THE 2007 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 sensitive barometers 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, and during the summers of 2003-2007 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, leading to further increases in 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. Proposed burning during the winter of 2007-2008 will impact 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. Cattle grazing is now prohibited within the boundaries of Camp Bowie and extensive burns are proposed during the winter of 2007-2008 will impact Dropzone. 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; Nott et al. 2006), and documents the operation of the 12 MAPS stations on Camp Swift and Camp Bowie during the 2007 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 2007 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 2007.

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. 2007). 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 Elizabeth Clark and Tenille Johnson and the operation of stations at Bowie were carried out by Cody Leudtke and Sheng Ma. All four of these interns were trained by IBP field biologists Bernie Emmons, Raphael Hernandez, and Angelina Sanchez, and were supervised by Rafael Hernandez and Angelina Sanchez 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. 2007):

(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.

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 (1994-2007) 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 2007 for a total of 3206.7 net-hours. This represents 99.0% 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 405 captures of 24 species occurred at Camp Swift during the summer of 2007 (Table 4). Newly banded birds comprised 62.0% of the total captures. The greatest number of total captures (103) was recorded at the Wine Cellar Loop station and the smallest number of total captures (47) was recorded at the Dropzone station (Table 2). The highest species richness occurred at East Loop West (15 species) and the lowest species richness occurred at East Loop East and 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 Wine Cellar Loop (51.3 adults/600 net hours; Table 3), followed by East Loop East (36.4), Dropzone (33.8), East Loop West (32.0), Pipeline (31.5) , and Sandy Junction (28.2). These values are all lower that those recorded last year. Overall, 35.4 individual adults per 600 net hrs was captured in 2007 (Table 4), representing an 43.2% decrease from the 62.3 adults per 600 net hours captured in 2006.

Among individual species, White-eyed Vireo was the most frequently captured at the six stations in 2007, followed by Northern Cardinal, Painted Bunting, Carolina Wren, Tufted Titmouse, and Summer Tanager (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 White-eyed Vireo, Northern Cardinal, Painted Bunting, 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):

Wine Cellar Loop
White-eyed Vireo
Painted Bunting
Northern Cardinal
Summer Tanager*
Carolina Wren*

Sandy Junction
Painted Bunting
Northern Cardinal

Pipeline
White-eyed Vireo
Northern Cardinal
Painted Bunting

East Loop West
Northern Cardinal
Painted Bunting*
White-eyed Vireo
Carolina Chickadee*
Indigo Bunting*

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

Dropzone
Painted Bunting
Northern Cardinal
White-eyed Vireo

* Not captured at similar rates in 2006.

Reproductive index (the number of young per adult captured) showed a different pattern over the six stations than adult population size, being highest at Pipeline (0.77), followed by East Loop East (0.69), Wine Cellar Loop (0.63), Dropzone (0.54). Sandy Junction (0.50), and East Loop West (0.37). These all represent increases in productivity from 2006. The overall Reproductive index for the six stations in 2007 was 0.58 (Table 4), a 56.8% increase over last year's index of 0.37 at Camp Swift. 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 2006-2007 may have been above average.

Using 14 years of data (1994-2007) 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 11.6%, similar to the 11.3% for the same six species using 13 years of data (1994-2006). Annual adult survival rates for these six species ranged from a low of 0.425 for Carolina Wren to a high of 0.571 for Northern Cardinal, with a mean of 0.518 for the six species. This compares to a mean survival of 0.514 for the same six species after 13 year's of data had been collected, indicating similar survival rates for Camp Swift species during the two winters. 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, but decreased again to 11.3 in 2007 (Table 3). Reproductive Index was 0.49, 0.27, 0.33, and 0.00, respectively, indicating reduced productivity from that of 2004. Populations sizes of all breeding species were down in 2007 compared with 2006 but productivity was higher. Thus, the drop in adults captured in 2007 at Dropzone could be predicted but not the lack of productivity. Never-the-less, evidence is provided that the species/landscape models developed through our analyses of MAPS data have predictive power, and that the prescribed burn appears to have resulted in increased recruitment of this species (which, predictably, may show lower productivity due to a surplus of younger 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. We anticipate observing the response in productivity of Painted Buntings to poroposed fire and shrub clearance at Dropzone, Camp Swift. 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 2007 for a total of 2711.0 net-hours (Table 6). This represents 83.7% 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 335 captures of 27 species occurred at Camp Bowie during the summer of 2007 (Table 9). Newly banded birds comprised 60.6% of the total captures. The greatest number of total captures (77) was recorded at the Nighthawk station and the smallest number of total captures (26) was recorded at the Mesquite Flat station (Table 7). The highest species richness occurred at Devil's Hill (16 species) and the lowest species richness occurred at Mesquite Flat (9 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 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 Nighthawk (54.1 adults/600 net hours; Table 8), followed by Devil's Hill (49.1), Stonehouse (43.0), Mockingbird Lane (40.9), Mesquite Flat (22.1), and Bedrock (19.6). These values are all substantially lower than those from the 2006 season. Overall, 37.4 individual adults were captured 600 net hrs (Table 9), representing a 40% decrease from the 62.3 adults per 600 net hours captured in 2006.

Among individual species, Painted Bunting was the most frequently captured at the six stations in 2007, followed by Northern Cardinal, Black-crested Titmouse, Rufous-crowned Sparrow, and Bewick's Wren (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, 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	**Devil's Hill**	**Stonehouse**
Yellow-billed Cuckoo*	Painted Bunting	Painted Bunting
Carolina Chickadee	Bewick's Wren	Northern Cardinal
	Rufous-crowned Sparrow	
Mockingbird Lane	Northern Cardinal	**Nighthawk**
Painted Bunting		Northern Cardinal
Lark Sparrow*	**Bedrock**	Rufous-crowned Sparrow*
Northern Cardinal	Painted Bunting	Summer Tanager
	Northern Cardinal*	Painted Bunting
		Yellow-billed Cuckoo*

* - Not captured at this rate in 2006.

Reproductive index (the number of young per adult captured) showed a different pattern over the six stations than adult population size, being highest at Mockingbird Lane (0.60), followed by Nighthawk (0.48), Bedrock (0.35), Devil's Hill (0.34), Mesquite Flat (0.24), and Stonehouse (0.32). All of these values except for that at Mesquite Flat were substantially higher than those recorded in 2006. The overall reproductive index for the six stations in 2007 was 0.39 (Table 9), representing a 129% increase over last year's index of 0.17 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 below average in 2007.

Using 14 years of data (1994-2007) 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 5-74%) with a mean of 22.8%. The mean for 13 species that were comparable to those of 2006 (17.4%) showed improvement over the mean CV for the same species using 13 years of data (18.1%). Annual adult survival rates for these 14 species ranged from a low of 0.317 for Northern Mockingbird to a high of 0.656 for Painted Bunting, with a mean of 0.497 for the 14 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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