29.4%
CALT	16	2	12.5%	3	0	0.0%	0	0	-	19	2	10.5%
BHGR	27	4	14.8%	4	0	0.0%	2	0	0.0%	33	4	12.1%
HUVI	1	1	100.0%	0	0	-	0	0	-	1	1	100.0%
LBVI	5	1	20.0%	0	0	-	0	0	-	5	1	20.0%
COYE	29	6	20.7%	11	1	9.1%	2	0	0.0%	42	7	16.7%
YBCH	28	4	14.3%	2	0	0.0%	0	0	-	30	4	13.3%
CATH	3	1	33.3%	0	0	-	1	0	0.0%	4	1	25.0%
BEWR	2	2	100.0%	2	0	0.0%	0	0	-	4	2	50.0%
HOWR	8	1	12.5%	0	0	-	0	0	-	8	1	12.5%
WREN	17	4	23.5%	1	0	0.0%	8	1	12.5%	26	5	19.2%
Total	**177**	**39**	**22.0%**	**47**	**2**	**4.3%**	**17**	**1**	**5.9%**	**241**	**42**	**17.4%**

C. Two Year Survival: 1998 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	1	1	100.0%	0	0	-	1	0	0.0%	2	1	50.0%
ATFL	7	0	0.0%	0	0	-	0	0	-	7	0	0.0%
SOSP	19	1	5.3%	22	1	4.5%	2	0	0.0%	43	2	4.7%
SPTO	14	2	14.3%	2	0	0.0%	1	0	0.0%	17	2	11.8%
CALT	16	2	12.5%	3	0	0.0%	0	0	-	19	2	10.5%
BHGR	27	2	7.4%	4	0	0.0%	2	0	0.0%	33	2	6.1%
HUVI	1	0	0.0%	0	0	-	0	0	-	1	0	0.0%
LBVI	5	0	0.0%	0	0	-	0	0	-	5	0	0.0%
COYE	29	0	0.0%	11	0	0.0%	2	0	0.0%	42	0	0.0%
YBCH	28	2	7.1%	2	0	0.0%	0	0	-	30	2	6.7%
CATH	3	0	0.0%	0	0	-	1	0	0.0%	4	0	0.0%
BEWR	2	1	50.0%	2	0	0.0%	0	0	-	4	1	25.0%
HOWR	8	0	0.0%	0	0	-	0	0	-	8	0	0.0%
WREN	17	1	5.9%	1	0	0.0%	8	0	0.0%	26	1	3.8%
Total	**177**	**12**	**6.8%**	**47**	**1**	**2.1%**	**17**	**0**	**0.0%**	**241**	**13**	**5.4%**

Table 9. Recapture Rates by Sex for Birds Banded as Adults: 1996 Cohort, De Luz Creek

A. One Year Survival: 1997 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	0	0	-	1	0	0.0%	0	0	-	1	0	0.0%
ATFL	2	1	50.0%	1	0	0.0%	4	0	0.0%	7	1	14.3%
SOSP	9	3	33.3%	8	2	25.0%	2	0	0.0%	19	5	26.3%
SPTO	7	2	28.6%	7	2	28.6%	0	0	-	14	4	28.6%
CALT	5	0	0.0%	4	1	25.0%	7	0	0.0%	16	1	6.3%
BHGR	12	1	8.3%	15	1	6.7%	0	0	-	27	2	7.4%
HUVI	0	0	-	0	0	-	1	1	100.0%	1	1	100.0%
LBVI	0	0	-	1	1	100.0%	4	0	0.0%	5	1	20.0%
COYE	13	2	15.4%	16	4	25.0%	0	0	-	29	6	20.7%
YBCH	19	1	5.3%	8	1	12.5%	1	0	0.0%	28	2	7.1%
CATH	1	1	100.0%	0	0	-	2	0	0.0%	3	1	33.3%
BEWR	0	0	-	0	0	-	2	1	50.0%	2	1	50.0%
HOWR	1	0	0.0%	2	1	50.0%	5	0	0.0%	8	1	12.5%
WREN	0	0	-	0	0	-	17	4	23.5%	17	4	23.5%
Total	**69**	**11**	**15.9%**	**63**	**13**	**20.6%**	**45**	**6**	**13.3%**	**177**	**30**	**16.9%**

B. One Year Survival: 1998 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	0	0	-	1	1	100.0%	0	0	-	1	1	100.0%
ATFL	2	1	50.0%	1	0	0.0%	4	0	0.0%	7	1	14.3%
SOSP	9	3	33.3%	8	3	37.5%	2	0	0.0%	19	6	31.6%
SPTO	7	3	42.9%	7	2	28.6%	0	0	-	14	5	35.7%
CALT	5	1	20.0%	4	1	25.0%	7	0	0.0%	16	2	12.5%
BHGR	12	2	16.7%	15	2	13.3%	0	0	-	27	4	14.8%
HUVI	0	0	-	0	0	-	1	1	100.0%	1	1	100.0%
LBVI	0	0	-	1	1	100.0%	4	0	0.0%	5	1	20.0%
COYE	13	2	15.4%	16	4	25.0%	0	0	-	29	6	20.7%
YBCH	19	3	15.8%	8	1	12.5%	1	0	0.0%	28	4	14.3%
CATH	1	1	100.0%	0	0	-	2	0	0.0%	3	1	33.3%
BEWR	0	0	-	0	0	-	2	2	100.0%	2	2	100.0%
HOWR	1	0	0.0%	2	1	50.0%	5	0	0.0%	8	1	12.5%
WREN	0	0	-	0	0	-	17	4	23.5%	17	4	23.5%
Total	**69**	**16**	**23.2%**	**63**	**16**	**25.4%**	**45**	**7**	**15.6%**	**177**	**39**	**22.0%**

C. Two Year Survival: 1998 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
NUWO	0	0	-	1	1	100.0%	0	0	-	1	1	100.0%
ATFL	2	0	0.0%	1	0	0.0%	4	0	0.0%	7	0	0.0%
SOSP	9	0	0.0%	8	1	12.5%	2	0	0.0%	19	1	5.3%
SPTO	7	1	14.3%	7	1	14.3%	0	0	-	14	2	14.3%
CALT	5	1	20.0%	4	1	25.0%	7	0	0.0%	16	2	12.5%
BHGR	12	1	8.3%	15	1	6.7%	0	0	-	27	2	7.4%
HUVI	0	0	-	0	0	-	1	0	0.0%	1	0	0.0%
LBVI	0	0	-	1	0	0.0%	4	0	0.0%	5	0	0.0%
COYE	13	0	0.0%	16	0	0.0%	0	0	-	29	0	0.0%
YBCH	19	2	10.5%	8	0	0.0%	1	0	0.0%	28	2	7.1%
CATH	1	0	0.0%	0	0	-	2	0	0.0%	3	0	0.0%
BEWR	0	0	-	0	0	-	2	1	50.0%	2	1	50.0%
HOWR	1	0	0.0%	2	0	0.0%	5	0	0.0%	8	0	0.0%
WREN	0	0	-	0	0	-	17	1	5.9%	17	1	5.9%
Total	**69**	**5**	**7.2%**	**63**	**5**	**7.9%**	**45**	**2**	**4.4%**	**177**	**12**	**6.8%**

Table 10. Recapture Rates by Sex and Age at Banding: 1997 Cohort, De Luz Creek

A. One Year Survival by Age at Banding: 1998 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ATFL	7	1	14.3%	2	0	0.0%	0	0	-	9	1	11.1%
PSFL	4	1	25.0%	2	0	0.0%	0	0	-	6	1	16.7%
SOSP	24	8	33.3%	18	1	5.6%	3	0	0.0%	45	9	20.0%
CALT	8	2	25.0%	0	0	-	0	0	-	8	2	25.0%
BHGR	17	1	5.9%	6	0	0.0%	0	0	-	23	1	4.3%
LBVI	2	1	50.0%	1	1	100.0%	0	0	-	3	2	66.7%
YWAR	3	1	33.3%	0	0	-	0	0	-	3	1	33.3%
COYE	19	4	21.1%	21	1	4.8%	2	0	0.0%	42	5	11.9%
YBCH	24	2	8.3%	3	0	0.0%	0	0	-	27	2	7.4%
HOWR	2	0	0.0%	3	1	33.3%	0	0	-	5	1	20.0%
WREN	13	3	23.1%	0	0	-	8	3	37.5%	21	6	28.6%
BUSH	13	2	15.4%	3	0	0.0%	2	0	0.0%	18	2	11.1%
Total	**136**	**26**	**19.1%**	**59**	**4**	**6.8%**	**15**	**3**	**20.0%**	**210**	**33**	**15.7%**

B. One Year Survival by Sex: 1998 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ATFL	0	0	-	0	0	-	7	1	14.3%	7	1	14.3%
PSFL	0	0	-	0	0	-	4	1	25.0%	4	1	25.0%
SOSP	12	5	41.7%	7	2	28.6%	5	1	20.0%	24	8	33.3%
CALT	3	1	33.3%	2	1	50.0%	3	0	0.0%	8	2	25.0%
BHGR	12	0	0.0%	5	1	20.0%	0	0	-	17	1	5.9%
LBVI	1	1	100.0%	0	0	-	1	0	0.0%	2	1	50.0%
YWAR	2	0	0.0%	1	1	100.0%	0	0	-	3	1	33.3%
COYE	10	2	20.0%	9	2	22.2%	0	0	-	19	4	21.1%
YBCH	18	1	5.6%	6	1	16.7%	0	0	-	24	2	8.3%
WREN	0	0	-	0	0	-	13	3	23.1%	13	3	23.1%
BUSH	8	1	12.5%	5	1	20.0%	0	0	-	13	2	15.4%
Total	**66**	**11**	**16.7%**	**35**	**9**	**25.7%**	**33**	**6**	**18.2%**	**134**	**26**	**19.4%**

(Tables 6A, 8A, and 10A). One-year survival for birds banded in 1997 (15.7 percent) was intermediate to that for birds banded in 1996 (13.3 percent) and 1995 (20.7 percent). Because the age composition of the original cohorts differs, and varies within each cohort over time as birds die, careful dissection and analysis of the data will be required before trends in annual survival and their association with environmental variables can be identified.

Case Springs

Overview of 1998 Captures

Two hundred and seventeen individuals of 37 species were caught during 766 net-hours at the Case Springs station (Table 11), an increase of 29 percent over the 1996 total captures. Capture rate averaged 30 birds per 100 net-hours, 25 percent higher than in 1996, and consistent with the trend of steadily increasing capture rates at this station since 1995. The most abundant species at the site included lesser goldfinch, California towhee, Pacific-slope flycatcher, black-headed grosbeak, house wren, and spotted towhee (Figure 6). With the exception of lesser goldfinch, these species breed at the station and were present throughout the season. Although lesser goldfinch also breeds at the site, 55/69 (80 percent) of the individuals captured were caught as a single flock in one net on the last netting day at the station, and were probably part of an aggregation of family groups moving into the site from outlying areas, typical of this irruptive species. Oak titmouse, the most abundant species at the station in 1997, was considerably less abundant in 1998. Species recorded for the first time included mourning dove, house finch, Cassin's vireo, Audubon's warbler, and California thrasher, bringing the total number of species captured at the station since 1995 to 53.

The sex ratio of birds of known sex (N=136) departed from the 1:1 ratio observed during all previous years, with 57 percent female and 43 percent males (Table 11). Age ratio also differed from past years, when typically one-quarter of the individuals captured were hatching-year birds; in 1998, 46 percent were hatching-year birds (N=199, Table 11). However, when the large flock of lesser goldfinches described above is excluded from the calculations, both the sex and age ratios of the 1998 population are comparable to those of previous years, with 53 percent females (43/81), and 26 percent hatching-year birds (35/135), suggesting that these parameters of the breeding population have not changed.

One hundred and ninety-four of the birds caught (89 percent), including 26 hummingbirds, and one mourning dove, were new captures. Of these, 93 percent (155/167) of the non-hummingbirds and game birds were banded; the remainder escaped prior to banding (7/12), died before processing (3/12), or were not banded for other reasons (2/12) (Table 12). As is typical at this site, recapture of banded birds occurred less often than at De Luz, with only 5 percent of banded birds captured more than once during the season (Table 13).

Overall capture rates by net ranged from seven (net 2) to 110 (net 4) captures per 100 net-hours, with an average of 30 (Table 15). When the large lesser goldfinch flock captured in net 4 is excluded from the calculations, average captures for this net are reduced to 40 per 100 net-

Table 11. Sex and Age of Individuals Captured: Case Springs, 1998

	Female						Male							Unknown Sex					
	Age[a]					Female	Age[a]						Male	Age[a]				Unknown	Species
Species	A	H	O	S	T	Total	A	H	L	O	S	U	Total	A	H	O	U	Total	Total
MODO	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	0	0	1	**1**	**1**
NUWO	1	0	0	0	0	**1**	1	0	0	0	0	0	**1**	0	0	0	0	**0**	**2**
ACWO	0	0	2	0	0	**2**	1	0	0	4	0	0	**5**	0	0	0	0	**0**	**7**
RSFL	1	0	0	0	1	**2**	0	0	0	1	0	0	**1**	0	0	0	0	**0**	**3**
COHU	0	0	0	0	0	**0**	0	3	0	0	0	0	**3**	0	0	0	1	**1**	**4**
ANHU	7	1	0	0	0	**8**	0	2	0	0	0	1	**3**	0	4	0	1	**5**	**16**
ALHU	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	2	0	0	**2**	**2**
UNHU	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	0	1	0	2	**3**	**4**
ATFL	0	0	0	0	0	**0**	0	0	0	1	0	0	**1**	0	0	4	0	**4**	**5**
PSFL	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	2	9	1	0	**12**	**13**
WESJ	0	0	1	0	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
HOFI	0	0	0	0	0	**0**	1	0	0	0	0	0	**1**	0	0	0	0	**0**	**1**
LEGO	1	32	1	0	0	**34**	3	16	0	1	1	0	**21**	0	9	0	5	**14**	**69**
LASP	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
GCSP	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	0	1	0	**1**	**1**
CHSP	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	1	1	0	0	**2**	**2**
ORJU	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	5	0	0	0	**5**	**5**
SPTO	2	0	2	1	0	**5**	1	0	0	4	0	0	**5**	0	1	0	0	**1**	**11**
CALT	2	0	0	0	0	**2**	5	0	0	1	0	0	**6**	3	3	0	1	**7**	**15**
BHGR	2	0	4	0	0	**6**	1	0	0	4	1	0	**6**	0	0	0	0	**0**	**12**
WETA	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
CAVI	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	1	0	0	0	**1**	**1**
HUVI	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	1	0	0	0	**1**	**2**
OCWA	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
YWAR	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	**1**	**1**
BTYW	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	0	0	1	**1**	**1**
AUWA	0	0	1	0	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
TOWA	0	0	0	0	0	**0**	1	0	0	0	0	0	**1**	0	0	0	0	**0**	**1**
WIWA	0	0	0	1	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
CATH	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	1	0	0	**1**	**1**
HOWR	3	0	0	0	0	**3**	1	0	0	0	0	0	**1**	3	2	0	3	**8**	**12**
WBNU	1	0	1	0	0	**2**	1	0	0	2	0	0	**3**	0	2	0	0	**2**	**7**
OATI	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	2	1	0	0	**3**	**4**
WREN	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	0	0	2	**2**	**2**
BUSH	1	0	0	0	0	**1**	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**1**
SWTH	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	0	1	0	**1**	**1**
HETH	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	0	2	0	**2**	**2**
WEBL	0	0	1	0	0	**1**	0	0	1	0	0	0	**1**	0	0	0	0	**0**	**2**
Total	**28**	**33**	**13**	**2**	**1**	**77**	**16**	**21**	**1**	**18**	**2**	**1**	**59**	**18**	**37**	**9**	**17**	**81**	**217**

[a]Age
A = After Hatching Year
H = Hatching Year
L = Local (recently fledged)
O = Older than Second Year
S = Second Year
T = Third Year
U = Unknown Age

Figure 6. Number of Individuals Caught per Species: Case Springs, 1998

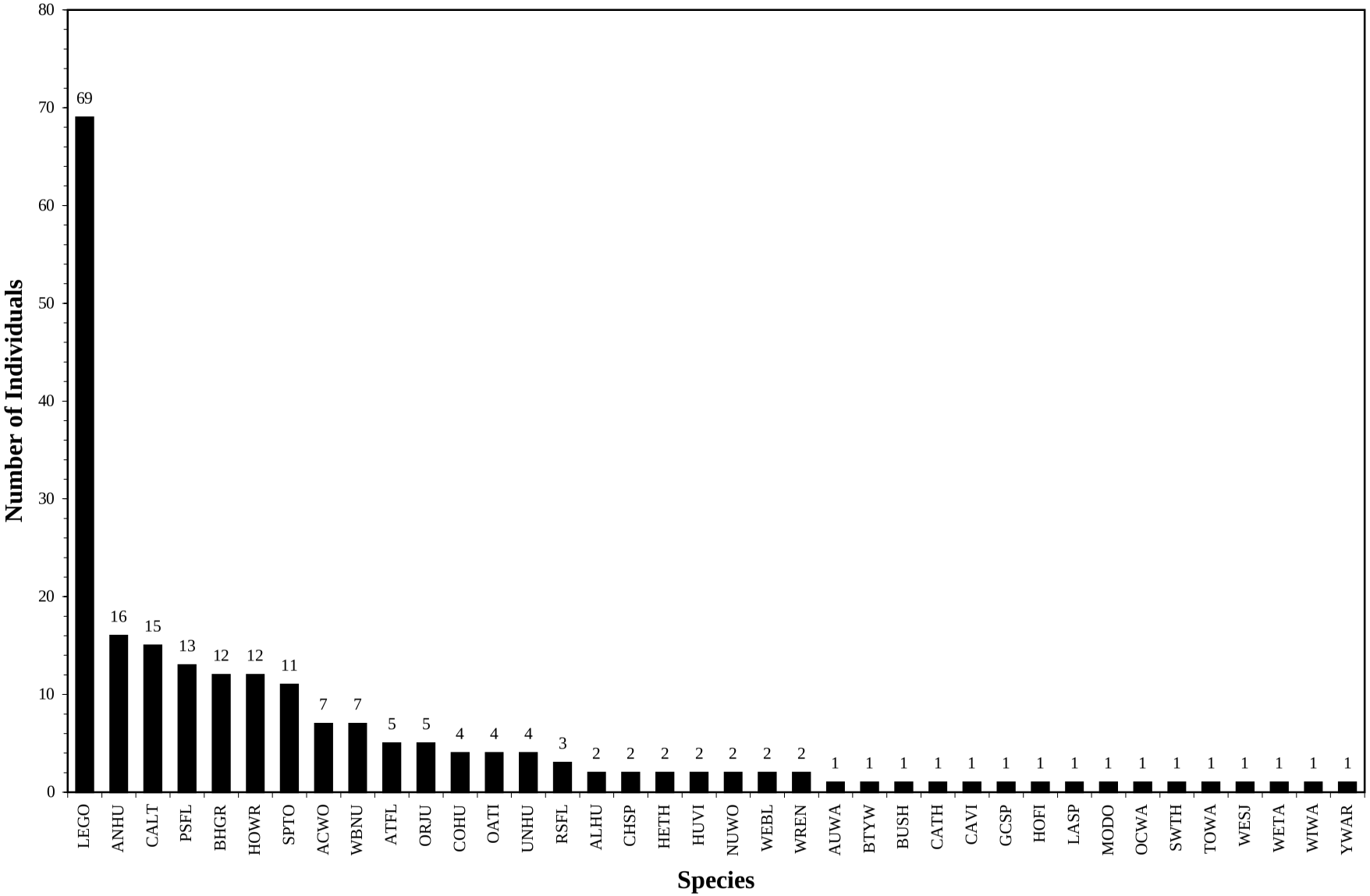


Table 12. Number of Birds Captured, Banded, and Recaptured: Case Springs, 1995 - 1998

	Total Captures				New Individuals Banded				Recaptured 1998			
Species	1995	1996	1997	1998	1995	1996	1997	1998	Banded 1995	Banded 1996	Banded 1997	Total
MODO	0	0	0	1	0	0	0	0	0	0	0	0
RSHA	0	1	0	0	0	0	0	0	0	0	0	0
NUWO	1	1	1	2	1	1	1	2	0	0	0	0
ACWO	15	5	13	8	11	4	9	4	0	2	1	3
RSFL	2	1	1	4	1	1	1	3	0	0	0	0
BCHU	0	1	0	0	0	0	0	0	0	0	0	0
COHU	2	3	0	4	0	0	0	0	0	0	0	0
ANHU	15	16	13	16	0	0	0	0	0	0	0	0
ALHU	4	0	1	2	0	0	0	0	0	0	0	0
UNHU	2	2	6	4	0	0	0	0	0	0	0	0
ATFL	5	2	7	6	4	1	6	3	1	0	1	2
WEWP	2	0	1	0	2	0	1	0	0	0	0	0
PSFL	9	7	12	13	9	7	12	13	0	0	0	0
HAFL	2	0	0	0	2	0	0	0	0	0	0	0
WESJ	3	3	0	1	3	3	0	1	0	0	0	0
EUST	0	1	0	0	0	1	0	0	0	0	0	0
HOFI	0	0	0	1	0	0	0	1	0	0	0	0
LEGO	25	24	8	69	24	24	8	64	0	0	0	0
LASP	7	1	2	1	6	1	2	1	0	0	0	0
WCSP	0	0	2	0	0	0	2	0	0	0	0	0
GCSP	0	2	3	1	0	2	2	1	0	0	0	0
CHSP	14	2	1	2	14	2	1	2	0	0	0	0
BCSP	0	0	1	0	0	0	1	0	0	0	0	0
DEJU	6	0	2	5	6	0	2	5	0	0	0	0
RCSP	3	1	0	0	3	1	0	0	0	0	0	0
SOSP	0	2	0	0	0	1	0	0	0	0	0	0
SPTO	5	6	7	12	4	3	7	8	1	0	2	3
CALT	21	10	15	15	16	7	8	9	1	2	1	4
BHGR	12	3	11	12	11	3	10	11	0	0	1	1
LAZB	9	2	1	0	9	2	1	0	0	0	0	0
WETA	1	3	3	1	1	3	3	1	0	0	0	0
VGSW	0	0	1	0	0	0	1	0	0	0	0	0
PHAI	0	1	4	0	0	1	4	0	0	0	0	0
WAVI	1	1	0	0	1	1	0	0	0	0	0	0
CAVI	0	0	0	1	0	0	0	1	0	0	0	0
HUVI	0	0	1	2	0	0	1	2	0	0	0	0
OCWA	3	1	2	1	3	1	2	1	0	0	0	0
YWAR	3	0	0	1	3	0	0	0	0	0	0	0
BTYW	1	0	0	1	1	0	0	0	0	0	0	0
AUWA	0	0	0	1	0	0	0	1	0	0	0	0
TOWA	3	0	0	1	3	0	0	1	0	0	0	0
HEWA	2	2	0	0	2	1	0	0	0	0	0	0
COYE	0	0	1	0	0	0	1	0	0	0	0	0
WIWA	3	0	1	1	3	0	1	1	0	0	0	0
CATH	0	0	0	1	0	0	0	1	0	0	0	0
BEWR	1	1	2	0	1	1	2	0	0	0	0	0
HOWR	11	9	10	14	9	7	7	7	1	0	1	2
WBNU	12	5	13	8	9	3	8	2	1	0	4	5
OATI	24	10	24	6	16	7	16	1	1	2	0	3
WREN	0	1	1	2	0	1	1	2	0	0	0	0
BUSH	2	2	5	1	2	2	5	1	0	0	0	0
SWTH	16	0	0	1	16	0	0	1	0	0	0	0
HETH	1	0	0	2	1	0	0	2	0	0	0	0
WEBL	4	4	7	3	4	4	7	2	0	0	0	0
Total	252	136	183	227	201	96	133	155	6	6	11	23

Table 13. Capture Frequency of Individuals: Case Springs, 1998

Species	# Individuals / Capture Incidence (Banded Birds Only)			# Captures		
	1 Capture	2 Captures	3 Captures	Banded Birds	Unbanded Birds	All Birds
MODO	0	0	0	0	1	1
NUWO	2	0	0	2	0	2
ACWO	6	1	0	8	0	8
RSFL	2	1	0	4	0	4
COHU	0	0	0	0	4	4
ANHU	0	0	0	0	16	16
ALHU	0	0	0	0	2	2
UNHU	0	0	0	0	4	4
ATFL	4	1	0	6	0	6
PSFL	13	0	0	13	0	13
WESJ	1	0	0	1	0	1
HOFI	1	0	0	1	0	1
LEGO	64	0	0	64	5	69
LASP	1	0	0	1	0	1
GCSP	1	0	0	1	0	1
CHSP	2	0	0	2	0	2
ORJU	5	0	0	5	0	5
SPTO	10	1	0	12	0	12
CALT	13	0	0	13	2	15
BHGR	12	0	0	12	0	12
WETA	1	0	0	1	0	1
CAVI	1	0	0	1	0	1
HUVI	2	0	0	2	0	2
OCWA	1	0	0	1	0	1
YWAR	0	0	0	0	1	1
BTYW	0	0	0	0	1	1
AUWA	1	0	0	1	0	1
TOWA	1	0	0	1	0	1
WIWA	1	0	0	1	0	1
CATH	1	0	0	1	0	1
HOWR	7	2	0	11	3	14
WBNU	6	1	0	8	0	8
OATI	3	0	1	6	0	6
WREN	2	0	0	2	0	2
BUSH	1	0	0	1	0	1
SWTH	1	0	0	1	0	1
HETH	2	0	0	2	0	2
WEBL	1	1	0	3	0	3
Total	**169**	**8**	**1**	**188**	**39**	**227**

Table 14. Number of Captures by Date: Case Springs, 1998

Species	MAPS Period[a]															Total Captures 1998	Captures per 100 Net-hours[b]
	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12		
	Date(s)																
	4/2	4/15	4/23	5/5	5/13	5/22	6/2	6/12	6/23	7/2	7/15	7/23	8/4	8/14 & 8/15	8/21		
MODO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**0.13**
NUWO	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	**2**	**0.26**
ACWO	0	4	1	0	0	0	0	0	0	0	1	0	0	0	2	**8**	**1.04**
RSFL	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	**4**	**0.52**
COHU	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1	**4**	**0.52**
ANHU	0	0	1	0	2	1	2	2	0	0	2	2	3	0	1	**16**	**2.09**
ALHU	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	**2**	**0.26**
UNHU[c]	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	**4**	**0.52**
ATFL	0	0	0	3	1	0	2	0	0	0	0	0	0	0	0	**6**	**0.78**
PSFL	0	0	0	0	1	0	0	0	0	0	0	7	1	1	3	**13**	**1.70**
WESJ	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
HOFI	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0.13**
LEGO	0	0	0	0	0	0	1	0	0	0	1	0	4	8	55	**69**	**9.01**
LASP	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**0.13**
GCSP	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
CHSP	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**2**	**0.26**
ORJU	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**	**0.65**
SPTO	1	1	0	0	0	3	2	1	1	0	1	1	0	0	1	**12**	**1.57**
CALT	1	1	4	2	1	1	1	0	0	0	1	0	0	0	3	**15**	**1.96**
BHGR	0	0	1	5	0	1	2	1	0	0	2	0	0	0	0	**12**	**1.57**
WETA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**0.13**
CAVI	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
HUVI	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	**2**	**0.26**
OCWA	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**	**0.13**
YWAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**	**0.13**
BTYW	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**	**0.13**
AUWA	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
TOWA	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
WIWA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0.13**
CATH	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
HOWR	0	0	0	1	1	5	1	0	1	0	2	2	1	0	0	**14**	**1.83**
WBNU	3	2	0	0	0	0	0	3	0	0	0	0	0	0	0	**8**	**1.04**
OATI	0	0	1	1	1	0	0	0	0	0	1	0	0	1	1	**6**	**0.78**
WREN	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**	**0.26**
BUSH	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**	**0.13**
SWTH	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**	**0.13**
HETH	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**0.26**
WEBL	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	**3**	**0.39**
Total	**11**	**15**	**9**	**15**	**10**	**15**	**13**	**8**	**3**	**0**	**15**	**14**	**14**	**16**	**69**	**227**	**29.64**
Species	**6**	**9**	**6**	**8**	**9**	**8**	**9**	**4**	**3**	**0**	**12**	**5**	**6**	**7**	**10**	**37**	**4.83**

[a]MAPS Period 1 = May 1-10. Periods -3, -2, and -1 represent April 1-10, 11-20, and 21-30.

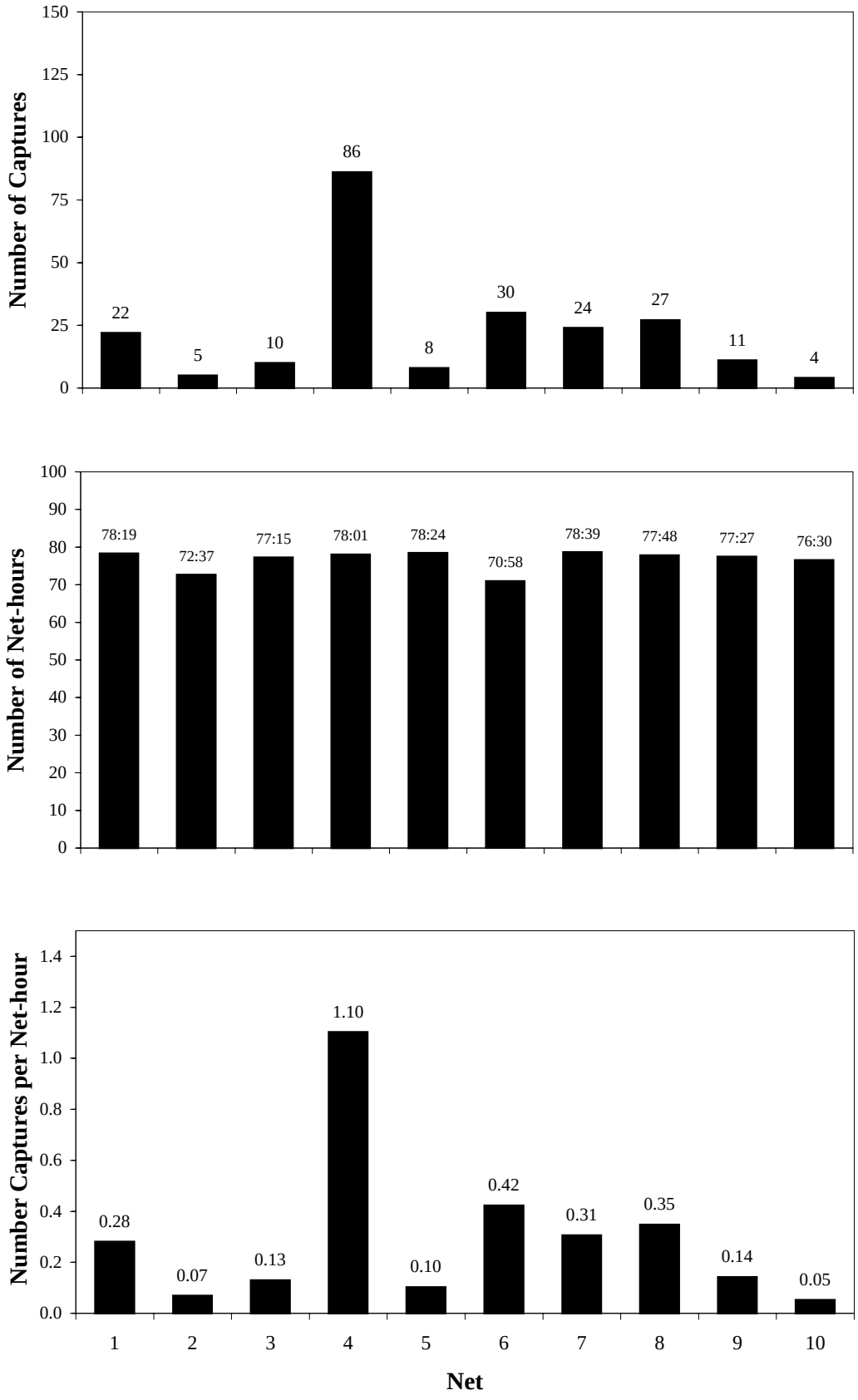
[b]765:58 total net-hours

[c]Not included in species total

Table 15. Capture Rate by Net and Date: Case Springs, 1998

MAPS Period	Date		Net										Date Totals
			1	2	3	4	5	6	7	8	9	10	
-3	4/1	Net-hours	5:02	5:02	4:55	4:56	4:44	4:17	4:44	4:35	4:22	5:00	**47:37**
		Captures	1	1	0	0	1	2	0	6	0	0	**11**
		Captures/Net-hour	0.20	0.20	0.00	0.00	0.21	0.47	0.00	1.31	0.00	0.00	**0.23**
-2	4/13	Net-hours	5:25	5:25	5:25	5:25	5:25	5:20	5:25	5:25	5:20	5:20	**53:55**
		Captures	0	0	0	0	1	5	3	5	1	0	**15**
		Captures/Net-hour	0.00	0.00	0.00	0.00	0.18	0.94	0.55	0.92	0.19	0.00	**0.28**
-1	4/21	Net-hours	5:05	5:05	4:40	5:05	5:05	5:12	5:13	5:16	5:07	5:08	**50:56**
		Captures	0	0	0	0	0	5	2	1	0	1	**9**
		Captures/Net-hour	0.00	0.00	0.00	0.00	0.00	0.96	0.38	0.19	0.00	0.19	**0.18**
1	5/3	Net-hours	5:35	5:15	5:15	5:15	5:15	5:15	5:30	5:05	5:05	5:05	**52:35**
		Captures	2	0	0	0	0	6	4	2	0	1	**15**
		Captures/Net-hour	0.36	0.00	0.00	0.00	0.00	1.14	0.73	0.39	0.00	0.20	**0.29**
2	5/11	Net-hours	5:05	5:05	5:05	5:05	5:05	5:05	5:05	5:00	5:05	5:05	**50:45**
		Captures	3	1	0	0	0	1	2	1	2	0	**10**
		Captures/Net-hour	0.59	0.20	0.00	0.00	0.00	0.20	0.39	0.20	0.39	0.00	**0.20**
3	5/21	Net-hours	5:20	5:20	5:25	5:25	5:25	5:25	5:20	5:25	5:25	5:25	**53:55**
		Captures	2	0	2	0	1	1	1	4	3	1	**15**
		Captures/Net-hour	0.38	0.00	0.37	0.00	0.18	0.18	0.19	0.74	0.55	0.18	**0.28**
4	5/31	Net-hours	5:40	5:40	5:50	5:45	5:55	5:42	5:42	5:43	5:41	5:37	**57:15**
		Captures	4	1	2	0	0	3	0	3	0	0	**13**
		Captures/Net-hour	0.71	0.18	0.34	0.00	0.00	0.53	0.00	0.52	0.00	0.00	**0.23**
5	6/10	Net-hours	5:22	5:20	5:20	5:15	5:15	4:55	5:25	5:29	5:22	4:45	**52:28**
		Captures	1	0	0	1	2	0	4	0	0	0	**8**
		Captures/Net-hour	0.19	0.00	0.00	0.19	0.38	0.00	0.74	0.00	0.00	0.00	**0.15**
6	6/22	Net-hours	5:30	5:40	5:40	5:40	5:40	0:00	5:35	5:40	5:40	5:10	**50:15**
		Captures	0	0	0	2	1	0	0	0	0	0	**3**
		Captures/Net-hour	0.00	0.00	0.00	0.35	0.18	0.00	0.00	0.00	0.00	0.00	**0.06**
7	7/1	Net-hours	5:35	5:35	5:35	5:35	5:35	5:25	5:35	5:35	5:35	5:35	**55:40**
		Captures	0	0	0	0	0	0	0	0	0	0	**0**
		Captures/Net-hour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
8	7/12	Net-hours	5:30	5:30	5:30	5:30	5:30	5:30	5:30	5:30	5:30	5:30	**55:00**
		Captures	0	1	1	6	0	4	2	0	1	0	**15**
		Captures/Net-hour	0.00	0.18	0.18	1.09	0.00	0.73	0.36	0.00	0.18	0.00	**0.27**
9	7/21	Net-hours	4:55	4:35	4:45	5:05	5:15	5:02	5:30	5:05	4:55	4:55	**50:02**
		Captures	3	0	0	3	0	2	2	0	4	0	**14**
		Captures/Net-hour	0.61	0.00	0.00	0.59	0.00	0.40	0.36	0.00	0.81	0.00	**0.28**
10	8/2	Net-hours	4:40	4:30	4:30	4:35	4:35	4:30	4:35	4:25	4:40	4:40	**45:40**
		Captures	1	0	2	5	2	1	0	2	0	1	**14**
		Captures/Net-hour	0.21	0.00	0.44	1.09	0.44	0.22	0.00	0.45	0.00	0.21	**0.31**
11	8/11	Net-hours	4:50	4:35	4:35	4:35	4:35	4:50	4:35	4:50	4:50	4:50	**47:05**
		Captures	3	1	1	10	0	0	1	0	0	0	**16**
		Captures/Net-hour	0.62	0.22	0.22	2.18	0.00	0.00	0.22	0.00	0.00	0.00	**0.34**
12	8/23	Net-hours	4:45	0:00	4:45	4:50	5:05	4:30	4:55	4:45	4:50	4:25	**42:50**
		Captures	2	0	2	59	0	0	3	3	0	0	**69**
		Captures/Net-hour	0.42	0.00	0.42	12.21	0.00	0.00	0.61	0.63	0.00	0.00	**1.61**
Net Totals		Net-hours	**78:19**	**72:37**	**77:15**	**78:01**	**78:24**	**70:58**	**78:39**	**77:48**	**77:27**	**76:30**	**765:58**
		Captures	**22**	**5**	**10**	**86**	**8**	**30**	**24**	**27**	**11**	**4**	**227**
		Captures/Net-hour	**0.28**	**0.07**	**0.13**	**1.10**	**0.10**	**0.42**	**0.31**	**0.35**	**0.14**	**0.05**	**0.30**

Figure 7. Captures, Net-hours, and Capture Rate by Net: Case Springs, 1998



hours, comparable to the performance of other high-capture nets (nets 6 and 8). As in previous years, capture rates were highly variable among nets (Figure 7), and no seasonal pattern in overall captures was discernible (Tables 14 and 15).

Survival and Return Rates of Birds Banded in 1995 -1997

Twenty-three of the 217 birds caught in 1997 (11 percent) were recaptured birds originally banded in 1995, 1996 or 1997 (Table 12). As at De Luz Creek, the 1998 returns included birds banded in 1995 but not recaptured in 1996 or 1997, producing an effect considerably larger than that at De Luz on previously calculated survival rates (Table 16). The adjusted first-year survival rate of 29 percent calculated for the 1995 cohort using three years of recapture data (Table 16C) was 49 percent greater than the non-adjusted rate of 10 percent originally calculated (Table 16A), and included the recapture of a species (spotted towhee) not previously represented among the recaptures for this cohort. However, the low numbers of banded birds and recaptures at this site plague interpretation of the data because of the enormous contribution that even a single bird makes to calculated return rates.

Unlike for the 1995 cohort, recapture rates for the 1996 cohort originally calculated with one year of return data remain unchanged two years later, i.e. there have been no recaptures of additional members of this cohort not already captured in 1997 (Table 18). The high first year recapture rate observed in 1997 (38 percent, Table 18A), nearly four times the unadjusted rate calculated for the 1995 cohort's first year survival (10 percent, Table 16A), may explain why no new birds have been recaptured subsequently.

No consistent or discernible pattern in recapture rates as a function of sex was evident from the data, again because of the high variability resulting from small sample sizes (Tables 17, 19).

As at De Luz Creek, the first year recapture rate of birds in the 1997 cohort (20 percent, Table 20A) was intermediate to those observed for the 1995 cohort (10 percent, Table 16A) and the 1996 cohort (38 percent, Table 18A).

Table 16. Recapture Rates by Age at Banding: 1995 Cohort, Case Springs

A. One Year Survival: 1996 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	7	1	14.3%	1	0	0.0%	3	0	0.0%	11	1	9.1%
ATFL	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
SPTO	4	0	0.0%	0	0	-	0	0	-	4	0	0.0%
CALT	9	1	11.1%	7	0	0.0%	0	0	-	16	1	6.3%
HOWR	8	2	25.0%	0	0	-	0	0	-	8	2	25.0%
WBNU	6	1	16.7%	2	0	0.0%	1	0	0.0%	9	1	11.1%
OATI	7	1	14.3%	4	0	0.0%	5	0	0.0%	16	1	6.3%
Total	**45**	**7**	**15.6%**	**14**	**0**	**0.0%**	**9**	**0**	**0.0%**	**68**	**7**	**10.3%**

B. One Year Survival: 1997 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	7	1	14.3%	1	0	0.0%	3	0	0.0%	11	1	9.1%
ATFL	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
SPTO	4	0	0.0%	0	0	-	0	0	-	4	0	0.0%
CALT	9	2	22.2%	7	0	0.0%	0	0	-	16	2	12.5%
HOWR	8	2	25.0%	0	0	-	0	0	-	8	2	25.0%
WBNU	6	1	16.7%	2	0	0.0%	1	0	0.0%	9	1	11.1%
OATI	7	1	14.3%	4	0	0.0%	5	0	0.0%	16	1	6.3%
Total	**45**	**8**	**17.8%**	**14**	**0**	**0.0%**	**9**	**0**	**0.0%**	**68**	**8**	**11.8%**

C. One Year Survival: 1998 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	7	1	14.3%	1	0	0.0%	3	0	0.0%	11	1	9.1%
ATFL	4	2	50.0%	0	0	-	0	0	-	4	2	50.0%
SPTO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
CALT	9	3	33.3%	7	0	0.0%	0	0	-	16	3	18.8%
HOWR	8	2	25.0%	0	0	-	0	0	-	8	2	25.0%
WBNU	6	1	16.7%	2	0	0.0%	1	0	0.0%	9	1	11.1%
OATI	7	2	28.6%	4	0	0.0%	5	0	0.0%	16	2	12.5%
Total	**45**	**12**	**26.7%**	**14**	**0**	**0.0%**	**9**	**0**	**0.0%**	**68**	**12**	**17.6%**

Table 16 (cont). Recapture Rates by Age at Banding: 1995 Cohort, Case Springs

D. Two Year Survival: 1997 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	7	0	0.0%	1	0	0.0%	3	0	0.0%	11	0	0.0%
ATFL	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
SPTO	4	0	0.0%	0	0	-	0	0	-	4	0	0.0%
CALT	9	2	22.2%	7	0	0.0%	0	0	-	16	2	12.5%
HOWR	8	1	12.5%	0	0	-	0	0	-	8	1	12.5%
WBNU	6	1	16.7%	2	0	0.0%	1	0	0.0%	9	1	11.1%
OATI	7	0	0.0%	4	0	0.0%	5	0	0.0%	16	0	0.0%
Total	**45**	**5**	**11.1%**	**14**	**0**	**0.0%**	**9**	**0**	**0.0%**	**68**	**5**	**7.4%**

E. Two Year Survival: 1998 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	7	0	0.0%	1	0	0.0%	3	0	0.0%	11	0	0.0%
ATFL	4	2	50.0%	0	0	-	0	0	-	4	2	50.0%
SPTO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
CALT	9	3	33.3%	7	0	0.0%	0	0	-	16	3	18.8%
HOWR	8	1	12.5%	0	0	-	0	0	-	8	1	12.5%
WBNU	6	1	16.7%	2	0	0.0%	1	0	0.0%	9	1	11.1%
OATI	7	1	14.3%	4	0	0.0%	5	0	0.0%	16	1	6.3%
Total	**45**	**9**	**20.0%**	**14**	**0**	**0.0%**	**9**	**0**	**0.0%**	**68**	**9**	**13.2%**

F. Three Year Survival: 1998 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	7	0	0.0%	1	0	0.0%	3	0	0.0%	11	0	0.0%
ATFL	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
SPTO	4	1	25.0%	0	0	-	0	0	-	4	1	25.0%
CALT	9	1	11.1%	7	0	0.0%	0	0	-	16	1	6.3%
HOWR	8	1	12.5%	0	0	-	0	0	-	8	1	12.5%
WBNU	6	1	16.7%	2	0	0.0%	1	0	0.0%	9	1	11.1%
OATI	7	1	14.3%	4	0	0.0%	5	0	0.0%	16	1	6.3%
Total	**45**	**6**	**13.3%**	**14**	**0**	**0.0%**	**9**	**0**	**0.0%**	**68**	**6**	**8.8%**

Table 17. Recapture Rates by Sex for Birds Banded as Adults: 1995 Cohort, Case Springs

A. One Year Survival: 1996 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	5	1	20.0%	1	0	0.0%	7	1	14.3%
ATFL	2	0	0.0%	1	0	0.0%	1	1	100.0%	4	1	25.0%
SPTO	2	0	0.0%	2	0	0.0%	0	0	-	4	0	0.0%
CALT	3	1	33.3%	5	0	0.0%	1	0	0.0%	9	1	11.1%
HOWR	2	0	0.0%	6	2	33.3%	0	0	-	8	2	25.0%
WBNU	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
OATI	3	1	33.3%	2	0	0.0%	2	0	0.0%	7	1	14.3%
Total	**18**	**3**	**16.7%**	**22**	**3**	**13.6%**	**5**	**1**	**20.0%**	**45**	**7**	**15.6%**

B. One Year Survival: 1997 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	5	1	20.0%	1	0	0.0%	7	1	14.3%
ATFL	2	0	0.0%	1	0	0.0%	1	1	100.0%	4	1	25.0%
SPTO	2	0	0.0%	2	0	0.0%	0	0	-	4	0	0.0%
CALT	3	2	66.7%	5	0	0.0%	1	0	0.0%	9	2	22.2%
HOWR	2	0	0.0%	6	2	33.3%	0	0	-	8	2	25.0%
WBNU	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
OATI	3	1	33.3%	2	0	0.0%	2	0	0.0%	7	1	14.3%
Total	**18**	**4**	**22.2%**	**22**	**3**	**13.6%**	**5**	**1**	**20.0%**	**45**	**8**	**17.8%**

C. One Year Survival: 1998 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	5	1	20.0%	1	0	0.0%	7	1	14.3%
ATFL	2	0	0.0%	1	1	100.0%	1	1	100.0%	4	2	50.0%
SPTO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
CALT	3	2	66.7%	5	1	20.0%	1	0	0.0%	9	3	33.3%
HOWR	2	0	0.0%	6	2	33.3%	0	0	-	8	2	25.0%
WBNU	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
OATI	3	1	33.3%	2	0	0.0%	2	1	50.0%	7	2	28.6%
Total	**18**	**4**	**22.2%**	**22**	**6**	**27.3%**	**5**	**2**	**40.0%**	**45**	**12**	**26.7%**

Table 17 (cont). Recapture Rates by Sex for Birds Banded as Adults: 1995 Cohort, Case Springs

D. Two Year Survival: 1997 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	5	0	0.0%	1	0	0.0%	7	0	0.0%
ATFL	2	0	0.0%	1	0	0.0%	1	1	100.0%	4	1	25.0%
SPTO	2	0	0.0%	2	0	0.0%	0	0	-	4	0	0.0%
CALT	3	2	66.7%	5	0	0.0%	1	0	0.0%	9	2	22.2%
HOWR	2	0	0.0%	6	1	16.7%	0	0	-	8	1	12.5%
WBNU	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
OATI	3	0	0.0%	2	0	0.0%	2	0	0.0%	7	0	0.0%
Total	**18**	**3**	**16.7%**	**22**	**1**	**4.5%**	**5**	**1**	**20.0%**	**45**	**5**	**11.1%**

E. Two Year Survival: 1998 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	5	0	0.0%	1	0	0.0%	7	0	0.0%
ATFL	2	0	0.0%	1	1	100.0%	1	1	100.0%	4	2	50.0%
SPTO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
CALT	3	2	66.7%	5	1	20.0%	1	0	0.0%	9	3	33.3%
HOWR	2	0	0.0%	6	1	16.7%	0	0	-	8	1	12.5%
WBNU	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
OATI	3	0	0.0%	2	0	0.0%	2	1	50.0%	7	1	14.3%
Total	**18**	**3**	**16.7%**	**22**	**4**	**18.2%**	**5**	**2**	**40.0%**	**45**	**9**	**20.0%**

F. Three Year Survival: 1998 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	5	0	0.0%	1	0	0.0%	7	0	0.0%
ATFL	2	0	0.0%	1	1	100.0%	1	0	0.0%	4	1	25.0%
SPTO	2	0	0.0%	2	1	50.0%	0	0	-	4	1	25.0%
CALT	3	0	0.0%	5	1	20.0%	1	0	0.0%	9	1	11.1%
HOWR	2	0	0.0%	6	1	16.7%	0	0	-	8	1	12.5%
WBNU	5	1	20.0%	1	0	0.0%	0	0	-	6	1	16.7%
OATI	3	0	0.0%	2	0	0.0%	2	1	50.0%	7	1	14.3%
Total	**18**	**1**	**5.6%**	**22**	**4**	**18.2%**	**5**	**1**	**20.0%**	**45**	**6**	**13.3%**

Table 18. Recapture Rates by Age at Banding: 1996 Cohort, Case Springs

A. One Year Survival: 1997 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	4	2	50.0%	0	0	-	0	0	-	4	2	50.0%
CALT	3	2	66.7%	4	1	25.0%	0	0	-	7	3	42.9%
BHGR	3	1	33.3%	0	0	-	0	0	-	3	1	33.3%
OATI	3	1	33.3%	4	1	25.0%	0	0	-	7	2	28.6%
Total	**13**	**6**	**46.2%**	**8**	**2**	**25.0%**	**0**	**0**	**-**	**21**	**8**	**38.1%**

B. One Year Survival: 1998 Adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	4	2	50.0%	0	0	-	0	0	-	4	2	50.0%
CALT	3	2	66.7%	4	1	25.0%	0	0	-	7	3	42.9%
BHGR	3	1	33.3%	0	0	-	0	0	-	3	1	33.3%
OATI	3	1	33.3%	4	1	25.0%	0	0	-	7	2	28.6%
Total	**13**	**6**	**46.2%**	**8**	**2**	**25.0%**	**0**	**0**	**-**	**21**	**8**	**38.1%**

C. Two Year Survival: 1998 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	4	2	50.0%	0	0	-	0	0	-	4	2	50.0%
CALT	3	1	33.3%	4	1	25.0%	0	0	-	7	2	28.6%
BHGR	3	0	0.0%	0	0	-	0	0	-	3	0	0.0%
OATI	3	1	33.3%	4	1	25.0%	0	0	-	7	2	28.6%
Total	**13**	**4**	**30.8%**	**8**	**2**	**25.0%**	**0**	**0**	**-**	**21**	**6**	**28.6%**

Table 19. Recapture Rates by Sex for Birds Banded as Adults: 1996 Cohort, Case Springs

A. One Year Survival: 1997 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	3	2	66.7%	0	0	-	4	2	50.0%
CALT	1	0	0.0%	2	2	100.0%	0	0	-	3	2	66.7%
BHGR	0	0	-	3	1	33.3%	0	0	-	3	1	33.3%
OATI	1	0	0.0%	0	0	-	2	1	50.0%	3	1	33.3%
Total	**3**	**0**	**0.0%**	**8**	**5**	**62.5%**	**2**	**1**	**50.0%**	**13**	**6**	**46.2%**

B. One Year Survival: 1998 Adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	3	2	66.7%	0	0	-	4	2	50.0%
CALT	1	0	0.0%	2	2	100.0%	0	0	-	3	2	66.7%
BHGR	0	0	-	3	1	33.3%	0	0	-	3	1	33.3%
OATI	1	0	0.0%	0	0	-	2	1	50.0%	3	1	33.3%
Total	**3**	**0**	**0.0%**	**8**	**5**	**62.5%**	**2**	**1**	**50.0%**	**13**	**6**	**46.2%**

C. Two Year Survival: 1998 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	1	0	0.0%	3	2	66.7%	0	0	-	4	2	50.0%
CALT	1	0	0.0%	2	1	50.0%	0	0	-	3	1	33.3%
BHGR	0	0	-	3	0	0.0%	0	0	-	3	0	0.0%
OATI	1	0	0.0%	0	0	-	2	1	50.0%	3	1	33.3%
Total	**3**	**0**	**0.0%**	**8**	**3**	**37.5%**	**2**	**1**	**50.0%**	**13**	**4**	**30.8%**

Table 20. Recapture Rates by Sex and Age at Banding: 1997 Cohort, Case Springs

A. One Year Survival by Age at Banding: 1998 Non-adjusted

	After Hatching Year			Hatching Year			Unknown Age			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
ACWO	3	0	0.0%	0	0	-	6	1	16.7%	9	1	11.1%
ATFL	4	0	0.0%	2	1	50.0%	0	0	-	6	1	16.7%
SPTO	4	2	50.0%	3	0	0.0%	0	0	-	7	2	28.6%
CALT	4	1	25.0%	3	0	0.0%	1	0	0.0%	8	1	12.5%
BHGR	10	1	10.0%	0	0	-	0	0	-	10	1	10.0%
HOWR	6	1	16.7%	0	0	-	1	0	0.0%	7	1	14.3%
WBNU	4	3	75.0%	3	1	33.3%	1	0	0.0%	8	4	50.0%
Total	35	8	22.9%	11	2	18.2%	9	1	11.1%	55	11	20.0%

B. One Year Survival by Sex: 1998 Non-adjusted

	Female			Male			Unknown Sex			Total		
Species	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %	Banded	Recaptured	Recapture %
SPTO	2	1	50.0%	2	1	50.0%	0	0	-	4	2	50.0%
CALT	0	0	-	2	0	0.0%	2	1	50.0%	4	1	25.0%
BHGR	3	1	33.3%	7	0	0.0%	0	0	-	10	1	10.0%
HOWR	2	1	50.0%	3	0	0.0%	1	0	0.0%	6	1	16.7%
WBNU	1	1	100.0%	3	2	66.7%	0	0	-	4	3	75.0%
Total	8	4	50.0%	17	3	17.6%	3	1	33.3%	28	8	28.6%

Santa Margarita River

Overview of 1998 Captures

Seven hundred and eighty-six individuals of 27 species were caught during 601 net-hours (Table 21), nearly twice as many birds as were caught at the De Luz station, despite the shorter operating period (12 versus 15 netting days). Overall captures totaled 936, for an average capture rate of 156 per 100 net-hours, 2.5 times higher than the capture rate at De Luz. Although bird abundance at the Santa Margarita was high, species richness was lower than at De Luz, despite the overall similarity in habitat types of the two sites. By far the most abundant species at the Santa Margarita station were song sparrows and common yellowthroats, which together made up 67 percent of the individuals caught (Figure 8). These species were followed in abundance by Least Bell's vireo and yellow warbler, two sensitive species breeding at high densities at the site. Other sensitive species confirmed breeding at the station include southwestern willow flycatcher and Swainson's thrush, indicating that while the Santa Margarita site is not as species rich as other riparian habitat on Base, it supports breeding populations of several species of intense conservation concern. Other noteworthy species captured at the site include American goldfinch and black phoebe, species not encountered at the other Pendleton MAPS stations.

The sex ratio of birds of known sex (N=338) was exactly 1:1 (Table 21). Age ratio was skewed relative to that documented for the De Luz (30 percent hatching-year) and Case Springs (26 percent hatching-year) populations, with 51 percent of the individuals captured hatching-year birds (373/728). The exceptionally high proportion of young birds in the Santa Margarita population suggests an overall level of productivity 2-3 times higher than that at the other two stations. Much of this productivity is likely attributable to successful breeding by just two species: song sparrows and common yellowthroats. Single-species comparisons between the Santa Margarita and De Luz populations indicate that song sparrow productivity is 2.6 times higher at the former site (2.25 young/adult versus 0.88 young/adult, respectively), while common yellowthroat productivity is 1.2 times higher (1.16 young/adult versus 1.00 young/adult), suggesting that high song sparrow abundance and productivity are the primary source of differences between sites. Further analyses of species-specific survival and productivity should shed light on the differences between sites in species composition and abundance.

Seven hundred and fifty-two of the birds caught (96 percent) were banded. Birds not banded included four hummingbirds and one mourning dove, and 29 additional birds, 20 of which escaped prior to or during processing, five of which died, and four of which were not banded for other reasons. The majority of birds (70 percent) were captured only once during the season, but some individuals of the most abundant species were captured 2-4 times, and one common yellowthroat was captured five times (Table 22).

Overall capture rates by net ranged from 97 to 219 captures per 100 net-hours (Table 24), for an overall average capture rate of 156 per 100 net-hours (Table 23). Nets were generally more equitable in capture rate than were nets at the other two stations (Figure 9). Capture rates peaked at 219 captures per 100-net hours in early July (Table 24); but were otherwise generally high throughout the season, with no discernible patterns of increase or decline.

Table 21. Sex and Age of Individuals Captured: Santa Margarita River, 1998

	Female						Male						Unknown Sex							
	Age[a]					Female	Age[a]					Male	Agea						Unknown	Species
Species	A	H	O	S	U	Total	A	H	O	S	U	Total	A	H	L	O	S	U	Total	Total
MODO	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	1	**1**	**1**
DOWO	0	0	1	0	0	**1**	0	0	0	1	0	**1**	0	0	0	0	0	0	**0**	**2**
ANHU	2	0	0	0	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	1	**1**	**3**
UNHU	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	0	0	0	**1**	**1**
BLPH	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	2	0	0	0	0	**2**	**2**
PSFL	0	0	0	0	0	**0**	0	0	0	0	0	**0**	1	0	0	1	0	1	**3**	**3**
WIFL	2	0	0	0	0	**2**	0	0	0	0	0	**0**	5	1	0	0	0	0	**6**	**8**
HOOR	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	0	**0**	**1**
HOFI	0	0	0	0	0	**0**	2	0	0	0	0	**2**	0	0	0	0	0	0	**0**	**2**
AMGO	4	0	1	0	0	**5**	7	1	0	0	0	**8**	0	6	0	0	0	0	**6**	**19**
LEGO	2	0	1	1	0	**4**	1	0	2	2	0	**5**	0	1	0	0	0	0	**1**	**10**
SOSP	38	0	0	0	0	**38**	33	0	0	0	0	**33**	22	208	1	0	0	26	**257**	**328**
SPTO	6	0	0	1	0	**7**	6	0	0	0	0	**6**	0	1	0	0	0	0	**1**	**14**
BHGR	1	0	0	0	0	**1**	1	0	0	0	0	**1**	0	0	0	0	0	1	**1**	**3**
WAVI	1	0	0	0	0	**1**	0	0	0	0	0	**0**	2	0	0	0	0	0	**2**	**3**
HUVI	3	0	0	0	0	**3**	0	0	0	0	0	**0**	1	0	0	0	0	0	**1**	**4**
LBVI	10	0	0	0	0	**10**	3	0	0	0	0	**3**	9	11	0	0	0	0	**20**	**33**
OCWA	9	2	0	0	0	**11**	4	0	0	0	0	**4**	0	6	0	0	0	7	**13**	**28**
YWAR	7	1	1	2	1	**12**	7	1	2	0	0	**10**	1	6	1	0	0	0	**8**	**30**
TOWA	0	0	0	0	0	**0**	0	0	1	0	0	**1**	0	0	0	0	0	0	**0**	**1**
COYE	43	8	0	0	3	**54**	46	24	1	0	1	**72**	0	71	1	0	0	2	**74**	**200**
YBCH	6	0	0	0	0	**6**	7	0	0	0	0	**7**	0	1	1	0	0	1	**3**	**16**
WIWA	2	0	0	0	0	**2**	6	0	1	0	0	**7**	0	0	0	0	0	0	**0**	**9**
BEWR	1	0	0	0	0	**1**	0	0	0	0	0	**0**	2	9	0	0	0	4	**15**	**16**
HOWR	1	0	0	0	0	**1**	0	0	0	0	0	**0**	1	1	0	0	0	5	**7**	**8**
WREN	0	0	0	0	0	**0**	0	0	0	0	0	**0**	6	1	0	0	0	2	**9**	**9**
BUSH	5	1	0	0	0	**6**	7	0	0	0	0	**7**	0	5	0	0	0	2	**7**	**20**
SWTH	1	0	0	0	0	**1**	2	0	0	0	0	**2**	7	0	0	1	1	0	**9**	**12**
Total	**144**	**12**	**4**	**4**	**4**	**168**	**132**	**26**	**8**	**3**	**1**	**170**	**57**	**331**	**4**	**2**	**1**	**53**	**448**	**786**

[a]Age
A = After Hatching Year
H = Hatching Year
L = Local (recently fledged)
O = Older than Second Year
S = Second Year
T = Third Year
U = Unknown Age

Figure 8. Number of Individuals Caught per Species: Santa Margarita River, 1998

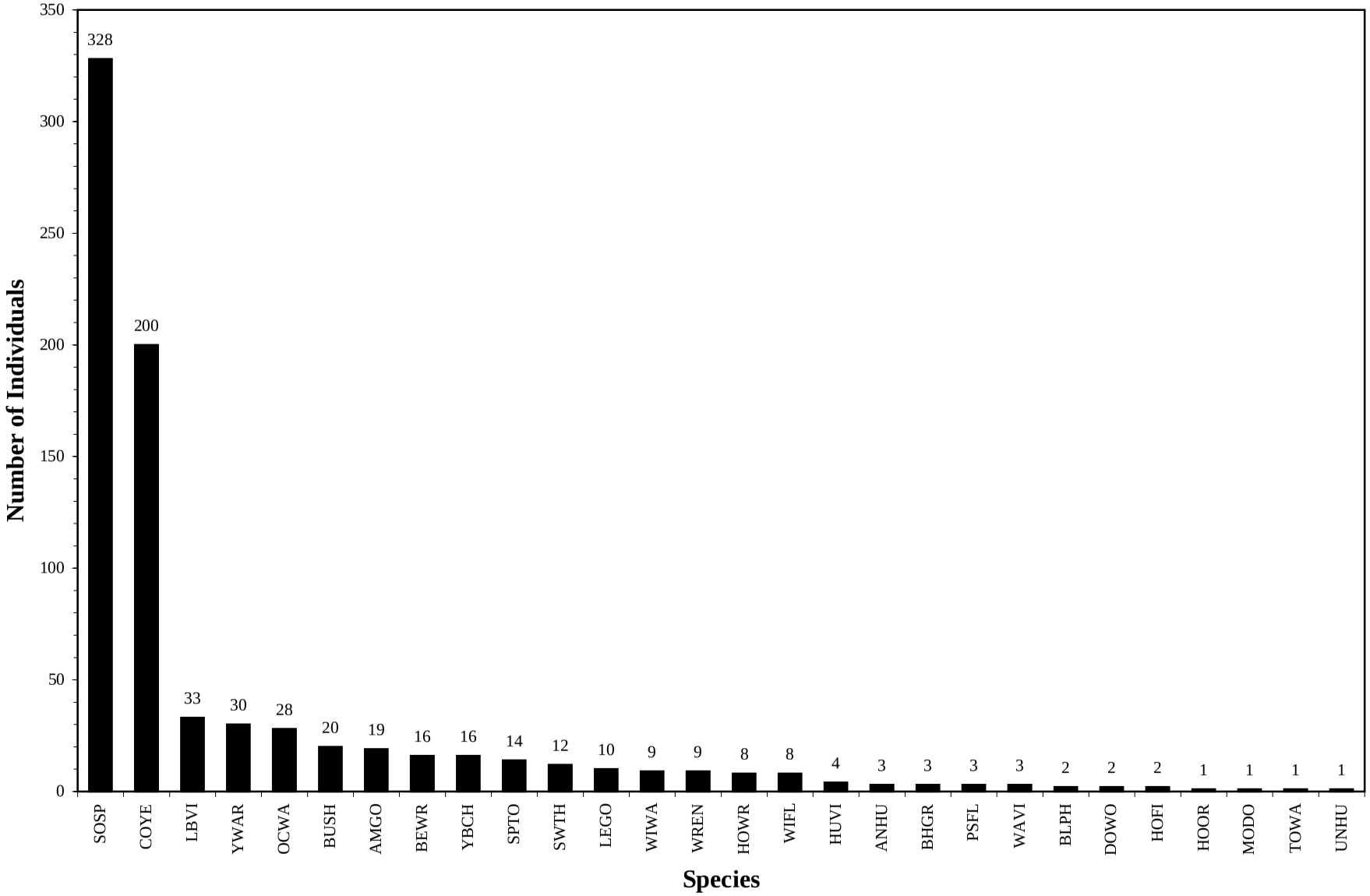


Table 22. Capture Frequency of Individuals: Santa Margarita River, 1998

Species	# Individuals / Capture Incidence (Banded Birds Only)					# Captures		
	1 Capture	2 Captures	3 Captures	4 Captures	5 Captures	Banded Birds	Unbanded Birds	All Birds
MODO	0	0	0	0	0	0	1	1
DOWO	1	1	0	0	0	3	0	3
ANHU	0	0	0	0	0	0	3	3
UNHU	0	0	0	0	0	0	1	1
BLPH	2	0	0	0	0	2	0	2
PSFL	2	0	0	0	0	2	1	3
WIFL	6	1	1	0	0	11	0	11
HOOR	1	0	0	0	0	1	0	1
HOFI	2	0	0	0	0	2	0	2
AMGO	17	0	0	0	0	17	2	19
LEGO	9	1	0	0	0	11	0	11
SOSP	258	46	10	2	0	388	12	400
SPTO	10	2	1	0	0	17	1	18
BHGR	1	1	0	0	0	3	1	4
WAVI	3	0	0	0	0	3	0	3
HUVI	3	1	0	0	0	5	0	5
LBVI	26	4	3	0	0	43	0	43
OCWA	25	1	0	0	0	27	2	29
YWAR	27	1	2	0	0	35	0	35
TOWA	1	0	0	0	0	1	0	1
COYE	172	20	3	0	1	226	4	230
YBCH	11	3	1	1	0	24	0	24
WIWA	8	0	0	0	0	8	1	9
BEWR	9	3	1	1	0	22	2	24
HOWR	6	1	0	0	0	8	1	9
WREN	6	2	0	0	0	10	1	11
BUSH	17	2	0	0	0	21	1	22
SWTH	12	0	0	0	0	12	0	12
Total	**635**	**90**	**22**	**4**	**1**	**902**	**34**	**936**

Table 23. Number of Captures by Date: Santa Margarita River, 1998

Species	MAPS Period[a] 1	2	3	4	5	6	7	8	9	10	11	12	Total Captures 1998	Captures per 100 Net-hours[b]
	Date(s)													
	5/6	5/13 & 5/18	5/20	6/1	6/12 & 6/16	6/21	6/30	7/13	7/22	8/3	8/12	8/24		
MODO	0	0	0	0	0	1	0	0	0	0	0	0	**1**	**0.17**
DOWO	0	0	1	2	0	0	0	0	0	0	0	0	**3**	**0.50**
ANHU	1	0	1	0	0	0	1	0	0	0	0	0	**3**	**0.50**
UNHU[c]	0	0	0	0	0	1	0	0	0	0	0	0	**1**	**0.17**
BLPH	0	0	0	2	0	0	0	0	0	0	0	0	**2**	**0.33**
PSFL	0	0	2	0	1	0	0	0	0	0	0	0	**3**	**0.50**
WIFL	1	1	1	1	1	0	2	1	1	0	2	0	**11**	**1.83**
HOOR	1	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.17**
HOFI	1	0	1	0	0	0	0	0	0	0	0	0	**2**	**0.33**
AMGO	1	3	1	0	1	4	7	0	0	0	2	0	**19**	**3.16**
LEGO	3	1	0	1	2	2	2	0	0	0	0	0	**11**	**1.83**
SOSP	16	36	25	42	44	47	65	30	21	27	27	20	**400**	**66.48**
SPTO	2	3	2	2	2	2	3	0	1	1	0	0	**18**	**2.99**
BHGR	1	0	0	0	0	0	2	0	0	0	1	0	**4**	**0.66**
WAVI	2	1	0	0	0	0	0	0	0	0	0	0	**3**	**0.50**
HUVI	0	0	0	1	0	0	2	0	1	1	0	0	**5**	**0.83**
LBVI	4	2	6	3	1	2	4	3	6	7	3	2	**43**	**7.15**
OCWA	2	4	6	2	0	5	0	1	2	4	2	1	**29**	**4.82**
YWAR	6	4	4	4	2	2	1	6	2	4	0	0	**35**	**5.82**
TOWA	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0.17**
COYE	14	20	17	25	17	19	14	23	13	18	24	26	**230**	**38.23**
YBCH	0	4	0	4	3	4	2	3	2	0	1	1	**24**	**3.99**
WIWA	4	4	0	0	0	0	0	0	0	0	1	0	**9**	**1.50**
BEWR	0	1	1	4	3	2	3	5	0	1	2	2	**24**	**3.99**
HOWR	0	1	1	0	0	0	3	1	1	1	1	0	**9**	**1.50**
WREN	1	0	0	0	1	0	0	5	2	2	0	0	**11**	**1.83**
BUSH	0	2	1	3	0	7	9	0	0	0	0	0	**22**	**3.66**
SWTH	4	7	0	0	0	0	0	1	0	0	0	0	**12**	**1.99**
Total	**64**	**94**	**71**	**96**	**78**	**98**	**120**	**79**	**52**	**66**	**66**	**52**	**936**	**155.57**
Species	**17**	**16**	**16**	**14**	**12**	**12**	**15**	**11**	**11**	**10**	**11**	**6**	**27**	**4.49**

[a]MAPS Period 1 = May 1-10. Periods -3, -2, and -1 represent April 1-10, 11-20, and 21-30.

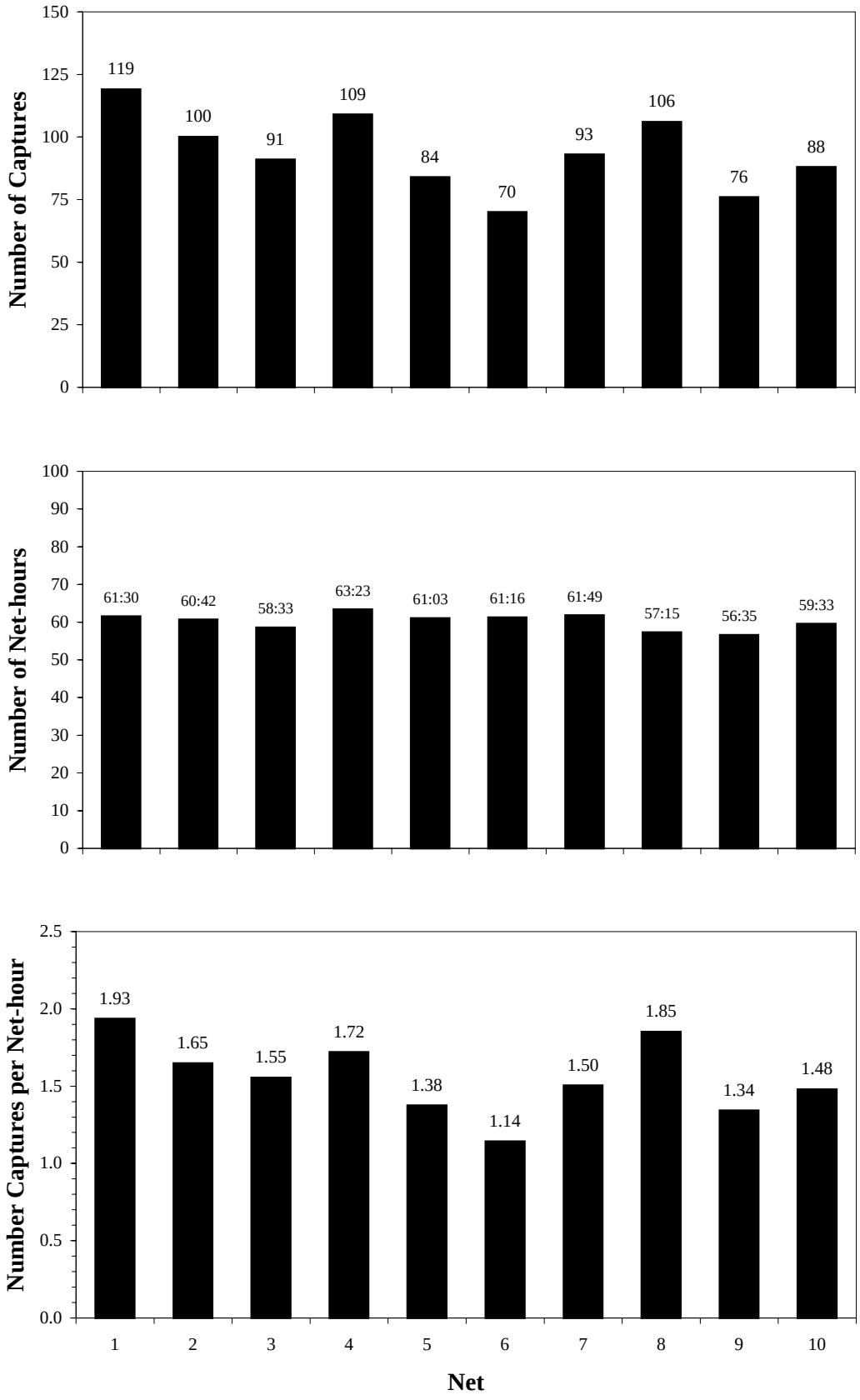
[b]601:39 total net-hours

[c]Not included in species total

Table 24. Capture Rate by Net and Date: Santa Margarita River, 1998

MAPS Period	Date(s)		Net										Date Totals
			1	2	3	4	5	6	7	8	9	10	
1	5/6	Net-hours	5:00	5:00	5:00	4:55	4:50	4:50	4:50	5:00	4:50	4:35	**48:50**
		Captures	4	8	5	7	5	4	7	8	5	11	**64**
		Captures/Net-hour	0.80	1.60	1.00	1.42	1.03	0.83	1.45	1.60	1.03	2.40	**1.31**
2	5/13 & 5/18	Net-hours	4:50	5:03	4:51	5:14	4:57	4:47	4:41	4:40	4:35	4:30	**48:08**
		Captures	7	12	7	8	11	5	12	6	15	11	**94**
		Captures/Net-hour	1.45	2.38	1.44	1.53	2.22	1.05	2.56	1.29	3.27	2.44	**1.95**
3	5/20	Net-hours	4:45	4:35	4:35	4:25	4:15	4:25	4:35	4:30	4:30	4:30	**45:05**
		Captures	7	4	10	6	6	10	9	9	5	5	**71**
		Captures/Net-hour	1.47	0.87	2.18	1.36	1.41	2.26	1.96	2.00	1.11	1.11	**1.57**
4	6/1	Net-hours	5:35	5:24	5:07	5:41	5:15	5:17	5:18	5:25	5:20	5:20	**53:42**
		Captures	9	6	11	3	12	5	16	17	7	10	**96**
		Captures/Net-hour	1.61	1.11	2.15	0.53	2.29	0.95	3.02	3.14	1.31	1.88	**1.79**
5	6/12 & 6/16	Net-hours	3:17	3:13	1:08	5:45	5:32	5:33	5:40	1:15	1:05	4:05	**36:33**
		Captures	13	8	3	18	4	8	7	5	1	11	**78**
		Captures/Net-hour	3.96	2.49	2.65	3.13	0.72	1.44	1.24	4.00	0.92	2.69	**2.13**
6	6/21	Net-hours	6:10	5:55	6:15	6:15	5:27	5:41	5:49	5:40	5:30	5:15	**57:57**
		Captures	12	10	6	17	14	6	8	12	7	6	**98**
		Captures/Net-hour	1.95	1.69	0.96	2.72	2.57	1.06	1.38	2.12	1.27	1.14	**1.69**
7	6/30	Net-hours	5:25	5:30	5:40	5:25	5:25	5:25	5:25	5:20	5:30	5:40	**54:45**
		Captures	25	21	11	11	6	3	11	10	15	7	**120**
		Captures/Net-hour	4.62	3.82	1.94	2.03	1.11	0.55	2.03	1.88	2.73	1.24	**2.19**
8	7/13	Net-hours	5:45	5:35	5:25	5:40	5:20	5:25	5:20	5:30	5:20	5:05	**54:25**
		Captures	8	6	9	14	5	8	7	7	6	9	**79**
		Captures/Net-hour	1.39	1.07	1.66	2.47	0.94	1.48	1.31	1.27	1.13	1.77	**1.45**
9	7/22	Net-hours	5:30	5:20	5:15	5:30	5:16	5:10	5:21	5:35	5:15	5:38	**53:50**
		Captures	10	4	6	7	7	2	5	4	4	3	**52**
		Captures/Net-hour	1.82	0.75	1.14	1.27	1.33	0.39	0.93	0.72	0.76	0.53	**0.97**
10	8/3	Net-hours	5:00	5:15	5:20	4:55	5:05	5:03	5:01	4:40	5:00	5:25	**50:44**
		Captures	10	6	9	3	4	8	1	12	4	9	**66**
		Captures/Net-hour	2.00	1.14	1.69	0.61	0.79	1.58	0.20	2.57	0.80	1.66	**1.30**
11	8/12	Net-hours	5:15	4:55	5:00	4:50	4:36	4:45	4:54	4:45	4:45	4:30	**48:15**
		Captures	10	6	7	11	2	6	6	12	2	4	**66**
		Captures/Net-hour	1.90	1.22	1.40	2.28	0.43	1.26	1.22	2.53	0.42	0.89	**1.37**
12	8/24	Net-hours	4:58	4:57	4:57	4:48	5:05	4:55	4:55	4:55	4:55	5:00	**49:25**
		Captures	4	9	7	4	8	5	4	4	5	2	**52**
		Captures/Net-hour	0.81	1.82	1.41	0.83	1.57	1.02	0.81	0.81	1.02	0.40	**1.05**
Net Totals		Net-hours	**61:30**	**60:42**	**58:33**	**63:23**	**61:03**	**61:16**	**61:49**	**57:15**	**56:35**	**59:33**	**601:39**
		Captures	**119**	**100**	**91**	**109**	**84**	**70**	**93**	**106**	**76**	**88**	**936**
		Captures/Net-hour	**1.93**	**1.65**	**1.55**	**1.72**	**1.38**	**1.14**	**1.50**	**1.85**	**1.34**	**1.48**	**1.56**

Figure 9. Captures, Net-hours, and Capture Rate by Net: Santa Margarita River, 1998



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

Code	Common Name	Scientific Name	AOU #
MODO	Mourning dove	*Zenaida macroura*	316.0
RSHA	Red-shouldered hawk	*Buteo lineatus*	339.0
AMKE	American kestrel	*Falco sparverius*	360.0
CAQU	California quail	*Callipepla californica*	0.0
DOWO	Downy woodpecker	*Dendrocopos pubescens*	394.0
NUWO	Nuttall's woodpecker	*Dendrocopos nuttallii*	397.0
ACWO	Acorn woodpecker	*Melanerpes formicivorus*	407.0
RSFL	Red-shafted Flicker	*Colaptes auratus cafer*	413.0
BCHU	Black-chinned hummingbird	*Archilochus alexandri*	429.0
COHU	Costa's hummingbird	*Archilochus costae*	430.0
ANHU	Anna's hummingbird	*Archilochus anna*	431.0
ALHU	Allen's hummingbird	*Selasphorus sasin*	434.0
ATFL	Ash-throated flycatcher	*Myiarchus cinerascens*	454.0
BLPH	Black phoebe	*Sayornis nigricans*	458.0
WEWP	Western wood-pewee	*Contopus sordidulus*	462.0
PSFL	Pacific-slope flycatcher	*Empidonax difficilis*	464.1
WIFL	Willow flycatcher	*Empidonax traillii*	466.0
HAFL	Hammond's flycatcher	*Empidonax hammondii*	468.0
WESJ	Western scrub-jay	*Aphelocoma californica*	481.0
EUST	European starling	*Sturnus vulgaris*	493.0
HOOR	Hooded oriole	*Icterus cucullatus*	505.0
BUOR	Bullock's oriole	*Icterus bullockii*	508.0
PUFI	Purple finch	*Carpodacus purpureus*	517.0
HOFI	House finch	*Carpodacus mexicanus*	519.0
AMGO	American goldfinch	*Carduelis tristis*	529.0
LEGO	Lesser goldfinch	*Carduelis psaltria*	530.0
LASP	Lark sparrow	*Chondestes grammacus*	552.0
WCSP	White-crowned sparrow	*Zonotrichia leucophrys*	554.0
GCSP	Golden-crowned sparrow	*Zonotrichia atricapilla*	557.0
CHSP	Chipping sparrow	*Spizella passerina*	560.0
BCSP	Black-chinned sparrow	*Spizella atrogularis*	565.0
DEJU	Dark-eyed junco	*Junco hyemalis*	567.1
RCSP	Rufous-crowned sparrow	*Aimophila ruficeps*	580.0
SOSP	Song sparrow	*Melospiza melodia*	581.0
LISP	Lincoln's sparrow	*Melospiza lincolnii*	583.0
SPTO	Spotted towhee	*Pipilo maculatus*	588.0
CALT	California towhee	*Pipilo crissalis*	591.1
BHGR	Black-headed grosbeak	*Pheucticus melanocephalus*	596.0
BLGR	Blue grosbeak	*Guiraca caerulea*	597.0
LAZB	Lazuli bunting	*Passerina amoena*	599.0
WETA	Western tanager	*Piranga ludoviciana*	607.0
VGSW	Violet-green swallow	*Tachycineta thalassina*	615.0
PHAI	Phainopepla	*Phainopepla nitens*	620.0
WAVI	Warbling vireo	*Vireo gilvus*	627.0
HUVI	Hutton's vireo	*Vireo huttoni*	632.0
LBVI	Least Bell's vireo	*Vireo bellii pusillus*	633.4
NAWA	Nashville warbler	*Vermivora ruficapilla*	645.0
OCWA	Orange-crowned warbler	*Vermivora celata*	646.0

Alpha Codes, Common Names, and Scientific Names
of Species Caught at MAPS Stations, Camp Pendleton
(continued)

Code	Common Name	Scientific Name	AOU #
YWAR	Yellow warbler	*Dendroica petechia*	652.0
AUWA	Audubon's warbler	*Dendroica coronata*	656.0
BTYW	Black-throated gray warbler	*Dendroica nigrescens*	665.0
TOWA	Townsend's warbler	*Dendroica townsendi*	668.0
HEWA	Hermit warbler	*Dendroica occidentalis*	669.0
COYE	Common yellowthroat	*Geothlypis trichas*	681.0
YBCH	Yellow-breasted chat	*Icteria virens*	683.0
WIWA	Wilson's warbler	*Wilsonia pusilla*	685.0
NOMO	Northern mockingbird	*Mimus polyglottos*	703.0
CATH	California thrasher	*Toxostoma redivivum*	710.0
BEWR	Bewick's wren	*Thyromanes bewickii*	719.0
HOWR	House wren	*Troglodytes aedon*	721.0
WBNU	White-breasted nuthatch	*Sitta carolinensis*	727.0
OATI	Oak titmouse	*Baeolophus inornatus*	733.0
WREN	Wrentit	*Chamaea fasciata*	742.0
BUSH	Bushtit	*Psaltriparus minimus*	743.0
SWTH	Swainson's thrush	*Catharus ustulata*	758.0
HETH	Hermit thrush	*Catharus guttatus*	759.0
WEBL	Western bluebird	*Sialia mexicana*	767.0