

Neotropical Migratory Bird Monitoring Study at Marine Corps Base Camp Pendleton, California

2004 Annual Report



Prepared for:

**Assistant Chief of Staff, Environmental Security
U.S. Marine Corps Base Camp Pendleton**

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U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

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Introduction

This report is the ninth annual progress update summarizing the activities of two MAPS stations at Marine Corps Base Camp Pendleton. MAPS, or “Monitoring Avian Productivity and Survivorship”, 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 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 they are being operated in a manner consistent with other banding stations participating in an effort to monitor birds world-wide. Operation of the Case Springs station was ceased after the 1999 season because of low annual capture rates (Kus and Beck 2001a), so the following progress report deals exclusively with results from the De Luz and Santa Margarita stations. These stations have been operated annually since 1995 and 1998, respectively, with the exception of 2003, when funding was unavailable.

Part-way through the 2004 season, a wildfire burned part of De Luz Canyon, including the MAPS station. The “India” fire, which started on 2 May, burned for several days, and drastically changed the habitat at the station, leaving little or no herbaceous or shrub layer and scorching most trees through the canopy layer. By August, an altered herbaceous layer had returned and trees and shrubs showed new growth. We continued to operate the De Luz station on a modified basis after the fire.

Methods

Following standardized MAPS protocol (DeSante et al. 1993), the De Luz and Santa Margarita stations were operated one day during every 10-day netting period (hereafter referred to as “Period”) between 1 April and 31 August 2004, for a total of 15 days (or Periods) per station. The first three periods (in April) were designated as “-3”, “-2”, and “-1”, while those between 1 May and 31 August were designated as “1”, “2”, etc. to conform to the nomenclature used at MAPS stations where operation begins on May 1. Ten mist nets, placed 60-100 meters apart, were erected at each site in fixed locations chosen in the first year of the study for their potential to capture birds moving through the vegetation (Figures 1, 2). Mist nets were made of 30 millimeter mesh black nylon, and were 12 meters long by 2.6 meters high, with four trammels (“pockets”) running the length of the net. Nets were suspended from vertical aluminum poles anchored by permanent rebar stakes, and when erected covered an area from approximately 0.25

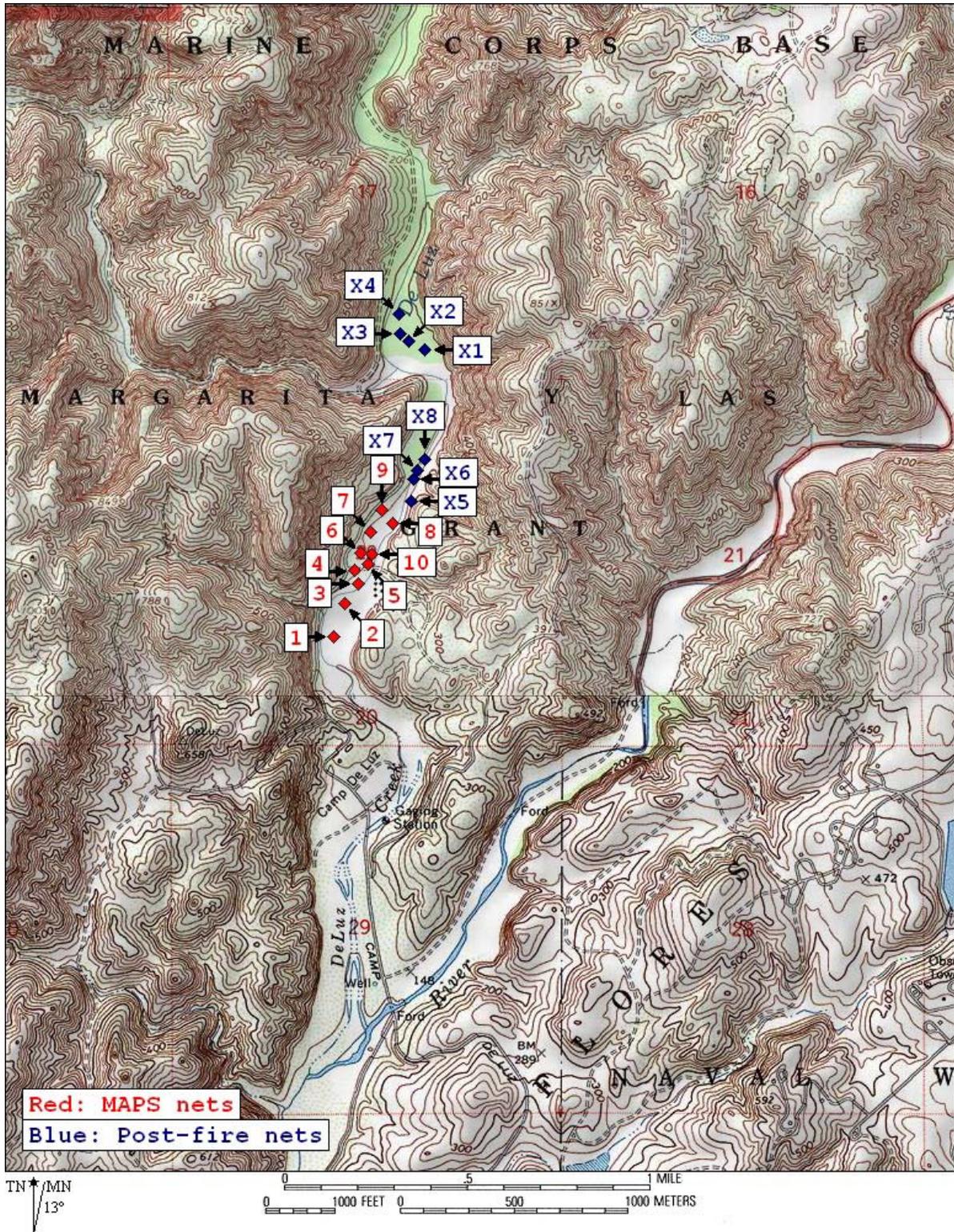


Figure 1. Location of De Luz Creek MAPS station, Marine Corps Base Camp Pendleton. Numbers show net locations.

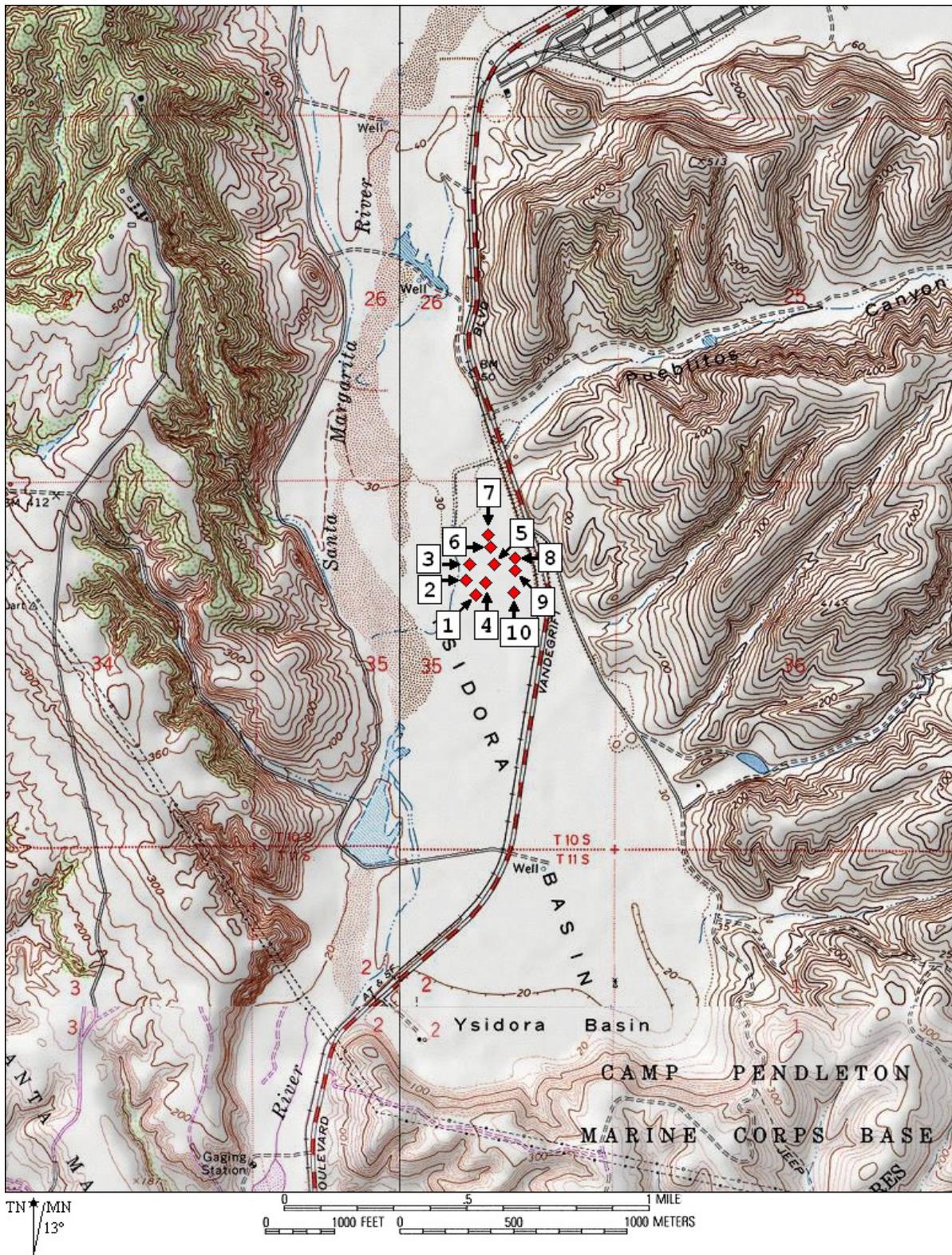


Figure 2. Location of Santa Margarita River MAPS station, Marine Corps Base Camp Pendleton. Numbers show net locations.

meters to approximately 2.5 meters above the ground. Nets were opened within one half-hour after dawn and run five hours, typically until between 1100 and noon. Nets were not operated during inclement weather such as rain, extreme heat or cold. Any deficiency in netting time as a result of weather or other events totaling more than 2.5 hours was corrected by netting for that amount of time on the next available day. After the fire and resulting change in vegetation structure at the De Luz station, nets were operated 2.5-3.3 hours a day in order to minimize sun exposure of birds in nets.

Nets were checked every 30-40 minutes by observers working circuits. All birds except hummingbirds, game birds (California quail (*Callipepla californica*), doves) and raptors were removed from nets, held in mesh bags labeled with the net number and time of net run, and taken to a central processing location within 250 meters of the most distant net, where they were banded with federal numbered aluminum bands. Data recorded for each individual caught included age, sex, breeding condition, weight, wing chord, fat deposition, feather wear, and molt status. Birds were held for 5-30 minutes depending on the number of birds captured during one net run. After processing, juveniles and brooding females were released in the vicinity of the net in which they had been captured, while all other birds were released at the processing station. 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 three field personnel operated the De Luz station, and five to six the Santa Margarita station.

Two additional arrays of nets were run in unburned patches of riparian habitat off-site and upstream of the De Luz station in an attempt to document movement of birds displaced by the fire. One array of four nets was placed near the edge of the fire line 650 meters upstream from the De Luz station (nets X1-X4, Figure 1) and was run during netting Periods 5-8 for 1.7-4.0 hours per day. A second array of four nets was placed in a smaller patch of unburned riparian habitat surrounded by burned habitat 90 meters from the De Luz station (nets X5-X8, Figure 1) and run from 3.0-4.0 hours per day during Periods 9-11. Both arrays were run between dawn and 1100. No birds were banded at these sites and all birds were released at the nets. Band number was recorded for any bird previously banded, and species was recorded for all birds caught.

Fieldwork was conducted by Josephine Falcone, Paul Galvin, Jeannie Yu Guzis, Heather Howitt, Kerry Kenwood, Dana Kamada, Barbara Kus, Melanie Madden-Smith, Melissa Mersy, Jay Rourke, Maria Topper, John Urbanic, and Mike Wellik.

Results

De Luz Creek

Overview of 2004 Captures

One hundred and fifty individuals of 29 species were captured during 462 net-hours (operation of one net for one hour; Table 1; unidentified species not included in species total; see

Table 1. Sex and age of individuals (banded and unbanded) captured: De Luz Creek, 2004.

| Species | Female | | | | Female Total | Male | | | | | Male Total | Unknown Sex | | | | Unknown Total | Species Total |
|--------------|------------------|-----------|----------|----------|--------------|----------|-----------|----------|-----------|----------|------------|-------------|-----------|----------|-----------|---------------|---------------|
| | Age ^a | | | | | Age | | | | | | Age | | | | | |
| | HY | AHY | SY | ASY | | HY | AHY | SY | ASY | I | | HY | AHY | ASY | I | | |
| BCHU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 3 |
| ANHU | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 1 | 1 | 4 |
| COHU | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| USHU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 |
| UNHU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 8 | 8 |
| NUWO | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| DOWO | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| WEWP | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 3 |
| PSFL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| UEFL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| ATFL | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 |
| WEKI | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 3 |
| LBVI | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 5 | 5 |
| WESJ | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| OATI | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 3 | 3 |
| BUSH | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 1 | 4 |
| BEWR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 2 | 7 | 7 |
| HOWR | 0 | 1 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 3 | 3 | 5 | 0 | 1 | 9 | 13 |
| WREN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 |
| OCWA | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 3 | 4 |
| COYE | 0 | 0 | 5 | 2 | 7 | 6 | 3 | 0 | 9 | 2 | 20 | 1 | 0 | 0 | 1 | 2 | 29 |
| WIWA | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| YBCH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 |
| SPTO | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| CALT | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 4 | 7 | 9 |
| RCSP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| FOSP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| SOSP | 0 | 5 | 0 | 0 | 5 | 0 | 7 | 1 | 0 | 0 | 8 | 0 | 2 | 0 | 3 | 5 | 18 |
| GCSP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| BHGR | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 2 | 4 |
| BUOR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| LEGO | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 2 | 5 |
| Total | 1 | 13 | 8 | 3 | 25 | 6 | 23 | 7 | 13 | 4 | 53 | 5 | 33 | 5 | 29 | 72 | 150 |

^aAge: HY=hatching-year bird, AHY=after-hatching-year bird, SY=second-year bird, ASY=after-second-year bird, I=indeterminable age

Table 2. Number of individuals (banded and unbanded) captured: De Luz Creek, 1995-2004.

| Species | IBP Code ^a | Year | | | | | | | | | Total |
|---------|-----------------------|------|------|------|------|------|------|------|------|------|-------|
| | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | |
| COHA | 02210 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| AMKE | 02630 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| CAQU | 03130 | 2 | 0 | 1 | 2 | 1 | 1 | 3 | 1 | 0 | 11 |
| MODO | 05570 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| COGD | 05610 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| BCHU | 08640 | 3 | 2 | 5 | 7 | 9 | 11 | 2 | 5 | 3 | 47 |
| ANHU | 08670 | 5 | 5 | 16 | 15 | 5 | 9 | 2 | 2 | 4 | 63 |
| COHU | 08680 | 2 | 2 | 1 | 2 | 1 | 0 | 2 | 0 | 1 | 11 |
| ALHU | 08740 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 4 |
| USHU | 08774 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| UNHU | 08775 | 11 | 1 | 2 | 8 | 9 | 12 | 9 | 2 | 8 | 62 |
| NUWO | 09640 | 4 | 3 | 1 | 9 | 2 | 2 | 4 | 4 | 2 | 31 |
| DOWO | 09650 | 2 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 2 | 10 |
| RSFL | 09800 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| WEWP | 11380 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 6 |
| WIFL | 11475 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 3 | 0 | 9 |
| HAFL | 11510 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| PSFL | 11555 | 14 | 8 | 7 | 2 | 8 | 11 | 9 | 26 | 1 | 86 |
| UEFL | 11595 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| ATFL | 11740 | 10 | 9 | 10 | 12 | 8 | 7 | 9 | 14 | 3 | 82 |
| WEKI | 12020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| LBVI | 12640 | 9 | 5 | 5 | 9 | 7 | 7 | 7 | 8 | 5 | 62 |
| HUVI | 12740 | 2 | 1 | 2 | 0 | 1 | 0 | 3 | 1 | 0 | 10 |
| WAVI | 12760 | 0 | 3 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 9 |
| WESJ | 13110 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 4 |
| VGSW | 13440 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| NRWS | 13490 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| CLSW | 13520 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| OATI | 13640 | 6 | 4 | 1 | 3 | 3 | 1 | 2 | 3 | 3 | 26 |
| BUSH | 13680 | 10 | 14 | 20 | 8 | 22 | 27 | 12 | 39 | 4 | 156 |
| BEWR | 14040 | 16 | 7 | 16 | 26 | 9 | 9 | 13 | 3 | 7 | 106 |
| HOWR | 14070 | 3 | 8 | 6 | 15 | 23 | 7 | 11 | 22 | 13 | 108 |
| SWTH | 14810 | 22 | 8 | 6 | 4 | 8 | 4 | 1 | 6 | 0 | 59 |
| HETH | 14820 | 1 | 0 | 2 | 2 | 3 | 1 | 3 | 1 | 0 | 13 |
| WREN | 15110 | 34 | 36 | 36 | 18 | 22 | 32 | 47 | 66 | 2 | 293 |
| NOMO | 15150 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| CATH | 15270 | 2 | 5 | 7 | 3 | 0 | 2 | 2 | 4 | 0 | 25 |
| PHAI | 15590 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| OCWA | 15660 | 13 | 4 | 6 | 8 | 16 | 8 | 15 | 11 | 4 | 85 |
| NAWA | 15670 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| YWAR | 15750 | 3 | 6 | 3 | 6 | 7 | 10 | 2 | 3 | 0 | 40 |
| AUWA | 15800 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 |
| TOWA | 15840 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| MGWA | 16140 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 0 | 6 |
| COYE | 16150 | 63 | 57 | 58 | 73 | 56 | 49 | 83 | 35 | 29 | 503 |
| WIWA | 16290 | 2 | 2 | 2 | 2 | 5 | 6 | 1 | 6 | 1 | 27 |

Table 2 (continued). Number of individuals (banded and unbanded) captured: De Luz Creek 1995-2004.

| Species | IBP Code ^a | Year | | | | | | | | | Total |
|----------------------------------|-----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | |
| YBCH | 16460 | 39 | 42 | 36 | 24 | 25 | 21 | 20 | 11 | 3 | 221 |
| WETA | 16840 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| SPTO | 17810 | 34 | 23 | 21 | 20 | 18 | 19 | 13 | 17 | 3 | 168 |
| CALT | 17850 | 17 | 23 | 10 | 21 | 16 | 8 | 9 | 31 | 9 | 144 |
| RCSP | 17950 | 1 | 4 | 1 | 0 | 3 | 0 | 1 | 3 | 1 | 14 |
| BCSP | 18070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| LASP | 18090 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| FOSP | 18220 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| SOSP | 18230 | 51 | 55 | 55 | 66 | 53 | 42 | 32 | 32 | 18 | 404 |
| LISP | 18240 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 4 |
| WCSP | 18290 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 |
| GCSP | 18300 | 3 | 2 | 0 | 1 | 1 | 0 | 0 | 3 | 1 | 11 |
| ORJU | 18320 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| BHGR | 18610 | 26 | 37 | 30 | 17 | 8 | 16 | 8 | 3 | 4 | 149 |
| BLGR | 18640 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 5 |
| LAZB | 18660 | 12 | 1 | 0 | 1 | 2 | 3 | 6 | 1 | 0 | 26 |
| HOOR | 19050 | 2 | 0 | 0 | 3 | 3 | 0 | 2 | 0 | 0 | 10 |
| BUOR | 19105 | 5 | 1 | 6 | 3 | 3 | 0 | 0 | 0 | 3 | 21 |
| PUFI | 19350 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 6 |
| HOFI | 19370 | 1 | 22 | 8 | 8 | 8 | 9 | 0 | 4 | 0 | 60 |
| LEGO | 19490 | 15 | 13 | 14 | 25 | 43 | 20 | 14 | 13 | 5 | 162 |
| Total Individuals | | 454 | 422 | 404 | 430 | 420 | 371 | 351 | 397 | 150 | 3399 |
| Total Species^b | | 41 | 39 | 37 | 37 | 43 | 38 | 34 | 39 | 29 | 64 |

^aInstitute for Bird Populations code

^bUnidentified species not included in species totals

Appendix 1 for common and taxonomic species names of alpha codes used in tables and figures), less than half the annual mean of 406 ± 33 individuals between 1995 and 2002 (Table 2). Species richness declined from 39 species in 2002 and an average of 39 ± 3 species from 1995-2002. Low capture rates were a direct result of habitat loss from the wildfire which occurred during Period 1 (on 2 May), and reduced net-hours after the fire. One new species, western kingbird (*Tyrannus verticalis*), was captured for the first time, bringing the species total for the De Luz station since 1995 to 64.

Overall captures totaled 167 (Table 3), and mean captures per net-hour for all nets combined reached a record low of 0.36 ± 0.12 (Table 4), as compared with an annual mean capture rate of 0.63 ± 0.17 between 1995 and 2002 (Figure 3). Capture rates by date ranged from 0.00 to 0.76 captures per net-hour. The mean capture rate before the fire (Periods -3, -2, and -1) was 0.69 ± 0.07 per net-hour, higher than the mean annual capture rate for the first three Periods in previous years of 0.63 ± 0.18 . After the fire, capture rate averaged 0.23 ± 0.19 bird per net-hour. Capture rates were lower at individual nets than in previous years except at net 8, where pre-fire capture rate rose to 0.97 ± 0.29 per net-hour. Even after the fire, the capture rate at net 8 was 0.61 ± 0.72 , comparable to the mean annual capture rate (0.63 ± 0.17 ; see above) for all Periods of previous years.

Total pre-fire captures in April (Periods -3, -2, and -1) were 93 (Table 5), comparable to the annual April mean in 1995-2002 of 90 ± 20 . Ten individual migrant birds (see De Luz Creek "Population Size" below for migrant species) were captured in April, identical to the annual April mean of 10 ± 5 , indicating that migratory movement through the site was typical of that since 1995. Individual captures in April (83, Figure 4), like total captures, were comparable to the April mean in 1995-2002 (82 ± 17). Captures plummeted in May and continued to drop in June (Tables 4, 5). May totals were double those of June and July, possibly a result of continued migratory activity and/or movement of surviving birds with territories established before the fire. Capture rates picked up in August, likely a result of vegetation re-growth and post-breeding dispersal.

Common yellowthroats (*Geothlypis trichas*, 29 individuals) and song sparrows (*Melospiza melodia*, 18 individuals) were the two most abundant species as in all previous years except 2002 (Kus and Kisner 2003), composing 31 percent of all individual captures (Figure 4, Table 2). Their numbers, however, were much lower than the annual means since 1995 (common yellowthroat: 59 ± 15 , song sparrow: 48 ± 12). Numbers were comparable to totals in 2002, an extreme drought year, when both populations suffered substantial decreases (Kus and Kisner 2003). Common yellowthroats and song sparrows were totally absent in post-fire Periods 1-7 (Table 5). Common yellowthroat showed a recovery in numbers totaling 11 captures during Periods 9-12, while total post-fire song sparrow captures were limited to three. Bewick's wrens (*Thyromanes bewickii*), house wrens (*Troglodytes aedon*), California towhees (*Pipilo crissalis*), and hummingbirds were the only other species observed with more than five individual captures for the entire season. The two most abundant species in 2002, wrentit (*Chamaea fasciata*) and bushtit (*Psaltriparus minimus*), both shrub-associated species, were almost totally absent after the fire. Other species associated with a dense shrub layer that were abundant at the station in the past but absent after the fire include yellow-breasted chat (*Icteria virens*), spotted towhee

Table 3. Number of birds captured, banded, and recaptured: De Luz Creek, 1995-2004.

| Species | IBP Code | Total Captures ^a | | | | | | | | | | New Individuals Banded | | | | | | | | | | Recaptured Individuals, 2004 | | | | | | |
|---------|----------|-----------------------------|------|------|------|------|------|------|------|------|-------|------------------------|------|------|------|------|------|------|------|------|-------|------------------------------|------|------|------|------|-------|---|
| | | Year | | | | | | | | | Total | Year | | | | | | | | | Total | Year Originally Banded | | | | | Total | |
| | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | | 1998 | 1999 | 2000 | 2001 | 2002 | | |
| COHA | 02210 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AMKE | 02630 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CAQU | 03130 | 2 | 0 | 1 | 2 | 1 | 1 | 3 | 1 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MODO | 05570 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| COGD | 05610 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| BCHU | 08640 | 3 | 2 | 5 | 7 | 9 | 11 | 2 | 5 | 3 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ANHU | 08670 | 5 | 5 | 16 | 15 | 5 | 9 | 2 | 2 | 4 | 63 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| COHU | 08680 | 2 | 2 | 1 | 2 | 1 | 0 | 2 | 0 | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ALHU | 08740 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| USHU | 08774 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| UNHU | 08775 | 11 | 1 | 2 | 8 | 9 | 12 | 9 | 2 | 8 | 62 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| NUWO | 09640 | 4 | 4 | 2 | 12 | 2 | 4 | 4 | 5 | 3 | 40 | 4 | 2 | 1 | 6 | 1 | 2 | 3 | 1 | 2 | 2 | 22 | 0 | 0 | 0 | 0 | 0 | |
| DOWO | 09650 | 2 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 3 | 11 | 2 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 2 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | |
| RSFL | 09800 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WEWP | 11380 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 5 | 8 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 5 | 0 | 0 | 0 | 0 | 1 | 1 | |
| WIFL | 11475 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 3 | 0 | 9 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 3 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | |
| H AFL | 11510 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PSFL | 11555 | 14 | 8 | 7 | 2 | 8 | 11 | 9 | 26 | 1 | 86 | 14 | 8 | 6 | 0 | 8 | 10 | 7 | 24 | 1 | 78 | 0 | 0 | 0 | 0 | 0 | 0 | |
| UEFL | 11595 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| ATFL | 11740 | 13 | 9 | 11 | 15 | 8 | 7 | 9 | 17 | 3 | 92 | 10 | 7 | 9 | 9 | 6 | 5 | 7 | 11 | 2 | 66 | 0 | 0 | 0 | 1 | 0 | 1 | |
| WEKI | 12020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | |
| LBVI | 12640 | 10 | 5 | 8 | 13 | 8 | 7 | 8 | 14 | 5 | 78 | 9 | 5 | 3 | 5 | 5 | 4 | 5 | 6 | 3 | 45 | 0 | 0 | 0 | 0 | 1 | 1 | |
| HUVI | 12740 | 2 | 1 | 2 | 0 | 1 | 0 | 3 | 1 | 0 | 10 | 2 | 1 | 1 | 0 | 1 | 0 | 3 | 1 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WAVI | 12760 | 0 | 3 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 9 | 0 | 3 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WESJ | 13110 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | |
| VGSW | 13440 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | |
| NRWS | 13490 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| CLSW | 13520 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| OATI | 13640 | 7 | 5 | 1 | 3 | 6 | 1 | 2 | 3 | 3 | 31 | 6 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 19 | 0 | 0 | 0 | 0 | 1 | 1 | |
| BUSH | 13680 | 10 | 14 | 20 | 9 | 23 | 28 | 13 | 44 | 4 | 165 | 9 | 13 | 18 | 4 | 16 | 23 | 10 | 32 | 4 | 129 | 0 | 0 | 0 | 0 | 0 | 0 | |
| BEWR | 14040 | 22 | 11 | 19 | 32 | 17 | 17 | 18 | 3 | 8 | 147 | 16 | 4 | 11 | 22 | 4 | 6 | 10 | 2 | 5 | 80 | 0 | 0 | 0 | 1 | 0 | 1 | |
| HOWR | 14070 | 3 | 8 | 8 | 18 | 37 | 10 | 13 | 28 | 13 | 138 | 2 | 8 | 5 | 13 | 20 | 4 | 11 | 16 | 11 | 90 | 0 | 0 | 0 | 0 | 1 | 1 | |
| SWTH | 14810 | 22 | 8 | 6 | 4 | 8 | 4 | 1 | 6 | 0 | 59 | 22 | 8 | 6 | 4 | 8 | 4 | 1 | 6 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | |
| HETH | 14820 | 1 | 0 | 2 | 2 | 3 | 1 | 3 | 1 | 0 | 13 | 1 | 0 | 2 | 2 | 2 | 1 | 3 | 1 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | |
| WREN | 15110 | 49 | 45 | 50 | 22 | 28 | 39 | 59 | 93 | 2 | 387 | 33 | 26 | 21 | 9 | 17 | 27 | 32 | 50 | 0 | 215 | 0 | 0 | 1 | 0 | 0 | 1 | |
| NOMO | 15150 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | |
| CATH | 15270 | 2 | 5 | 7 | 3 | 0 | 2 | 2 | 4 | 0 | 25 | 0 | 4 | 6 | 3 | 0 | 1 | 2 | 3 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | |
| PHAI | 15590 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | |

Table 3 (continued). Number of birds captured, banded, and recaptured: De Luz Creek, 1995-2004.

| Species | IBP Code | Total Captures ^a | | | | | | | | | | New Individuals Banded | | | | | | | | | | Recaptured Individuals, 2004 | | | | | | | |
|--------------|----------|-----------------------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------------------------|----------|------------------------|----------|----------|-----------|--|-------|
| | | Year | | | | | | | | | | Total | Year | | | | | | | | | | Total | Year Originally Banded | | | | | Total |
| | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | 1995 | | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | 1998 | 1999 | | 2000 | 2001 | 2002 | | | |
| OCWA | 15660 | 13 | 4 | 6 | 9 | 20 | 8 | 16 | 12 | 4 | 92 | 12 | 3 | 5 | 8 | 16 | 5 | 14 | 10 | 3 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| NAWA | 15670 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| YWAR | 15750 | 3 | 7 | 3 | 6 | 7 | 10 | 2 | 3 | 0 | 41 | 3 | 6 | 3 | 5 | 7 | 10 | 2 | 3 | 0 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| AUWA | 15800 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| TOWA | 15840 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| MGWA | 16140 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| COYE | 16150 | 74 | 70 | 74 | 101 | 73 | 69 | 107 | 55 | 38 | 661 | 62 | 42 | 41 | 64 | 40 | 37 | 66 | 17 | 26 | 395 | 0 | 0 | 2 | 0 | 0 | 2 | | |
| WIWA | 16290 | 2 | 2 | 2 | 2 | 5 | 6 | 1 | 6 | 1 | 27 | 2 | 2 | 2 | 2 | 5 | 6 | 0 | 6 | 1 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| YBCH | 16460 | 55 | 51 | 43 | 28 | 35 | 29 | 25 | 11 | 3 | 280 | 39 | 30 | 27 | 18 | 17 | 16 | 15 | 5 | 1 | 168 | 0 | 0 | 0 | 0 | 1 | 1 | | |
| WETA | 16840 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SPTO | 17810 | 38 | 27 | 25 | 26 | 21 | 20 | 13 | 19 | 3 | 192 | 33 | 17 | 10 | 14 | 17 | 14 | 10 | 13 | 1 | 129 | 0 | 0 | 0 | 2 | 0 | 2 | | |
| CALT | 17850 | 20 | 25 | 10 | 23 | 16 | 10 | 10 | 31 | 9 | 154 | 17 | 19 | 8 | 16 | 13 | 6 | 4 | 24 | 6 | 113 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| RCSP | 17950 | 1 | 4 | 1 | 0 | 3 | 0 | 1 | 3 | 1 | 14 | 1 | 4 | 1 | 0 | 3 | 0 | 1 | 3 | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| BCSP | 18070 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| LASP | 18090 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| FOSP | 18220 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SOSP | 18230 | 70 | 69 | 74 | 79 | 80 | 55 | 38 | 39 | 20 | 524 | 51 | 42 | 45 | 52 | 31 | 25 | 22 | 24 | 13 | 305 | 1 | 0 | 0 | 0 | 2 | 3 | | |
| LISP | 18240 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 4 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| WCSP | 18290 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| GCSP | 18300 | 3 | 2 | 0 | 1 | 1 | 0 | 0 | 3 | 1 | 11 | 3 | 2 | 0 | 0 | 1 | 0 | 0 | 3 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| ORJU | 18320 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| BHGR | 18610 | 33 | 40 | 36 | 21 | 8 | 17 | 8 | 3 | 4 | 170 | 26 | 33 | 23 | 8 | 5 | 13 | 6 | 2 | 4 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| BLGR | 18640 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 5 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| LAZB | 18660 | 12 | 1 | 0 | 2 | 2 | 3 | 7 | 1 | 0 | 28 | 12 | 1 | 0 | 1 | 2 | 3 | 6 | 1 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| HOOR | 19050 | 2 | 0 | 0 | 3 | 3 | 0 | 2 | 0 | 0 | 10 | 2 | 0 | 0 | 3 | 3 | 0 | 2 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| BUOR | 19105 | 5 | 1 | 7 | 3 | 3 | 0 | 0 | 0 | 3 | 22 | 5 | 1 | 5 | 3 | 3 | 0 | 0 | 0 | 3 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| PUFI | 19350 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 6 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| HOFI | 19370 | 1 | 23 | 8 | 8 | 8 | 9 | 0 | 4 | 0 | 61 | 1 | 22 | 8 | 8 | 6 | 9 | 0 | 3 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| LEGO | 19490 | 15 | 14 | 14 | 26 | 46 | 20 | 14 | 14 | 5 | 168 | 15 | 13 | 14 | 25 | 41 | 17 | 10 | 12 | 5 | 152 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Total | | 540 | 485 | 481 | 514 | 517 | 438 | 410 | 477 | 167 | 4029 | 423 | 335 | 288 | 312 | 310 | 264 | 258 | 296 | 105 | 2591 | 1 | 0 | 3 | 4 | 7 | 15 | | |

^aIncludes multiple captures of some individuals and unbanded birds

Table 4. Capture rate by net and date: De Luz Creek, 2004.

| MAPS Period ^a | Date | | Net | | | | | | | | | | Totals by DATE |
|--------------------------|---------|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| -3 | 4/5/04 | Net Hours | 4:20 | 4:30 | 4:00 | 4:00 | 4:40 | 4:40 | 4:10 | 4:30 | 4:30 | 4:30 | 43:50 |
| | | Captures | 3 | 1 | 1 | 3 | 5 | 4 | 2 | 3 | 4 | 4 | 30 |
| | | Captures/Net hour | 0.69 | 0.22 | 0.25 | 0.75 | 1.07 | 0.86 | 0.48 | 0.67 | 0.89 | 0.89 | 0.68 |
| -2 | 4/14/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 5 | 3 | 3 | 4 | 8 | 1 | 2 | 5 | 2 | 5 | 38 |
| | | Captures/Net hour | 1.00 | 0.60 | 0.60 | 0.80 | 1.60 | 0.20 | 0.40 | 1.00 | 0.40 | 1.00 | 0.76 |
| -1 | 4/23/04 | Net Hours | 4:00 | 4:00 | 4:00 | 4:00 | 4:00 | 4:00 | 4:00 | 4:00 | 4:00 | 4:00 | 40:00 |
| | | Captures | 3 | 5 | 5 | 1 | 1 | 3 | 2 | 5 | 0 | 0 | 25 |
| | | Captures/Net hour | 0.75 | 1.25 | 1.25 | 0.25 | 0.25 | 0.75 | 0.50 | 1.25 | 0.00 | 0.00 | 0.63 |
| 1 | 5/14/04 | Net Hours | 3:00 | 3:00 | 3:00 | 3:20 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 30:20 |
| | | Captures | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 |
| | | Captures/Net hour | 1.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.16 |
| 2 | 5/19/04 | Net Hours | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 30:00 |
| | | Captures | 4 | 1 | 0 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | 11 |
| | | Captures/Net hour | 1.33 | 0.33 | 0.00 | 1.00 | 0.00 | 0.33 | 0.00 | 0.33 | 0.00 | 0.33 | 0.37 |
| 3 | 5/24/04 | Net Hours | 3:20 | 3:20 | 3:20 | 3:20 | 3:20 | 3:20 | 3:20 | 3:20 | 3:20 | 3:20 | 33:20 |
| | | Captures | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | Captures/Net hour | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| 4 | 6/4/04 | Net Hours | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 30:00 |
| | | Captures | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 5 |
| | | Captures/Net hour | 0.00 | 0.33 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.17 |
| 5 | 6/14/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | 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 |
| 6 | 6/21/04 | Net Hours | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 3:00 | 30:00 |
| | | Captures | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 4 |
| | | Captures/Net hour | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.33 | 0.13 |
| 7 | 7/2/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | Captures | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| | | Captures/Net hour | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.08 |
| 8 | 7/12/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | Captures | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| | | Captures/Net hour | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.20 |
| 9 | 7/23/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | Captures | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 4 |
| | | Captures/Net hour | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 0.40 | 0.00 | 0.16 |
| 10 | 8/2/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | Captures | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 6 | 0 | 0 | 8 |
| | | Captures/Net hour | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.40 | 0.00 | 2.40 | 0.00 | 0.00 | 0.32 |
| 11 | 8/11/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | Captures | 4 | 1 | 3 | 0 | 4 | 1 | 0 | 3 | 0 | 0 | 16 |
| | | Captures/Net hour | 1.60 | 0.40 | 1.20 | 0.00 | 1.60 | 0.40 | 0.00 | 1.20 | 0.00 | 0.00 | 0.64 |
| 12 | 8/23/04 | Net Hours | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 2:30 | 25:00 |
| | | Captures | 1 | 1 | 2 | 0 | 1 | 0 | 3 | 3 | 0 | 2 | 13 |
| | | Captures/Net hour | 0.40 | 0.40 | 0.80 | 0.00 | 0.40 | 0.00 | 1.20 | 1.20 | 0.00 | 0.80 | 0.52 |
| Totals by NET | | Net Hours | 46:10 | 46:20 | 45:50 | 46:10 | 46:30 | 46:30 | 46:00 | 46:20 | 46:20 | 46:20 | 462:30 |
| | | Captures | 27 | 13 | 22 | 12 | 20 | 11 | 9 | 32 | 8 | 13 | 167 |
| | | Captures/Net hour | 0.58 | 0.28 | 0.48 | 0.26 | 0.43 | 0.24 | 0.20 | 0.69 | 0.17 | 0.28 | 0.36 |

^aPeriods -3, -2, -1: pre-fire; Periods 1-12: post-fire

Figure 3. Captures, net-hours and capture rates by net: De Luz Creek, 2004

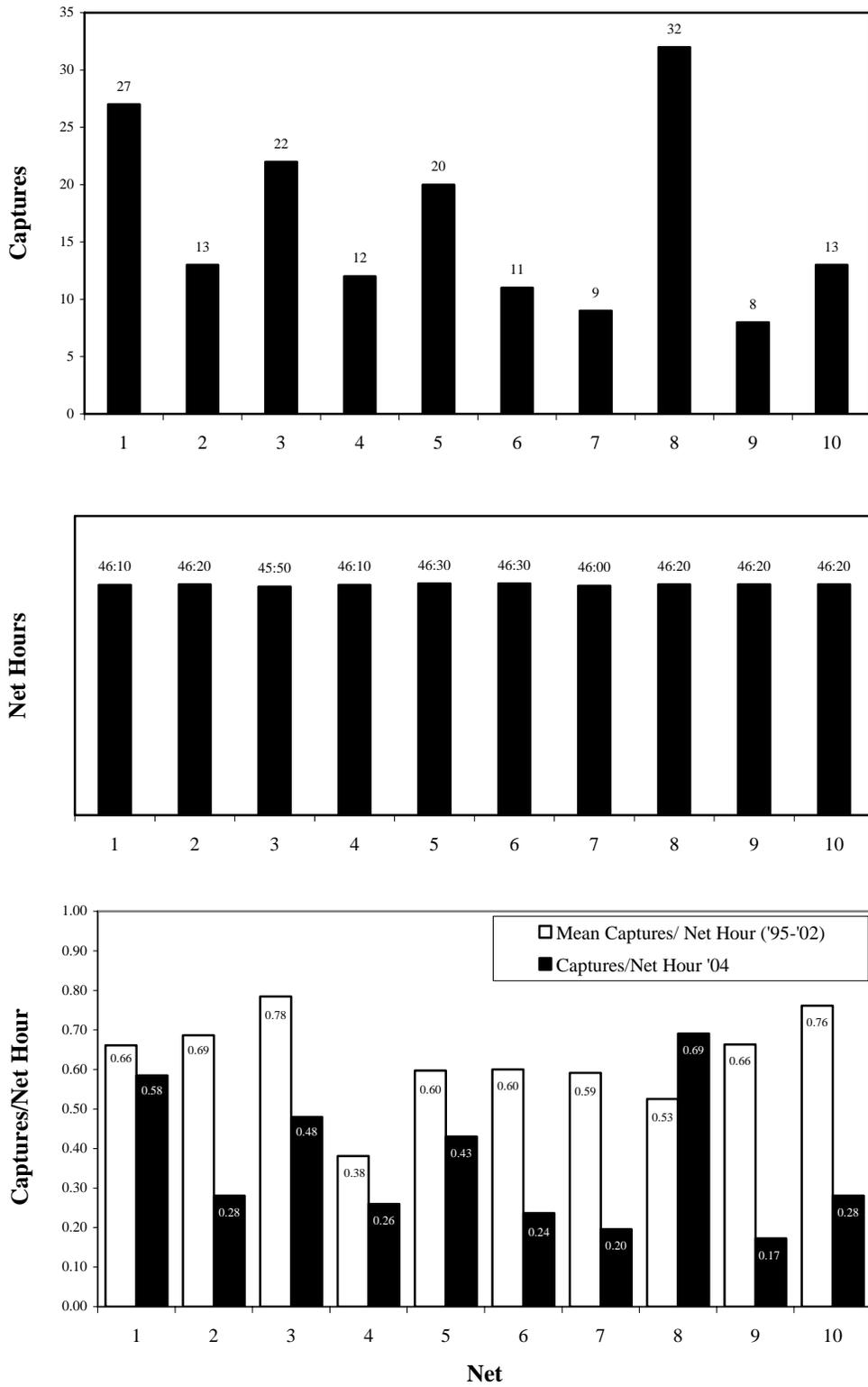


Table 5. Number of captures by date: De Luz Creek, 2004.

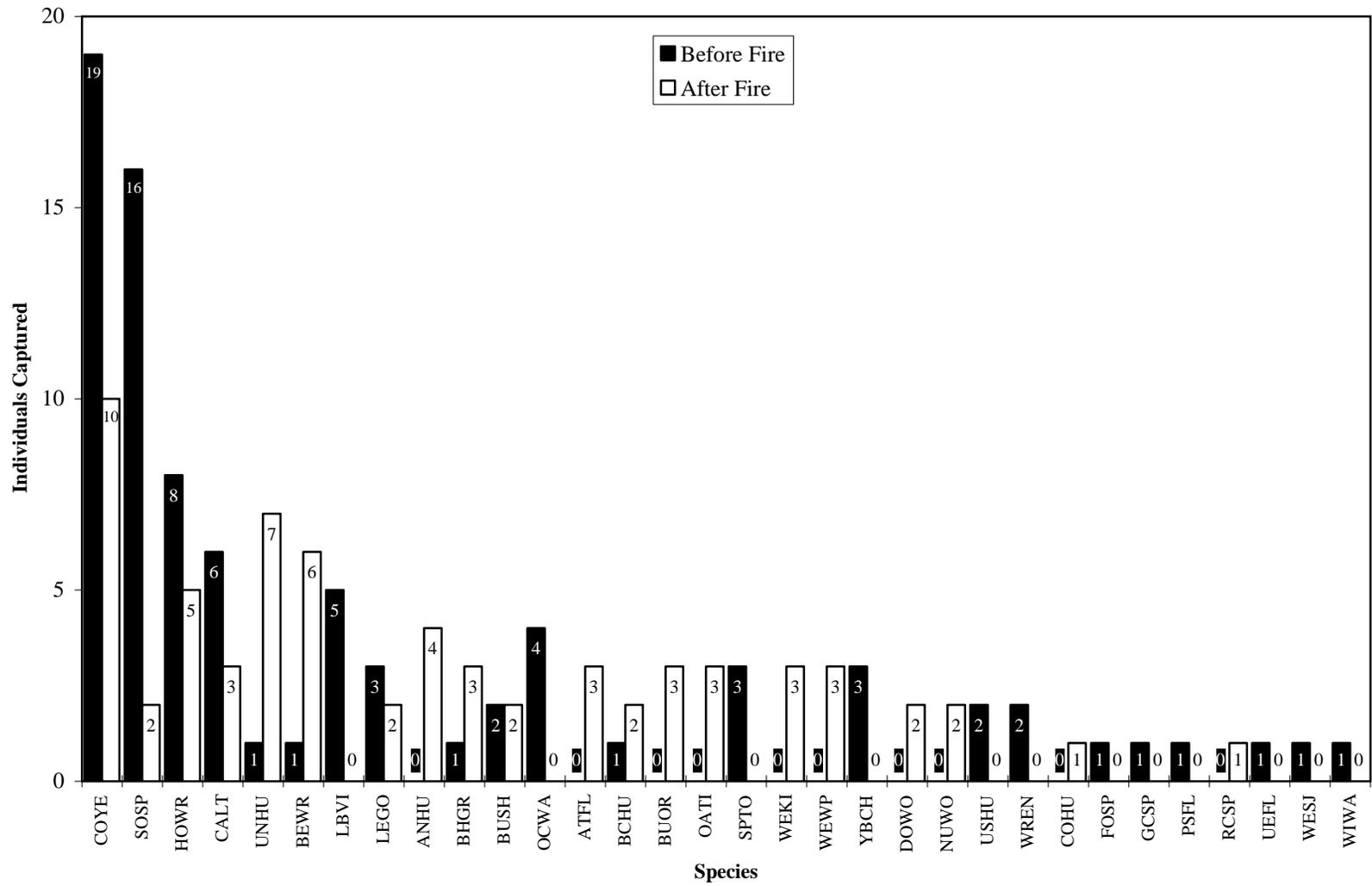
| Species | MAPS Period ^a | | | | | | | | | | | | | | | Total | Captures per 100 Net-hours ^b |
|----------------|--------------------------|-----------|-----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|------------|---|
| | -3 | -2 | -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| | Date | | | | | | | | | | | | | | | | |
| | 4/5 | 4/14 | 4/23 | 5/14 | 5/19 | 5/24 | 6/4 | 6/14 | 6/21 | 7/2 | 7/12 | 7/23 | 8/2 | 8/11 | 8/23 | | |
| BCHU | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| ANHU | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 4 | 0.87 |
| COHU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.22 |
| USHU | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.43 |
| UNHU | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 3 | 0 | 8 | 1.73 |
| NUWO | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| DOWO | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0.65 |
| WEWP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 5 | 1.08 |
| PSFL | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.22 |
| UEFL | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.22 |
| ATFL | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| WEKI | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| LBVI | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1.08 |
| WESJ | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.22 |
| OATI | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| BUSH | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 0.87 |
| BEWR | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 8 | 1.73 |
| HOWR | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 13 | 2.81 |
| WREN | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.43 |
| OCWA | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0.87 |
| COYE | 13 | 8 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 3 | 38 | 8.23 |
| WIWA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.22 |
| YBCH | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| SPTO | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| CALT | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 9 | 1.95 |
| RCSP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.22 |
| FOSP | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.43 |
| SOSP | 5 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 20 | 4.33 |
| GCSP | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.22 |
| BHGR | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 0.87 |
| BUOR | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.65 |
| LEGO | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1.08 |
| Total | 30 | 38 | 25 | 5 | 11 | 1 | 5 | 0 | 4 | 2 | 5 | 4 | 8 | 16 | 13 | 167 | 36.15 |
| Species | 9 | 11 | 11 | 4 | 8 | 1 | 4 | 0 | 2 | 1 | 2 | 2 | 5 | 8 | 7 | 32 | 6.93 |

^aPeriods -3, -2, -1: pre-fire; Periods 1-12: post-fire

^b462:30 total net-hours

^cUnidentified species not included in species totals

Figure 4. Number of individuals (banded and unbanded) caught per species before and after fire: De Luz Creek, 2004



(*Pipilo maculatus*), and least Bell's vireo (*Vireo bellii pusillus*).

Hummingbird captures were remarkably consistent throughout the season, with peaks in April and August (Table 5); total captures (18) approached the mean from 1995-2002 (21 ± 10 ; Table 2). The cavity-nesting species downy woodpecker (*Picoides pubescens*), Nuttall's woodpecker (*Picoides nuttallii*), ash-throated flycatcher (*Myiarchus cinerascens*), and oak titmouse (*Baeolophus inornatus*) arrived after the fire and were captured regularly albeit in low numbers into August, indicative of possible breeding on the burn site. Tyrant flycatchers such as western wood-pewee (*Contopus sordidulus*) were also captured with regularity after the fire, and an active western kingbird nest was observed in June. Wrens were also captured consistently after the fire, though primarily in April and August.

The sex ratio of birds of known sex (N=78) was highly skewed at 68 percent males (Table 1). Half of the birds captured (72) were of indeterminable sex, contributing to a small known-sex sample size. Thirty-four adult birds fully processed but unsexed showed a lack of definitive breeding condition; the remaining birds either were not banded or could not be sexed by other criteria. A total of 25 adults (12 males and 13 females) were sexed by breeding condition, a ratio of approximately 1:1. No female common yellowthroats were captured after the fire, while nine males including six juveniles were captured in July and August.

While only seven juvenile birds were captured in 2002, a record low of two percent of all known-age individuals captured (Kus and Kisner 2003), in 2004 the number of young in the known-age population increased to 10 percent (12/117). Four species—common yellowthroat (7), house wren (3), downy woodpecker (1) and lesser goldfinch (*Carduelis psaltria*, 1)—composed the 2004 juvenile population, captured primarily in July and August.

Eighty percent (120/150) of the individual birds captured at the station were banded either in 2004 or in previous years (Table 6). Of the 30 birds not banded, 18 were hummingbirds and the remaining 12 either escaped prior to banding or were not banded for other reasons. Most banded individuals were captured only once during the season, 10 percent were captured twice, and one bird was captured three times.

Populations Trends and Productivity: 1995-2004

Fifteen individual birds, 10 percent of all individuals (banded and unbanded) captured (15/150, Tables 3, 6), were banded in previous years at the De Luz station, roughly half of the mean annual return rate from 1996-2002 of 17 ± 1.7 percent. This low number of returning birds was attributable to both the fire and the lack of banding in 2003 (most recaptured individuals from past years are from the immediately preceding year). Only common yellowthroat, song sparrow, and spotted towhee recaptures from previous years totaled more than one individual. Three of the 15 recaptures were caught after the fire—one western wood-pewee, one ash-throated flycatcher, and one oak titmouse.

Annual survival and recruitment, and their relationships to population size, could not be examined this year because of extremely low recapture rates in 2004 and the lack of data from

Table 6. Capture frequency of individuals: De Luz Creek, 2004.

| Species | # Individuals per Capture Incidence (Banded Birds Only) | | | Total # Individuals | | |
|--------------|--|------------|------------|---------------------|-------------------|--------------|
| | 1 Capture | 2 Captures | 3 Captures | Banded Birds | Unbanded Birds | All Birds |
| BCHU | 0 | 0 | 0 | 0 | 3 | 3 |
| ANHU | 0 | 0 | 0 | 0 | 4 | 4 |
| COHU | 0 | 0 | 0 | 0 | 1 | 1 |
| USHU | 0 | 0 | 0 | 0 | 2 | 2 |
| UNHU | 0 | 0 | 0 | 0 | 8 | 8 |
| NUWO | 1 | 1 | 0 | 2 | 0 | 2 |
| DOWO | 1 | 1 | 0 | 2 | 0 | 2 |
| WEWP | 1 | 2 | 0 | 3 | 0 | 3 |
| PSFL | 1 | 0 | 0 | 1 | 0 | 1 |
| UEFL | 1 | 0 | 0 | 1 | 0 | 1 |
| ATFL | 3 | 0 | 0 | 3 | 0 | 3 |
| WEKI | 3 | 0 | 0 | 3 | 0 | 3 |
| LBVI | 4 | 0 | 0 | 4 | 1 | 5 |
| WESJ | 1 | 0 | 0 | 1 | 0 | 1 |
| OATI | 3 | 0 | 0 | 3 | 0 | 3 |
| BUSH | 4 | 0 | 0 | 4 | 0 | 4 |
| BEWR | 5 | 1 | 0 | 6 | 1 | 7 |
| HOWR | 12 | 0 | 0 | 12 | 1 | 13 |
| WREN | 1 | 0 | 0 | 1 | 1 | 2 |
| OCWA | 3 | 0 | 0 | 3 | 1 | 4 |
| COYE | 20 | 7 | 1 | 28 | 1 | 29 |
| WIWA | 1 | 0 | 0 | 1 | 0 | 1 |
| YBCH | 2 | 0 | 0 | 2 | 1 | 3 |
| SPTO | 3 | 0 | 0 | 3 | 0 | 3 |
| CALT | 6 | 0 | 0 | 6 | 3 | 9 |
| RCSP | 1 | 0 | 0 | 1 | 0 | 1 |
| FOSP | 0 | 1 | 0 | 1 | 0 | 1 |
| SOSP | 14 | 2 | 0 | 16 | 2 | 18 |
| GCSP | 1 | 0 | 0 | 1 | 0 | 1 |
| BHGR | 4 | 0 | 0 | 4 | 0 | 4 |
| BUOR | 3 | 0 | 0 | 3 | 0 | 3 |
| LEGO | 5 | 0 | 0 | 5 | 0 | 5 |
| Total | 104 | 15 | 1 | 120 | 30 | 150 |

2003. We thus confine our analysis to population size. Birds not banded were not included in analysis.

Population Size

We examined populations of 12 species with adequate numbers of known-age individuals at the De Luz station, as discussed in previous years (Kus and Kisner 2003). We considered residents and migrants separately, since these two groups experience different conditions affecting their populations. Seven resident and five migrant species were selected for consideration of population trends.

Local population size, as measured by the number of adult (after-hatching-year, AHY) individuals captured, decreased from 2002 numbers for six of the seven resident species in 2004 (Figures 5, 6). Bewick's wren adults increased from three in 2002 to five in 2004. California towhees, common yellowthroats and song sparrows retained roughly half of their annual mean local populations in 2004 despite the fire, while wren tit populations dropped precipitously. House wrens maintained adult numbers comparable to the annual mean from 1995 through 2002.

Fifteen individual adults of the five migrant species combined were captured at the De Luz station this year (Figures 5, 6). Of these, only black-headed grosbeaks (*Pheucticus melanocephalus*) increased their adult numbers over 2002 with a total of four captures; however, this was a minor increase over their record low of three in 2002 and is substantially lower than the yearly average of 16 ± 10 . Pacific-slope flycatchers (*Empidonax difficilis*) suffered the steepest decline among migrants after a peak in abundance in 2002. Only least Bell's vireos numbered more than half of the prior annual mean in 2004, and all individuals were caught before the fire (Figure 4).

Productivity

In past reports, four species—common yellowthroat, song sparrow, yellow-breasted chat, and black-headed grosbeak—were selected for further analysis of productivity and other indices and relationships based on their historically higher capture rates (Kus and Kisner 2003). The number of juvenile (hatching-year, HY) individuals captured was indexed to number of adults to control for fluctuations in adult population size when calculating annual productivity (number HY birds / number AHY birds). Of these four species, only common yellowthroat produced young in 2004 at the De Luz station with productivity estimated at 0.37 young per adult (Figure 7), an increase from no young produced in 2002, but lower than the mean annual productivity through 2002 of 0.58 ± 0.43 young per adult.

Off-site Nets

Beginning in June we ran eight off-site nets in unburned habitat in an attempt to recapture birds previously banded at the De Luz station. In April 2004 there were 70 individual banded captures at the station, creating a potential pool of individuals for recapture if the pre-fire birds survived and moved to the nearest unburned habitat. A total of 119 birds were captured

Figure 5. Adult population trends of (a) resident species and (b) migrant species at De Luz Creek, 1995-2004 (banded birds only)

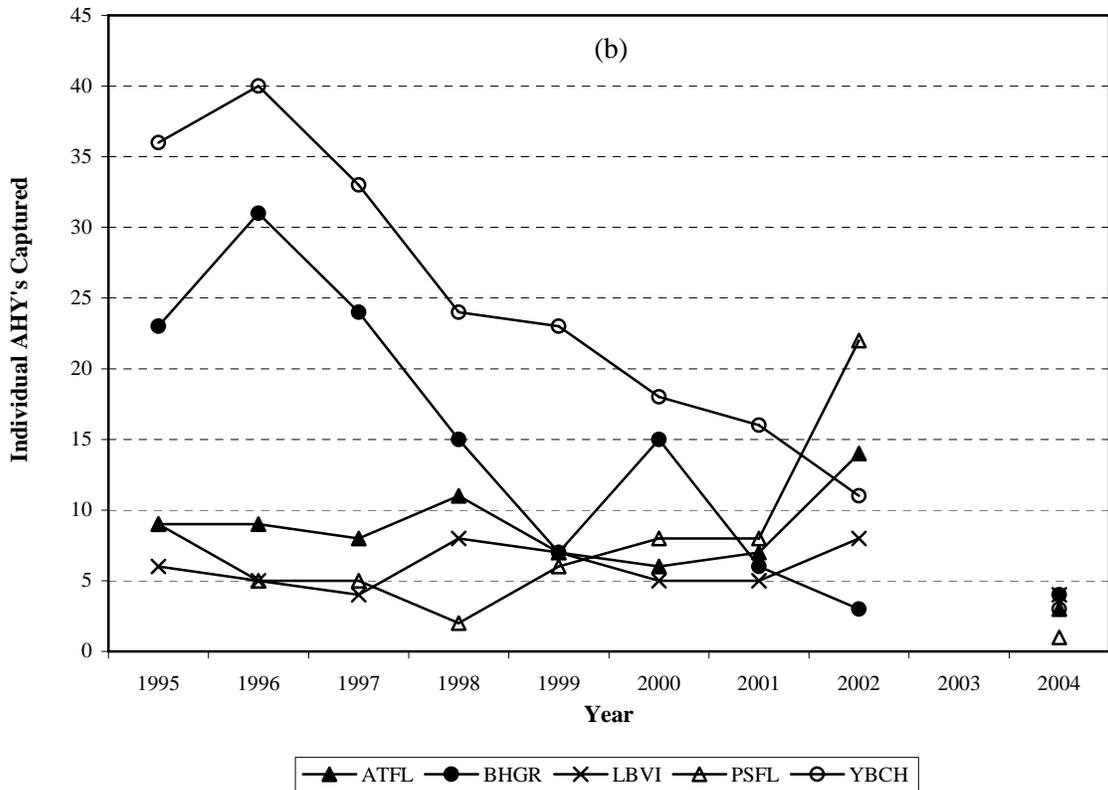
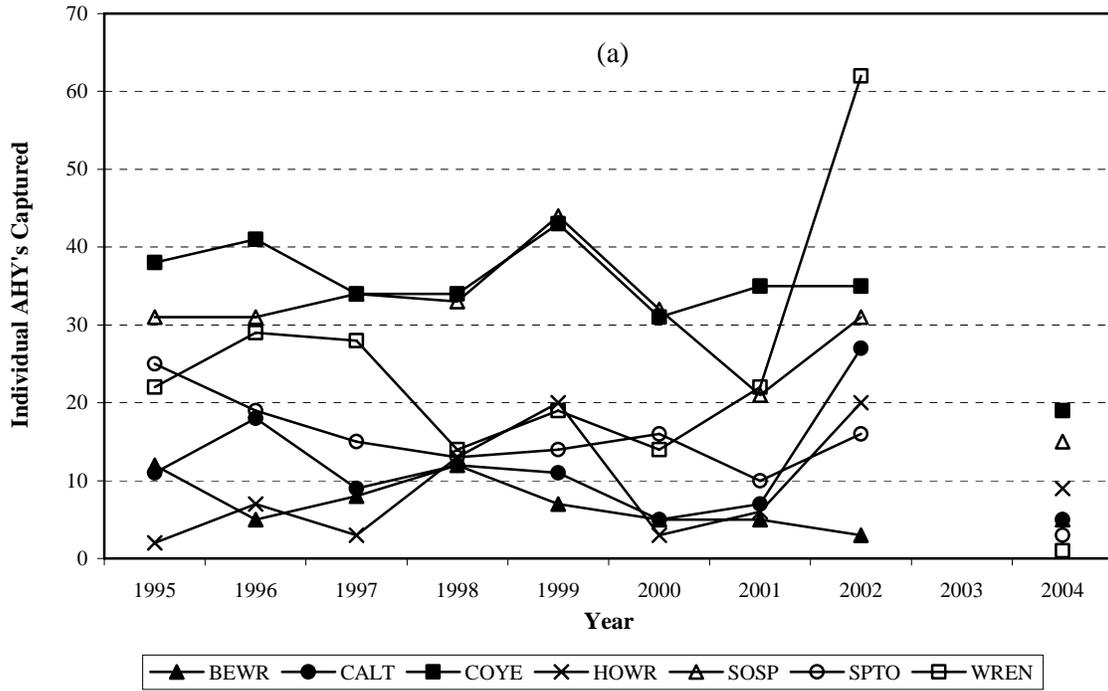


Figure 6. Local adult populations of (a) resident species and (b) migrant species at De Luz Creek, 2004 (banded birds only)

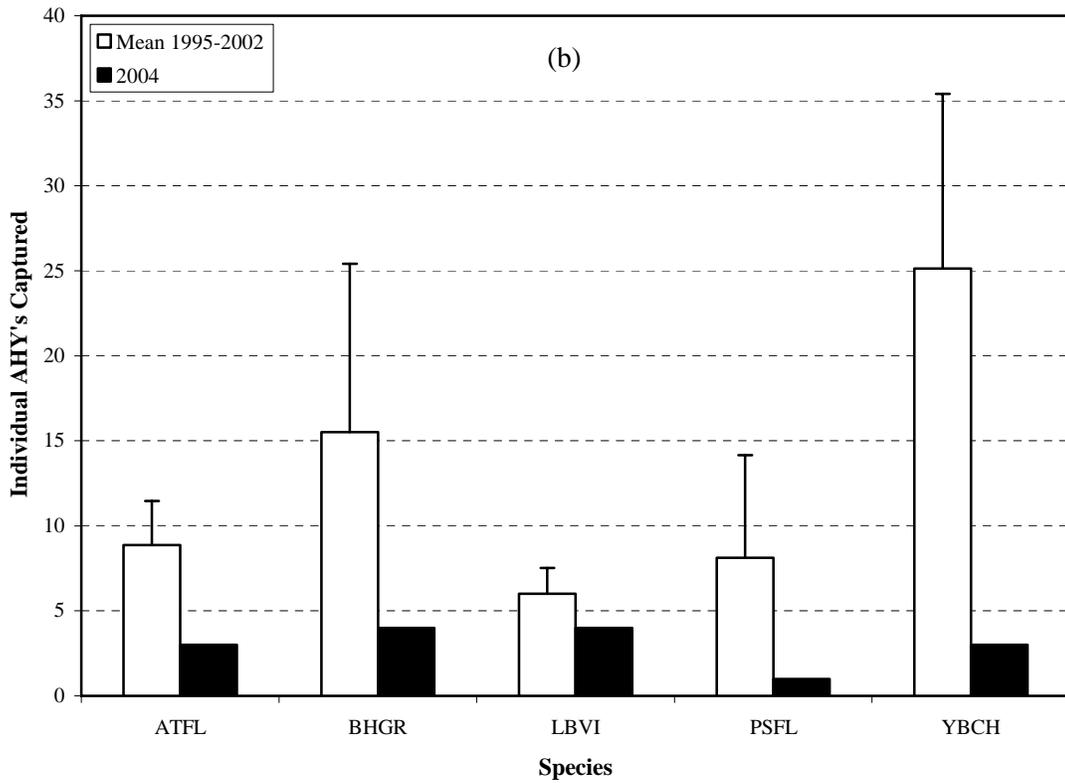
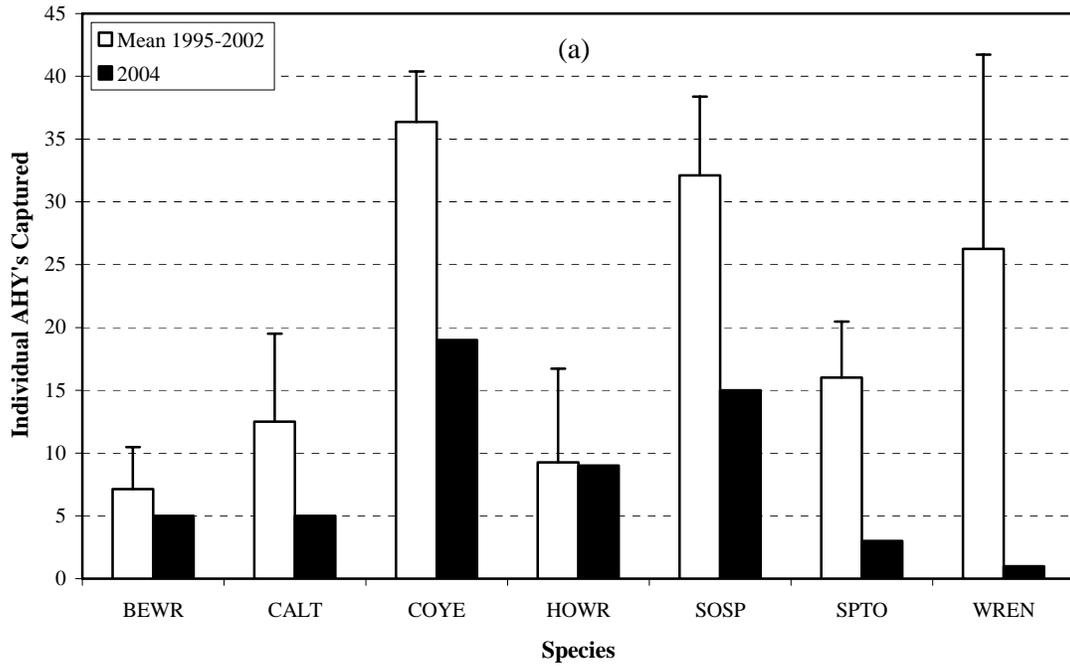


Figure 7. Annual productivity of (a) resident species and (b) migrant species at De Luz Creek, 1995-2004 (banded birds only)

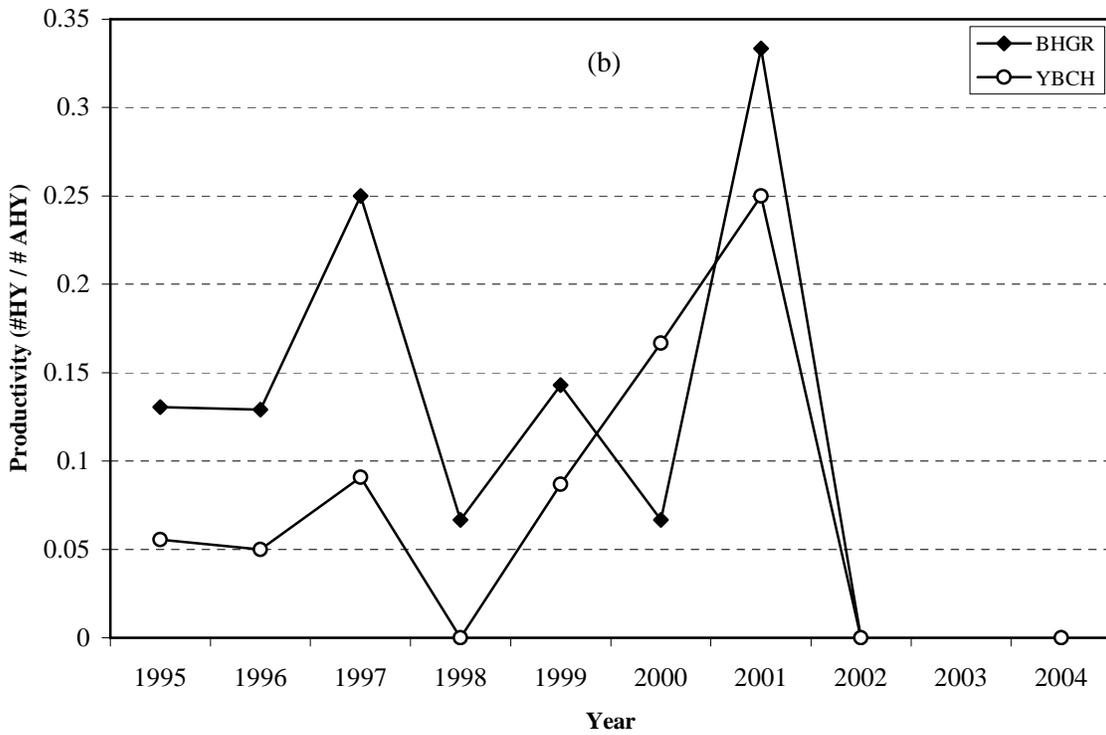
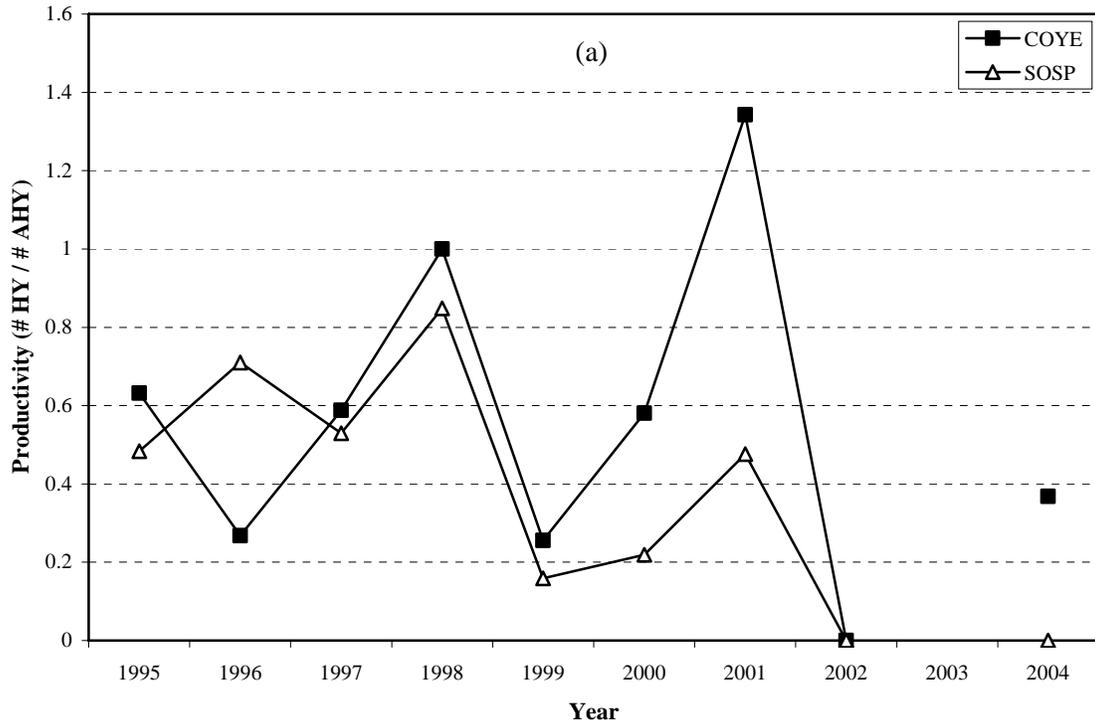


Table 7. Number of birds captured at off-sites nets: De Luz Creek, 2004.

| Species | Previously Banded | Unbanded | Total |
|--------------|-------------------|------------|------------|
| BCHU | 0 | 4 | 4 |
| ANHU | 0 | 7 | 7 |
| UNHU | 0 | 3 | 3 |
| PSFL | 1 | 3 | 4 |
| LBVI | 0 | 5 | 5 |
| HUVI | 0 | 1 | 1 |
| BUSH | 0 | 32 | 32 |
| BEWR | 0 | 11 | 11 |
| HOWR | 0 | 1 | 1 |
| WREN | 0 | 9 | 9 |
| CATH | 0 | 1 | 1 |
| OCWA | 0 | 2 | 2 |
| COYE | 0 | 12 | 12 |
| YBCH | 0 | 5 | 5 |
| SPTO | 0 | 1 | 1 |
| CALT | 0 | 2 | 2 |
| SOSP | 0 | 12 | 12 |
| LEGO | 0 | 5 | 5 |
| BHGR | 0 | 1 | 1 |
| HOFI | 0 | 1 | 1 |
| Total | 1 | 118 | 119 |

Table 8. Capture rates at off-site nets: De Luz Creek, 2004.

| Array | Net | Net-hours | Captures | Captures/ Net-hour |
|-------------------------|--------------|--------------|------------|-----------------------|
| 1 Periods 5 to 8 | X1 | 12:00 | 12 | 1.00 |
| | X2 | 11:50 | 4 | 0.34 |
| | X3 | 11:40 | 15 | 1.29 |
| | X4 | 11:45 | 23 | 1.96 |
| | Total | 47:15 | 54 | 1.14 |
| 2 Periods 9 to 11 | X5 | 12:00 | 15 | 1.25 |
| | X6 | 12:00 | 21 | 1.75 |
| | X7 | 11:00 | 8 | 0.73 |
| | X8 | 12:00 | 21 | 1.75 |
| | Total | 47:00 | 65 | 1.38 |
| Grand Total | | 94:15 | 119 | 1.26 |

in the off-site nets (Table 7). The overall capture rate at the off-site nets (1.26 ± 0.56 captures per net-hour; Table 8) was nearly double the 2004 capture rate at the De Luz station before the fire (0.69 ± 0.07 per net-hour; Table 4). However, only one bird previously banded was recaptured at the off-site nets during 94 net-hours, a Pacific-slope flycatcher originally banded in 1999 (Table 7). The results suggest that the birds with breeding territories within De Luz station in April either perished or moved beyond the closest viable patches of vegetation after the fire.

Summary: 1995-2004

The De Luz Creek bird community experienced dramatic declines in bird abundance in 2004 as a result of a wildfire that swept through De Luz Canyon on 2 May and completely burned the MAPS station. Prior to the fire (April), capture rates and totals were typical for this month in past years. These results support the premise that the fire was the cause of the observed declines, and suggest that the populations were recovering from low abundance and productivity in 2002 caused by record low rainfall in the preceding year.

As in most years, common yellowthroat was the most abundant species at the station before and after the fire. In contrast, song sparrows, the second most abundant species prior to the fire, nearly disappeared from the site after the fire. Most captures after the fire were of flycatchers and species associated with the remaining dead trees, such as woodpeckers and titmice.

An attempt to recapture birds displaced by the fire by netting in unburned patches of riparian habitat upstream of the MAPS station produced only one banded recapture. This suggests that birds breeding at the station before the fire did not “fill in” territories locally, but either left the general area or perished, and implies that birds using habitat within the off-site arrays maintained their territory boundaries after the fire.

Santa Margarita River

Overview of 2004 Captures

Seven hundred and thirty-one individuals of 31 species were caught during 747 net-hours (Table 9; unidentified species not included in species total), a total comparable to the annual mean number of individuals captured (710 ± 159) in 1998-2002 (Table 10). Overall captures totaled 950, with 636 new individuals banded and 53 individuals recaptured from previous years (Table 11; total individuals recaptured does not include one willow flycatcher (*Empidonax traillii*) banded off-site in 2003 and recaptured twice at the Santa Margarita MAPS station in 2004). Species richness was lower than the 39 species observed in 2002, and lower than the mean through 2002 of 35 ± 6 (Table 10). Two species, Bullock's oriole (*Icterus bullockii*) and red-shafted flicker (*Colaptes auratus cafer*), were captured for the first time, bringing the species total since 1998 for the Santa Margarita station to 58.

Common yellowthroat remained the most abundant species with 204 individual captures (Figure 8, Table 10), an increase of 73 percent from 2002 (118) and the second highest number recorded since monitoring began in 1998. Song sparrows have declined every year from a high of 328 in 1998 to a low of 54 in 2002, but in 2004 they returned as the second most abundant species with 136 individuals captured, an increase of 152 percent from 2002. The third most abundant species, bushtits, increased 44 percent over 2002 with 69 individuals captured, exceeding their record high in 1999. Orange-crowned warbler (*Vermivora celata*) abundance increased 21 percent over 2002 with 68 individual captures, exceeding the annual mean number of 59 ± 27 individuals through 2002. Blue grosbeaks (*Guiraca caerulea*), downy woodpeckers, hooded orioles (*Icterus cucullatus*), house wrens, wrentits, and yellow-breasted chats also exceeded all-time high individual capture numbers. Most notably, 31 individuals of the sensitive species yellow-breasted chat were captured, a 48 percent increase over the previous high of 21 individuals captured in 1999, 2001, and 2002. Bewick's wrens, black-headed grosbeaks, Hutton's vireos (*Vireo huttoni*), and least Bell's vireos increased from 2002, least Bell's vireos reaching a record high of 34 individuals. Numbers of yellow warblers (*Dendroica petechia*) and Swainson's thrushes (*Catharus ustulatus*) reached record lows—yellow warblers (15) have trended downwards from a high of 45 in 1999, and only one Swainson's thrush was captured in 2004 compared to 11 in 2002 and a record high of 25 in 1999. American goldfinch (*Carduelis tristis*), house finch (*Carpodacus mexicanus*), Nuttall's woodpecker, Pacific-slope flycatcher, spotted towhee, and Wilson's warbler (*Wilsonia pusilla*) abundances decreased from 2002. House finch and Pacific-slope flycatcher dropped precipitously from their record numbers in 2002. Lesser goldfinches (7) and willow flycatchers (4) matched previous record lows in 2004.

The sex ratio of birds of known sex (N=419) was approximately 1:1, with 52 percent males and 48 percent females (Table 9), similar to all previous years. The proportion of juveniles in the known-age population in 2004 was 27 percent, following a low of 11 percent in 2002 (Kus and Kisner 2003). This proportion was lower than the annual mean of 32 ± 15 percent since 1998. A record high 19 species produced young in 2004, an increase from a previous high of 18 species in 2001. Song sparrows (28 percent) and common yellowthroats (26 percent) comprised over half of the hatching-year captures.

Table 10. Number of individuals (banded and unbanded) captured: Santa Margarita River, 1998-2004.

| Species | IBP Code ^a | Year | | | | | | Total |
|---------|-----------------------|------|------|------|------|------|------|-------|
| | | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | |
| SSHA | 02200 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| CAQU | 03130 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| MODO | 05570 | 1 | 0 | 0 | 0 | 1 | 1 | 3 |
| COGD | 05610 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| BCHU | 08640 | 0 | 1 | 0 | 1 | 4 | 0 | 6 |
| ANHU | 08670 | 3 | 4 | 1 | 1 | 2 | 2 | 13 |
| COHU | 08680 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| RUHU | 08730 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ALHU | 08740 | 0 | 3 | 0 | 0 | 1 | 0 | 4 |
| UNHU | 08775 | 1 | 5 | 0 | 7 | 2 | 3 | 18 |
| NUWO | 09640 | 0 | 1 | 1 | 2 | 4 | 2 | 10 |
| DOWO | 09650 | 2 | 4 | 3 | 2 | 2 | 5 | 18 |
| RSFL | 09800 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| WEWP | 11380 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| WIFL | 11475 | 8 | 9 | 4 | 7 | 5 | 4 | 37 |
| PSFL | 11555 | 3 | 15 | 2 | 0 | 33 | 5 | 58 |
| BLPH | 11600 | 2 | 1 | 0 | 0 | 0 | 0 | 3 |
| ATFL | 11740 | 0 | 5 | 2 | 4 | 6 | 0 | 17 |
| LBVI | 12640 | 33 | 21 | 27 | 23 | 20 | 34 | 158 |
| CAVI | 12710 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| HUVI | 12740 | 4 | 1 | 1 | 2 | 2 | 3 | 13 |
| WAVI | 12760 | 3 | 19 | 2 | 9 | 7 | 7 | 47 |
| TRES | 13410 | 0 | 1 | 0 | 1 | 1 | 0 | 3 |
| BUSH | 13680 | 20 | 58 | 24 | 29 | 48 | 69 | 248 |
| BEWR | 14040 | 16 | 18 | 10 | 15 | 6 | 15 | 80 |
| HOWR | 14070 | 8 | 14 | 2 | 18 | 10 | 23 | 75 |
| RCKI | 14250 | 0 | 2 | 0 | 1 | 0 | 0 | 3 |
| SWTH | 14810 | 12 | 25 | 4 | 4 | 11 | 1 | 57 |
| HETH | 14820 | 0 | 1 | 0 | 1 | 1 | 0 | 3 |
| WREN | 15110 | 9 | 17 | 16 | 20 | 19 | 25 | 106 |
| CATH | 15270 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| PHAI | 15590 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| OCWA | 15660 | 28 | 102 | 58 | 53 | 56 | 68 | 365 |
| NAWA | 15670 | 0 | 4 | 0 | 0 | 1 | 0 | 5 |
| YWAR | 15750 | 30 | 45 | 23 | 28 | 20 | 15 | 161 |
| AUWA | 15800 | 0 | 1 | 0 | 4 | 0 | 0 | 5 |
| BTYW | 15810 | 0 | 1 | 1 | 3 | 1 | 0 | 6 |
| TOWA | 15840 | 1 | 4 | 1 | 1 | 2 | 1 | 10 |
| HEWA | 15850 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| MGWA | 16140 | 0 | 0 | 0 | 3 | 0 | 2 | 5 |
| COYE | 16150 | 199 | 192 | 180 | 222 | 118 | 204 | 1115 |
| HOWA | 16280 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| WIWA | 16290 | 9 | 26 | 18 | 25 | 24 | 11 | 113 |
| YBCH | 16460 | 16 | 21 | 19 | 21 | 21 | 31 | 129 |
| SPTO | 17810 | 14 | 13 | 17 | 15 | 19 | 15 | 93 |
| CALT | 17850 | 0 | 0 | 0 | 1 | 1 | 0 | 2 |

Table 10 (continued). Number of individuals (banded and unbanded) captured: Santa Margarita River, 1998-2004.

| Species | IBP Code ^a | Year | | | | | | Total |
|----------------------------------|-----------------------|------------|------------|------------|------------|------------|------------|-------------|
| | | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | |
| BRSP | 18040 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| FOSP | 18220 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| SOSP | 18230 | 328 | 238 | 109 | 98 | 54 | 136 | 963 |
| LISP | 18240 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| WCSP | 18290 | 0 | 4 | 0 | 5 | 0 | 0 | 9 |
| BHGR | 18610 | 3 | 6 | 2 | 8 | 1 | 6 | 26 |
| BLGR | 18640 | 0 | 1 | 0 | 0 | 0 | 3 | 4 |
| LAZB | 18660 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| HOOR | 19050 | 1 | 0 | 0 | 0 | 1 | 2 | 4 |
| BUOR | 19105 | 0 | 0 | 0 | 0 | 0 | 8 | 8 |
| HOFI | 19370 | 2 | 10 | 8 | 3 | 40 | 3 | 66 |
| LEGO | 19490 | 10 | 24 | 8 | 7 | 11 | 7 | 67 |
| AMGO | 19510 | 18 | 30 | 13 | 16 | 28 | 18 | 123 |
| Total Individuals | | 784 | 950 | 563 | 666 | 589 | 731 | 4283 |
| Total Species^b | | 27 | 40 | 31 | 39 | 39 | 31 | 58 |

^aInstitute for Bird Populations code

^bUnidentified species not included in species totals

Table 11. Number of birds captured, banded, and recaptured: Santa Margarita River, 1998-2004.

| Species | IBP Code | Total Captures ^a | | | | | | | New Individuals Banded | | | | | | | Recaptured Individuals, 2004 ^b | | | | | | | |
|---------|----------|-----------------------------|------|------|------|------|------|-------|------------------------|------|------|------|------|------|-------|---|------|------|------|------|-------|---|---|
| | | Year | | | | | | Total | Year | | | | | | Total | Year Originally Banded | | | | | Total | | |
| | | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | | 1998 | 1999 | 2000 | 2001 | 2002 | | | |
| SSHA | 02200 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CAQU | 03130 | 0 | 1 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MODO | 05570 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COGD | 05610 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BCHU | 08640 | 0 | 1 | 0 | 1 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ANHU | 08670 | 3 | 4 | 1 | 1 | 2 | 2 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COHU | 08680 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RUHU | 08730 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ALHU | 08740 | 0 | 3 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UNHU | 08775 | 1 | 5 | 0 | 7 | 2 | 3 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NUWO | 09640 | 0 | 1 | 1 | 2 | 4 | 2 | 10 | 0 | 1 | 1 | 2 | 4 | 2 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOWO | 09650 | 3 | 4 | 3 | 2 | 2 | 6 | 20 | 2 | 2 | 2 | 2 | 2 | 5 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RSFL | 09800 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WEWP | 11380 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WIFL | 11475 | 11 | 11 | 4 | 8 | 5 | 5 | 44 | 6 | 7 | 3 | 5 | 4 | 3 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PSFL | 11555 | 3 | 15 | 2 | 0 | 33 | 5 | 58 | 2 | 15 | 2 | 0 | 32 | 5 | 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLPH | 11600 | 2 | 1 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ATFL | 11740 | 0 | 5 | 2 | 4 | 6 | 0 | 17 | 0 | 4 | 2 | 3 | 5 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LBVI | 12640 | 44 | 36 | 33 | 32 | 27 | 45 | 217 | 33 | 14 | 19 | 19 | 14 | 32 | 131 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CAVI | 12710 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HUVI | 12740 | 5 | 1 | 1 | 2 | 2 | 5 | 16 | 4 | 0 | 1 | 1 | 2 | 2 | 10 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| WAVI | 12760 | 3 | 19 | 2 | 9 | 7 | 7 | 47 | 3 | 19 | 2 | 9 | 7 | 7 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TRES | 13410 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BUSH | 13680 | 22 | 63 | 30 | 31 | 56 | 79 | 281 | 19 | 54 | 20 | 25 | 43 | 62 | 223 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 3 |
| BEWR | 14040 | 24 | 21 | 14 | 21 | 7 | 23 | 110 | 14 | 14 | 4 | 12 | 3 | 13 | 60 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| HOWR | 14070 | 9 | 20 | 2 | 22 | 12 | 26 | 91 | 7 | 13 | 2 | 16 | 10 | 21 | 69 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| RCKI | 14250 | 0 | 2 | 0 | 1 | 0 | 0 | 3 | 0 | 2 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SWTH | 14810 | 12 | 25 | 4 | 4 | 11 | 1 | 57 | 12 | 25 | 4 | 3 | 11 | 1 | 56 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HETH | 14820 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| WREN | 15110 | 11 | 18 | 18 | 25 | 23 | 40 | 135 | 8 | 16 | 15 | 17 | 13 | 22 | 91 | 0 | 0 | 0 | 2 | 1 | 3 | 3 | 3 |
| CATH | 15270 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

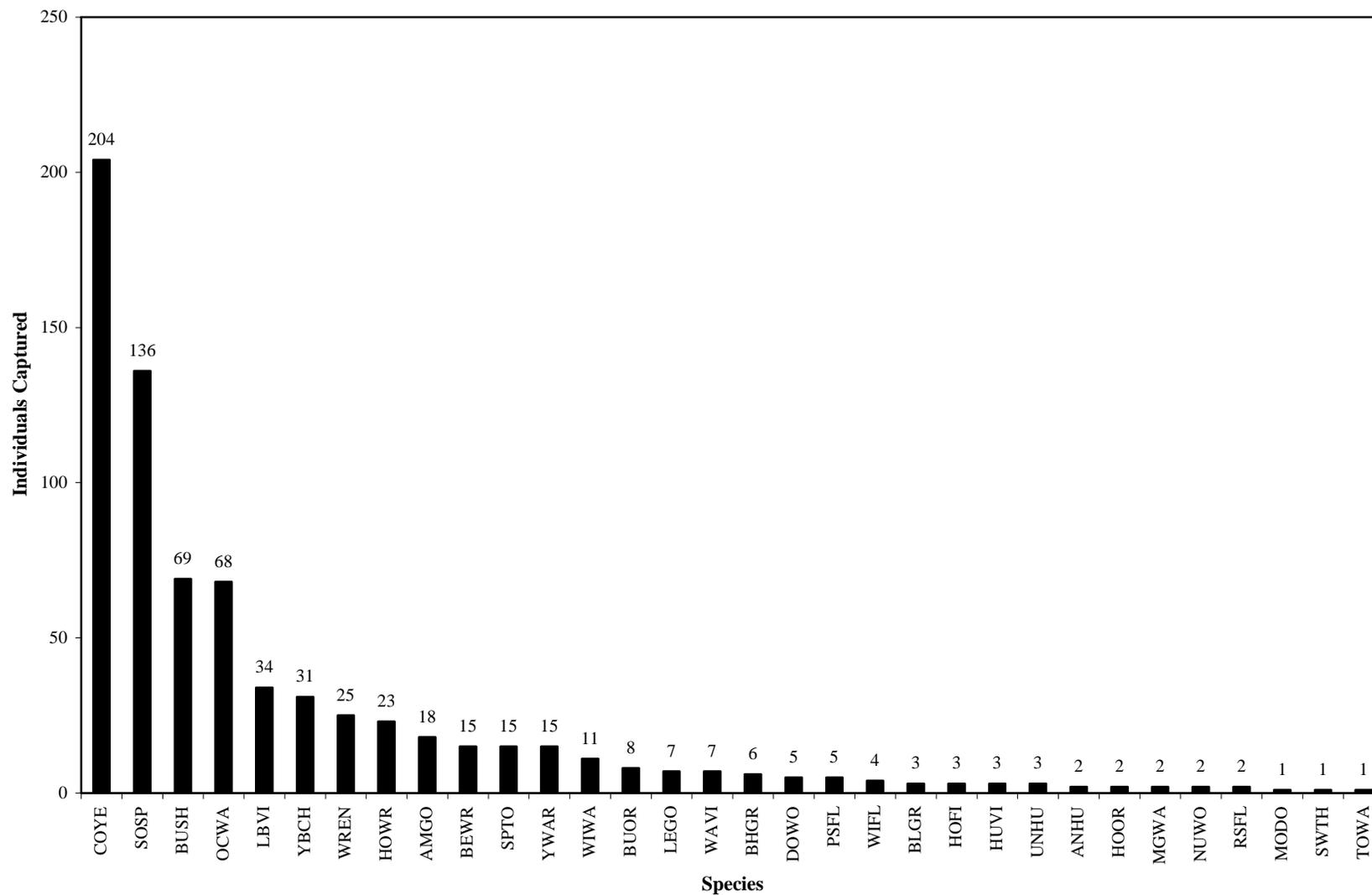
Table 11 (continued). Number of birds captured, banded, and recaptured: Santa Margarita River, 1998-2004.

| Species | IBP Code | Total Captures ^a | | | | | | | New Individuals Banded | | | | | | | Recaptured Individuals, 2004 ^b | | | | | |
|--------------|----------|-----------------------------|-------------|------------|------------|------------|------------|-------------|------------------------|------------|------------|------------|------------|------------|-------------|---|----------|----------|-----------|-----------|-----------|
| | | Year | | | | | | Total | Year | | | | | | Total | Year Originally Banded | | | | | Total |
| | | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 | | 1998 | 1999 | 2000 | 2001 | 2002 | |
| PHAI | 15590 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| OCWA | 15660 | 29 | 116 | 68 | 61 | 65 | 82 | 421 | 26 | 99 | 46 | 38 | 42 | 56 | 307 | 0 | 1 | 3 | 3 | 2 | 9 |
| NAWA | 15670 | 0 | 4 | 0 | 0 | 1 | 0 | 5 | 0 | 4 | 0 | 0 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| YWAR | 15750 | 35 | 57 | 28 | 31 | 23 | 18 | 192 | 30 | 37 | 13 | 22 | 18 | 13 | 133 | 0 | 0 | 0 | 1 | 1 | 2 |
| AUWA | 15800 | 0 | 1 | 0 | 4 | 0 | 0 | 5 | 0 | 1 | 0 | 4 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| BTYW | 15810 | 0 | 1 | 1 | 3 | 1 | 0 | 6 | 0 | 1 | 1 | 3 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOWA | 15840 | 1 | 4 | 1 | 1 | 2 | 1 | 10 | 1 | 4 | 1 | 1 | 1 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| HEWA | 15850 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MGWA | 16140 | 0 | 0 | 0 | 3 | 0 | 2 | 5 | 0 | 0 | 0 | 3 | 0 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| COYE | 16150 | 231 | 264 | 242 | 290 | 162 | 276 | 1465 | 196 | 160 | 140 | 180 | 80 | 174 | 930 | 2 | 3 | 4 | 1 | 7 | 17 |
| HOWA | 16280 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| WIWA | 16290 | 9 | 27 | 18 | 25 | 24 | 11 | 114 | 8 | 26 | 17 | 25 | 23 | 11 | 110 | 0 | 0 | 0 | 0 | 0 | 0 |
| YBCH | 16460 | 26 | 27 | 27 | 26 | 28 | 47 | 181 | 16 | 19 | 15 | 17 | 16 | 26 | 109 | 0 | 0 | 0 | 2 | 1 | 3 |
| SPTO | 17810 | 18 | 13 | 19 | 17 | 24 | 19 | 110 | 13 | 11 | 12 | 10 | 13 | 10 | 69 | 1 | 0 | 0 | 0 | 3 | 4 |
| CALT | 17850 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| BRSP | 18040 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| FOSP | 18220 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| SOSP | 18230 | 403 | 321 | 153 | 125 | 70 | 192 | 1264 | 316 | 177 | 69 | 70 | 30 | 120 | 782 | 0 | 1 | 1 | 4 | 3 | 9 |
| LISP | 18240 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| WCSP | 18290 | 0 | 5 | 0 | 5 | 0 | 0 | 10 | 0 | 4 | 0 | 5 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| BHGR | 18610 | 4 | 6 | 2 | 9 | 1 | 6 | 28 | 2 | 6 | 2 | 7 | 1 | 6 | 24 | 0 | 0 | 0 | 0 | 0 | 0 |
| BLGR | 18640 | 0 | 1 | 0 | 0 | 0 | 3 | 4 | 0 | 1 | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| LAZB | 18660 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOOR | 19050 | 1 | 0 | 0 | 0 | 1 | 2 | 4 | 1 | 0 | 0 | 0 | 1 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| BUOR | 19105 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| HOFI | 19370 | 2 | 10 | 8 | 3 | 41 | 4 | 68 | 2 | 10 | 8 | 3 | 36 | 3 | 62 | 0 | 0 | 0 | 0 | 0 | 0 |
| LEGO | 19490 | 12 | 26 | 8 | 7 | 11 | 7 | 71 | 10 | 23 | 8 | 7 | 10 | 7 | 65 | 0 | 0 | 0 | 0 | 0 | 0 |
| AMGO | 19510 | 20 | 31 | 14 | 16 | 28 | 19 | 128 | 17 | 28 | 12 | 16 | 25 | 18 | 116 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 945 | 1176 | 713 | 807 | 696 | 950 | 5287 | 750 | 801 | 424 | 534 | 456 | 636 | 3601 | 4 | 4 | 8 | 13 | 23 | 53 |

^aIncludes multiple captures of some individuals and unbanded birds

^bDoes not include one WIFL originally banded off-site in 2003 and recaptured twice at the Santa Margarita MAPS station in 2004

Figure 8. Number of individuals (banded and unbanded) caught per species: Santa Margarita River, 2004



Ninety-four percent (690/731) of individual birds captured at the station were banded in 2004 or recaptured from previous years (Table 12). Of the 41 birds not banded, five were hummingbirds and one was a mourning dove; the remaining birds either escaped prior to banding or were not banded for other reasons. Seventy-eight percent of banded individuals were captured only once during the season, but birds of 15 species were captured more than once—16 percent twice and six percent three to six times.

Overall capture rates by date ranged from 0.49 to 2.12 captures per net-hour for an overall average capture rate of 1.26 ± 0.52 per net-hour for all nets combined (Table 13), a 40 percent increase over 2002 (0.90 ± 0.31 ; Kus and Kisner 2003) and higher than the annual mean capture rate of 1.19 ± 0.28 through 2002 (Figure 9). Capture rates of all nets except net 6 increased over 2002 (Kus and Kisner 2003), and nets 2, 3 and 9 showed rates substantially higher than the 1998-2002 averages. Changes in vegetation density probably contribute to these annual fluctuations. Capture rates remained fairly steady through mid-May and then increased, peaking in June. Rates then steeply declined in mid-July and remained lower for the rest of the season. Migrant captures peaked in late April reflecting movement of migratory species through the site (Table 14). High rates in mid-June through early July coincided with production of fledglings, and the late-season drop in rates corresponded to low hatching-year bird captures signaling the closing of the breeding season.

Population Trends, Survivorship, and Productivity: 1998-2004

Fifty-three individual birds, 7 percent of all individuals (banded and unbanded) captured (53/731, Tables 11, 12) were banded in previous years at the Santa Margarita station, less than half the mean annual return rate from 1999-2002 of 17 ± 3.7 percent. This low percentage is in part a result of the fact that banding was not conducted in 2003. Song sparrows, common yellowthroats, and orange-crowned warblers composed 66 percent of all recaptures from previous years, comparable to the 70 percent for these three species recorded in 2002 (Kus and Kisner 2003). Because no data are available for 2003, population trends cannot be considered continuous between 2002 and 2004.

Population Size

As discussed in previous reports (Kus and Kisner 2003), we examined populations of 13 species with adequate numbers of known-age individuals at the Santa Margarita station. Residents and migrants were considered separately, since these two groups experience different conditions affecting survival and productivity.

Local population size (number of AHY's) of resident species generally increased from 2002 to 2004 (Figure 10). Common yellowthroats and song sparrows increased approximately 50 percent, yellowthroats experiencing a record high of adult individuals. Bewick's wrens increased moderately, house wrens and wrentits remained unchanged, spotted towhees decreased slightly, and American goldfinch adult populations decreased to the 2001 level. Adult migrant populations also generally increased between 2002 and 2004. Yellow-breasted chats

Table 12. Capture frequency of individuals: Santa Margarita River, 2004.

| Species | # Individuals per Capture Incidence (Banded Birds Only) | | | | | | Total # Individuals | | |
|--------------|--|------------|------------|------------|------------|------------|---------------------|----------------|------------|
| | 1 Capture | 2 Captures | 3 Captures | 4 Captures | 5 Captures | 6 Captures | Banded Birds | Unbanded Birds | All Birds |
| MODO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| ANHU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| UNHU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| NUWO | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| DOWO | 4 | 1 | 0 | 0 | 0 | 0 | 5 | 0 | 5 |
| RSFL | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| WIFL | 3 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| PSFL | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 |
| LBVI | 23 | 7 | 2 | 0 | 0 | 0 | 32 | 2 | 34 |
| HUVI | 2 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 3 |
| WAVI | 7 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| BUSH | 55 | 10 | 0 | 0 | 0 | 0 | 65 | 4 | 69 |
| BEWR | 8 | 4 | 2 | 0 | 0 | 0 | 14 | 1 | 15 |
| HOWR | 19 | 3 | 0 | 0 | 0 | 0 | 22 | 1 | 23 |
| SWTH | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| WREN | 16 | 3 | 6 | 0 | 0 | 0 | 25 | 0 | 25 |
| OCWA | 51 | 14 | 0 | 0 | 0 | 0 | 65 | 3 | 68 |
| YWAR | 13 | 1 | 1 | 0 | 0 | 0 | 15 | 0 | 15 |
| TOWA | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| MGWA | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| COYE | 148 | 26 | 8 | 8 | 0 | 1 | 191 | 13 | 204 |
| WIWA | 11 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 11 |
| YBCH | 18 | 8 | 1 | 2 | 0 | 0 | 29 | 2 | 31 |
| SPTO | 10 | 4 | 0 | 0 | 0 | 0 | 14 | 1 | 15 |
| SOSP | 89 | 28 | 9 | 2 | 1 | 0 | 129 | 7 | 136 |
| BHGR | 6 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 6 |
| BLGR | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| HOOR | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| BUOR | 8 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 8 |
| HOFI | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| LEGO | 7 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| AMGO | 17 | 1 | 0 | 0 | 0 | 0 | 18 | 0 | 18 |
| Total | 535 | 111 | 30 | 12 | 1 | 1 | 690 | 41 | 731 |

Table 13. Capture rate by net and date: Santa Margarita River, 2004.

| MAPS Period | Date | | Net | | | | | | | | | | Totals by DATE |
|----------------------|---------|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------------------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| -3 | 4/7/04 | Net Hours | 5:10 | 5:10 | 5:00 | 4:50 | 5:20 | 4:50 | 5:00 | 4:20 | 4:10 | 4:50 | 48:40 |
| | | Captures | 2 | 7 | 6 | 6 | 8 | 2 | 7 | 11 | 11 | 2 | 62 |
| | | Captures/Net hour | 0.39 | 1.35 | 1.20 | 1.24 | 1.50 | 0.41 | 1.40 | 2.54 | 2.64 | 0.41 | 1.27 |
| -2 | 4/16/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 5 | 6 | 7 | 3 | 6 | 5 | 9 | 6 | 8 | 9 | 64 |
| | | Captures/Net hour | 1.00 | 1.20 | 1.40 | 0.60 | 1.20 | 1.00 | 1.80 | 1.20 | 1.60 | 1.80 | 1.28 |
| -1 | 4/26/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 11 | 6 | 8 | 10 | 6 | 8 | 2 | 10 | 10 | 4 | 75 |
| | | Captures/Net hour | 2.20 | 1.20 | 1.60 | 2.00 | 1.20 | 1.60 | 0.40 | 2.00 | 2.00 | 0.80 | 1.50 |
| 1 | 5/5/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 5 | 7 | 8 | 3 | 3 | 4 | 2 | 3 | 6 | 10 | 51 |
| | | Captures/Net hour | 1.00 | 1.40 | 1.60 | 0.60 | 0.60 | 0.80 | 0.40 | 0.60 | 1.20 | 2.00 | 1.02 |
| 2 | 5/12/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 5 | 13 | 4 | 7 | 10 | 4 | 3 | 8 | 9 | 7 | 70 |
| | | Captures/Net hour | 1.00 | 2.60 | 0.80 | 1.40 | 2.00 | 0.80 | 0.60 | 1.60 | 1.80 | 1.40 | 1.40 |
| 3 | 5/28/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 9 | 16 | 7 | 4 | 14 | 3 | 8 | 13 | 8 | 11 | 93 |
| | | Captures/Net hour | 1.80 | 3.20 | 1.40 | 0.80 | 2.80 | 0.60 | 1.60 | 2.60 | 1.60 | 2.20 | 1.86 |
| 4 | 6/7/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 7 | 27 | 3 | 7 | 7 | 1 | 8 | 8 | 20 | 8 | 96 |
| | | Captures/Net hour | 1.40 | 5.40 | 0.60 | 1.40 | 1.40 | 0.20 | 1.60 | 1.60 | 4.00 | 1.60 | 1.92 |
| 5 | 6/16/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 10 | 21 | 18 | 10 | 4 | 4 | 5 | 9 | 13 | 12 | 106 |
| | | Captures/Net hour | 2.00 | 4.20 | 3.60 | 2.00 | 0.80 | 0.80 | 1.00 | 1.80 | 2.60 | 2.40 | 2.12 |
| 6 | 6/25/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 2 | 13 | 15 | 8 | 8 | 1 | 5 | 9 | 12 | 12 | 85 |
| | | Captures/Net hour | 0.40 | 2.60 | 3.00 | 1.60 | 1.60 | 0.20 | 1.00 | 1.80 | 2.40 | 2.40 | 1.70 |
| 7 | 7/6/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 4:30 | 49:30 |
| | | Captures | 4 | 35 | 12 | 6 | 5 | 1 | 6 | 1 | 7 | 7 | 84 |
| | | Captures/Net hour | 0.80 | 7.00 | 2.40 | 1.20 | 1.00 | 0.20 | 1.20 | 0.20 | 1.40 | 1.56 | 1.70 |
| 8 | 7/16/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 4:00 | 5:00 | 5:00 | 5:00 | 49:00 |
| | | Captures | 5 | 2 | 3 | 3 | 4 | 0 | 0 | 2 | 3 | 2 | 24 |
| | | Captures/Net hour | 1.00 | 0.40 | 0.60 | 0.60 | 0.80 | 0.00 | 0.00 | 0.40 | 0.60 | 0.40 | 0.49 |
| 9 | 7/26/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 4 | 17 | 2 | 3 | 4 | 0 | 1 | 4 | 2 | 1 | 38 |
| | | Captures/Net hour | 0.80 | 3.40 | 0.40 | 0.60 | 0.80 | 0.00 | 0.20 | 0.80 | 0.40 | 0.20 | 0.76 |
| 10 | 8/6/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 1 | 3 | 4 | 4 | 2 | 1 | 4 | 2 | 1 | 3 | 25 |
| | | Captures/Net hour | 0.20 | 0.60 | 0.80 | 0.80 | 0.40 | 0.20 | 0.80 | 0.40 | 0.20 | 0.60 | 0.50 |
| 11 | 8/13/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 3 | 1 | 19 | 1 | 0 | 2 | 4 | 3 | 2 | 3 | 38 |
| | | Captures/Net hour | 0.60 | 0.20 | 3.80 | 0.20 | 0.00 | 0.40 | 0.80 | 0.60 | 0.40 | 0.60 | 0.76 |
| 12 | 8/28/04 | Net Hours | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 5:00 | 50:00 |
| | | Captures | 1 | 4 | 17 | 2 | 0 | 1 | 3 | 1 | 4 | 1 | 34 |
| | | Captures/Net hour | 0.20 | 0.80 | 3.40 | 0.40 | 0.00 | 0.20 | 0.60 | 0.20 | 0.80 | 0.20 | 0.68 |
| Totals by NET | | Net Hours | 75:10 | 75:10 | 75:00 | 74:50 | 75:20 | 74:50 | 74:00 | 74:20 | 74:10 | 74:20 | 747:10 |
| | | Captures | 74 | 178 | 133 | 77 | 81 | 37 | 67 | 90 | 116 | 92 | 945^a |
| | | Captures/Net hour | 0.98 | 2.37 | 1.77 | 1.03 | 1.08 | 0.49 | 0.91 | 1.21 | 1.56 | 1.24 | 1.26 |

^aTotal does not include five captures from periods -1, 1, and 4 for which net number was not recorded

Figure 9. Captures, net-hours, and capture rates by net: Santa Margarita River, 2004

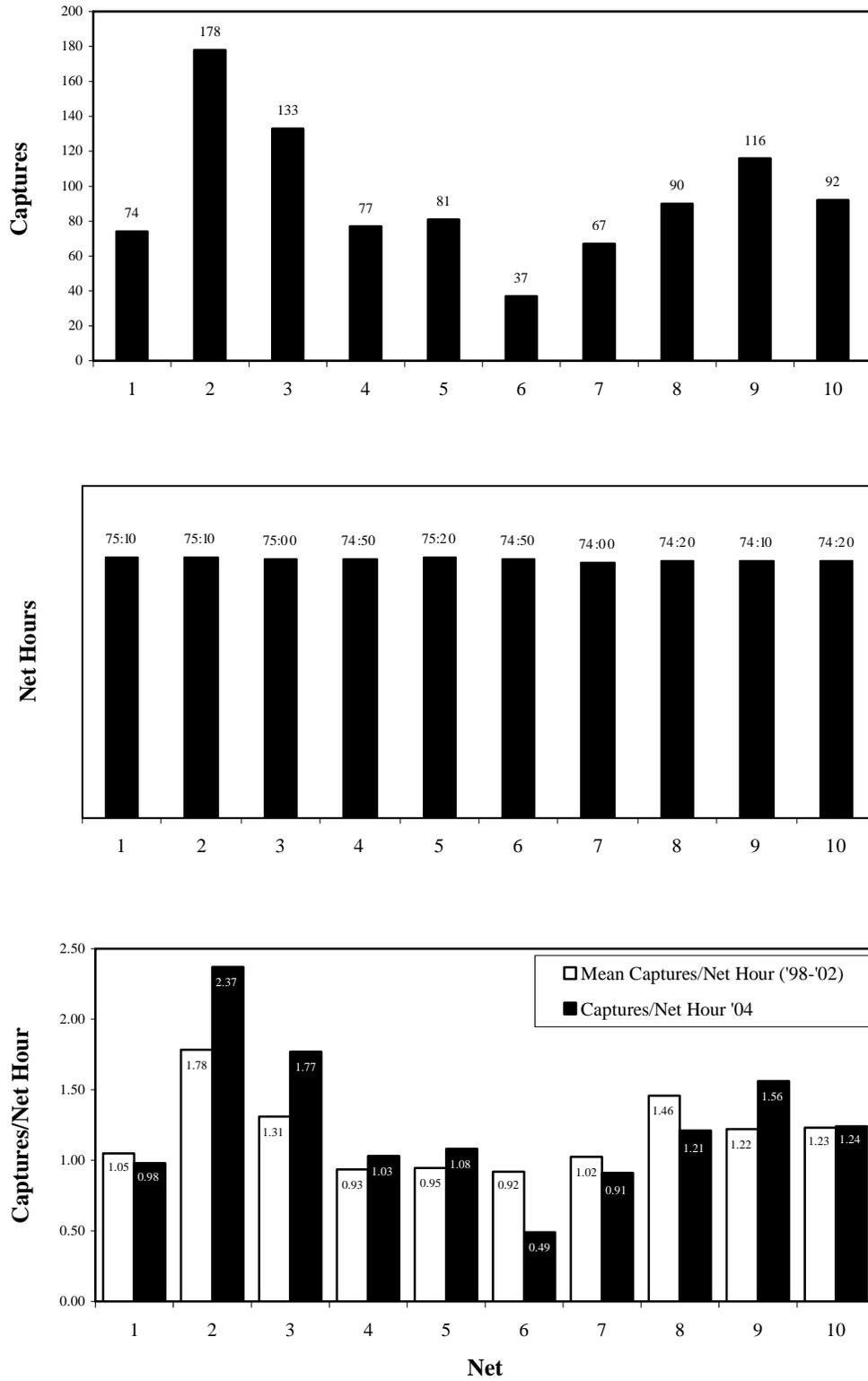


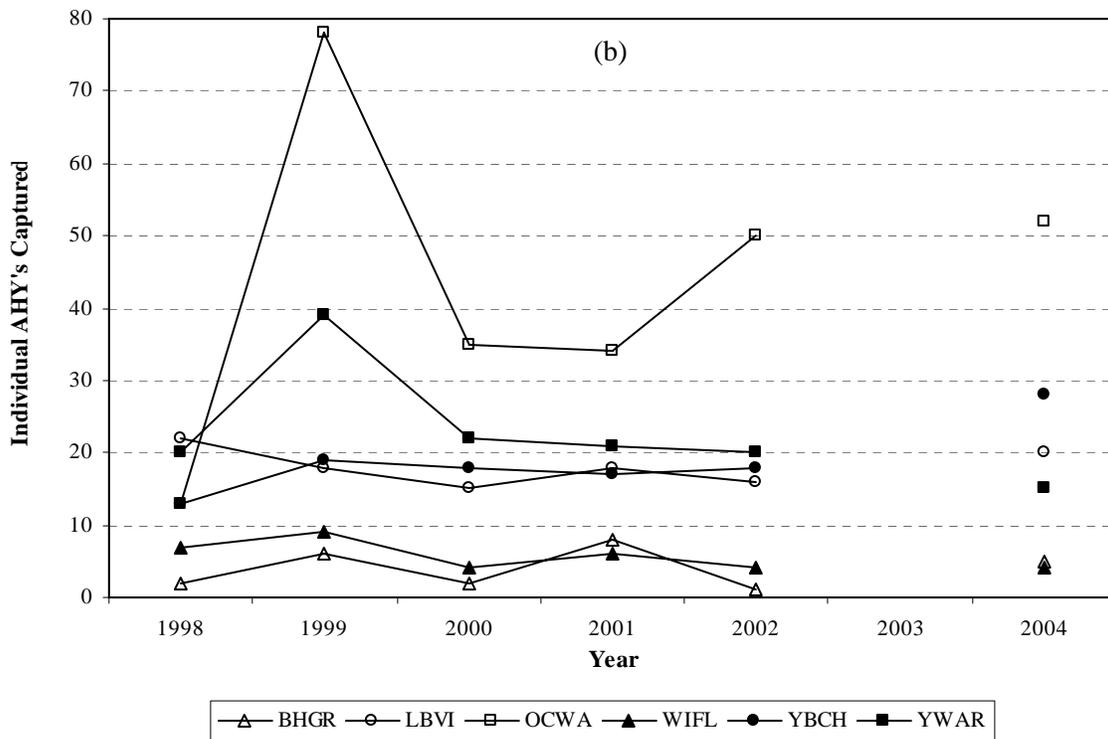
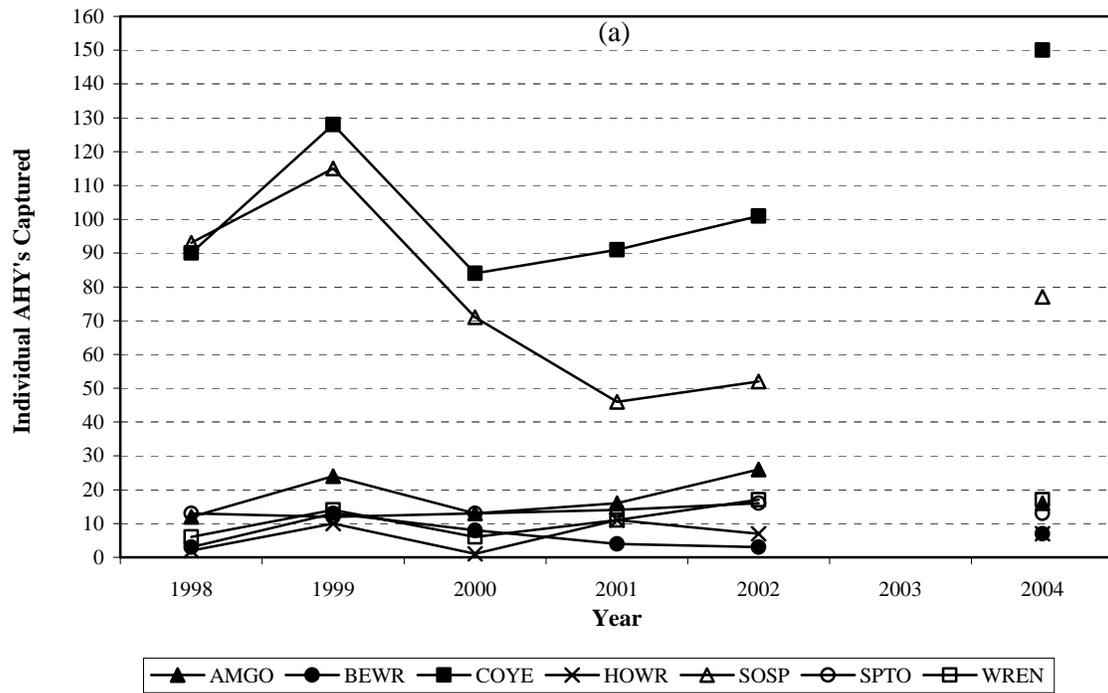
Table 14. Number of captures by date: Santa Margarita River, 2004.

| Species | MAPS Period | | | | | | | | | | | | | | | Total | Captures per 100 Net-hours ^a |
|----------------------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|---|
| | -3 | -2 | -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| | Date | | | | | | | | | | | | | | | | |
| | 4/7 | 4/16 | 4/26 | 5/5 | 5/12 | 5/28 | 6/7 | 6/16 | 6/25 | 7/6 | 7/16 | 7/26 | 8/6 | 8/13 | 8/28 | | |
| MODO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.13 |
| ANHU | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0.27 |
| UNHU | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.40 |
| NUWO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.27 |
| DOWO | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0.80 |
| RSFL | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.27 |
| WIFL | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 0.67 |
| PSFL | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 5 | 0.67 |
| LBVI | 2 | 4 | 0 | 4 | 3 | 5 | 2 | 2 | 2 | 10 | 2 | 3 | 1 | 4 | 1 | 45 | 6.02 |
| HUVI | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 5 | 0.67 |
| WAVI | 0 | 0 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0.94 |
| BUSH | 1 | 2 | 0 | 0 | 5 | 10 | 21 | 4 | 0 | 1 | 0 | 11 | 0 | 14 | 10 | 79 | 10.58 |
| BEWR | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 3 | 6 | 1 | 1 | 0 | 0 | 2 | 23 | 3.08 |
| HOWR | 0 | 1 | 2 | 0 | 1 | 2 | 1 | 4 | 4 | 6 | 0 | 1 | 3 | 0 | 1 | 26 | 3.48 |
| SWTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.13 |
| WREN | 0 | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 9 | 4 | 1 | 0 | 1 | 2 | 4 | 40 | 5.35 |
| OCWA | 9 | 8 | 16 | 7 | 9 | 11 | 1 | 6 | 2 | 5 | 0 | 2 | 1 | 2 | 3 | 82 | 10.98 |
| YWAR | 1 | 3 | 4 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 18 | 2.41 |
| TOWA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.13 |
| MGWA | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.27 |
| COYE | 24 | 14 | 17 | 14 | 14 | 34 | 34 | 45 | 33 | 12 | 9 | 9 | 7 | 5 | 5 | 276 | 36.95 |
| WIWA | 0 | 7 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 1.47 |
| YBCH | 0 | 1 | 2 | 5 | 2 | 5 | 8 | 7 | 8 | 8 | 0 | 0 | 1 | 0 | 0 | 47 | 6.29 |
| SPTO | 3 | 0 | 1 | 0 | 4 | 0 | 1 | 2 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 19 | 2.54 |
| SOSP | 14 | 18 | 12 | 11 | 21 | 13 | 16 | 16 | 12 | 21 | 8 | 8 | 8 | 7 | 7 | 192 | 25.70 |
| BHGR | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 0.80 |
| BLGR | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.40 |
| HOOR | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.27 |
| BUOR | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1.20 |
| HOFI | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 4 | 0.54 |
| LEGO | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 7 | 0.94 |
| AMGO | 3 | 0 | 4 | 2 | 1 | 1 | 3 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 19 | 2.54 |
| Total | 62 | 64 | 77 | 53 | 70 | 93 | 97 | 106 | 85 | 84 | 24 | 38 | 25 | 38 | 34 | 950 | 127.18 |
| Species^b | 11 | 13 | 18 | 13 | 17 | 15 | 14 | 17 | 16 | 17 | 8 | 10 | 9 | 10 | 9 | 31 | 4.15 |

^a747:10 total net-hours

^bUnidentified species not included in species totals

Figure 10. Adult population trends of (a) resident species and (b) migrant species at Santa Margarita River, 1998-2004 (banded birds only)



experienced their highest adult numbers recorded for the Santa Margarita station, a 47 percent increase over the previous 1999 high, and all other species except yellow warblers either increased or remained stable.

Survival and Productivity

We further analyzed the two most abundant resident species, common yellowthroat and song sparrow, and two migrants, orange-crowned warbler and yellow-breasted chat, for survival and productivity. As discussed in previous reports, 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 (Kus and Beck 1999). With no data available from 2003, we could not analyze between-year survivorship and recruitment for 2004, nor could we determine the contribution of adult survival to annual population changes because expected population sizes for 2004 could not be calculated without known 2003 populations.

Adult captures were primarily composed of new captures in 2004 as in previous years (Figure 11). From 1998 to 2002 recapture rates of adult birds of common yellowthroats and orange-crowned warblers were relatively stable, while those of yellow-breasted chats and song sparrows increased over time. Between 2002 and 2004, recaptures of adult common yellowthroats and song sparrows were approximately half of those in previous years, reflecting the absence of banding in 2003 combined with mortality of birds banded prior to 2003. Recaptures of adult orange-crowned warblers and yellow-breasted chats were remarkably similar to previous years, suggesting lower annual mortality in these migrants. Cumulative survivorship declined from a mean across all species of 0.18 ± 0.08 after one year to a mean of 0.00 ± 0.01 after six (Figure 12).

Productivity (number of HY birds / number of AHY birds) increased over record lows in 2002 for all but yellow-breasted chats (Figure 13). Common yellowthroat productivity doubled from 0.16 to 0.31 young per adult, and song sparrows recovered from no juveniles captured in 2000 to a productivity of 0.65 young per adult in 2004. Orange-crowned warblers increased from 0.10 to 0.27 young per adult; yellow-breasted chats declined slightly from 0.06 to 0.04 young per adult. However, productivity in all four species was lower than their respective averages from 1998-2002 (common yellowthroat: 0.85 ± 0.51 young per adult, song sparrow: 0.92 ± 0.85 young per adult, orange crowned warbler: 0.41 ± 0.22 young per adult, yellow-breasted chat: 0.11 ± 0.09 young per adult).

Summary: 1998-2004

Relative abundance increased at the Santa Margarita station in 2004 over record lows in 2002. Common yellowthroat remained the most common species captured, and song sparrows were the second most abundant after declining every year of the study. Approximately one third of the species, comprising roughly one third of individuals captured, reached or exceeded record high abundances, while the overall total of individuals captured was comparable to the average through 2002. These data indicate shifts in the overall composition of the bird community including both resident and migrant species. Two endangered or sensitive migrant species

Figure 11. Composition of adult captures of (a) common yellowthroat, (b) song sparrow, (c) orange-crowned warbler, and (d) yellow-breasted chat at Santa Margarita River, 1998-2004 (banded birds only)

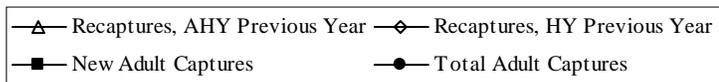
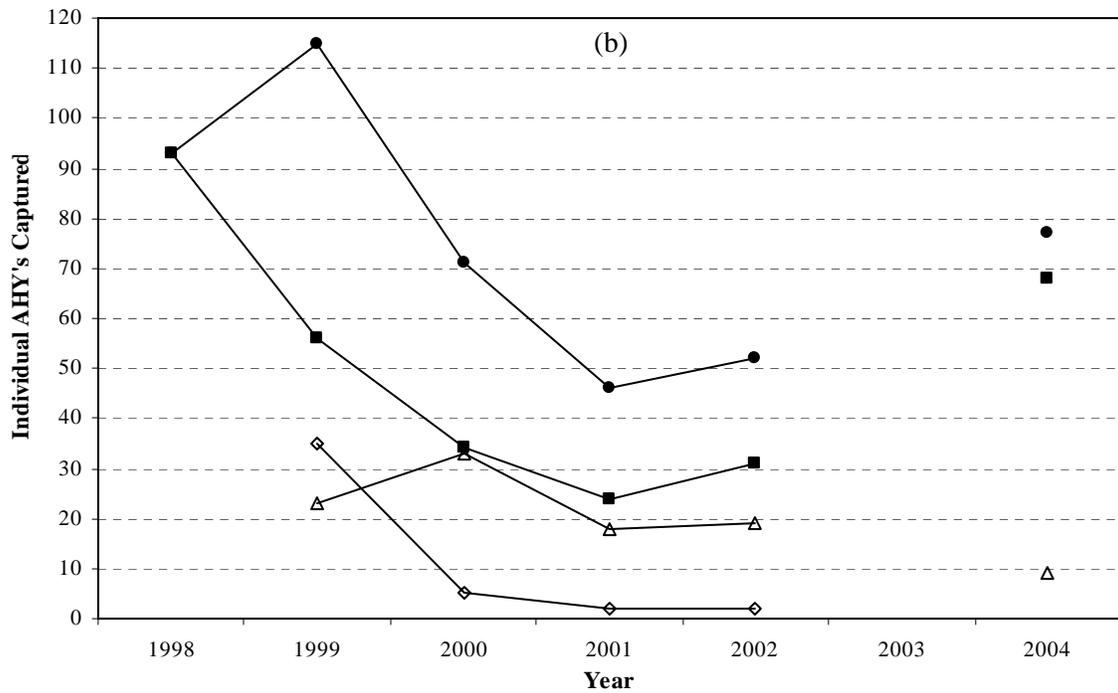
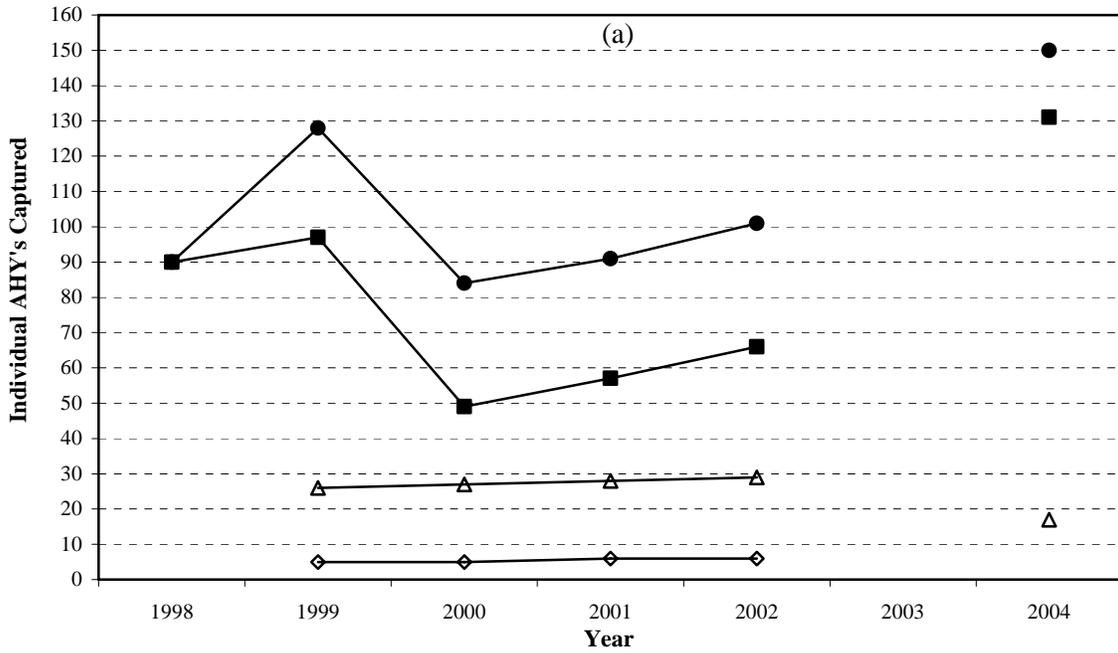


Figure 11 (continued). Composition of adult captures of (a) common yellowthroat, (b) song sparrow, (c) orange-crowned warbler, and (d) yellow-breasted chat at Santa Margarita River, 1998-2004 (banded birds only)

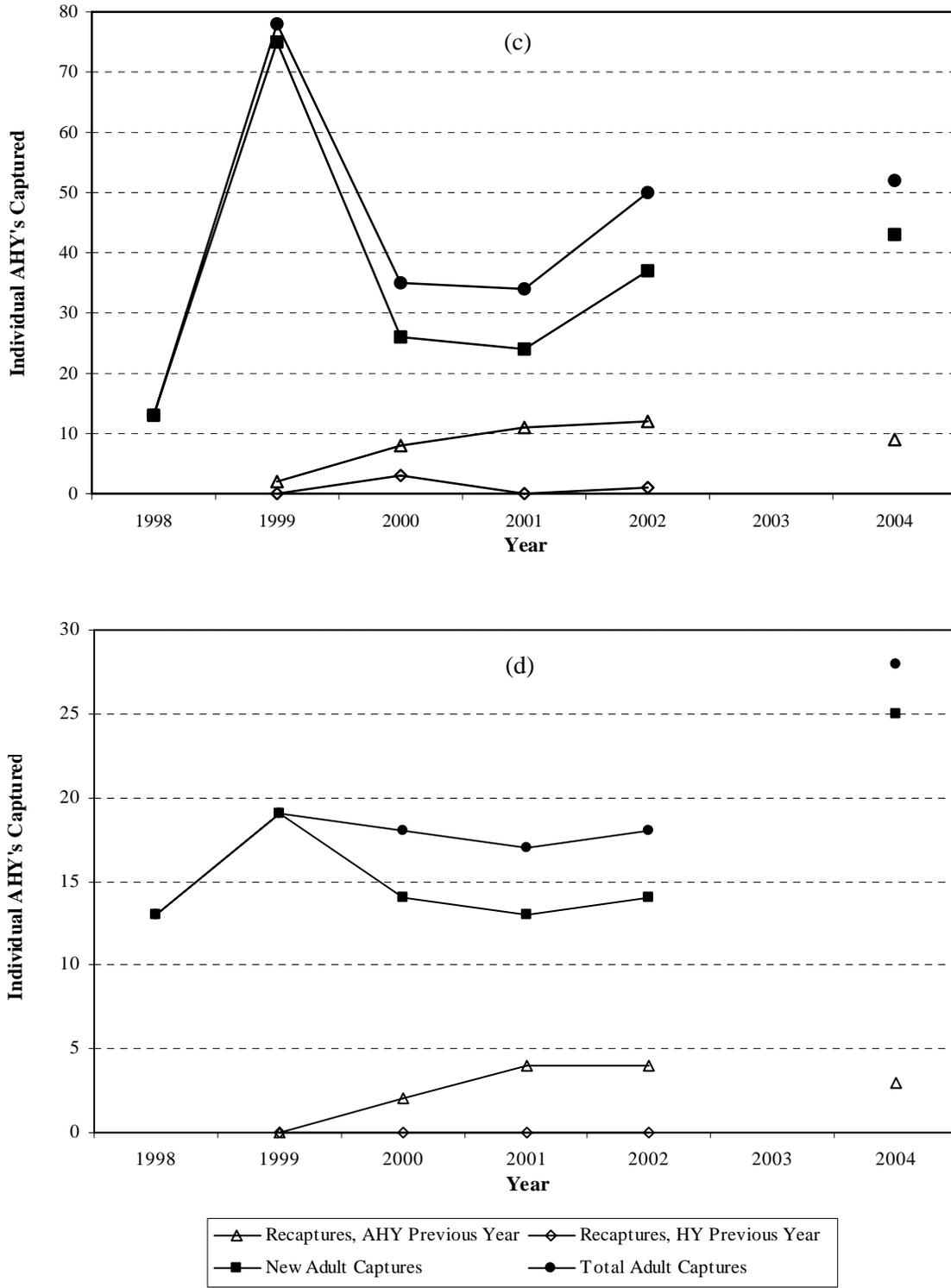


Figure 12. Adult survivorship from time of first capture at Santa Margarita River, 1998-2004 (all cohorts combined)

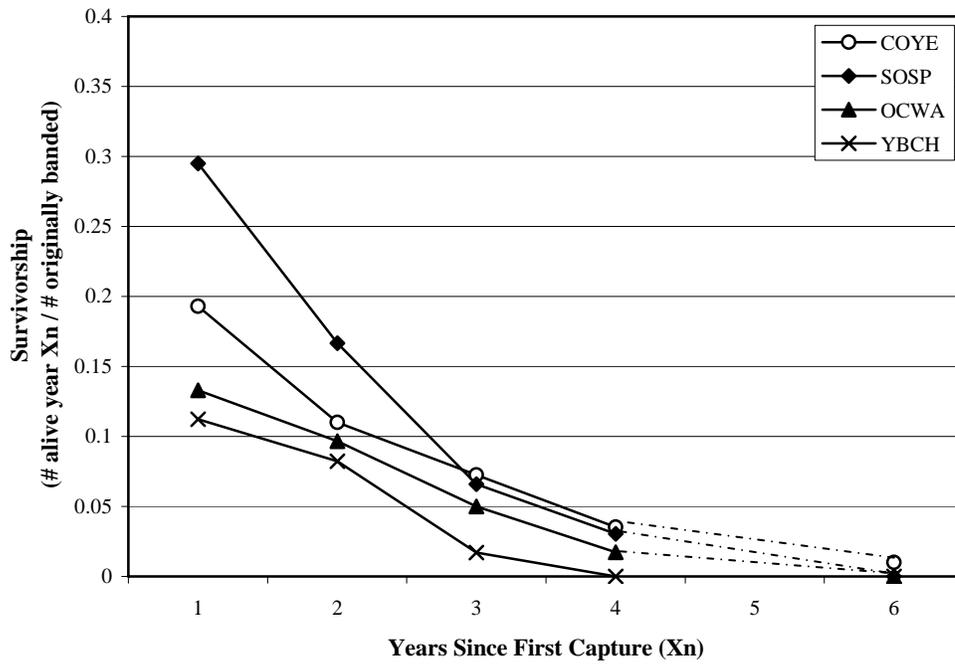
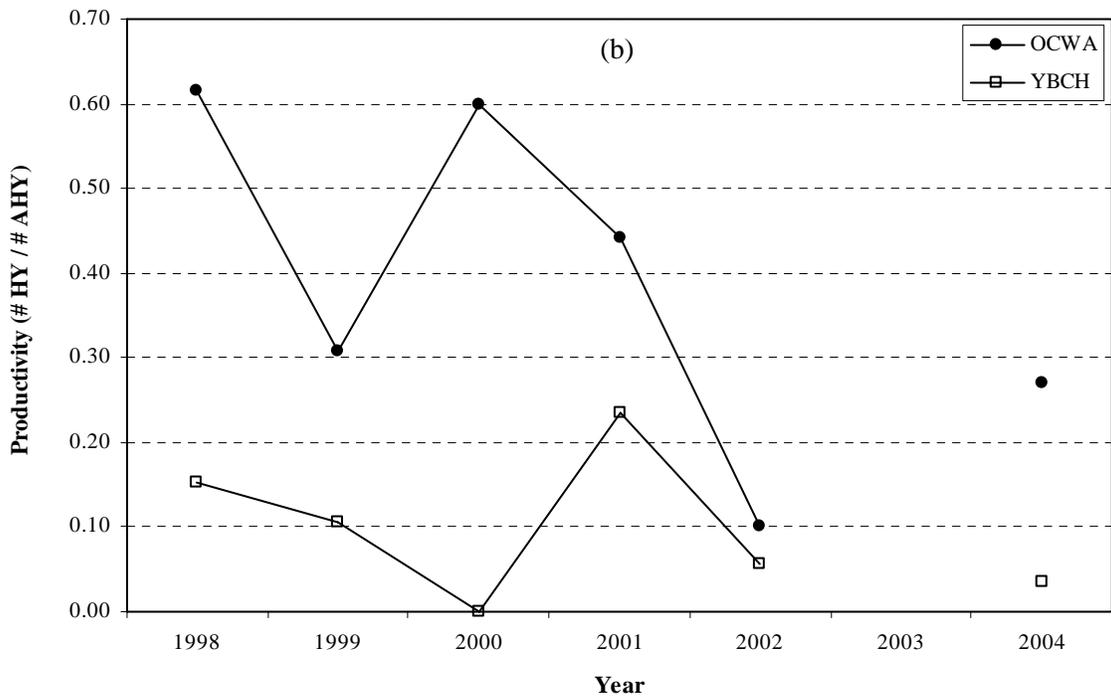
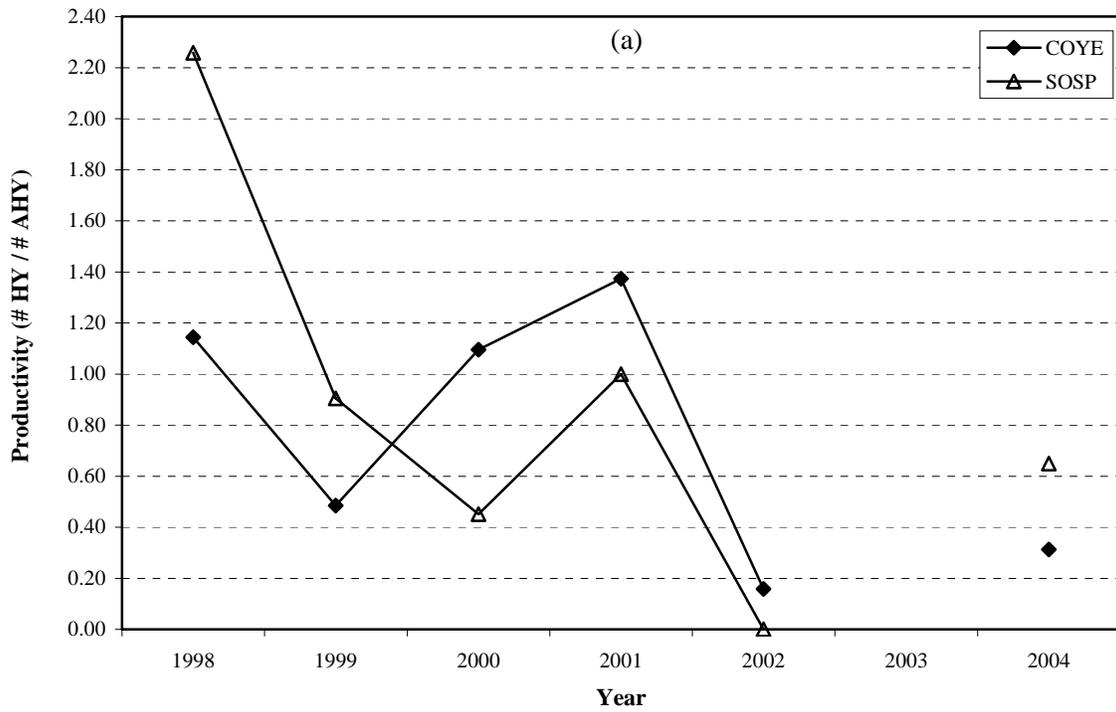


Figure 13. Annual productivity of (a) resident species and (b) migrant species at Santa Margarita River, 1998-2004 (banded birds only)



captured at the Santa Margarita station, least Bell's vireo and yellow-breasted chat, reached or exceeded all-time high individual capture numbers, while two others, willow flycatcher and yellow warbler, matched or exceeded record lows for the station.

General productivity increased over record lows in 2002—more species produced young than ever recorded at the Santa Margarita station, but the two most common resident species comprised over half of the young fledged. Least Bell's vireo productivity rebounded from a near record low 2002 (Kus and Kisner 2003); numbers of young per adult were comparable to the peak years of 1998 (Table 11 in Kus and Beck 1999) and 2000 (Table 7 in Kus and Beck 2001b). The increases in population size and productivity suggest that the bird community is rapidly recovering from the effects of record low rainfall between 2001 and 2002.

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Appendix 1

Alpha codes, common names, scientific names, and Institute for Bird Populations (IBP) numeric codes for species caught at De Luz Creek and Santa Margarita River MAPS stations, Camp Pendleton, CA

| Alpha Code | Common Name | Scientific Name | IBP Code |
|------------|---|-----------------------------------|----------|
| SSHA | Sharp-shinned hawk | <i>Accipiter striatus</i> | 02200 |
| COHA | Cooper's hawk | <i>Accipiter cooperii</i> | 02210 |
| AMKE | American kestrel | <i>Falco sparverius</i> | 02630 |
| CAQU | California quail | <i>Callipepla californica</i> | 03130 |
| MODO | Mourning dove | <i>Zenaida macroura</i> | 05570 |
| COGD | Common ground-dove | <i>Columbina passerina</i> | 05610 |
| BCHU | Black-chinned hummingbird | <i>Archilochus alexandri</i> | 08640 |
| ANHU | Anna's hummingbird | <i>Calypte anna</i> | 08670 |
| COHU | Costa's hummingbird | <i>Calypte costae</i> | 08680 |
| RUHU | Rufous hummingbird | <i>Selasphorus rufus</i> | 08730 |
| ALHU | Allen's hummingbird | <i>Selasphorus sasin</i> | 08740 |
| USHU | Unidentified <i>Selasphorus</i> hummingbird species | <i>Selasphorus</i> spp. | 08774 |
| UNHU | Unidentified hummingbird species | --- | 08775 |
| NUWO | Nuttall's woodpecker | <i>Picoides nuttallii</i> | 09640 |
| DOWO | Downy woodpecker | <i>Picoides pubescens</i> | 09650 |
| RSFL | Red-shafted Flicker | <i>Colaptes auratus cafer</i> | 09800 |
| WEWP | Western wood-pewee | <i>Contopus sordidulus</i> | 11380 |
| WIFL | Willow flycatcher | <i>Empidonax traillii</i> | 11475 |
| HAFL | Hammond's flycatcher | <i>Empidonax hammondii</i> | 11510 |
| PSFL | Pacific-slope flycatcher | <i>Empidonax difficilis</i> | 11555 |
| UEFL | Unidentified <i>Empidonax</i> flycatcher species | <i>Empidonax</i> spp. | 11595 |
| BLPH | Black phoebe | <i>Sayornis nigricans</i> | 11600 |
| ATFL | Ash-throated flycatcher | <i>Myiarchus cinerascens</i> | 11740 |
| WEKI | Western kingbird | <i>Tyrannus verticalis</i> | 12020 |
| LBVI | Least Bell's vireo | <i>Vireo bellii pusillus</i> | 12640 |
| CAVI | Cassin's vireo | <i>Vireo cassinii</i> | 12710 |
| HUVI | Hutton's vireo | <i>Vireo huttoni</i> | 12740 |
| WAVI | Warbling vireo | <i>Vireo gilvus</i> | 12760 |
| WESJ | Western scrub-jay | <i>Aphelocoma californica</i> | 13110 |
| TRES | Tree swallow | <i>Tachycineta bicolor</i> | 13410 |
| VGSW | Violet-green swallow | <i>Tachycineta thalassina</i> | 13440 |
| NRWS | Northern rough-winged swallow | <i>Stelgidopteryx serripennis</i> | 13490 |
| CLSW | Cliff swallow | <i>Petrochelidon pyrrhonota</i> | 13520 |
| OATI | Oak titmouse | <i>Baeolophus inornatus</i> | 13640 |
| BUSH | Bushtit | <i>Psaltriparus minimus</i> | 13680 |
| BEWR | Bewick's wren | <i>Thyromanes bewickii</i> | 14040 |
| HOWR | House wren | <i>Troglodytes aedon</i> | 14070 |
| RCKI | Ruby-crowned kinglet | <i>Regulus calendula</i> | 14250 |
| SWTH | Swainson's thrush | <i>Catharus ustulatus</i> | 14810 |
| HETH | Hermit thrush | <i>Catharus guttatus</i> | 14820 |
| WREN | Wrentit | <i>Chamaea fasciata</i> | 15110 |
| NOMO | Northern mockingbird | <i>Mimus polyglottos</i> | 15150 |
| CATH | California thrasher | <i>Toxostoma redivivum</i> | 15270 |
| PHAI | Phainopepla | <i>Phainopepla nitens</i> | 15590 |
| OCWA | Orange-crowned warbler | <i>Vermivora celata</i> | 15660 |

Appendix 1 (continued)

Alpha codes, common names, scientific names, and Institute for Bird Populations (IBP) numeric codes for species caught at De Luz Creek and Santa Margarita River MAPS stations, Camp Pendleton, CA

| Alpha Code | Common Name | Scientific Name | IBP Code |
|------------|-----------------------------|------------------------------------|----------|
| NAWA | Nashville warbler | <i>Vermivora ruficapilla</i> | 15670 |
| YWAR | Yellow warbler | <i>Dendroica petechia</i> | 15750 |
| AUWA | Audubon's warbler | <i>Dendroica coronata auduboni</i> | 15800 |
| BTYW | Black-throated gray warbler | <i>Dendroica nigrescens</i> | 15810 |
| TOWA | Townsend's warbler | <i>Dendroica townsendi</i> | 15840 |
| HEWA | Hermit warbler | <i>Dendroica occidentalis</i> | 15850 |
| MGWA | MacGillivray's warbler | <i>Oporornis tolmiei</i> | 16140 |
| COYE | Common yellowthroat | <i>Geothlypis trichas</i> | 16150 |
| HOWA | Hooded warbler | <i>Wilsonia citrina</i> | 16280 |
| WIWA | Wilson's warbler | <i>Wilsonia pusilla</i> | 16290 |
| YBCH | Yellow-breasted chat | <i>Icteria virens</i> | 16460 |
| WETA | Western tanager | <i>Piranga ludoviciana</i> | 16840 |
| SPTO | Spotted towhee | <i>Pipilo maculatus</i> | 17810 |
| CALT | California towhee | <i>Pipilo crissalis</i> | 17850 |
| RCSP | Rufous-crowned sparrow | <i>Aimophila ruficeps</i> | 17950 |
| BRSP | Brewer's Sparrow | <i>Spizella breweri</i> | 18040 |
| BCSP | Black-chinned sparrow | <i>Spizella atrogularis</i> | 18070 |
| LASP | Lark sparrow | <i>Chondestes grammacus</i> | 18090 |
| FOSP | Fox sparrow | <i>Passerella iliaca</i> | 18220 |
| SOSP | Song sparrow | <i>Melospiza melodia</i> | 18230 |
| BHGR | Black-headed grosbeak | <i>Pheucticus melanocephalus</i> | 18610 |
| BLGR | Blue grosbeak | <i>Guiraca caerulea</i> | 18640 |
| LAZB | Lazuli bunting | <i>Passerina amoena</i> | 18660 |
| HOOR | Hooded oriole | <i>Icterus cucullatus</i> | 19050 |
| BUOR | Bullock's oriole | <i>Icterus bullockii</i> | 19105 |
| PUFI | Purple finch | <i>Carpodacus purpureus</i> | 19350 |
| HOFI | House finch | <i>Carpodacus mexicanus</i> | 19370 |
| LEGO | Lesser goldfinch | <i>Carduelis psaltria</i> | 19490 |
| AMGO | American goldfinch | <i>Carduelis tristis</i> | 19510 |

Appendix 2
Net coordinates, in decimal degrees, for De Luz Creek and Santa Margarita River MAPS stations,
Camp Pendleton, CA

| Net # | De Luz Creek Station | Latitude | Longitude |
|----------|--|----------|------------|
| 1 | | 33.37737 | -117.32429 |
| 2 | | 33.37866 | -117.32378 |
| 3 | | 33.37945 | -117.32311 |
| 4 | | 33.38001 | -117.32328 |
| 5 | | 33.38030 | -117.32259 |
| 6 | | 33.38070 | -117.32302 |
| 7 | | 33.38154 | -117.32256 |
| 8 | | 33.38188 | -117.32144 |
| 9 | | 33.38246 | -117.32201 |
| 10 | | 33.38066 | -117.32250 |
| | De Luz Creek Station Off-site Nets 2004 | | |
| X1 | | 33.38873 | -117.31992 |
| X2 | | 33.38915 | -117.32066 |
| X3 | | 33.38937 | -117.32120 |
| X4 | | 33.39017 | -117.32118 |
| X5 | | 33.38275 | -117.32064 |
| X6 | | 33.38363 | -117.32042 |
| X7 | | 33.38392 | -117.32036 |
| X8 | | 33.38445 | -117.31997 |
| | Santa Margarita River Station | | |
| 1 | | 33.26641 | -117.37221 |
| 2 | | 33.26701 | -117.37269 |
| 3 | | 33.26763 | -117.37252 |
| 4 | | 33.26687 | -117.37174 |
| 5 | | 33.26764 | -117.37135 |
| 6 | | 33.26834 | -117.37150 |
| 7 | | 33.26880 | -117.37165 |
| 8 | | 33.26787 | -117.37036 |
| 9 | | 33.26741 | -117.37034 |
| 10 | | 33.26649 | -117.37039 |