# THE 2006 REPORT OF THE MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP (MAPS) PROGRAM ON TEXAS ARMY NATIONAL GUARD INSTALLATIONS CAMP SWIFT AND CAMP BOWIE

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## Introduction

Since 1989, The Institute for Bird Populations has been coordinating the Monitoring Avian Productivity and Survivorship (MAPS) Program, a cooperative effort among public and private agencies and individual bird banders in North America, to operate a continent-wide network of over 500 constant-effort mist-netting and banding stations. MAPS was designed to provide information on the vital rates (productivity or birth rate, and survivorship or death rate) of landbirds that is critically needed for efforts to identify demographic causes of the severe and sometimes accelerating population declines documented (Robbins et al. 1989, Terborgh 1989, Peterjohn et al.1995) for many species of North American landbirds (DeSante 1992, DeSante et al. 1995, 1999, 2001a). Such data on vital rates are also critically needed in efforts to identify management strategies to reverse such population declines (DeSante 1995, DeSante and Rosenberg 1998).

MAPS is organized to fulfill three sets of goals and objectives: monitoring, research, and management. The specific **monitoring** goals of MAPS are to provide, for over 100 target species, including Neotropical-wintering migrants, temperate-wintering migrants, and permanent residents: (a) annual indices of adult population size and post-fledging productivity from data on the numbers and proportions of young and adult birds captured; and (b) annual estimates of adult population size, adult survival rates, proportions of residents, and recruitment into the adult population from modified Cormack- Jolly-Seber analyses of mark-recapture data on adult birds.

The specific **research** goals of MAPS are to identify and describe: (a) temporal and spatial patterns in these demographic indices and estimates at a variety of spatial scales ranging from the local landscape to the entire continent; and (b) relationships between these patterns and ecological characteristics of the target species, population trends of the target species, station-specific and landscape-level habitat characteristics, and spatially-explicit weather variables.

The specific **management** goals of MAPS are to use these patterns and relationships, at the appropriate spatial scales, to: (a) identify thresholds and trigger points to notify appropriate agencies and organizations of the need for further research and/or management actions; (b) determine the proximate demographic cause(s) of population change; (c) suggest management actions and conservation strategies to reverse population declines and maintain stable or increasing populations; and (d) evaluate the effectiveness of the management actions and conservation strategies actually implemented through an adaptive management framework.

All of these monitoring, research, and management goals are in agreement with the Department of Defense (DoD) Partners-in-Flight strategy. Moreover, because birds are excellent indicators of the health of ecological systems, they can serve as a sensitive barometer of the overall effectiveness of efforts to maintain the biodiversity and ecological integrity of military installations. Accordingly, the MAPS program was initiated on select military installations beginning in 1992 and soon became one of the focus projects of the DoD Partners-in-Flight program. It was expected that information from the MAPS program would be capable of aiding research and management efforts on these military installations to protect and enhance the installations' avifauna and ecological integrity, while allowing them to fulfill their military mission.

Accordingly, in 1994, 12 MAPS stations were established and operated on Texas National Guard Installations Camp Swift (6 stations) and Camp Bowie (6 stations). The operation of these stations was continued during the summers of 1994-2002 by means of funding from the DoD Legacy Resource Management Program. The operation of the 12 stations was continued during the summers of 2003-2006 through funding from the Texas Army National Guard. Data from these stations and six stations at Fort Hood comprise a regional analytical unit.

The ultimate objective of the MAPS Program on military installations, such as Camp Swift and Camp Bowie, is to identify generalized management guidelines and formulate specific management actions that can be implemented on military installations and elsewhere to reverse the population declines of target landbird species and maintain populations of stable or increasing species. The identification and formulation of these management guidelines and actions is to be achieved by modeling the vital rates (productivity and survivorship) of the various landbird species as a function of landscape-level habitat characteristics and spatially explicit weather variables. Our goal is to identify relationships between productivity (and survivorship for permanent resident species) and these habitat and weather variables. The management strategies will involve efforts to modify habitat characteristics from those associated with low productivity to those associated with high productivity, for species in which low productivity is driving a population decline.

The Legacy Resource Management Program allowed us to undertake these analyses and formulate management strategies. These analyses have now been completed (Nott et al. 2003) and management guidelines have been formulated for ten bird species of conservation concern that breed in the southeastern United States. With additional funding from the Legacy Resource Management Program, we are currently implementing these guidelines and actions on eight military installations (including Camp Swift and Camp Bowie) in conjunction with efforts to increase military Readiness and Range Sustainment (Nott and Michel 2005). The strategy for implementing these guidelines includes the establishment of new MAPS stations to monitor their effectiveness, the discontinuance of an equal number of old stations, and the continued operation of others of the old stations to serve as controls for the new management stations. In this way, the total number of stations operated has remained the same.

At Camp Swift in 2004, we replaced the McLaughlin Creek station with a new station, Dropzone, aimed at better monitoring Painted Buntings, a species of conservation and management concern at Camp Swift. We achieved this by selecting an area in which habitat patterns, according to our models, should support healthy bunting populations (e.g., oak prairie). We also hypothesized that, by implementing warm season burn regimes upon these areas, we would be able to enhance the restoration of native grasses and forbs in the oak prairie habitat, and that this should further increase population sizes and reproductive success of Painted Buntings. Unfortunately, the warm-season fire regime could not be implemented during 2004 or 2005 due to unfavorable weather conditions and logistical considerations. Due to the accumulation of fuel, however, installation-wide cool season burns are proposed for the winter of 2006-7, including Dropzone. We will be able to monitor the effects of these management actions on populations at each station and will be especially interested by any observable effects on Painted Bunting populations.

At Camp Bowie no stations were replaced, all six having been in operation since 1994. there are currently management plans to restore riparian corridors, fill stock ponds, prescribe fires to clear vegetation for military training purposes and restore native plant communities, and possibly to reduce or cease cattle grazing to create more grassland habitat and reduce the success of Brown-headed Cowbirds. There are no current plans to move existing MAPS stations, merely to monitor the changes in avifauna that will occur when the proposed management actions are implemented.

A complete summary of the results of the MAPS Program on Camp Swift and Camp Bowie from 1994-1999, as well as on 11 other installations or groups of nearby installations in eastern United States, was presented by DeSante et al. (2001b). This report briefly updates both that earlier report and previous year's reports (DeSante et al. 2004, 2005a), and documents the operation of the 12 MAPS stations on Camp Swift and Camp Bowie during the 2006 breeding season. Reports were also submitted to the Legacy Resource Management Office which included information regarding the long-term precipitation patterns associated with the stations. Furthermore, analyses of the Painted Bunting data from these stations and the Fort Hood stations form the basis of a manuscript entitled "Painted Bunting (*Passerina ciris*) Demographics in Texas: Survival, Reproduction, and migration Connectivity" (Nott et al. in prep.)

## Methods

Six MAPS stations were operated in 2006 on each of Camp Swift and Camp Bowie. At Camp Swift, five stations were at the same locations where they were first established in 1994. The sixth station, Dropzone, was established in 2004 in an area of mixed little bluestem grassland and post oak woodland habitat bordered by cedars and loblolly pines, on the border of a Texas Reserve Air National Guard drop zone. While the location of this site was initially selected from species/landscape models of MAPS data, point counts were conducted in the area to verify the abundance of Painted Buntings prior to final site selection for this new station. At Camp Bowie the same six stations have been operated from 1994 through 2006.

All MAPS stations were operated in accordance with the highly standardized banding protocols established by The Institute for Bird Populations for use by the MAPS Program throughout North America and spelled out in detail in the MAPS Manual (DeSante et al. 2006). On each day of operation each year, one 12-m long, 30-mm mesh, 4-tier nylon mist net was erected at each of ten fixed mist-net sites within the interior eight ha of each 20-ha station. These ten nets at each station were operated for six morning hours per day (beginning at local sunrise) for one day in each of nine consecutive 10-day periods between May 11 and August 4 (Tables 1 and 6). The operation of all stations occurred on schedule in each ten-day period. The operation of stations at Swift was carried out by field biologist interns Melanie Musset and Simon Valdez and the operation of stations at Bowie were carried out by Katy Becraft and Margaret Muenich. All four of these interns were trained by IBP field biologists Matt Schaap and Blanca Roldan and were supervised by Matt Schaap throughout the season.

With few exceptions, all birds captured during the course of the study were identified to species, age, and sex and, if unbanded, were banded with USGS/BRD numbered aluminum bands. Birds were released immediately upon capture and before being banded or processed if

situations arose where bird safety would be compromised. The following data were taken on all birds captured, including recaptures, according to MAPS guidelines using standardized codes and forms (DeSante et al. 2006):

(1) capture code (newly banded, recaptured, band changed, unbanded);
(2) band number;
(3) species;
(4) age and how aged;
(5) sex (if possible) and how sexed (if applicable);
(6) extent of skull pneumaticization;
(7) breeding condition of adults (i.e., extent of cloacal protuberance or brood patch);
(8) extent of juvenal plumage in young birds;
(9) extent of body and flight-feather molt;
(10) extent of primary-feather wear;
(11) presence of molt limits and plumage characteristics;
(12) wing chord;
(13) fat class and body mass;
(14) date and time of capture (net-run time);
(15) station and net site where captured; and
(16) any pertinent notes.

Effort data (i.e., the number and timing of net-hours on each day of operation) were also collected in a standardized manner. In order to allow constant-effort comparisons of data to be made, the times of opening and closing the array of mist nets and of beginning each net check were recorded to the nearest ten minutes. The breeding (summer residency) status (confirmed breeder, likely breeder, non-breeder) of each species seen, heard, or captured at each MAPS station on each day of operation was recorded using techniques similar to those employed for breeding bird atlas projects.

The computer entry, proofing, and verification of all banding, effort, and breeding status data were completed by IBP biologists using specially designed data entry, verification, and editing programs. The critical data for each banding record (capture code, band number, species, age, sex, date, capture time, station, and net number) were proofed by hand against the raw data and any computer-entry errors were corrected. All banding data were then run through a series of verification programs as follows:

(1) Clean-up programs to check the validity of all codes entered and the ranges of all numerical data;
(2) Cross-check programs to compare station, date, and net fields from the banding data with those from the effort and breeding status data;
(3) Cross-check programs to compare species, age, and sex determinations against degree of skull pneumaticization, breeding condition (extent of cloacal protuberance and brood patch), extent of juvenal plumage, extent of body and flight-feather molt, extent of primary-feather wear, and presence of molt limits and plumage characteristics;

(4) Screening programs which allow identification of unusual or duplicate band numbers or unusual band sizes for each species; and
(5) Verification programs to screen banding and recapture data from all years of operation for inconsistent species, age, or sex determinations for each band number.

Any discrepancies or suspicious data identified by any of these programs were examined manually and corrected if necessary. Wing chord, body mass, fat content, date and station of capture, and any pertinent notes were used as supplementary information for the correct determination of species, age, and sex in all of these verification processes. The proofed, verified, and corrected banding data from each year were then run through a series of analysis programs that calculated for each species and for all species pooled at each station and for all stations pooled on each forest:

(1) the numbers of newly banded birds, recaptured birds, and birds released unbanded;
(2) the numbers and capture rates (per 600 net-hours) of first captures (in each year) for individual adult and young birds; and
(3) the proportion of young in the catch.

Following the procedures pioneered by the British Trust for Ornithology (BTO) in their CES Scheme (Peach et al. 1996), the number of adult birds captured was used as an index of adult population size. For our estimate of post-fledging productivity, we are now using "reproductive index" (number of young divided by number of adults) as opposed to "proportion of young in the catch" previously used. Reproductive index is a more intuitive value for productivity, and it is also more comparable to other calculated MAPS parameters such as recruitment indices.

Survival of target species was estimated using Modified Cormack-Jolly-Seber (CJS) mark-recapture analyses (Pollock et al.1990, Lebreton et al.1992) on 12 years (1994-2006) of capture histories of adult birds from the six stations at each location. Target species were those for which, on average, at least 2.5 individual adults per year and at least two between-year returns were recorded from the six stations pooled per location, at which the species was a breeder during more than half of the years the station was operated. Using the computer program TMSURVIV (White 1983, Hines et al. 2003), we calculated, for each target species, maximum-likelihood estimates and standard errors (*SE*s) for adult survival probability, adult recapture probability, and the proportion of residents among newly captured adults using a time-constant, between- and within-year transient model (Pradel et al. 1997, Nott and DeSante 2002, Hines et al. 2003). The use of the transient model accounts for the existence of transient adults (dispersing and floater individuals which are only captured once) in the sample of newly captured birds, and provides survival estimates that are unbiased with respect to these transient individuals (Pradel et al. 1997). Recapture probability is defined as the conditional probability of recapturing a bird in a subsequent year that was banded in a previous year, given that it survived and returned to the place it was originally banded.

## Results and Discussion

CAMP SWIFT

We operated six MAPS stations at Camp Swift during the summer of 2006 for a total of 2937.7 net-hours. This represents 72.5% of the maximum effort at this station. The details of the operation of these six stations are presented in Table 1.

For each individual species and for all species pooled, the numbers of individual birds newly banded, captured and released unbanded (including hummingbirds, which we do not band), and recaptured are presented for each station in Table 2, and for all stations combined in Table 4. A total of 518 captures of 31 species occurred at Camp Swift during the summer of 2006 (Table 4). Newly banded birds comprised 59.8% of the total captures. The greatest number of total captures (132) was recorded at the East Loop East station and the smallest number of total captures (48) was recorded at the Sandy Junction station (Table 2). The highest species richness occurred at East Loop East (18 species) and the lowest species richness occurred at Dropzone (8 species).

The capture rates (per 600 net-hours) of individual adult and young birds and the proportion of young in the catch are presented for each species and for all species pooled at each station in Table 3, and for all stations combined in Table 4. We present capture rates (captures per 600 net-hours) of adults and young in these tables so that the data can be compared among stations which, because of the vagaries of weather and accidental net damage, can differ from one another in effort expended (Table 1). Adult population size (for all species pooled) was highest at Dropzone (67.8; adults/600 net hours; Table 3), followed by East Loop East (60.9), Pipeline (49.8), East Loop West (48.5), Wine Cellar Loop (59.8) , and Sandy Junction (38.1). These values varied from last year in different directions at different stations. Overall, individual adults captured, 62.3 per 600 net hrs (Table 4), represents an 8.5% decrease form the 58.5 adults per 600 net hours captured in 2005.

**Wine Cellar Loop**
Painted Bunting
White-eyed Vireo
Northern Cardinal

**East Loop West**
White-eyed Vireo
Northern Cardinal
Carolina Wren

**Pipeline**
White-eyed Vireo
Painted Bunting
Northern Cardinal
Carolina Wren
Summer Tanager

**Dropzone**
Painted Bunting
Northern Cardinal
White-eyed Vireo

**East Loop East**
White-eyed Vireo
Painted Bunting
Northern Cardinal

**Sandy Junction**
Northern Cardinal
Painted Bunting
Summer Tanager*

* Not captured at similar rates in 2005.

Among individual species, Northern Cardinal was the most frequently captured at the six stations in 2006, followed by White-eyed Vireo, Painted Bunting, Carolina Wren, Carolina Chickadee, and Tufted Titmouse (Table 4). The most abundant breeding species, having a capture rate of at least 3.0 adults per 600 net-hours, in decreasing order, were Painted Bunting, Northern Cardinal, White-eyed Vireo, and Carolina Wren (Table 4). The most abundant breeding species at each installation, having capture rates of at least 3.0 adults/600 net-hours were as follows (Table 3):

Reproductive index (the number of young per adult captured) showed a different pattern over the six stations than adult population size, being highest at East Loop East (0.75), followed by Wine Cellar Loop, East Loop West, and Dropzone (0.33 each), Pipeline (0.27), and Sandy Junction (0.06). Except for East Loop East these represent sizeable declines in productivity from 2005. The overall Reproductive index for the six stations in 2006 was 0.37 (Table 4), a decrease over last year's index of 0.48 at Camp Swift but similar to the index of 2004 (0.37). Mean productivity for all species pooled at Camp Swift during the six years 1994-1999 was 0.294 (see DeSante et al. 2001b), indicating that productivity in both 2004-2006 may have been above average, although the replacement of the McLaughlin Creek station with Dropzone would have to be considered.

Using 13 years of data (1994-2006) from all six stations combined, estimates of adult survival and recapture probabilities were obtained for six target species breeding at Camp Swift. Maximum-likelihood estimates of annual adult survival probability, recapture probability, and proportion of residents among newly captured adults from the time-constant transient model are presented in Table 5 for these six species. Survival-rate estimates for all six species showed good precision (CVs < 22%) with a mean CV of 11.3%, an improvement over the 12.2% for the same six species using 12 years of data (1994-2005). Annual adult survival rates for these six species ranged from a low of 0.445 for Carolina Wren to a high of 0.559 for Summer Tanager, with a mean of 0.514 for the six species. This compares to a mean survival of 0.538 for the same six species after 11 year's of data had been collected, perhaps indicating poorer survival of Camp Swift species during the winter of 2005-2006. Survivorship at Camp Swift also appears to be at least comparable to that of the South-central Region as a whole (DeSante et al. 2004).

As mentioned earlier, analyses aimed at identifying and describing relationships between four demographic parameters (adult population size, population trend, number of young, and productivity) and landscape-level habitat characteristics for ten bird species of conservation concern have been completed for 13 military installations in south-central and southeastern United States, including Camp Swift (Nott et al. 2003, Nott and Michel 2005). At Camp Swift, one species, Painted Bunting, emerged as a candidate for particular management concern. Regional experts predict that post-breeding fire management practices, as opposed to the current spring or fall practices, would (given adequate winter precipitation) result in a more natural and diverse cool-season grassland and richer springtime/early summer forb community, which should benefit buntings.

An objective of the MAPS program at Camp Swift is to evaluate the effectiveness of such proposed and on-going management practices, and to modify them, according to an adaptive

management process, to reverse declining populations and maintain stable or increasing populations of target landbird species. During 2004 we made advancements toward these goals by replacing a woodland station (McLaughlin Creek), which experienced few captures of Painted Buntings, with the Dropzone station. We predicted from our species/landscape models, that the new station would have higher capture rates and high productivity in general. Moreover, this station underwent habitat management in the form of prescribed burning during the spring of 2005, which we predicted would provide high quality Painted Bunting habitat by improving the nesting and foraging quality of the Camp Swift's oak-prairie habitats and encouraging the establishment of a more natural grassland-forb community than previously existed.

In 2004 we captured 7.6 adult Painted Buntings per 600 net-hours at Dropzone, and this value increased to 20.7 in 2005 and 26.5 in 2006 (Table 3). Reproductive Index was 0.49, 0.27, and 0.33, respectively, indicating reasonable but reduced productivity from that of 2004. However, productivity of all species was down in 2006 compared with 2005, and that it increased for Painted Bunting at Dropzone may indicate increased productivity overall. This provides evidence that the species/landscape models developed through our analyses of MAPS data have substantial predictive power, and that the prescribed burn appears to have resulted in increased recruitment of this species (which, predictably, may have shown lower productivity in 2005 due to a surplus of first-time breeders).

Painted Bunting requires the right mix of forest, shrub and grassland to breed successfully which must be maintained by fire or physical means. The conservation goal is to consistently provide enough primary breeding habitat to annually support a target number of territories (dependent on installation or management zone) level of productivity consistent with that of a "source" population in which breeding individuals replace their own numbers. This requires maintaining a mosaic of habitat patches in various stages of post-fire succession such that every year there is an adequate area of primary breeding habitat. The ability to maintain an abundant "source" population might be considered an adequate performance measure by which to evaluate landbird conservation efforts and habitat management techniques.

## CAMP BOWIE

We operated six MAPS stations at Camp Bowie during the summer of 2006 for a total of 2273.0 net-hours (Table 6). This represents 67.9% of the maximum effort at this station. The details of the operation of these six stations are presented in Table 6.

For each individual species and for all species pooled, the numbers of individual birds newly banded, captured and released unbanded (including hummingbirds, which we do not band), and recaptured are presented for each station in Table 7, and for all stations combined in Table 9. A total of 355 captures of 35 species occurred at Camp Bowie during the summer of 2006 (Table 9). Newly banded birds comprised 62.5% of the total captures. The greatest number of total captures (113) was recorded at the Devil's Hill station and the smallest number of total captures (24) was recorded at the Bedrock station (Table 7). The highest species richness occurred at Mesquite Flat (19 species) and the lowest species richness occurred at Bedrock and Mockingbird Lane (10 species each).

The capture rates (per 600 net-hours) of individual adult and young birds and the proportion of young in the catch are presented for each species and for all species pooled at each station in Table 8, and for all stations combined in Table 9. We present capture rates (captures per 600 net-hours) of adults and young in these tables so that the data can be compared among stations which, because of the vagaries of weather and accidental net damage, can differ from one another in effort expended (Table 6). Adult population size (for all species pooled) was highest at Devil's Hill (102.0 adults/600 net hours; Table 8), followed by Stonehouse (75.4), Mesquite Flat (67.9), Mockingbird Lane (56.8), Nighthawk (48.4), and Bedrock (22.0). These values varied from last year in different directions at different stations. Overall, individual adults captured, 62.3 per 600 net hrs (Table 9), represents an 18% increase form the 52.8 adults per 600 net hours captured in 2005.

Among individual species, Painted Bunting was the most frequently captured at the six stations in 2006, followed by Bewick's Wren, Northern Cardinal, Black-crested Titmouse, Field Sparrow, and Rufous-crowned Sparrow (Table 9). The most abundant breeding species, having a capture rate of at least 3.0 adults per 600 net-hours, in decreasing order, were Painted Bunting, Northern Cardinal, Bewick's Wren, Field Sparrow, and Summer Tanager (Table 9). The most abundant breeding species at each installation, having capture rates of at least 3.0 adults/600 net-hours were as follows (Table 8):

**Mesquite Flat**
Painted Bunting
Red-winged Blackbird*
Bewick's Wren
Eastern Bluebird
Eastern Phoebe*
Great Crested Flycatcher*
Carolina Chickadee*

**Devil's Hill**
Painted Bunting
Rufous-crowned Sparrow
Bewick's Wren
Northern Cardinal
Black-crested Titmouse
Yellow-billed Cuckoo
Summer Tanager
Field Sparrow*

**Stonehouse**
Painted Bunting
Northern Cardinal
Bewick's Wren
Field Sparrow
Rufous-crowned Sparrow*

**Nighthawk**
Northern Cardinal
Bewick's Wren
Summer Tanager
Field Sparrow
Painted Bunting
Chipping Sparrow*

**Mockingbird Lane**
Painted Bunting
Northern Cardinal
Field Sparrow
Carolina Chickadee*

**Bedrock**
Summer Tanager
Black-crested Titmouse*
Painted Bunting

* - Not captured at this rate in 2005.

Reproductive index (the number of young per adult captured) showed a different pattern over the six stations than adult population size, being highest at Mesquite Flat (0.31), followed by Nighthawk (0.18), Devil's Hill (0.17), Mockingbird Lane (0.14), Bedrock (0.13), and Stonehouse (0.12). All of these values were substantially lower those recorded in 2005. The overall reproductive index for the six stations in 2006 was 0.17 (Table 9), representing a 65.3% decrease over last year's index of 0.49 at Camp Bowie. Mean productivity for all species pooled at Camp Bowie during the six years 1994-1999 was 0.43 (see DeSante et al. 2001b), indicating that productivity was slightly above average in 2005, but substantially below average in 2006.

Using 13 years of data (1994-2006) from all six stations combined, estimates of adult survival and recapture probabilities were obtained for 14 target species breeding at Camp Bowie. Maximum-likelihood estimates of annual adult survival probability, recapture probability, and proportion of residents among newly captured adults from the time-constant transient model are presented in Table 10 for these 14 species. Survival-rate estimates for all 14 species showed good to poor precision (CVs 6-52%) with a mean of 18.8% 21.2%. The mean for these 14 species showed improvement over the mean CV for the same species using 12 years of data (21.1%). Annual adult survival rates for these 14 species ranged from a low of 0.321 for Northern Mockingbird to a high of 0.749 for Great Crested Flycatcher, with a mean of 0.495 for the six species.

As mentioned earlier, analyses aimed at identifying and describing relationships between four demographic parameters (adult population size, population trend, number of young, and productivity) and landscape-level habitat characteristics for ten bird species of conservation concern have been completed for 13 military installations in south-central and southeastern United States, including Camp Bowie (Nott et al. 2003, Nott and Michel 2005). At Camp Bowie, previous data has suggested an installation-wide decline in all breeding landbirds, including three species of management concern (Bewick's Wren, Field Sparrow, and Painted Bunting). Post-breeding fire management practices in oldfield and scrub/woodland habitats could reset succession and effect local recoveries of the three species of concern (plus the Endangered Black-capped Vireo), while exclusion of cattle grazing from key areas could also be an effective management strategy for these and other species at Camp Bowie. The restoration of wet-season riparian corridors could be another effective management strategy and will require the removal of stock ponds and re-establishment of natural watercourses at the Camp. We recommend that these management practices be undertaken at Bowie so that we can monitor their effects on landbird populations. Currently there are no plans to move existing MAPS stations, merely to monitor the changes in avifauna that will occur when the proposed management actions are implemented.

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Table 1. Summary of the 2006 MAPS program on Camp Swift.

| Station | | | | | | 2006 operation | | |
|---|---|---|---|---|---|---|---|---|
| Name | Code | No. | Major Habitat Type | Latitude-longitude | Avg Elev. (m) | Total number of net-hours[1] | No. of periods | Inclusive dates |
| Wine Cellar Loop | WCLO | 14439 | Post oak/cedar woodland, open field | 30°16'27"N,97°19'13"W | 137 | 511.7 (462.3) | 9 | 5/19 - 7/28 |
| Pipeline | PIPE | 14436 | Post oak/cedar woodland, successional oak/cedar oldfield | 30°17'00"N,97°19'42"W | 143 | 493.7 (454.8) | 9 | 5/20 - 8/01 |
| East Loop East | EALE | 14438 | Successional oldfield, oak/cedar woodland | 30°15'55"N,97°15'48"W | 152 | 502.2 (437.3) | 9 | 5/15 - 7/31 |
| East Loop West | EALW | 14437 | Open oak/cedar woodland, dense oak/cedar woodland, early-successional oldfield | 30°15'45"N,97°16'19"W | 152 | 519.2 (454.3) | 9 | 5/17 - 8/02 |
| Dropzone | DROP | 14509 | mixed grassland/post oak woodland | 30°15'12"N,97°16'24"W | 152 | 407.0 (364.7) | 9 | 5/18 - 7/30 |
| Sandy Junction | SAJU | 14440 | Post oak/cedar woodland | 30°17'09"N,97°17'23"W | 155 | 504.0 (463.5) | 9 | 5/13 - 7/29 |
| ALL STATIONS COMBINED | | | | | | 2937.7(2637.0) | 9 | 5/13 - 8/02 |

[1] Total net-hours in 2006. Net-hours in 2006 that could be compared in a constant-effort manner to 2005 are shown in parentheses.

Table 2. Capture summary for the six individual MAPS stations operated on Camp Swift in 2006.
N = Newly Banded, U = Unbanded, R = Recaptures of banded birds.

| | Wine Cellar Loop | | | Pipeline | | | East Loop East | | | East Loop West | | | Dropzone | | | Sandy Junction | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R |
| Yellow-billed Cuckoo | | | | 1 | | | 1 | | | 1 | | | | | | | | |
| Ruby-throated Hummingbird | | | | | | | | 1 | | | 1 | | | | | | | |
| Black-chinned Hummingbird | | | | | | | | 1 | | | | | | | | | | |
| Red-bellied Woodpecker | | | | | | | | | | | | | | | | 1 | | |
| Downy Woodpecker | | | | | | | | | | | | | | | | 2 | | |
| Acadian Flycatcher | | | | | | | 1 | | | | | | | | | | | |
| Traill's Flycatcher | 1 | | | 1 | | | 5 | | | | 1 | | 1 | | | 1 | | |
| Unident. Empidonax Flycat. | | 1 | | | 1 | | | 1 | | | | | | | | | | |
| Great Crested Flycatcher | | | | | | | 1 | | 1 | | | | | | | | | |
| White-eyed Vireo | 17 | 3 | 8 | 7 | 3 | 11 | 28 | 5 | 18 | 15 | 1 | 14 | 10 | | 4 | 1 | | |
| Red-eyed Vireo | | | | | | | 1 | | | 1 | | | | | | | | |
| Carolina Chickadee | 1 | | | 1 | | 1 | 4 | | | 7 | 1 | 1 | | | | | | |
| Tufted Titmouse | | | | | | | | | | | | | | | | 1 | | |
| Black-crested Titmouse | 1 | 1 | | | | | | | | | | | | | | | | 1 |
| Carolina Wren | 6 | 2 | 6 | 6 | 3 | 4 | 7 | 1 | 2 | 3 | | 3 | 4 | | 3 | 1 | | 1 |
| Blue-gray Gnatcatcher | | | | | | | 2 | | | 2 | | | 1 | | | | 1 | |
| Swainson's Thrush | | | | 2 | | | | | | 2 | | 1 | 1 | | | | | |
| Gray Catbird | | | | | | | | | | 1 | | | | | | | | |
| Northern Parula | 1 | 1 | | | | | 1 | | | | | | | | | | | |
| Pine Warbler | 1 | 1 | | 1 | | | | | | | | | | | | | | |
| Black-and-white Warbler | 2 | | | 3 | | | | | | | | | | | | | | |
| American Redstart | | | | | | | | | | 1 | | | | | | | | |
| Swainson's Warbler | | | | | | | 1 | | | | | | | | | | | |
| Mourning Warbler | | | | | | | | | | 1 | | | 1 | | | | | |
| Common Yellowthroat | | | | | | | 1 | | | | | | | | | | | |
| Hooded Warbler | 1 | | | | | | | | | | | | | | | | | |

Table 2. (cont.) Capture summary for the six individual MAPS stations operated on Camp Swift in 2006.
N = Newly Banded, U = Unbanded, R = Recaptures of banded birds.

| | Wine Cellar Loop | | | Pipeline | | | East Loop East | | | East Loop West | | | Dropzone | | | Sandy Junction | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R |
| Canada Warbler | | | | | | | | | | 1 | | | | | | | | |
| Summer Tanager | | | | 3 | 1 | | | | | | | | | | | 2 | | 3 |
| Northern Cardinal | 6 | | 6 | 7 | 1 | 8 | 14 | 3 | 10 | 14 | | 8 | 14 | | 7 | 9 | 1 | 4 |
| Indigo Bunting | | | | | | | 1 | | | 2 | | | | | | | | |
| Painted Bunting | 18 | 2 | 14 | 10 | | 7 | 12 | | 7 | | | | 22 | | 5 | 8 | 1 | 10 |
| Brown-headed Cowbird | | | | | | 1 | 2 | | | | | | | | | | | |
| ALL SPECIES POOLED | 55 | 11 | 34 | 42 | 9 | 32 | 82 | 12 | 38 | 51 | 4 | 27 | 54 | | 19 | 26 | 3 | 19 |
| Total Number of Captures | | 100 | | | 83 | | | 132 | | | 82 | | | 73 | | | 48 | |
| Number of Species | 11 | 6 | 4 | 11 | 4 | 6 | 16 | 5 | 5 | 13 | 4 | 5 | 8 | 0 | 4 | 9 | 3 | 5 |
| Total Number of Species | | 11 | | | 12 | | | 18 | | | 15 | | | 8 | | | 11 | |

Table 3. Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated on Camp Swift in 2006.

| | Wine Cellar Loop | | | Pipeline | | | East Loop East | | | East Loop West | | | Dropzone | | | Sandy Junction | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index |
| Yellow-billed Cuckoo | | | | 1.2 | 0.0 | 0.00 | 1.2 | 0.0 | 0.00 | 1.2 | 0.0 | 0.00 | | | | | | |
| Red-bellied Woodpecker | | | | | | | | | | | | | | | | 1.2 | 0.0 | 0.00 |
| Downy Woodpecker | | | | | | | | | | | | | | | | 2.4 | 0.0 | 0.00 |
| Acadian Flycatcher | | | | | | | 1.2 | 0.0 | 0.00 | | | | | | | | | |
| Great Crested Flycatcher | | | | | | | 1.2 | 0.0 | 0.00 | | | | | | | | | |
| White-eyed Vireo | 21.1 | 4.7 | 0.22 | 13.4 | 2.4 | 0.18 | 27.5 | 11.9 | 0.44 | 18.5 | 4.6 | 0.25 | 16.2 | 1.5 | 0.09 | 0.0 | 1.2 | und.[1] |
| Red-eyed Vireo | | | | | | | 0.0 | 1.2 | und.[1] | 1.2 | 0.0 | 0.00 | | | | | | |
| Carolina Chickadee | 0.0 | 1.2 | und.[1] | 0.0 | 1.2 | und.[1] | 1.2 | 3.6 | 3.00 | 2.3 | 5.8 | 2.50 | | | | | | |
| Tufted Titmouse | | | | | | | | | | | | | | | | 1.2 | 0.0 | 0.00 |
| Black-crested Titmouse | 0.0 | 1.2 | und. | | | | | | | | | | | | | 1.2 | 0.0 | 0.00 |
| Carolina Wren | 1.2 | 3.5 | 3.00 | 3.6 | 3.6 | 1.00 | 2.4 | 6.0 | 2.50 | 5.8 | 1.2 | 0.20 | 2.9 | 4.4 | 1.50 | 1.2 | 0.0 | 0.00 |
| Blue-gray Gnatcatcher | | | | | | | 2.4 | 0.0 | 0.00 | 1.2 | 1.2 | 1.00 | 0.0 | 1.5 | und.[1] | | | |
| Northern Parula | 0.0 | 1.2 | und. | | | | | | | | | | | | | | | |
| Pine Warbler | 0.0 | 1.2 | und. | 1.2 | 0.0 | 0.00 | | | | | | | | | | | | |
| Black-and-white Warbler | 2.3 | 0.0 | 0.00 | 2.4 | 1.2 | 0.50 | | | | | | | | | | | | |
| Common Yellowthroat | | | | | | | 1.2 | 0.0 | 0.00 | | | | | | | | | |
| Summer Tanager | | | | 3.6 | 0.0 | 0.00 | | | | | | | | | | 4.8 | 0.0 | 0.00 |
| Northern Cardinal | 9.4 | 3.5 | 0.38 | 10.9 | 1.2 | 0.11 | 8.4 | 15.5 | 1.86 | 16.2 | 3.5 | 0.21 | 22.1 | 5.9 | 0.27 | 13.1 | 0.0 | 0.00 |
| Indigo Bunting | | | | | | | 1.2 | 0.0 | 0.00 | 2.3 | 0.0 | 0.00 | | | | | | |
| Painted Bunting | 25.8 | 3.5 | 0.14 | 12.2 | 3.6 | 0.30 | 10.8 | 7.2 | 0.67 | | | | 26.5 | 8.8 | 0.33 | 13.1 | 1.2 | 0.09 |
| Brown-headed Cowbird | | | | 1.2 | 0.0 | 0.00 | 2.4 | 0.0 | 0.00 | | | | | | | | | |

Table 3. (cont.) Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated on Camp Swift in 2006.

| | Wine Cellar Loop | | | Pipeline | | | East Loop East | | | East Loop West | | | Dropzone | | | Sandy Junction | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index |
| ALL SPECIES POOLED | 59.8 | 19.9 | 0.33 | 49.8 | 13.4 | 0.27 | 60.9 | 45.4 | 0.75 | 48.5 | 16.2 | 0.33 | 67.8 | 22.1 | 0.33 | 38.1 | 2.4 | 0.06 |
| Number of Species | 5 | 8 | | 9 | 6 | | 12 | 6 | | 8 | 5 | | 4 | 5 | | 8 | 2 | |
| Total Number of Species | | 9 | | | 10 | | | 13 | | | 8 | | | 5 | | | 9 | |

[1] Reproductive index (young/adult) is undefined because no adults of this species were captured at this station in this year.

Table 4. Summary of results for all six Camp Swift MAPS stations combined in 2006.

| Species | Birds captured | | | Birds/600 nethours | | Reprod. Index |
|---|---|---|---|---|---|---|
| | Newly banded | Un-banded | Recap-tured | Adults | Young | |
| Yellow-billed Cuckoo | 3 | | | 0.6 | 0.0 | 0.00 |
| Ruby-throated Hummingbird | | 2 | | | | |
| Black-chinned Hummingbird | | 1 | | | | |
| Red-bellied Woodpecker | 1 | | | 0.2 | 0.0 | 0.00 |
| Downy Woodpecker | 2 | | | 0.4 | 0.0 | 0.00 |
| Acadian Flycatcher | 1 | | | 0.2 | 0.0 | 0.00 |
| Traill's Flycatcher | 9 | 1 | | | | |
| Unidentified Empidonax Flyc. | | 3 | | | | |
| Great Crested Flycatcher | 1 | | 1 | 0.2 | 0.0 | 0.00 |
| White-eyed Vireo | 78 | 12 | 55 | 15.9 | 4.5 | 0.28 |
| Red-eyed Vireo | 2 | | | 0.2 | 0.2 | 1.00 |
| Carolina Chickadee | 13 | 1 | 2 | 0.6 | 2.0 | 3.33 |
| Tufted Titmouse | 1 | | | 0.2 | 0.0 | 0.00 |
| Black-crested Titmouse | 1 | 1 | 1 | 0.2 | 0.2 | 1.00 |
| Carolina Wren | 27 | 6 | 19 | 2.9 | 3.1 | 1.07 |
| Blue-gray Gnatcatcher | 5 | 1 | | 0.6 | 0.4 | 0.67 |
| Swainson's Thrush | 5 | | 1 | | | |
| Gray Catbird | 1 | | | | | |
| Northern Parula | 2 | 1 | | 0.0 | 0.2 | und.[1] |
| Pine Warbler | 2 | 1 | | 0.2 | 0.2 | 1.00 |
| Black-and-white Warbler | 5 | | | 0.8 | 0.2 | 0.25 |
| American Redstart | 1 | | | | | |
| Swainson's Warbler | 1 | | | | | |
| Mourning Warbler | 2 | | | | | |
| Common Yellowthroat | 1 | | | 0.2 | 0.0 | 0.00 |
| Hooded Warbler | 1 | | | | | |
| Canada Warbler | 1 | | | | | |
| Summer Tanager | 5 | 1 | 3 | 1.4 | 0.0 | 0.00 |
| Northern Cardinal | 64 | 5 | 43 | 13.1 | 4.7 | 0.36 |
| Indigo Bunting | 3 | | | 0.6 | 0.0 | 0.00 |
| Painted Bunting | 70 | 3 | 43 | 14.3 | 3.9 | 0.27 |
| Brown-headed Cowbird | 2 | | 1 | 0.6 | 0.0 | 0.00 |

Table 4. (cont.) Summary of results for all six Camp Swift MAPS stations combined in 2006.

| Species | Birds captured: Newly banded | Birds captured: Un-banded | Birds captured: Recap-tured | Birds/600 nethours: Adults | Birds/600 nethours: Young | Reprod. Index |
|---|---|---|---|---|---|---|
| ALL SPECIES POOLED | 310 | 39 | 169 | 53.5 | 19.6 | 0.37 |
| Total Number of Captures | | 518 | | | | |
| Number of Species | 29 | 13 | 10 | 20 | 11 | |
| Total Number of Species | | 31 | | | 21 | |

[1] Reproductive index (young/adult) is undefined because no adults of this species were captured at this location in this year.

Table 5. Estimates of adult annual survival and recapture probabilities and proportion of residents among newly captured adults using a time-constant model for six species breeding at MAPS stations on Camp Swift* obtained from 13 years (1994-2006) of mark-recapture data.

| Species | Num. sta2.[1] | Num. ind.[2] | Num. caps.[3] | Num. ret.[4] | Survival probability[5] | Surv. C.V.[6] | Recapture probability[7] | Proportion of residents[8] |
|---|---|---|---|---|---|---|---|---|
| White-eyed Vireo | 3 | 632 | 1093 | 163 | 0.557 (0.031) | 5.5 | 0.429 (0.042) | 0.426 (0.062) |
| Tufted Titmouse † | 3 | 78 | 107 | 14 | 0.499 (0.106) | 21.2 | 0.195 (0.101) | 1.000 (0.535) |
| Carolina Wren | 3 | 276 | 436 | 44 | 0.445 (0.058) | 13.1 | 0.343 (0.078) | 0.511 (0.142) |
| Summer Tanager | 3 | 77 | 97 | 13 | 0.559 (0.096) | 17.2 | 0.219 (0.087) | 0.206 (0.208) |
| Northern Cardinal | 3 | 757 | 1227 | 235 | 0.554 (0.024) | 4.3 | 0.345 (0.030) | 0.665 (0.085) |
| Painted Bunting | 3 | 524 | 820 | 135 | 0.471 (0.032) | 6.9 | 0.471 (0.050) | 0.427 (0.083) |

[1] Number of stations where the species was a regular or usual breeder and at which adults of the species were captured. Stations within one km of each other were combined into a single super-station to prevent individuals whose home ranges included portions of two or more stations from being counted as multiple individuals.
[2] Number of adult individuals captured at stations where the species was a regular or usual breeder (i.e., number of capture histories).
[3] Total number of captures of adult birds of the species at stations where the species was a regular or usual breeder.
[4] Total number of returns. A return is the first recapture in a given year of a bird originally banded at the same station in a previous year.
[5] Survival probability ($\varphi$) presented as the maximum likelihood estimate (standard error of the estimate).
[6] The coefficient of variation for survival probability, CV($\varphi$).
[7] Recapture probability (p) presented as the maximum likelihood estimate (standard error of the estimate).
[8] The proportion of residents among newly captured adults ($\tau$) presented as the maximum likelihood estimate (standard error of the estimate).

† The estimate for recapture probability (and possibly survival probability as well) may be biased low because the estimate for $\tau$ was 1.000.
* Data from the Dropzone station were not included in this analysis because the station has not yet operated the minimum four years necessary for inclusion in survivorship analysis. Data from the McLaughlin Creek station (last year of operation was 2003) were included in this analysis.

Table 6. Summary of the 2006 MAPS program on Camp Bowie.

| Station | | | | | | 2006 operation | | |
|---|---|---|---|---|---|---|---|---|
| Name | Code | No. | Major Habitat Type | Latitude-longitude | Avg Elev. (m) | Total number of net-hours[1] | No. of periods | Inclusive dates |
| Mesquite Flat | MESQ | 14446 | Disturbed open mesquite savannah, open cedar/elm woodland | 31°38'59"N,98°54'31"W | 396 | 309.5 (253.8) | 8 | 5/18 - 8/02 |
| Devil's Hill | DEVI | 14447 | Live oak/post oak savannah, open mesquite savannah | 31°37'06"N,98°53'39"W | 424 | 411.7 (344.8) | 9 | 5/10 - 7/31 |
| Stonehouse | STON | 14442 | Live oak savannah, riparian areas | 31°35'41"N,98°54'27"W | 442 | 414.0 (315.2) | 9 | 5/12 - 8/02 |
| Bedrock | BEDR | 14445 | Mixed oak woodland, mesquite savannah | 31°38'37"N,98°56'10"W | 442 | 410.0 (387.8) | 8 | 5/20 - 8/01 |
| Mockingbird Lane | MOCK | 14444 | Arid oak/juniper highland | 31°36'16"N,98°55'25"W | 479 | 380.5 (339.5) | 9 | 5/13 - 7/28 |
| Nighthawk | NIGH | 14443 | Open oak woodland | 31°37'15"N,98°57'00"W | 485 | 347.3 (312.0) | 8 | 5/16 - 8/01 |
| ALL STATIONS COMBINED | | | | | | 2273.0(1953.2) | 9 | 5/10 - 8/02 |

[1] Total net-hours in 2006. Net-hours in 2006 that could be compared in a constant-effort manner to 2005 are shown in parentheses.

Table 7. Capture summary for the six individual MAPS stations operated on Camp Bowie in 2006.
N = Newly Banded, U = Unbanded, R = Recaptures of banded birds.

| Species | Mesquite Flat | | | Devil's Hill | | | Stonehouse | | | Bedrock | | | Mockingbird Lane | | | Nighthawk | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R |
| Red-shouldered Hawk | | 1 | | | | | | | | | | | | | | | | |
| Yellow-billed Cuckoo | 1 | | | 4 | | | | | | | | | 1 | | | 1 | | |
| Great Horned Owl | | | | | | | | | | | 1 | | | | | | | |
| Ruby-throated Hummingbird | | | | | | | | | | | | | | 1 | | | | |
| Black-chinned Hummingbird | | | | | 4 | | | | | | 1 | | | | | | | |
| Unidentified Hummingbird | | | | | 2 | | | | | | | | | | | | | |
| Ladder-backed Woodpecker | 2 | | | 2 | | | 2 | | 1 | | | | | | | 1 | | |
| Traill's Flycatcher | | | | | | | | | | | | | | | | 1 | | |
| Least Flycatcher | | | | | | | 1 | | | | | | | | | | | |
| Eastern Phoebe | 2 | | | | | | | | | | | | | | | | | |
| Vermilion Flycatcher | 1 | | 1 | | | | | | | | | | | | | | | |
| Ash-throated Flycatcher | | | | 1 | | | | | | | | | | | | | | |
| Great Crested Flycatcher | 2 | | | | | | | | | 1 | | | | | | | | |
| White-eyed Vireo | | | | | | | 2 | | | | | | | | | | | |
| Carolina Chickadee | 1 | | 1 | 2 | | | 1 | | | | | | 2 | | | | | |
| Black-crested Titmouse | 1 | | | 3 | | 4 | 3 | | | 4 | 1 | 3 | 5 | | 5 | 4 | | |
| Verdin | | | | 4 | | | | | | | | | | | | | | |
| Bushtit | | | | | | | | | | | | | 2 | | | | | |
| Carolina Wren | 1 | | | | | | | | | | | | | | | | | |
| Bewick's Wren | 5 | | 4 | 8 | 1 | 8 | 5 | | 6 | | | | | | | 4 | | 1 |
| Eastern Bluebird | 3 | | 2 | | | | | | | | | | | | | | | |
| Swainson's Thrush | | | | | | | | | | | | | | | | 1 | | |
| Northern Mockingbird | 1 | | | | | | | | 2 | 1 | | | | | | | 1 | |
| Nashville Warbler | 1 | | | | | | | | | | | | | | | | | |
| Black-and-white Warbler | | | | | | | | | | | | | 1 | | | | | |

Table 7. (cont.) Capture summary for the six individual MAPS stations operated on Camp Bowie in 2006.
N = Newly Banded, U = Unbanded, R = Recaptures of banded birds.

| | Mesquite Flat | | | Devil's Hill | | | Stonehouse | | | Bedrock | | | Mockingbird Lane | | | Nighthawk | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R | N | U | R |
| Yellow-breasted Chat | | | | | | | 1 | | | | | | | | | | | |
| Summer Tanager | | | | 4 | | 1 | 1 | | | 4 | | 1 | | | | 2 | | 2 |
| Rufous-crowned Sparrow | | | | 7 | | 8 | 2 | | 1 | | | | 1 | | | | | |
| Chipping Sparrow | | | | | | | | | | | | | | | | 2 | | |
| Field Sparrow | | | | 4 | | | 3 | | 1 | | | | 5 | | 1 | 3 | 1 | 2 |
| Lark Sparrow | 4 | | | 2 | | | | | 1 | 1 | | | | | | 1 | | |
| Northern Cardinal | 1 | | 1 | 2 | | 8 | 7 | 1 | 4 | 1 | | | 5 | | 2 | 6 | | 3 |
| Painted Bunting | 6 | | 5 | 14 | 1 | 18 | 11 | | 8 | 3 | | 1 | 16 | | 6 | 3 | | 1 |
| Red-winged Blackbird | 6 | 1 | | | | | | | | | | | | | | | | |
| Common Grackle | 1 | 1 | | | | | | | | | | | | | | | | |
| Brown-headed Cowbird | 1 | 1 | | 1 | | | 2 | | 1 | 1 | | | | | | | | |
| ALL SPECIES POOLED | 40 | 4 | 14 | 58 | 8 | 47 | 41 | 1 | 25 | 16 | 3 | 5 | 38 | 1 | 14 | 29 | 2 | 9 |
| Total Number of Captures | | 58 | | | 113 | | | 67 | | | 24 | | | 53 | | | 40 | |
| Number of Species | 18 | 4 | 6 | 14 | 3 | 6 | 13 | 1 | 9 | 8 | 3 | 3 | 9 | 1 | 4 | 12 | 2 | 5 |
| Total Number of Species | | 19 | | | 15 | | | 15 | | | 10 | | | 10 | | | 13 | |

Table 8. Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated on Camp Bowie in 2006.

| | Mesquite Flat | | | Devil's Hill | | | Stonehouse | | | Bedrock | | | Mockingbird Lane | | | Nighthawk | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index |
| Yellow-billed Cuckoo | 1.9 | 0.0 | 0.00 | 5.8 | 0.0 | 0.00 | | | | | | | 1.6 | 0.0 | 0.00 | 1.7 | 0.0 | 0.00 |
| Ladder-backed Woodpecker | 1.9 | 1.9 | 1.00 | 1.5 | 1.5 | 1.00 | 1.4 | 2.9 | 2.00 | | | | | | | 1.7 | 0.0 | 0.00 |
| Eastern Phoebe | 3.9 | 0.0 | 0.00 | | | | | | | | | | | | | | | |
| Vermilion Flycatcher | 1.9 | 0.0 | 0.00 | | | | | | | | | | | | | | | |
| Ash-throated Flycatcher | | | | 1.5 | 0.0 | 0.00 | | | | | | | | | | | | |
| Great Crested Flycatcher | 3.9 | 0.0 | 0.00 | | | | | | | 1.5 | 0.0 | 0.00 | | | | | | |
| White-eyed Vireo | | | | | | | 2.9 | 0.0 | 0.00 | | | | | | | | | |
| Carolina Chickadee | 3.9 | 0.0 | 0.00 | 0.0 | 2.9 | und.[1] | 1.4 | 0.0 | 0.00 | | | | 3.2 | 0.0 | 0.00 | | | |
| Black-crested Titmouse | 0.0 | 1.9 | und.[1] | 7.3 | 1.5 | 0.20 | 1.4 | 2.9 | 2.00 | 4.4 | 2.9 | 0.67 | 1.6 | 6.3 | 4.00 | 0.0 | 6.9 | und.[1] |
| Verdin | | | | 0.0 | 5.8 | und. | | | | | | | | | | | | |
| Bushtit | | | | | | | | | | | | | 1.6 | 1.6 | 1.00 | | | |
| Carolina Wren | 0.0 | 1.9 | und. | | | | | | | | | | | | | | | |
| Bewick's Wren | 5.8 | 5.8 | 1.00 | 14.6 | 1.5 | 0.10 | 13.0 | 1.4 | 0.11 | | | | | | | 6.9 | 1.7 | 0.25 |
| Eastern Bluebird | 5.8 | 1.9 | 0.33 | | | | | | | | | | | | | | | |
| Northern Mockingbird | 1.9 | 0.0 | 0.00 | | | | 1.4 | 0.0 | 0.00 | 1.5 | 0.0 | 0.00 | | | | | | |
| Yellow-breasted Chat | | | | | | | 1.4 | 0.0 | 0.00 | | | | | | | | | |
| Summer Tanager | | | | 5.8 | 0.0 | 0.00 | 1.4 | 0.0 | 0.00 | 5.9 | 0.0 | 0.00 | | | | 6.9 | 0.0 | 0.00 |
| Rufous-crowned Sparrow | | | | 16.0 | 0.0 | 0.00 | 4.3 | 0.0 | 0.00 | | | | 1.6 | 0.0 | 0.00 | | | |
| Chipping Sparrow | | | | | | | | | | | | | | | | 3.5 | 0.0 | 0.00 |
| Field Sparrow | | | | 5.8 | 0.0 | 0.00 | 5.8 | 0.0 | 0.00 | | | | 9.5 | 0.0 | 0.00 | 6.9 | 0.0 | 0.00 |
| Lark Sparrow | 1.9 | 5.8 | 3.00 | 1.5 | 1.5 | 1.00 | 1.4 | 0.0 | 0.00 | 1.5 | 0.0 | 0.00 | | | | 1.7 | 0.0 | 0.00 |

Table 8. (cont.) Numbers of adult and young individual birds captured per 600 net-hours and reproductive index (young/adult) at the six individual MAPS stations operated on Camp Bowie in 2006.

| | Mesquite Flat | | | Devil's Hill | | | Stonehouse | | | Bedrock | | | Mockingbird Lane | | | Nighthawk | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index | Ad. | Yg. | Repr. index |
| Northern Cardinal | 1.9 | 1.9 | 1.00 | 8.7 | 0.0 | 0.00 | 14.5 | 1.4 | 0.10 | 1.5 | 0.0 | 0.00 | 9.5 | 0.0 | 0.00 | 13.8 | 0.0 | 0.00 |
| Painted Bunting | 17.4 | 0.0 | 0.00 | 32.1 | 2.9 | 0.09 | 21.7 | 0.0 | 0.00 | 4.4 | 0.0 | 0.00 | 28.4 | 0.0 | 0.00 | 5.2 | 0.0 | 0.00 |
| Red-winged Blackbird | 11.6 | 0.0 | 0.00 | | | | | | | | | | | | | | | |
| Common Grackle | 1.9 | 0.0 | 0.00 | | | | | | | | | | | | | | | |
| Brown-headed Cowbird | 1.9 | 0.0 | 0.00 | 1.5 | 0.0 | 0.00 | 2.9 | 0.0 | 0.00 | 1.5 | 0.0 | 0.00 | | | | | | |
| ALL SPECIES POOLED | 67.9 | 21.3 | 0.31 | 102.0 | 17.5 | 0.17 | 75.4 | 8.7 | 0.12 | 22.0 | 2.9 | 0.13 | 56.8 | 7.9 | 0.14 | 48.4 | 8.6 | 0.18 |
| Number of Species | 15 | 7 | | 12 | 7 | | 14 | 4 | | 8 | 1 | | 8 | 2 | | 9 | 2 | |
| Total Number of Species | | 17 | | | 14 | | | 14 | | | 8 | | | 8 | | | 10 | |

[1] Reproductive index (young/adult) is undefined because no adults of this species were captured at this station in this year.

Table 9. Summary of results for all six Camp Bowie MAPS stations combined in 2006.

| Species | Birds captured | | | Birds/600 nethours | | Reprod. Index |
|---|---|---|---|---|---|---|
| | Newly banded | Un-banded | Recap-tured | Adults | Young | |
| Red-shouldered Hawk | | 1 | | | | |
| Yellow-billed Cuckoo | 7 | | | 1.8 | 0.0 | 0.00 |
| Great Horned Owl | | 1 | | | | |
| Ruby-throated Hummingbird | | 1 | | | | |
| Black-chinned Hummingbird | | 5 | | | | |
| Unidentified Hummingbird | | 2 | | | | |
| Ladder-backed Woodpecker | 7 | | 1 | 1.1 | 1.1 | 1.00 |
| Traill's Flycatcher | 1 | | | | | |
| Least Flycatcher | 1 | | | | | |
| Eastern Phoebe | 2 | | | 0.5 | 0.0 | 0.00 |
| Vermilion Flycatcher | 1 | | 1 | 0.3 | 0.0 | 0.00 |
| Ash-throated Flycatcher | 1 | | | 0.3 | 0.0 | 0.00 |
| Great Crested Flycatcher | 3 | | | 0.8 | 0.0 | 0.00 |
| White-eyed Vireo | 2 | | | 0.5 | 0.0 | 0.00 |
| Carolina Chickadee | 6 | | 1 | 1.3 | 0.5 | 0.40 |
| Black-crested Titmouse | 20 | 1 | 12 | 2.6 | 3.7 | 1.40 |
| Verdin | 4 | | | 0.0 | 1.1 | und.[1] |
| Bushtit | 2 | | | 0.3 | 0.3 | 1.00 |
| Carolina Wren | 1 | | | 0.0 | 0.3 | und. |
| Bewick's Wren | 22 | 1 | 19 | 6.9 | 1.6 | 0.23 |
| Eastern Bluebird | 3 | | 2 | 0.8 | 0.3 | 0.33 |
| Swainson's Thrush | 1 | | | | | |
| Northern Mockingbird | 2 | 1 | 2 | 0.8 | 0.0 | 0.00 |
| Nashville Warbler | 1 | | | | | |
| Black-and-white Warbler | 1 | | | | | |
| Yellow-breasted Chat | 1 | | | 0.3 | 0.0 | 0.00 |
| Summer Tanager | 11 | | 4 | 3.4 | 0.0 | 0.00 |
| Rufous-crowned Sparrow | 10 | | 9 | 4.0 | 0.0 | 0.00 |
| Chipping Sparrow | 2 | | | 0.5 | 0.0 | 0.00 |
| Field Sparrow | 15 | 1 | 4 | 4.8 | 0.0 | 0.00 |
| Lark Sparrow | 8 | | 1 | 1.3 | 1.1 | 0.80 |
| Northern Cardinal | 22 | 1 | 18 | 8.4 | 0.5 | 0.06 |
| Painted Bunting | 53 | 1 | 39 | 18.5 | 0.5 | 0.03 |
| Red-winged Blackbird | 6 | 1 | | 1.6 | 0.0 | 0.00 |

Table 9. (cont.) Summary of results for all six Camp Bowie MAPS stations combined in 2006.

| Species | Birds captured: Newly banded | Birds captured: Un-banded | Birds captured: Recap-tured | Birds/600 nethours: Adults | Birds/600 nethours: Young | Reprod. Index |
|---|---|---|---|---|---|---|
| Common Grackle | 1 | 1 | | 0.3 | 0.0 | 0.00 |
| Brown-headed Cowbird | 5 | 1 | 1 | 1.3 | 0.0 | 0.00 |
| ALL SPECIES POOLED | 222 | 19 | 114 | 62.3 | 10.8 | 0.17 |
| Total Number of Captures | | 355 | | | | |
| Number of Species | 31 | 13 | 14 | 24 | 11 | |
| Total Number of Species | | 35 | | | 26 | |

[1] Reproductive index (young/adult) is undefined because no adults of this species were captured at this location in this year.

Table 10. Estimates of adult annual survival and recapture probabilities and proportion of residents among newly captured adults using a time-constant model for 14 species breeding at MAPS stations on Camp Bowie obtained from 13 years (1994-2006) of mark-recapture data.

| Species | Num. sta2.[1] | Num. ind.[2] | Num. caps.[3] | Num. ret.[4] | Survival probability[5] | Surv. C.V.[6] | Recapture probability[7] | Proportion of residents[8] |
|---|---|---|---|---|---|---|---|---|
| Yellow-billed Cuckoo | 6 | 182 | 211 | 13 | 0.412 (0.106) | 25.7 | 0.292 (0.138) | 0.305 (0.163) |
| Ladder-backed Woodpecker † | 5 | 55 | 85 | 22 | 0.555 (0.077) | 14.0 | 0.377 (0.102) | 1.000 (0.428) |
| Great Crested Flycatcher ‡ | 2 | 29 | 34 | 4 | 0.749 (0.197) | 26.3 | 0.158 (0.141) | 0.404 (0.419) |
| Carolina Chickadee ‡ | 6 | 100 | 114 | 5 | 0.340 (0.176) | 51.8 | 0.117 (0.133) | 0.873 (0.948) |
| Black-crested Titmouse | 6 | 218 | 306 | 42 | 0.530 (0.061) | 11.4 | 0.212 (0.058) | 0.875 (0.259) |
| Bewick's Wren | 6 | 306 | 443 | 52 | 0.350 (0.048) | 13.7 | 0.638 (0.100) | 0.361 (0.097) |
| Northern Mockingbird | 6 | 231 | 291 | 16 | 0.321 (0.090) | 28.1 | 0.239 (0.112) | 0.483 (0.232) |
| Summer Tanager | 5 | 124 | 173 | 27 | 0.549 (0.073) | 13.4 | 0.298 (0.079) | 0.443 (0.204) |
| Rufous-crowned Sparrow | 3 | 97 | 157 | 20 | 0.462 (0.084) | 18.2 | 0.374 (0.115) | 0.345 (0.244) |
| Field Sparrow | 5 | 165 | 224 | 28 | 0.502 (0.073) | 14.6 | 0.261 (0.074) | 0.528 (0.215) |
| Lark Sparrow ‡ | 4 | 63 | 69 | 4 | 0.582 (0.189) | 32.5 | 0.058 (0.051) | 0.735 (0.825) |
| Northern Cardinal | 6 | 364 | 594 | 101 | 0.512 (0.037) | 7.2 | 0.387 (0.050) | 0.503 (0.117) |
| Painted Bunting | 6 | 492 | 745 | 122 | 0.577 (0.035) | 6.0 | 0.358 (0.042) | 0.348 (0.075) |
| Brown-headed Cowbird † | 6 | 122 | 184 | 24 | 0.486 (0.077) | 15.8 | 0.226 (0.078) | 1.000 (0.373) |

[1] Number of stations where the species was a regular or usual breeder and at which adults of the species were captured. Stations within one km of each other were combined into a single super-station to prevent individuals whose home ranges included portions of two or more stations from being counted as multiple individuals.
[2] Number of adult individuals captured at stations where the species was a regular or usual breeder (i.e., number of capture histories).
[3] Total number of captures of adult birds of the species at stations where the species was a regular or usual breeder.
[4] Total number of returns. A return is the first recapture in a given year of a bird originally banded at the same station in a previous year.
[5] Survival probability ($\varphi$) presented as the maximum likelihood estimate (standard error of the estimate).
[6] The coefficient of variation for survival probability, CV($\varphi$).
[7] Recapture probability (p) presented as the maximum likelihood estimate (standard error of the estimate).
[8] The proportion of residents among newly captured adults ($\tau$) presented as the maximum likelihood estimate (standard error of the estimate).

‡ The estimate for survival probability should be viewed with caution because it is based on fewer than five between-year recaptures, or the estimate is very imprecise (SE($\varphi$)>0.200 or CV($\varphi$)>50.0%).
† The estimate for recapture probability (and possibly survival probability as well) may be biased low because the estimate for $\tau$ was 1.000.

Appendix I. Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha codes, and species names for all species banded or encountered during the 13 years, 1994-2006, of the MAPS Program on the seven stations ever operated on **Camp Swift.**

Cumulative breeding status for all years in which each station was operated are also included (B = Regular Breeder (all years); **U =** Usual Breeder (>½, not all, years); **O** = Occasional Breeder (≤½ years); **T** = Transient; **M** = Migrant; **A=** Altitudinal Disperser; **?** = Uncertain Species ID

| NUMB | SPEC | SPECIES NAME | Wine Cellar Loop (WCLO) | Pipeline (PIPE) | East Loop East (EALE) | East Loop West (EALW) | Dropzone (DROP) | Sandy Junction (SAJU) | McLaughlin Creek (MCCR) |
|---|---|---|---|---|---|---|---|---|---|
| 01010 | GBHE | Great Blue Heron | T | T | T | T | T | T | T |
| 01040 | GREG | Great Egret | | | T | T | T | | |
| 01080 | SNEG | Snowy Egret | | | | T | | | T |
| 01090 | LBHE | Little Blue Heron | T | | | T | T | | |
| 01120 | CAEG | Cattle Egret | T | O | T | T | T | T | T |
| 01130 | GRHE | Green Heron | | | T | T | | | |
| 01280 | WOST | Wood Stork | M | | | | | | |
| 01290 | BLVU | Black Vulture | T | O | O | O | T | | T |
| 01300 | TUVU | Turkey Vulture | O | U | U | U | B | T | O |
| 01360 | BBWD | Black-bellied Whistling-Duck | | | T | T | T | | |
| 01570 | WODU | Wood Duck | | O | | | | | |
| 01630 | MALL | Mallard | | | | | M | | |
| 02070 | WTKI | White-tailed Kite | | | O | O | | | T |
| 02110 | MIKI | Mississippi Kite | | | M | | | | |
| 02380 | RSHA | Red-shouldered Hawk | U | B | U | U | U | U | U |
| 02400 | BWHA | Broad-winged Hawk | | M | | M | | | |
| 02420 | SWHA | Swainson's Hawk | | | T | T | T | | |
| 02430 | WTHA | White-tailed Hawk | | | | | | | T |
| 02460 | RTHA | Red-tailed Hawk | O | T | T | T | | T | T |
| 02545 | UNHA | Unidentified Hawk | | ? | | | | | |
| 02590 | CRCA | Crested Caracara | | T | | T | | T | |
| 02630 | AMKE | American Kestrel | | T | | | | | |
| 03040 | WITU | Wild Turkey | | T | | | | | T |
| 03780 | KILL | Killdeer | T | | | | | | |
| 05540 | WWDO | White-winged Dove | | | | | T | | |
| 05570 | MODO | Mourning Dove | B | B | U | B | B | B | B |
| 05600 | INDO | Inca Dove | | | T | T | T | | |
| 05610 | COGD | Common Ground-Dove | U | B | U | U | B | U | U |
| 06400 | BBCU | Black-billed Cuckoo | | | M | M | | | |
| 06410 | YBCU | Yellow-billed Cuckoo | B | B | U | U | B | B | B |
| 06580 | GRRO | Greater Roadrunner | T | T | T | T | | O | T |

Appendix I. (cont.)

| NUMB | SPEC | SPECIES NAME | WCLO | PIPE | EALE | EALW | DROP | SAJU | MCCR |
|---|---|---|---|---|---|---|---|---|---|
| 06680 | EASO | Eastern Screech-Owl | | | | T | | | O |
| 06800 | GHOW | Great Horned Owl | O | T | | T | | T | T |
| 06950 | BADO | Barred Owl | O | T | T | | | U | O |
| 07055 | UNOW | Unidentified Owl | | | | | ? | | |
| 07080 | CONI | Common Nighthawk | O | | T | T | | T | T |
| 07170 | CWWI | Chuck-will's-widow | O | U | O | O | O | O | O |
| 07400 | CHSW | Chimney Swift | T | T | T | T | T | T | |
| 08630 | RTHU | Ruby-throated Hummingbird | T | O | T | T | T | T | O |
| 08640 | BCHU | Black-chinned Hummingbird | T | T | T | T | | T | T |
| 08775 | UNHU | Unidentified Hummingbird | ? | ? | ? | ? | ? | ? | ? |
| 09540 | GFWO | Golden-fronted Woodpecker | | | | | | | T |
| 09550 | RBWO | Red-bellied Woodpecker | U | U | U | U | B | O | B |
| 09630 | LBWO | Ladder-backed Woodpecker | O | | O | O | | T | |
| 09650 | DOWO | Downy Woodpecker | U | U | U | U | B | U | U |
| 09660 | HAWO | Hairy Woodpecker | | T | | | | | |
| 09800 | RSFL | Red-shafted Flicker | | | | T | | | |
| 09800 | YSFL | Yellow-shafted Flicker | | | T | T | | | |
| 09860 | PIWO | Pileated Woodpecker | U | O | O | O | B | U | U |
| 11340 | OSFL | Olive-sided Flycatcher | | | M | M | | | |
| 11390 | EAWP | Eastern Wood-Pewee | T | T | | T | | | T |
| 11450 | YBFL | Yellow-bellied Flycatcher | M | M | M | M | | M | M |
| 11460 | ACFL | Acadian Flycatcher | T | T | T | T | | T | O |
| 11475 | TRFL | Traill's Flycatcher | M | M | M | M | M | M | M |
| 11500 | LEFL | Least Flycatcher | M | M | M | M | | M | M |
| 11555 | COFL | Cordilleran Flycatcher | M | | M | M | | | |
| 11555 | WEFL | Western Flycatcher | M | | M | M | | | |
| 11595 | UEFL | Unidentified Empidonax Flycatcher | ? | ? | ? | ? | ? | ? | |
| 11610 | EAPH | Eastern Phoebe | T | | | T | T | | |
| 11760 | GCFL | Great Crested Flycatcher | T | T | T | T | T | T | T |
| 12020 | WEKI | Western Kingbird | | | T | T | T | | |
| 12030 | EAKI | Eastern Kingbird | | | M | M | | | |
| 12070 | STFL | Scissor-tailed Flycatcher | T | T | O | O | | | |
| 12085 | UNFL | Unidentified Flycatcher | | | ? | ? | | | ? |
| 12550 | WEVI | White-eyed Vireo | B | B | B | B | B | B | B |
| 12690 | YTVI | Yellow-throated Vireo | | | | | | | T |
| 12790 | REVI | Red-eyed Vireo | O | O | O | T | T | O | B |
| 12930 | BLJA | Blue Jay | O | O | O | T | T | O | T |
| 13190 | AMCR | American Crow | B | U | B | B | B | B | B |
| 13300 | CORA | Common Raven | | | T | T | | | |
| 13340 | PUMA | Purple Martin | O | O | O | O | T | T | T |

Appendix I. (cont.)

| NUMB | SPEC | SPECIES NAME | WCLO | PIPE | EALE | EALW | DROP | SAJU | MCCR |
|---|---|---|---|---|---|---|---|---|---|
| 13410 | TRES | Tree Swallow | T | | | | | T | |
| 13490 | NRWS | Northern Rough-winged Swallow | T | | T | | | | |
| 13520 | CLSW | Cliff Swallow | T | T | | T | T | T | |
| 13540 | BARS | Barn Swallow | T | T | T | | T | T | |
| 13560 | CACH | Carolina Chickadee | B | B | U | U | B | B | B |
| 13660 | TUTI | Tufted Titmouse | B | B | U | U | B | B | B |
| 13661 | BCTI | Black-crested Titmouse | T | | | | | T | |
| 13700 | WBNU | White-breasted Nuthatch | | | | | | T | |
| 14000 | CARW | Carolina Wren | B | B | B | B | B | B | B |
| 14040 | BEWR | Bewick's Wren | | | T | | | | |
| 14350 | BGGN | Blue-gray Gnatcatcher | B | U | O | O | B | U | O |
| 14790 | GCTH | Gray-cheeked Thrush | M | | | M | | | |
| 14795 | GCBT | Gray-cheeked/Bicknell's Thrush | M | | | M | | | |
| 14810 | SWTH | Swainson's Thrush | M | M | M | M | M | M | M |
| 14830 | WOTH | Wood Thrush | | | | | | M | M |
| 15130 | GRCA | Gray Catbird | M | M | M | M | | M | M |
| 15150 | NOMO | Northern Mockingbird | T | T | T | T | T | T | |
| 15550 | CEDW | Cedar Waxwing | M | | | | | | |
| 15670 | NAWA | Nashville Warbler | | | | | | | M |
| 15730 | NOPA | Northern Parula | T | T | T | O | T | T | O |
| 15750 | YWAR | Yellow Warbler | | | M | | | | M |
| 15760 | CSWA | Chestnut-sided Warbler | | | M | | | | |
| 15770 | MAWA | Magnolia Warbler | M | | | M | | | M |
| 15790 | BTBW | Black-throated Blue Warbler | | | | | | M | |
| 15820 | GCWA | Golden-cheeked Warbler | | M | | | | | |
| 15830 | BTNW | Black-throated Green Warbler | M | M | | | | M | M |
| 15860 | BLBW | Blackburnian Warbler | M | | | | | | |
| 15910 | PIWA | Pine Warbler | B | U | O | T | U | O | O |
| 15930 | PRAW | Prairie Warbler | | | M | | | | |
| 16030 | BAWW | Black-and-white Warbler | O | U | O | O | T | O | O |
| 16040 | AMRE | American Redstart | M | M | M | M | | | M |
| 16070 | SWWA | Swainson's Warbler | | | M | M | | | M |
| 16080 | OVEN | Ovenbird | M | M | M | M | | | M |
| 16110 | KEWA | Kentucky Warbler | T | | | | | | O |
| 16130 | MOWA | Mourning Warbler | M | | M | M | M | | M |
| 16140 | MGWA | MacGillivray's Warbler | | | | | M | | |
| 16150 | COYE | Common Yellowthroat | T | | T | T | T | | T |
| 16280 | HOWA | Hooded Warbler | M | M | | M | | | |
| 16290 | WIWA | Wilson's Warbler | | M | M | | | | |
| 16300 | CAWA | Canada Warbler | M | M | M | M | | | |

Appendix I. (cont.)

| NUMB | SPEC | SPECIES NAME | WCLO | PIPE | EALE | EALW | DROP | SAJU | MCCR |
|---|---|---|---|---|---|---|---|---|---|
| 16460 | YBCH | Yellow-breasted Chat | | T | T | T | | T | |
| 16495 | UNWA | Unidentified Warbler | ? | | ? | | | | |
| 16820 | SUTA | Summer Tanager | B | U | U | U | B | B | U |
| 16830 | SCTA | Scarlet Tanager | | | M | | | M | |
| 18020 | CHSP | Chipping Sparrow | | | | | | | T |
| 18050 | FISP | Field Sparrow | | | T | | | | |
| 18560 | NOCA | Northern Cardinal | B | B | B | B | B | B | B |
| 18600 | RBGR | Rose-breasted Grosbeak | | | M | M | | | |
| 18640 | BLGR | Blue Grosbeak | | T | T | T | | | |
| 18670 | INBU | Indigo Bunting | T | O | O | O | | | O |
| 18700 | PABU | Painted Bunting | B | B | B | B | B | B | B |
| 18710 | DICK | Dickcissel | T | | T | T | | | |
| 18730 | RWBL | Red-winged Blackbird | | | T | T | | | |
| 18800 | EAME | Eastern Meadowlark | | | T | T | | | |
| 18870 | COGR | Common Grackle | T | T | T | O | T | | |
| 18890 | GTGR | Great-tailed Grackle | | T | T | | | | |
| 18960 | BHCO | Brown-headed Cowbird | U | B | U | U | B | U | U |
| 19040 | OROR | Orchard Oriole | | T | | | | | |
| 19160 | BAOR | Baltimore Oriole | | | | | | M | |
| 19380 | RECR | Red Crossbill | M | | | | | | |
| 19490 | LEGO | Lesser Goldfinch | | | | T | | | |

Appendix II. Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha codes, and species names for all species banded or encountered during the 13 years, 1994-2006, of the MAPS Program on the six stations ever operated on **Camp Bowie.**

Cumulative breeding status for all years in which each station was operated are also included (B = Regular Breeder (all years); **U =** Usual Breeder (>½, not all, years); **O** = Occasional Breeder (≤½ years); **T** = Transient; **M** = Migrant; **A=** Altitudinal Disperser; **?** = Uncertain Species ID

| NUMB | SPEC | SPECIES NAME | Mesquite Flat (MESQ) | Devil's Hill (DEVI) | Stonehouse (STON) | Bedrock (BEDR) | Mockingbird Lane (MOCK) | Nighthawk (NIGH) |
|---|---|---|---|---|---|---|---|---|
| 01010 | GBHE | Great Blue Heron | O | T | T | T | T | T |
| 01040 | GREG | Great Egret | | | | T | | |
| 01090 | LBHE | Little Blue Heron | | | | | | T |
| 01120 | CAEG | Cattle Egret | | | | | | T |
| 01130 | GRHE | Green Heron | T | T | T | T | T | |
| 01290 | BLVU | Black Vulture | U | O | O | O | O | O |
| 01300 | TUVU | Turkey Vulture | U | U | B | U | B | U |
| 01360 | BBWD | Black-bellied Whistling-Duck | M | M | M | | M | M |
| 01380 | FUWD | Fulvous Whistling-Duck | T | | | | | |
| 01570 | WODU | Wood Duck | T | | | | | |
| 02110 | MIKI | Mississippi Kite | | | | | T | O |
| 02210 | COHA | Cooper's Hawk | T | T | T | T | | T |
| 02380 | RSHA | Red-shouldered Hawk | T | | O | O | T | O |
| 02420 | SWHA | Swainson's Hawk | T | T | T | | | T |
| 02460 | RTHA | Red-tailed Hawk | T | O | O | T | T | O |
| 02545 | UNHA | Unidentified Hawk | | ? | | | | |
| 02590 | CRCA | Crested Caracara | T | | | | T | |
| 03040 | WITU | Wild Turkey | O | O | B | U | U | O |
| 03160 | NOBO | Northern Bobwhite | U | B | B | B | B | U |
| 03780 | KILL | Killdeer | B | U | O | U | T | O |
| 05370 | ROPI | Rock Pigeon | | T | | | | |
| 05540 | WWDO | White-winged Dove | T | T | | T | T | T |
| 05570 | MODO | Mourning Dove | B | B | B | B | B | B |
| 05600 | INDO | Inca Dove | | T | | | | T |
| 05610 | COGD | Common Ground-Dove | O | O | O | O | O | O |
| 06410 | YBCU | Yellow-billed Cuckoo | B | B | B | B | B | B |
| 06580 | GRRO | Greater Roadrunner | O | O | O | T | O | T |
| 06680 | EASO | Eastern Screech-Owl | | T | T | O | T | |
| 06800 | GHOW | Great Horned Owl | T | O | O | O | T | T |
| 06950 | BADO | Barred Owl | O | T | | T | | |
| 07080 | CONI | Common Nighthawk | O | U | U | B | U | B |
| 07110 | COPO | Common Poorwill | | T | T | T | T | O |

Appendix II. (cont.) Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha

| NUMB | SPEC | SPECIES NAME | MESQ | DEVI | STON | BEDR | MOCK | NIGH |
|---|---|---|---|---|---|---|---|---|
| 07170 | CWWI | Chuck-will's-widow | O | O | O | T | O | O |
| 07400 | CHSW | Chimney Swift | O | T | O | O | T | T |
| 08630 | RTHU | Ruby-throated Hummingbird | T | O | O | O | T | T |
| 08640 | BCHU | Black-chinned Hummingbird | O | U | O | U | O | O |
| 08775 | UNHU | Unidentified Hummingbird | ? | ? | ? | ? | ? | ? |
| 09110 | BEKI | Belted Kingfisher | T | O | T | O | T | T |
| 09540 | GFWO | Golden-fronted Woodpecker | U | O | O | O | | O |
| 09550 | RBWO | Red-bellied Woodpecker | O | | | T | T | |
| 09630 | LBWO | Ladder-backed Woodpecker | B | U | U | U | O | B |
| 09650 | DOWO | Downy Woodpecker | O | T | O | O | T | T |
| 09660 | HAWO | Hairy Woodpecker | | T | | | | |
| 09800 | YSFL | Yellow-shafted Flicker | | | | T | | |
| 09915 | UNWO | Unidentified Woodpecker | | ? | ? | ? | ? | |
| 11340 | OSFL | Olive-sided Flycatcher | | | M | M | | |
| 11390 | EAWP | Eastern Wood-Pewee | O | T | T | O | | T |
| 11450 | YBFL | Yellow-bellied Flycatcher | | | M | | M | M |
| 11460 | ACFL | Acadian Flycatcher | | | T | | T | |
| 11475 | TRFL | Traill's Flycatcher | M | M | | | M | M |
| 11500 | LEFL | Least Flycatcher | M | M | M | M | M | M |
| 11520 | GRFL | Gray Flycatcher | | M | | | | |
| 11595 | UEFL | Unidentified Empidonax Flycatcher | | ? | ? | ? | ? | ? |
| 11610 | EAPH | Eastern Phoebe | U | O | O | O | O | O |
| 11630 | VEFL | Vermilion Flycatcher | O | | | T | | |
| 11740 | ATFL | Ash-throated Flycatcher | O | U | O | T | T | T |
| 11760 | GCFL | Great Crested Flycatcher | B | O | O | U | T | T |
| 12020 | WEKI | Western Kingbird | O | | T | T | | O |
| 12070 | STFL | Scissor-tailed Flycatcher | U | O | O | O | U | O |
| 12085 | UNFL | Unidentified Flycatcher | | | | | ? | |
| 12520 | LOSH | Loggerhead Shrike | T | | | | | |
| 12550 | WEVI | White-eyed Vireo | T | T | O | | T | |
| 12640 | BEVI | Bell's Vireo | | O | | T | | |
| 12650 | BCVI | Black-capped Vireo | | T | | | | |
| 12760 | WAVI | Warbling Vireo | | | | M | | |
| 12790 | REVI | Red-eyed Vireo | | | | M | | M |
| 12930 | BLJA | Blue Jay | T | O | O | O | T | U |
| 13110 | WESJ | Western Scrub-Jay | | | T | | U | |
| 13190 | AMCR | American Crow | O | O | O | O | O | T |
| 13300 | CORA | Common Raven | T | T | T | T | T | T |
| 13340 | PUMA | Purple Martin | T | T | T | | T | T |

Appendix II. (cont.) Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha

| NUMB | SPEC | SPECIES NAME | MESQ | DEVI | STON | BEDR | MOCK | NIGH |
|---|---|---|---|---|---|---|---|---|
| 13490 | NRWS | Northern Rough-winged Swallow | O | O | | T | | |
| 13520 | CLSW | Cliff Swallow | | T | T | | | T |
| 13540 | BARS | Barn Swallow | T | T | T | T | T | T |
| 13560 | CACH | Carolina Chickadee | B | B | B | B | B | B |
| 13660 | TUTI | Tufted Titmouse | | | T | | | |
| 13661 | BCTI | Black-crested Titmouse | B | B | B | B | B | B |
| 13670 | VERD | Verdin | | O | T | | | |
| 13680 | BUSH | Bushtit | | O | O | T | O | O |
| 13830 | CACW | Cactus Wren | | O | O | | | |
| 13850 | CANW | Canyon Wren | | T | | | | |
| 14000 | CARW | Carolina Wren | T | O | O | U | T | T |
| 14040 | BEWR | Bewick's Wren | B | B | B | U | U | B |
| 14070 | HOWR | House Wren | | M | M | | | M |
| 14350 | BGGN | Blue-gray Gnatcatcher | O | O | U | O | O | U |
| 14560 | EABL | Eastern Bluebird | B | O | O | U | T | O |
| 14810 | SWTH | Swainson's Thrush | | M | | M | M | M |
| 14820 | HETH | Hermit Thrush | | | | M | M | |
| 15000 | AMRO | American Robin | T | | T | T | | T |
| 15150 | NOMO | Northern Mockingbird | B | B | B | U | U | B |
| 15260 | CBTH | Curve-billed Thrasher | | T | | | | |
| 15370 | EUST | European Starling | T | | | | | |
| 15550 | CEDW | Cedar Waxwing | | M | | M | | |
| 15660 | OCWA | Orange-crowned Warbler | | | M | | | |
| 15670 | NAWA | Nashville Warbler | M | | | M | | |
| 15750 | YWAR | Yellow Warbler | M | | | M | | |
| 15770 | MAWA | Magnolia Warbler | | | | | M | |
| 15830 | BTNW | Black-throated Green Warbler | | M | | | | |
| 15860 | BLBW | Blackburnian Warbler | | | | M | | |
| 16030 | BAWW | Black-and-white Warbler | M | M | M | M | M | M |
| 16080 | OVEN | Ovenbird | | M | | M | M | M |
| 16100 | LOWA | Louisiana Waterthrush | | | | M | | |
| 16130 | MOWA | Mourning Warbler | | M | M | | M | |
| 16140 | MGWA | MacGillivray's Warbler | | M | M | M | | |
| 16150 | COYE | Common Yellowthroat | T | T | | | T | T |
| 16290 | WIWA | Wilson's Warbler | | M | M | | M | |
| 16300 | CAWA | Canada Warbler | | | M | | | |
| 16460 | YBCH | Yellow-breasted Chat | T | T | T | | | |
| 16820 | SUTA | Summer Tanager | U | U | U | B | T | B |
| 16830 | SCTA | Scarlet Tanager | | | M | | | |

Appendix II. (cont.) Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha

| NUMB | SPEC | SPECIES NAME | MESQ | DEVI | STON | BEDR | MOCK | NIGH |
|---|---|---|---|---|---|---|---|---|
| 17820 | EATO | Eastern Towhee | | | M | | | |
| 17840 | CANT | Canyon Towhee | T | O | U | T | T | T |
| 17920 | CASP | Cassin's Sparrow | | T | | | | |
| 17950 | RCSP | Rufous-crowned Sparrow | T | B | U | O | O | U |
| 18020 | CHSP | Chipping Sparrow | T | O | T | T | O | B |
| 18030 | CCSP | Clay-colored Sparrow | | M | | | | |
| 18050 | FISP | Field Sparrow | U | B | B | O | B | U |
| 18090 | LASP | Lark Sparrow | O | U | U | U | O | B |
| 18100 | BTSP | Black-throated Sparrow | T | | | | | |
| 18130 | SAVS | Savannah Sparrow | | M | | | | |
| 18140 | GRSP | Grasshopper Sparrow | | T | O | | | |
| 18240 | LISP | Lincoln's Sparrow | | M | | | | |
| 18290 | WCSP | White-crowned Sparrow | | M | | | | |
| 18335 | UNSP | Unidentified Sparrow | ? | ? | | ? | ? | ? |
| 18560 | NOCA | Northern Cardinal | B | B | B | B | B | B |
| 18640 | BLGR | Blue Grosbeak | O | T | T | T | | |
| 18670 | INBU | Indigo Bunting | T | T | | | T | |
| 18700 | PABU | Painted Bunting | B | B | B | U | B | U |
| 18710 | DICK | Dickcissel | | O | O | | T | |
| 18730 | RWBL | Red-winged Blackbird | O | T | T | T | | |
| 18800 | EAME | Eastern Meadowlark | O | U | O | T | O | O |
| 18870 | COGR | Common Grackle | O | T | T | O | O | O |
| 18890 | GTGR | Great-tailed Grackle | T | T | | | T | T |
| 18960 | BHCO | Brown-headed Cowbird | B | B | B | B | B | B |
| 19105 | BUOR | Bullock's Oriole | O | T | | | | |
| 19160 | BAOR | Baltimore Oriole | T | | | | | |
| 19190 | SCOR | Scott's Oriole | | | T | | | |
| 19370 | HOFI | House Finch | T | | T | T | T | T |
| 19490 | LEGO | Lesser Goldfinch | T | T | O | O | T | T |
| 19510 | AMGO | American Goldfinch | T | | | | | |
| 19920 | HOSP | House Sparrow | T | | | | | |
| 20085 | UNBI | Unidentified Bird | | ? | ? | | | |

Appendix I. Numerical listing (in AOU checklist order) of all the species sequence numbers, species alpha codes, and species names for all species banded or encountered during the 13 years, 1994-2006, of the MAPS Program on the seven stations ever operated on **Camp Swift.**

Cumulative breeding status for all years in which each station was operated are also included (B = Regular Breeder (all years); **U =** Usual Breeder (>½, not all, years); **O** = Occasional Breeder (≤½ years); **T** = Transient; **M** = Migrant; **A=** Altitudinal Disperser; **?** = Uncertain Species ID

| NUMB | SPEC | SPECIES NAME | Wine Cellar Loop (WCLO) | Pipeline (PIPE) | East Loop East (EALE) | East Loop West (EALW) | Dropzone (DROP) | Sandy Junction (SAJU) | McLaughlin Creek (MCCR) |
|---|---|---|---|---|---|---|---|---|---|
| 01010 | GBHE | Great Blue Heron | T | T | T | T | T | T | T |
| 01040 | GREG | Great Egret | | | T | T | T | | |
| 01080 | SNEG | Snowy Egret | | | | T | | | T |
| 01090 | LBHE | Little Blue Heron | T | | | T | T | | |
| 01120 | CAEG | Cattle Egret | T | O | T | T | T | T | T |
| 01130 | GRHE | Green Heron | | | T | T | | | |
| 01280 | WOST | Wood Stork | M | | | | | | |
| 01290 | BLVU | Black Vulture | T | O | O | O | T | | T |
| 01300 | TUVU | Turkey Vulture | O | U | U | U | B | T | O |
| 01360 | BBWD | Black-bellied Whistling-Duck | | | T | T | T | | |
| 01570 | WODU | Wood Duck | | O | | | | | |
| 01630 | MALL | Mallard | | | | | M | | |
| 02070 | WTKI | White-tailed Kite | | | O | O | | | T |
| 02110 | MIKI | Mississippi Kite | | | M | | | | |
| 02380 | RSHA | Red-shouldered Hawk | U | B | U | U | U | U | U |
| 02400 | BWHA | Broad-winged Hawk | | M | | M | | | |
| 02420 | SWHA | Swainson's Hawk | | | T | T | T | | |
| 02430 | WTHA | White-tailed Hawk | | | | | | | T |
| 02460 | RTHA | Red-tailed Hawk | O | T | T | T | | T | T |
| 02545 | UNHA | Unidentified Hawk | | ? | | | | | |
| 02590 | CRCA | Crested Caracara | | T | | T | | T | |
| 02630 | AMKE | American Kestrel | | T | | | | | |
| 03040 | WITU | Wild Turkey | | T | | | | | T |
| 03780 | KILL | Killdeer | T | | | | | | |
| 05540 | WWDO | White-winged Dove | | | | | T | | |
| 05570 | MODO | Mourning Dove | B | B | U | B | B | B | B |
| 05600 | INDO | Inca Dove | | | T | T | T | | |
| 05610 | COGD | Common Ground-Dove | U | B | U | U | B | U | U |
| 06400 | BBCU | Black-billed Cuckoo | | | M | M | | | |
| 06410 | YBCU | Yellow-billed Cuckoo | B | B | U | U | B | B | B |
| 06580 | GRRO | Greater Roadrunner | T | T | T | T | | O | T |

Appendix I. (cont.)

| NUMB | SPEC | SPECIES NAME | WCLO | PIPE | EALE | EALW | DROP | SAJU | MCCR |
|---|---|---|---|---|---|---|---|---|---|
| 06680 | EASO | Eastern Screech-Owl | | | | T | | | O |
| 06800 | GHOW | Great Horned Owl | O | T | | T | | T | T |
| 06950 | BADO | Barred Owl | O | T | T | | | U | O |
| 07055 | UNOW | Unidentified Owl | | | | | ? | | |
| 07080 | CONI | Common Nighthawk | O | | T | T | | T | T |
| 07170 | CWWI | Chuck-will's-widow | O | U | O | O | O | O | O |
| 07400 | CHSW | Chimney Swift | T | T | T | T | T | T | |
| 08630 | RTHU | Ruby-throated Hummingbird | T | O | T | T | T | T | O |
| 08640 | BCHU | Black-chinned Hummingbird | T | T | T | T | | T | T |
| 08775 | UNHU | Unidentified Hummingbird | ? | ? | ? | ? | ? | ? | ? |
| 09540 | GFWO | Golden-fronted Woodpecker | | | | | | | T |
| 09550 | RBWO | Red-bellied Woodpecker | U | U | U | U | B | O | B |
| 09630 | LBWO | Ladder-backed Woodpecker | O | | O | O | | T | |
| 09650 | DOWO | Downy Woodpecker | U | U | U | U | B | U | U |
| 09660 | HAWO | Hairy Woodpecker | | T | | | | | |
| 09800 | RSFL | Red-shafted Flicker | | | | T | | | |
| 09800 | YSFL | Yellow-shafted Flicker | | | T | T | | | |
| 09860 | PIWO | Pileated Woodpecker | U | O | O | O | B | U | U |
| 11340 | OSFL | Olive-sided Flycatcher | | | M | M | | | |
| 11390 | EAWP | Eastern Wood-Pewee | T | T | | T | | | T |
| 11450 | YBFL | Yellow-bellied Flycatcher | M | M | M | M | | M | M |
| 11460 | ACFL | Acadian Flycatcher | T | T | T | T | | T | O |
| 11475 | TRFL | Traill's Flycatcher | M | M | M | M | M | M | M |
| 11500 | LEFL | Least Flycatcher | M | M | M | M | | M | M |
| 11555 | COFL | Cordilleran Flycatcher | M | | M | M | | | |
| 11555 | WEFL | Western Flycatcher | M | | M | M | | | |
| 11595 | UEFL | Unidentified Empidonax Flycatcher | ? | ? | ? | ? | ? | ? | |
| 11610 | EAPH | Eastern Phoebe | T | | | T | T | | |
| 11760 | GCFL | Great Crested Flycatcher | T | T | T | T | T | T | T |
| 12020 | WEKI | Western Kingbird | | | T | T | T | | |
| 12030 | EAKI | Eastern Kingbird | | | M | M | | | |
| 12070 | STFL | Scissor-tailed Flycatcher | T | T | O | O | | | |
| 12085 | UNFL | Unidentified Flycatcher | | | ? | ? | | | ? |
| 12550 | WEVI | White-eyed Vireo | B | B | B | B | B | B | B |
| 12690 | YTVI | Yellow-throated Vireo | | | | | | | T |
| 12790 | REVI | Red-eyed Vireo | O | O | O | T | T | O | B |
| 12930 | BLJA | Blue Jay | O | O | O | T | T | O | T |
| 13190 | AMCR | American Crow | B | U | B | B | B | B | B |
| 13300 | CORA | Common Raven | | | T | T | | | |
| 13340 | PUMA | Purple Martin | O | O | O | O | T | T | T |

Appendix I. (cont.)

| NUMB | SPEC | SPECIES NAME | WCLO | PIPE | EALE | EALW | DROP | SAJU | MCCR |
|---|---|---|---|---|---|---|---|---|---|
| 13410 | TRES | Tree Swallow | T | | | | | T | |
| 13490 | NRWS | Northern Rough-winged Swallow | T | | T | | | | |
| 13520 | CLSW | Cliff Swallow | T | T | | T | T | T | |
| 13540 | BARS | Barn Swallow | T | T | T | | T | T | |
| 13560 | CACH | Carolina Chickadee | B | B | U | U | B | B | B |
| 13660 | TUTI | Tufted Titmouse | B | B | U | U | B | B | B |
| 13661 | BCTI | Black-crested Titmouse | T | | | | | T | |
| 13700 | WBNU | White-breasted Nuthatch | | | | | | T | |
| 14000 | CARW | Carolina Wren | B | B | B | B | B | B | B |
| 14040 | BEWR | Bewick's Wren | | | T | | | | |
| 14350 | BGGN | Blue-gray Gnatcatcher | B | U | O | O | B | U | O |
| 14790 | GCTH | Gray-cheeked Thrush | M | | | M | | | |
| 14795 | GCBT | Gray-cheeked/Bicknell's Thrush | M | | | M | | | |
| 14810 | SWTH | Swainson's Thrush | M | M | M | M | M | M | M |
| 14830 | WOTH | Wood Thrush | | | | | | M | M |
| 15130 | GRCA | Gray Catbird | M | M | M | M | | M | M |
| 15150 | NOMO | Northern Mockingbird | T | T | T | T | T | T | |
| 15550 | CEDW | Cedar Waxwing | M | | | | | | |
| 15670 | NAWA | Nashville Warbler | | | | | | | M |
| 15730 | NOPA | Northern Parula | T | T | T | O | T | T | O |
| 15750 | YWAR | Yellow Warbler | | | M | | | | M |
| 15760 | CSWA | Chestnut-sided Warbler | | | M | | | | |
| 15770 | MAWA | Magnolia Warbler | M | | | M | | | M |
| 15790 | BTBW | Black-throated Blue Warbler | | | | | | M | |
| 15820 | GCWA | Golden-cheeked Warbler | | M | | | | | |
| 15830 | BTNW | Black-throated Green Warbler | M | M | | | | M | M |
| 15860 | BLBW | Blackburnian Warbler | M | | | | | | |
| 15910 | PIWA | Pine Warbler | B | U | O | T | U | O | O |
| 15930 | PRAW | Prairie Warbler | | | M | | | | |
| 16030 | BAWW | Black-and-white Warbler | O | U | O | O | T | O | O |
| 16040 | AMRE | American Redstart | M | M | M | M | | | M |
| 16070 | SWWA | Swainson's Warbler | | | M | M | | | M |
| 16080 | OVEN | Ovenbird | M | M | M | M | | | M |
| 16110 | KEWA | Kentucky Warbler | T | | | | | | O |
| 16130 | MOWA | Mourning Warbler | M | | M | M | M | | M |
| 16140 | MGWA | MacGillivray's Warbler | | | | | M | | |
| 16150 | COYE | Common Yellowthroat | T | | T | T | T | | T |
| 16280 | HOWA | Hooded Warbler | M | M | | M | | | |
| 16290 | WIWA | Wilson's Warbler | | M | M | | | | |
| 16300 | CAWA | Canada Warbler | M | M | M | M | | | |

Appendix I. (cont.)

| NUMB | SPEC | SPECIES NAME | WCLO | PIPE | EALE | EALW | DROP | SAJU | MCCR |
|---|---|---|---|---|---|---|---|---|---|
| 16460 | YBCH | Yellow-breasted Chat | | T | T | T | | T | |
| 16495 | UNWA | Unidentified Warbler | ? | | ? | | | | |
| 16820 | SUTA | Summer Tanager | B | U | U | U | B | B | U |
| 16830 | SCTA | Scarlet Tanager | | | M | | | M | |
| 18020 | CHSP | Chipping Sparrow | | | | | | | T |
| 18050 | FISP | Field Sparrow | | | T | | | | |
| 18560 | NOCA | Northern Cardinal | B | B | B | B | B | B | B |
| 18600 | RBGR | Rose-breasted Grosbeak | | | M | M | | | |
| 18640 | BLGR | Blue Grosbeak | | T | T | T | | | |
| 18670 | INBU | Indigo Bunting | T | O | O | O | | | O |
| 18700 | PABU | Painted Bunting | B | B | B | B | B | B | B |
| 18710 | DICK | Dickcissel | T | | T | T | | | |
| 18730 | RWBL | Red-winged Blackbird | | | T | T | | | |
| 18800 | EAME | Eastern Meadowlark | | | T | T | | | |
| 18870 | COGR | Common Grackle | T | T | T | O | T | | |
| 18890 | GTGR | Great-tailed Grackle | | T | T | | | | |
| 18960 | BHCO | Brown-headed Cowbird | U | B | U | U | B | U | U |
| 19040 | OROR | Orchard Oriole | | T | | | | | |
| 19160 | BAOR | Baltimore Oriole | | | | | | M | |
| 19380 | RECR | Red Crossbill | M | | | | | | |
| 19490 | LEGO | Lesser Goldfinch | | | | T | | | |